Applying the Digital Twin to Ethylene Crackers

Chemical

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 ethylene cracker units.

Ethylene Crackers Modeling

Solutions for ethylene crackers include dynamic models of the following process areas:

- Feed Preheating
- Feed Vaporization
- Gas Compression
- Cracking Furnace with Built-in Reaction Tubes
- Water-Oil Separator
- Heavy-Oil Separator
- Quench Wash Column

Application Capabilities

- Dynamic real time mass and energy balances.
- 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 Arrhenius 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.

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

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Instructor Station

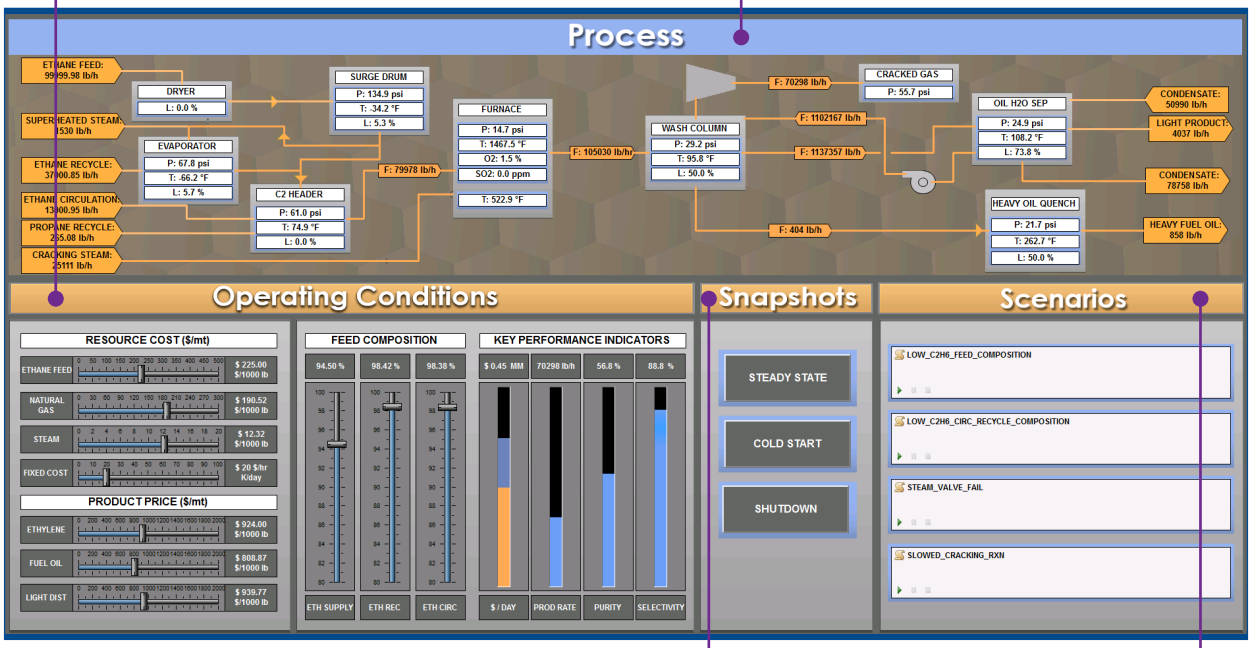
Instructor controls in Mimic and instructor screens in Mimic Component Studio allow your training team to prepare for working with the control system and process. Any element in Mimic can be manipulated or controlled, and instructor screens provide easy access in one location. Typical controls allow 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.

Plant Feed Conditions

Manipulate costs, prices, compositions, and other operating conditions.

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.

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