

System 800xA ABB secures food cultures on time



Chr. Hansen's latest factory in Avedøre is intended to secure the company's continuing leading position in the market for advanced food cultures for the dairy industry. The factory's control systems, user interfaces, process integration and reporting systems have been supplied by ABB Denmark in close cooperation with Chr. Hansen's own engineering group.

The Danish company, Chr. Hansen A/S, is one of the world's largest producers of natural food ingredients such as cultures, enzymes, colours and functional ingredients. The company's most important products include cultures for the production of fermented milk and cheese products. A history of more than 130 years has given Chr. Hansen unique expertise, making it its customers' preferred partner. Chr. Hansen has research and development centres in more than 20 countries all over the world and factories in Denmark, China, France and the USA, among others.

From word to action in a short time

To keep pace with the increasing demand on the world market for advanced food cultures, Chr. Hansen decided at the end of 2006 to build a new factory for the production of food cultures in Avedøre. There were only 15 months from the decision to proceed until the finished factory had to be ready for production – a very short time horizon for such a complicated and complex project.

"The new culture factory, which represents an investment of 50 million euro, is intended, in addition to supplying the European market with feed cultures, to be a reference project for any future factories that we may establish around the world," says Thomas Düring, Director of Chr. Hansen. Thomas Düring is responsible for the company's 24-man strong engineering group, which maintained close cooperation with ABB in Denmark over the entire course of the project.

Danish efficiency with a global horizon

When a global business like Chr. Hansen establishes a new production facility, there is no room for local patriotism or errors. Among other things, consideration was given to whether there could be any possible advantage in locating the new factory in a country other than Denmark, although for various reasons Denmark was chosen as the home for AiR7, as Chr. Hansen's new factory with its floor area of 10,000 square meters is known.

"The production of feed cultures is Chr. Hansen's largest business area. That is why it was so important to ensure that neither bureaucratic obstacles nor a defective infrastructure could have a disturbing effect and disrupt the extremely strict timetable for the implementation of the project," says Thomas Düring.

"Our greatest product and production skills are here in Denmark, and the fact that the transfer of technology and expertise are such key parameters also spoke in favour of Denmark."



Air7, Chr. Hansen's new factory for the production of food cultures, represents an investment of 50 million euro, the company's largest single investment to date. The production control system, which is based on ABB's proven System 800xA, receives close on 5,500 signals, of which around 300 relate to feedback about the state of production and specific information of a critical nature with regard to traceability and consequently food safety.

Joint project team

A crucial consideration for Chr. Hansen was that the company's own engineering group could be included in the project team that would be responsible for the planning and implementation of the extensive project. Not only for the sake of dynamic project management, but also to ensure that the business would have access to the necessary skills to enable it to undertake programming and maintenance of the application code for the control system.

At the time when ABB became involved, only about seven months remained until the project had to be completed and the factory had to be ready for production. This made it necessary to establish a particularly efficient and flexible project organization, which was in a position to take whatever steps were necessary at short notice in order to deal with peak loads and bottlenecks in the project. Chr. Hansen wrote its own design specifications based on the concept that they had drawn up jointly with ABB. That is why it was also natural for the company to assign 5-6 men to the project team, which, furthermore, was made up of Danish and foreign employees of ABB.

ABB provided effective project management

"When ABB entered the project, the I/Os were already in place. Our task was thus to bind the units together and to undertake part of the actual engineering and integration, both forwards towards the process and backwards towards Chr. Hansen's ERP system," relates Per Larsen, Technology Manager with ABB. And I believe that I am speaking on behalf of everyone

when I state that the successful implementation of the project can be attributed to a high degree, in addition to ABB's first-class hardware and software products, to the fact that we were able to manage the project extremely efficiently in spite of the time constraints and the many changing resources.

Standard elements in the customized MES system

ABB has supplied the overriding process control system for batch processing, which is structured on the basis of ABB's standard libraries, but with the necessary client-specific adaptations.

"The system is based on the S88 concept, and the applications are based on ABB's standard libraries for batches, and components, that are designed to satisfy the requirements of S88," explains Project Manager Jim Nielsen from ABB. The components are built up with the help of objects, which gives a high degree of reuse. The system is based on interactive process images designed specifically for the plant. This means that, with a few clicks on the individual element, it is possible to see all the values, obtain an overview and details and an overview of sources of error.

"The very fact that we had access to these already tested and validated libraries contributed to our ability to ensure that we could live up to Chr. Hansen's strict timetable. At the same time, the modular nature of the design offers a unique opportunity to extend and modify the system, little by little as the need arises," says Jim Nielsen.

“On the engineering side, ABB was an outstanding partner. They were very flexible and capable of putting the necessary resources into the task at very short notice. We built the factory in only 15 months, so we were working under full pressure from the start.”

Thomas Düring, Director, Chr. Hansen.



All photos from Chr. Hansen.

The batch control system is prepared for the reuse and development of recipes without further adaptation. It is also possible to place the production orders in a queue, so that they can be processed in turn as the production equipment becomes free. The system itself is also able to work out which recipes must be processed and the sequence in which this must take place to ensure appropriate utilization of the production plant. This means that a number of batches at a time can be started, which can subsequently be processed in parallel.

Integration with the financial system

Apart from the many specific requirements for the process control system, a further requirement was that ABB's system should be able to communicate upwards to CEOPS, Chr. Hansen's own overriding ERP system developed in-house. In order to be able to guarantee this, ABB developed a client-adapted interface, which ensures that production plans can be transferred from the ERP system to the MES system, and that all the relevant data from production can be sent to the ERP system.

The production control system, which is based on ABB's proven System 800xA, receives close on 5,500 signals, of which around 300 relate to feedback about the state of production and specific information of a critical nature with regard to traceability and consequently food safety. All the data are collected in a database (Microsoft SQL server), from where reports can be generated, so that it is possible to see all process and product parameters, including which raw materials have been used, their origin and preparation.

ABB's supply

Hardware

- 15 servers, of which one virtual
- 7 operator stations
(3 operator stations each have 3 screens. The terminals for the last 4 operator stations are located out in the factory environment and are used for local control and monitoring.)
- The controllers have a profibus interface to all sensors and actuators.

Software

Complete process control system for batch processing based on the S88 standard. Uses ABB's standard libraries for batches, which gives a high degree of reuse, and good opportunities to expand and make changes in the system. The use of tested and validated libraries has played a part in being able to adhere to the strict timetable.

ABB's batch system has given Chr. Hansen the following advantages:

- Developed recipes can be reused and developed without the need for additional engineering.
- There is the possibility to place several batches in a queue, so that they can be processed in turn as the process equipment becomes free.
- Several batches can be started at the same time. The batch system processes several batches in parallel. The system itself works out what recipes must be processed on what equipment depending on the operating status.
- The system is prepared for preventive maintenance. This means that all the process and IT components can be monitored so that breakdowns can be minimized.

ERP integration

Produktionssystemet er integreret med Chr. Hansens The production system is integrated with Chr. Hansen's business system. This allows the production plans from the business system to be transferred automatically to the production system. The operators can then see the planned production in the form of a GANTT chart and can start and monitor production from here on a continuous basis. A combined overview of the entire production process in the individual production orders is obtained in this way. When a production order is complete, production data are transferred from the production system to the business system.

Production reporting

All production data are collected in a database (Microsoft SQL Server), and batch reports can be generated from this. Reports can be defined, displayed, printed or saved for subsequent documentation. Reports can be displayed on all the PCs connected to the production system without the installation of additional software. Reports can thus also be displayed on office PCs.

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