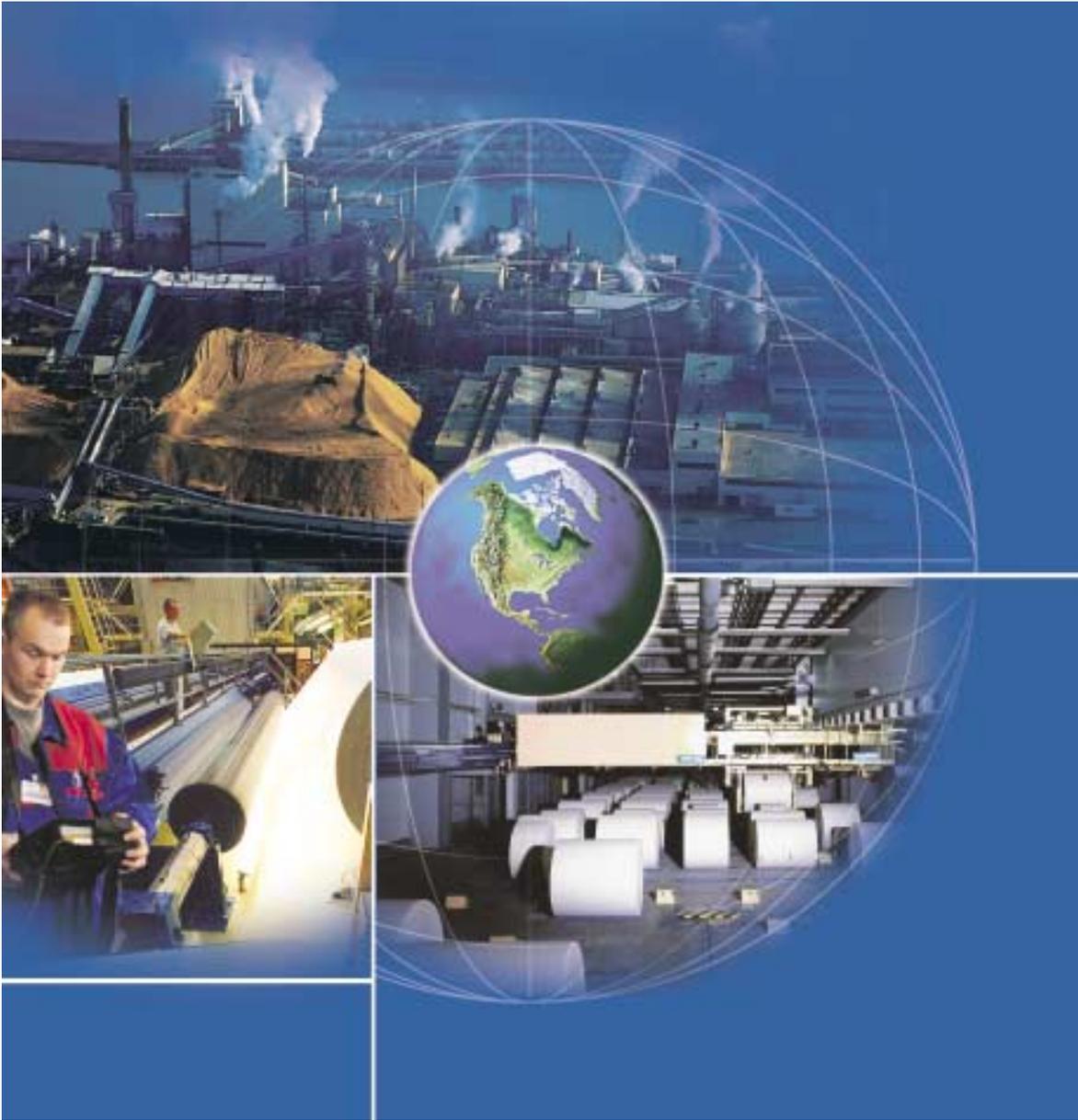
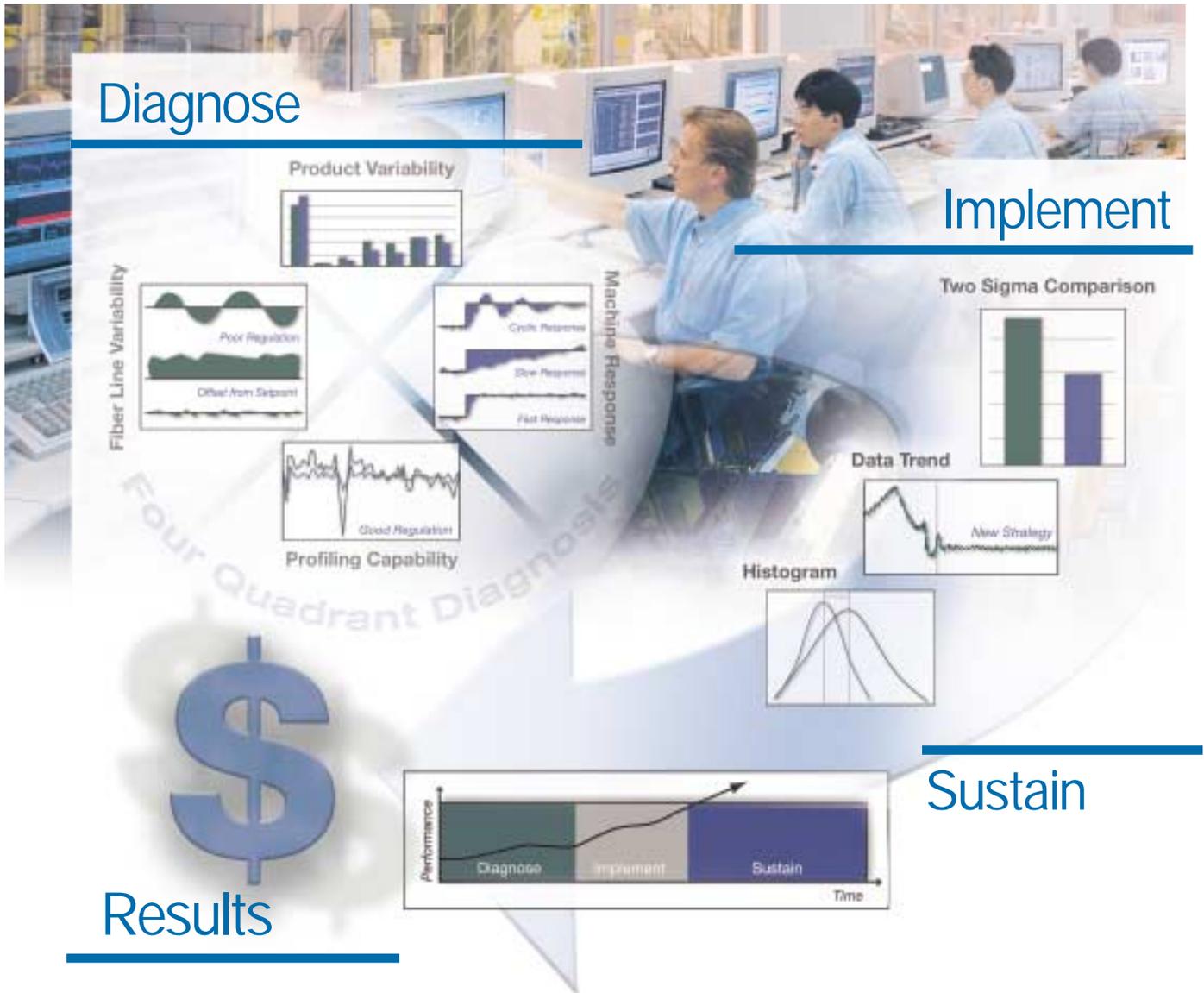


Support^{IT} Paper Optimization Implementation

Optimizing Paper-Making Assets



ABB's Engineered Approach to Optimization



Diagnose

Implement

Sustain

Results

ABB Optimization Services

Paper making optimization has been the goal of the paper industry and ABB for many years. There are many barriers which can reduce production and conversion efficiencies, resulting in lost profits. The source of these barriers can be illusive and difficult to identify. However, with an engineered troubleshooting method, ABB can diagnose and identify existing barriers to optimization. After barriers have been identified, ABB can provide a customized implementation plan based upon our industry expertise, resources and products. Once optimization goals have been met, ABB's local expertise is available to sustain the financial and operational benefits gained through the optimization process.

Unparalleled Expertise

ABB's pulp and paper industry support organization is one of the world's leading authorities in paper production and technology. ABB has invested substantially in business-driven research, and the development and delivery of optimization solutions to improve return on paper-making equipment.

ABB can help you reach your optimization goals.

PHASE 1 Diagnose

ABB Paper Machine Fingerprint

The ABB Paper Machine Fingerprint provides a set of unbiased surveys that analyze: Product Variability, Machine Response, Fiber and Steam Stability, and Profiling Capability. The Fingerprint is an industry-proven diagnostic methodology, providing the most comprehensive machine study available. It delivers a complete machine analysis, which provides data vital to identifying and capturing higher productivity and improved profitability. The associated Return on Investment is included with the findings.

The following illustrations are examples of analyses and findings resulting from the Fingerprint diagnostic surveys:

Product Variability

This survey analyzes product quality from a variability perspective. The weight and moisture signals are analyzed, as well as machine and cross direction data in the frequency range of 0.0001 hertz to 1000 hertz. Analysis of the cyclic tendencies in this frequency range provides insight into: the Quality Control System (QCS), Distributed Control System (DCS), and vibration or rotational equipment operating efficiency.

The Product Variability Index (fig. 1) illustrates results of the Product Variability survey. In this case, a problem within the DCS controls is identified.

Machine Response

The machine response survey evaluates the response to control setpoint changes. Results provide insights related to: Speed of Response, Reel-to-Reel Variability, Machine Direction Variability, Scan Level Control, Sheet Break Recovery, Start-up Time, Grade Change Time, and Profiling Capability. This survey is based on tests applied to the total head, weight, and moisture control loops. Acceptable performance levels have been established based upon multiple site testing and evaluations.

The Machine Response Index (fig. 2) provides information regarding the total head, which is significantly de-tuned, resulting in poor setpoint tracking and disturbance regulation.

Fiber Stability

The fiber stability survey measures the steady state operation of the stock system. The survey provides insights that can be related to: Paper Quality, Fiber Mixing, Inconsistent Lab Tests, Scan Level Control Quality, and Signal Conditioning. This survey analyzes the operation of the controls relating to: Total Head, Machine Chest Level, Thick Stock Flow, and Thick Stock Consistency.

The Fiber Stability Index (fig. 3), in this case, clearly identifies excessive machine chest level variability.

Profiling Capability

The profiling capability survey measures the controllability of the weight and moisture profiles. The results of this survey provide insights into: Controllability and Control Efficiency.

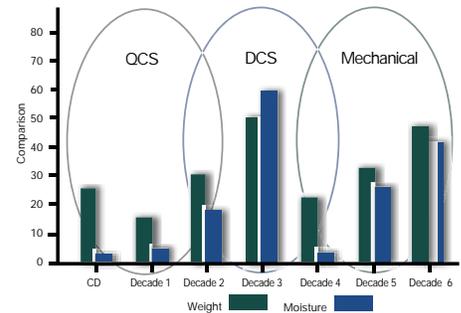
The Profile Forecast (fig. 4) indicates a typical forecast for this survey, which points to significant improvement potential within the Cross Direction Control package.

Fingerprint: Paper Machine

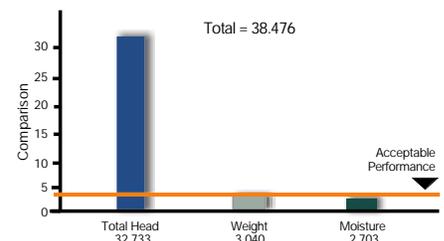
Results:

A working methodology to improve machine efficiency and productivity.

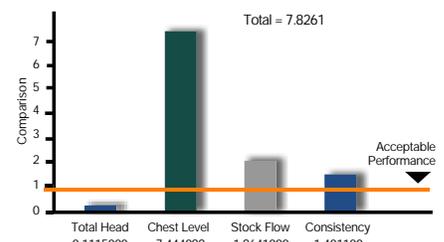
Product Variability Index (Fig. 1)



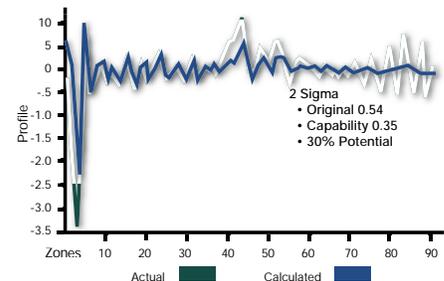
Machine Response Index (Fig. 2)



Fiber Stability Index (Fig. 3)



Profile Forecast (Fig. 4)



Once a Paper Machine Fingerprint is complete, the next step is to move into ABB's Implementation phase.

Control+ Service

Results:

The ABB Control+ Service generates tremendous financial benefits. Measurable benefits include process enhancements, production increases and direct cost savings. Typical savings range from \$250,000 to \$1,000,000 annually. Most of this benefit is achievable with little or no capital investment.

Implementation

The time required to reach paper machine performance goals is a function of the implementation plan taken. If identified improvements are implemented all at one time (Option A), the mill will benefit immediately. This option is especially valuable when the paper machine is under a short deadline to improve product quality and reduce operating cost.

A phased approach provides the same complete optimization delivery, which is scheduled to occur incrementally over a longer period of time (Option B). This progressive approach results in slowed progress toward the performance goal. However, the stepped implementation ensures that process and equipment changes can be made and maintained throughout the year with steady progress toward the performance goal.

Program Overview

The Control+ Service applies people, processes, and proven troubleshooting techniques to locate and solve problems in the following areas:

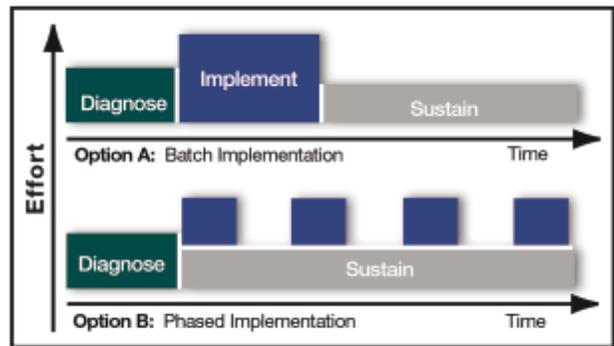
- Stock Approach system from the High Density Storage tank
- Steam pressure system related to paper drying
- Paper machine Machine Direction controls
- Paper machine Cross Direction controls
- Operator usage of paper machine controls

PHASE 2
Implement

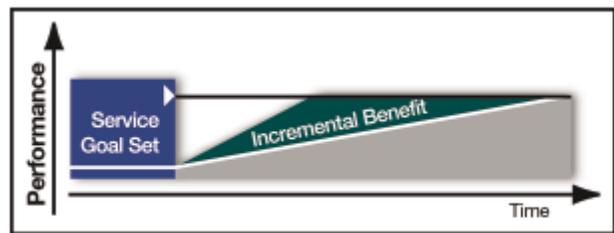
ABB Control+ Paper Machine Service

ABB Control+ Service focuses on implementing solutions that improve machine performance. The Control+ Service plan is a natural next step after an ABB Paper Machine Fingerprint diagnosis. The Fingerprint highlights areas of opportunity and the Control+ Service further investigates these areas. Solutions are then developed and implemented. ABB's Control+ Service is the most efficient and cost effective way to realize full financial benefits of your paper making process.

Implementation Effort



Performance Goal



Typical Findings

Typical findings during an Implementation are categorized in the following areas:

- Instrumentation and Valve Performance
- Signal Conditioning
- Additional Automation Solutions
- Stock Cleaner and Mixing issues
- Control Tuning
- Vibration or Pulsation sources
- User interface modification
- Standard Operating Procedures
- Operator Training
- Lab Procedures

After completion of the implementation phase, the next step is to formulate a maintenance plan, which will sustain the achieved performance improvements.

PHASE 3
Sustain

ABB Utilization, Optimization and Availability Services

ABB Utilization, Optimization and Availability Services provide a full range of performance monitoring, maintenance and continuous optimization services, which serve to sustain the optimization achievements. These services are a natural extension of optimization programs, such as Control+ Service.

Optimization Checklist Health Check

Results:
 These Sustaining Services prevent gradual degradations in performance, while preserving optimized levels of performance and profitability.
 – Sustained benefit and continued Return on Investment.

Service Portfolio

Sustained equipment performance improvements can be achieved through our results-driven automation services and service programs. Our services can also provide increased production, reduced maintenance costs and improved return on assets. The chart below identifies nine available service categories based on System Availability, Control Application and Process Asset Optimization.

| | System Availability Services | Control Application Utilization Services | Process/Asset Optimization Services |
|------------------|--|---|---|
| Diagnose | Fingerprint: System Frame Stability Controller Loading Fingerprint: CD Profiler Power and Grounding | Fingerprint: Paper Machine Fingerprint: Coater Fingerprint: Color Fingerprint: Extruder | Fingerprint+ Paper Machine Fingerprint Stock Approach Fingerprint Steam System Vibration/Pulsation Audit Performance Forecasting Benchmarking |
| Implement | Sensor/Lab Correlation Lab Certification Plan Basic Software Changes Frame Cable Change Sensor Replacement Frame Alignment | Level 3 Control Tuning Level 2 Control Tuning Level 1 Control Tuning Operator Training Advanced Software Changes Display Modifications | Control+ Paper Machine Control+ Coater Control+ Color Control+ Extruder MDS tracker On-Demand Service Customized Control Training Custom Software Changes |
| Sustain | Preventative Maintenance Maintenance Tracking System Backup Camera System PMs Ulma System PMs Customer Meetings Status Reporting | Control Maintenance Remote Monitoring Control Maintenance Tracking Variability Tracking Scheduled Reporting Status Reporting | Optimization Checklist Health Check Remote Analysis Status Reporting Knowledge Bank |

This brochure illustrates the use of four service products (highlighted above) from our comprehensive service portfolio. Our complete service portfolio is available to address the particular needs of your site equipment. Please contact us to obtain information regarding other ABB services, and to learn more about how ABB can optimize your papermaking equipment.

Our complete portfolio of ABB services is available to improve equipment performance.

Tools

Results:

The combination of ABB's People, Products, Tools, and Service solutions ensures peak machine performance.

Implementation Tools

ABB has developed a suite of tools that are fundamental to efficient implementation of Utilization and Optimization Services. ABB software is designed to be user friendly and to aid engineers in solving problems. In addition, the same tools that ABB engineers use are available to customers.

The ABB tool suite and methods are designed for use in the following areas:

Stock and Steam System Loop Performance

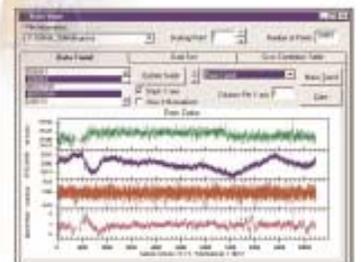
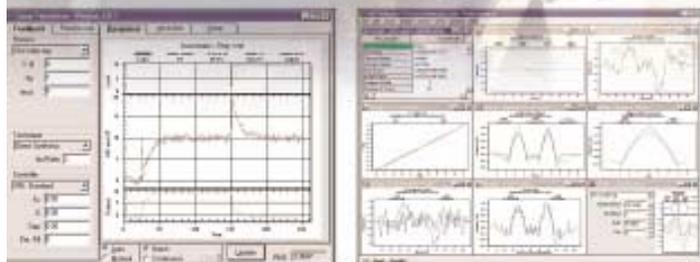
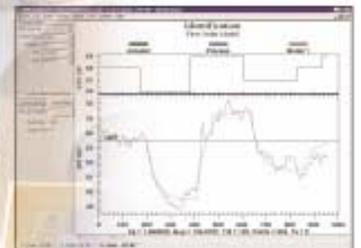
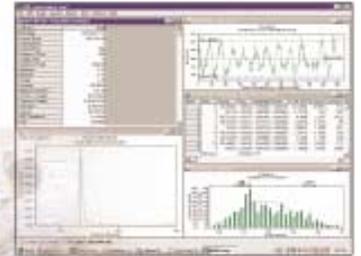
The ABB XGP300 Loop analysis software has the ability to quickly analyze hundreds of control loops and indicators. This is especially useful for identifying bad valves, signal conditioning problems, control problems, interactions, and Root Cause Analysis.

Control Tuning

The XGP300 Loop and Profile software provides modeling techniques and tuning methodologies for a wide array of industrial controllers. Control tuning is based on proven open and closed loop controller bump tests. These bump tests are used to quantify the dynamics of the process. Once the process dynamics have been identified, then they are used to calibrate the controller. The XGP300 software provides graphical solutions, simulations, and trends of potential control solutions.

Mechanical Vibration and Pressure Pulsation

ABB has two levels to finding problems in this area. The first solution is the AGP300. This hardware and software connects directly to the frames and allows for data to be collected at rates up to 1000 Hz. The XGP300 software is then used to identify the presence of cyclic high frequency energy. This information, coupled with machine clothing lengths and diameters of dominant rolls, usually points to the source. If the problem cannot be found, then ABB will suggest that the customer invest in a full pulsation and vibration study. This study uses a Data Physics analysis



unit, vibration transducers, laser tachometers, and pressure transducers to find the exact source of high frequency problems.

Cross Direction Profile Analysis

The XGP300 profile analysis tool will allow for detailed analysis of 100's of profiles. This analysis will point to mapping, modeling, tuning, or actuator problems.

Service Tool Kit

This allows for continuous monitoring of all control system variation reports. The ABB reel reports are especially useful for monitoring the control performance versus time.

Each tool is designed to work with a certain area of the optimization process.

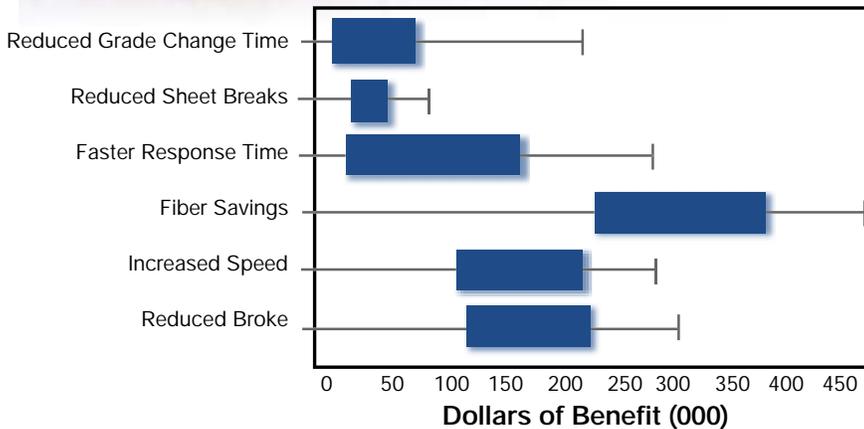
ROI

Financial Impact

ABB is dedicated to improving paper-making efficiencies and improving paper machine performance. The success of our progress can be *measured* by the improvement performance, profitability and ROI at mills like yours – around the globe. To date, the documented financial impact of our optimization programs has been recognized as exceptional.



Typical Benefit



Results:

Typical returns have generated customer agreed upon Return on Investment ranging from **\$250,000 to \$1,000,000** per year.

The payback is regularly within 6 months

Benefits

Implementation of the defined corrective action plan provides positive results in the following areas:

- Increased production
- Reduced grade change recovery time
- Fewer sheet breaks and faster sheet break recovery time
- Faster start up times
- Fiber savings through target shifts
- Increased speed through better speed control
- Reduced broke
- Improved thin stock mixing strategies

ABB Service is dedicated to making sure you produce the best product possible. Our proven methodologies, trained engineers, service products, and state-of-the-art tools are designed to quickly diagnose your process, develop an ROI-based action plan, implement corrective actions, and sustain results to ensure that the positive product and financial benefits do not erode with time.

Other quantitative benefits include quality improvements, better runability, reduced customer complaints, and the opportunity to make additional value-added grades.

Support Network



ABB's notable success in paper machine optimization is a result of our experienced staff, advanced technology, comprehensive industry knowledge and operational experience. Our exceptional service and delivery is assured through a tiered support network. Our local and regional engineers have unlimited, direct collaborative access to expert North American and Global support resources.

Your optimization project is in good hands with ABB.

ABB's service organization includes more than 10,000 service professionals and US\$1.5 billion in revenues. ABB is the world's largest provider of industrial asset and optimizations services for automation systems.

To obtain additional information regarding our complete service portfolio, visit us on the Internet: www.abb.com

Or call: **1-800-HELP-365**

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Industrial IT

Industrial IT is the ABB vision for real-time integration of automation, information and collaborative business systems. Our compatible enterprise building blocks, single architecture and domain industry expertise are helping customers around the globe to achieve greater productivity, return on investment and shareholder value.

ABB's portfolio of service agreement solutions complement the Industrial IT strategy by delivering improved process performance and cost savings.

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