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Digitalizing dairy operations

A digital revolution is causing significant changes in China's dairy industry. The China Mengniu Dairy Company Limited is leading the way in this transformation by rolling out quality control information management and enterprise resource planning (ERP) systems at 36 labs and facilities throughout the country.

In a clean and brightly lit quality control lab outside the Inner Mongolian capital of Hohhot, China, Huiping Zhang, a quality control expert at Mengniu, checks test samples using the company's Laboratory Information Management System (LIMS).

A conglomerate producing over 400 dairy products for more than 70 million customers in China and abroad, Mengniu is in the midst of a digital revolution. The dairy products giant is building intelligent factories and paving the way for a "Dairy Industry 4.0" in China. And Zhang is excited to be part of it. "At Mengniu, quality control has undergone radical changes," she says.

Growing pains
Food safety and quality control are the key factors for dairy producers. A container of milk passes through 35 vital production steps and 105 sections of testing ring before reaching consumers. In the company's early years, Zhang and her colleagues used written records for all test results, calculated formulas, and entered and summarized most test data by hand.

As the Mengnui company grew, inspectors had to process an ever-growing mountain of data. Aware of the need to upgrade, and wanting to take advantage of the opportunity to modernize its production methods, Mengnui determined to enter cooperation with Siemens to seek for innovation. The result: a twofold software and hardware solution combining the Laboratory Information Management System (LIMS) with Totally Integrated Automation (TIA) solutions.

The secret ingredient: data
Mengniu began implementing an LIMS solution on the Siemens Simatic IT Unilab platform in 2013. It developed a scientific test plan with systematic sampling points, sample sizes, testing frequencies, and test instruments to minimize deviations from manual scheduling. Test data is automatically collected and transmitted to the LIMS for calculation; at the same time the LIMS also determines if results are compliant with national standards. "Mengniu is the first dairy producer in China to implement information management of quality control, which, combined with our ERP system, enables automated management of production processes," says Song Xiaodong, Head of Quality Safety Management System at Mengniu.

Since the LIMS went live in 2015, testing times have been reduced by 10% to 25% and efficiency increased by more than 15%. Mengniu can now trace quality problems to any step, from receiving or pre-processing, all the way to the exact location in the warehouse.

Intelligent automated operation
Mengniu has also implemented Totally Integrated Automation (TIA) solutions from Siemens in all of its factories. Siemens programmable logic controllers (PLCs) regulate fluid temperature and pressure during pre-processing and Siemens flowmeters measure pure and soft water flow in filling and sterilizing machines and boiler rooms. 1LG0 motors and other PLCs monitor the positioning of filling boxes, liquid flow, and filling levels.

The company's warehouse in Hohhot is fully automated. In the warehouse, PLCs control the conveyor belt and transmit signals to robot palletizers to ensure that containerized products are stacked neatly and efficiently. Next to the warehouse, PLCs ensure delivery vehicles stay a safe distance from each other to avoid collisions.

When the LIMS finishes testing a batch, results are passed on to the ERP system and transmitted to the PLC via the warehouse management system. The PLC can then command the stackers and delivery trucks and vans to deliver the products from the warehouse.

The road to "Dairy Industry 4.0"
The good wish of "Industry 4.0" is profoundly influencing every industry. Mengniu has developed the concept of "Dairy Industry 4.0", which is leading the industrial development trend.

Mengniu hopes that its factory can realize a connection of five major systems, including Product Lifecycle Management (PLM), Enterprise Resource Planning (ERP), Manufacturing Execution System (MES), production automation and logistics automation. In this way, consumers can know all the information about products via Internet before they receive their customized dairy products through efficient logistics system.

This scene may become a reality soon from an impossible dream. Mengniu and Siemens are jointly striding forward the path to future digital factory. ∎