



Paper Machine Dryer Simulation

High Pressure (Motive) Steam 10488 pph 250 psia RSP (Moisture) 47.9 psia **MAN** Moisture

Process Simulators

Stock Preparation System Simulator

BW LOW MOI LOW Basis Weight 40.9 gsm

Enhance mill training programs, process & control design and variability troubleshooting

Stock Flow Design
Stock Consistency
High Density Stock

Stock Preparation
Paper Machine Dryers

DCS-like interface, selectable/configurable process and control equipment

Design Features:

- Pre-packaged /ready to use
- DCS-like graphical interface
- Configurable process equipment
 - Pumps, Piping, Control Valves
 - Sizing of primary process equipment
- Selectable control strategies
- Adjustable controller tuning, filtering and configurable sensor and DCS parameters
- Disturbance injection capabilities to build troubleshooting skills and conduct sensitivity analysis
- Equipment non-linearities

Use the Simulators to:

- Train operators and technical personnel
 - Improve process knowledge
 - Develop operator troubleshooting skills
 - Develop control loop optimization skills
- Troubleshoot process and control problems
 - Inject process disturbances
 - Introduce equipment non-linearities
 - Evaluate process equipment limitations
- Compare process and control design options
 - Identify process bottlenecks
 - Demonstrate impact of process changes on control performance and variability
 - Evaluate control loop & strategy designs

An invaluable learning tool for process variability and control troubleshoot-



Simulator Operation

Process Equipment:

- Choose from a pre-defined list of pumps and valves
- Custom configure pump and valve curves
- Define piping isometrics, chest dimensions and other equipment



Iso

valve Properties

Valve Series PCV099:

Valve Size PCV099:

Generic Valve Flow Characteristic:

Generic Valve Max Cv:

p310 Properties

Pump Selection:

Pump 310 Nominal Speed:

Pump310 Design Flow gpm:

Pump310 Design Head ft:

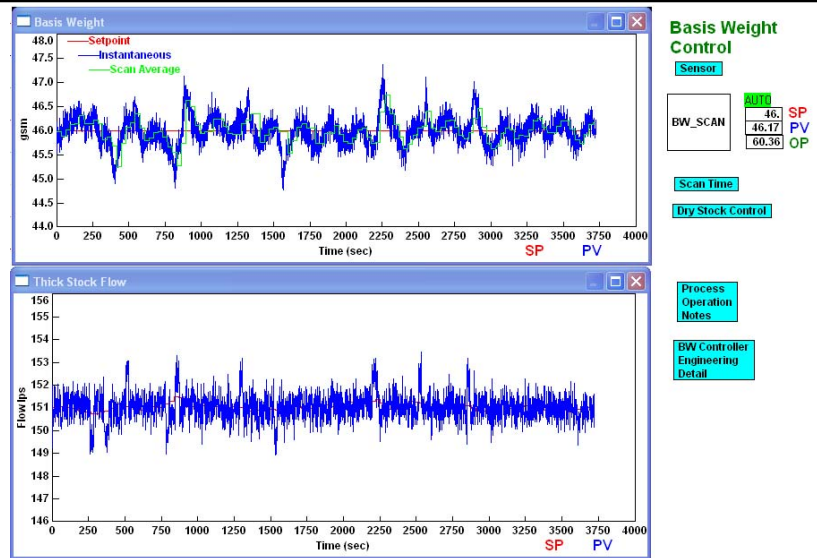
Trim Impeller by %:

Process Operation:

- Turn Motors On/Off
- View process trends
 - Process variable (PV) in engineering units and percent of span
 - Controller output and setpoint
 - Zoom in/out and coordinates cursor
- Adjust the controller mode, setpoint & output
- Adjust the controller tuning constants
- Select PID controller type



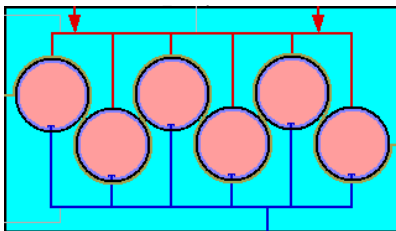
Control Loop Symbol



Primary Processing Equipment:

- Selecting the major process equipment symbol (outlined/filled with cyan) accesses the parameter data entry block

Dryer Section Design



Dryer Design Properties

Syphon Type: Syphon Size:

Spoiler Bars Contact Coefficient:

Number of Cans: Dryer Shell Thickness, inches:

Dryer Can Diameter, ft: Condensate Coefficient:

Syphon Clearance:

Additional Design Information & Disturbances:

- Modify process area design to match your process
- Inject process disturbances and sensor noise
- Inject control valve non-linearities
- Switch to VFD control
- View trends to show the relationship between key variables



Disturbances



Switch

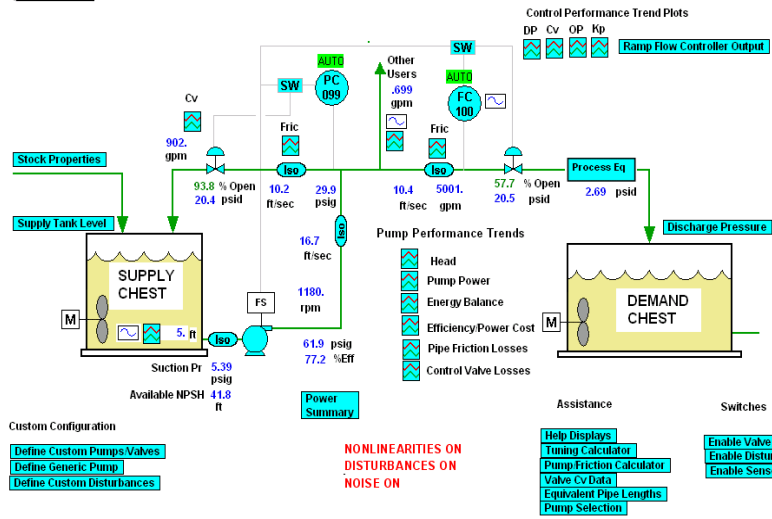


Trends

Simulator Description



Stock Flow Control Loop Analysis Simulator



Stock Flow Simulator

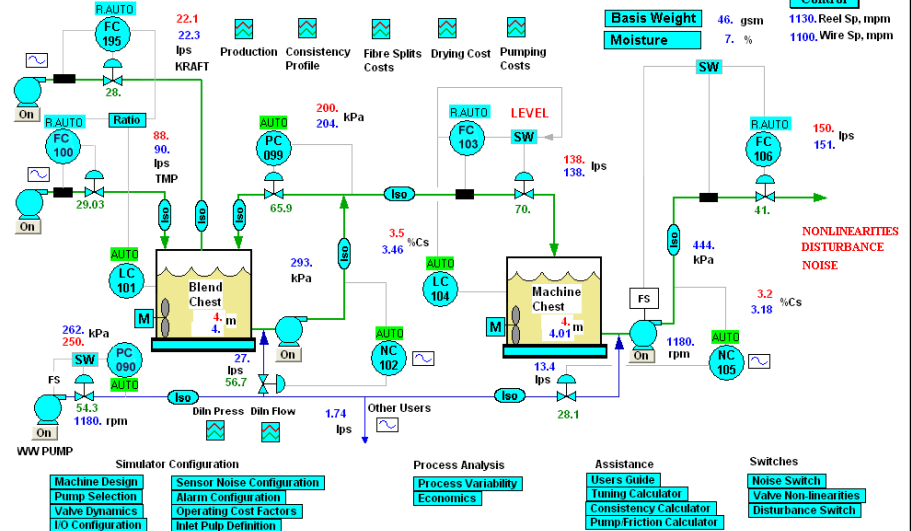
- Select the best pump and valve combination
- Investigate the benefits of a VFD for flow control
- Evaluate addition of a pressure control loop on flow control performance and energy consumption
- Use the ramp functions to evaluate control loop linearity and optimize the controller tuning
- Optimize the control performance and tuning strategy for the pressure and flow loops

Troubleshooting Simulator

- Improve process and control troubleshooting and optimization skills
- Investigate variability propagation from the stock preparation system to the reel
- Investigate the impact of stock chest agitation performance on BW variation
- Optimize pump and valve selection to optimize control performance and minimize pumping costs
- Investigate the application of VFD's
- Evaluate controller tuning strategies to minimize variability in key processes
- Evaluate financial benefits of reduced Basis Weight and Moisture variability



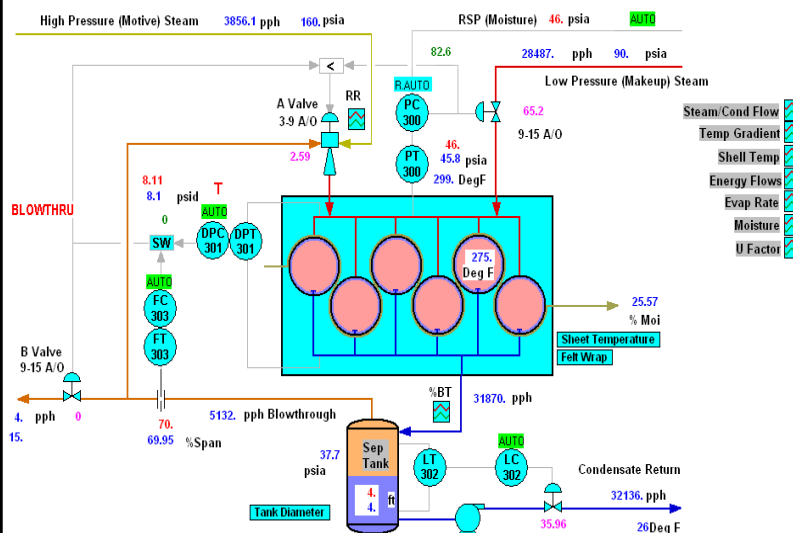
Troubleshooting Simulator Stock Preparation Area



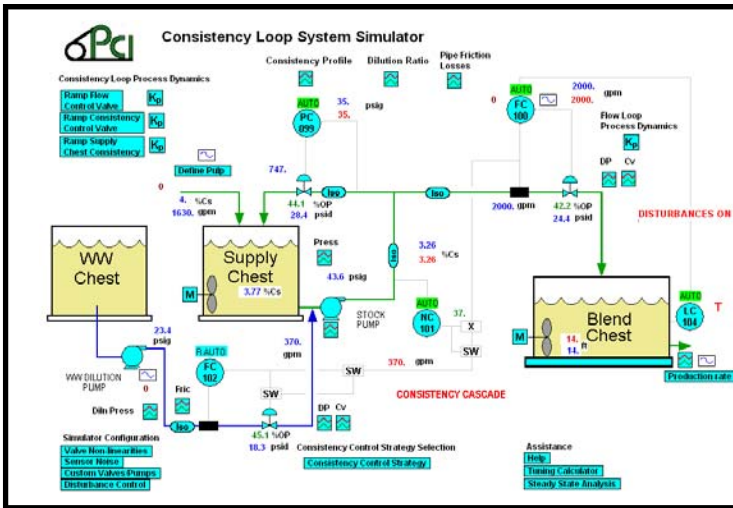
Paper Machine Dryer Simulator

- Upgrade operator knowledge of dryer process
- Improve operator comfort level with complex dryer control strategies
- Improve operator troubleshooting skills
- Troubleshoot dryer control problems by injecting disturbances and process equipment flaws
- Identify thermocompressor and control valve performance problems
- Evaluate dryer design options
- Compare control strategy alternatives such as blowthrough versus differential
- Develop optimum tuning for with complex, non-linear dryer loops
- Improve sheet break logic
- Develop flooding detection logic

3rd Dryer Section

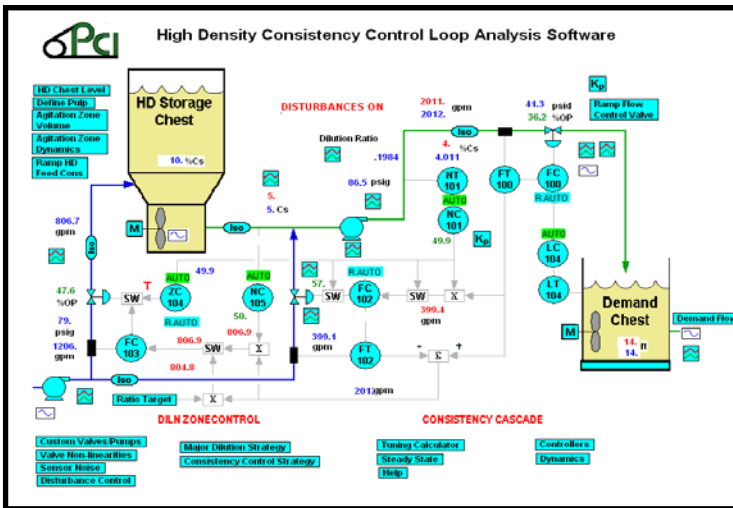


Simulator Description



Consistency Loop System Simulator

- Investigate the best consistency control design for a given set of disturbances
- Investigate the benefits of a VFD for dilution header pressure control
- Select the best dilution control valve for linear consistency loop dynamics
- Select the best flow and pressure control valves to linearize process dynamics
- Investigate the impact of poor stock tank mixing on consistency variability
- Optimize tuning to minimize variability



High Density Consistency Control Loop Analysis Software

- Improve operator knowledge of High Density process and control strategy
- Evaluate alternate high density consistency control strategy designs
- Investigate the benefits of a VFD for dilution header pressure control
- Develop optimum controller tuning strategy to deal with severe consistency disturbances
- Investigate the impact of poor agitation zone mixing on consistency variability

ProNamics Control Inc.

ProNamics Control Inc is a Vancouver, BC based process and control optimization company. The company conducts **optimization surveys** to improve process efficiency and product quality, provides results oriented **process and control training** to the operations, engineering and maintenance groups and prepares **process simulations** to establish best practices. Each of the simulations incorporate ProNamics' extensive knowledge of process dynamics, process equipment, control strategy alternatives, control loop health issues and process variability.

ProNamics **Optimization Surveys** are designed to maximize the mill's economic returns. The surveys are focused on improving product uniformity, increasing process efficiency and reducing operating costs. ProNamics will recommend process design and process control improvements to achieve these goals.

ProNamics **Process and Control training** courses are designed to give the attendee the necessary knowledge to understand the impact of process variability as well as the skills to identify and either direct or implement a solution. The courses strengthen the attendees understanding of pulp and paper process dynamics and process control principles. The courses are a combination of lectures and computer based simulation labs. **Process Control Optimization (PCO)** is a one-week course primarily intended for pulp and paper mill instrumentation technicians who want to improve their ability to Lambda tune control loops and troubleshoot control loop problems. The course is also a good introductory course for process and instrumentation engineers. **Process Control Troubleshooting (PCT)** is a one-week course primarily intended for process engineers, instrumentation engineers and operations management personnel who want to improve their ability to troubleshoot process control

Note: Each simulator is USB plug protected. The listed pricing is the unit price for each simulator. Contact ProNamics for pricing of multiple copies or multiple simulators. Pricing subject to change without notice.