



AVEVA™

## DYNSIM DYNAMIC SIMULATION

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High Fidelity Dynamic Simulation for  
Engineering & Operator Training Solutions

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DYNSIM Dynamic Simulation® is a comprehensive, dynamic process simulator that enables users to meet and beat the dynamic challenges of designing and operating a modern process plant safely and profitably. By assisting in process design, controls checkout and control system design, DYNSIM Dynamic Simulation enables process yield improvement and reduction of capital investment costs. The DYNSIM Dynamic Simulation operator training simulator provides safer operation while improving performance and productivity.

DYNSIM Dynamic Simulation is now available via the cloud in addition to the traditional on-premise access method.



## Summary

State-of-the-art, field-proven dynamic process simulation program. Unified process plant modeling environment covers the entire lifecycle of the plant, from simulation through system checkout, operator training and start up.

DYNSIM Dynamic Simulation is available online anywhere, anytime via AVEVA cloud platform.

## Business Value

- Meet and beat the dynamic challenges of designing and operating a process plant safely and profitably
- Reflects the combined experience of over 100 process plants worldwide, saving you time and increasing ROI
- Preserve the equity you have by leveraging and reusing model designs in any product such as DYNSIM Dynamic Simulation and PRO/II® Process Engineering
- DYNSIM Dynamic Simulation is the first commercially available dynamic process simulator bringing Increased Accessibility, Enhanced Availability, & Lower Cost of Ownership to the powerful DYNSIM Dynamic Simulation application

## Setting New Standards for Rigor, Robustness, Openness, Ease of Use

Process plants face the same real-world challenges to operational excellence that their predecessors did, but the stakes today are higher than ever before. The constantly changing nature of plants, and their internal and external environments, can threaten safe, profitable plant operations. Uncontrolled upsets can cause start-up delays, production outages, severe equipment damage, and even catastrophic failures.

DYNSIM Dynamic Simulation is a state-of-the-art, field-proven dynamic process simulation program. DYNSIM Dynamic Simulation enables you to meet and beat the dynamic challenges of designing and operating a modern process plant safely and profitably. DYNSIM Dynamic Simulation is an advanced, unified process plant modeling environment for use throughout a plant's lifecycle:

- Rigorous dynamic process simulation for engineering design
- High Fidelity modeling used for control system checkout
- Rigorous process modeling for Operator Training for first time startup
- Plant performance and operation improvement tool for operating plants

DYNSIM Dynamic Simulation offers a cost-effective, professional grade alternative to other commercial dynamic simulation products. Over 100 plants around the world have already used DYNSIM Dynamic Simulation to satisfy their process design, operator training, and operational analysis requirements in the upstream, gas processing/LNG, Refining, Petrochemical, and Chemical industries. The combination of industry experience, proven technology and service expertise can give you the right tools to achieve and maintain optimal control of your plant.

DYNSIM Dynamic Simulation is now available via the cloud in addition to the traditional on-premise access method. Our cloud access has not only many benefits over on-premise access, but also over other products with cloud access, due to platform technology developed with simulation users in mind.

- Increased efficiency due to the ability to adapt to changing needs by scaling up or down the computing power with varying number of machines or instances or simulation templates for engineering test or training scenarios.



- A secure user access control that allows the administrator to add & delete users or edit privileges as needed.
- Simplified IT overhead since the product is on pure on-demand cloud machines via a secure URL, new versions available as soon as they are released.
- Seamless Collaboration by splitting the content from the product allowing the content, such as simulation models, to be managed easily with file history log in a central repository.
- Flexible Usage and Pricing with a pure SaaS business model based on hourly usage.

## Industries Served

- Oil & Gas processing / LNG
- Refining
- Petrochemicals and Chemicals
- Engineering & Construction / Consulting

## Benefits Summary

- Reduce the cost of process equipment designed to meet transient requirements
- Increase plant safety by evaluating flare and relief systems
- Validate process control strategy to reduce risk during abnormal events
- Evaluate plant start-up and shut-down procedures and operation to reduce the risk of startup delays
- Validate operation to prevent production interruptions and increase plant performance efficiency
- Evaluate Batch operations from dry startup
- Provide operator training simulator, process modeling, engine & instructor station interface

## Simulation Applications

- Distillation tower relief analysis to accurately set flare capacity
- Compressor surge studies to reduce the possibility of damage to rotating equipment
- Cryogenic depressuring to determine low temperature metallurgy requirements
- Boiler draft studies to assess the risk of furnace implosion
- Refinery steam system analysis to improve reliability

## The Perfect Dynamic Simulation and Training Tool for Engineers and Operators

### Scalability Protects Your Investment in DYNSIM Dynamic Simulation

DYNSIM Dynamic Simulation is unique in its ability to seamlessly scale from engineering design applications to control checkout and operator training, all within the same graphical user environment. Its modular architecture and open interfaces ensure that DYNSIM Dynamic Simulation meets all your simulation requirements throughout the lifecycle of your plant.

### Import Existing PRO/II Process Engineering Simulations

DYNSIM Dynamic Simulation preserves the equity you have built in any existing PRO/II Process Engineering model. DYNSIM Dynamic Simulation can translate a steady-state PRO/II Process Engineering simulation into a running dynamic simulation to eliminate tedious data re-entry and preserve the thermodynamic methods that you trust. All that is required is to complete the process control strategy to operate the plant.





### **First Principles Equipment Models Ensure Accuracy and Robustness**

DYNSIM Dynamic Simulation's first principles models, including rigorous thermodynamic and fluid flow calculations, bring a superior level of robustness and accuracy to dynamic process simulation at your plant. DYNSIM Dynamic Simulation rigorously handles even the most complex plant layouts and systems, using a robust and high performance solution algorithm. Furthermore, DYNSIM Dynamic Simulation robustly models cold startup from purged conditions to normal operation and then back to shutdown.

### **Connect with DCS and PLC Control Systems**

DYNSIM Dynamic Simulation takes full advantage of modern, open software standards to interface with other important plant applications, such as DCS and PLC control system emulators.

DYNSIM Dynamic Simulation also connects easily with control system emulators (such as Foxboro Evo™ Simulation and Triconex Control Simulation) to drive operator training systems with a rigorous simulation foundation. DYNSIM Dynamic Simulation provides an open API to connect any third-party simulation system.

### **Runtime Licenses**

DYNSIM Dynamic Simulation is available in runtime licenses to reduce OTS deployment costs. Runtime licenses provide the full power of the operating model but restrict the modification of the simulation database that defines the process model. The Engineer environment access mode is disabled during instructor, administrator, and operator environments.



## Unit Operation / Models

### Process Models

- Source
- Sink
- Valve
- Relief Valve
- Mixer / Splitter
- Header
- Drum
- Distillation Tower w/packing
- Atmospheric Tank
- Separator with Weir
- Pump with NPSH
- Gas Expander and Turbines
- Reciprocating Compressor
- Centrifugal Compressor
- Rotating Equipment Shaft
- Multi Stream LNG Exchanger
- Utility Exchanger (Air cooler)
- Heat Exchanger
- Fired Heater with refractory
- Segmented Pipe w/Sonic Flow
- Plug Flow Reactors
- Slate Change
- Stream Set
- Stream Send/Receive
- OLGA Send/Receive
- Combustor

### Electrical Models

- Bus
- Circuit Breaker
- Voltage Transformer
- Power Source/Sink
- Circuit Disconnect
- Motor
- Electrical Load

### Control Models

- Function Generator
- Master
- Summation
- Latch
- PID Controller
- Surge Controller
- Calculation
- Lead/Lag
- Pulse Positioner
- Dual Input Switch Timer
- Counter
- Custom Logic
- Rate Limiter
- Timer



## Thermodynamics

### Component Systems

- Acids
- Alcohols
- Aldehydes
- Amides
- Aromatic hydrocarbons
- Elements
- Esters
- Ethers
- Halogenated derivatives
- Ketones
- Naphthenic hydrocarbons
- Other nitrogen derivatives
- Paraffinic hydrocarbons
- Salts and minerals
- Silicon derivatives
- Sulfur derivatives
- Unsaturated hydrocarbons

### Thermodynamic Systems

- Braun K10 (BK10)
- Peng-Robinson (PR)
- Soave-Redlich-Kwong (SRK)
- Glycol
- Grayson-Streed (GS)
- PR-Panagiotopoulos-Reid (PRP)
- Redlich-Kwong
- Sour Water
- PR-Modified Panagiotopolous-Reid (PRM)
- SRK
- Two Bluck Coon
- SRK-Modified Panagiotopoulos-Reid (SRKM)

- Steam Tables – Scientific
- SRK-Kabadi-Danner (SRKKD)
- SRK-Panagiotopoulos-Reid (SRKP)
- Steam Tables – Industrial

## System

### Features

- Add C++ user added models
- Disable any unit operation or flowsheet
- Online help and search
- Flowsheet interactive control widgets
- Color coded input guidance
- Add equations to model parameters

### Instructor Features

- Administrator, engineer, instructor, and operator access modes
- Scenarios, trends, and profile plots
- Integrated model building graphical user interface
- Trainee performance monitoring
- Built in Control cross-referencing
- Built-in model malfunctions
- Snapshots for initial conditions and backtracks
- Remote Functions/Field Operated Devices

### Connectivity

- SPT OLGA™
- Microsoft Excel®
- OPC
- Foxboro Evo Simulation (for Foxboro Evo)
- Triconex Control Simulation
- Customized Solutions
- PRO/II Process Engineering Translator

The screenshot displays the DYN SIM software interface for a dynamic simulation. The main window shows a detailed process flow diagram with various equipment like tanks, pumps, and heat exchangers. Several callout boxes highlight key features:
 

- Thermodynamics**: Points to the simulation parameters and equipment models.
- Data Historian**: Points to the left-hand navigation pane.
- Cross Referencing**: Points to the central process diagram.
- Scenarios**: Points to the top toolbar.
- Trane Performance Monitoring (TPM)**: Points to a specific control panel on the right.
- Interactive Control**: Points to the 'Operate Value' dialog box.
- Model library**: Points to the 'Model Editing' panel on the right.
- Custom widgets**: Points to a 'Feed Propane Composition' widget.
- Trends**: Points to a 'DYNAMIC RESPONSE' plot showing data over time.
- Initial conditions and Backtracks**: Points to the 'Snapshot Summary' table at the bottom.
- Malfunctions**: Points to the 'Malfunction Summary' table at the bottom.

- Engineering /Model Building
- OTS Instruction Station
- Both Engineering and OTS

## Dynamic Simulation Suite

DYN SIM Dynamic Simulation is part of the Dynamic Simulation Suite (DSS) of products. DSS provides full-power rigorous dynamic simulation for plant engineers, operators, and managers to use in optimizing plant operations and design. DSS is comprised of DYN SIM Dynamic Simulation, Foxboro Control Simulation, Triconex

Control Simulation, and Operator Training programs; offering a professional grade alternative to dated, fragmented and hard-to-use products with which many plants currently struggle. All DSS products can communicate with each other, allowing a perfect combination to suit your exact plant requirements.

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