



ProSimPlus

Steady-State Process Simulation and Optimization

To design more competitive unit operations, operate very integrated processes closer to their limits, face new regulations (environmental, safety...), engineers can no longer be satisfied with simple models anymore. They need a powerful but easy-to-use tool to simulate plant behavior, quickly test new configurations and get the optimal solution, whether they are senior or junior engineers!

ProSimPlus is a flexible process engineering software that performs rigorous mass and energy balances for a wide range of industrial processing plants.

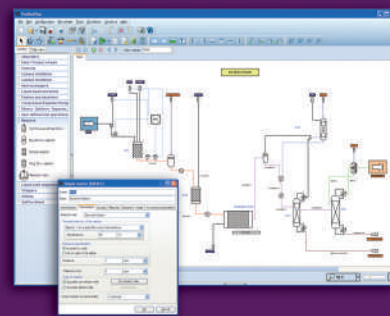
It is used in design as well as in operation of existing plants for performance optimization, units troubleshooting, debottlenecking, plants revamping or front-end engineering analysis.

- **Comprehensive set of unit operations including complex models.**
- **Powerful thermodynamic package** able to model highly non-ideal systems and a wide range of processes.
- **Unrivalled convergence methods.**
- **Unique graphical user interface** allowing instant usability, convenient drawing of the flow-sheet and quick access to results.
- **Open system to expand capabilities** (user defined unit operations, Visual Basic scripting, CAPE-OPEN thermo and unit operation interfaces...).
- **Solution widely used by world's leading oil, gas, chemicals, energy or bio-based industry players.**

Accurately model and analyze a wide range of processes

The solutions obtained from simple models are probably already implemented. So ProSimPlus goes further and uses sophisticated models to represent the full complexity of the plant. ProSimPlus provides a comprehensive library of unit operation models that includes standard unit operations and more specific advanced unit operations:

- Chemical reactors (CSTR, PFR, conversion, Gibbs minimization...) with many chemical reaction models: equilibrium, kinetic controlled, complex reactions, user defined...
- Three-phase and reactive distillation columns.
- Complex refinery distillations: side-strippers, pumparounds...
- Multi-stage separators for liquid-liquid extraction.
- Multi-fluid heat exchangers (LNG, brazed plate-fin...).
- Rate-based non equilibrium model for trays and packed columns (optional).
- Other: fuel cells (Solid Oxide Fuel Cells), solid handling (crystallizers, filters, hydrocyclones...), utility management (gas engine, boiler, ORC, heat pump...).



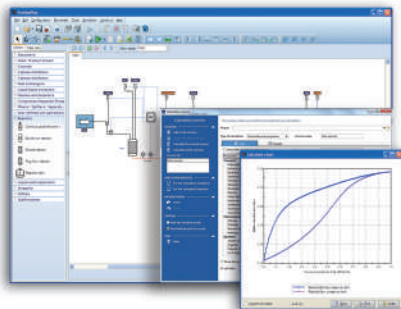
Bioethanol production process

Sizing calculation and generation of specification sheets are possible for most equipment (columns, heat exchangers...).

Easy to use links with manufacturer's rating software are available (Sulcol® by Sulzer Chemtech, KG Tower® by Koch-Glitsch...).

ProSim's advanced Pinch analysis and Exergy analysis are also included to achieve more energy efficient processes.

One of the richest thermodynamic packages available



Thermophysical property calculations within ProSimPlus

The quality of a simulation relies above all on a good representation of the system's thermodynamic behavior and one cannot hope to accurately model a process without the appropriate property models, in particular when it is highly non-ideal. ProSimPlus provides an extensive set of thermodynamic models selected for their reliability and robustness, and a **property database of over 2300 components** built from the AIChE's DIPPR® database.

Simulis Thermodynamics, ProSim's acclaimed thermodynamics server, is embedded in ProSimPlus. This allows seamless access to all kinds of physical property calculations and an in-depth analysis of the pure components or mixtures involved (see *Simulis Thermodynamics documentation*).

Accurately model any types of systems: oil and gas production, refining, gas processing, petrochemicals, chemicals, biochemicals, pharmaceutical, nuclear, electrolytes, coal processing, synthetic fuels, environmental, water and steam, food, food intermediates, mineral, metallurgical...

Each process can be represented confidently by combining different properties calculation methods, when necessary. Additionally, the simulation can be fine-tuned by using several property models within the same flowsheet.

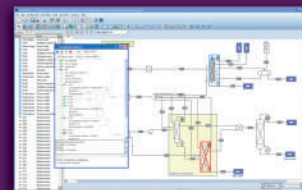
Reliable results without time-consuming convergence tests

ProSimPlus is particularly effective in resolving complex simulation problems: processes with highly non-ideal mixtures, numerous recycling loops and design specifications, difficult separations or very large flowsheets. The fast convergence is ensured by specific algorithms based on the **simultaneous modular approach**. This development, unique in the world of process simulation, comprises in particular:

- Automatic determination of the calculation sequence: stream initialization and tear streams are not required.
- Simultaneous treatment of recycling and design specifications through proven methods.
- Multivariable control approach that allows one or several process outputs to be controlled while simultaneously adjusting one or several selected parameters.
- An advanced optimization module (native SQP and genetic algorithms, or any external algorithms) for the optimization of operating conditions according to user defined objectives and constraints.

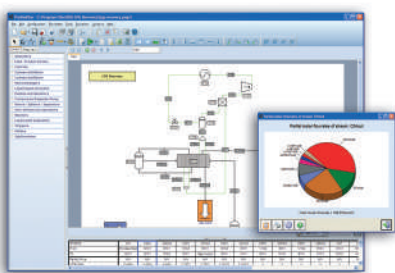
At each unit operation level, a fast and reliable convergence is ensured by using the method best suited to the equation system to be solved (Newton, Gear...) and the preferred use of analytical derivatives.

Ability to run case studies to automatically perform sensitivity analysis (influence of a given operating parameter on a set of predefined variables).



Status of convergence shown during calculation

A software very quickly adopted by users



Plotting charts directly from the flowsheet

No software, regardless of its capabilities, will bring payback if it is not used. However only a few companies can maintain in-house simulation experts. ProSimPlus is very intuitive. Engineers used to other simulation tools are surprised how easy it is to learn ProSimPlus and how fast they progress with the software. As for beginners, they do not need long and expensive training to become fully operational. The Windows® based graphical environment provides many features to **easily build process flow diagrams**: drag and drop, copy and paste of unit operations, colors, sizing, sub-flowsheets, tree view, image and text insertions, zooming, different views of the same process... **Quick analysis and understanding of simulation results** is supported by many "one-click" functions such as plotting charts, distillation curves (TBP/ASTM), equipment list and datasheet, retrieving global material and energy balances, the recovery ratio of each component... Profiles of columns and heat exchangers as well as simulation results are made available in each unit operation window. During and after the simulation, convergence status is shown on the diagram and in the simulation report (along with indications about the source of any errors). The complete report is generated in HTML and Excel formats. The flowsheets and charts can be copied and pasted into other environments or saved in .BMP or .EMF formats.

Open system to take into account specific requirements

At all levels, ProSimPlus can be enriched to fit end-users requirements. Users can add/create private component databases, new thermodynamic models or create complementary calculations and custom unit operations (in VBS, Fortran, C++...). Simulation results can be customized. Advanced integration (custom algorithms or equations) can also be added by ProSim engineers. Thanks to advanced CAPE-OPEN compliance, the use of thermodynamic packages and unit operations from other providers is easy.

Used and approved in many industries

ProSimPlus is built on many years of research carried out in particular by the *Laboratoire de Génie Chimique de Toulouse*. Decades of intensive use in various process industries allowed for the full validation of the software, and it comes as no surprise that an ever increasing number of production companies, engineering firms, equipment suppliers, universities and research departments now chooses ProSimPlus.



www.prosim.net | info@prosim.net

Immeuble Stratège A - 51, rue Ampère - 31670 Labège - FRANCE - Tel: +33 (0)5 62 88 24 30
325 Chestnut Street, Suite 800 - Philadelphia, PA 19106 - USA - Tel: +1 215 600 3760