DATASHEET

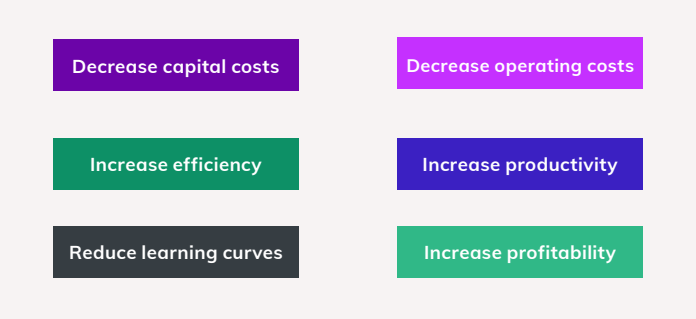
AVEVA™ PRO/II™ Simulation: Steady-state process simulation

AVEVA PRO/II Simulation improves process design, powers operational analysis, and performs engineering studies. A wide variety of thermodynamic models for rigorous steady-state heat and material balance calculations for a wide range of chemical processes helps you decrease both capital and operating costs as you optimize your plant.

Summary

AVEVA PRO/II Simulation is a professional simulation tool that offers comprehensive simulation for process design, revamps, and operational analysis.

AVEVA PRO/II Simulation performs rigorous steady-state mass and energy balance calculations for processes ranging from oil and gas separation to reactive distillation.



AVEVA PRO/II simulates a wide range of processes at a steady state, from refining to chemicals, and provides robust and accurate results based on industry-standard thermodynamic methods and physical property data. This valuable tool can help you improve the margins of your process or plant through simulations before you invest in infrastructure or overhead.

Simulation uses

- Design new processes
- Evaluate alternate plant configurations
- Modernize or revamp existing plants
- Assess and document compliance with environmental regulations
- Troubleshoot and remove bottlenecks in plant processes
- Monitor, optimize, and improve plant yields and profitability

Key features

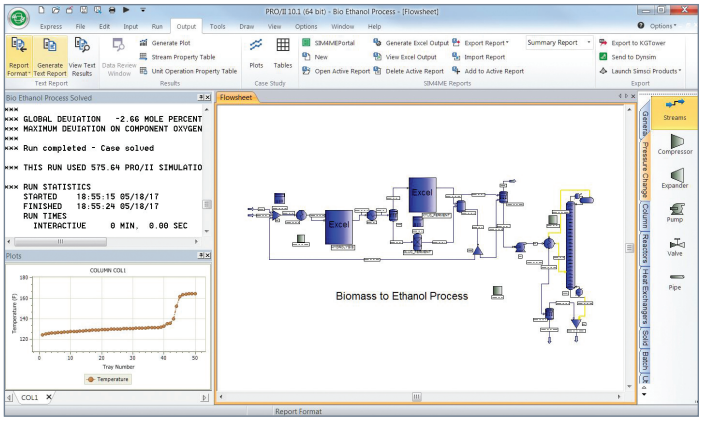
- Comprehensive thermodynamics and physical property data
- The ability to create and manage custom component data
- Comprehensive rigorous unit operation modeling
- Customizable process modeling via Microsoft® Excel
- Built-in integration with Excel for custom reporting
- AVEVA™ Excel Simulation integration for simulation control and analysis from Excel
- Refinery reactor models adapted from the proven models used in AVEVA™ Process Optimization
- Integration with industry-standard licensors including HTRI, OLI, and Koch-Glitsch
- Integration with AVEVA™ Unified Supply Chain for assay information
- Applications across multiple industries, including:
  - Green engineering
  - Chemicals
  - Refining
  - Oil and gas processing
  - Pharmaceuticals
  - Petrochemicals
- AVEVA PRO/II Simulation is now available via the cloud through AVEVA™ Simulation
  - Access AVEVA PRO/II Simulation, AVEVA™ Process Simulation and AVEVA™ Dynamic Simulation through a single cloud environment
  - Deploy with speed via the cloud by reducing software needs

Simulation applications

AVEVA PRO/II Simulation offers a wide variety of thermodynamic methods and physical property data that are applicable to virtually every industry. Below are a few of the applications.

Green engineering

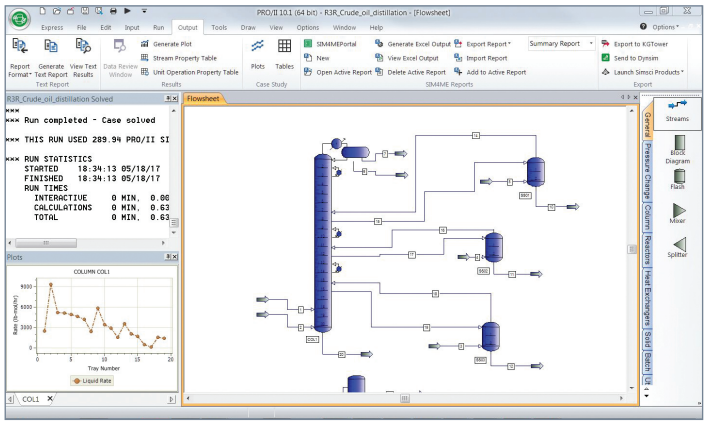
- Integrated gasification combined-cycle (IGCC)
- CO_2 recovery from fuel or flue gas
- Gasification of inedible biomass
- Biofuels production
- Solar silicon production
- Solid fuel characterization



Green Engineering

Refining

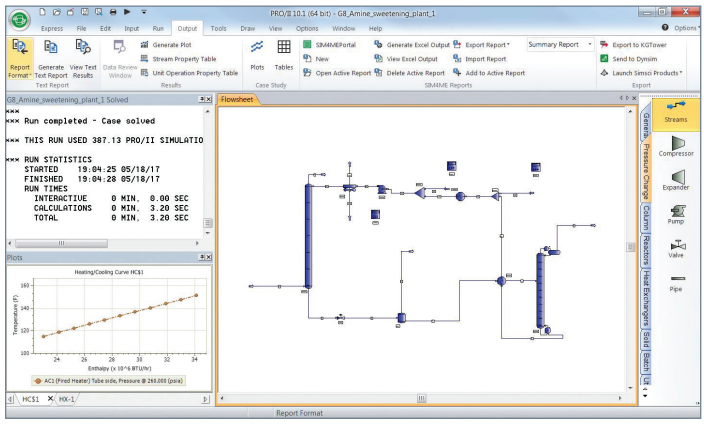
- Heavy oils processing
- Crude preheating
- Atmospheric crude distillation
- Vacuum column
- FCC main fractionator
- Coker fractionator
- Gas plant
- Gasoline and naphtha stabilizer
- Shift and methanator reactors
- Sour water stripper
- HF alkylation
- H_2SO_4 alkylation
- Delayed coker
- Visbreaker
- Isomerization
- Deisobutanizer



Refining

Oil and gas processing

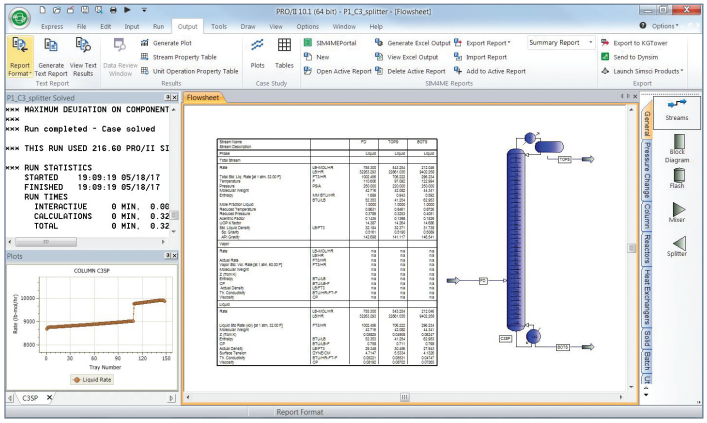
- Amine sweetening
- Cascade refrigeration and refrigeration loops
- Compressor train
- Deethanizer and demethanizer
- Expander plant
- Gas dehydration
- Hydrate formation and inhibition
- Turbo-expander optimization
- Liquefaction of natural gas
- Oil and gas separation
- Upstream integration with PIPEPHASE Pipeline Network Design
- Tight oil and shale oil and gas processing
- Solid CO_2 prediction



Oil and Gas Processing

Petrochemicals

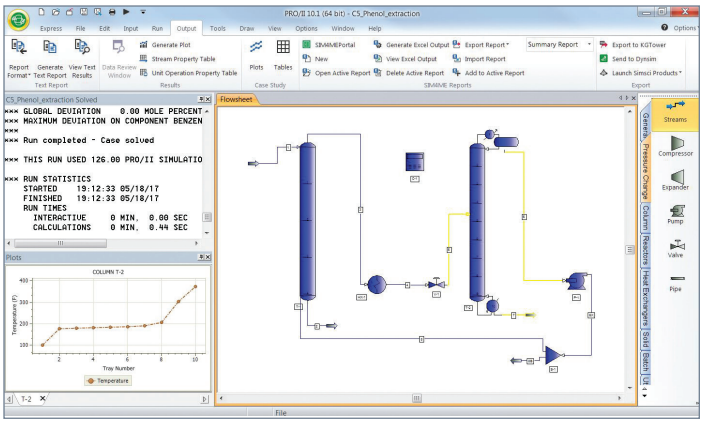
- Ethylene fractionator
- C3 splitter
- Aromatics separation
- Cyclohexane plant
- MTBE separation manufacturing
- Naphthalene recovery
- Olefin production
- Oxygenate production
- Propylene chlorination



Petrochemicals

Chemicals and life sciences

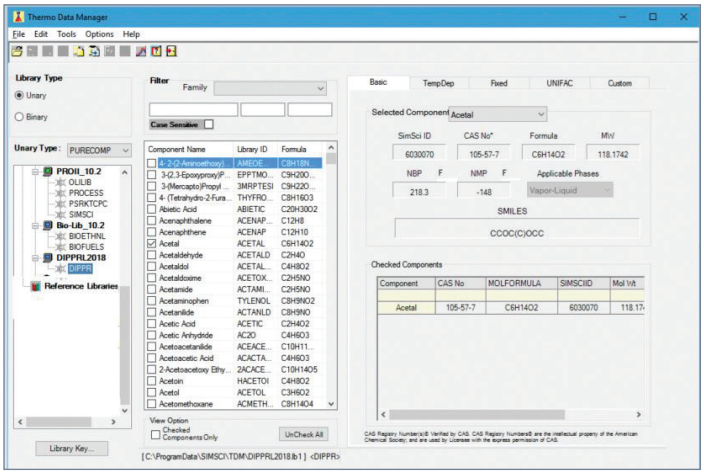
- Ammonia synthesis
- Azeotropic and extractive distillation
- Biofuels
- Crystallization
- Dehydration processes
- Electrolytes
- Inorganic processes
- Liquid-liquid extraction
- Phenol distillation
- Solids handling
- Batch distillation and reactors



Chemicals & life sciences

Component databanks

- Pure component library with over 1,700 entries
- Solids properties
- Components/species electrolyte databank with over 1,900 entries
- Integration with AVEVA Unified Supply Chain provides libraries for crude assays
- Non-library components
- DIPPR® databank
- Pseudocomponents and assay characterization
- User libraries
- Property prediction from UNIFAC and PROPRED structures
- Multiple assay blends
- The thermodynamic data manager (TDM) allows users to create, regress, and manage custom data libraries
- Solid fuel characterization using ultimate and proximate analysis



Thermodynamic methods

Refining/oil and gas/petrochemicals

- Soave-Redlich-Kwong (SRK)
- Peng-Robinson (PR)
- Huron-Vidal mixing rule (SRK and PR)
- Kabadi-Danner mixing rule (SRK and PR)
- Panagiotopoulos and Reid mixing rule (SRK and PR) original and modified
- SIMSCI mixing rule
  - PSRK
  - PPR78
  - PPR78 as a fill option for EOS methods above
  - Glycol
- Temperature-dependent Kijs
- Lee-Kesler
- Lee-Kesler-Plocker
- Chao-Seader
- Grayson-Streed
- Braun K10
- Ideal library methods
- BWRS
- Costald
- API density method
- Single and multi-fluid Rackett densities
- IF97 Steam Tables
- Free-water decant

Petrochemical/chemicals

- UNIFAC (VLE, LLE, and VLLE)
- UNIFAC-FV (free volume)
- UNIWAALS
- UNIQUAC
- NRTL
- Wilson
- Van Laar
- Regular solution model
- Acid dimerization
- Henry's law for non-condensibles
- Henry's law for dilute aqueous systems
- Three-phase equilibrium
- Heat of mixing
- Hayden-O'Connell
- Electrolyte models (OLI)
- Advanced Lattice Model (ALM)
- Flory-Huggins with Chi
- SAFT EOS
- PHSC EOS

Unit operations

General flowsheet models

- Flash, valve, compressor, expander, pump, pipe, AMSIM module, and membrane separator
- Simply integrate custom units using the Excel unit operation

Heat exchanger models

- Shell and tube exchanger, simplified exchanger, LNG exchanger, fired heater, air cooled exchanger, and heating/cooling curves
- HTRI integration, and zone analysis

Flowsheet control

- Feed-forward control, feedback controller, multivariable controller, and risk-based maintenance
- Parameter cross-referencing, and auto-sequencing

Distillation models

- Multiple advanced solution algorithms
- Multiple initial estimate generators
- Two/Three phase distillation
- Electrolytic distillation
- Reactive and batch distillation
- Liquid-liquid extraction
- Column and tray sizing or rating
- Thermosiphon reboiler
- RATEFRAC and BATCHFRAC

Solids modeling

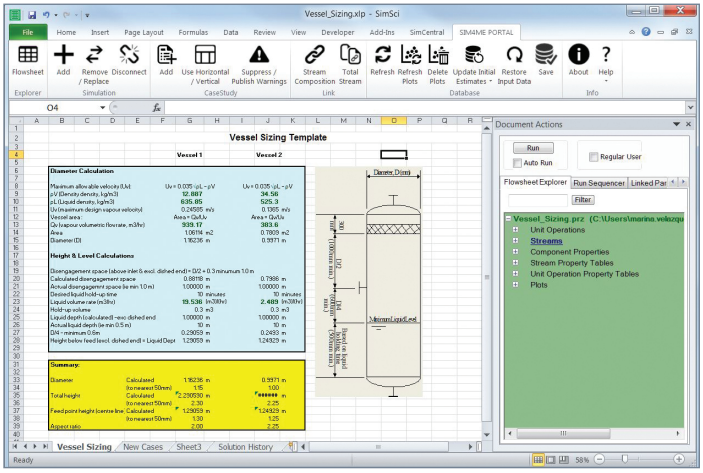
- Solid fuel gasification
- Countercurrent decanter, centrifuge, rotary drum filter, dryer, solid separator, cyclone

Reactor models

- Conversion and equilibrium reactors, plug flow reactor, continuous stirred tank reactor, shift and methanation reactors, boiling pot reactor, batch reactor
- Inline FORTRAN reaction kinetics, Gibbs free energy minimization
- Refinery reactor models are based on the proven models of AVEVA Process Optimization

Add-on modules

There are several add-on modules, interfaces to third-party software, and separate software such as the AVEVA Excel Simulation that are integrated with AVEVA PRO/II Simulation as licensable add-ons. These add-on modules extend the functionality of AVEVA PRO/II Simulation in various ways from Excel integration to electrolytic modeling to rate-based distillation.

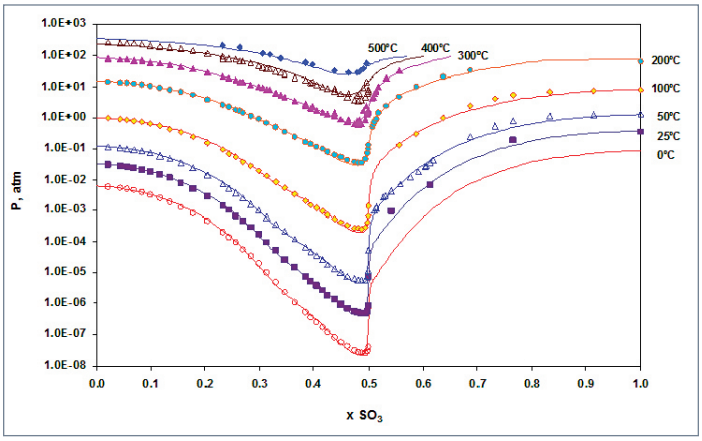


AVEVA Excel Simulation

The AVEVA Excel Simulation portal facilitates a simple, bidirectional transfer of variables between various AVEVA simulation software, including AVEVA PRO/II Simulation, and Microsoft Excel. The portal allows a novice to use the simulation program through Excel.

Limited databank electrolyte module

The electrolyte module extends the capabilities of AVEVA PRO/II Simulation to electrolyte modeling with rigorous thermodynamics originating from the limited Aqueous Databank from OLI Systems Inc. This limited databank, embedded in PRO/II, includes the ability to design and analyze electrolytic systems and build customized electrolyte models.



Interface with Mixed Solvent Electrolytes (MSE)

MSE is the latest full database of electrolytic components from OLI Systems Inc that provides species information and thermodynamic algorithms for electrolytic systems without a concentration limit by utilizing an activity coefficient model. MSE is ideal for systems where the components have high miscibility with water.

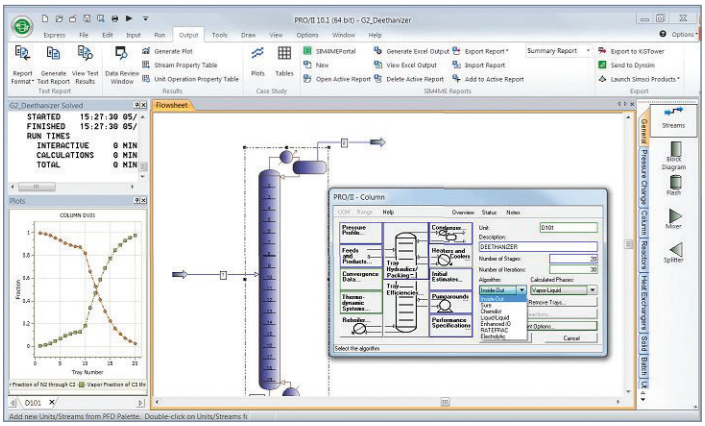
This interface allows AVEVA PRO/II Simulation model interaction with the MSE full databank, giving extended capabilities in modeling electrolytic processes.

AMSIM

Schlumberger's AMSIM® is fully integrated into AVEVA PRO/II Simulation allowing accurate simulation for the removal of H_2S, CO_2, and mercaptans from natural gas and liquefied petroleum gas (LPG) streams using chemicals (amines) and physical solvents.

RATEFRAC

RATEFRAC™ is a product of Koch-Glitsch and licensed exclusively within AVEVA PRO/II Simulation. RATEFRAC is a rigorous rate-based distillation model for applications where equilibrium initiatives are limited by heat and mass transfer rates. RATEFRAC allows for the simulation of all types of multistage vapor-liquid columns such as absorption, stripping, and conventional azeotropic and extractive distillation.



BATCHFRAC

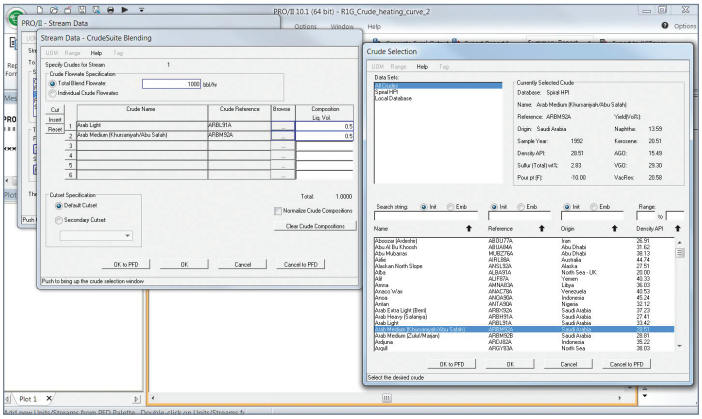
BATCHFRAC™ is a product of Koch-Glitsch and licensed exclusively within AVEVA PRO/II Simulation. BATCHFRAC is a rigorous distillation algorithm capable of modeling unsteady-state batch distillation processes.

The BATCHFRAC module allows for simulation of reactive distillation and supports two liquid phases making it well-suited for applications within the chemicals industry.

AVEVA Unified Supply Chain

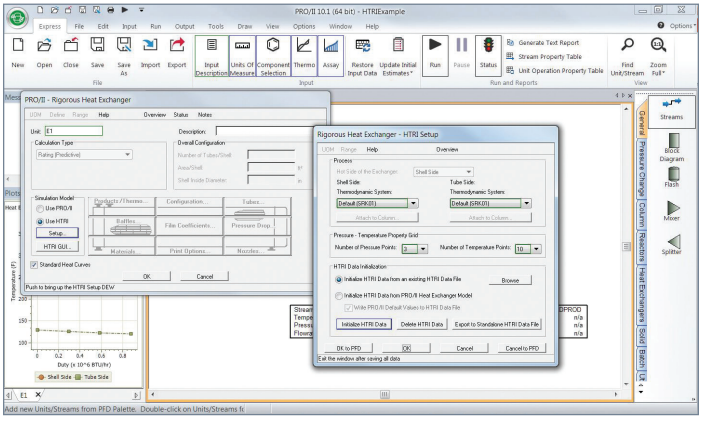
AVEVA Unified Supply Chain (formerly Spiral) is an industry-leading, enterprise toolset for crude oil knowledge management. It is also a key component of AVEVA's enterprise-level supply chain solution, working in conjunction with the AVEVA Unified Supply Chain toolset to support work processes across assay management, planning, scheduling, and supply and distribution.

The unique features of this toolset have made it the assay management tool of choice across the petroleum industry. AVEVA Unified Supply Chain helps organizations manage their data, make purchasing and blending decisions, and feed refinery plans. Integration with AVEVA PRO/II Simulation extends the benefits to process design and operational support by providing accurate feedstock information to the simulations, which greatly increases the accuracy of the models.



HTRI

Heat Transfer Research, Inc. (HTRI®) delivers world-class process heat transfer and heat exchanger technology within AVEVA PRO/II Simulation. HTRI products are widely recognized as the industry standard for the rigorous design, rating, and simulation of heat transfer equipment, including shell and tube exchangers and air coolers. This technology is accessible via the Rigorous Heat Exchanger unit operation of PRO/II Process Engineering.



ChemApp

GTT-Tecnologies' ChemApp provides the powerful calculation capabilities of their FactSage software in the form of a programmer's library. It consists of a rich set of subroutines that provides all the necessary tools to calculate complex multicomponent, multiphase chemical equilibria and determine the associated energy balances. AVEVA PRO/II Simulation supports ChemApp allowing users to import FactSage files and access reaction and phase equilibrium data. This allows AVEVA PRO/II Simulation to simulate inorganic processes such as metal processing or cement production.

MySep

MySep helps companies optimize operations in chemicals and oil and gas for phase separation constraints. MySep provides the industry-accepted standard software for performance simulation and rigorous design of process phase separators. The software models and predicts the carryover of phases during separation unit operations. When used within AVEVA PRO/II Simulation flowsheets, the MySep Engine calculates entrainment and pressure drop in the flash drum. This provides a comprehensive, rigorous modeling capability ensuring that phase carryover can be properly detected, analyzed, and remedied early in process design or troubleshooting.

For more information about AVEVA PRO/II Simulation, please visit: aveva.com/en/products/pro-ii-simulation