CASE STUDY

Informatics

Improving Refinery Lab Productivity 20% While Increasing Accuracy with LABWORKS LIMS

A Laboratory Information Management System (LIMS) implementation will deliver exceptional value to a process manufacturing facility if it eliminates redundant data transcriptions within the lab, automates the production of information from this data and effectively communicates with the other critical systems throughout the enterprise. Ergon Refining Inc.'s specialty products plant in Vicksburg, MS is recognizing this value immediately from its implementation of LABWORKS™ LIMS from PerkinElmer®, Inc.

Ergon Refining Inc. previously used multiple in-house developed programs for managing quality control information. The cost of maintaining multiple systems, difficulties in accessing information across units and the lack of workflow automation justified a decision to select a unified solution. Ergon selected LABWORKS LIMS because of its proven ability to work in a refining environment, its versatile interfacing capabilities and track record for fast implementations. The new LIMS automates many formerly manual operations including sample login, calculations, workflow approval and report generation. Integration with both simulated distillation and plant operation systems eliminates data entry and associated errors. Report

Key Features

- Integration with distillation and plant operation systems
- Automated, custom reports
- Configurability to handle refinery operations
- Quick implementations

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generation is now fully automated and management has the ability to drill down and query for any information throughout the plant. "As a result, we are now able to handle 20% more information with the same staff and have also substantially increased the accuracy of our data," said Janice Carstafhnur, Laboratory Quality Administrator for Ergon.

At Ergon's Vicksburg refinery, select wax-free naphthenic crude oils are processed to produce distinctive specialty petroleum and asphalt products for niche markets worldwide. The Vicksburg refinery produces a variety of non-fuel, engineered products, naphthenic process oils, electrical insulating oils, naphthenic base oils, liquid asphalt cement, polymer-modified asphalt cement, and asphalt emulsions. Special processing technology – developed exclusively by Ergon in the Vicksburg hydro processing pilot plant – allows safe, efficient, clean refining of high-acid, high-sulfur crude oils that many competitors would not be able to process. Since its original start-up in 1978, the refinery has been expanded and modernized several times to attain its current configuration. The hydro processing unit, where the naphthenic base oils are produced, is the largest single-train naphthenic base oil processing unit in the world. The Vicksburg plant was one of the first refineries in the United States to hold a full ISO 9000 certification for the entire operation. The refinery is now recertified to the new ISO 9001:2000 standard.

Multiple systems used in past

In the past, the information systems department developed separate systems to meet the needs of the individual units within the refinery. This approach was problematic because the department had to maintain each of these programs. As the systems' architects and authors who wrote them left the company, program maintenance became increasingly difficult.

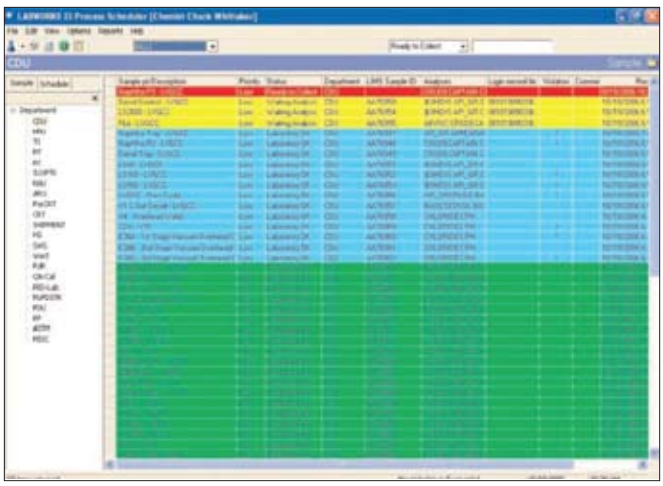

Figure 1. Process Scheduler provides a comprehensive and current view to the end-user in real time data. Critical decisions are expedited based on current data.

Another issue was the plant's requirement that reports crossed unit boundaries to track overall refinery operations. This particular report was all but impossible to produce. There was little opportunity for automation since it was difficult to justify the required custom programming for an application that only touched a single unit. It was also impractical to interface just a partial software package, which would require writing six custom interfaces – one for each of the unit systems. In addition, the custom programs did not provide an auditing mechanism and lacked many of the error-checking and security features offered by modern packaged software.

The LIMS selection process was originally performed by a sister refinery located in West Virginia. The sister refinery formed a selection committee that evaluated the leading LIMS applications. They chose LABWORKS because its superior configurability enables it to meet the complete requirements of large refineries without any expensive customization, or consultants' services. The implementation process is shorter and less expensive, without sacrificing capabilities. LABWORKS also offers the ability to interface with many software packages used in refineries, including PI System® from OSIsoft® and Simulated Distillation (SimDist-2000©) from Envantage, Inc. "Our decision to purchase a LIMS came after a sister company had completed their selection process," said Debbie Beach, Systems Application Manager of Ergon. "We reviewed their decision criteria and discovered that LABWORKS met our requirements as well as it met theirs. For that reason, along with the benefits of using a common LIMS, we decided to go with LABWORKS."

Configurability simplifies implementation process

LABWORKS' configurability, and its ability to handle refinery operations, without writing any code, made it possible for the Ergon information systems department to implement the application themselves with minimal outside assistance. "PerkinElmer was onsite only a few days to do the initial installation and to help us map out the development process," said Chuck Whittaker, Technical Service Chemist for Ergon. "We started with the unit stream, moving downstream through the plant. Then we addressed the finished product side, the tanks, shipments, and certificates of analysis. Throughout the process, PerkinElmer served as a facilitating resource and was there whenever we had questions or needed additional help. Obviously, we saved a lot of money being able to do the implementation ourselves. But even more important, we know the business processes much better than a consultant could ever learn them. As a result, we were able to identify many opportunities to improve business processes during the implementation."

Ergon Refining configured the software to streamline many laboratory operations. They set up the Process Scheduler to automatically log in all of the samples taken on a regular basis (Figure 1). The only information that requires entry is the time and date the sample is taken. In the future, the refinery plans to install a bar code system that will eliminate the need for even these two entries. The refinery uses a gas chromatography system to automatically generate the analysis and transfer the results into the LIMS. The LABWORKS calculation utility is used to automate calculations required as part of analysis. This utility uses Excel® to perform the actual calculations which simplifies configuration to allow any Excel® calculation to be performed. The software is also configured to handle any needed approval steps.

Interfaces save time, improve accuracy

Substantial time and accuracy improvements come from LABWORKS' ability to interface with other key programs. Ergon uses SimDis to optimize product yields and operating margins by offering cut point control, stream processability and process mass balance. The LABWORKS interface accepts information such as the temperatures at which components come off the distillation stream. "The advantage is that the technician does not have to type in all these numbers," said Carstafhnur. "Just as important is that the LIMS provides a permanent record of this important process information. Later when we review the results we can check back into the process information to, for example, analyze why a problem occurred. This helps us make adjustments that will improve our yields and margins in the future." The interface also converts SimDis results into D86 format, a standardized distillation method. Another LABWORKS interface is used to communicate with the PI real-time performance management platform. LABWORKS has provided an additional interface to pass tank certification and shipment data to an existing blending system.

Ergon has developed many custom reports to automatically generate information that was previously much more difficult to obtain. "One of the most important custom reports ties together the product test results to the shipment," said Whittaker. "Most of the testing is done while the products are stored in tanks awaiting shipment. Some basic tests are performed after the product is pumped into a container for shipment. The tank tests serve as reference when more detailed information is required. In the past we had to search through tank results which took a considerable amount of time. Now when the shipment tests are performed the shipment is linked to the most recent tank certification. The use of Excel® calculations simplifies the customization of tank results to the particular method used in the refinery. For example, analysts enter the color of the sample based on defined ranges. When the value is passed into an Excel® template for certificate of analysis, the logic within the spreadsheet automatically converts the number to the appropriate ASTM® standard." Reports are generated every 12 hours and operations people can access all of the information in the system at any point through the LABWORKS interface."

The implementation of the new LIMS provides substantial improvements at Ergon's Vicksburg refinery. "We are saving significant amounts of time at every stage of the quality control process," Whittaker added. "Samples are logged in automatically and only minimal data needs to be entered after the sample is collected. Data entry is much faster than with the old systems because we have set up spreadsheets that match the way that the data comes off the instruments. For example, we can type in multiple samples in adjacent rows of a spreadsheet rather than having to call up separate records for each entry. This has been a key factor in our ability to handle a 20% increase in samples to about 40,000 per year without having to add any staff members. At the same time, the reduction in the amount of data entry and the automation of calculations has substantially improved the accuracy of our data."

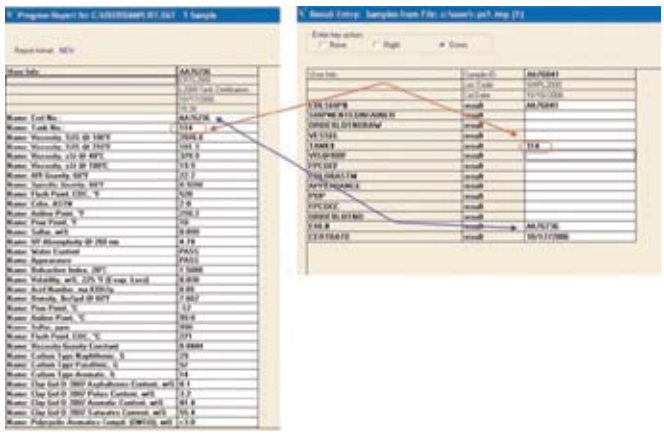

Figure 2. LABWORKS configurability empowers the user to easily provide solutions, such as automating the addition of typical data or certified data for a shipment sample.

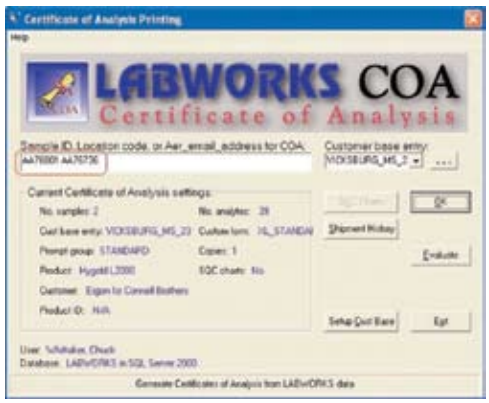

Figure 3. LABWORKS COA program provides a real life solution when combining Storage Tank data with key parameter data on shipment samples by using multiple samples to produce the COA.

PerkinElmer, Inc.
940 Winter Street
Waltham, MA 02451 USA
P: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com

For a complete listing of our global offices, visit www.perkinelmer.com/ContactUs

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