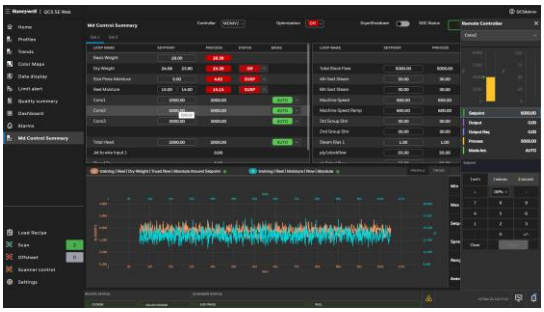
Honeywell | Sheet Manufacturing

Machine Direction (MD) Controls

Product Information Note

Honeywell's Machine Direction Controls utilize industry proven multivariable model predictive control technology to improve product quality and paper machine efficiency, while minimizing material and energy usage. Production losses are further reduced by fast, efficient, automated grade changes.

As manufacturers continually strive to improve operational efficiencies and reduce production costs, the role of paper machine and flat sheet supervisory controls has moved beyond simply reducing product variability and attenuating process upsets, to optimizing the paper making process for the most economical operation possible.



MD control displays clearly present the most important process and control status information to paper machine operators. Actions such as entering set points, changing supervisory control modes, or changing grades, are efficiently performed with a minimum number of steps.

Model Predictive Machine Direction Controls

The foundation of machine direction (MD) controls is Honeywell's new Alpha MPC controller. Leveraging more than twenty years of experience implementing model predictive control (MPC) on paper machines, Alpha MPC combines the proven performance of the control technology used in Honeywell's cross direction multivariable controls with simple alpha tuning concepts that have been used for decades with traditional MD controls.

Alpha MPC has been designed to control the most difficult of paper making processes, with the least amount of configuration and maintenance effort. It minimizes the future predicted variation of all controlled variables (CVs) in the papermaking process while honoring both their quality constraints and any physical constraints on manipulated variables (MVs).

Configuration is simplified with easy-to-navigate displays, and automated bump test and process model identification tools. The number of tuning parameters has been reduced to the fewest possible, with default values that provide robust, reliable, control performance.

FEATURES & BENEFITS

Ultimate Control Performance

- Multivariable MPC designed specifically to control papermaking and flat sheet processes, with constraint handling and grade-dependent configuration.
- Dynamic retuning based on changes in machine speed, production rate and/or dryer section steam pressure.

Improved Yield and Efficiency

- Production and economic optimization through built-in cost-penalty models and dynamic range controls.
- Open or closed loop grade change control to minimize off specification product.

Easy to Use and Maintain

- Operator displays designed with Honeywell User Experience principles clearly show critical information.
- Automated bump tests and process model identification for easy commissioning and maintenance.

Flexible and Scalable

- Support for multiple coordinated controllers allows complex processes to be segmented for easier implementation and maintenance.
- Flexible controls configuration for complex processes without custom built software.

The flexibility of multivariable model predictive control allows advanced control strategies to be implemented without requiring custom-coded solutions. If a new sheet property measurement is added to the quality control system, the process model simply needs to be updated; no changes are required to the controller itself. For complex processes, multiple coordinated controllers can be used to segment controls into logical groups. Examples of advanced control strategies for paper-making process include:

- Optimization of wet end additive and sheet filler usage while maintaining optimal sheet formation, using sheet drainage, wet-end analyzers and formation measurements.
- Drying energy optimization using cost structure model and moisture sensors in the press and dryer sections
- Reducing fiber costs while maintaining sheet strength using virtual stiffness measurement

Optimization

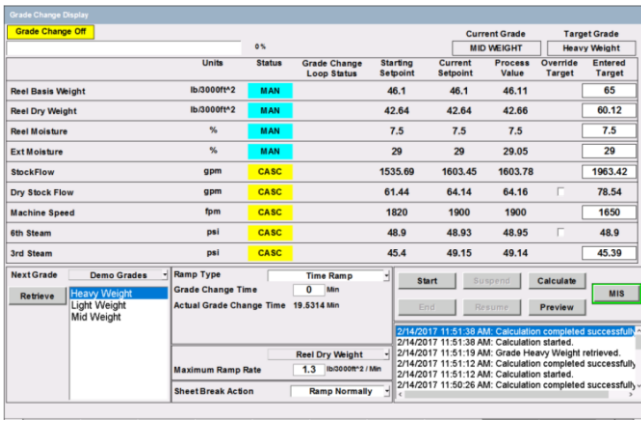
For processes with extra degrees of freedom (more MVs than CVs), Alpha MPC can be configured to optimize any CVs or MVs. The optimization function works with its constraint handling and range control capabilities to evaluate material costs, product quality specifications and process constraints. When it determines that all CVs can be held within their quality specifications over the entire prediction horizon, the control s will manipulate the process so that it operates at the point of highest production, or minimum cost. Some examples of paper-machine optimization:

- Maximizing machine speed while keeping CVs within quality limits and MVs within process constraints.
- Fine paper machines; weight, ash, and opacity can be tightly controlled while minimizing fiber and filler costs.
- Board machines; fiber and steam costs can be minimized while meeting strength specifications.
- Tissue machines: optimizing drying energy usage based on the cost of electricity or natural gas.

Even small incremental improvements can result in large economic benefits. Reducing fiber usage, or increasing production, by as little as one percent can result in annual savings exceeding one million dollars.

Grade Change Optimization for Paper Application

Multivariable interactions, non-linear process behavior and differences in operator experience make it difficult to achieve consistently fast and smooth grade changes with a minimal loss of production. MPC -based MD Controls provide optional automatic grade changes which can be performed with the controls in open or closed loop. In closed loop, Alpha MPC optimizes changes to CVs and MVs to provide the fastest grade change, while continuing to attenuate process disturbances. The result is an efficient grade change with minimum off specification product.

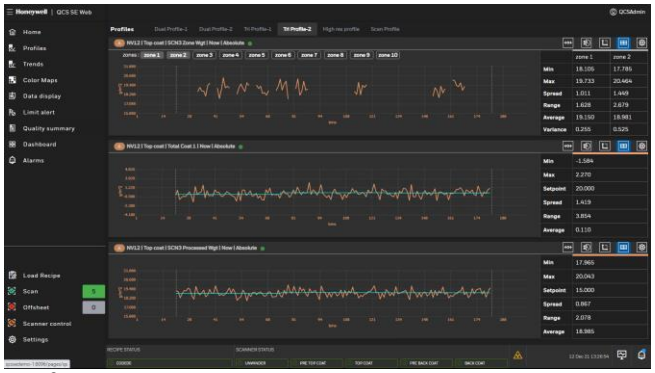


Grade Change Summary Display

Experion MX and QCS SE Quality Control Systems

Quality Control System (QCS) hosts the machine direction control application. Experion MX and QCS SE systems by Honeywell will help improve business performance in today's challenging economic environment. These fully integrated quality control and process knowledge systems provide superior visibility into the paper and other flat sheet processes, while simplifying operational efforts. It is also easy, and cost effective, to maintain and service. Experion MX and QCS SE will improve production quality, reduce raw material, energy, and maintenance costs, while increasing production efficiency. All with the lowest possible total lifecycle cost.

- Fast, robust, and accurate scanning measurement platform.
- Full line of intelligent quality sensors to measure all critical sheet properties.
- Scanner and sensor diagnostics linked to troubleshooting documentation.
- Built in service and maintenance tools.
- Multivariable model predictive cross and machine direction controls with cost optimization.
- Native integration with Honeywell 's Experian DCS including support for custom displays.
- Wide range of Industry standard connectivity interfaces.
- Full support for virtualization.



Sheet Manufacturing Support Services

Honeywell provides a complete portfolio of service offerings to optimize control performance and production, maintain and extend the life of your plant, and provide cost-effective path forward to the latest Quality Control technology.

Honeywell services include:

- Hardware and software installation services.
- On-site engineering services.
- Migration services.
- Performance baseline and tuning services.
- QCS training.

For More Information

Learn more about how Honeywell's Experion MX and QCS SE can improve efficiency of your production, visit https://process.honeywell.com/us/en/products/control-and-supervisory-systems/quality-control-systems-qcs

or contact your Honeywell Account Manager, Distributor or System Integrator.

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