



DATASHEET

AVEVA™ Dynamic Simulation

formerly DYNSIM

High fidelity dynamic simulation for engineering & operator training solutions

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

AVEVA 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, the process plant modeling environment covers the entire lifecycle of the plant, from simulation through system checkout, operator training and start up.

AVEVA Dynamic Simulation is also available online anywhere, anytime via AVEVA™ Connect.

Business value

- Meet and beat the dynamic challenges of designing, commissioning, controlling, and operating a process plant safely, reliably, and profitably
- Reflects the combined experience of over 1200 projects worldwide, saving you time and increasing ROI
- Preserve the equity you have by leveraging and reusing model designs in any product such as AVEVA Dynamic Simulation and AVEVA™ PRO/II™ Simulation (formerly PRO/II)

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.

AVEVA Dynamic Simulation is a state-of-the-art, field-proven dynamic process simulation program. AVEVA Dynamic Simulation enables you to meet and beat the dynamic challenges of designing, commissioning, controlling, and operating a process plant safely, reliably, and profitably. AVEVA Dynamic Simulation is an advanced, 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

AVEVA Dynamic Simulation offers a cost-effective, professional grade alternative to other commercial dynamic simulation products. Over 1200 projects around the world have already used AVEVA Dynamic Simulation to satisfy their process design, operator training, and operational analysis requirements in the upstream, gas processing/LNG, Refining, petrochemicals, and chemicals 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.

AVEVA Dynamic Simulation is now available via the cloud in addition to the traditional on-premise access method. AVEVA Connect offers benefits beyond other cloud services because it is 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

- Upstream Oil & Gas
- Pipelines
- Refining
- Power & Utilities
- Petrochemicals, Chemicals, Polymers, Fertilizer
- Mining, food & beverage, pulp and paper

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 application examples

- 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 AVEVA Dynamic Simulation

AVEVA 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 AVEVA Dynamic Simulation meets all your simulation requirements throughout the lifecycle of your plant.

Import existing AVEVA PRO/II Simulation models

AVEVA Dynamic Simulation preserves the equity you have built in any existing AVEVA PRO/II Simulation model. AVEVA Dynamic Simulation can translate a steady-state AVEVA PRO/II Simulation model 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

AVEVA 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. AVEVA Dynamic Simulation rigorously handles even the most complex plant layouts and systems, using a robust and high performance solution algorithm. Furthermore, AVEVA Dynamic Simulation robustly models cold startup from purged conditions to normal operation and then back to shutdown.

Connect with DCS and PLC control systems

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

Runtime licenses

AVEVA Dynamic Simulation is also 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.

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
- Integrated model building graphical user interface
- Data Historian
- Change simulation speed to run faster or slower than real time
- Simulation freeze and single step mode are supported

Instructor features

- Administrator, engineer, instructor, and operator access modes
- Scenarios
- Trends and profile plots
- Trainee performance monitoring
- Built-in control cross-referencing
- Built-in model malfunctions
- Snapshots for initial conditions and backtracks
- Remote functions/field operated devices

Connectivity

- Microsoft Excel®
- OPC
- AVEVA Simulation for Foxboro Controls (for EcoStruxure Foxboro DCS)
- AVEVA Simulation for Triconex Systems
- Major 3rd Party Control Systems
- AVEVA PRO/II Simulation Translator
- SPT OLGA™

Unit operation / models

Process models

- Source
- Reboiler
- 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
- Transmitter
- Summation
- Latch
- PID Controller
- Surge Controller
- Calculation
- Lead/Lag
- Pulse Positioner
- Dual Input Switch Timer
- Counter
- Custom Logic
- Rate Limiter
- Timer

Mining library

- Conveyor
- Crusher
- Cyclone Separator
- Hydrocyclone
- Flotation unit
- Mill
- Roaster
- Screen
- Solid Separator

Polymer library

- Polymerization reactors (CSTR, GPRP)
- Degasser

Thermodynamics

Component systems

- Acids
- Alcohols
- Pseudo-Components
- 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

- Alcohol Package
- Amine Package
- API/EPA Sour Water Package
- Benedict-Webb-Rubin-Starling
- Braun K10
- Chao-Seader (CS)
- Erbar Modification to CS
- Flory-Huggins Theory
- Glycol Package
- GPA Sour Water Package
- Grayson-Streed (GS)
- Erbar Modification to CS and GS

- Hayden-O
- HEXAMER
- Ideal
- Ideal Dimerization (IDIMER)
- Improved Grayson-Streed (IGS)
- Lee-Kesler (LK)
- Lee-Kesler-Plocker (LKP)
- Margules Equation
- Modifications to UNIFAC
- NRTL Equation
- Panagiotopoulos-Reid Modified (PRM)
- Peng-Robinson (PR)
- PC-SAFT
- Predictive Peng-Robinson (PPR78)
- Predictive Soave-Redlich-Kwong (PSRK)
- PR-Panagiotopoulos-Reid (PRP)
- Redlich-Kwong (RK)
- Regular Solution Theory
- Soave-Redlich-Kwong (SRK)
- Sour Water Package
- SRKH and PRH
- SRK-Kabadi-Danner (SRKKD)
- SRK-Modified Panagiotopoulos-Reid (SRKM)
- SRK-Panagiotopoulos-Reid (SRKP)
- SRK-SIMSCI (SRKS)
- Steam Tables Industrial Form
- Steam Tables Scientific Form
- Truncated Virial (TVIRIAL)
- Twu-Bluck-Coon (TBC)
- UNIFAC
- UNIQUAC Equation
- UNIWAALS
- van Laar Equation
- Wilson Equation

The screenshot shows the AVEVA Dynamic Simulation 2022 interface. The main window displays a 3D process flow diagram of a compressor train. Several callout boxes point to specific features:

- Custom widget:** Points to a 'Source Temperature (K)' widget in the top left.
- Thermodynamic:** Points to the 'Thermo' button in the top toolbar.
- Cross referencing:** Points to the 'Cross Reference' button in the top toolbar.
- Initial Conditions and Backtracks:** Points to the 'Load Full', 'Load Engine', and 'Load XRef' buttons in the top toolbar.
- Scenarios:** Points to the 'Scenario' button in the top toolbar.
- Malfunctions:** Points to the 'Malfunctions' button in the top toolbar.
- Model Library:** Points to the 'Icon Palette' on the right side.
- Plots:** Points to a 'Pressure Head (Pa) vs Volumetric Flow (m³/h)' plot in the top right.
- Trends:** Points to a 'DRUM PRESSURE - need to Apply changes' plot in the bottom right.
- Interactive Controls:** Points to the 'Operate PID' dialog box in the bottom left.
- Messages:** Points to the 'Messages' window at the bottom.
- Traine Performance Monitoring:** Points to the 'TPM Summary, G2_Deethanizer' window at the bottom.

Engineering / model building

OTS Instructor Station

Both engineering & OTS

For more information on dynamic simulation software and AVEVA engineering services, please visit:
aveva.com/en/products/dynamic-simulation

