

Northern European sugar producer refines processes with ABB's Ability™ System 800xA Upgrade

Critical knowledge retention and increased batch production capability after SattLine conversion

01 For more than 100 years, the Northern European community has enjoyed a wide variety of syrups and packaged sugar products from this producer. The refinery produces about 850 tons of raw sugar daily and is in full production 24X5. Recently, they worked with ABB to evolve their SattLine production system to ABB's Ability™ System 800xA to preserve their most valuable asset: the expertise contained in the control engineering and operation procedures.



Where ironworkers once worked in conditions of intense heat, today, this producer's 150+ highly trained operators are engaged in the sugar production process as machine operators, process operators, service engineers and laboratory workers.

The management team for this sugar producer needed an alternative for its dated SattLine automation control system. There were several reasons to upgrade, including the need to efficiently monitor the production lines to manufacture their high degree of quality, innovative products.

However, they had heavily invested in their SattLine control system which contained nearly 20 years of production code. They had no interest in discarding this investment and starting over. So, they decided to build on their strong distributed control system

(DCS) foundation. They searched for a solution that would migrate their existing code and protect their investment. Another desired feature was batch functionality.

Driving forces for change

- Increase productivity and availability
- Simplify process changes
- Modernize the operator environment
- Introduce Batch Management

However, producers do not move quickly to make a decision of this magnitude; the final decision was preceded by three years of discussions, analysis and specification reviews.

After weighing all the technical aspects of their current control system, as well as the future requirements and demands on production, they

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02 This producer's diverse portfolio of sugar products numbers over 100, all produced differently, including tailor-made liquid sugars for many industrial customers. Liquid sugars enable customers to cost-effectively streamline their sweetening process and are delivered daily by truck or train.

chose to upgrade their SattLine system with ABB's Ability™ System 800xA. With ABB's SattLine evolution concept and the SattLine Conversion Tool, about 85 percent of the SattLine DCS controller application was automatically converted to System 800xA controller code.

ABB's Ability™ System 800xA Extended Automation platform offers easy migration from previous systems, evolution capability as system needs change, and compatibility with all leading communication protocols.

Once the contract was awarded, the conversion planning began. The driving factor in the planning process was the requirement to provide just-in-time supplies to its customers. Some of their customers buy dry sugar products and have a surplus on hand, but many customers prefer ready-made sugar solutions and have their "stock" in logistics, then in tankers. It is an on-demand system on which these customers rely; a stoppage would create a logistical nightmare.

“Our customers can place orders for sugar solutions that are sent by rail or by truck and delivered the next day. Should we suffer a system failure, the consequences would be serious pretty quickly.”

Technical Manager/Deputy Site Manager for a Northern European sugar producer



03 At the Extended Operator Workplaces, operators work in an integrated environment where they have access to all information - everything from documentation to the technical descriptions and emission reports with integrated live video (CCTV).

Step-wise evolution

To avoid plant downtime, and maintain continuous operation, ABB offered a step-wise evolution of the existing SattLine system to the 800xA control system. ABB's evolution program supports a step-wise approach in which components or process areas are upgraded individually as required, while leaving the rest of the system undisturbed.

These options utilize the system to its full potential. Step-wise evolution alleviates the need for large capital investment and the resultant cash flow impact associated with a full-scale 'rip-and-replace' approach that requires a major outage and cost-intensive engineering, design, and construction efforts. The most significant benefit for this producer was the ability to mitigate the risks associated with 'rip-and-replace,' such as poor design quality, resource allocation, plant trips, and project overruns.

This Northern European manufacturer selected ABB's Ability™ System 800xA because it provided them with the desired batch processing functionality as well as history and traceability functionality; key features for identifying production issues. System 800xA is an automation platform that unifies the ability to engineer, commission, and execute automation strategies for process, power management, electrical and safety in the same redundant, reliable system. These features are critical because the automation system controls the entire sugar refinery, excluding the packaging lines.



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Phased implementation

After a variety of comprehensive tests, the new system was introduced in three phases over two years. The first stage began in 2013, followed by a second stage a few months later and the final stage completed early in 2014. The stages were held at weekends when production was down. The goal for each stage was to enable this manufacturer to be in full production on Monday after each stage was completed over the preceding weekend. The installations involved close cooperation with all participants. During the migration, the producer developed over 200 new production process maps. The successful migration included a well-executed Factory Acceptance Testing, customized training for operators, thoroughly tested hardware with I/O connectors, and verification of approximately 20 percent of all components.

All the controllers and human-machine interfaces were replaced and the plant received its first batch control system. These batch clients are based on two 800xA systems - controlling 40 various production units. The 800xA configuration has eight AC 800M controllers (4 PM891 and 4 PM866). The operator environment was upgraded with 14 Operator/Engineering stations in addition to two Extended Operator Workplaces.

Operators now work in an integrated environment where they have access to all information using ABB Smart Client functionality on office PCs, two redundant virtual servers, five remote operator workplaces, an Information Management server and communication with SAP and LIMS (Laboratory Information Management System). The existing I/O (16,500 channels) will be replaced with S800 at a later stage.

In addition, ABB has made two deliveries of its MNSiS switchgear and two palletizing IRB640 robots. This producer also chose to do an upgrade of the burner management system to control the three boilers. ABB also supplied an analytical tool for measuring nitrogen oxides. This replaced a system that had been there since 1991 and simplifies reporting to environmental authorities, and it is fully integrated in the 800xA.

Since its introduction in 2004, ABB's Ability™ System 800xA is fast approaching 10,000 installed systems in over 100 countries. 800xA monitors and controls over 50 million tags helping ABB become a leading global DCS supplier.

Customer benefits:

- Extend automation system life cycle
- Increased production capacity and system availability
- Re-use of the existing I/O and wiring
- Modern operator environment
- ERP connectivity and batch management

The direct benefits of the new 800xA control system were numerous. The upgraded automation system gave operators access to the 800xA system's large variety of features. According to the plant's Deputy Site Manager, "the system also allows efficiency improvements and energy optimization. The new 'smart' batch processing integrated in the control system also makes it possible to detect very small errors should anything go wrong in production. It helps us ensure that our products always maintain a high and consistent quality."

ABB's batch processing has helped to increase production by 10%

Annually, over 100,000 quality checks are done by the plant's quality control (QC) group to ensure the highest product quality.

Results

The System 800xA running the factory today is supported by a current service agreement with ABB that delivers on-site response within four hours. This producer is well-satisfied with their investment in ABB's Ability™ System 800xA and assures other area producers who are considering a SattLine conversion.

Next Steps

This producer's management team is already planning to migrate again within the next three years. They are taking the necessary steps to keep up with new releases and technology by preparing to move to ABB's latest DCS, ABB's Ability™ System 800xA version 6. The sixth-generation release provides ABB's customers with many opportunities to improve operational productivity.

Other opportunities for future upgrades include:

- ABB's Ability™ System 800xA connectivity to SAP
- ABB's Ability™ System 800xA Smart Client to view plant metrics and KPIs outside of the control room
- ABB's Ability™ System 800xA Cybersecurity functionality—keeping software and plant assets secure
- ABB's Ability™ System 800xA Smart Client alarm and event analysis
- Enhanced graphics for the Operator environment
- Batch management functionality increased with more "units"
- Batch tracking functionality increased with greater utilization