How LIMS Enable LNG Laboratory Agility in the Face of Changing Standards

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When laboratory professionals discuss the vision of the true paperless laboratory – a lab that contains zero paper, where processes are automated and data is virtually mistake-free – simplified compliance is usually one of the first advantages mentioned. In LNG sampling labs, however, automating compliance is much easier said than done. In addition to regulations enforced by local, national and international agencies, LNG customers require suppliers to comply with standards that are usually stricter than the law. And if manufacturers cannot meet these stringent requirements, they risk being displaced by companies that will.

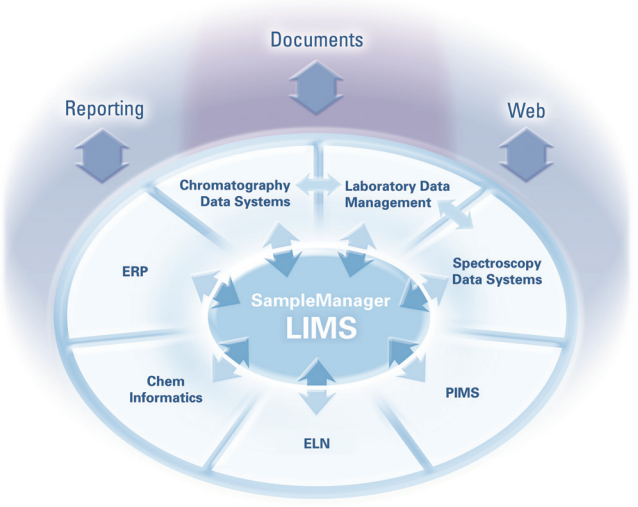
Compliance would be one thing if standards for testing such as those recommended by ISO and ASTM were a static set of guidelines, but standards are in constant flux as methods and technologies evolve. Running a paperless LNG laboratory that complies with moving targets and completes audits efficiently would be an impossible task without major automation capabilities.

Fortunately for quality managers, there is a solution: a laboratory information management system (LIMS). A LIMS not only enables an LNG laboratory to collect, store and analyse data more accurately and efficiently in a paperless environment, it also ensures compliance in an environment of constant change. How? This article will explore how a LIMS enables integration with enterprise systems and automation of processes to transform compliance with industry standards from a burdensome source of worry to a business differentiator.

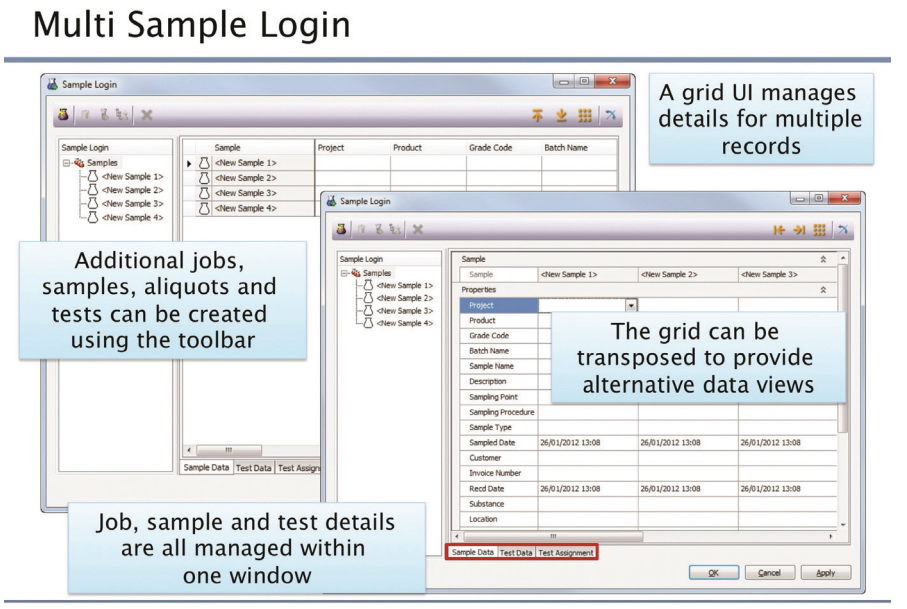
Compliance in the Paperless Lab

Twenty years ago, when nothing in the lab was automated and the idea of a paperless lab would have seemed farfetched, compliance revolved around frequent referrals to hard copy manuals kept in the lab. Standards organisations issued new testing definitions through subscription, and each time a standard was created or revised, the lab would update an operating procedure and retire the old one. Lab technicians unfamiliar with updated procedures were obligated to refer to the newest manual constantly to ensure that their day-to-day activities would not violate the new standard. Control of the correct versions of operating procedures required a manual control system to ensure that everyone was using the right version at the right time. Under this system, unintended violations were difficult, if not impossible, to spot and audits were slow and inefficient.

Today's successful LNG enterprise relies heavily on the integration and automation capabilities of a LIMS to enable compliance in an environment where standards are more accessible, but also updated more frequently. Instead of having to familiarise personnel with perpetually outdated hard copy manuals, labs now have LIMS that automatically link directly to the revised standards and update records accordingly. Some advanced LIMS, such as Thermo Scientific SampleManager 11,



An enterprise level LIMS such as SampleManager can help bridge the islands of data generated in the lab and transform that data into information that can be used across the enterprise.



Enhanced traceability features in SampleManager, including the ability to track aliquots and composites, enable finer control over samples and more reliable data for decision making and compliance.

can even store standards as attached documents on relevant workflows. That way, if a user wants to double check for compliance midway through a procedure, he or she needn't track down the correct section in an enormous paper document. A simple point and click will open up the relevant parts of the standard for the technician to review.

With automation, however, even point and click navigation is often unnecessary. New standards aren't just downloaded automatically; the LIMS also adjusts laboratory management workflows to conform to new requirements. This includes necessary user training requirements, equipment calibration, instrument timelines and more. If, for instance, an ASTM standard is revised to require instrument inspection for accuracy monthly instead of bimonthly, the LIMS will automatically revise inspection scheduling and issue reminders to lab managers so that the company doesn't miss a beat.

So which standards are most onerous for LNG companies? Let's consider two of the most important standards organisations: ASTM and ISO.

Managing to ASTM Standards

ASTM International, formerly the American Society for Testing and Materials, is an internationally-recognised organisation that issues standards "to improve product quality, enhance safety, facilitate market access and trade, and build consumer confidence." ASTM creates standards on everything from 3D imaging, nuclear technology and quality control to, most relevantly, laboratory testing. LNG customers worldwide require suppliers to comply with ASTM standards that, if followed correctly, will ensure that tests done to assess product composition and quality are performed correctly and are comparable wherever they have been carried out across a global industry.

Unlike some other standards, which are revised on a schedule basis, ASTM's recommendations are

Sakhalin Energy has standardized on SampleManager LIMS in its state-of-the-art LNG/OET Laboratory. Photo courtesy Sakhalin Energy.

changed whenever necessary. Standard D1945, for example, which pertains to analysis of natural gas by gas chromatography, was updated in 1991, 1996, 2001 and 2003. Revisions can range from recommendations for new instruments such as detectors or autosamplers to sampling frequencies and other changes that are equally important for compliance. An old-fashioned paper based system would require a huge expenditure of resources to monitor such irregular updates. Not only would a laboratory have to check regularly for revisions, it would also have a limited amount of time to prepare itself to modify a test. The automation provided by a LIMS gives lab managers the lead time to think more strategically about implementing these changes, some of which can have dramatic impact on existing workflows. New and updated workflows can now be prepared ahead of time, and then activated when the whole laboratory goes live with the new version of the standard, ensuring complete consistency across the organisation.

Industry-generated revisions are another area where LIMS add value to ASTM compliance. ASTM International accepts external requests to review existing methods, so if a lab employee notices that a tool, technology or technique that isn't currently in compliance with a standard actually produces superior results, he or she can initiate a review by ASTM. If ASTM agrees, this could lead to a change industry-wide.

ASTM compliance isn't easy, but it is important. With a LIMS, staff needn't work overtime just to ensure compliance. Instead, the LIMS gives lab personnel at every level the capacity and ability to analyse data quickly, efficiently and reliably with confidence that workflows are compliant with the most current ASTM requirements, and it enables users to initiate changes to those requirements if necessary.

ISO 17025 and the LIMS

ISO, (the International Organization for Standardization) is similar in some respects to ASTM, but its standards are intended more to give personnel a framework for managing to other standards. In a lab setting, ASTM gives laboratories recommended parameters, while ISO – especially the lab standard ISO 17025 – helps lab managers implement changes to meet those parameters.

ISO 17025 is widely adopted in laboratories across a variety of industries, but in oil and gas manufacturing, compliance is an absolute necessity to conduct business. As with ASTM standards, customers demand that their LNG suppliers adhere to ISO 17025 so that they can accept shipments quickly and efficiently, without the costly delays of additionally testing every single container upon receipt.

ISO standards are altered on a more regular schedule than ASTM recommendations – they are revised every four to five years – but LIMS functionality is still critical to ensuring constant compliance and proving that compliance in the case of an audit. In fact, advanced LIMS such as Thermo Scientific SampleManager 11 are preconfigured for compliance; no additional programming or bolt-on modules are required. For an onsite or third-party laboratory in the LNG industry, built-in functionality saves time, money and months of aggravation that can be associated with custom software development.

For example, sections 4 and 5 of ISO 17025 resemble a list of best practices for any lab at first glance, but what's spelled out in each section is more complex than many realise. It's nearly impossible to manage so many interdependencies and so much relational data without assistance from software. While some companies have developed home-grown paper systems that seem intuitive, ultimately they can't scale, often contain troublesome, burdensome processes and can be slow to track down data, especially during an audit. Auditors often want to follow the data trail from a test result, to an analyser's calibration history, to the qualification of the lab technician, to the approval of the result – all of which can be shown immediately in the LIMS application, but it's not so simple when dealing with paper.

An integrated data management system, such as Thermo Scientific SampleManager LIMS, is designed to manage this complexity, easing compliance within LNG laboratories and, most important, exposing previously unrecognised opportunities for performance improvement.

Conclusion

When it comes to regulations and standards, LNG companies can be sure of one thing: The rules won't become less strict anytime soon. To the contrary, standards are constantly evolving to include the latest methods for preserving safety, quality, environmental preservation and more. At the same time, compliance is in higher demand than ever: In a customer-controlled industry, LNG producers have no choice but to maintain strict compliance or risk losing market share.

But that doesn't mean standards such as ASTM and ISO should be a burden to the LNG industry. When examined closely, the standards offer keys to efficiency, safety, data accuracy and other business benefits, as long as the laboratory is outfitted with a LIMS that can properly manage the demands of compliance. The automation and integration provided by a LIMS turns adherence with ASTM and ISO standards into an opportunity to identify methods, tools and workflows that ultimately drive a better bottom line.