Applying the Digital Twin to Batch Digesters

Pulp & Paper

Dynamic simulation with Mimic Simulation Software provides a high-performance solution for operator training and control system optimization. This Digital Twin technology delivers the complete environment for control system optimization and is an effective tool for teaching process and control engineers the control and operation of pulp and paper mill production.

Batch Digester Modeling

Solutions for batch digesters include dynamic models of the following process areas:

- Batch (Kraft) Digester
- Wood Chips Chute
- Medium Pressure Steam System
- Low Pressure Steam System
- Black Liquor Tank
- White Liquor Tank
- Wash Liquor Tank
- Pulp Storage Tank

Mimic Simulation Software

- **Train operators on infrequent and dangerous process occurrences**
- **Test control system enhancements**
- **Transfer knowledge from seasoned to inexperienced operators**
- **Increase overall plant safety**

Application Capabilities

- Dynamic real time mass and energy balances for individual components
- Dynamic vapor liquid equilibrium balance accounting for reaction mixture interaction with external streams, chemical transformations due to the reaction kinetics
- Ion-exchange or affinity reaction models using the power law dependencies with the Arrhenius type equation for reaction rate constants
- Tunable reaction rate constants (activation energies, pre-exponential factors, and reaction orders) for both forward and reverse reactions
- Real-time display of digester conversion and process performance using Mimic Reactor View

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Instructor Station

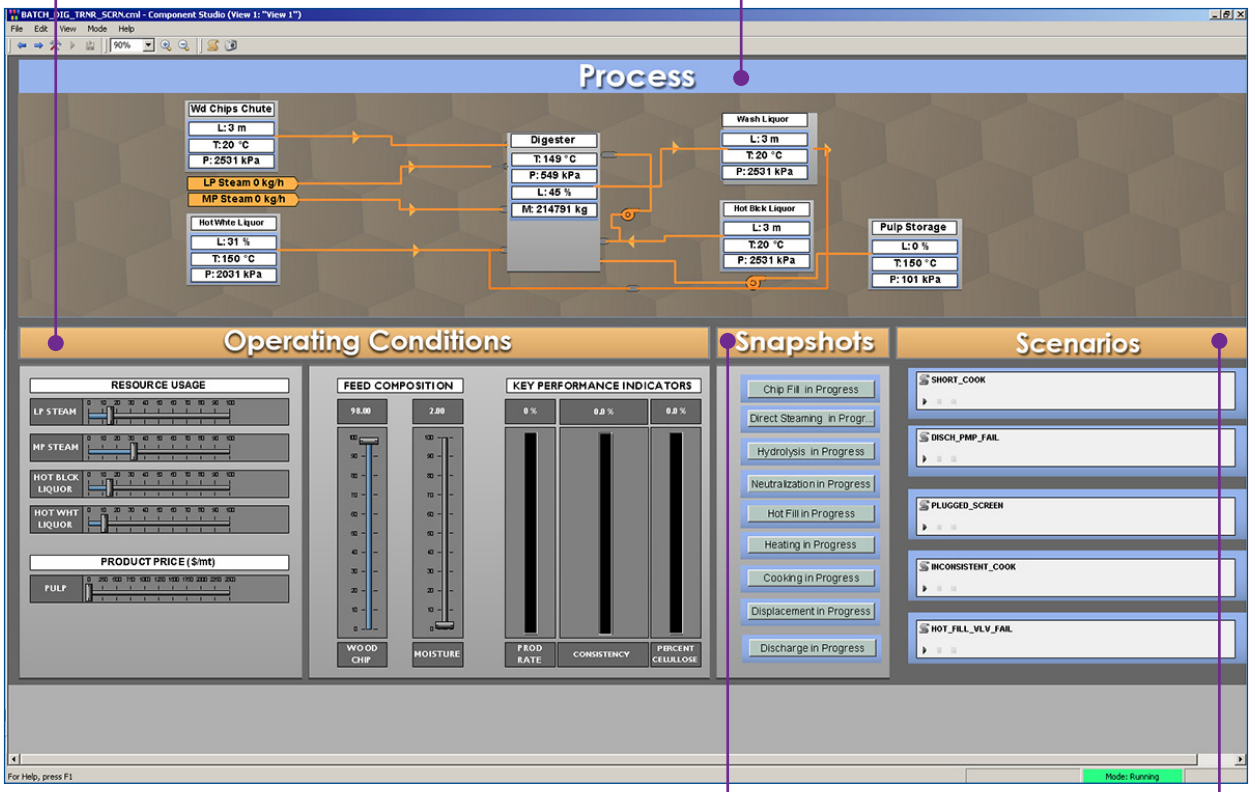
Instructor controls in Mimic and instructor screens in Mimic Component Studio allow your training team to prepare for working with the control system and process. Any element in Mimic can be manipulated or controlled, and instructor screens provide easy access in one location. Typical controls allow instructors to manipulate operating conditions, such as boundary conditions and compositions, introduce ad-hoc device failures, control scripted training scenarios, and restore snapshots to steady-state operations.

Operating Conditions

Manipulate operating conditions such as boundary condition compositions.

Ad-Hoc Process

Switches for individual unit failures.



Process Snapshots

Control and restore full steady-state, cold, or other plant conditions.

Scripted Scenarios

Pre-engineered scenarios with dynamic representation of student scores.

Emerson
North America, Latin America:
+1 800 833 8314 or
+1 512 832 3774

Asia Pacific:
65 6777 8211

Europe, Middle East:
+41 41 768 6111

www.emerson.com/mimic

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