Case Study

THORNTON
Leading Pure Water Analytics

Identify the Contamination Source

with Real-time Microbial Monitoring

As pharmaceutical and biotechnology companies strive to achieve more efficient operations and respond proactively to excursions in their production, they are increasingly adopting on-line monitoring to gain deeper insight into their processes. A manufacturer of biotechnology products used the METTLER TOLEDO 7000RMS™ Microbial Detection Analyzer to meet this objective and mitigate risks through process control.

History of bioburden concerns

A leading manufacturer of biotechnology products observed periodic bioburden excursions in its water, and was not able to consistently control the water quality. Even with daily sanitization, the manufacturer could not maintain the required water quality leading to a number of bioburden issues that impacted production.

However, the plant could not identify the cause of bioburden or the true frequency of excursions using the traditional plate counting method. With just snapshots of the process available using plate counting, they were unable to view the real-time effects of process changes or trouble-shooting steps. This led to extensive root cause investigations by plant personnel, which were ultimately unsuccessful in resolving the issue.

7000RMS provides real-time feedback for root cause analysis

The plant decided to install the 7000RMS on-line analyzer on their water loop to utilize the real-time trending capability of the instrument in the hope of determining the cause of the contamination.

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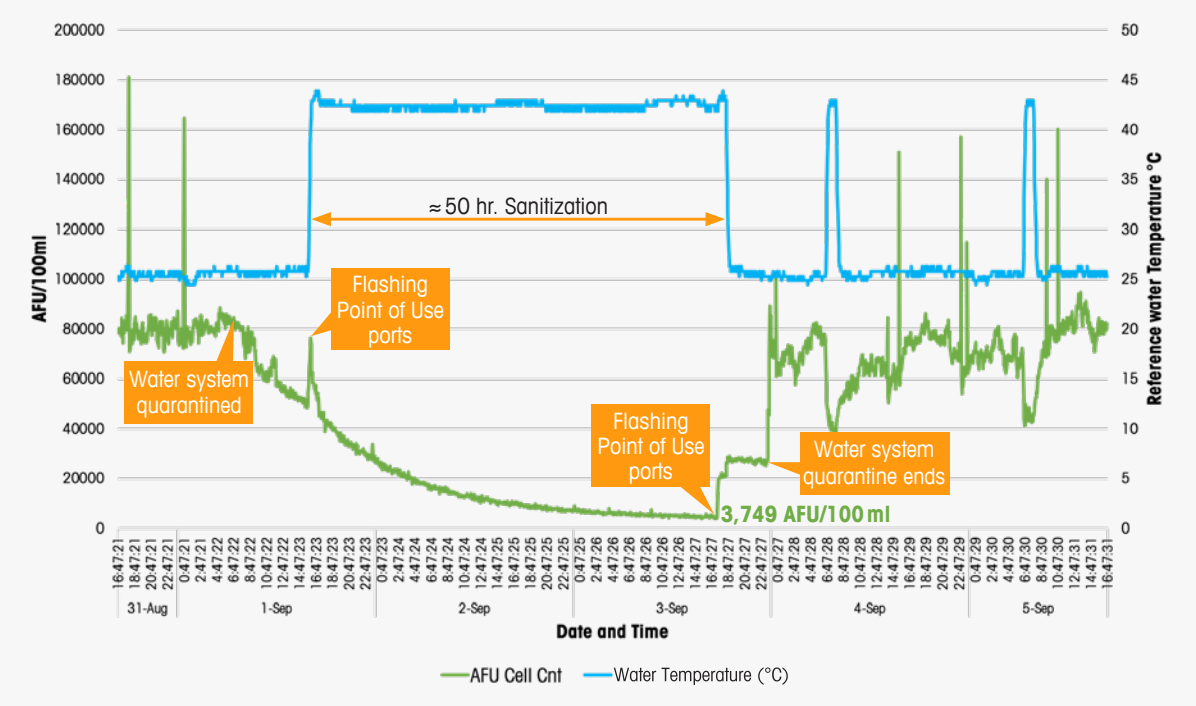

Figure 1: Real-time trend of AFU cell count reflecting the impact of troubleshooting steps.

The 7000RMS was installed on an ambient WFI loop, which was hot water sanitized daily. The WFI loop also had a UV light in place to address potential microbial contamination. On-line data for the trial was collected and showed that the Auto Fluorescent Unit (AFU—the 7000RMS' unit of measurement) levels were high and fluctuating intermittently. After collecting several weeks of data, an AFU baseline was established. The 7000RMS immediately started to indicate changes in the AFU levels during the sanitization cycle and regular WFI loop operations.

During a subsequent three-day sanitization of the loop, the on-line trending data provided by the 7000RMS illustrated its value as a process control tool. During this sanitization cycle, the 7000RMS ran continuously on the closed ambient loop with data logged every three minutes in 100 mL increments. Prior to this sanitization cycle, average AFU levels were around 120,000 AFU/100mL. AFU levels dropped steadily, eventually bottoming out at a low value of 3,749 AFU/100mL while the extended sanitization continued to polish water in the loop.

Once upstream water was allowed to enter the loop, AFU levels steadily increased back to pre-sanitization levels. Figure 1 illustrates this process trend.

These results indicated that the sanitization procedure was effective in restoring water quality in the loop. However, the water system supplying the loop contributed extensively to the bioburden, leading to very high AFU levels.

The 7000RMS provided the customer with visibility of their water loop's status, which was reporting high AFU numbers. Using plate counting, their CFU measurement was zero—well within the acceptable limit of <10 CFU/100mL. Despite passing validation, there was obviously an issue with the water system. With the 7000RMS, the customer was able to view the real-time effects of the extended sanitization and reintroduction of upstream water from their purification system. This helped them to identify the source of the problem as being the pre-treatment area of the water source—the purification plant.

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Based on the analysis provided by the 7000RMS, the plant was able to identify the source of their bioburden concerns and immediately act on the issue. The plant also recognized the value of the 7000RMS analyzer to enable faster plant startup. With real-time feedback, the plant personnel can decide when the water quality is adequate for use in their process.

Process control mitigates risk

The 7000RMS was able to measure bioburden contamination in real time as the ambient WFI loop was polished during the three-day sanitization, and then as contaminated upstream water was released into the loop. The real-time measurement capability of the analyzer allows the user to effectively control their process, minimize risk and identify root causes of bioburden issues. When used as a process control tool, the 7000RMS can pinpoint the source of contamination and proactively resolve issues that are difficult to diagnose using the plate counting method.

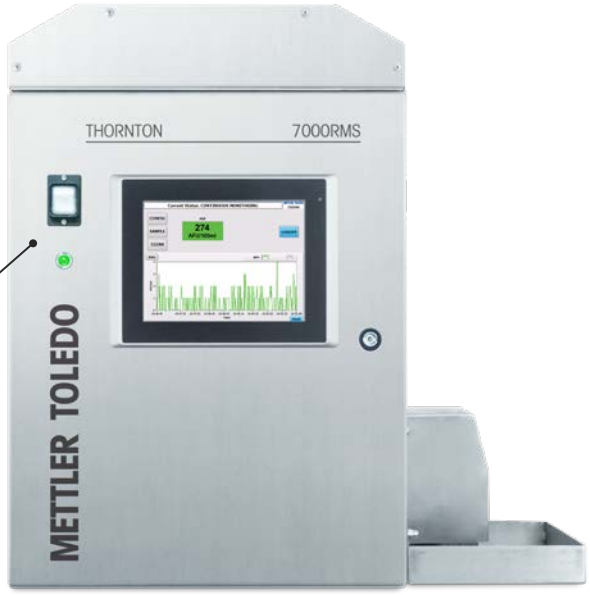
www.mt.com/7000RMS

7000RMS
Microbial Detection Analyzer

Results every two seconds – improves process control and production efficiency

Counts individual microorganisms down to 0.3 µm in size – controls product quality

Real-time monitoring eliminates waiting period for results – minimizes risk and reduces costs



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