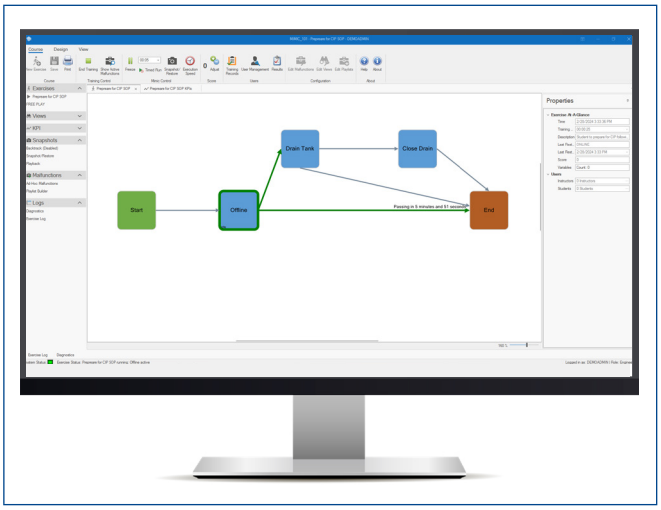
DeltaV™ Mimic Train

- State based operator training sessions provide unlimited flexibility for any training scenario
- Configurable instructor station allows fast customization to training requirements
- Training record data warehouse captures student profiles, operator actions and process Key Performance Indicators (KPIs)
- Built-in device malfunctions support ad-hoc training or structured training sessions
- Playback for a richer training review experience between trainer and trainee
- Enterprise level record management capabilities



Introduction

DeltaV™ Mimic Train is a comprehensive operator training environment. Mimic Train works with process and IO models in a dynamic simulation system, adding the capability of operator training exercises and instructor controls. It functions as a supervisory manager of the training session and control of the Mimic simulation and any OPC-compatible off-line control system.

Benefits

- **State based operator training sessions provide unlimited flexibility for any training scenario –** The state based training engine in Mimic Train supports training exercises that naturally follow the state of the process allowing flexible training and session scoring based upon the ability of the operator to manage the process.
- **Configurable instructor station allows fast customization to training requirements –** Mimic Train has a high-performance instructor station that provides instructors with a comprehensive and configurable instructor environment that includes process equipment controls, training exercise controls, and operator training controls: Freeze/Resume, Snapshot, Restore, Backtrack (or Replay), Playback, Speedup.
- **Training record data warehouse captures student profiles, operator actions and process Key Performance Indicators (KPIs) –** Mimic Train measures and tracks operator actions, process KPIs and session scores during training exercises. The operator training data warehouse keeps records of training sessions for each student and allows for exporting data into corporate Learning Management Systems (LMS).
- **Built-in device malfunctions support ad-hoc training or structured training sessions –** Modeling objects contain standard malfunctions that are typical to each specific unit operation; these malfunctions are automatically configurable in Mimic Train.

- **Playback feature for a comprehensive training review experience –** As operators train on a scenario, the changes made within the DeltaV system and Mimic are recorded (and saved with training records). After the session ends, the trainer can playback the session and review with the trainee. At any point, the trainer can pause to discuss decisions made or discuss alternative actions. Once a decision is made, either the playback is resumed, or the trainee runs the simulation in real time to explore different outcomes.
- **Enterprise aggregation of training records –** The training data from each site can be aggregated into a central server location allowing organizations to leverage valuable insights across a fleet. This can significantly improve overall training strategies and operator training effectiveness across the enterprise. The data can be analyzed directly from the central storage using built in Mimic tools or egressed and fed into other business learning tracking tools, other business algorithms or standard business reporting products.

Product Description

DeltaV Mimic Train requires a Mimic Foundation license. Mimic Foundation provides integration and execution of the dynamic simulation of the process running in Mimic Process or an external party modeling platform like AspenTech HYSYS Dynamics. Mimic Train provides the following:

- **Training Courses –** operator training exercises with individual state logic diagrams.
- **State Based Training Engine –** to execute the training exercises.
- **Key Performance Indicator Scoring –** critical process data points against which the student's performance can be evaluated.
- **Default & Custom Malfunctions –** directly linked to the IO or Mimic modeling objects.
- **Records & Reports –** a record of each exercise that is executed that can be exported to LMS.
- **Custom Interfaces –** Mimic user types: Engineer, Instructor, Student, Evaluator.
- **Views –** additional graphical, interactive resources such as Remote access to DeltaV control systems, Component Studio Graphics, Remote Desktop, PDFs, web links, and online resources.
- **Playback –** record, playback, pause, and resume the actions taken during a training scenario to identify critical actions taken by a student to reinforce learning opportunities that drive key performance indicators.

Training Courses

Mimic training courses include one or more exercises, a state diagram of actions, logic specifying transitions between states, predicates that are conditionals based on the active process state, and state actions which include scoring the student or invoking a malfunction.

States

Mimic Train contains comprehensive state management in the design and execution of training exercises. States provide trainers and engineers numerous features with which they can design and execute training exercises. For example, states can be configured to perform actions such as triggering a malfunction or gathering input when the state becomes active or when an outbound transition occurs. States also allow for students to be scored on KPIs that relate to the conditions encountered during the state.

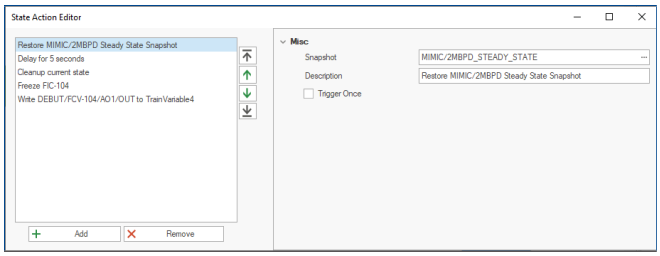
A training session can interact responsively based on the student's actions, the complex requirements of the unit operation, and the desired learning outcomes of the training session.

State Actions

In addition to representing the current conditions of a training exercise, states have an active role in controlling the simulated environment. States can be configured to deliver a dynamic experience by writing data into a Mimic module, capturing information about KPIs, cleaning up after the prior state, or launching malfunctions.

Available State Actions include:

- Process Manipulation – Write Data, Block Freeze, Start Malfunction.
- Scoring – Linear scoring, KPI Time Scoring, KPI Value Scoring, KPI Time and Value Scoring.
- State Control – Cleanup, Delay, User Prompt.
- Simulation Control – Restore Snapshot.



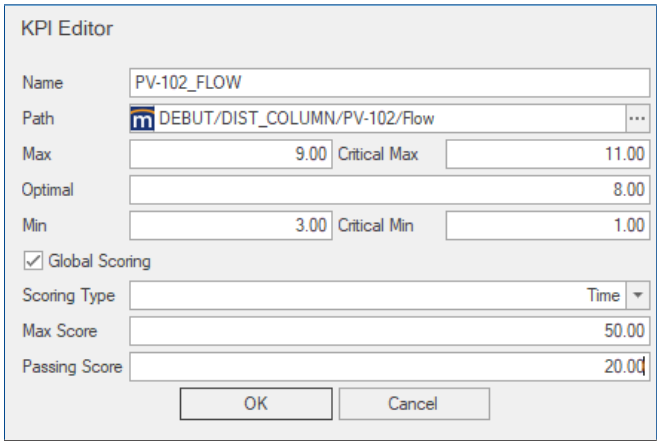
The State Action Editor.

Key Performance Indicators

Instructors and Engineers can define Key Performance Indicators (KPIs), which are critical points against which the student's performance can be evaluated. KPIs include a data reference and a range of desired values. The range of desired values takes the form of [Min, Max], where the Min and Max have been determined by the Engineer. KPI values are stored for reporting purposes and displayed as a graph.

KPIs are used in conjunction with a time-based, value-based, time and value-based scoring mechanism, or a global KPI scoring mechanism.

- Time-Based KPI Scoring examines the KPI data point over a configurable timespan.
- Value-Based KPI Scoring continuously scans the data point over a configurable timespan. At each pass, the maximum and minimum recorded values are stored.
- Time and Value-Based Scoring evaluates the KPI's value throughout the duration of a configurable timespan.
- Global KPI Scoring begins at the beginning of a Training Exercise and lasts until the Training Exercise ends. A score will be calculated based on every KPI value recorded during the exercise.

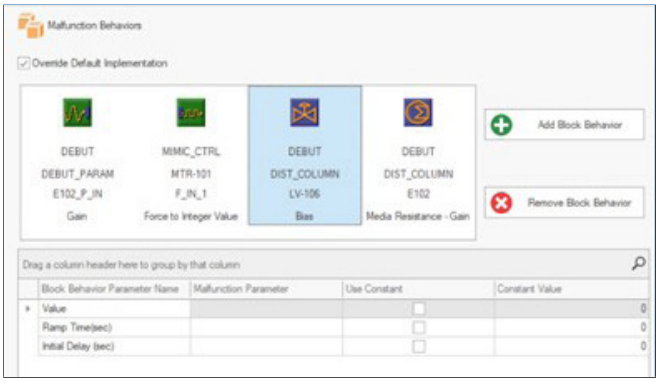


The KPI Editor showing a KPI complete with a Global Scoring configuration.

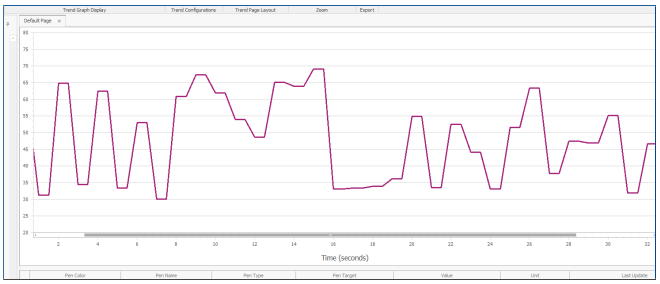
Malfunctions

Mimic Train Malfunctions are the primary vehicle for manipulating the conditions of the simulated environment and, in turn, dictating the flow of the training session. Malfunctions take the form of a playlist of various behaviors that modify the performance or stability of a simulated object. Playlists can then be saved and executed manually or automatically, such as being triggered from a training exercise state via an action.

Malfunctions are class-based, providing top-down management tools for effectively creating and administering failure behaviors.



The Malfunction Behaviors customization dialog showing a Malfunction that has been configured to include several Block Behaviors.



Noise Malfunction in Trend View.

Default Malfunctions

Mimic Train provides a series of default Mimic unit operations.

Compressor	Speed - Wave Disturbance, Noise, Bias, Slew, Gain, Stick, Set to High Value, Set to Low Value, Force to Floating Value, Noise as % PV, Drift, Performance Reduction %, Trip, IO Failure Efficiency - Wave Disturbance, Noise, Bias, Slew, Gain, Stick, Set to High Value, Set to Low Value, Force to Floating Value, Noise as % PV, Drift, Performance Reduction %, IO Failure
Valve	Force Open, Force Closed, Stick, Bias, Wave Disturbance, Gain, Force to Position, IO Failure
Heat Exchanger	Process Resistance - Bias, Gain, Force to Floating Value Media Resistance - Bias, Gain, Force to Floating Value Fouling - Bias, Gain, Force to Floating Value
Pump	Speed - Wave Disturbance, Noise, Bias, Slew, Gain, Stick, Set to High Value, Set to Low Value, Force to Floating Value, Noise as % PV, Drift, Performance Reduction %, Trip, IO Failure
Analog Transmitter	Wave Disturbance, Noise, Bias, Slew, Gain Stick, Set to High Value, Set to Low Value, Force to Floating Value, Noise as % PV, Drift, IO Failure
Digital Transmitter	Noise, Stick, Force to Integer Value, IO Failure

Custom Unit Operations Malfunctions

In addition to the default unit operations, Mimic Train has custom unit operations Malfunctions, using Simulated IO tags. Custom unit operations use Malfunctions that are built by the course designer.

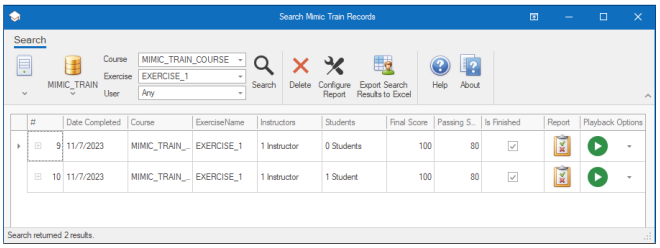
- Also, the Malfunctions contained in instances of default Mimic unit operations can be overridden so their behavior may be tailored to unique use cases. Behaviors describe a defined action undertaken during the execution of a Malfunction. A Behavior consists of a target block or SIO tag and a list of Block Behavior Parameters. Malfunctions contain a single behavior or a list of behaviors. For example:
  - Invoking a malfunction in both a piece of equipment and the underlying control system
  - Hiding Malfunction Parameters from the instructor
  - Changing the default values of Malfunction Parameters
  - Mapping Block Behavior Parameters to Malfunction Parameters

Records & Reports

Mimic Train creates a record of each exercise that is executed with students and instructors assigned. Records contain the following information:

- Training exercises and courses performed
- Participants (students and instructors)
- Score adjustments and comments
- Malfunctions encountered during training
- Data points for KPIs
- Mimic database name and host name of Mimic server
- Exercise state transitions

Records can be exported to Learning Management Systems (LMS) or other operation support systems. Mimic Train also provides the user with a report generator that aggregates training session data into a printable and exportable file format.



Mimic Train Records.

Reports present information about course sessions in a variety of exportable, printable file formats, such as PDF, HTML/MHTML, Excel Spreadsheet, CSV, and image file. Mimic Train reports are user configurable and may include a company letterhead, list the exercises completed during the training session, information about participants, graphs of key performance indicators, and descriptions of the events encountered during training (e.g., score adjustments and malfunctions).

Roles

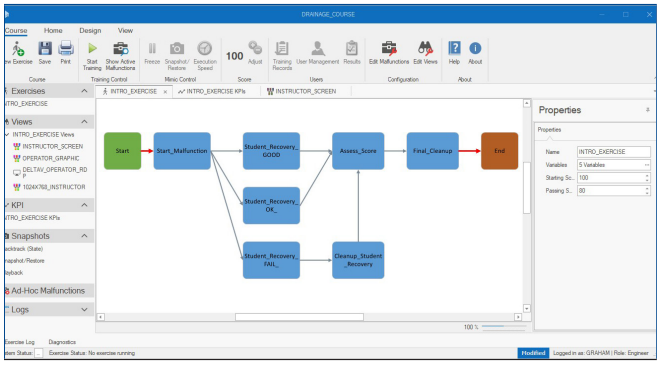
Users are granted various functionality based on their role. The primary user roles are Engineer, Instructor, Student and Evaluator.

	Student	Instructor	Engineer	Evaluator
Create & configure users	X	✓	✓	X
Access Mimic Explorer engineering functions	X	X	✓	X
Create course sessions & manage student enrollments	X	✓	✓	X
Access Mimic Train Records & Training Reports	X	✓	✓	✓
Administer and lead course sessions	X	✓	✓	X
Configure Mimic Train Courses & Exercises	X	X	✓	X
Participate in Mimic Train Courses & Exercises	✓	X	X	X
Log into Mimic Train	✓	✓	✓	✓
Exclusive resources access to Mimic Train courses and exercises	X	X	✓	X

Interfaces

Engineering Interface

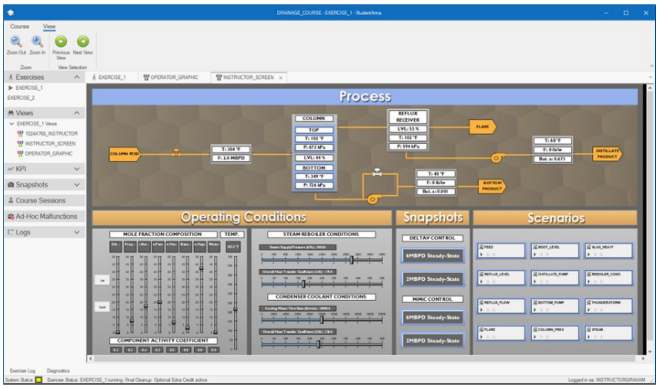
The Engineering Interface is used to create and update training exercises, malfunctions, and KPIs.



The Mimic Train Engineer interface showing a sample Train Exercise State Diagram.

Instructor Station Interface

The Instructor Station Interface allows instructor to lead a student through preconfigured courses that include exercises, malfunctions, KPI, and scoring.



The Mimic Train interface showing the INSTRUCTOR_SCREEN View.

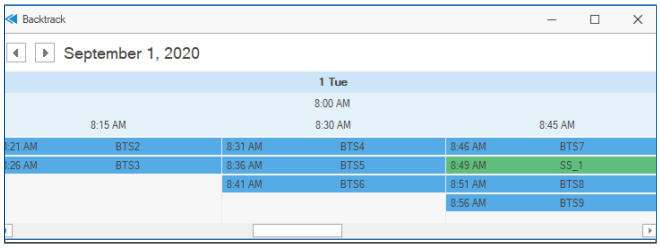
Instructor Station Controls

Mimic Train allows instructors the ability to take snapshots automatically with backtrack functionality or ad-hoc during the execution of an exercise.

Backtrack snapshots lets the user configure courses to automatically take snapshots during the execution of a course. Backtrack configuration provides the user with four configuration options that can be used during the execution of the exercise.

- State Based Backtrack – snapshot is taken each time a new exercise state is activated
- Time Based Backtrack – snapshot is taken each time the snapshot frequency elapses

During the execution of an exercise, a timeline view is available that contains each of the Backtrack snapshots. Snapshots can be restored from the timeline view.

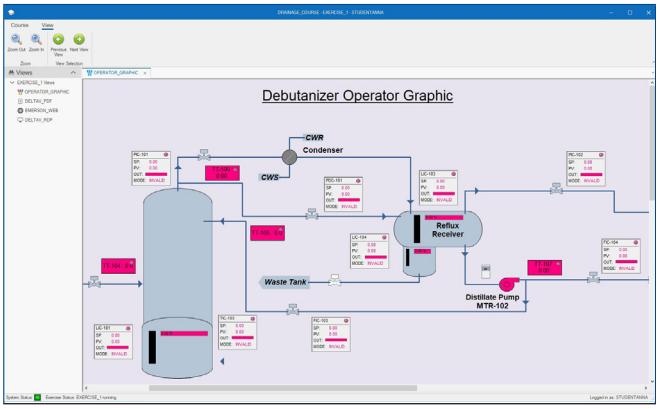


Browsing Snapshots in the Backtrack Timeline.

Instructors can also create and restore snapshots on an ad-hoc basis using the Snapshot/Restore feature. It allows for freezing the nodes present in the course's snapshot definition, taking a snapshot, and restoring a snapshot.

Student Interface

The Student Interface is an external production replica of the existing control system HMI.



The Student Interface in Mimic Train.

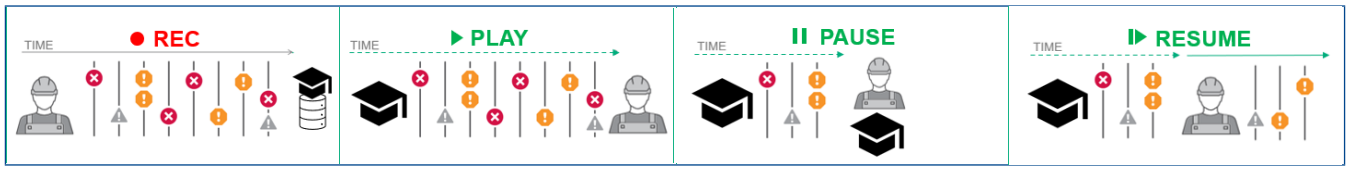
Views

Views extend the Mimic Train Interface with additional graphical, interactive resources that operate control systems, describe processes, and access remote machines or online resources. There are 5 categories of views in Mimic Train:

- **Component Studio Views –** Instructor station graphics can be built in Component Studio. Instructor station graphics in Component Studio allow for:
  - Control of operator training scenarios and training sessions
    - Control of plant operations outside of the control system control (i.e., field start, stops)
  - Monitoring of student actions and progress
  - Graphical controls for simple simulator functions
- **PDF View –** Ability to view other operational documents – SOPs, P&IDs, PFDs in PDF format
- **Remote Desktop Views (RDP) –** Access to other operations systems using RDP protocol
- **Mimic Train State Diagrams –** Online execution of the Mimic Train state diagrams
- **Web Resources –** Embedded web browser in instructor station view

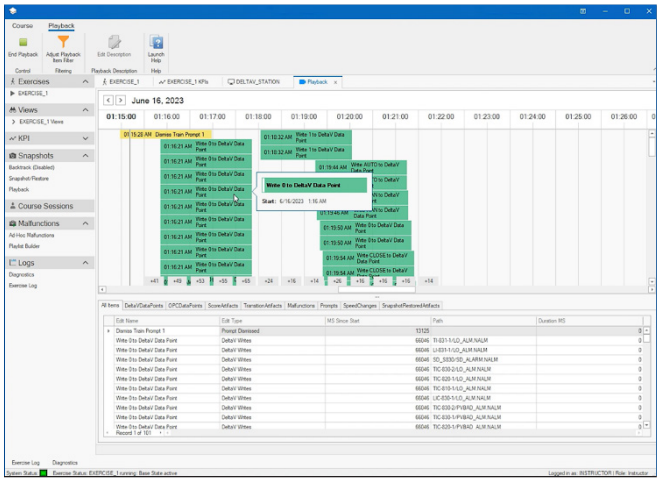
Playback

Mimic Train Playback progress can be followed in the event timeline view or simply by watching the operator station as the changes are made and playback progresses. The timeline view is useful for trainers to see when an upcoming change performed by the trainee is about to occur. The playback can be paused before the change to allow the trainee to explore alternative actions to the initial training session.



Playback has several phases of operation:

- **Record –** As train sessions are performed by a trainee the changes are recorded in DeltaV and Mimic for later playback.
- **Playback –** Once the session is complete the trainer can playback the session and discuss the decisions the trainee made.
- **Pause –** During the playback the training playback can be paused for more detailed conversation on what occurred at the time.
- **Resume with playback –** The session can resume playback after a pause and continue to show what changes occurred in the original training session.
- **Resume with trainee taking over –** Operators can take over the playback session and explore different outcomes rather than simply replaying the previously recorded steps from the initial training session.



Mimic Train Playback Time Sequence.

Requirements

- DeltaV Mimic Foundation license

Product Support

Mimic Product Support is delivered through Guardian™. Guardian is Emerson's digital platform for addressing the end-to-end lifecycle needs of automation & control software and asset performance management solutions. The Guardian digital experience enables users to quickly connect to product support; securely manage subscriptions; get intuitive views into system health; and explore additional software and services that propel performance.

Ordering Information

DeltaV Mimic is licensed on a Flexible Subscription basis. Flexible Subscriptions can be used to access any Mimic feature that is licensed on a Flexible Subscription basis, with each feature requiring its own subscription count. The Flexible Subscriptions are offered in one-year, three-year, and five-year terms. To purchase, extend, or expand a license, please contact your Emerson Sales Representative.

Related Products

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- DeltaV Mimic Field 3D
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