

## Carabao Selects STARLIMS to Digitalize Energy Drink Quality Control Testing

Thailand based Carabao Tawandang Co., Ltd was established in 2001 with the vision of manufacturing and distributing energy drinks under the Carabao Dang Brand (CBD). The company's flagship drinks rapidly gained a commercial foothold in the domestic market, and Carabao started exporting its products within just two years of its foundation.

Over the last two decades, the company has witnessed major expansion and diversification, and currently produces a wide range of drinks in various flavors and sizes for both domestic and international markets. Alongside its well-known energy drink products, Carabao also produces sport and vitamin C drinks, water, 3-in-1 coffee, and ready-to-drink coffee under its own brand name, along with 3rd party alcoholic and non-alcoholic products for distribution.

Today, Carabao group manufactures, markets, and distributes a range of drink products worldwide. The company operates a vertically integrated business model that includes its Asia Pacific Glass (APG) business, which manufactures glass bottles, Asia Can Manufacturing (ACM), which operates as a joint venture with Showa Denko Group to manufacture aluminium cans, and the more recently established Asia Packaging Manufacturing (APM), which manufactures packing materials. The Carabao Group also has facilities for bottling and canning.

Carabao has the capacity to produce over 1,200 bottles per minute and estimates that their global sales have exceeded 1 billion cans per year, with products available in 42 countries.

Carabao operates three production sites in Thailand. The company's state-of-the-art production site is located at Bangpakong, Chachoengsao Province, which manufactures the Carabao energy drinks and other beverage products. The facility, situated next to the glass bottle and aluminium can production facilities, can process 2.5 billion cans and 2 billion bottles of drink per year.

Additionally, Carabao became the official partner sponsor for Chelsea Football Club in 2016, and signed a sponsorship deal with the EFL Cup in 2017, renaming the league cup the Carabao Cup.

### BUSINESS CHALLENGES

Over the last few years, Carabao has made major investments in production equipment to manufacture the high-quality products expected by its global consumers. With a rapidly expanding business in a tightly regulated sector, the company had grown to the point where its existing Enterprise Resource Planning (ERP) and warehouse management systems could no longer support full traceability of its raw materials and products, or the scheduling and data handling for laboratory testing.



Test results were being manually recorded and physically transported from the in-house testing site to the company's headquarters in Bangkok. There, the results would be reviewed by designated personnel who would make any additional decisions and sign off on raw materials or final batch release. The amount of personnel time being spent performing these manual tasks was costing Carabao time, money, and resources. It also made auditing and achieving full traceability a huge challenge.

"We were looking for a LIMS system that would reduce the need for manual transcription and paper-based data transfer, not just to save personnel time and eliminate the likelihood of data transcription errors and loss, but to allow automated result upload and online reporting, streamline scheduling, reduce turnaround time, and also to improve overall quality and security of processes."

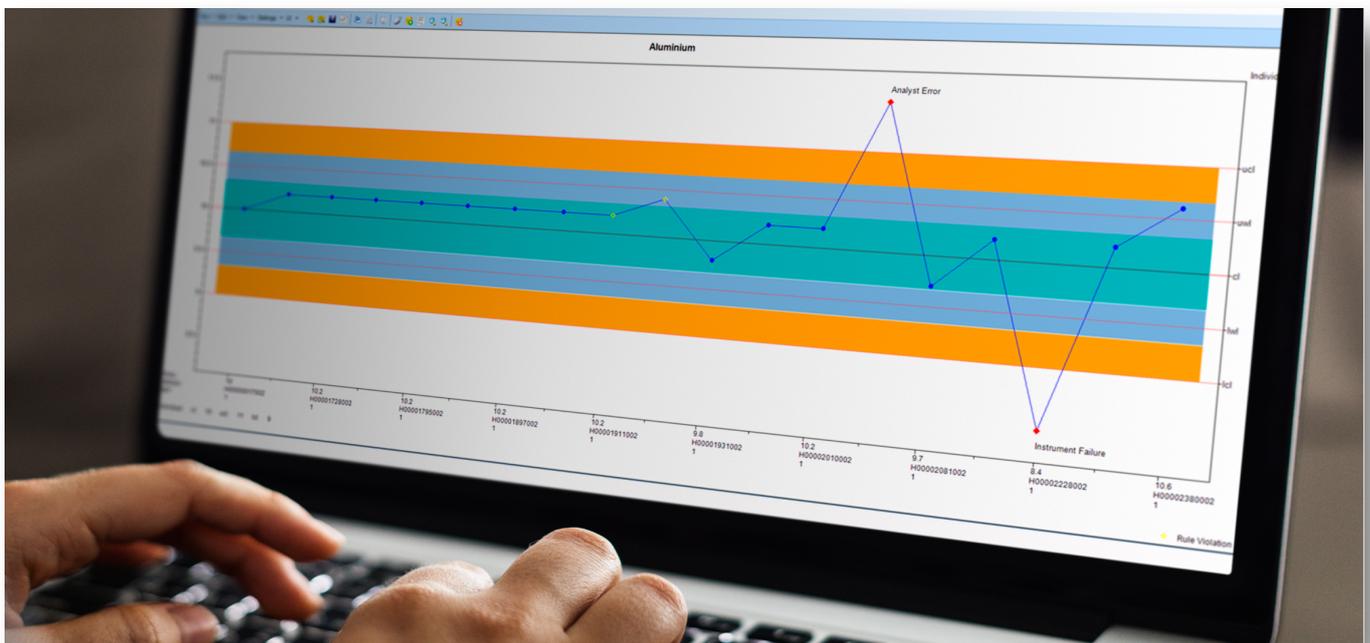
Tawatpong Supikamolsenei, Quality Control Manager, Carabao Dang Brand Factory

Additionally, each department managed its own data independently, which meant data was often times siloed within Carabao. The combination of siloed information and handwritten data files meant that there was an increased risk of transcription errors and data loss, as well as significant limitations when it came to searching for or analyzing data.

Further, a lack of digital infrastructure and connectivity within the Carabao production sites and testing laboratories resulted in delays in test turnaround time, creating operational inefficiencies and bottlenecks.

## WHY CARABAO CHOSE STARLIMS

The company was looking to invest in a Laboratory Information Management System (LIMS) that would reduce time-consuming manual activities, as well as automate test scheduling, sample management, and test results capture. It also needed a system that would upload and automatically flag out-of-specification results and quality issues, or even trigger the need to halt processing or production.



Carabao recognized that STARLIMS' LIMS solution was already used widely within the sector to support typical lab processes for food and beverage manufacturing, including raw material release, continuous process monitoring, and batch release. STARLIMS also offered features that would help the company to comply with strict international regulatory requirements, maintain data integrity, and aid inspection, as well as reduce delays, wastage, and repetition. Further, the service laboratory that carried out quality testing for Carabao was a STARLIMS customer and spoke highly of the STARLIMS solution.

Following discussions with the local STARLIMS team and a review of reference installations, Carabao selected the STARLIMS' LIMS, Scientific Data Management System (SDMS), and Electronic Laboratory Notebook (ELN) solutions within the STARLIMS Quality Manufacturing (QM) Informatics Platform to help them efficiently manage quality and laboratory operations at its beverage manufacturing facility. The system went live in April 2021.

“We selected STARLIMS system in part due to its flexibility, but also due to the development of the platform backed by extensive experience of the STARLIMS team within the food and beverage manufacturing sector. We were impressed by some of the key features of STARLIMS system, such as ANSI sampling tables for raw material testing. And the richness of the capabilities and automation make STARLIMS solution a perfect fit for our requirements.”

Tawatpong Supikamolsenei, Quality Control Manager,  
Carabao Dang Brand Factory

## THE RESULTS

Today, Carabao relies on the wide range of functionalities offered by the STARLIMS QM Platform to support hardware and software connectivity and communication, as well as automated sample handling, test scheduling, and data acquisition, handling, and storage.

The level of automation and management enabled by STARLIMS means that data is easily accessible, searchable, and available in real-time. Digitalization ensures that data won't be lost or manipulated, freeing up personnel hours and delivering confidence in quality control operations and data management. The STARLIMS QM Platform has also helped Carabao meet its compliance initiatives and internal Standard Operating Procedures (SOPs).



With STARLIMS ELN, Carabao is now able to manage the workflows and test procedures that allow for complex calculations and authorized access to raw data and metadata. The company has also been able to eliminate the manual tasks that were costing it time, money, and resources with paperless document control and management in SDMS. Additionally, Carabao now has confidence in its stability testing for packaging materials with STARLIMS Stability Study.

Carabao has significantly improved its quality control initiatives with STARLIMS. The companies will continue to collaborate together on Carabao's laboratory digitalization at its bottle and can manufacturing facilities, which will further support end-to-end automation and data management efforts across the whole organization.

“We now have confidence in the complete, end-to-end traceability of our raw materials and final products throughout processing and sample testing, to ensure fully auditable batch genealogy. The STARLIMS solution integrates with our existing ERP system and key manufacturing equipment, and can approve continuation or stoppage of a process or batch release, dependent on test results received by the system in real-time.”

Tawatpong Supikamolsenei, Quality Control Manager, Carabao Dang Brand Factory

Carabao Challenges	STARLIMS Solution	Results
Manual data entry at all stages, paper-based recording, and storage resulted in a lack of data integrity, security, and completeness. Manual data transcription also opened up the possibility for lost or destroyed data, and was a significant drain on personnel time.	STARLIMS securely automates all test-related data acquisition and reporting in the ELN without the need for manual data entry. The system also interfaces with the Carabao ERP, reducing errors and enabling data sharing in real - time. Automated, paperless operations enable more secure data management and faster, improved data accessibility.	Automated result entry, electronic reporting, and electronic signatures in ELN have resulted in much faster turnaround times and eliminated manual data entry. Real-time data accessibility and searching without concerns for data loss, integrity, or security, has helped enable compliance and better audits.
Laboratory hardware and software were not connected to the laboratory or wider enterprise informatics infrastructure, causing workflows to be disconnected. Manual data input into workflows from analytical instrumentation and other devices increased the risk for errors, stoppage time, and bottlenecks, as well as required more personnel time to manage it.	The STARLIMS system interfaces directly with hardware and software in the lab and the wider enterprise to improve automation and digitalization, as well as accelerate data acquisition, flow, security, and completeness of results, in context alongside metadata.	Carabao gained more complete data acquisition, management, access, and searching capabilities. Improved access to contextualized data and metadata provides a much better foundation for decision making, performing trend and predictive analytics, and fine-tuning operational parameters to maximize instrument utility and use of reagents and consumables.
The company's legacy ERP and warehouse management system did not support full traceability of processes and products at every stage. The high level of manual data input meant there was a greater risk for errors and potential for data loss and manipulation.	STARLIMS offers end-to-end batch genealogy. All raw materials, reagents, instrumentation usage, and human interaction with the process are documented in real - time, supporting end-to-end tracking of materials throughout the manufacturing workflow.	Carabao now has full traceability of their products, from origins and raw materials to final product. All process stages and activities are automatically recorded and retrievable. This level of traceability is critical to speed and confidence in regulatory audits or when production issues are flagged.
Without a centralized system, each Carabao site acted autonomously and kept its own records. Test documentation and results had to be manually recorded on paper worksheets and physically transported to the head office for review and sign-off – ultimately slowing turnaround times and creating inefficiencies.	STARLIMS generates online testing and result reports in real time. Scientists and managers can rapidly review, take action, and sign off on batch release. The STARLIMS system also connects with analytical instrumentation directly and will trigger production stoppage if there are anomalous or out-of-specification sample test results.	Test turnaround time is much faster. Carabao has seen reduced stoppage time and less wastage, with the ability to halt production quickly and as needed. The STARLIMS platform also makes batch release much faster with less test repetition and reliance on the physical presence of personnel, who can now view and act on results remotely.
The previous system's lack of automation and digitalization, as well as the reliance on manual data entry resulted in challenges to meet regulatory compliance.	STARLIMS helps organizations reach their compliance initiatives. The STARLIMS solution helps to prevent data loss or manipulation by tracking all data, prohibiting unauthorized personnel access, and supporting electronic signatures. The system also automates and alerts scheduling of personnel training, instrument maintenance and validation, and when vital functions are missed or need repeating.	STARLIMS has helped Carabao meet their compliance goals with its LIMS system that supports faster audits with fewer queries, resulting in a minimized risk of unwanted, costly stoppages.
Heavy reliance on manual tasks and a lack of laboratory connectivity created challenges in keeping track of inventory, maximizing instrument uptime, and scheduling maintenance.	The STARLIMS solution can schedule testing and monitor reagents, consumables, and instrument usage to maximize value. The STARLIMS QM Platform can also trigger production shutdown when there are measurable anomalies in test results, as well as flag adverse trends to enable remedial activities that will prevent future shutdown.	Carabao has greater confidence that its test processes and workflows are optimized, equipment is appropriately maintained and operating at full efficiency, and inventory is monitored to avoid over or under purchasing. The ability for automated plant shutdown if adverse tests are detected also means that the potential for batch loss is minimized.

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