Asset Optimization: challenging the *next millennium*

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Changing business paradigms are defining new rules for success in today's global markets. With Asset Optimization, ABB offers a comprehensive program for the complete lifecycle optimization of plant assets, from field devices, control systems and automation elements, through intermediate resources such as energy and manpower, to major assets of plant infrastructure. Its core feature is an innovative automation architecture with new communication capabilities and products that allow accessing of all asset-related information.

Companies in the process and utilities industries constantly strive to optimize the lifecycle costs of their plant investments. They search for tools that reduce the maintenance effort for all plant equipment, extend the life of critical capital equipment and increase the utilization of the existing asset base, thus improving total plant availability and productivity.

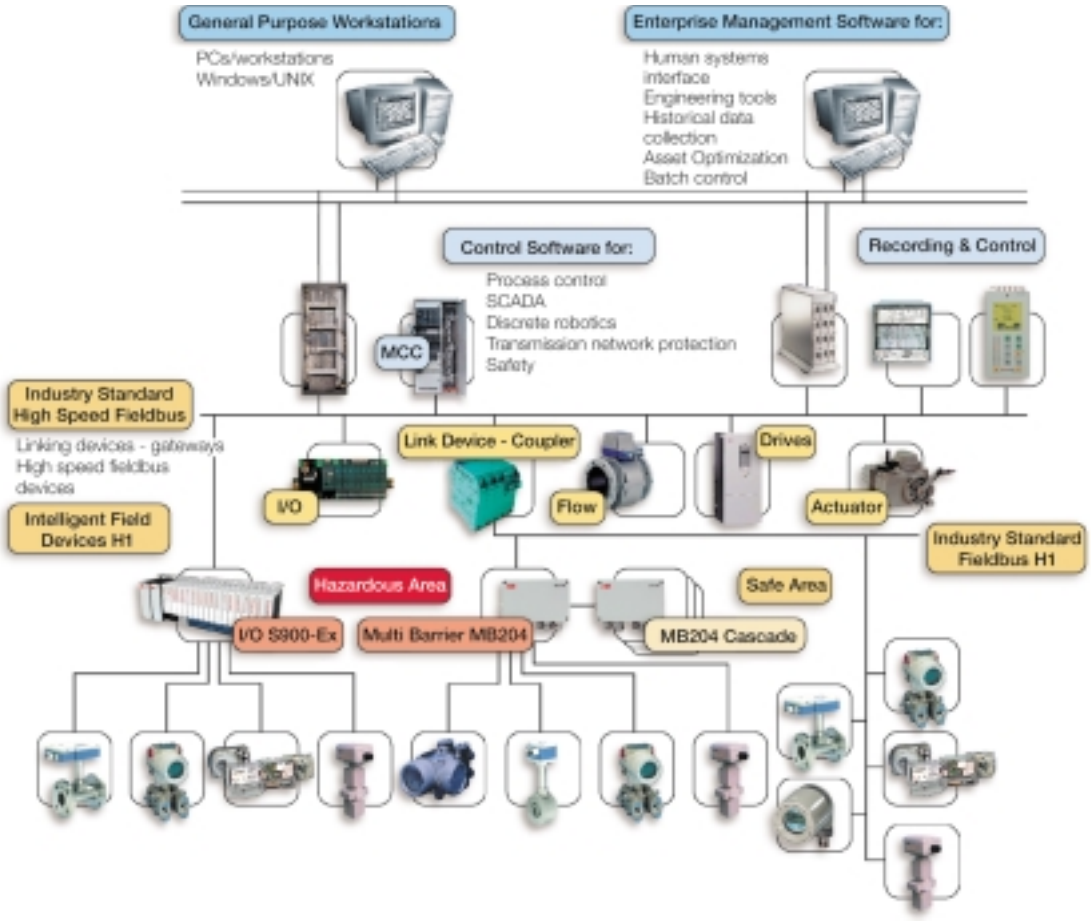
There is a sense of urgency for plant managers to examine plant assets and continuously question such key aspects as:

- Efficiency
- Utilization costs and their trend
- Current operating conditions and their impact on life expectancy
- Potential for a facilitated maintenance schedule, without risking a degradation of safety and efficiency

However, faced with the ever-increasing competitiveness of today's global markets, companies need also to focus their human and financial resources on core competencies. They increasingly outsource support services, such as information technology and automation solutions, that are not part of their specific know-how. These conflicting trends create a strategic challenge for the plant manager. How can he best focus on the unique competencies of his company, while relying on a dwindling staff to provide the comprehensive information needed to optimize his plant assets?

ABB is sensitive to these challenges and is aware of the customer's eagerness for a comprehensive solution from its automation supplier. As part of its Industrial IT program, ABB offers 'Asset Optimization'; this combines the industry's best knowledge base and most comprehensive scope of supply with innovative and new approaches to enhance plant asset productivity and profitability. The company leverages its own experience in the design and manufacturing of plant equipment, combined with its leadership in process automation and vast know-how in industry-specific applications, to lend credence to its ability to analyze, monitor and help optimize the performance of all plant assets.

ABB's Asset Optimization is a comprehensive program that focuses on complete lifecycle optimization of plant assets, from



1 *Automation architecture with communication capabilities and products for accessing all asset-related information*

field devices, control systems and automation elements, through intermediate resources such as energy and manpower, to major assets of plant infrastructure, such as the heaters and generators of a facility.

Automation architecture offering access to asset-related data

ABB has set forth an innovative automation architecture using the most advanced information technologies, including integrated fieldbus solutions, to provide communication capabilities and products for accessing all asset-related information **1**. ABB also offers a suite of applications, providing decision support for life-cycle asset optimization from the plant design stage through the maintenance and disposal phases.

What is the implicit power of this architecture?

First, it addresses a customer's need to monitor and optimize plant assets in real time. Today's business paradigm of 'Internet time' is filtering down to the enterprise operations level. If plant managers do not fully control the incremental cost of production and the corresponding incremental revenue at any given moment, they will be at a disadvantage in the fiercely competitive, wide-open global markets to come.

Second, this architecture can easily and quickly identify differences in performance between two or more similar assets (eg, heat exchangers of similar capacity, pressure transmitters on the same process), or groups of assets (eg, production plants of similar design, all the control valves in similar plants). Detailed *audit trails* record the asset's maintenance history and inform about impending trouble. This early warning capability averts unscheduled plant shutdowns, and allows enterprises to maximize their plants' uptime and operate them closer to their design limits, thus maximizing Overall Equipment Effectiveness (OEE) and profit.

Third, this architecture provides the infrastructure needed to monitor and record asset performance, both physical and financial, over the assets' entire life span. Managers have the opportunity to

utilize this information to set future performance and profitability goals. The accumulated knowledge base and decision support infrastructure greatly assists management personnel in deciding when asset disposal is warranted, as it is based on rigorous performance metrics.

Fourth, this solution is provided by the market leader in industrial automation. ABB has the staying power, the breadth of products and the application experience that allow the end user to focus on his primary task, manufacturing competitiveness, while relying on his automation supplier to provide state-of-the-art solutions for lifecycle optimization of his plant assets.

Multiple levels of support

At the *field device level*, ABB has developed, throughout its entire product range, intelligent instruments that provide inherent features for tracking instrument performance, status and maintenance history, thus allowing preventive maintenance through early detection of degrading functionality.

At the *communication level*, ABB supports customer 'freedom of choice' in the selection of instrumentation and associated communication protocols that best fit their application. ABB ensures compatibility of its products (instruments, systems and engineering tools) with the emerging fieldbus standards (Profibus, Foundation Fieldbus, LON). Fieldbus is a powerful technology that enables the wealth of information available in intelligent field instrument to be accessed and then utilized in innovative preventive maintenance and asset optimization schemes. However, the digital fieldbus architecture is only one option for realizing the many benefits of asset optimization; much can already be achieved with conventional 4-20 mA or HART hybrid communication.

At the *automation system level*, ABB is implementing a unique, state-of-the-art, object-oriented infrastructure for its automation platform, further enhancing the Industrial IT paradigm. A key feature in this respect is the ABB *Object Model*, an object-oriented approach to the description of plant components such as motors, valves, etc. This tool brings together information about configuration, control, topological location and functions as 'objects' and associated *aspects* (ie, attributes). It allows for continuous allocation of all plant data to dedicated objects, such as automation tasks, local plant structures or maintenance work schedules.

Information management is essential for understanding asset performance and designing procedures for optimizing assets over their lifecycles. ABB provides a suite of applications that support lifecycle asset optimization with different levels of sophistication.

ABB has been a pioneer in channelling the power of the Internet to realize the benefits of enterprise communication and e-Commerce. Our *Process Information Web Server* was one of the first of its kind in the industry. As part of Asset Optimization, we are using it to host asset-related documentation. Its Web access facility is used for ordering replacement parts, and allows remote plant diagnostics and maintenance.

The *Loop Auditor* diagnoses maintenance needs on a control loop basis, and thus is perfectly comfortable with conventional field devices, which comprise the huge majority of the worldwide installed base. It collects short-term loop characteristics, applies them to its own fuzzy logic engine, and determines impending fault scenarios and associated probabilities. A *Loop Optimizer* also proposes new tuning parame-

2 ***ABB offerings in the petroleum and petrochemical industries include a Planning, Scheduling and Blending Simulator which analyzes day-to-day tankage operations and quantifies the economic risk associated with having more or less tankage inventory.***

3 *Power plant managers need to be able to compare assets within a plant and estimate their remaining life. Monitoring of the state of the process enables operators to schedule preventive maintenance and avoid costly downtime.*

ter values that will improve the performance of the control loop.

The *Enterprise Historian* provides an open, distributed, data-redundant platform for information management. This allows users to store, manipulate, display and report time-tagged process information as well as event-based transaction information, enabling tactical reporting, event analysis, performance monitoring, and strategic studies for process improvement. ABB has integrated the *Pavilion* suite of software into its Enterprise Historian. This powerful combination lets users perform data mining and analysis, which can later be applied to production improvement and unique product applications, such as non-linear model predictive control and optimization.

ABB has provided interfaces to market leading CMMS (Computer Managed Maintenance System) products, such as Maximo, IFS Maintenance Module and SAP-certified interfaces to the SAP PP-PI and PP-PM modules. These latter interfaces allow a state-of-the-art generation of maintenance work orders that integrates real-time information from the control system, rather than blindly following a calendar-based maintenance schedule. The obvious benefits are longer uptime and reduced maintenance costs.

ABB has long championed asset performance and lifetime assessment applications and has been providing *industry-specific applications* to its customers for some time.

In the petroleum and petrochemical industries 2, for instance, ABB's Planning, Scheduling and Blending Simulator analyzes day-to-day tankage operations, evaluates current and future production capacity, and quantifies the economic risk associated with having more or less tankage inventory. The plant manager can quickly determine how to best manage his products inventory for optimal economic returns.

In electric power generation, ABB's OPTIMAX solutions give power plant managers a number of different possible perspectives with regard to the efficiency and expected performance of assets such as boilers or turbines 3. They can compare similar assets within a plant and estimate their remaining life. For instance, MODI, a component of the OPTIMAX suite, monitors the state of the process, performs diagnostics and informs the operator at an early stage whether a fault is about to occur. On Target is another component that detects off-model behavior of a (conventional) field device before it fails, giving operators sufficient time to schedule preventive maintenance and avoid costly process downtime.

Similar Asset Optimization solutions exist for pulp & paper, cement and metallurgy applications, to name a few.

Asset Optimization, along with the other structural elements of the Industrial IT paradigm, has brought a unique approach to solving automation issues. ABB is now stepping forward as the premier provider, offering plant managers the experience, resources, scope of supply, global organization and staying power that will address the concerns of the next millennium. ■

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