

Smart automation and power integration in accordance with IEC 61850 at chemical plant



Kemira Kemi has decided to modernize its incoming substation. This was done to improve the safety of the staff who worked with electrical power, to increase the reliability, availability, energy efficiency and capacity.

“The old system was installed in the late 60’s,” says Arne Jönsson, electrical manager at Kemira Kemi. “A system like this has an estimated service life span of 30-40 years, and this business is dependent upon power around the clock, every day of the year.”

“Operational changes to incoming power was made with help of long checklists on site of the switchgears. This resulted in cumbersome and time consuming operation and meant that there were few people who could handle the installations.”

Kemira is located in southern Helsingborg, near Öresund. It is an impressive facility. Someone has figured out that the factory surface area is equal to the principality of Monaco.

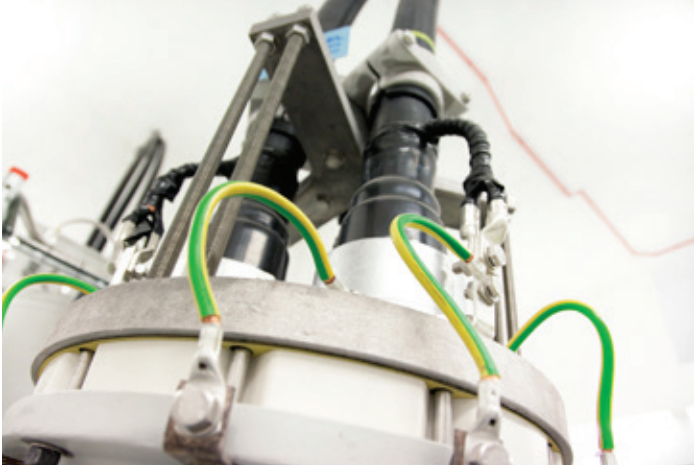
Aside of Kemira Kemi AB on site there is also IPOS- Industry Park of Sweden. It is an industrial park, owned by Kemira, with the ambition to attract more businesses to the area.

“But soon we ran into difficulties with taking on more business,” says Mats Åberg who is involved in projects and construction at Kemira Kemi. “It was getting crowded in the switchgear and the possibility to add more output cables to support new businesses with electric power was limited. Electric power came from Öresundskraft AB’s switchgear by 50 kV cables.”

The fact that capacity was nearing the limit was another reason to look at the electrical system. So Kemira began to seriously examine the facility and what needed to be done.

“This resulted in a plant analysis conducted by ABB,” says Arne Jönsson. “It pointed to the risks of service disruptions to the former system.”

“We know what needs to be done and then the system knows the order in which it will happen. No need to run in front of the cabinets and control the switches.”



System 800xA provides monitoring and control of electrical equipment in operator control rooms and office environment.

After some time, the situation had become such that it was time to act. ABB procured a 35-million project contract. Work to install the new systems was a challenge. “Everything must be done in time and on existing premises,” says project manager Jörgen Persson.

On October 27, it was time for energizing of the new switchgear, there after the process of transferring all outgoing cables to substations began. On the 13th December the last cable was moved and the old substation was finally extinguished. The installation and commissioning were done in steps and under full production. ABB’s delivery was completed in 1,5 months – a remarkable short time for a quite complex and demanding mission.

Today there are two incoming 132 kV lines through two parallel ELK-O GIS switchgears and transformers feeding down to two 6kV networks with parallel rails and UniGear switchgears.

This solution achieves a redundancy which means that five different operating modes can feed the entire plant with only one incoming cable, one of the two GIS switchgears, one of the two 6kV rails etc.

Protection of electrical equipment and the switching between modes is done by Relion IEC 61850 protection relays (RET670, REF630 and REF615) linked to an 800xA system. This solution provides a highly reliable service and easy switching between operating modes and clear insight into the power system through the data from the protection relays to 800xA monitors, for operations, logging and trends.

“In a stress situation, for example, power failure on an incoming cable, we can go into the automation system and reconnect the entire 6.35-kV switchgear from pre-programmed sequences,” explains Arne Jönsson. “We know what needs to be done and then the system knows the order in which it will happen. No need to run in front of the cabinets and control the switches.”



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An example of reliability was when we had a cable failure on the grid of for an incoming 132 kV supply. Half the plant was dead, because you normally run 50/50 on the two incoming 132 kV lines, but through a few keystrokes in 800xA we linked to another mode and the entire facility had power again after 15 minutes. Previously this would have meant hours of troubleshooting and manual switching through panels in switchgears. If it were not for the parallel design a cable failure would have caused several days shutdown before the fault would be located, the cable dug up, repaired, etc.

Today, the 800xA system is primarily for control of the five operating modes, and monitoring and alarm management from the electrical system. Future features Kemira want to incorporate are a clearer monitoring of consumptions that would also be used for internal billing of energy. Energy costs are accounted to the respective facility and operating costs and energy costs are high so there is a strong focus on

energy efficiency.

With 800xA integration in the electrical system, it is now possible to log and follow trends of consumption more or less in the seconds time scale. Previously consumptions were reported as a lump sum every month. Now you can for example monitor how different loads such as intermittent operation of the compressors give instantaneous increase in power consumption. This accuracy has not been possible before, and Kemira believe this will be an important tool to further track electrical energy flows and improve energy efficiency. Kemira are convinced that in addition to electrician personnel several different personnel groups should have access to data from the electrical system for reporting and monitoring.

Some facts about Industry Park of Sweden

Industry Park of Sweden in Helsingborg, Sweden is a facility supporting companies who want to locate its operations in the south of Scandinavia. Kemira plus a dozen industry enterprises like Air Liquide, Perstorp, PNO, Yara are today active in the industry park. The facility has a logistically attractive location with easy access to central Europe via its modern harbor plus via the European rail and road networks. The park was up to 2003 owned by Kemira and has since 2006 been converted to an industry park when different companies started to establish here.

Facts of the ABB delivery

The redundant System 800xA installation includes:

- 1 AC 800M controller with S800 I/O for control and interlock signals to protection relays.
- IEC 61850 Connect to control and monitor substation protection relays from 800xA clients.
- 2 clients (one located in the switchgear room and one located in the site engineering office).
- Information Manager for long time data storage.

A complete delivery with functional responsibility from ABB containing:

- Project implementation
- 145 kV gas insulated switchgear type ELK-O
- 35 MVA transformers 140/6, 35 kV
- 6 kV Switchgear type ZS1 UniGear
- Relay Protection from Relion series type REF615, REF630, RET670.
- Redundant System 800xA solution with AC 800M and IEC 61850 integration of protection relays.

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