

# LABWORKS LIMS Solutions Chemical Industry



## Real-time trending helps improve chemical plant process control

Ethyl Corporation of Pasadena, Texas, implemented a LIMS that automatically plots test results in an intuitive graphical format allowing operators and supervisors to keep their fingers on the pulse of the process. The new LIMS also helps the laboratory or plant personnel to determine the status of any sample in seconds and helps the laboratory manage its backlog.

“The ability to monitor plant processes significantly improved since we installed the new LIMS,” said Paul Cook, Laboratory Co-

ordinator for Ethyl Corporation. “We made other improvements simultaneously so we can’t attribute the entire improvement to the LIMS but it’s clear that it made a significant contribution.”

Ethyl develops, manufactures, blends and delivers leading-edge additive technology for fuels and lubricants around the world. The company produces fuel additives engineered to improve the performance of gasoline, diesel and other fuels. The company also makes lubricant additives that help protect engine and other moving parts from wear, deposits, corrosion, water and high operating temperatures.

## Key Benefits

- ▶ Automatic Trend Plotting eliminates manual plot creation.
- ▶ Quick upgrades for lower cost of ownership
- ▶ Process Scheduler saves time with automatic viewing of sample statuses.

## Trend plots were manual in the past

Statistical process control data is an important part of day-to-day decision making in the plant. The ability to gather and efficiently organize this data has become increasingly important.

The Ethyl plant originally shared the cost of a host-based LIMS with several corporate siblings. The system provided basic functionalities but nothing close to the real-time plotting capabilities the company is receiving now. The results of the tests were printed on paper reports and sent to unit operations for recording and plotting on paper charts. Laboratory statistical quality control checks were also maintained manually. Manual maintenance of statistical quality and process control charts required additional time.

The Ethyl team decided to upgrade the LIMS and they chose the PC version of LABWORKS™, from PerkinElmer®, Inc., Shelton, Connecticut. LABWORKS was chosen because it is a configurable product that is designed to meet the needs of chemical plant laboratories, without the need for customization. The LIMS provides build-in tools that adapt the software to any laboratory processes. This made it possible to upgrade the system in just three days with minimized disruption of plant operations.

## Move to automated trend plotting

“The main reason we decided to do the upgrade was to take advantage of the online plotting program,” Cook said. The LABWORKS Trend Plot program provides users with the ability to graphically display series of result values for groups of selected parameters and location

codes in real time. These trend plots can be used by personnel outside the laboratory for tracking manufacturing or environmental processes in a plant or by workers in the lab for tracking instrument performance and calibrations. “We configured the software to show alarm limits and specification limits in different colors on the plots,” Cook said. “The trend plots are automatically updated every time a sample is analyzed. The result is we can see

duction units. The continuous units might receive data every six hours while the blending units, which operate in batch mode, only get data at the end of a batch. “Our objective in implementing trend plotting was to improve our process capabilities by getting a better understanding of the variation in our process,” Cook said. The new tool provides far more information than we had in the past and it also saves us time by eliminating the need to create plots manually.”

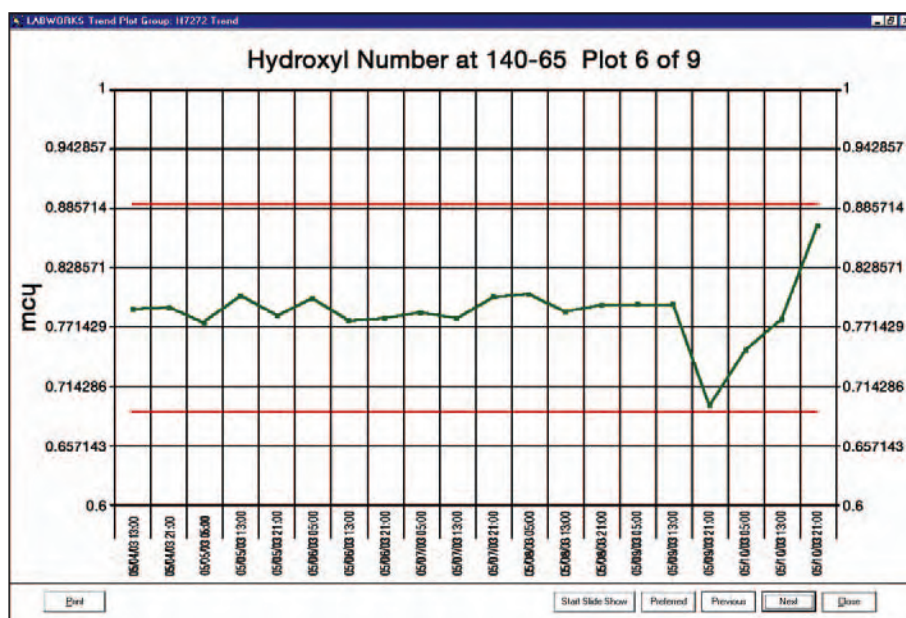


Figure 1. Although all of these points are within the limits, this sharp change might warrant some communication. The last point on the right is from the last sample analyzed. One can easily obtain all of the information associated with this sample from the Process Scheduler.

at a glance if we have a problem or if we are heading for a problem in a few hours while there is still plenty of time to correct it. Just as important, we can view key parameters over time to get an idea of where we are headed.”

Ethyl has set up five or six plots for supervisors and process operators in each of the company’s four production units. They configured the software to automatically scan from plot to plot, making it possible to instantly review trends. The intervals between tests vary within the pro-

## Streamlined laboratory workflow

The laboratory workflow proceeds as follows:

1. Unit operations deliver the samples on a defined schedule.
2. Each sample has a unique unit code. This unit code is defined in the LIMS with all the required test parameters and specification limits. When an analyst receives a sample, he or she enters the unit code, date and time and all the test parameters for the sample are quickly displayed.

- As a test is completed an analyst enters the result.
- When all the tests are completed, the analyst validates the results.
- At any stage the operating unit can see the status of the sample through the Process Scheduler. As results are saved, the value is also displayed on the trend plots.

## Process Scheduler saves time

Cook said the LABWORKS Process Scheduler provides a window into the status of every sample in the laboratory. “If we have a sample that’s a high priority and want to know the status, we simply click on it and see at a glance exactly

where it is,” Cook said. “Or we can generate a list of samples that are waiting for analysis or waiting for validation. The units have the Process Scheduler which also saves an untold number of phone calls back and forth to check on the status of a high priority sample. Each unit is set up to see only their department’s samples. We could get this information from our system but it took a lot more time and it was not available at the unit level, which meant significantly more phone calls. The Process Scheduler also serves as a valuable tool for laboratory management. We can easily see the entire backlog and evaluate how it stacks up against available resources. I also use the

Statistical Quality Control module on a regular basis to generate all kinds of quality control and quality assurance charts.”

“We implemented trend plotting in the new version of LABWORKS to make sure the people responsible for these parameters knew where they were at any minute. When we got the trend plots working, it was clear that putting this information at our fingertips made a significant difference in gaining control over our process and continually reducing variation.”

For more information about PerkinElmer and LABWORKS, please visit the company’s website at [www.labworks.com](http://www.labworks.com) or call 1.800.762.4060.

User Info	Samp ID	AB96887
Unit Code	140-65	
Descript	C1423 H727	
Batch Number	TEST SAMP	
Col Date	05/28/2003	
Col Time	16:00	
Lot Number	TRAINING	
Name: Cresol %	Result	0
Name: TAC %	Result	0
Name: TBC %	Result	0
Name: VISC @100 C	Result	250
Name: % Activity	Result	70
Name: Hydroxyl Number	Result	87
Name: Molecular Weight	Result	805

Figure 2. The red fields indicate out of spec results. Left-click on any of the results for more details, specs, comments, or a history of results.

Sample Description	Status	Sample ID/Description	Dept	LIMS Sample ID	Login record file	Violation	Comment	Request Time	Collect On Time
Total Organic Carbon (TOC)	Not Ready	SQC-304	SQC	983 26				06/18/2003 5:00:0	
EDC Headspace	Not Ready	SQC-308	SQC	983 96				06/17/2003 5:00:0	
EDC PAT	Not Ready	SQC-306	SQC	983 96				06/17/2003 5:00:0	
Phenol in Waste Water	Not Ready	SQC-302	SQC	983 27				06/17/2003 5:00:0	
Formaldehyde in Waste Water	Not Ready	SQC-300	SQC	842 983				06/17/2003 5:00:0	
Hexoq FP	Not Ready	SQC-132	SQC	983 738				06/17/2003 5:00:0	
Turkots #1 FP	Not Ready	SQC-128	SQC	983 738				06/17/2003 5:00:0	
Cresol %	Out of Spec	135-114	SQC	AB96567				06/18/2003 13:33	06/18/2003
Activity %	Out of Spec	135-114	SQC	AB96567				06/18/2003 13:33	06/18/2003
H-1921 EVANS DRUMMING	Waiting Analysis	135-141	135	AB96565	736 738 755 770			06/18/2003 4:54:0	06/18/2003
H-1461 EVANS DRUMMING	Waiting Analysis	135-135	135	AB96564	730 738 65 796 770			06/18/2003 4:53:2	06/18/2003
T-1223 H6415 Adjust	Waiting Analysis	120-127	140	AB96563	203 761 784 768			06/18/2003 4:41:0	06/18/2003
Titratr #1 pH check	Waiting Analysis	SQC-100	SQC	AB96548	106 983			06/18/2003 5:00:0	06/18/2003
DMA-5000	Waiting Analysis	SQC-118	SQC	AB96566	735			06/17/2003 5:00:0	06/18/2003
DMA-49	Waiting Analysis	SQC-116	SQC	AB96567	735			06/17/2003 5:00:0	06/18/2003
940 PH Slope	Waiting Validation	SQC-105B	SQC	AB96568	922-2			06/17/2003 5:00:0	06/18/2003
920 PH Slope	Waiting Validation	SQC-105A	SQC	AB96569	922-1			06/17/2003 5:00:0	06/18/2003
SF1160 (0, 1, 0)	Laboratory OK	110-30	140	AB96562	756-1 756-2			06/18/2003 3:52	06/18/2003
SF1160 (0, 1, 0)	Laboratory OK	110-30	140	AB96561	756-1 756-2			06/18/2003 3:52	06/18/2003
HPLC H6415	Laboratory OK	SQC-134	SQC	AB96560	973 983			06/18/2003 3:36	06/18/2003
HPLC H7272-70	Laboratory OK	SQC-136	SQC	AB96559	802 983			06/18/2003 3:35	06/18/2003
H-6478 Load	Laboratory OK	120-201	120	AB96545	730 784 202			06/18/2003 2:51	06/18/2003
D1425 Phenol (3, 2, 2)	Laboratory OK	140-52	140	AB96544	800-1 800-2 800-3 8			06/18/2003 2:52	06/18/2003
Sparkler Dur H-6415	Laboratory OK	120-125	120	AB96543	768 203 776 761 78			06/18/2003 1:58	06/18/2003
H-6530 Lot	Laboratory OK	120-202	120	AB96542	203 89 779 765 796			06/18/2003 1:57	06/18/2003
C1423 H7270 (0, 1, 0)	Production OK	140-45	140	AB96541	736 803-2 80		!	06/18/2003 1:57	06/18/2003
D1425 Cresol (3, 2, 2)	Production OK	140-60	140	AB96540	852-1 952-2 952-3			06/18/2003 1:56	06/18/2003
C1424 Phenol (3, 2, 2)	Production OK	140-51	140	AB96539	803-1 803-2 803-3			06/18/2003 1:56	06/18/2003
R1401 H7270 (3, 2, 2)	Production OK	140-43	140	AB96538	803-1 803-2 803-3		!	06/18/2003 1:05	06/18/2003
C1419 H7270 (3, 2, 1)	Production OK	140-42	140	AB96537	804 742 804-4 800		!	06/18/2003 1:05	06/18/2003
C1429Schnitler (3, 0, 3)	Production OK	140-53	140	AB96536	103			06/18/2003 1:05	06/18/2003
Low Nitrogen SGC LECO	Production OK	SQC-117	SQC	AB96535	755 983 986			06/18/2003 12:22	06/18/2003
H6428 Load	Production OK	120-508	120	AB96534	750 203 761			06/18/2003 12:22	06/18/2003
Low Nitrogen SGC LECO	Production OK	SQC-112	SQC	AB96533	755 983 986		!	06/18/2003 11:59	06/18/2003
T-1223 H6415 (Load)	Production OK	120-126	120	AB96532	761 794 203 766			06/18/2003 10:31	06/18/2003
Hydroxyl SGC	Production OK	SQC-106	SQC	AB96531	983 186			06/18/2003 10:00	06/18/2003
2-Ethyl Hexanol	Production OK	120-52	120	AB96530	730 770 202			06/18/2003 9:17	06/18/2003
D1425 Phenol (3, 2, 2)	Production OK	140-52	140	AB96529	800-1 800-2 800-3			06/18/2003 8:23	06/18/2003

Figure 3. A closer look at the same view reveals:

- The lab has a backlog of 6 samples as indicated by yellow shading. T1223 is waiting for at least one test. Other results for T1223 might already be complete and accessible. The lab has been instructed to save results ASAP so they will appear on trend charts and be available for viewing.
- The lab has finished with the samples beginning with the blue SF1160 and below.
- The first sample in green, the C1423, has had a limit violation indicated by the exclamation point in the violation field.

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