



# Building Your Mill's Automation System

A look at the role today's automation systems play in reducing costs and managing quality.

By Jeff Long

**“Don't even talk to me** unless you can help me reduce my costs” is a common welcome given to automation suppliers (and others) by today's paper industry. Fortunately, automation is adaptive by nature and existing investments can be updated to reduce costs in very effective and specific ways.

Although the issues are very clear and generic across the industry (energy, chemical costs, fiber, and labor for example), the solutions—especially prioritized solutions—require some effort to quantify. Paper mills are unique entities that share some common traits. Against this backdrop, it becomes apparent that a collaborative approach with suppliers can be the most productive. Mills are beginning to look beyond specific product offerings and view their suppliers as a resource pool they can leverage to complement their own skill mix on an as-needed basis. The deeper and wider that pool, the better. The pragmatism of industry restructuring has driven this change in perception.

## A STRUCTURED APPROACH

The power of today's automation systems is their flexibility, scalability and openness. Suppliers have been claiming these virtues for years, but today this is genuinely the case. Nowhere is this more apparent than in the ability to start small and then justify expansion against known and measurable Return On Investment (ROI) criteria.

Figure 1 identifies the process Metso Automation has used to determine specific goal-oriented road maps with its customers. Benchmarking is a particularly important component of what ultimately becomes a continuous improvement program. The result of this program is that actions are quantified and continue to be measured and the justification and objectives are clear to all parties.

Typically, results achieved through automation are broadly categorized in terms of Quality, Production, Environmental and Cost (QPEC). Invariably there are spillovers between these categories and this is a positive phenomena (Figure 2). Frequently, actions that are taken to drive down cost and are justified on that basis also have a positive effect on the other parameters—a valuable “double-dip.” Following are examples that illustrate how actions taken to primarily reduce costs also achieved important synergistic benefits.

## PRACTICAL EXAMPLES

Color measurement and control have long been recognized as a way to reduce off spec broke and avoid dye saturation. Today, OBAs are being consumed at unprecedented levels as brightness targets climb. It is now possible to accurately measure the OBA contribution and control it effectively. This control has a very satisfactory payback even at moderately low dosing levels.

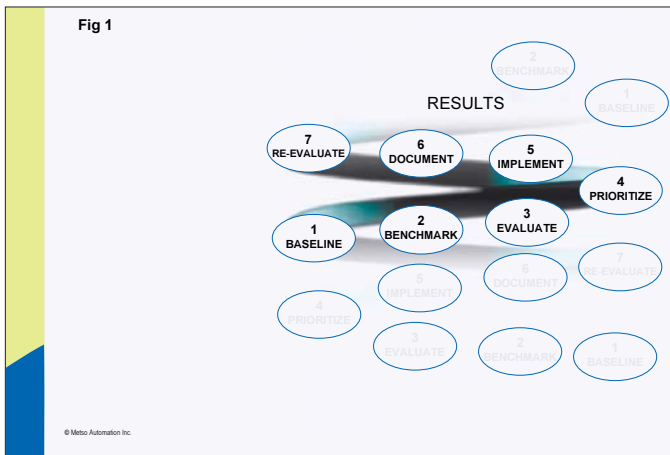
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TMP producers have major issues with energy pricing windows and maintaining quality. The basic idea is to make the most pulp when the costs are lowest and selectively curb production when the prices are high. But this up and down production scheduling can also contribute to unstable quality. Advanced controls can effectively manage these dual objectives. Paybacks of less than one year have been reported, and as energy prices continue to climb, the investment looks wiser than ever.

Ash measurement and control are becoming increasingly important as producers substitute fillers, particularly calcium carbonate, for costly fibers. Today it is viable to reliably and accurately measure constituents in addition to total ash in the web. Model Predictive Controls can thus achieve cost and quality objectives simultaneously.

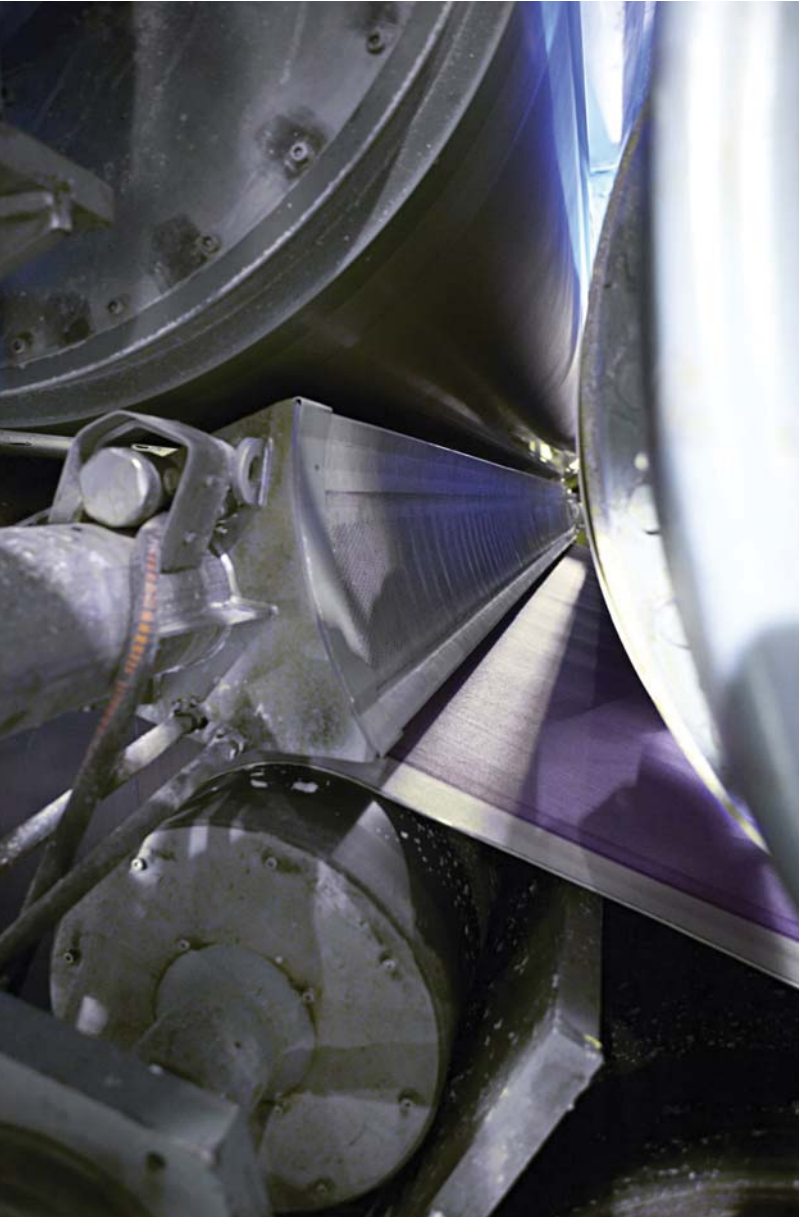
Although steamboxes have been around for a long time, many are approaching the end of their lifecycle and have become very inefficient. Leakage not only wastes energy but often creates consequential damage, particularly to roofs. Modern steam boxes such as Metso's IQSteamPro offer improved profiling capabilities and efficiencies that often result in a payback time of six months or less. In some cases, reel moisture averages can also be increased to take advantage of the improved web uniformity and save fiber while maintaining quality.

In the Pulp mill, modern control and measurement techniques can make substantial contributions that can be justified on a variety of bases. The Recovery Boiler is a good example of automation in action. Reduced sootblowing steam and improved thermal efficiency directly reduce costs. In addition, the same actions tend to decrease flue gas



**Fig 2**  
Actions Are Often Synergistic!

Quality	Production	Environment	Cost	Benefit
Level profiles	Drying limited	Optimized steam usage	Specific energy	<b>IQSteamPro</b>
Uniformity Reduction degree	High availability Maximum capacity	Flue gas emissions decrease	Decreased sootblowing Steam cons. Thermal efficiency	<b>Recovery boiler</b>
Stable & high white liquor strength	Increased capacity	Decreased energy consumption in chemical recovery cycle	Better quality lime mud to kiln Decreased dead load	<b>Causticizing</b>
Stable steam pressures Steam quality & availability	Response to change	Minimum steam venting losses Reduced cons. of support fuels	Cost optimized production	<b>Energy Balance Control</b>



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emissions and create a uniform degree of reduction. Meanwhile a high availability is achieved and the boiler can run at maximum capacity.

**Causticizing** is a relatively new application for advanced controls. The key is the availability of reliable on-line analyzers such as the Kajaani ALKALi that can measure such properties as Effective Alkali (EA), Active Alkali (AA), Total Titratable Alkali (TTA), Causticizing Efficiency and Sulfidity. Advanced controls decrease dead load and thus reduce energy consumption in the recovery cycle. In addition, better lime mud quality is delivered to the kiln, capacity is maximized and a stable white liquor delivered to the digester.

**Energy Balance Control** optimizes the cost of energy production. It also drives to achieve stable steam quality, pressures and availability. It must be responsive to changes in demand and minimize venting losses. The overall intent is to satisfy the needs of consuming entities while reducing consumption of support fuels. In general, the more complex the distribution network (and options), the greater the return.

**Platform Upgrade** paths are a major concern to the industry today. Many QCS and DCS installed systems are more than fifteen years old. The cost of maintaining obsolete equipment is quite significant, particularly when software and hardware components are no longer supported by the supplier. The issue becomes critical when availability is affected. Fortunately, there are cost effective approaches to replacement ranging from using existing field I/O to replacing functionality piecemeal. Again there will invariably be operational benefits because of the progress in electronics, software and applications development in more recent years.

The above are just a small sample of the many opportunities that exist to use automation to drive down costs and improve operations.

### THE CONTROL ZONE

Multivariable MPC (Model Predictive Control) is the enabling technology that delivers the results. The ability to manage the process as one entity is vital. The detailed understanding of interactions between sub-processes is achievable with this new approach. Model Predictive Controllers rely on dynamic models of the process, including process interactions. MPC can predict process behavior based on these dynamic models and optimize simultaneously all control actions. Multi-variable MPC is a very powerful technology that leads to particularly robust controls.

Automation offers many opportunities to reduce cost and manage quality. Benefits are often synergistic and create options for the user to optimize the parameters that are currently most vital. Many options deliver a fast return in isolation as well as making significant improvements in coupled areas. ■

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