Using a LIMS to Optimize Antimicrobial Innovations for the Textile Industry

Yihong Li, Glenner Richards and Ken Ochi*
Microban International and Accelerated Technology Laboratories*

ABSTRACT

Microban® International is a leader in antimicrobial and odor control technologies for the textile industry. Developing new products is a collaborative process that involves Microban's microbiology and analytical laboratories and their engineering labs. An essential component of this process is the use of a Laboratory Information Management System (LIMS). The LIMS is a valuable data management tool that performs many duties used to innovate and develop new products at Microban.

What You Will Learn During this Poster Presentation:

- How Microban uses a LIMS to test the efficacy and performance of the company's antimicrobial technologies.
- The role of a LIMS in optimizing creativity and innovation in creating new antimicrobial products at Microban.
- Understanding how testing data created and managed in the LIMS is used by other Microban departments to make better and faster business decisions.
- Learn how the LIMS is used in Microban's product development process from initial development to final testing.

ORGANIZATION OVERVIEW

Microban International was founded in 1984 and is the global leader in antimicrobial, odor control and disinfection/sanitation technologies. The company's mission is to redefine clean for a wide variety of products and surfaces. This includes the world of textiles such as man-made fabrics that are used to manufacture apparel, sporting goods, pet products, and many other products used in an array of environments. Microban's antimicrobial additive technologies are applied to common fabrics (polyester, rayon, cotton) during the manufacturing process.

Fabrics incorporating these antimicrobial additives protects against bacteria that can cause staining, bad odor, mold/mildew, and premature product degradation. Products using these technologies can be found in the consumer, textile, industrial and medical products industries.

Microbiology Laboratory

To develop these antimicrobial additives, Microban has advanced analytical and microbiology research and testing laboratories at its Huntersville, NC headquarters facility. These labs include microbiologists, chemists and engineers who conduct over 40,000 tests annually. The laboratories utilize state-of-the-art scientific instruments capable of performing testing using standard test methods created by industry-approved committees like AATCC, ASTM, ISO and JIS.

In addition to conducting testing during development of antimicrobial additives, the laboratories also provide a wide range of antimicrobial and odor testing services on textile product samples provided by customers.

THE ROLE OF LIMS IN THE DEVELOPMENT OF ANTIMICROBIAL TECHNOLOGIES

Microban has been developing antimicrobial technologies or additives for over 35 years and now has over 300 manufacturing partners globally. From initial concept to actual production of a new additive, Microban's R&D Team, which includes engineering and test labs, work together to create custom antimicrobial additives for each client. For example, Textiles Engineering and Test Labs (Microbiology and Analytical Chemistry laboratories) coordinate experimental sample preparation, submission, testing, and reporting processes for the successful product development. The end result is a textile product that has achieved the highest possible standard in antimicrobial and odor control performance.

To achieve these high standards, Microban has a proven product development process that consists of four phases: PLAN / DESIGN / DEVELOP / INTEGRATE. The company implemented a LIMS that would not only oversee the sample management process but also increase laboratory productivity and enhance testing efficiency. Microban evaluated several LIMS solutions and selected ATL Sample Master® LIMS based on its ability to meet the following core requirements:

- Ability to provide comprehensive sample scheduling, archiving and tracking of all samples tested in the Textiles and Microbiology laboratories.
- Interfacing the LIMS to a wide spectrum of laboratory instrumentation to improve data quality and shorten testing turnaround time.
- Using the LIMS to automate the statistical manipulation of testing results.
- Leveraging the LIMS to easily query the system and generate reporting that can be exported in a variety of required formats.
- Taking advantage of the customer relationship management functions in the LIMS to manage customer inquiries.

In Phase 1 – PLAN, the Microban Product Development Team works with the customer to develop each aspect of the project. During this phase, Microban determines how and where its antimicrobial compounds will best provide for product hygiene and cleanliness.

It is during this phase that Microban and the customer will generate all the R&D data needed to begin designing the product's unique antimicrobial solution.

In Phase 2 – DESIGN, Microban Engineering accounts for vital factors such as product-compound interactions and targeted additive loading levels to develop additive prototypes based on the research data generated in Phase 1 – PLAN.

During this phase, the Textiles Team and Test Labs utilize the LIMS to manage the high volume of testing needed to create the antimicrobial solution designed to protect the customer's product throughout its lifetime. The LIMS accomplishes this by facilitating rapid login, calculating turnaround times, maximizing productivity and profitability, generating QA/QC analysis and ensuring that regulatory and accreditation requirements are being met. Figure 1 shows a detailed Login Report for sample submission to the labs.

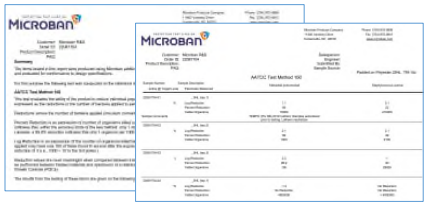
A single entry of a test request from the Textiles Team to the lab contains a large amount of information that will be retained in perpetuity.

Figure 1. Login Report

In Phase 3 – DEVELOP, the Textiles Team submits newly designed compounds and treated textile samples to the Test Labs to evaluate antimicrobial functionality and compatibility with the customer's manufacturing process. After technical challenges are resolved, the development phase is completed with the creation of the customized antimicrobial additive. During this phase, the LIMS is used to communicate test information and results to the Textiles Team to facilitate the direction of the project and maintain a congruent workflow between the Textiles Team and the Test Labs.

Figure 2 shows a Test Report, generated by the LIMS. This report provides the Textiles Team with critical data needed to make crucial decisions that will ensure the successful creation of a customized antimicrobial additive.

Figure 2. Test Report



In Phase 4 – INTEGRATE, Microban engineers provide technical guidance on how to integrate the technology into the customer's manufacturing process. Microban supports the finished textile product with ongoing quality control testing and technical support, to ensure technology performance.

The Textiles Team and Test Labs provide ongoing testing support and leverages the LIMS to realize the following benefits:

- Samples are easily tracked (from test request to report generation) with unique identifiers.
- Engineers can easily recall the tests conducted and view the results in one place for all treatments.
- Data/results can be transferred to laboratory notebook computers, which minimizes data transcription errors.
- Data is saved in spreadsheet files that include required calculations – this ensures data quality.

CONCLUSIONS

Microban believe that the LIMS has been invaluable in managing the sample testing process in both the Textiles and Microbiology laboratories and playing a critical role during the product development process. As an example, the Textiles Laboratory has reported significant improvements in reducing turnaround time on sample tests since implementing the LIMS.

2020	Test Sample Counts	Turn Around Time (day)	2021	Test Sample Counts	Turnaround Time (day)
June	963	20	January	659	29
July	947	26	February	528	22
August	1172	26	March	603	21
September	743	21	April	956	21
October	405	15	May	585	17
November	707	17	June	865	15
December	623	26	July	579	12

The table above shows average turnaround time for samples tested in the Textiles Laboratory in 2020-21. The impact of the LIMS on reducing turnaround time can be seen in the June/July 2021 timeframe and is now averaging around two weeks, which is a significant improvement prior to implementing the LIMS.

The role of the LIMS plays a critical role in the development process and its benefits are summarized here:

- The LIMS has allowed the laboratory staff to submit much higher volumes of samples for microbiological and analytical tests.
- Since implementing the LIMS, turnaround time on sample testing has decreased significantly.
- The LIMS has controls in place to manage who has access to the LIMS – this ensures the confidentiality of client test data.
- The Microban team has powerful querying capabilities in the LIMS, allowing immediate access to all historical data to support product development and quality control requirements.
- The LIMS is designed to ensure that Microban maintains its ISO 9001 certification and that the Microbiology Laboratory maintains its ISO 17025 accreditation.

Textiles Laboratory

QUESTIONS / REQUESTS

Accelerated Technology Laboratories Inc.

If you have questions or would like to learn more, please call ATL at 800.565.LIMS or email us at info@atlab.com. Or visit our website at atlab.com.