Honeywell | Sheet Manufacturing

Cross Direction (CD) Controls

Product Information Note

Honeywell's Cross Direction Controls utilize industry proven multivariable model predictive control (MPC) technology to improve production quality and efficiency on various flat sheet manufacturing processes, while minimizing material and energy usage. Production losses are reduced by coordinating all profiling actuators to achieve global production optimum for quality and runnability.

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

CD control displays clearly present the most important process information to production operators. Actions such as entering set points, changing actuator control modes, or changing bias target, are efficiently performed with a minimum number of steps.

Model Predictive Cross Direction (CD) Controls

The uniformity of a sheet's cross direction (CD) properties is important for all grades to ensure high product quality and consistent uniformity. With paper machines commonly having multiple CD actuators, which affect multiple downstream sheet properties, it is imperative for a quality control system to have CD controls that can coordinate the actuators to provide the best overall sheet quality. Honeywell's cross direction controls utilize array-based multivariable model predictive control technology to ensure product quality and downstream runnability to improve the economics of the sheet manufacturing process through better utilization of resources and increased production efficiency. Controller has been specifically designed to calculate the optimal actuator setpoints at the end of every scan to ensure fastest response possible. The current measured profiles, the model of each actuator's response, as well as their physical constraints are all taken into account to minimize the future predicted profile variation. To ensure that all controllable variation is seen by the controller, all calculations are performed using high resolution profiles.

FEATURES & BENEFITS

Ultimate Control Performance

- A true multivariable, array-based, model predictive controller. Provides optimal coordination of multiple CD actuator beams controlling multiple sheet properties.
- Adaptive alignment provides long term control performance and reduces maintenance costs.
- Controls high resolution profiles so no controllable profile data is lost through filtering.

Improved Yield and Efficiency

- Production and economic optimization through built-in cost-penalty models and dynamic range controls.
- Actuator and process constraints are taken into account. Increases actuators' effective control range and improves overall sheet quality and speed of recovery from upsets.

Easy to Use and Maintain

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

Flexible and Scalable

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

Complex Control Problem Simplified

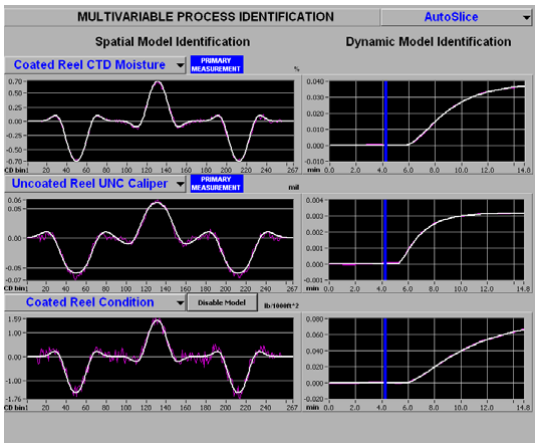
Recognizing that wide range of production may require different process configurations and control objectives, MPC-CD Control provides scenario switching so that machine operators can change from one pre-defined control configuration to another, on-line, as needed. Control scenarios can contain any combination of actuators and downstream measurements to match those used in a particular process configuration.

Even small incremental improvements can result in large economic benefits. Reducing raw material usage, or increasing production, by as little as one percent can result in annual savings exceeding one million dollars. Scenario switching provides a high degree of configuration flexibility without the need for custom coded applications.

To control the most complex processes, MPC-CD Control can implement a distributed control approach utilizing multiple multivariable CD controllers. Each controller is responsible for a specific process area, and its outputs are fed forward to downstream controllers. This approach simplifies configuration and troubleshooting and allows the performance of specific process areas to be optimized as desired. For example, upstream CD controls could be segregated from down-stream to facilitate commissioning while keeping all the advantages of the complex multivariable controls.

Easy to Use and Maintain

Commissioning and tuning of the CD controls is accomplished with IntelliMap, award-winner CD identification and tuning tool. Automated bump tests identify the actuators' spatial and dynamic responses in all downstream measured profiles. Once the complete process model is built, IntelliMap automatically calculates the actuator alignment and all control tuning parameters.

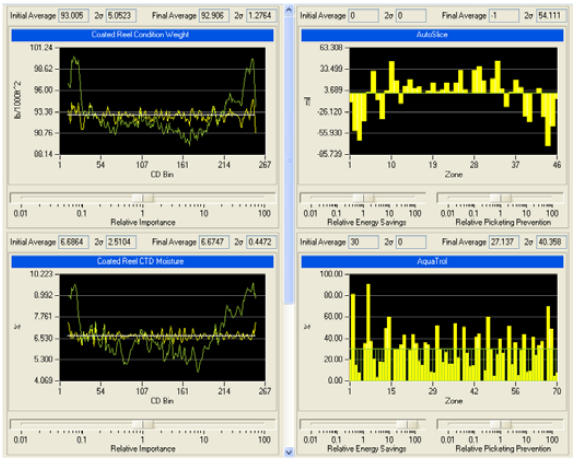


IntelliMap's Multivariable Process Identification Display

If desired, the generated tuning parameters can be easily adjusted to achieve the following:

- Specify the relative importance of sheet properties to achieve specific control objectives.
- Choose the dynamic aggressiveness of the controller to set the recovery speed from upsets.
- Specify the amount of spatial aggressiveness of the controller to set the degree of streak rejection.
- Set the desired actuator setpoint profiles and costs associated with deviating from them.

Prior to implementation, tuning parameters can be verified using IntelliMap's multivariable performance predictor. Once the desired control performance is achieved, a single button press transfers the process model and all tuning parameters to CD control.



IntelliMap's Multivariable Performance Prediction Display.

Adaptive Alignment

To ensure that the CD controls operate at a high level of effectiveness over the long term, Adaptive Alignment functionality continuously monitors the control performance and mapping to detect significant changes in actuator alignment. This occurs in the background during normal production operations, with the CD controls in closed loop. If new alignment parameters are needed to maintain performance, they can be implemented automatically, or reviewed and implemented with operator approval. If the new parameters are not found to improve the actuator alignment, service personnel are alerted to investigate further.

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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