



**Rockwell
Automation**

Food and beverage solutions

Optimization using model
predictive control



World's largest company dedicated to industrial automation and information

Rockwell Automation is a member of the Association for Packaging and Processing Technologies (PMMI) – a trade association made up of more than 700 member companies that manufacture packaging, processing and packaging-related converting machinery, commercially-available packaging machinery components, containers and materials in the United States, Canada and Mexico.

PMMI members are the industry-leading solutions providers on your processing and packaging supply chain, and PMMI resources help you connect with them.

SERVING CUSTOMERS FOR MORE THAN 115 YEARS

- Technology innovation
- Domain expertise
- Culture of integrity and corporate responsibility

80+
countries

20+
industries



Rockwell Automation
at a glance

22,000
employees

\$6.8B
fiscal 2020
sales





Food and beverage solutions

HELPING YOU EXCEED YOUR BUSINESS GOALS

INNOVATION

- The most powerful predictive modeling software in the industry
- Enhancing the profitability of global manufacturers
- Delivering the highest ROI in the industry

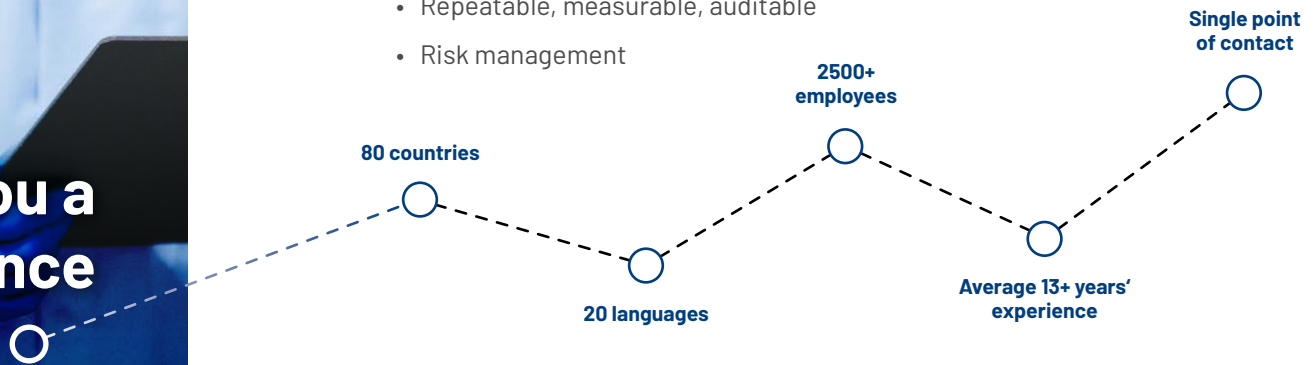
DOMAIN EXPERTISE

- Combining technology and application knowledge
- Targeted industries
- Best practices from multiple industries

PRODUCTS

- Certified project managers
- Repeatable, measurable, auditable
- Risk management

Bringing you a world of experience



ENERGY OPTIMIZATION • ENVIRONMENTAL • FOOD AND BEVERAGE • POLYMERS
MINERALS/MINING/CEMENT • NATURAL GAS LIQUIDS • WATER/WASTEWATER

Expertise in food and beverage

MODEL PREDICTIVE CONTROL (MPC) SOLUTIONS

Rockwell Automation industrial process solutions have provided more than 115+ years of innovation, experience and global support. Industry best practices are incorporated into every application, which is built upon a composite application framework that leverages a Service Oriented Architecture (SOA).

This scalable solution, when combined with library-based content, offers personalization options that promote faster user adoption and time-to-value for Food and Beverage producers. Our customers enjoy industry specific results to increase revenue and increase saving that directly effect the bottom-line.

Our capabilities help improve your operations

- Increase throughput up to 9%
- Reduce energy per unit of product up to 9%
- Reduce off-spec product up to 75%
- Improve yield up to 1%
- Reduce variability in quality up to 60%



Milk-based ingredient supplier benefits from tighter controls on caseinate production (EMEA)



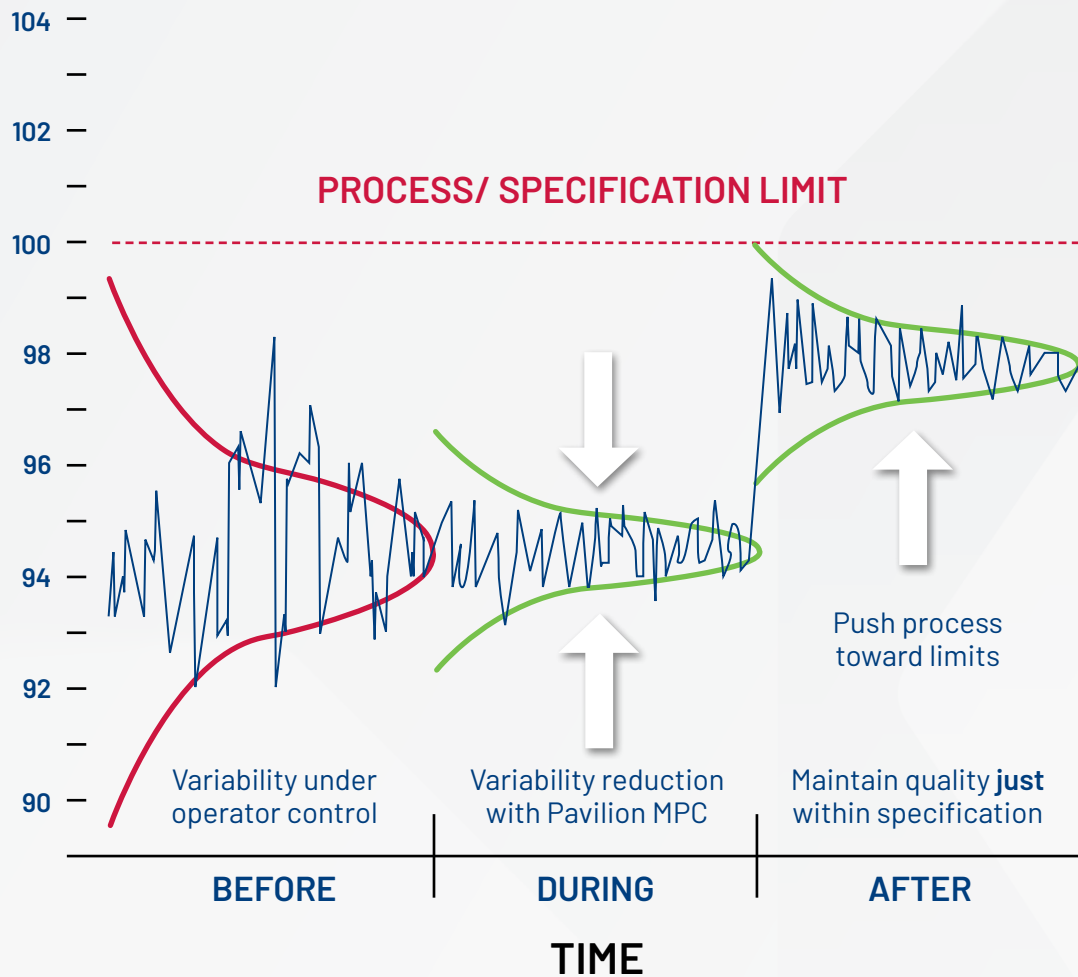
Milk processor improves operational efficiencies and increases yields by reducing moisture variability on its dryers (Asia/Pacific)



Improving product quality and operating efficiency on a global scale (EMEA)



KEY PRODUCT PROPERTY PERCENT OF LIMIT



How MPC generates benefits

Model predictive control effectively reduces the variation of key product variables; optimization drives the average toward a more profitable operating point.

Maximum profitability is realized by operating a process as close to its constraints as possible while maintaining an appropriate margin of safety. The margin of safety is largely dependent upon the control system for the process.

Model Predictive Control Solutions are able to reduce process variability and enhance stability over and above what is currently possible with more traditional control schemes. This is accomplished through our multi-variable, nonlinear, model predictive control capabilities.

- **REDUCES** variability
- **ACHIEVES** “plant obedience”
- **MANAGES** the process within constraints
- **ACHIEVES UPLIFT** - operate closer to specifications and performance limits while maintaining safety margins

THE FACILITY CONSISTS OF: CVS, CCVS, MVS, DVS

CONTROLLED VARIABLES (CVs)

Process variables that need to be maintained at a target or within a set range

CONTROLLED CONSTRAINT VARIABLES (CCVS)

Process variables that should not be allowed to violate limits (upper, lower or within a range)

MANIPULATED VARIABLES (MVs)

Process variables you can adjust that affect the CVs (typically PID set-points)

DISTURBANCE VARIABLES (DVs)

Measured process variables that affect the CVs that are not MVs

MPC is the replacement of the driver with automated control that takes all variables into account for defined performance





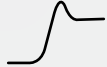









Controller matrix

Advanced Process Control (APC) software solutions deliver unparalleled modeling, prediction, control, and optimization capabilities in one unified solution.

Through superior data pre-processing, parameter formulation, modeling, and prediction techniques, APC provides extremely accurate representations of even the most complex processes. A multivariable predictive control solution is the only one in the market capable of synthesizing all available information – process knowledge, first-principle equations, or empirical models – into a comprehensive model of the production process.

Flexible and efficient, the control solution continuously drives the most out of your production assets to achieve your unique business objectives. Predictive analysis capability provides insight into key process parameters, reducing variability and eliminating the guesswork between infrequent lab sampling. Individual input output models are combined together in a matrix to give an overall picture of how the process behaves. This model matrix forms the heart of the MPC Controller.

Controller consists of a matrix of process model pairs that explain important interactions in the process...

	CV1	CV2	CV3
MV1			
MV2	NO MODEL		NO MODEL
MV3			
DV1			
DV2			NO MODEL

Predict the values

of the CVs by movement of all the MVs and DVs



Proactive control

to achieve CV setpoints, prevent them from being violated, hence reducing variability

PID

SINGLE VARIABLE IN & SINGLE VARIABLE OUT

Set up a target and control process variable to the target.
No awareness of how control changes impact other PID loops.

FEEDBACK CONTROL

The controller will take no action unless PV deviates from target

INDIRECT CONTROL OF LAB MEASUREMENTS

Control property variables through proxy (temperature, pressure, etc.)

POOR ABILITY TO HANDLE PROCESS DELAYS

During complex dynamic interactions

CONSTRAINTS

Only internal awareness of loop's limits on set point and output

MPC

MULTIVARIABLE IN & MULTIVARIABLE OUT

Control strategy based on a holistic comprehension of key process variables and their interdependencies.

PREDICTIVE CONTROL

Dynamic models developed through process step tests. Controller action based on current and future PV deviations from target.

DIRECT CONTROL OF LAB MEASUREMENTS

Controller predictions of lab measurements used for control updated as available.

EXPLICIT DYNAMIC MODELS

Full understanding of process dynamics and interactions

CONSTRAINTS

Predict and monitor future values of constraints

DRYER AND EVAPORATOR

Manufacturers of milk and other food ingredient powders recognize the constant need to operate their processes more efficiently. The goal is to increase throughput while simultaneously reducing costs in order to be competitive globally.

Many manufacturers are also shifting more production towards higher value specialty products that require higher quality standards (such as low-fat, no-fat, protein-enhanced, etc.) In order to produce these different products, plant operations must perform within narrower, more consistent, product specifications.

In the dairy industry, a variety of dryers and evaporators are common in the production of powdered products to achieve cost-effective moisture removal from concentrated liquids. Dryers and evaporators are the most energy intensive units used in the dairy processing industries. Optimal operation of this process is essential to reduce costs and help meet final product quality specifications.

CUSTOMER CHALLENGES

Inconsistent dryer feed milk solids

Inefficient energy use

Reduced throughput

High moisture and content variability

Balancing the rates between the evaporator(s) and the dryer

MPC BENEFITS

- **INCREASE** throughput up to 15%
- **INCREASE** outlet air relative humidity up to 16%
- **REDUCE** energy use up to 12%
- **REDUCE** off-spec product up to 75%
- **INCREASE** moisture yield up to 1%
- **REDUCE** moisture variability up to 60%
- **IMPROVE** the consistency of dryer feed milk solids

Process optimization for results: Model Predictive Control has proven to be an effective technology to help our customers regardless of market conditions. Whether it is getting more out of existing equipment, or improving operations for tighter margins, MPC from Rockwell Automation is the answer to your challenges.

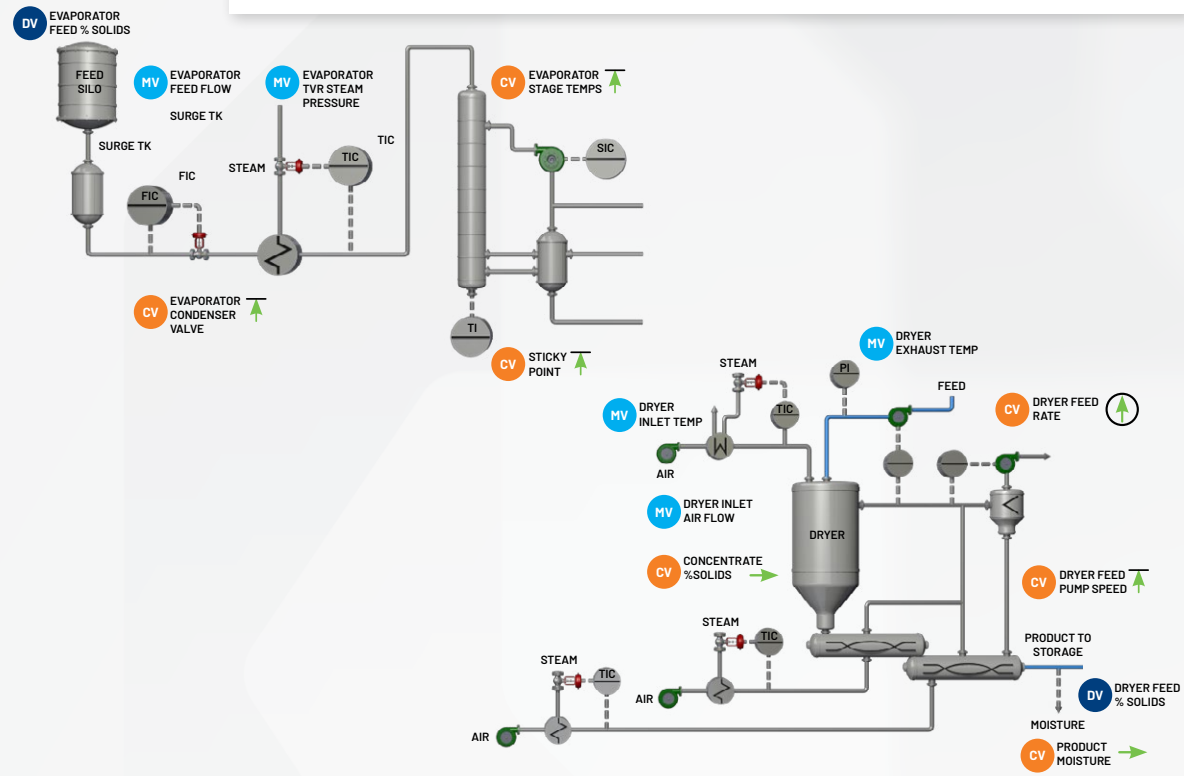
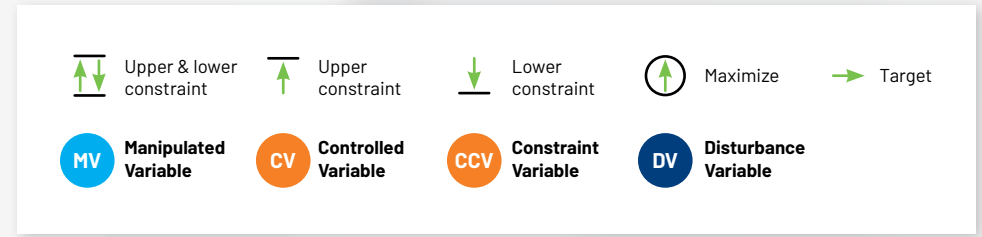
DRYER AND EVAPORATOR

Dairy dryer/evaporator balance application

The Rockwell Automation Model Predictive Control (MPC) and Optimization Application is tailored to the individual configuration of each unit and specific site objectives. It combines the Rockwell Automation Dryer and Evaporator Balance Control Applications for a complete solution which incorporates full thermal control and optimization.

Energy balancing

Implementing this dual application solution offers a unique thermal energy balancing opportunity between the evaporator and the dryer. Optimal energy use and cost control can be achieved.



CHALLENGES	Milk variability	Energy inefficiency	Increase throughput	Moisture variability
OBJECTIVES	Stabilize process	Push evaporators	Operate at limits	Dry to specification
BENEFITS	Increased milk solids	Reduced energy 12%	Increased throughput 16%	Decreased variability 60%

DRYER

Manufacturers of milk and other food ingredient powders recognize the constant need to operate their processes more efficiently. The goal is to increase throughput while simultaneously reducing costs in order to be competitive globally.

Many manufacturers are also shifting more production towards higher value specialty products that require higher quality standards (such as low-fat, no-fat, protein-enhanced, etc.). In order to produce these different products, plant operations must perform within narrower, more consistent product specifications.

In the production of powdered products to achieve cost-effective moisture removal from concentrated liquids, dryers require maximum efficiency and optimization to improve yield and save energy costs. Dryers are one of the most energy intensive units used in the dairy processing industries. Optimal operation of this process is essential to reduce costs and help meet final product quality specifications.

CUSTOMER CHALLENGES

Need to increase capacity to meet demand

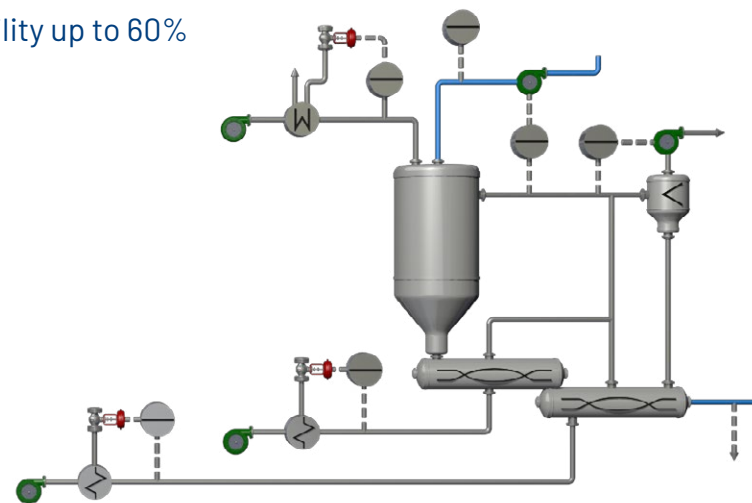
Too much off-spec product

Inefficient energy utilization

Moisture variability: under and over drying product

MPC BENEFITS

- **INCREASE** throughput up to 9%
- **REDUCE** energy use up to 9%
- **REDUCE** off-spec product up to 75%
- **INCREASE** moisture yield up to 1%
- **REDUCE** moisture variability up to 60%



DRYER

Application scope

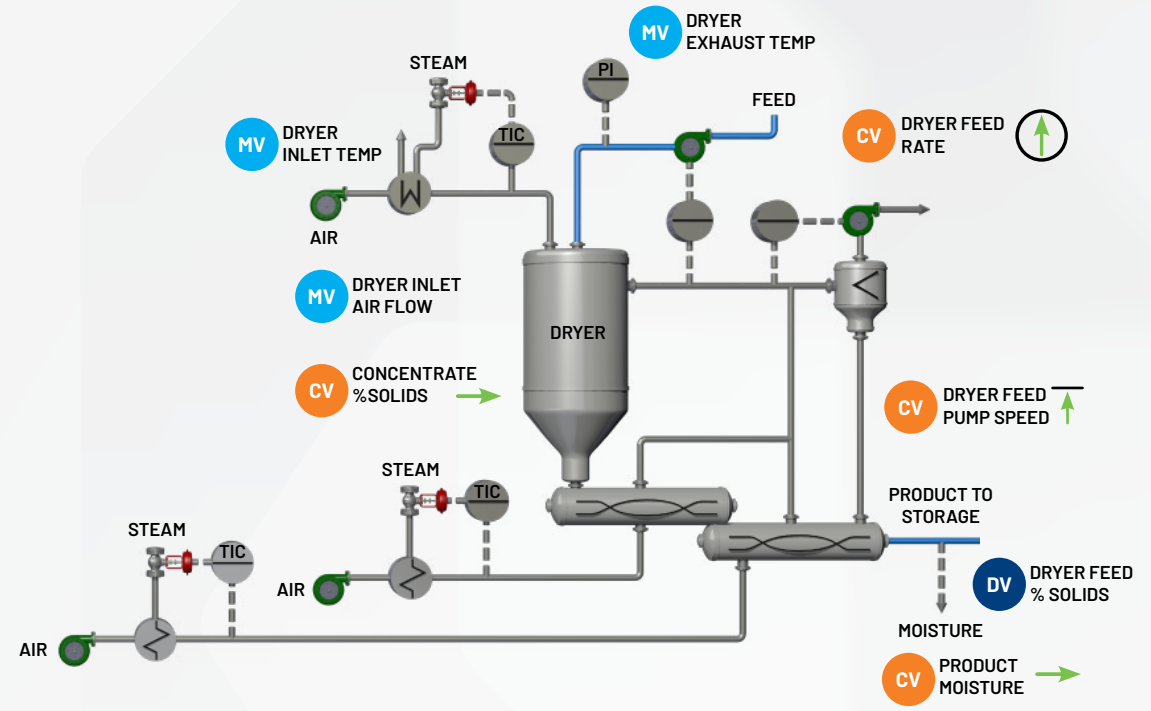
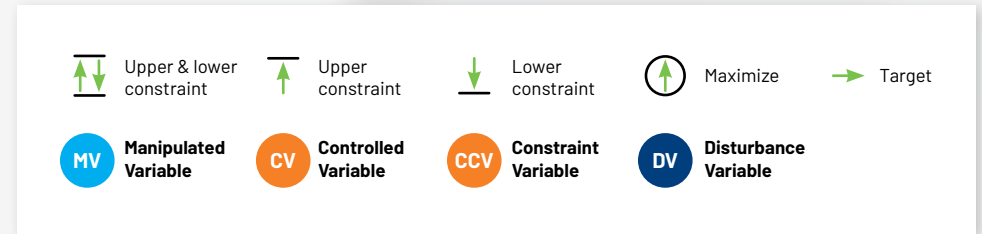
The MPC application works with single and multi-stage spray drying processes as well as flash dryers and processes with fluidized beds. It controls product average moisture to a desired target while reducing overall moisture variability. Relative humidity and capacity are also managed to help achieve optimal performance.

Moisture management

The MPC software controller compensates for variations in the milk solids concentrate as well as inlet air relative humidity and other disturbances that affect drying efficiency. By reducing moisture variability, the average moisture target can be increased without compromising product quality. This increase in moisture target can also produce higher yields from the same milk solids, increase dryer capacity and reduce product re-work and energy usage per ton of finished product. This application includes early engagement control, which sees the dryer under MPC and optimization. This helps in achieving optimal quality and thermal efficiency within minutes of the dryer commencing powder production. Capacity management is achieved by improving the thermal efficiency of the dryer and controlling chamber temperatures and airflows to achieve the capacity target. At the same time, the absolute chamber relative humidity constraint and product quality are optimized.

Performance metric and visualization

Real-time visualization in a browser-based interface presents metrics that allow operators and management to monitor the performance measures of production, quality and energy. These dashboards allow current and predicted plant performances to be viewed and managed to realize and sustain the lifetime business value of MPC investment.



CHALLENGES	Increase capacity	Off-spec	Increase yield	Excessive energy use
OBJECTIVES	Manage process	Reduce moisture variability	Control variables	Reduce energy
BENEFITS	Increased throughput 9%	Reduced off-spec 75%	Increased yield 1%	Reduced energy 9%

EVAPORATORS

Prescriptive and predictive analytic process solutions:

Evaporators are critical in the production of powdered products to achieve cost effective moisture removal from concentrated liquids. Evaporators are one of the most energy intensive units used in the dairy processing industries. Optimal operation of this process is essential to reduce costs and help meet final product quality specifications.

Rockwell Automation recognizes these challenges and offers an application focused on delivering valuable evaporator control for optimization and performance.

Dairy evaporator control application:

Application assists in controlling and optimizing the evaporation process during the production of powdered dairy products. Powered by FactoryTalk Prescriptive and Predictive Analytics patented technology, this application is tailored to the individual configuration of each unit and specific site objectives. It may be a stand-alone option or combined with the Dryer Control Application for a complete drying solution.

CUSTOMER CHALLENGES

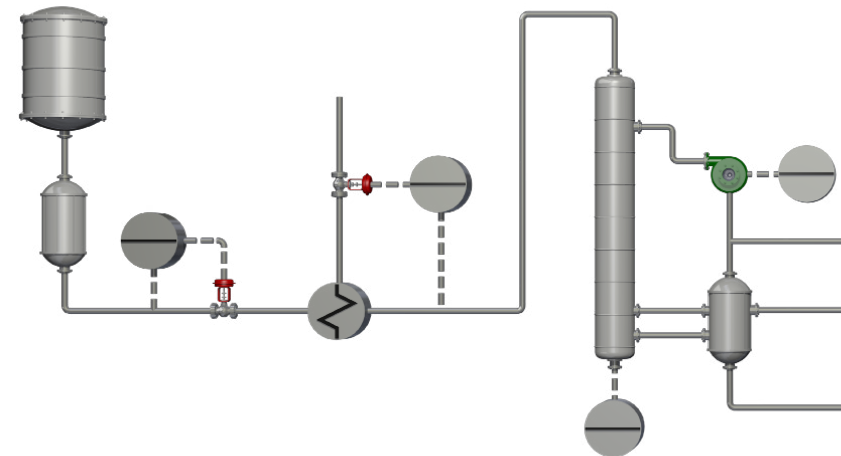
Inconsistent concentrate solids

Inefficient energy use

Need to increase capacity to meet demand

MPC BENEFITS

- INCREASE throughput up to 9%
- REDUCE energy use up to 9%
- REDUCE concentrate solids variability up to 60%
- IMPROVE the consistency of dryer feed milk solids



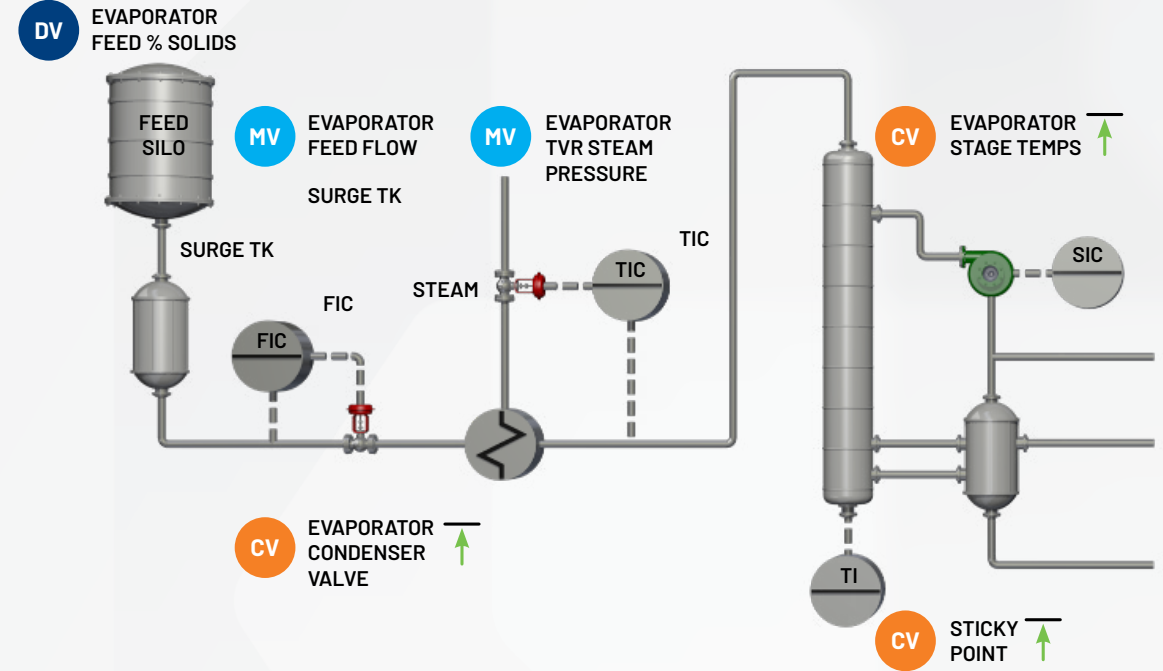
EVAPORATOR

Application scope

The Evaporator application works with single and multiple effect evaporators and can optimize energy usage by including mechanical and thermal vapor recompression loops if they exist. It has also been successfully applied in the most complex evaporator configurations, including rising-film, falling-film, wiped film and units with pre-evaporation or finisher.

Milk solids management

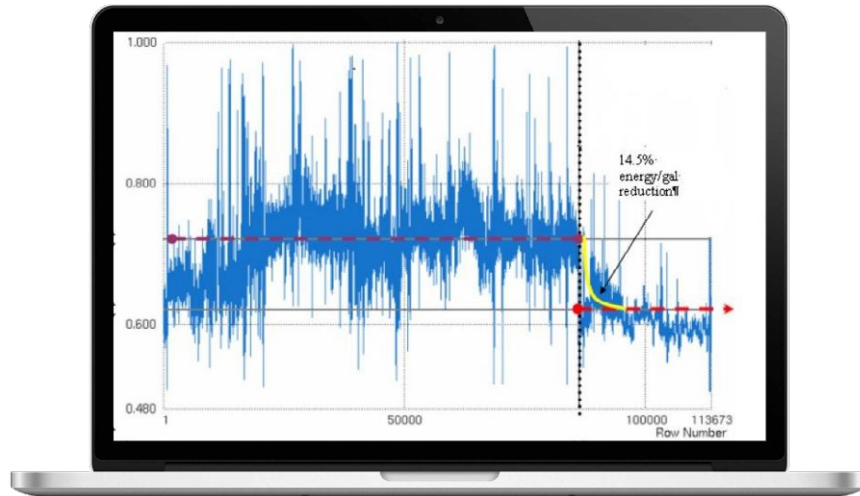
This application reduces the variability of the milk solids concentrate, allowing the average production target to be shifted upward without compromising the downstream drying process. Variations in milk feed temperature and concentrate feed to the dryers, helping to improve the consistency in product quality.



CHALLENGES	Increase demand	Energy costs	Inconsistent concentrate solids
OBJECTIVES	Increase throughput	Reduce energy	Reduce concentrate solids variability
BENEFITS	Increased throughput 9%	Reduced energy 9%	Reduced variability 60%

Dryer MPC results

Dryer/Evaporator or MPC commissioned



ENERGY SAVINGS
14.5% less BTU/gal

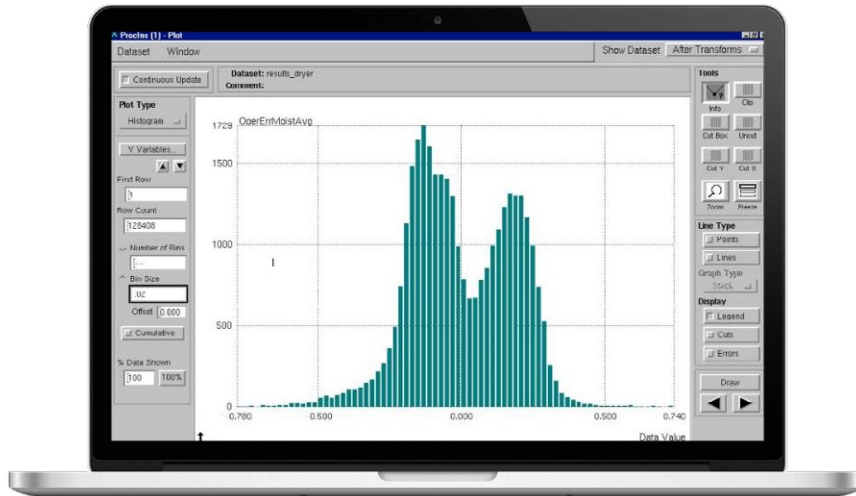


THROUGHPUT INCREASE
+10.6% gal/year

The Rockwell Automation Dairy Model Predictive Control (MPC) applications assist in controlling and optimizing the drying and evaporating process during the production of powdered dairy products. Powered by Rockwell Automation patented technology, this application is tailored to the individual configuration of each unit and specific site objectives. It may be a stand-alone option with drying, evaporating, or combined for a complete drying solution.

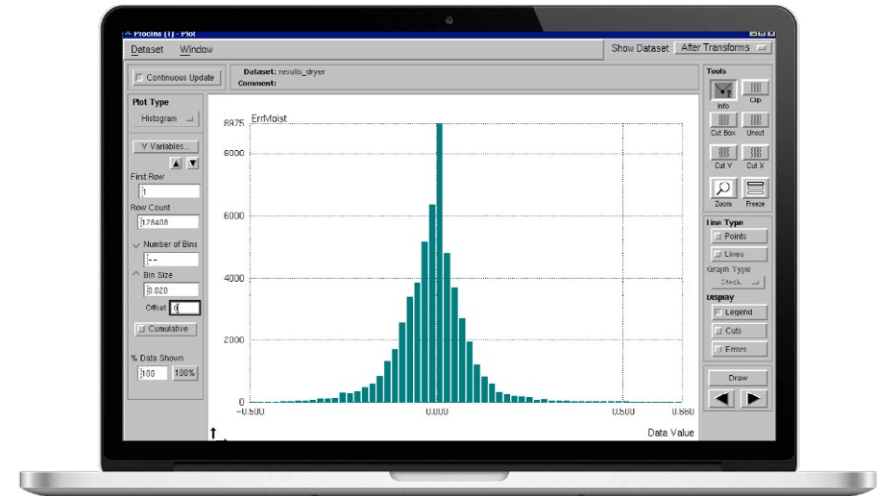
Reduction in variability

Example: dryer results
(moisture) 49%



BEFORE

Model Predictive Control



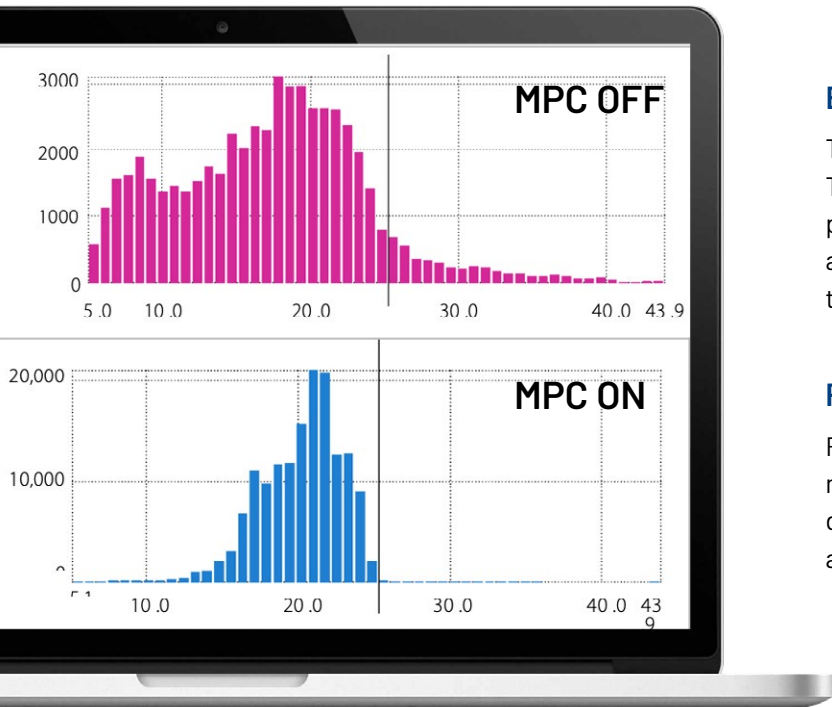
AFTER

Model Predictive Control

Moisture management

The MPC software controller compensates for variations in the milk solids concentrate as well as inlet air relative humidity and other disturbances that affect drying efficiency. By reducing moisture variability, the average moisture target can be increased without compromising product quality. This increase in moisture target can also produce higher yields from the same milk solids, increase dryer capacity and reduce product re-work and energy usage per ton of finished product.

Exhaust relative humidity control



Early engagement and capacity management

This application includes early engagement control, which sees the dryer under MPC and optimization. This helps in achieving optimal quality and thermal efficiency within minutes of the dryer commencing powder production. Capacity management is achieved by improving the thermal efficiency of the dryer and controlling chamber temperatures and airflows to achieve the capacity target. At the same time, the absolute chamber relative humidity constraint and product quality are optimized.

Performance metrics and visualization

Real-time visualization in a browser-based interface presents metrics that allow operators and management to monitor the performance measures of production, quality and energy. These dashboards allow current and predicted plant performances to be viewed and managed to realize and sustain the lifetime business value of MPC investment.

MPC OFF

- Humidity frequently exceeds limit
- Wide distribution = poor manual control
- Over drying = wasted energy

MPC ON

- Keeps process Relative Humidity under limit even with changes in Ambient Humidity
- Narrow distribution = tighter control with MPC
- Less over drying = energy savings

DAIRY STANDARDIZATION

In milk processing, powder compositional control is one of the most difficult process control challenges. Typically fat composition is regulated through ratio control of cream to skim milk feed. Protein is controlled through the addition of lactose or permeate. Traditional regulatory control of liquid fat and protein composition is problematic due to the interactions of the ingredient streams.

Adjusting ratios and variables may affect both the fat and protein composition. Furthermore, other complexities arise when relating the final powder composition back to the wet-side composition. Managing the effects of evaporation, process dynamics and compositional instrumentation measurement accuracy is nearly impossible without an automated system.

A process optimization solution using MPC allows control of dairy standardization for definitive results.

CUSTOMER CHALLENGES

Variability in final product composition
Give away of fat & protein in final product
Out-of-spec quality

MPC BENEFITS

- **REDUCE** final product component variability up to 60%
- **REDUCE** fat and protein in the final product by up to 0.35%
(to specification limits)
- **DECREASE** product give-away
- **LIMITING** out-of-spec product

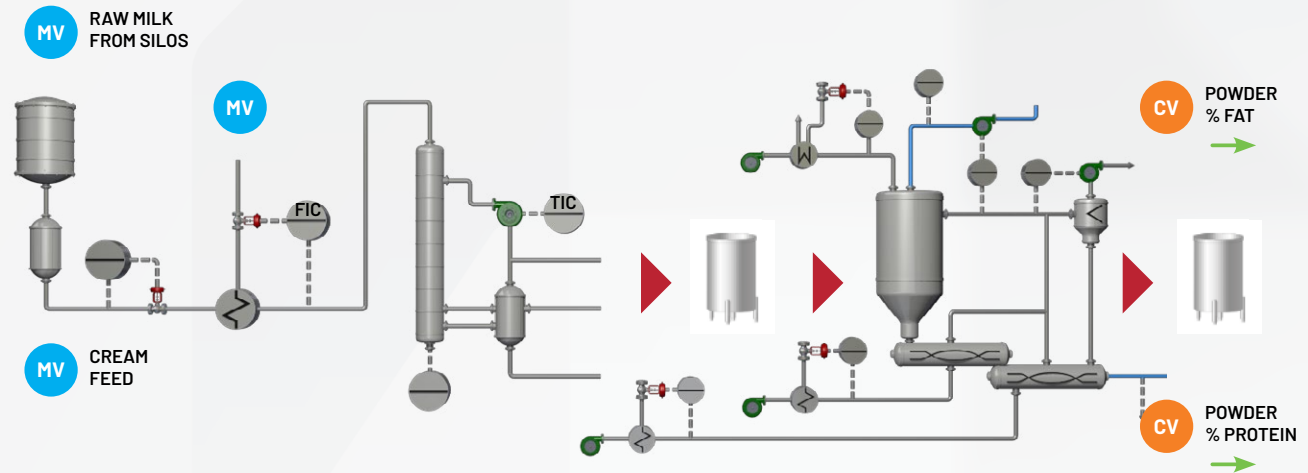
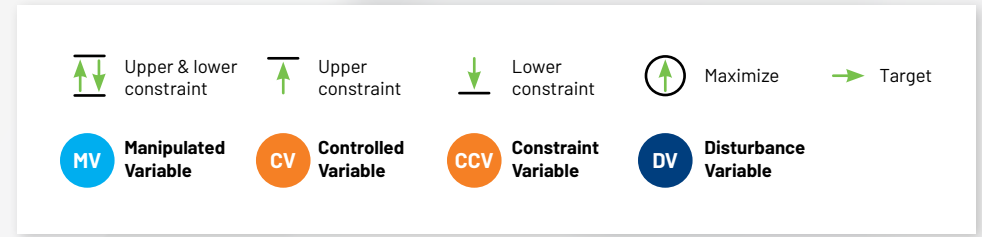
DAIRY STANDARDIZATION

Standardization application

The MPC application from Rockwell Automation provides a closed loop standardizing solution with superior targeting of final powder composition and constraint management through real-time control of wet-side standardizing and process accurate inferential powder composition models.

Monitor and control

Powder composition inferential models are developed to provide a continuous virtual measurement of the final powder composition. The models account for mixing in silos and balance tanks, loss of water through evaporation, post standardizing additives and process dynamics through the evaporator and drying systems. The inferential models are biased with validated in-process testing (IPT) results to account for instrument drift. Appropriate Statistical Process Control (SPC) rules are applied in the biasing algorithm.



CHALLENGES	Product give-away	Out-of-spec quality	Final product variability
OBJECTIVES	Decrease product give-away	Limit out-of-spec	Reduce product composition variability
BENEFITS	Reduced fat .35% and protein .25% in final product	Reduced out-of-spec	Reduced variability 60%

Liquid composition MPC controller

By utilizing in-line analytical measurement of wet-side composition with instrumentation, standardization is run as a continuous process. The FactoryTalk® Analytics™ MPC Liquid Composition Controller adjusts the cream and lactose or permeate ratios typically at a 30-second interval to control to liquid composition targets. The multi-variable predictive control models handle the interactions between the ingredient streams.

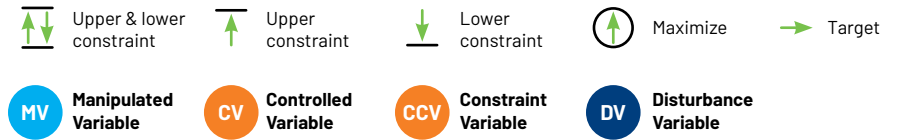
Powder composition MPC controller

The Powder Composition Controller, which accurately encompasses process dynamics, is used to make adjustments to the targets of the Liquid Composition Controller based on feedback from the statistically biased inferential powder composition models.

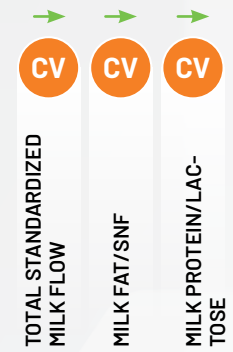
Performance and visibility

Historical and predicted milk compositions along with past and planned controller actions are displayed through the FactoryTalk® Analytics™ PavilionX™ Console. The web browser interface allows operators, engineers, and managers to clearly see all pertinent composition and ingredient flow information in both comprehensive and custom trends. Optimization Multivariable models handle interactions that cannot be solved with regulatory PID control thus reducing liquid compositional variability.

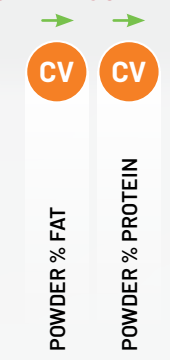
Variable dynamic models and SPC logic allow for superior powder compositional targeting further reducing the variability in the final product. Detection of instrument drift provides valuable calibration assistance. Tighter compositional control allows fat and protein targets to be driven to the specification minimums leading to significant financial savings. Web-based visualization platforms facilitate easy access to real-time controller and performance data enabling operations and management to make proactive decisions further maximizing benefit.



LIQUID CONTROLS



POWDER CONTROLS



- MV RAW MILK FROM SILOS
- MV LACTOSE FEED
- MV CREAM FEED
- DV RAW MILK COMPOSITION
- DV CREAM COMPOSITION

	➔	➔	➔
	CV	CV	CV
TOTAL STANDARDIZED MILK FLOW	X	X	X
MILK FAT/SNF	X	X	X
MILK PROTEIN/LACTOSE	X	X	X

- MV MILK FAT/SNF
- MV MILK PROTEIN/LACTOSE

	➔	➔
	CV	CV
POWDER % FAT	X	X
POWDER % PROTEIN	X	X

BENEFITS

- 50% Reduced fat variability by 50%
- Reduced protein variability by 60%
- Optimized protein in final product by 0.25%
- Optimized fat by 0.35%
- Reduced product give-away
- Reduced off-spec
- Improved fat and protein consistency

FOOD LINES

Food Line Optimization provides control and optimization of food line processes, from raw material introduction to final pre-packaged product, using patented, industry-leading technology.

The Food Line Application provides control performance by reducing the disturbance effects from raw material variations and feed interruptions. The application responds to raw material disturbances such as color, density and material size, as well as changes in steam supply, cooling capacity and ambient conditions. With real-time optimization, increased throughput and yield is achieved by operating the plant closer to process constraints. An MPC solution drives more production, optimizes energy, and lowers off-spec product with existing equipment that does not require additional capital investment to achieve greater profits.

CUSTOMER CHALLENGES

Inconsistent production rates
Excessive energy consumption
Off-spec product increasing scrap or rework
Loss of production from not balancing equipment

MPC BENEFITS

- **INCREASE** throughput up to 15%
- **REDUCE** energy use up to 12%
- **REDUCE** quality variability up to 60%
- **INCREASE** yield up to 1%
- **IMPROVE** operational stability

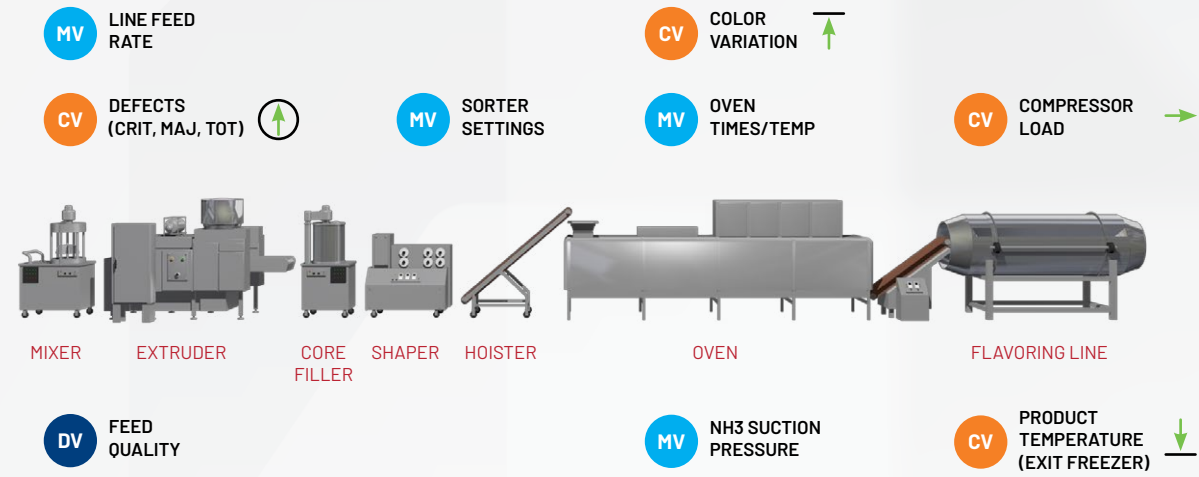
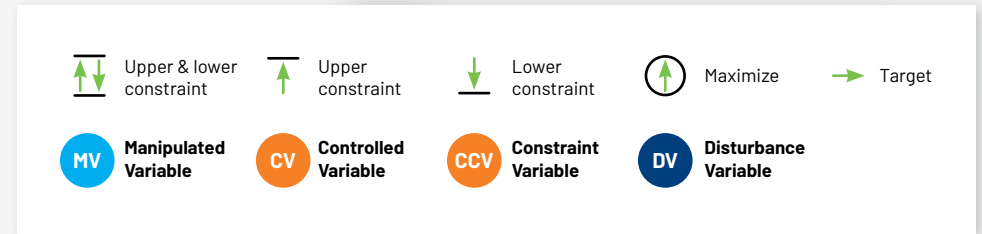
FOOD LINES

Monitor and control

Monitoring and controlling production can significantly reduce process inconsistency and variability, limiting off-spec product and rework of materials. Through predictive control, our solution delivers better process stability and higher consistency in product quality. The MPC software provides real-time visibility of production metrics compared to a baseline and promotes a performance-driven culture.

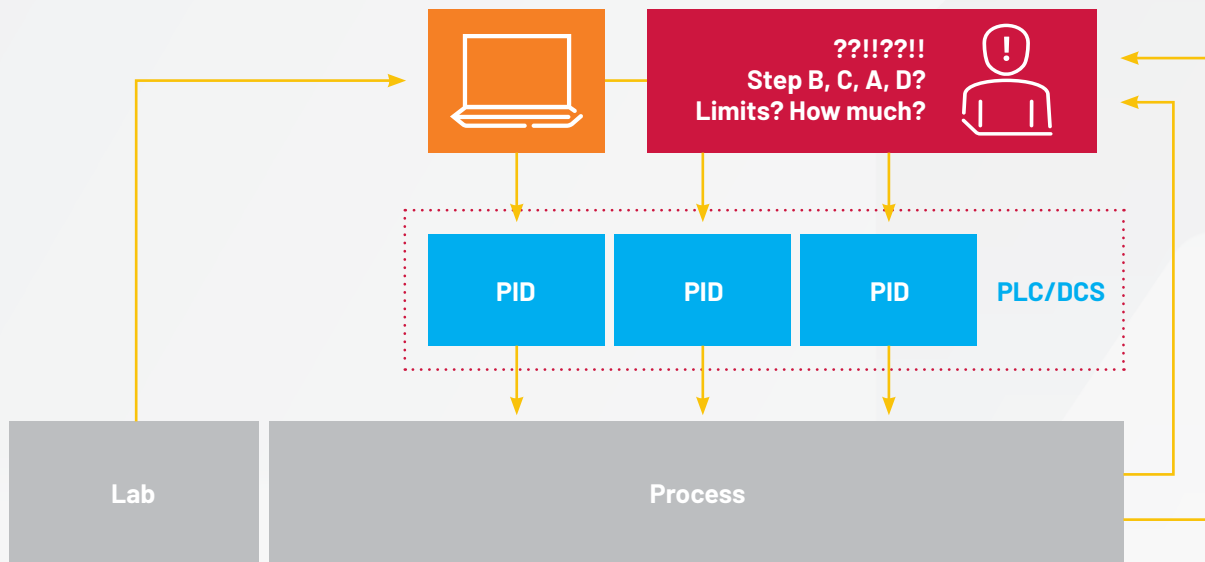
Process constraints are monitored and future violations predicted. Corrective action is taken as necessary to ensure that the process runs close to constraints without violating acceptable limits.

The application stabilizes the production process by coordinating multiple loops with a multivariable predictive control algorithm (Model Predictive Control). In addition, the Food Line Optimization MPC enables an innovative approach to optimize sorters, fryers, freezers and other food line equipment, by calculating and controlling temperatures, raw material rates, additive rates, dwell times and other key process parameters for balanced equipment efficiency.



CHALLENGES	Inconsistent production	Excessive energy consumption	Off-spec product	Imbalanced equipment
OBJECTIVES	Balance production rates	Reduce energy	Reduce concentrate solids variability	Balance equipment
BENEFITS	Increased throughput 15%	Energy reduction 12%	Decreased variability 60%	Reduce product quality variability

Control structure before MPC



BASIC REGULATORY CONTROL

A PID loop system is limited to a single area of your entire process. This does not allow for proactive actions should any disruption in your system occur, such as unexpected changes in humidity, pump speeds, or feed variability.

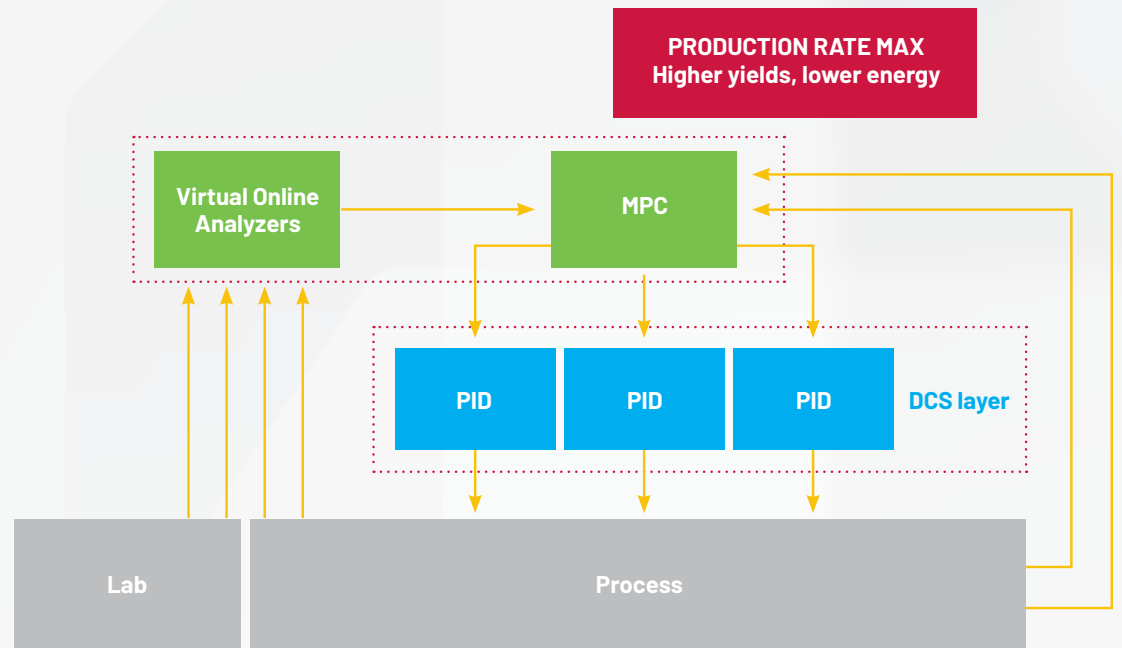
Without a holistic view of any process, an operator will always be in reactive mode, and not in a predictive or prescriptive mindset.

Model Predictive Control sees the whole picture throughout the process and then is able to make adjustments prior to any slow-down or stoppage.

MPC/optimization architecture overview

With MPC we can create virtual online analysers. These are inferential measurements that use easy to measure information in your process to provide continuous feedback of quality parameters that typically require lab sampling to measure.

These VOA's are typically used to provide feedback to our PavilionX MPC controller enabling continuous closed loop control of important quality parameters.



Predictive analytic machine learning

Predictive analytic machine learning can be leveraged throughout a food and beverage facility to provide additional oversight. Many soft sensors are in use to drive quality control within the previously described MPC applications where no online analyzer is available. Predictive maintenance targets any equipment that has concerns on failure or high maintenance costs: flash fryers or cutting components, dryers, evaporators, conveyors, critical pumps or other critical machinery with connected sensors. Improve maintenance dispatch timing to improve the return for every maintenance dollar spent.

Anomaly detection is very useful for any equipment section that periodically goes wrong and providing operators early insight into developing problems with freezers or belt systems, material losses or equipment failure concerns where there is not an existing history of identified failures. With anomaly detection you can frequently gain advanced warning on detectable issues (measurement deviations) and resolve them to minimize periods of upset or poor performance.

If MPC is continuously driving good periods of plant performance to the highest levels, many of these predictive analytics are reducing time spent performing abnormally. This technology helps drive increases in food and beverage profitability.



ValueFirst

THE WAY WE DO BUSINESS

ValueFirst is the Rockwell Automation unique customer engagement process that guarantees measurable value and lasting results. ValueFirst aligns every aspect of the Rockwell Automation people, process and product with customers' business needs to deliver and demonstrate the incremental and cumulative value of our solutions.

The ValueFirst methodology encompasses every step in our customer engagement process. From a simplified contracts process to a uniform set of performance metrics on every Model Predictive Control (MPC) and Environmental Compliance solution, we are dedicated to delivering the highest possible value to customers, faster and better than alternative solutions.

ValueFirst® project methodology



Sustained value services

SUPPORT PROGRAMS TO HELP PROTECT YOUR INVESTMENT

The Sustained Value Team is committed to keeping your investment at its optimal performance level, and our program of value-added services is designed to help deliver results to your bottom-line year after year. To achieve this goal, we offer proactive support to maximize your operations. This includes new software features and industry-specific applications, solutions and services to help customers increase production, reduce costs, improve quality and increase profitability.

Our Sustained Value Program provides you with the foundation to continue to leverage our industry leading solutions, ongoing insight into plant, application and solution performance and a proven path to achieve the greatest possible annual return on your investment in solutions from Rockwell Automation.

KEY BENEFITS

- Proactive maintenance for optimal performance
- Improved application availability
- Refresher training for maintaining operator expertise
- Greater software availability through product enhancements, updates and quarterly application backups
- Enhanced visibility of application performance through quarterly status reports

LEVEL 1 SUPPORT

- Email and live telephone support
- Service-Pack Releases provide updates and system changes
- MPC System recovery assistance from server failures

LEVEL 1 AND LEVEL 2 SUPPORT

- Email and live telephone support
- Service-pack releases provide updates and system changes
- MPC System recovery assistance from server failures
- **Quarterly PavilionX MPC status reporting and troubleshooting APC application issues**
- **Web-based PavilionX Support Knowledgebase and annual onsite visits available for APC**



**Rockwell
Automation**

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