

Danone Group Optimises TOC Management and Reduces Reagent Costs

Problem

The treatment plant of a leading food products manufacturer historically depended on 1 daily laboratory sample to measure influent C/N/P loading to establish its chemical dosing regime. This snapshot result was not representative of daily fluctuations and did not offer real time control.

Solution

The installation of two BioTector analysers and a Real Time Controller Doser (RTC-DOS), specifically developed for the plant, provided real time measurement of incoming and outgoing organic loads, optimised management of the buffer tank, and automated the addition of nutrients.

Benefits

With the implementation of online analysers, the plant realised improved compliance on TOC/COD effluent values. They experienced a significant reduction in reagent consumption by 39% and saw an improvement in the quality of discharge with a reduction in overall nitrogen content of 48%.

Background

Société des Eaux de Volvic (SEV) is a Danone Group company and bottles 1,700,000,000 liters of mineral water per year. Fruit drinks account for 25% of this total. To meet product quality standards, the plant frequently cleans and flushes the systems, generating waste with high sugar and fruit content.

In 2014, the pre-treatment plant struggled to reach 45% of its nominal capacity. As a result, officials approached a consulting firm, IFB Environnement, for diagnosis of the problem and submitted a plan to achieve a target of 150% of nominal capacity within 2 years. It was not possible to achieve these goals using only laboratory measurements based on grab samples.

The plant aimed to control the operation of its treatment plant through optimisation on several levels:

- Isolating highly concentrated organic loads using online TOC measurement.
- Manage the feed rate into the biological treatment buffer tank to provide consistent inflow and control the effluent loading.
- Automate and optimise nutrient injection to ensure a continuous, optimal C, N and P ratio in the aeration tank.
- Increase the reliability and round-the-clock safety of the discharge from the system in accordance with the current discharge standards for the industrial facility.



Plant bottling lines

Solutions & Improvements

The plant and the consulting firm reached out to Hach® to develop a reliable and comprehensive solution, utilising online measurement and a real time controller. The plant executed the proposed solution in two stages.

The first stage required the installation of two BioTector analysers. Hach installed the first BioTector 7000i upstream of the treatment plant to continuously measure the concentration of organic matter in the production effluent. This on-line measurement automates the opening of a motorised valve in the event of accidental waste product overload.

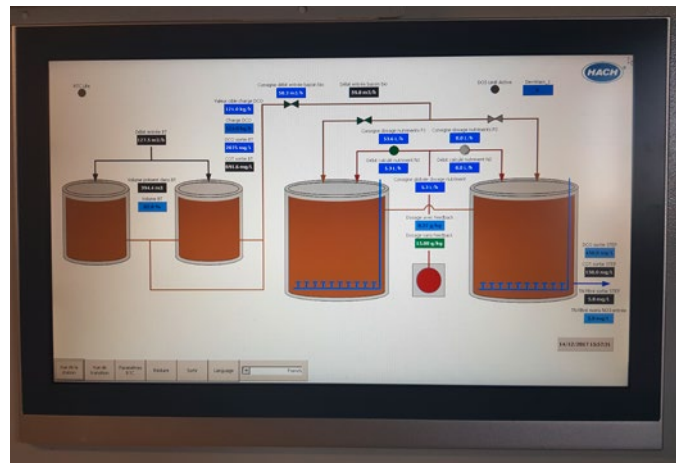
The second BioTector was installed at the treatment plant to provide total organic carbon and total nitrogen measurements (TOC/TN). This multi-stream BioTector measures input, output and other control points on-site. The sample from each stream is taken directly from the measuring containers installed near the analyser.

In the second stage, an RTC-DOS regulator, installed on an industrial touch-screen PC, provided the ability to manage buffer tanks and optimise nutrient dosing, in addition to providing online TOC measurements. The regulator calculates incoming flow rates at the biological treatment stage, in order to control the organic load and optimise use of the buffer tanks.

The RTC-DOS also calculates the nutrient injection flow rate according to the incoming organic load at the biological stage and also according to the residual concentrations of total nitrogen upon discharge.



6-stream TOC/TN Biotector B7000 Analyser



RTC regulator installed on an industrial touch-screen PC

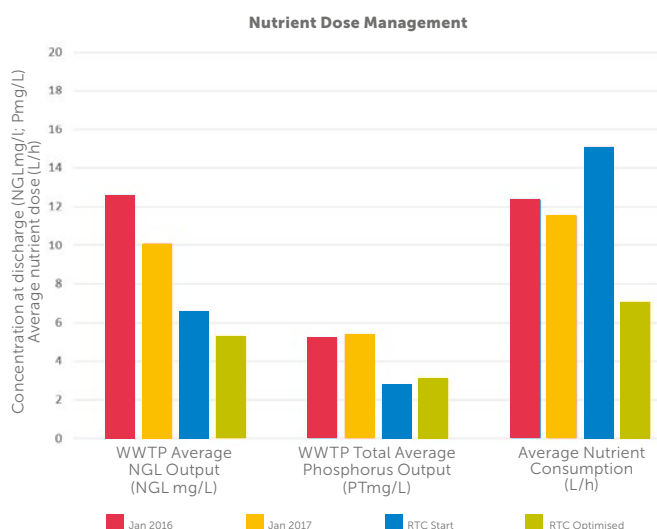


Figure 1: Development of the regulation of nutrient injections

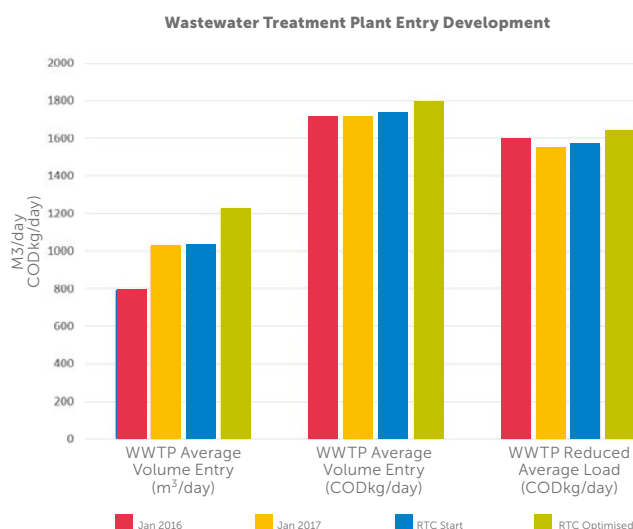


Figure 2: Operation of buffer tank management

Conclusion

In May 2017, the plant executed the two-stage solution that involved two BioTector analysers and the RTC-DOS. After several months of observation and measurement analysis to fine-tune regulation and automation, they achieved a high level of system performance and met all four goals initially set at the beginning of the process:

- Significant reduction of bypass situations in the system
- Optimised management of the buffer tank
- Reduction of reagent consumption: 39% reduction in the consumption of nutrient solution compared to the beginning of 2017
- Improvement in the quality of discharge with a 48% reduction in overall nitrogen content compared to the beginning of 2017

Summary

The installation of two BioTector analysers and the RTC-DOS combined innovative and reliable instrumentation with an overall optimised solution.

Hach supported the plant throughout the entire project with industry experts and after several months of close cooperation, a reliable and lasting solution was put in place to fully address the complex problems of the facility.

With the installation of the BioTector + RTC-DOS system, the plant has benefitted from:

- Buffer tank management optimisation
- Reduction in bypass situations in the system
- Reduction in nutrient consumption
- Increased round-the-clock reliability of discharge in compliance with the current regulations



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About the Customer

Société des Eaux de Volvic (SEV) DANONE Group France

Leading multinational food-products manufacturer

Region: Auvergne, France

Interviewees: Yves Garcon, Engineering; Sébastien Mazurek, Process Manager;

Philippe Pellegrini, WWTP and Water Resources Manager; Jean Christophe

Stucky, Consultant and Assistant Project Manager (IFB Environnement)

