

Metso Automation's Delivery Scope

Automation with Optimization

- Recovery Island
 - Causticizing
 - Evaporation
 - Lime Kiln
 - Recovery Boiler
 - Soot Blowing

Fiber Lines 1 & 2

- Continuous cooking
- SuperBatch cooking
- Bleaching

Process Automation

- Tall Oil plant
- Steam turbine
- Fiber Lines 1 & 2 (upgraded to metsoDNA)
 - Stock Preparation
 - Screening
 - Oxygen Delignification
 - Drying machines

Drying Machine Quality Control System

PaperIQ

Information Systems

- Causticizing
- Steam Turbine
- Stock Preparation
- Continuous cooking
- Screening
- Oxygen Delignification
- Bleaching
- Bale Handling

Kajaani Analyzers

- Causticizing
- Cooking
- Bleaching

Neles Valves

- More than 1000 throughout the mill
- FieldCare asset management system



**Total Automation Capability
to UPM Wisaforest**

Metso Automation Inc.
 P.O. Box 237 (Lentokentänkatu 11)
 FIN-33101 TAMPERE, Finland
 Tel. +358 20 483 170
 Fax +358 20 483 171

www.metsoautomation.com



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An attitude of **continuous improvement**

In April 2004, UPM's Wisaforest pulp mill in Pietarsaari, Finland, started what was then the world's highest capacity kraft pulp recovery line. On the official opening of the new recovery line on August 24, 2004, the largest recovery boiler in the world burned a world record of 4,700 tons of black liquor solids. Automation for the project as well as two fiber lines was supplied by Metso Automation.

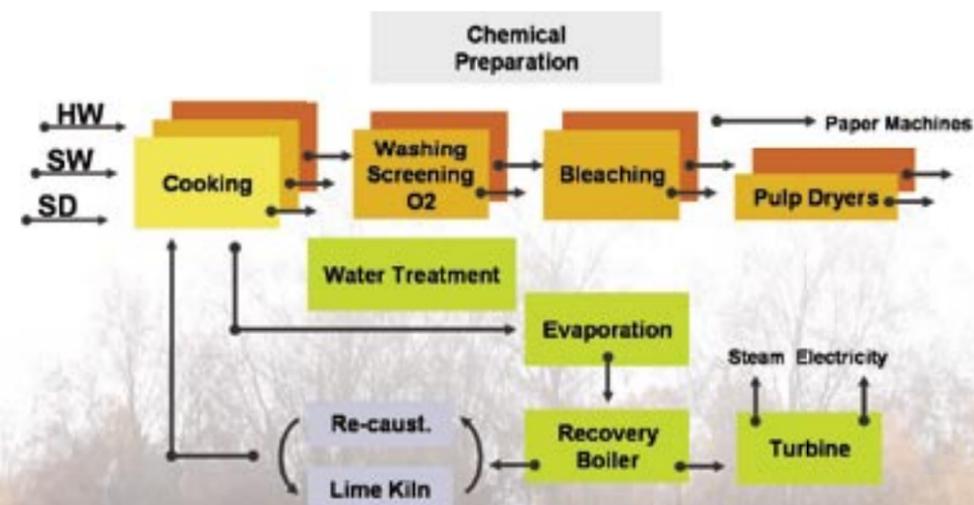
Located 470 km northwest of Helsinki on the Gulf of Bothnia's coast in Pietarsaari, Finland, the UPM Wisaforest pulp mill produces pulp for bags, sacks and various industrial operations. The pulp mill was originally constructed in 1935 and was designed around a sulfite process. The plant switched to kraft pulping during a 1962 rebuild, and in 1976 underwent major upgrades to the hardwood and softwood pulp lines. Production capacity today is 800,000 Air Dried tons per annum (ADt/a) of pulp. The mill generates its own power and is entirely self-sufficient in this respect. Slightly over 23 percent of the mill's pulp goes to its integrated partner, the UPM Wisapaper paper mill (180,000 ADt/a of kraft and sack papers), while the majority goes to other UPM mills and the open market.

Increasing Production

When the decision was made to raise pulping capacity by one-third, Wisaforest quickly realized that its pulping line was a lesser concern. Instead, it was the two outdated recovery lines that had to be renewed, as this was creating a bottleneck. In 2002 UPM started construction of a new single-line recovery island as part of a 284 million euro mill expansion project to increase Wisaforest's pulp production to 800 000 ADt/a. The project, suitably called Wisa800, was completed in a swift 22.5 months. The new recovery line has significantly reduced emissions per ton of pulp produced and improved cost efficiency. As with all modern pulp mill processes, automation played a major role in the success of the startup. Good

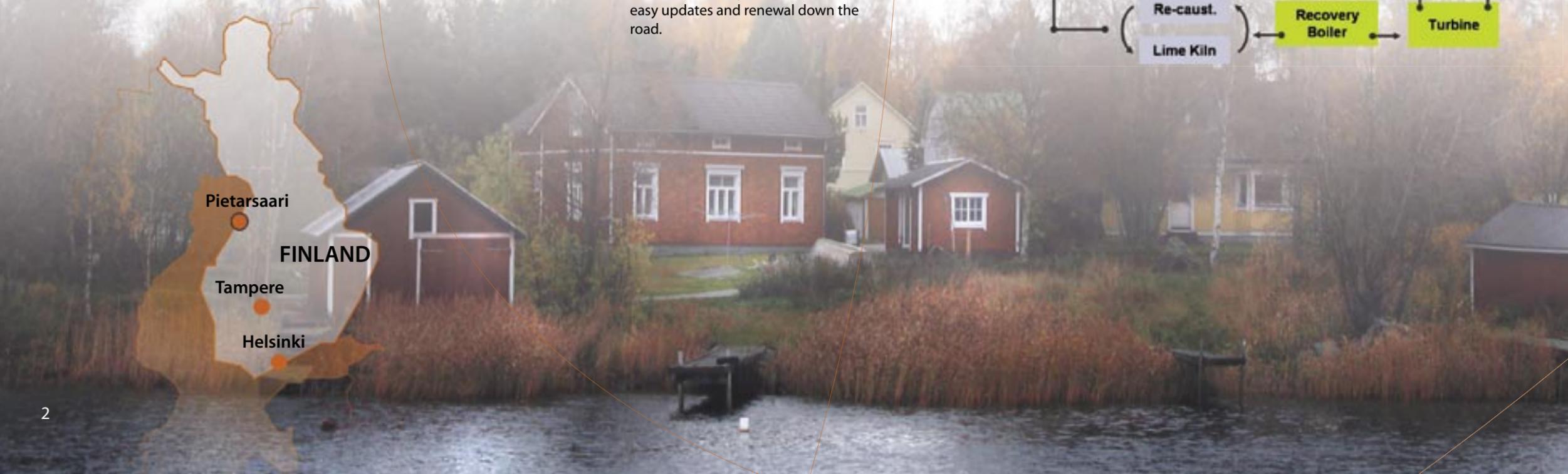
control enables rapid ramp up to full production capacity and the continuing optimization of product quality and productivity in the future. For this important process startup, Wisaforest's requirements for the automation supplier were very exacting.

The choice of supplier, however, came down to more than technology. Since Wisaforest's own engineers were well versed in technical administration, it was important to find a qualified supplier who could provide added value in the form of interaction. Metso Automation, with its extensive expertise, nearby development facilities in Tampere and a local service unit in Pietarsaari, seemed an ideal match. Moreover, since Metso solutions are built on industrial standards, the choice of Metso Automation as a partner would allow easy updates and renewal down the road.



Case facts

- 2 Fiber Lines
ECF with oxygen delignification
800,000 ADt/a
- Cooking
continuous digester (hardwood)
continuous digester (sawdust)
8 SuperBatch digesters (softwood)
- Evaporation Plant
1 050 tons/hour
- Recovery Boiler
4 450 tons dry solids/day
- Recausticizing
10 000 m³/day
- Lime Kiln
4,75 x 135 meters
750 tons/day



Pietarsaari
FINLAND
Tampere
Helsinki

Choosing **Metso** as a partner

metsoDNA

The new recovery line is totally automated with metsoDNA, and the line's process information is managed through an extensive metsoDNA IA (Information Activity) system. In addition to complete process, motor and sequencing controls, metsoDNA provides process optimization controls for the evaporation plant, the recovery boiler combustion process, sootblowing operation, causticizing plant, lime kiln operation, and steam load leveling. This was also the first installation of DNArecline for optimizing the entire recovery line. metsoDNA systems are also used for controlling two fiber lines – an 8-digester Metso SuperBatch process with two new digesters, a continuous digester process, and a new sawdust pulping line.

The previously installed fiber line systems had been upgraded earlier from Damatic XDi, retaining the original base automation but now with metsoDNA operator stations. The ability to provide modular and scalable upgrades is a Metso specialty. The metsoDNA control also extends to the new tall oil plant and provides the operator interface for the new turbine generator control. Metso Automation also delivered over 1,000 automated Neles control and on/off valves, numerous manual valves and a large package of Endress+Hauser magnetic flow meters. PaperIQ quality control systems on the pulp drying machines were also added as part of the related project to increase drying machine capacity.



The New Recovery Island

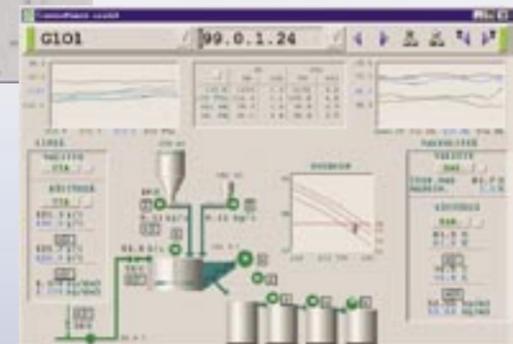
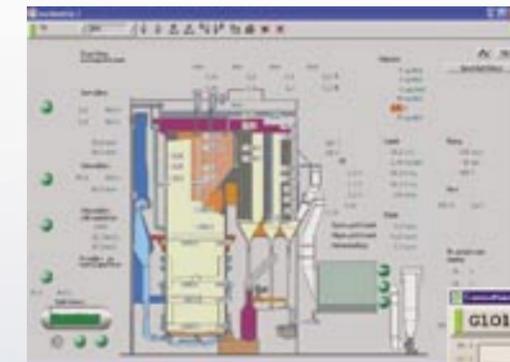
Black liquor evaporation is carried out in a 7+ stage evaporation plant with a capacity of 1050 t H₂O/h for a dry solids content of the heavy black liquor of 85 %. The **DNAeva** optimization maintains desired dry solids content profile by coordinating the feed-, medium-, and strong liquor dry solids controls. The result is stable black liquor quality with low specific energy consumption while extending washing intervals. **DNArecbo** is designed to stabilize and carefully control the combustion of black liquor, a process that is difficult due to the relatively low heat value of black liquor. Maintaining low SO₂ and TRS emissions and ensuring safety of the boiler operation are key targets. The main burning control functions are black liquor spraying control and combustion air control.

DNAsoot optimizes sootblowing steam consumption. It enables the maximum transfer of heat from flue gas to water and steam while monitoring the fouling of different boiler sections for

sootblowing where and when needed. The back-pressure turbine generator is the largest in pulp and paper with a maximum power generation capacity of 143 MW.

A Kajaani automatic sampling and titration analyzer for green liquor, lime milk and white liquor, supports causticizing control with **DNacaust**. The advanced control of green liquor TTA-, causticizing degree-, and slaker, eliminates over and under liming, resulting in a stronger and more stable white liquor. The lime kiln burns mostly tall oil, some 65 to 70 %, recovered from the process and heavy fuel oil. The **DNAlime** optimization supervises the lime kiln burning process and filling degree at optimum residual carbonate level. Fuzzy logic controls are used to optimize the temperature profile in the 135 meter long kiln, enhancing energy efficiency and kiln availability while improving reburned lime quality and reducing emissions.

The fiber line operators and the recovery line operators are now side by side in the integrated control center.



Round-the-clock automatic control



"Recovery operations typically suffer from shift to shift variations because of the long time delays but here we have 24 hour automation and continuity of operation."

Kaj Nordbäck, power and recovery plant manager is enthusiastic about the process control and information management. He says, "Its easy to get information. The trends I have available from the DNA information activity tell me exactly how the plant is running." When asked about times before the big recovery island, he smiles and just says that controlling the two old lines was, "interesting!" On the optimization packages supplied by Metso, he is more emphatic, "Quite honestly I did not believe that they would be as good as they have proved be. In the more than two years after start-up, the controls have worked very well. The operators see the advantages and automatic control is on all the time."



"We tested everything possible and it took time but it was time well spent. We had very few surprises during start-up."

Raimo Lahtinen, automation engineer, attributes much of the automation's success to the comprehensive factory acceptance testing before delivery. The successful startup was aided by a recovery boiler simulation system implemented in a "virtual" metsoDNA system. Operators were able to learn about the operating characteristics of the new boiler and particularly about the new metsoDNA operating controls. Wisaforest operators were experts at recovery boiler operation, but they needed pre-startup experience with the new-look controls. The simulator is still in use today for training operators and can also be used to check later process modifications.



"The dioxide dosages we run today are very much lower than ten years ago."

Tero Virkkala, pulp mill production manager, is happy with the fiberline controls, "We can run the same grade from one week to almost a month, so things remain pretty stable." The two pulp drying lines are equipped with Metso Automation's quality control systems using PaperIQ scanners for measurement and control of basis weight and moisture.

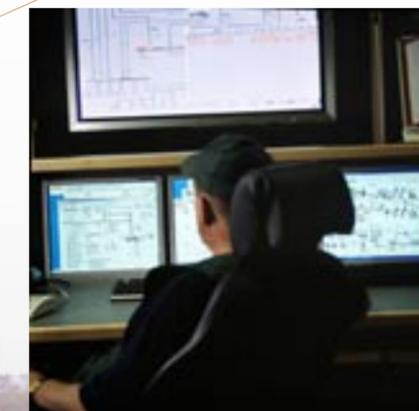
Fiberlines

The Fiberline controls were updated in 2004 with metsoDNA operator stations integrated with the existing Damatic XD base automation. Both the super batch digesters and continuous digester lines are under the control of DNACook. Two bleaching lines, hardwood and softwood are elemental chlorine free (ECF) and rely on Kajaani analyzers for control of bleaching chemicals.

Availability

High process control availability through simple-to-use online diagnostics tools, allow mill personnel to detect and quickly correct; process, interface and control problems. The use of the Profibus standard is widespread across the process. Over 1,000 motors are linked in this way. Sectional drives on the pulp drying machine are controlled directly from metsoDNA through Profibus without separate controllers. Also, Metso Automation's FieldCare asset management system diagnoses potential or impending service or process control problems by networking over 1,000 intelligent Neles valves to remotely located diagnostic terminals. Numerous Modbus and OPC links to external systems, safety protection systems and measurement devices, provided by other suppliers, underline

the external connectivity of metsoDNA. Networking is a key issue for a modern automation system and Wisaforest's automation experts foresaw a clear shift from an internal (proprietary) network to open, external standards.



There is an attitude of continuous improvement at Wisaforest. Process improvements today are incremental and require a great attention to detail, Wisaforest together with Metso Automation have the process experience, knowledge and just as important, the tools to keep on improving.