

Better production control with Industrial^{IT}

A global company with activities in pulp and paper, paint and fertilizer production recently undertook a three-stage program to fully integrate the production control systems in its specialty products sector. ABB's Industrial^{IT} platform was chosen to bring its fertilizer plant in Denmark to the forefront of innovation in production control.



Localized production of fertilizer has given way to a competitive global market in which a handful of international players satisfy the bulk of world demand. This centralization makes it possible to improve processes to increase efficiency and output. Producers nevertheless find they must reduce energy consumption and the use of raw materials in order to remain profitable and competitive. With these goals in mind, Kemira Denmark, a member of

the Kemira Group located in Fredericia, Jutland, recently completed the three-stage implementation of a new production control system based on ABB's Industrial^{IT} platform.

The fertilizer production plant

Kemira Denmark has an annual production of around 650,000 tons. Operating around the clock, the plant and its 400 employees put out no less than 100 tons of product every hour. It is this output

Kemira Denmark

Kemira Denmark is one of ten fertilizer plants operated by the Kemira Group, which has production facilities in more than 30 countries and activities that include chemicals for the pulp and paper industry, and paint and fertilizer production. Accounting for over 40% of sales, the agricultural chemicals business is by far the company's largest unit.



Kemira operates one of Denmark's main production sites for complex fertilizers.

that makes the plant one of Denmark's primary sites for complex fertilizers, acids and specialty products.

To increase output and efficiency, Kemira launched an ambitious investment plan to completely integrate the production control systems in its specialty products sector (SPS).

Three steps towards integration

The specialty products sector of Kemira Denmark comprises five decentralized plants which were originally equipped with three different DCS control systems, two PLC systems and a lot of single instruments in old mimic panels. This set-up did not provide the necessary

overview or allow complete control of the production process. Neither did the mixture of DCS and stand-alone systems allow a common control room from where all aspects of production could be monitored and controlled.

Consequently, it was decided to initiate a three-phase process to integrate the control systems, establish a common control room and renovate equipment wherever possible.

How Kemira benefits

- Increase in plant efficiency and output
- Ability to monitor and control the entire production process
- Easy maintenance and modification by Kemira's own programmers
- Adaptability to further changes or extensions in the plant
- Firm, dependable basis for second and third phases of project

The decisive facts

Kemira Denmark set four criteria for its new control system: competitive pricing; facilities to allow company employees to do their own programming; easy integration with the existing process; and a supplier who would also be around in years to come, ready to modify, upgrade and improve the system.

Kemira chose ABB as its partner because ABB's newly developed Industrial IT platform – consisting of Process Portal operator workstations and



AC 800M controllers connected by means of a redundant fiber optic cable – would provide the flexibility and efficiency needed to control the intricate SPS production.

Among the decisive factors for Kemira was the fact that ABB's Industrial IT solutions are built on the open IEC 61131-3 standard. This greatly simplifies integration with its own information and control systems. The use of open standard systems also facilitates programming, maintenance and process design, and these can be handled by the company's own programmers.

The controllers, input/output system, functionality and engineering tools are all modular and can be selected to meet each user's current needs without sacrificing a future option to add to the existing system, as needed. This adaptability is a unique feature of the Industrial IT system, which makes it a logical choice wherever future changes or extensions must be contemplated.

Aspect Object™ organized information

ABB's Aspect Object technology associates elements of production with the plant or business in which they operate. By doing so it mirrors reality, making information gathering simpler than ever before.

Plant capacity is 100 tons of finished product per hour.

“It was decisive for us that ABB's Industrial^{IT} solutions are built on the open IEC 61131-3 standard, which greatly simplifies integration with existing control and information systems.”

Volander Rasmussen, Kemira Denmark

The technology allows easy access to all available information by clicking on the relevant object. At the same time, different aspects enable every user, from operator to senior management, to zoom in on exactly the information they want, without having to navigate endless amounts of irrelevant data.

First phase integrates three plants

In a first phase Kemira Denmark chose to install and implement the new

Industrial IT control system in its ion exchange, vacuum dehydration and calcium chloride plants. Installation in further plants, and renovation of the production equipment, will follow.

The finished installation features a common control room with four Operate^{IT} Process Portal operator workstations, three local control rooms, each with one Operate^{IT} Process Portal workstation, an engineering room with an Engineering Studio and with Control Builder, as well as six Control^{IT} AC 800M





ControlIT AC 800M controller and S800 I/O units in the Kemira plant

controllers distributed throughout the plant. The system includes more than 3600 I/Os, a 1000-meter fiber optic plant network and a similar control network connected on two parallel Aspect and Connectivity servers to provide redundancy as a back-up.

An ambitious plan

Following weeks of intensive collaboration between Kemira Denmark and ABB,

the production processes of the three plants were seamlessly integrated and the control system was subjected to two tests. The first was the usual factory acceptance test at ABB in Denmark. Second, after installation but prior to commissioning, came a site acceptance test at Kemira Denmark.

Both of these tests are routine in all ABB projects and are an important contributing factor to the rapid implementa-

tion of the company's process control systems, reducing downtime to minimize loss of production.

It took ABB only three days to completely re-cable the three Kemira plants. And installation and commissioning were carried out with a plant downtime of only eight days. This is an impressive result considering the huge logistical challenges and complexity of the facility. Further, after just two days of commissioning, the fertilizer plant had resumed 80% of normal production. (LM)

For more information, visit www.abb.com/chemical

Fertilizer – a sophisticated product

Kemira's plant is one of the largest fertilizer producers in Denmark. The plant specializes in complex fertilizers based on nitrogen, phosphorus and potassium. Specialty chemicals include dicalcium phosphate (DCP), which is used in feed mix, and potassium nitrate, a specialized fertilizer used with irrigation equipment.

DCP is made using an advanced and patented ion-exchange process to ensure a pure product and high output. Phosphorus is supplied from Kemira's

own mines and shipped to the company's port facilities adjacent to the plant.

Nitric acid is produced on site by burning ammonia. The resulting nitrogen oxide (NO_x) is dissolved in water to produce nitric acid (HNO_3), the main source of nitrogen.

The manufacturing process involves the mixing of raw phosphorus with nitric acid and the subsequent addition of potassium, micronutrients and acids to ensure

that the finished product is soluble in water.

The resulting slurry is dried in a so-called spherodizer, where the liquid product is sprayed on to reprocessed granulated fertilizer. The granulate is dried using hot air, which passes through the spherodizer together with the fertilizer. The aim is to produce perfectly spherical granules with a very even particle size to ensure efficient spreading of the commercial product.