

Higher energy efficiency and lower environmental impact at Skoghall Mill

Client:	Stora Enso Skoghall Mill
Headquarters:	Skoghall, just south of Karlstad, Sweden
Delivery:	Automation system including system integration and commissioning of a new power supply and recovery installation. Electrical and instrument equipment for portions of the installation.

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Over a period of just a few years, Skoghall Mill has invested over a quarter of a million dollars in a project that safeguards its power supply and enhances cost-effective production. The project includes a new recovery boiler and an evaporation plant, as well as a converted biofuel boiler. ABB provided Skoghall with automation systems, electrical equipment and instruments.

The main component of Skoghall Mill’s Energy 2005 project is the mill’s new recovery boiler which was installed in the summer of 2005. The building that houses the boiler features an imposing 72-meter high facade that now serves as a landmark for boats on Lake Vänern. The equally new evaporation plant has a row of silo-shaped towers between the pulp mill and the recovery boiler. Near the lake, an oil boiler is being converted into a biofuel boiler.

“The elements included in the Energy 2005 project contribute to raising the degree of electrical self-sufficiency, from 15 to 40 percent, and to reducing annual oil consumption by 60,000 cubic meters,” says Peter Olsson, project manager at Skoghall Mill. “More efficient energy use and conversion to biofuel also gives us significantly lower carbon dioxide emissions, while at the same time other emissions are also reduced from the card mill.”

Multifaceted project

At the end of 2003, Stora Enso decided to move forward with their comprehensive project. The first phase included the recovery boiler, evaporation plant, CTMP evaporation plant, malodorous gas system, tall oil plant, conversion of turbines to back-pressure turbines and steam systems, and a new control room. The second phase included a conversion of the oil boiler into a biofuel boiler and a fuel-handling system.



Peter Nilsson, production engineer at Skoghall Mill.



Common control room for the entire mill with the most modern technology from ABB.

Olsson explains that the mill's decision came about because Skoghall Mill had two old recovery boilers in poor condition that were in need of replacement. "Moreover, oil consumption was high," he says. "We saw opportunities to reduce various emissions from the mill, and at the same time, to invest in future development."

One of the selected suppliers for the project, ABB delivered low voltage switchgear, process motors, drives, instrumentation and a complete automation system for the project's first phase.

"In choosing suppliers, we looked for the most modern and most reliable technology," says Olsson. "If the recovery boiler is down for long, no liquid cartons are produced and this means no milk in our refrigerators."

At the time they made their supplier selection, Skoghall Mill was already using ABB Advant and ABB Masterpiece in various process areas. The ABB automation included a new system that covered Skoghall's entire recovery process.

After project management conducted a careful evaluation of ABB and three other system suppliers, ABB came out on top. "ABB presented a good overall concept for the system with its sensors and component parts," says Olsson. "It was a good fit with today's maintenance approach, with products that automatically provide information and make this information easily accessible from any location. This was where we wanted to go and this requires a comprehensive supplier."

Operators control 800xA

Modern technology reigns in the well-lit and well-designed control room where the operator stations are arranged in a circle. Previously, there were six different control rooms for the recovery boilers, evaporation plant and other recovery processes. The operators are now in the same room and can view the entire flow via the many screens, with ABB's System 800xA providing the operator interface for control and monitoring.

"For some operators, this has meant a step from manual control to the most exciting and modern control that ABB can supply," says Olsson. "We've invested a lot in training, and all in all everything really works well. Availability for the entire recovery installation has been very high during this first year."

The mill's operators particularly appreciate that the process measurements are clearly displayed. The two operators who run the new evaporation plant point out that the dry matter content of the black liquor has increased from the 15 percent it had been in the pulp mill to 81.46 percent.

The operators say that the old evaporation plant normally produced a dry matter content of 66.5 percent. Now the plant produces 80 percent, which is pure rocket fuel for the recovery boiler and reduces oil costs for the mill.

From sensor to server

The black liquor is injected into the recovery boiler via a series of nozzles around the boiler hearth. Tubes and pumps lead to the boiler. Here and there, ABB process motors, instrument circuits and other electrical equipment can be seen.

The control system for the recovery boiler includes 900 sensors and close to 2,000 instrument circuits. These are integrated with the field buses, I/O units, AC800 controllers and large servers that make up the automation system in its entirety.

"They are conventionally constructed, however the system platform has been enhanced with application solutions developed especially for the pulp industry by ABB's specialists in its Pulp & Paper business unit, and then further enhanced with project solutions specific for Energy 2005, in which both consultants and Skoghall's system managers have been involved," explains ABB's account manager Lars-Gunnar Josefsson.

Skoghall Mill's Peter Lindh, who has been involved in the procurement of instruments and automation, says that the mill chose to have substantial system capacity.

"It includes a large number of servers to increase safety," says Lindh. "We've also arranged connections to older 450 networks and an information system for logs and histories for producing reports and operational statistics.

Moreover, we've attained increased availability to process data by the automation system being accessible as graphic images from any computer in the mill. Everyone can see what's happening, but naturally not affect anything."

Lower emission of foul odors

Phase 1 of the project included a malodorous system with a gas boiler for incineration of the strong, noxious gases from the mill.

This boiler's control system has also been supplied and installed by ABB. The system is partially integrated with the large automation system for the recovery process and is partially independent.

"We've now complemented the strong malodorous gas system with an extra reserve incinerator that is operable even in the event of a blackout at the mill, power fluctuations or computer failures," says Olsson. "The boiler is therefore also equipped with a UPS system for control systems and functions out in the mill, such as necessary motor operations. The gases are not dangerous but they have a very unpleasant odor."

Flying start

In the fall of 2005, the recovery boiler, evaporation plant and other installations in the project's first phase were installed. On September 29, 2005, Skoghall's operators were ready to start up the new recovery boiler, with a full overview of the already commissioned 800xA control system.

"We managed to get off with a flying start - 'hot switching' from the older recovery boilers during operation," says Olsson. "The control system and all other equipment had to work from Day 1."

ABB account manager Josefsson carefully monitored the project's progress and startup. As with most large systems, there were details to modify and improve.

Josefsson explains that in this type of large project, ABB's business unit Pulp & Paper could use its expertise and extensive experience to ensure a secure foundation for the installation.

"On the other side of the coin, these projects contribute to raising the demands on ABB," says Josefsson. "For example, Swedish process industries are much more advanced in their demands on ABB's products and on our project management in regard to time and execution."

Adds Josefsson: "There are also high environmental demands in the projects. Swedish customers take a very strong environmental approach."

Phase 2, which included the biofuel boiler, was commissioned in the summer of 2006. In September 2006, inauguration of the entire Energy 2005 project was celebrated by the participants with festivities. Olsson is very satisfied with the results during the first year of operation.

"The entire process installation has worked well, with high performance and high reliability. This is really nice to see," Josefsson says.

He is also happy that the environmental objectives are on their way to being fulfilled.

"We had set the objective of reducing carbon dioxide emissions by 170,000 tons per year, which is ten percent of the combined emissions from the Värmland region. This is a tangible contribution to the world's eco-political objectives concerning global warming," says Josefsson. "The results have probably been even better than this. Oil costs are lower than what we had expected. Additionally, emissions of nitrogen oxides and sulfur oxides are noticeably declining."

With the new installation, energy production at Skoghall Mill during the next thirty years will be primarily based on black liquor and biofuel. Although annual electrical production is rising to 400,000 MWh, the environmental impact is much less than before.

A success story in a large format!

Facts about Skoghall Mill

Skoghall Mill is situated south of Karlstad and is a part of the Stora Enso Group's Packaging Products unit. The mill is an integrated card mill with two pulp plants, a sulfur plant and a CTMP plant for chemical pulp, and two card machines.

In 2005, about 700,000 tons of card products were produced, primarily for food packaging. Skoghall Mill is a world-leader in producing cartons for milk and juice packaging. Other products the mill produces include cartons for dry foodstuffs and liners, and surface layers for cardboard boxes.

Skoghall Mill also has operations in Forshaga, where some card production is coated with plastic. Overall, the mill has approximately 950 employees.

ABB's delivery

The delivery from ABB included:

- Control system 800xA with system integration and application solutions.
- 9 AC800 process stations, 6 operator stations, 15 thin clients.
- Application programming, system configuration and commissioning.
- Low voltage switchgear type MNS with Insum integrated in the control system.
- Instrument equipment for flow and pressure with superimposed Hart integration.
- High-power motors from the M3BP series and drives from the ACS800 series.
- Project management, construction, configuration, commissioning and training.



Skoghall Mill, south of Karlstad is a world-leader in producing cartons for milk and juice packaging.



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