Why LIMS Is a Necessity, Not a Nicety

How a laboratory information management system can facilitate safety testing and regulatory compliance within a food processor's lab.

By Dr. Christine Paszko, Accelerated Technology Laboratories, Inc.

The food industry is under pressure to produce high-quality products while adhering to stringent microbiological testing standards controlling costs and meeting regulatory compliance goals. Food companies face a number of regulations and requirements, including those related to Good Manufacturing Practices, nutritional labeling, HACCP (Hazard Analysis and Critical Control Points), public health security, the Bioterrorism Preparedness and Response Act of 2002, and FSMA. For laboratories that offer products globally, the Global Food Safety Initiative focuses on continuous improvement of food safety management systems to ensure confidence in the delivery of safe food to consumers. Many companies face these regulatory challenges armed with a stable and secure laboratory information management system (LIMS) and laboratory automation solutions. LIMS solutions can provide a cost-effective means to ensure that product standards are met, product is delivered as quickly as possible, and managers and staff have the tools to effectively do their jobs. While there are many commercially available LIMS solutions, it is critical that laboratory managers perform due diligence to ensure that the system they select will be successful in the lab. Some ways in which an LIMS vendor can differentiate itself includes: having ISO 9001 certification offering a qualified staff, being a certified Microsoft Gold Partner, and offering software solutions based on the latest technology that allows users to leverage the Internet, tablets and smartphones.

Implementing an LIMS: The problem and the solution

A microbiology laboratory of a meat processor was looking for ways to eliminate transcription errors, and shorten its analysis turnaround time and reporting time through automation. The company was experiencing increasing sample volume, which would require hiring additional resources that had to be trained and deployed. However, taking on more personnel was not an option. To manage its growing sample volume, the company was seeking an LIMS that could also interface with its laboratory instruments and manage plant samples from multiple remote sites. An evaluation of current processes revealed multiple opportunities to automate data entry, reporting, and eliminate dual and triple entry while accelerating and automating data handling and test scheduling.

Samples, including raw materials, finished products and plant samples, were sent from multiple plants to the laboratory daily for environmental monitoring. The current manual system was labor intensive and required that all processes be manually checked and re-checked for accuracy prior to data release. Data was entered into the manual systems multiple times. Instrument data was not integrated with the reporting and the lab was increasing its sample volume for the instruments alone by up to 900 samples per day. Primary reasons for investing in LIMS automation included:

- Having the ability to do more work with the same resources (removing manual tasks)

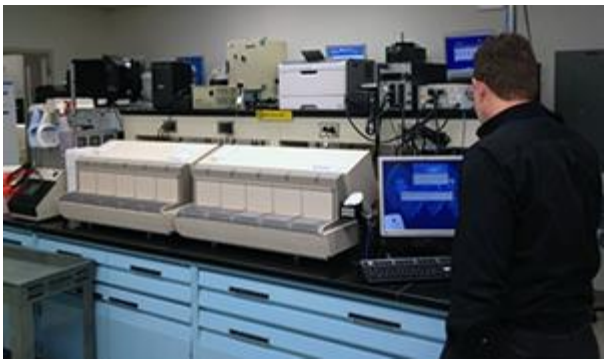
- Enhancing data management into a single, secure data base
- Meeting regulatory compliance goals
- Operating under enhanced efficiency and data quality
- Facilitation of standards and increased communication across their operations
- Cost savings

Automation reduces transcription errors, increases productivity, enhances data quality and accelerates result delivery. Faster turnaround translates into faster product release, longer shelf-life and ultimately, cost savings.

Then: Prior to implementing the LIMS, samples would arrive at the food processor's laboratory each morning. From there, they were manually sorted, paperwork was organized, and checks were conducted to verify receipt of samples.

Now: LIMS has significantly streamlined the process. Each morning, a work list is printed from the LIMS, identifying which samples will be received from the plants. The samples are organized and prepared for analysis and placed on the instruments with barcoded work lists for rapid and accurate set up.

The microbiology laboratory leveraged an automated food pathogen detection system to test for *Listeria spp., Salmonella spp*. and *E.coli:*0157:H7 on various sample types. Prior to automation, the manual steps of loading the sample IDs, scanning the print outs from the instruments, and then entering the data into reports with secondary review required 40 to 45 minutes per batch of 60 samples.



Two of the four VIDAS instruments interfaced with TITAN® LIMS.

Implementation of the LIMS has reduced report review time to five minutes. The data is received by the LIMS, and the email is automatically parsed and ready to receive the samples. The emailed worksheets, which are also automatically imported into the LIMS, eliminate several manual steps, including the time in which the laboratory team spent cross-checking samples with the paperwork and calling for missing samples. In this case, the automation has reduced the amount of paperwork and significantly streamlined the process. Now the laboratory knows which samples it will be receiving each day and can quickly match the samples to previously imported work lists.

Once the samples are loaded on the pathogen detection instrument to match the work list from the LIMS, the screening is conducted and the data is sent back to the LIMS, with the final analysis report completed automatically.

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MICROBIOLOGICAL ANALYSIS

Report ID #:
Supervisor: None
Report Date:

ACCREDITED
TESTING CERT # 3001.01

Customer Information	Name	Telephone	Email Results to:	Approved By:
	Janet Pippin Quality Assurance Manager Amour-Edwich Meats, LLC 1909 Lacy Dr. Junction City, KS 66441	785-762-3306 x220	janet.Pippin@amour-swift.com jeremiah.Hoeppner@amour-swift.com joe.vinch@amour-swift.com rachel.Blackwell@amour-swift.com Kevin.Richardson@amour-swift.com Dawn.Howard@amour-swift.com	Sandra Moore Corp Lab Manager

Sample Information	
	Date Received:
	Sample Type: Environmental Swabbing
	Reference Method: USDA/FSIS AOAC-RI 961.02 (Environmental Swab/Sponge) ISO 11138 Accredited

Customer Sample #	Sample Description	Line	Date	Time	Sampled By	Contact/Non-Contact	Sample Result Listeria spp.
1	Power Table # 3	Line 1	02/20/12	12:10	JF	Contact	
2	Power's Gloves - Samrasit	Line 1	02/20/12	12:10	JF	Contact	
3	Inline Conveyor Belt	Line 1	02/20/12	12:10	JF	Contact	
4	Drake Flights	Line 1	02/20/12	12:10	JF	Contact	
5	Operator's Gloves - Ly	Line 1	02/20/12	12:10	JF	Contact	
6	High Low Line Adjusters - Random	Line 1	02/20/12	12:10	JF	Contact	
7	Tuber Hopper Walls - Random	Line 1	02/20/12	12:10	JF	Non-Contact	
8	Rework Table - Random	Line 1	02/20/12	12:10	JF	Non-Contact	
9	Drake Safety Covers - Random	Line 1	02/20/12	12:10	JF	Non-Contact	
10	Conveyor Belt	Line 4	02/20/12	11:20	JF	Contact	
11	Cutter's Gloves - Nothard	Line 4	02/20/12	11:20	JF	Contact	
12	Crossover Conveyor Belt	Line 4	02/20/12	11:20	JF	Contact	
13	Machine Ledge	Line 4	02/20/12	11:20	JF	Contact	
14	Operator's Gloves - Mike	Line 4	02/20/12	11:20	JF	Contact	
15	Crossover Conveyor End Stop - Random	Line 4	02/20/12	11:20	JF	Contact	
16	Sullun Film Rollers - Random	Line 4	02/20/12	11:20	JF	Non-Contact	
17	Metal Detector - Random	Line 4	02/20/12	11:20	JF	Non-Contact	
18	Operator's Tools - Random	Line 4	02/20/12	11:20	JF	Non-Contact	
19	Conveyor Belt	Line 6	02/20/12	13:30	JF	Contact	
20	Cutter's Gloves - Augustine	Line 6	02/20/12	13:30	JF	Contact	
21	Crossover Conveyor Belt	Line 6	02/20/12	13:30	JF	Contact	
22	Machine Ledge	Line 6	02/20/12	13:30	JF	Contact	
23	Operator's Gloves - Nothard	Line 6	02/20/12	13:30	JF	Contact	
24	Stationary Knives - Random	Line 6	02/20/12	13:30	JF	Contact	
25	Rework Station Table Hopper - Random	Line 6	02/20/12	13:30	JF	Non-Contact	
26	Machine Air LOTO Switch - Random	Line 6	02/20/12	13:30	JF	Non-Contact	
27	Main Lift Shaft - Random	Line 6	02/20/12	13:30	JF	Non-Contact	
37	Power Table # 1	Line 9	02/20/12	13:15	JF	Contact	
38	Power's Gloves - Ly	Line 9	02/20/12	13:15	JF	Contact	
39	Conveyor Belt	Line 9	02/20/12	13:15	JF	Contact	
40	Crossover Conveyor Belt	Line 9	02/20/12	13:15	JF	Contact	
41	Operator's Gloves - Raquel	Line 9	02/20/12	13:15	JF	Contact	
42	Machine Ledge - Random	Line 9	02/20/12	13:15	JF	Contact	

An example of a final report automatically generated from the system, which is also automatically emailed.

Conclusion

Primary enhancements to implementing an LIMS include higher data quality and significant time savings (a conservative estimate: LIMS typically saves customers between 25-45% of time on their operations). On the instrument integration alone, the automation saved 35 to 40 minutes of work per batch (a batch contains 60 samples), and a typical day includes 10 to12 batches, or up to 720 test results per day. Conservatively, if we allot 35 minutes per batch and 10 batches per day, the time savings are nearly six hours daily, and this is only from interfacing four instruments. Additional time savings are also realized as a result of reducing data errors.

An alternative solution to hiring additional staff to work in the lab involved examining the benefits of automation to leverage existing resources and allowing them to be more productive. This path eliminated mundane tasks and allowed existing lab staff to focus on the LIMS (managing, tracking and organizing data) and automation (barcoding, scanning, instrument integration, automated email imports and automated reporting). Laboratory staff was trained on-site and received follow-up training at the LIMS

Boot Camp. As a result, workflows were streamlined, sample throughput was accelerated, and the lab experienced faster turnaround times.

Other benefits of deploying a new LIMS in the laboratory include increasing data security, having an audit trail if any approved and validated results required a change, full traceability, facilitating standardization across the organization, reducing the amount of paper forms, and automating the release and reporting process.

About the Author

Dr. Christine Paszko has extensive expertise in LIMS, laboratory automation and food safety testing. She is currently the VP of Sales and Marketing at Accelerated Technology Laboratories, Inc., (ATL). Prior to joining ATL, she worked at Applied Biosystems. She was responsible for the creation, marketing and sales of molecular test kits that leveraged the TaqMan technology to detect major foodborne pathogens such as Salmonella, Listeria, and E. coli 0157.