

Experion MX MD Controls

Product Information Note

Honeywell’s Experion MX 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 paper manufacturers continually strive to improve operational efficiencies and reduce production costs, the role of paper machine 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.

The foundation of the Experion MX 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.



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.

FEATURES & BENEFITS

- Multivariable MPC designed specifically to control papermaking processes, with constraint handling and grade-dependent configuration
- Robust control technology which requires less maintenance to keep process models accurate
- Automated bump tests and process model identification for easy commissioning and maintenance
- Dynamic retuning based on changes in machine speed, production rate and/or dryer section steam pressure
- Flexible controls configuration for complex processes without custom built software
- Operator displays designed with Honeywell User Experience principles clearly show critical information
- Open or closed loop grade change control to minimize off specification product
- Production and economic optimization through built-in cost-penalty models and dynamic range controls
- Support for multiple coordinated controllers allows complex processes to be segmented for easier implementation and maintenance

The flexibility of multivariable controls allows advanced control strategies to be implemented without requiring custom-coded solutions. If a new paper 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 include:

- Optimization of wet end additive and sheet filler usage while maintaining optimal sheet formation, using sheet drainage and formation measurements
- Drying energy optimization using ExPress moisture sensors in the press and dryer sections
- Reducing fiber costs while maintaining sheet strength using online extensional 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 controls will manipulate the process so that it operates at the point of highest production, or minimum cost.

Some examples of 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

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. Experion MX MD Controls provide 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 Display									
Grade Change Off									
		0%		Current Grade			Target Grade		
				MID WEIGHT			Heavy Weight		
	Units	Status	Grade Change Loop Status	Starting Setpoint	Current Setpoint	Process Value	Override Target	Entered Target	
Reel Basis Weight	lb/3000ft*2	MAN		46.1	46.1	46.11		65	
Reel Dry Weight	lb/3000ft*2	MAN		42.64	42.64	42.66		60.12	
Reel Moisture	%	MAN		7.5	7.5	7.5		7.5	
Ext Moisture	%	MAN		29	29	29.05		29	
StockFlow	gpm	CASC		1535.69	1603.45	1603.78		1963.42	
Dry Stock Flow	gpm	CASC		61.44	64.14	64.16	<input type="checkbox"/>	78.54	
Machine Speed	fpm	CASC		1820	1900	1900		1650	
6th Steam	psi	CASC		48.9	48.93	48.95	<input type="checkbox"/>	48.9	
3rd Steam	psi	CASC		45.4	49.15	49.14		45.39	

Next Grade	Demo Grades	Ramp Type	Time Ramp	Start	Suspend	Calculate
Retrieve	Heavy Weight Light Weight Mid Weight	Grade Change Time	0 Min	End	Resume	Preview
		Actual Grade Change Time	19.5314 Min	MIS		
		Reel Dry Weight		2/14/2017 11:51:38 AM: Calculation completed successfully 2/14/2017 11:51:38 AM: Calculation started. 2/14/2017 11:51:12 AM: Grade Heavy Weight retrieved. 2/14/2017 11:51:12 AM: Calculation completed successfully 2/14/2017 11:51:12 AM: Calculation started. 2/14/2017 11:50:26 AM: Calculation completed successfully		
		Maximum Ramp Rate	1.3 lb/3000ft*2 / Min			
		Sheet Break Action	Ramp Normally			

Grade Change Summary Display

Experion MX Quality Control System (QCS)

Experion MX will help improve business performance in today's challenging economic environment. This fully-integrated quality control and process knowledge system provides superior visibility into the papermaking process, while simplifying operational efforts. It is also easy, and cost effective, to maintain and service. Experion MX will improve paper quality, reduce raw material, energy, service, 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 paper 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 Experion DCS including support for custom displays
- Industry standard OPC interfaces
- Full support for virtualization

Experion MX Support Services

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

Honeywell services include:

- Hardware and software installation services
- QCS and maintenance
- Performance baseline and tuning services
- Migration services
- QCS training

For More Information

Learn more about Experion MX by visiting honeywellprocess.com, or contact your Honeywell Account Manager.

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