

Laboratory Products Focus

HOW HAS LIMS BENEFITED MEXICO'S LARGEST COMPANY?

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In 1998, PEMEX Gas and Basic Petrochemicals selected Thermo Electron's SampleManager LIMS™ for its gas processing complex in Tabasco State in Mexico.

The significant productivity gains achieved in the Tabasco facility led PEMEX to initiate a LIMS standardisation project and implement the solution across eight additional gas processing facilities throughout Mexico.

This enterprise-wide standardisation generated significant cost savings and provided immediate benefits with regards to personnel, productivity, business intelligence and decision-making process.

PEMEX NEEDED A SYSTEM THAT WOULD OPERATE VIA A SINGLE CENTRALISED SERVER FOR THE DIFFERENT GAS PROCESSING FACILITIES

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BACKGROUND

PEMEX (Petróleos Mexicanos) (Figure 1) is the largest company in Mexico with revenues totaling \$86 billion in 2005. At the same time, it is the world's third largest producer of crude oil and ninth largest integrated oil company [1], achieving remarkable proved reserves equivalent to 10 years of production [2]. Its activities include the exploration of hydrocarbons and the production, storage, transport, distribution and sales of crude oil, natural gas and refined products.

PEMEX operates through four principal subsidiary entities: PEMEX Exploration and Production (crude oil and natural gas), PEMEX Refining (petroleum products), PEMEX Gas and Basic Petrochemicals (natural gas, liquefied natural gas and basic petrochemicals) and PEMEX Petrochemicals (secondary petrochemicals).

PEMEX Gas and Basic Petrochemicals operates nine gas processing facilities throughout Mexico, holding a strategic position in the country's gas industry. It processes, stores, transports, distributes and markets natural gas, natural gas liquids, gas derivatives and basic petrochemicals. PEMEX Gas and Basic Petrochemicals employs 12,000 people.

THE NEED FOR LIMS

Prior to LIMS implementation, the company faced a series of challenges that impacted its personnel, productivity, business intelligence and decision-making process. Because there were no organisation-wide standards for testing and analysis, routine analysis was dependent upon individual experience and skill, which presented significant constraints for personnel rotation. In addition, the majority of employees' time was spent on the manual capture, calculation and verification of data, resulting in a tremendous drain on human resources.

Furthermore, the integrity of the information could not be guaranteed since all data was captured, entered and manipulated manually often using multiple systems with proprietary file formats. The administration of paper records proved inefficient and expensive. Without a single, easy to access database that would incorporate all real-time information coming from the laboratories of the company's process chain and auxiliary services, PEMEX had limited ability to make timely decisions to improve or correct processes. What's more, data was not



Figure 1. PEMEX, the largest refinery in Mexico

easily integrated with other technologies employed by PEMEX including SAP/R3 and OSI PI. Finally, analytical methods, job routines, reports and units were not unified and consolidated.

In an attempt to eliminate these problems, PEMEX decided to employ a LIMS solution, an enterprise-wide system that would drive their business decisions. A solution that would yield real-time analysis and reports, monitor regulatory compliance and product quality, integrate with the company's broader network, provide secure access to data throughout the organisation and provide much more functionality than merely storing and retrieving results.

WHY SAMPLEMANAGER?

PEMEX needed a system that would operate via a single centralised server for the different gas processing facilities thus providing easy access to queries and administration of information, as well as the capability to unify and consolidate analytical methods, job routines, reports and units. Moreover, the company needed a LIMS solution that would integrate easily with other technologies employed by PEMEX, such as SAP/R3 and PI (Figure 2).

This would mean that as soon as the test results were introduced and authorised in LIMS by the laboratory personnel, the information could be immediately available for the processing facilities technicians and other personnel as well as PEMEX's headquarters and laboratory administrators. SampleManager is available with a full range of enhanced functionality designed for the specific needs of the petrochemical industry.

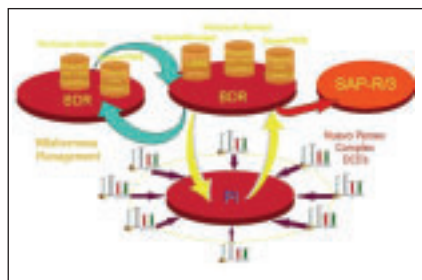


Figure 2. How LIMS system integrates the needs of S

It can be implemented to support both local and global laboratory deployments, is scalable for a large user base and available in multiple languages. The system integrates the laboratory with the process plant and the enterprise, as well as with desktop applications, providing a foundation for a complete laboratory automation solution.

A three-tier client/server solution operating on Windows® environments with a Windows Explorer driven interface makes the system particularly easy to use with the least training possible. The solution is also fully auditable for satisfying laboratories operating in a regulated environment while being designed, developed and supported within an ISO 9001/TickIT environment.

ANTICIPATED BENEFITS FROM STANDARDISATION

PEMEX decided to standardise its LIMS solution across all of its gas processing facilities for a number of different reasons. The first reason to encourage this decision was the automation of the Data Capturing Process that LIMS offered for all data coming from chromatography and other analytical equipment. PEMEX was hoping that automation of enterprise-wide data capture would reduce the time being spent on analysis tasks, ensuring data integrity, reviewing the quality of the results by automating the results validation process. This would free users' time for more valuable work.

The company also sought to improve its business decision-making with electronic publishing and fast access to information contained on standard reports. Data consistency and availability of real-time results would help PEMEX execute the best decisions as well as work under continuous improvement practices. Furthermore, working with a single server that is easy to access and administer would protect and save the integrity of the information, avoiding the storage of data in personal computers, Excel or Word sheets.

Finally, PEMEX sought to establish an enterprise-wide system that would follow up the main parameters and specifications that certify the products under a strict quality control process and ensure the right compliance with PEMEX's customers' requirements in all of the products.

ACTUAL BENEFITS FROM STANDARDISATION

When assessing the actual benefits resulting from the standardisation of its LIMS solution across all of its gas processing facilities, PEMEX was delighted to realise that its production costs had been decreased considerably – more than could have ever been anticipated. In fact, the production cost savings have been projected to be over \$500,000 per year. At the same time, there has been a notable increase in revenues generated by the improved productivity and quality of the end products.

The main reasons that led to these significant productivity cost savings were the standardisation of methods, analysis and reports, the overall reduced production time and the capability to produce electronic reports which eliminated hard copies and printers. Additionally, the reliable and real-time access to information along the production chain process and auxiliary services has enabled PEMEX to make timely decisions for continuous, on-time improvement of the quality of products.

Being friendly to use and easy to deploy, even by new personnel, the standardised LIMS solution has allowed PEMEX to rotate personnel across their gas processing facilities, thereby reducing training costs considerably. Risks of accident and insurance costs have also been reduced since employees are no longer requested to transfer documents throughout the different operative areas. LIMS standardisation has also led to more effective planning of all tasks taking place in PEMEX's laboratories, organising them by different levels of priority in daily bases. In addition, all tasks for all processor facilities have been consolidated and programmed in the most efficient way. Being an open system, LIMS has further allowed the integration of equipment and functionalities while ensuring remote access capabilities for efficient and effective support.

LIMS USER FEEDBACK

Among the multiple benefits that a LIMS standardisation has provided to PEMEX's laboratories, the control, automation and simplification of workbooks and worksheets have been the most-used and well-accepted functionalities by end users. Furthermore, end users have noted the need for reliable and real-time access to information stored in a single database stored in a single database and available in all the different processing areas. This allows PEMEX's Processing Facilities and Gas Assessors to make the right decisions on time.



CONCLUSION

The example of PEMEX has demonstrated that there are a number of important benefits resulting from LIMS standardisation. Full automation reduces considerably the time needed to conclude the different tasks.

The logical risks generated by manual processes are also eliminated. Consistent and real-time information becomes available for the continuous improvement of the production processes and for the quality control of the end products. Real-time monitoring and access to data allows the control of trends and deviations within the quality specifications throughout the analytical process. This capability enables the execution of adjustments and corrections during the production process for improving the final product.

In summary, there are certain criteria that need to be taken under careful consideration when evaluating whether a LIMS solution is suitable for a standardisation project or not. First of all, the system should be able to standardise laboratory practices such as methods, analysis and reports while also eradicating inconsistent information originated by manual capture and calculus.

Moreover, results to the process areas should be delivered within the least time possible. A LIMS solution operating under a single centralised database simplifies administration.

The system should also be easy to use by all laboratory employees and offer web access to information, PI interface and other capabilities to share information with network systems. Easy configuration and an easy to use tool for reporting are also essential to attend internal and external reporting requirements.

References

- [1] *Petroleum Intelligence Weekly, PIW Ranks The World's Top Oil Companies, December 2005.*
- [2] *2005 production levels and proved reserves in accordance with the definition under Rule 4.10(a) of Regulation S-X under the U.S. Securities Act of 1933*