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Closing the results gap: high-performance quality measurement and control solutions improve production

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1. Intelligent CD actuators combined with predictive model-based CD control minimize CD profile variations for high-end product quality.

In the pulp and paper industry, stable production, meeting quality specifications and minimizing both quality rejects and energy consumption are essential to achieving profitable operations.

Pulp and paper producers need to ensure utmost speed, quality and reliability in demanding paper, board, tissue, specialty, coating and calendaring operations. This requires advanced measurement and control solutions flexible enough to be tailored to their process needs.

However, a system is expected to sustain peak performance throughout its lifecycle so a comprehensive services program with the lowest total cost of ownership is essential.

TODAY'S OPERATIONAL CHALLENGES

In an increasingly competitive and dynamic environment, papermakers must make every day the best day of operation. This means meeting and exceeding the quality of sheet properties, increasing high-value paper in the grade mix, and maximizing production.

The specific operational objectives for papermakers include:

- Produce more sellable products with fewer rejects and faster recovery from upsets
- Enhance product quality by reducing process variations
- Improve process runnability with fewer sheet breaks
- Reduce grade change and startup losses and downgrades
- Enhance asset reliability to avoid potential failures, which can cause production downtime

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2. Fast, precise, and reliable measurement sensors and sub-systems are essential for effective operations

Measurement accuracy and control performance are essential to maintaining high production standards. There are two control challenges involved in these processes: Machine Directional (MD) control and Cross Directional (CD) control, both of which are managed by the Quality Control System (QCS). It is important to note an effective QCS is an integrated MD and CD control system, as opposed to measurement systems with actuators and controls elsewhere.

In a conventional QCS, a measurement subsystem with multiple sensors scans across the sheet and, at the end of every scan, reports the average measurement for each sensor. These scan-average values are input to the MD controller, which manipulates a process “handle” to reduce the machine direction variability.

The measurement subsystem also provides cross-direction (CD) values from each sensor. These are inputs to the CD controls. The purpose of CD control is to minimize the cross-direction variation of measured sheet properties using one of the CD actuator beams that span the sheet.

In a conventional QCS, these MD and CD “handles” are isolated from each other by design so that manipulating one “handle” does not affect the other. However, in the real process, these are usually strongly interacting and influencing each other.

OPTIMIZING MEASUREMENT AND CONTROL CAPABILITIES

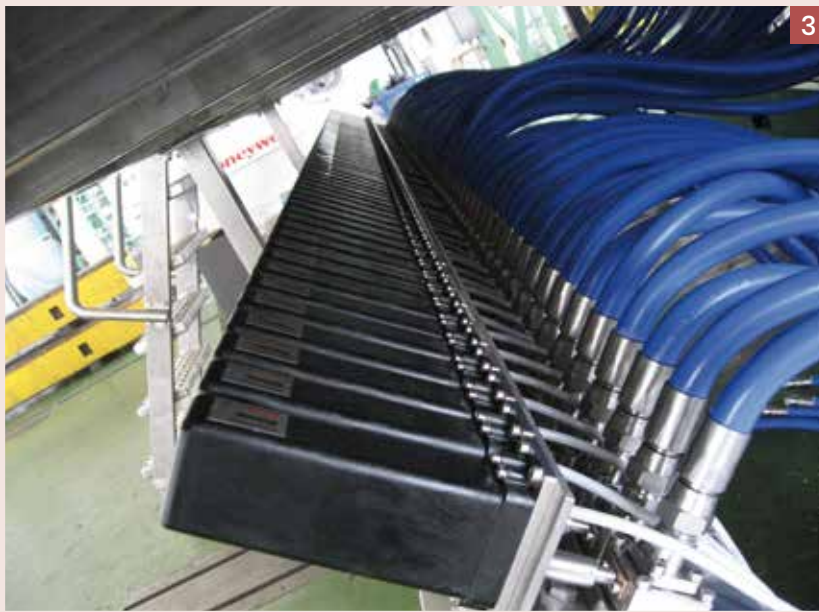
Throughout the paper industry, papermakers are deploying more sensors to measure the full spectrum of quality properties, thus creating new opportunities for highly automated control. Advanced sensor and actuator designs, coupled with advances in QCS technology, support manufacturers to meet difficult and often contradicting production challenges.

The first requirement for demanding paper operations starts with accurate measurement capabilities. Fast, precise, and reliable measurement sensors and sub-systems are essential for effective operations because, by continuously measuring sheet properties, they make it possible to react almost instantaneously to process changes using automated controls.

Intelligent CD actuators, combined with predictive model-based CD controls, minimize CD profile variations for superior product quality. The most advanced CD control solutions need an effective actuator system on the process, along with sophisticated process modeling tools. Modernizing existing CD-quality profiling systems is often necessary to achieve a step-change in quality uniformity from the process.

The use of a multivariable predictive MD control package, coupled with model-based grade change software, enables papermakers to shorten transition times between different products, reduces rejection rates to keep pace with fast customer order cycles. This high level of automation also reduces shift-to-shift variation that can result from operator skills gaps. Advanced measurements such as online fiber orientation can help identify process limits during grade changes to reduce the overall transition time.

Furthermore, papermakers benefit from QCS measurement and control subsystems that are optimized for fast response, high resolution (even at maximum scan speed) and accurate edge measurement — all essential to faster grade changes, quicker upset recoveries and higher-quality steady-state production. High resolution, full sheet-width, and fast-scan CD profiles are essential to maximizing value from the MD and CD controls.



3. Measurement and control performance is crucial to maintaining high standards of paper production.

Papermakers around the world have found that the right combination of measurement sensors, CD actuator systems with CD and MD control applications, has allowed them to simultaneously improve sheet properties, as well as productivity, and profitability. Honeywell has decades of experience, from thousands of installations around the world, on all types of paper machines to help guide papermakers to the optimal solution for their needs.

SUSTAINING ADVANCED QUALITY CONTROL SOLUTIONS

Papermaking operations are among the world's most demanding automation applications due to the speed and complexity of the processes, along with rigorous quality requirements. They also require state-of-the-art measurement and control solutions, operating continuously at peak performance, to deliver consistently on-specification production.

Honeywell, a recognized leader in Operational Technology (OT) for many process and sheet manufacturing industries, provides a broad portfolio of process measurement and control solutions, including tightly integrated on-premise automation and cloud-based solutions, to help customers take a holistic approach to processes throughout their operations.

Honeywell's QCS 4.0 service solution brings advanced analytics capabilities of big data and

cloud computing to help papermakers make better day-to-day decisions. Unlike other general-purpose offerings, which require substantial custom engineering, Honeywell's QCS 4.0 is designed for QCS optimization. It produces task-specific insights from a large amount of data collected from the process and systems to support maintenance tasks, process control and production optimization.

The QCS 4.0 solution is purpose-built to monitor the performance and health of production assets remotely. It uses Honeywell's cybersecure data connection to collect data from the scanners, sensors and controllers, and then streams it to the cloud in near real time. Continuous automatic analytics detect and alert users with user role-based messages that drive specific actions. Information is rendered in dashboards that are accessible anytime on any device and allow drill-down from the mill level overview to individual quality parameters. Every authorized user in the organization can easily gain access to the quality insights from any QCS, around-the-clock, anywhere in the world, to drive an enterprise-wide step change in quality.

By pairing QCS 4.0 with an OptiVision® Manufacturing Execution System (MES), Honeywell can standardize operations across production lines and multiple sites throughout the enterprise. This helps to achieve global improvements in product quality and production yield, reduce sheet breaks, cut downtime, lower energy costs, decrease operating expenses and gain tangible business benefits.

CHOOSING THE RIGHT TECHNOLOGY PARTNER

In the paper industry, choosing an automation technology supplier is a critical task. Production operations continuously seek new ways to get more out of their assets. A key area of focus is on measurement and control of the production so that the quality is as good — or better — than the competition, while increasing the volume and reducing the cost of production each day.

Unlike other companies, Honeywell is not a machine supplier — it is strictly focused on the design, production and delivery of measurement and control systems. Papermakers can be confident that its automation solutions are state-of-the-art, accurate and reliable. As a dedicated control technology provider with experience in assisting all leading paper machine manufacturers, Honeywell provides solutions that give a true indication of the state of machine operations, the efficiency of production processes and the quality of end products, without any potential ambiguity.

Moreover, as pulp and paper automation is a core piece of Honeywell's overall Process Solutions business, hundreds of scientists and research engineers are focused on developing and supporting best-in-class DCS, QCS and CD actuator systems.

Although the automation scope in a production investment is a relatively small component of the overall project, the consequence of a sound automation choice will have an important business impact over the long term. A machinery-bundled automation solution may be suitable for a specific project; however, it may not yield optimum results after the project is handed over to the day-to-day operations, reducing effectiveness over the asset lifecycle.

NEW ADVANCEMENTS TOWARDS AUTONOMOUS OPERATIONS

The automation industry is making major strides to enable papermakers to benefit from the most appropriate, modern technology for

their facilities. This requires automation strategies to be clearly aligned with business goals.

For example, Honeywell has introduced the Highly Integrated Virtual Environment (HIVE) solution that decouples the hardware modules and software control strategies from specific controllers, focusing more on the control capabilities of the entire group (or hive) of controllers. One of the benefits of HIVE is if one or several controllers are offline then the other controllers will take up the control tasks to keep operations running uninterrupted.

The latest remote operations solutions can assist sites with reduced staffing or limited in-house resources. By extending the capabilities of its technology, Honeywell has demonstrated that its control systems can facilitate remote operations in a secure manner. This capability opens the door for papermakers to operate with optimal staffing onsite and augment that staffing with remote support, regardless of geographic location or time-zone.

In addition, Honeywell has introduced a new type of intelligent automation service providing a holistic DCS and QCS support solution, utilizing a remote connection, cloud data collection, predictive and diagnostic tools, and global expert centers. Honeywell's Enabled Services program assists operators in visualizing the state of their system health and compliance, and then act upon expert recommendations, significantly reducing the time to resolve issues from first detection.

CONCLUSION

Thanks to Honeywell's ongoing technology developments, papermakers can take advantage of highly automated and advanced quality control systems to implement more consistent and precise measurement and control capabilities, enabling target shifts closer to quality or design limits. This helps to provide key production benefits which, in turn, gain competitive advantage to be successful in the pulp and paper industry today and in the future.