

CASE STUDY: OPTIMISE CHLORINATION DOSAGE BASED ON BACTERIAL COUNTS

CONTEXT

bNovate Technologies and CSTB (The Scientific and Technical Centre for Construction), partnered in a controlled pilot to monitor chlorination using BactoSense on the closed loop system, Alpheo II. A team of multi-disciplinary experts; Industrial Researcher, Bioengineer & Biochemist oversaw the investigation.

Key Objectives

1. Compare results from Heterotrophic Plate Count (HPC) and BactoSense Online (BSO)
2. Identify (& establish) relation between Chlorination and bacterial re-growth
3. Confirm efficacy of chlorination process in bacterial count reduction

TESTING SET UP

Key Features

- **Optimized Environment:** The system maintains a high bacterial level of 10^4 - 10^5 cfu/L, ensuring challenging testing conditions.
- **Temperature Control:** Circuit temperature is set at 37°C to support bacterial growth.
- **Customizable Configurations:** Four identical stainless steel loops can operate in isolated or connected setups.
- **Biofilm Analysis:** Each loop includes a "biofilm box" with semi-cylindrical coupons to assess treatment impact on biofilm populations.
- **Nutrient Renewal:** The system renews the water volume every 24 hours to maintain optimal test conditions.
- **Automated sampling:** Hourly monitoring

AT A GLANCE

OUTCOMES

- Accurate bacterial population monitoring over time. Observing bacterial growth at 37°C
- Chlorination efficiency and bacterial dynamics - BactoSense easily capture the 4 log decrease caused by chlorination and the subsequent regrowth.
- Throughout the experiment, BactoSense measurements (ICC) related well with HPC



Figure 1 Alpheo II test setup at The Scientific and Technical Centre for Construction (CSTB), Nantes, France

OUTCOMES

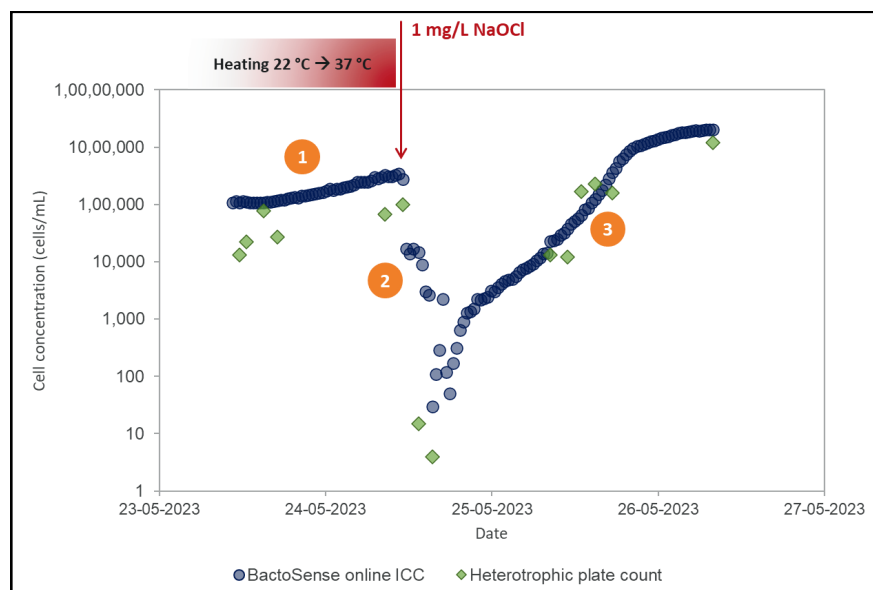


Figure 2 Results from CSTB's closed loop system. Readings from HPC and BSO are put on the same graph for comparability.

Key Findings

1. Increase in temperatures lead to increase in Intact Cell Count (108'000 at 22°C to 343'000 / mL at 37°C)
2. **Chlorination** immediately **reduced the Intact Cell Count** by > 4 orders of magnitude (343'000 in 30 / mL)
3. **Within 1.5 days** post treatment, **regrowth** in the network **led to a surge** of Intact Cell Count to > 2 mio / mL.
4. Throughout the experiment, Intact Cell Count from **BactoSense Online** **correlated well with Heterotrophic Plate Count**

“Continuous monitoring allows you to observe the effects of disinfection and subsequent regrowth as they occur. That is why BactoSense provides a significant advantage when it comes to optimizing chlorination dosage.”

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