

Applying the Digital Twin to Kamyr 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 kamyr digesters.

Kamyr Digester Modeling

Solutions for pulp and paper facilities include dynamic models of the following process areas:

- White liquor and chip feeder mixing
- Digester with circulating liquor
- Multiple cook zones
- Wash region
- Upper and Lower Heaters
- Used liquor extraction

Application Capabilities

Continuous Digester

- Dynamic real time mass and energy balances for individual chip components including lignin, cellulose, hemicellulose and resins.
- Dynamic Vapor Liquid Equilibrium Balance accounting for reaction mixture interaction with external streams, chemical transformations due to the reaction kinetics.
- Configurable thermodynamic activities and enthalpy correction factors to account for mixture non-idealities.
- Reaction modeling 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.
- Flexible Heat Transfer models characterized to actual tube or shell design.
- Instructor controls for feed composition and digester KPIs (Kappa, etc).

Mimic Simulation Software



Train operators on infrequent and dangerous process occurrences



Test control system enhancements



Transfer knowledge from seasoned to inexperienced operators

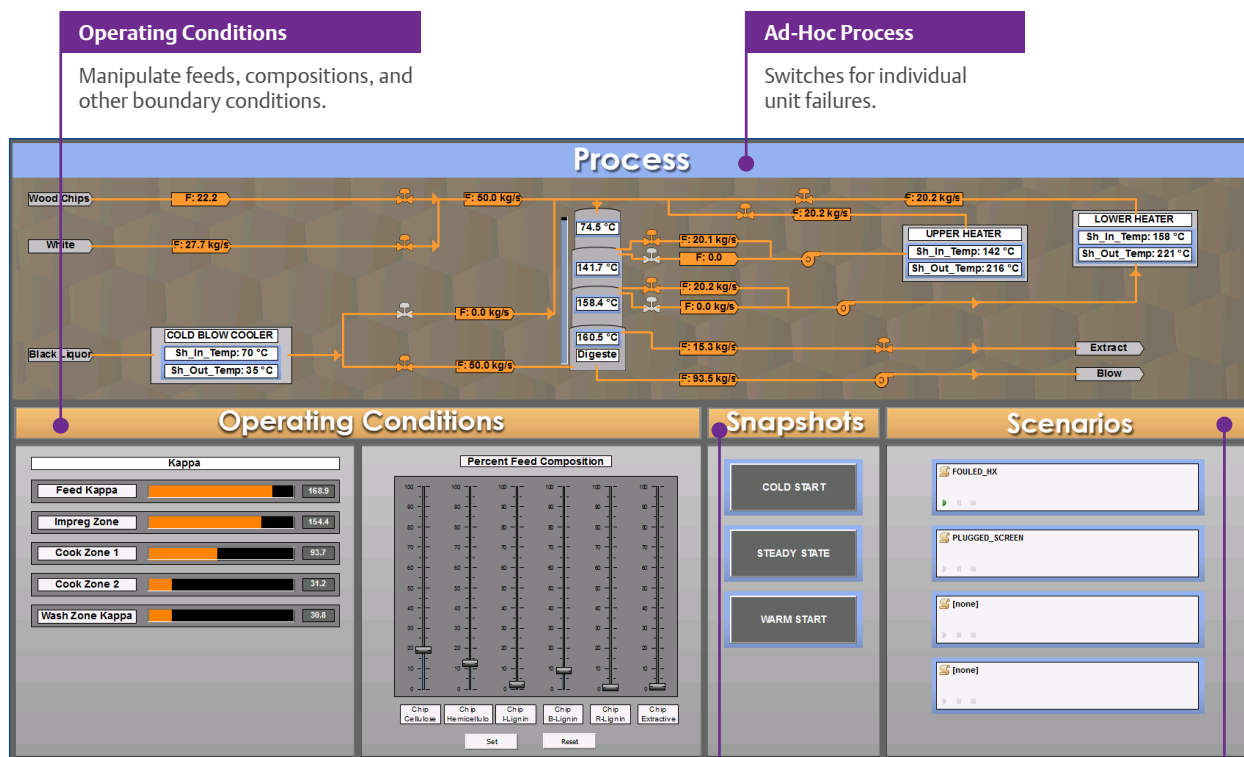


Increase overall plant safety

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 feeds, compositions, and other boundary conditions.

Ad-Hoc Process

Switches for individual unit failures.

Operating Conditions

Snapshots

Scenarios

Process Snapshots

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

Scripted Scenarios

Pre-engineered scenarios with dynamic representation of student scores.

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