



Energy savings
The profit opportunity is yours

Power and productivity
for a better world™



80 percent of available energy is wasted and only 20 percent becomes the power we need. ABB technologies can reduce waste by 20 to 30 percent.

FUEL

ELECTRICITY

ENERGY



Three hotspots for energy savings opportunities:

- Power
- Process
- Performance

PROCESS

The challenge

Without exception, the costs associated with powering a mill are increasing. More so than ever, maintaining profitability is directly tied to efficiencies in power usage and operations.

ABB is a global leader in power and automation technologies and has unparalleled expertise in the pulp and paper industry. This combination provides papermakers with the practical experience and expertise needed to identify energy savings solutions for virtually any type of mill—from small to large, board to tissue, and stand alone mill to multi-mill corporations.

ABB experts have been helping organizations identify energy savings opportunities for years. This means eliminating the risk in decision making and providing papermakers with the action items needed to develop and follow a roadmap that results in mill improvements and payback.

While every mill is unique, all have areas where substantial energy savings can be realized. ABB offers a team of experts who can uncover those opportunities from top to bottom—from mechanical opportunities, right through the forecasting and situational energy usage, as well as energy procurement, generation, distribution and consumption used in the papermaking process.

POWER

Energy efficiency begins with a well designed power distribution and electrification system.

POWER



PURCHASE

GENERATE

Energy savings opportunities in power

Total power distribution and electrification solutions

It is critical that components used in an electrification solution are energy efficient. ABB offers complete power distribution and process electrification solutions, which reduce energy consumption and optimize energy use.

Whether your project is a major upgrade or greenfield, ABB can design your network and recommend the voltage levels, circuit capacities and proper electrical supply that will guarantee the best long-term reliability.

Choosing the right voltage levels can make a substantial difference in a mill's electrical consumption. ABB can model your network assuring you a properly sized network dimensioning to save energy from day one.

Energy Management Software

Mills with multiple energy sources available to power their operations now have an option for an integrated power plant solution. ABB products have been developed to support the energy business from both operational and economic perspectives.

The business intelligence applied to your company's energy policy ensures that you never miss savings opportunities, or overpay due to human error or lack of visibility.

Liquid Cooled Drives

Liquid Cooled Paper Machine Drive Systems reduce the need for air conditioning to cool drives, creating huge savings opportunities.



PRODUCT

Direct Drive

Dramatically reducing the need for mechanical drive components by having the motor directly coupled to a paper machine section, Direct Drives save space, energy and money. Elimination of the gearbox alone reduces several percent of the power required for operation.

In addition, the permanent magnet motor can deliver more torque from a smaller unit when hooked up to a paper machine without a gearbox.

Metering

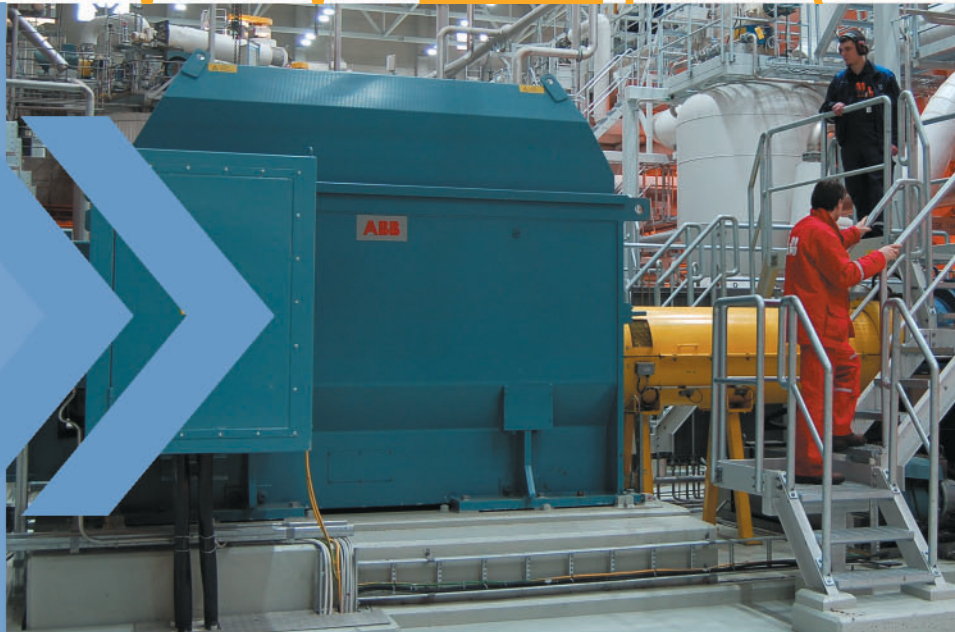
Metering systems offers energy savings opportunities by showing where your energy demands are and how much you are consuming. ABB offers electrical, water, steam and compressed air flow meters. One example is the ABB DeltaPlus Submeter, which is used to distribute and meter the costs of electrical power registered by utility meters at delivery points. It lets users see exactly where energy is being used—and overused—to help you determine the best course of action.

INEFFICIENT
EQUIPMENT

The purchase price of a motor is approximately 5 percent of its long-term cost of ownership, while 90 percent of its cost relates to the energy to run it.

POWER

POWER



Reduce energy consumption in motors and drives

Electric motors account for an estimated 65 percent of industrial electrical use. Any increases in efficiency clearly provide the potential for major savings. Energy consumption by electric motors can be reduced in two main ways:

- Implementing efficient control over the speed at which they run
- Increasing the efficiency of the motors themselves

High efficiency motors- Over its life, a motor can cost 15 to 20 times more to run than to buy. A high-efficiency motor can pay for itself many times over in energy savings. ABB motors are not only highly efficient, but they also provide superior reliability and availability, ensuring increased savings and uptime.

Making motors an energy savings opportunity is more than dropping in hardware. Dimensioning of the motor arrangements has an important effect on cost and reliability, and adjusting reactive power and filtering harmonics impacts a mill's bottom line costs. Our experts help organizations realize savings through right-sized motors, while increasing reliability and reducing operating costs.

Drives- Replacement of mechanical drives by electric drives using variable speed can cut energy bills by as much as 60 percent. For example, a pump or fan running at half speed consumes only one quarter as much energy as a unit running at full speed against a throttle type control.

Switchgear Improves Power Factor

About 5,000 motors at Skoghall are controlled by ABB low-voltage switchgear, including 400 that are linked to ABB's latest switchgear technology, a motor management system called MNS iS.

MNS iS collects and analyzes data from motors and uses it to control them during all phases of operation. This monitoring and control enables the system to achieve a better power factor, meaning more of the power consumed is actually getting to the motors.

MNS iS not only reduces the losses of an individual motor but optimizes the coordinated operation of a whole set of motors in a mill.



Improved Debarking

A pulp mill's debarking drum did not debark logs satisfactorily because the drum speed could not be adjusted for the different quality of the logs. The mill bought three AC drives (400 kW each) to control the speed of the drum motors, improving quality and reducing electrical costs.

Variable Speed Drives

A Swedish pulp mill discovered that at 850 kWh per pulp ton, its energy consumption was far too high. By changing to variable speed control of its pumps, properly sizing the pump motors and making changes in pipe layouts, they were able to reduce energy consumption to 635 kWh per pulp ton.

DIFFERENT SEPARATE
CABLES, COMPENSATION
CAPACITORS, ETC.

VARIABLE
SPEED
DRIVES

MAIN
TRANSFORMERS

DISTRIBUTION
TRANSFORMERS

MOTOR
CABLES

MOTORS

Reducing time to decision and action is a primary key to reducing fuel, steam and electricity waste in a mill.

PROCESS

Pulp Production Optimizer

By modeling a mill and accounting for the materials, processes and subprocesses linked to the production process, an advanced control system can help achieve optimum production. ABB Pulp Production Optimizer takes this one step further, allowing management to adapt instantly to disturbances which unchecked, can lead to production losses, quality deviations and waste of materials and energy.



Optimize complex operations for energy efficiency, product quality and cutting waste

Many mills and processes were designed with upfront cash cost as the foremost measure. As long as the process was stable and the quality acceptable, the process or machine supplier was able to make their guarantees and everybody was happy. In other mills the long-term cost of operation was compared to the upfront cost but the discount rate of energy cost was significantly underestimated. In either case, this has provided a tremendous opportunity for ABB to help customers improve these sub-optimized processes by implementing improved visibility and advanced control.

UNDER
RUNS

OVER
RUNS

OFF-SPEC
PRODUCTION

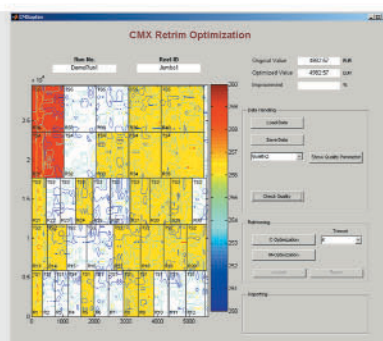
SPEC
CHANGE
LOSSES

GRADE
CHANGE
LOSSES

Control Room

By making full use of ABB's System 800xA Control System capabilities, control room staff can adjust the process to run at its optimal level and reduce energy and raw material consumption, as well as keep vital processes running without interruption.

When an operator can use the integration of their process knowledge and System 800xA's full capability, energy consumption can be reduced by 10 percent.



Boiler Control

ABB Recovery boiler controls provide stable and optimized control of the burning process and soot blowing to maximize burning capacity and improve reduction and thermal efficiency, as well as to decrease soot blowing steam consumption and gaseous emissions.

Quality Re-trimming

The best laid production plans can never take into account the realities of the manufacturing process. Off quality production can lead to significant trim losses. While the fiber can be recovered, the energy can not.

During the papermaking process, significant amounts of data are collected concerning the quality of the sheet. ABB Quality Re-trim takes the initial production requirements and the known quality data and then optimizes the trim patterns to minimize waste. All of this is done in seconds and on the machine floor.

ABB Quality Re-trim has reduced waste from 8 percent to over 25 percent.

STARTUP
LOSSES

GRADE
CHANGE
LOSSES

BREAK
LOSSES

SLAB
LOSSES

TRIM
LOSSES

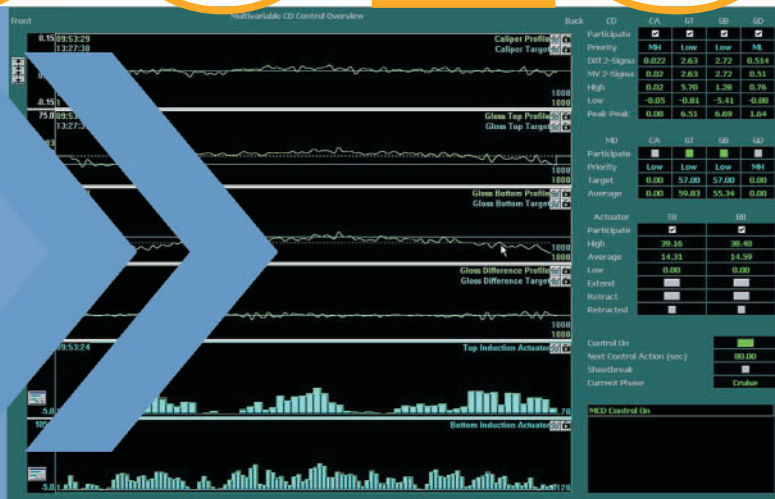
TRIM
LOSSES

OVER
RUNS

A 1 percent shift in wet press moisture target can reduce steam cost by 5 percent.

PROCESS

HIGH PRESSURE



LOW

Energy savings through optimum paper machine performance and control

The paper machine is the most expensive part of the process in terms of energy. As a result, efforts to improve energy efficiency in the machine are well justified. ABB control systems not only ensure the end product quality of the sheet but act as the optimal point of focus initiatives intended to improve machine efficiency.

Good control begins with good measurement. ABB Quality Control Systems give papermakers the ability to precisely measure the characteristics of the paper while it is being produced. By being able to measure characteristics such as the weight (fiber content) and moisture content of the sheet in both the machine direction and cross machine direction, ABB systems can make adjustments to the machine's operation that minimize energy usage while at the same time ensuring the quality of the end product.

ABB also delivers advanced actuators for the production process. By applying highly-focused energy to the precise spots in the process, ABB actuators reduce energy in the form of steam and electricity.

RECOVERY

HOT
WATER

Fiber Orientation

The distribution of the wood fiber in a sheet of paper is critical to the ultimate end purpose of the sheet. Being able to measure and control the angle and orientation of the fibers provides paper producers with the ability to reduce fiber usage and decrease steam usage while increasing yields and quality. Only ABB offers on-line fiber orientation and control.



Quality Control Systems

ABB actuators and sensors can reduce total steam usage by 10 percent, and steam costs the average mill USD 8/1,000 PPH.

SteamPlus Profiler

SteamPlus profiler improves on previous generation steambox designs by controlling 100 percent of the steam flow across the web. Reduction of steam used by improved cross direction profiling and increased dryness represents up to 55 percent reduction in energy costs over older designs.

Control Systems

ABB System 800xA reduces costs by:

- Reducing the time to decision and action
- Engineering for maximum performance
- Integrating information for improved visibility
- Optimizing plant asset availability and performance

EXHAUST

PRESSURE

MEDIUM
PRESSURE

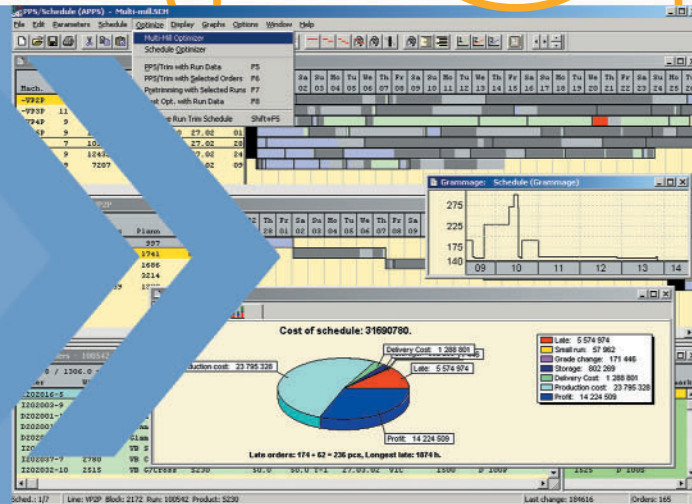
FRICTION
LOSS

CONDENSATE

Increasing production efficiency
directly results in a decrease in
the energy per ton of sold paper.

PERFORM

PRODUCTION CAPABILITY



Seamlessly link mill automation, optimization and collaborative business processes for productivity improvements and enhanced energy efficiency

Operations in pulp and paper mills represent the hundreds of dynamic, inter-related functions that comprise the production process. ABB regulatory and process control tools and software address these functions to assure efficiency, reliability and energy savings.

Coordinating all of these activities is the holistic process of running the mill. This process makes sure that all subprocesses are coordinated to assure mills operate at the highest level of energy efficiency and productivity with every ton of paper that goes out the door.

It's at this level that ABB Optimize products help mills to operate in the black, with energy, raw materials and runtime managed for the highest level of efficiency possible.

Pulp Production Planning

Integrated Pulp Production Planning enables you to integrate paper and board production planning with energy management and provides realtime forecasts for pulp, water, chemical and energy balances.

The most important variables are:

- Direct production costs on different machines
- Cost of grade changes
- Cost of trim waste
- Cost of transporting finished products
- Cost of delayed customer orders
- Cost of warehousing

This production and logistics management tool is based on minimizing the overall enhanced schedule cost of paper by optimizing pulp production including energy to produce that pulp.

UNPLANNED
OUTAGES

PERFORMANCE



SALABLE
PAPER

Optimizing Control Solutions

ABB supplies a comprehensive set of control solutions for widely varying methods of continuous and batch digesting, pulp washing, bleaching, re-causticizing and recovery boilers.

- Better control reduces the average temperatures, decreasing steam usage in bleaching
- Decreased use of steam in digesters by better set point optimization
- Decrease in steam consumed in the evaporation process by decreasing the white liquor circulation as the solids content of the weak liquor increases
- Optimized lime kiln temperature profile for minimum energy requirements
- Re-causticizing over liming can increase kiln energy losses, conversely under liming can result in a low causticity level causing excess energy consumption in other parts of the process

Production Planning and Optimization

Planning production across the enterprise vastly expands the probability of a profitable solution to any given production problem and is critical to efficient operations. Enterprise production plans can be created in multi-machine, multi-mill environments that optimize execution while reducing costs and improving customer service.

- Optimize mill and machine capacity and minimize inventory, while ensuring on-time delivery to customers
- Enhance business processes with enterprise production data
- Maximize machine efficiency in multi-machine and multi-mill environments
- Minimize grade change losses at the paper machine
- Produce efficient trim plans, even in multi-stage trim problems
- Improve finishing line operations by predicting bottleneck and overload situations

PRODUCTION LOSSES
CONVERTING LOSSES

SLOW MOVING INVENTORY
WAREHOUSE DAMAGE

Without integrated production and energy planning solutions, energy costs can account for up to 40 percent of paper's selling price.

PERFORM

AS IS



Objective energy assessment

There are dozens of ways to save energy. Each can save a little, some can save a lot. You manage massive amounts of energy and tons of raw materials in a process so complex that only a handful of people can understand it all. Yet every day presents the challenge to make it more efficient, more productive and more profitable.

ABB's paper mill consulting service team knows the paper industry and can objectively evaluate your operation. From raw material to finished product, our team will identify performance gaps in your process and show you how to turn them into savings opportunities.

We don't just leave you with a golden binder and a big bill; you'll have a strategy that provides a forward view of the mill and an implementation plan that will have an immediate impact on your bottom line.

ABB will analyze your operation, from electrification to motors and drives to advanced process control and

optimization, and identify opportunities for energy savings.

We take an in-depth look at your mill and provide a strategy for both the short and long term. The comprehensive report on current status provides the basis to formulate a forward view of potential power and steam efficiency recommendations. From there, the view shifts to realtime optimization of the process to create a proactive action plan for asset management, and power and operational improvements. Finally, automated process control capabilities from ABB will be factored in to complete the picture.

The ABB team then provides the guidance and implementation strategies needed to implement the plan. You end up with a blueprint that shows how to improve, assure and maintain the efficient performance—and energy savings—of your manufacturing operation.

MANAGE

**Identify Opportunities for Performance Improvement**

One service that ABB offers is called Fingerprinting. A Fingerprint is designed to identify and document the opportunities for performance improvements in a specific process area. The fingerprint sets a standard to compare performance in the future. It also includes an implementation plan that provides a detailed ROI based solution designed to insure improved efficiency, quality and production.

The Fingerprint service is platform independent so that it can be applied to any process area regardless of the control systems that are installed. A typical Fingerprint will look at efficiency, control loop automation, process stability and process interactions. Historically ABB Fingerprints have uncovered potential savings that are in excess of 10 times the cost of the service.

ABB Performance Services

ABB's expertise in designing energy efficient products and advising customers on the savings they can achieve is bundled together in the services we offer.

Under a full service contract, ABB takes over responsibility for the engineering, planning, execution and management of an entire mill's maintenance activities. This enables customers to focus on their core operations, while ABB focuses on improving equipment production and efficiency. In addition, our application and process knowledge provides proficiency, resulting in measurable performance improvements.

Remote Optimization

Not every mill can afford in-house, world-class control expertise. Not every mill is quickly accessible to outside assistance. ABB is supplying world-class control expertise remotely to enable pulp and paper mills to operate at the maximum efficiency. ABB Remote Optimization services are configured to diagnose problems, implement corrective strategies and sustain performance. ABB Remote Optimization can be applied to any ABB control system.

OPPORTUNITIES

**Energy is money. Time is money.
> Call and start saving money.**

Contact us

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