

ProSim Batch Colonne is a software dedicated to the simulation of the dynamic behavior of a batch distillation process.

Its flexibility and robustness for the most complex separations, and its user-friendliness makes it a unique tool, used and prized by the largest chemists and international engineering companies.

# ProSim Batch Colonne



**ProSim**

Batch column  
simulation software

## Any types of columns and operating conditions

As you would have done for your industrial unit, build your production scenario by describing successive operating steps, defined by specific operating conditions and automatically chained through events detection. For each step of your distillation process, you may modify all the process parameters:

### Types of operating steps:

- filling-up of the column: calculation of the boiler pre-heating time and of the filling-up time for all stages and the condenser;
- fixed reflux distillation;
- variable reflux distillation: calculation of the reflux policy in order to maintain a given purity in one of the components at the distillate;
- infinite reflux distillation: the distillate is sent back to the top of the column;
- finite reflux distillation: the distillate is sent back to the boiler.

### Operating parameters:

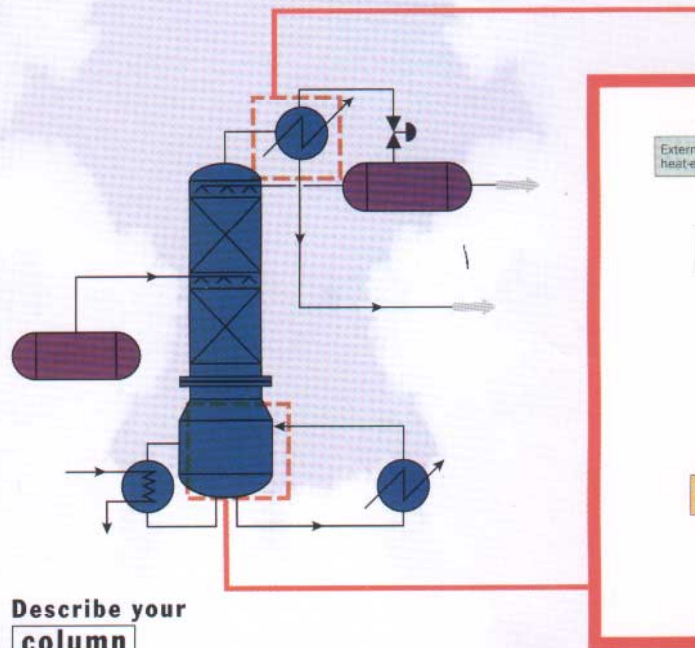
- reflux ratio;
- boiler duty: fixed or calculated according to the described heating device;
- input temperature of the utility fluid (constant or time dependent);
- desired purity of the distillate (variable reflux steps);
- feeds (semi-batch): flow rates (constant or time dependent), compositions, levels, ...;
- side streams: state (liquid or vapor), levels, flow rates;
- intermediate reboilers: heat duties, levels, ...;
- condenser: total, sub-cooled, calculated from the geometry;
- temperatures and flow rates of the cooling fluids on condensation stages;
- temperature and pressure control system: ideal regulation or real controls (cascade, feedback, feedforward);
- operating pressure: ramp on the pressure at the top of the column, control of the pressure so as to maintain a given temperature on one plate, ...;
- volume in the boiler: calculated or constant (dynamic simulation of a continuous column);
- decanter: choice of the refluxed phase, constant level;
- chemical reactions to be taken into account;

### Events

- elapsed time since the beginning of the simulation or the step;
- produced quantity (global or for one component) in one of the collection tank or still in the boiler;
- value of the reflux ratio;
- temperature on one stage;
- composition at the top of the column, in the boiler, on one stage or in one of the collection tank;
- liquid or vapor flow rates in the column, ...;

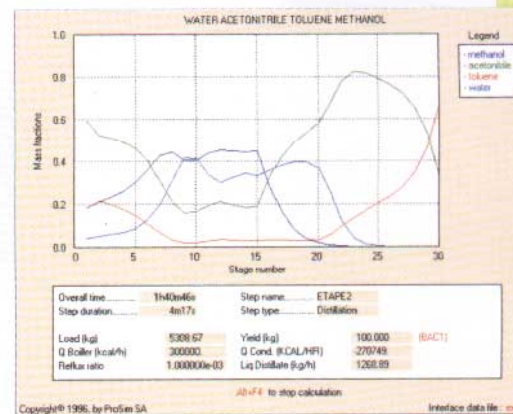
## A complete thermodynamic package

In order to calculate at any time the physicochemical properties (viscosity, specific heat, thermal conductivity,...) of the fluids circulating in the column as well as the liquid-vapor or liquid-liquid equilibria, ProSim Batch Colonne features:



### Describe your column

- Trayed column (sieve, bubble cap, valves, ... trays).
- Packed column: packings library (dumped and structured)
- Calculation of hydrodynamic performances: pressure drops, holdups, flooding.

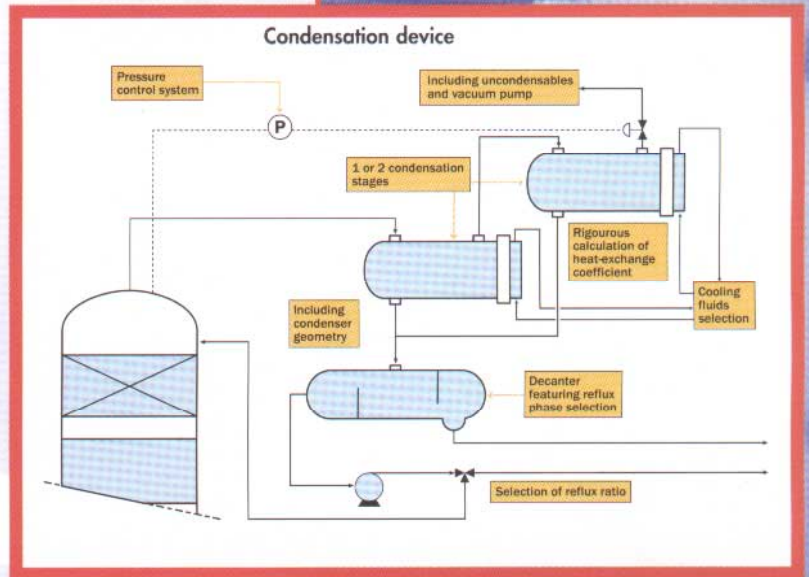
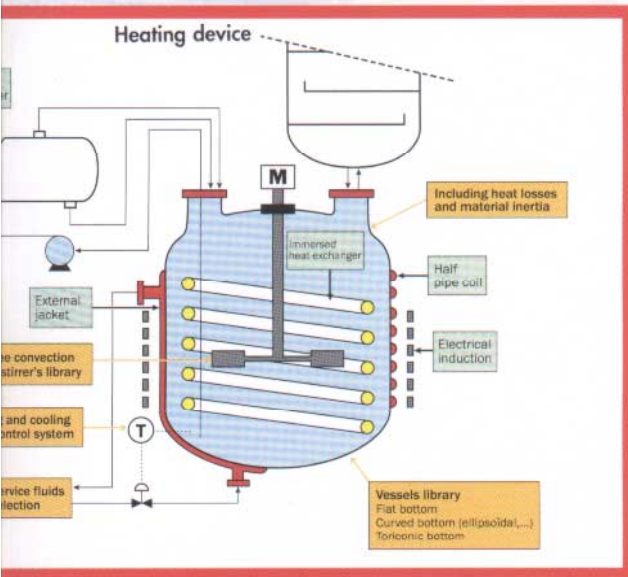


**1 A pure components databases** containing the properties of more than 1 500 components. A 'private' database allows you to store your own components. In order to help you in the management of this database, a specific module allows to:

- regress properties obtained from experimental data.
  - assess properties according to the structure of the molecule, from numerous incremental methods (Benson, Joback,...).
- Several search criteria allow to quickly select some components in the database: raw chemical formula, chemical family, CAS Number, boiling temperature, molar weight, ...

**2 A complete thermodynamic models library** including numerous methods which have been selected and validated in order to cover a wide range of applications with a great reliability. Among the available models, you will find state equations (SRK, PR, LKP, BWRS, ...), activity coefficients models (NRTL, UNIFAC, Wilson,...) or specific models (MHV2, Engels,...) which provide an accurate representation of complex and highly non-ideal mixtures. A specific processing allows to rigorously handle liquid-liquid-vapor equilibria.

**3 A binary interaction parameters database:** required by some thermodynamic models. If these parameters are not known and not available in the database, generate them using the experimental data regression program.



## Fast calculations and easily exploitable results

- 1** ProSim Batch Colonne ensures a fast and reliable convergence of the calculations and proves to be extremely efficient on complex cases : highly non-ideal mixtures, discontinuities handling ( feed opening or closing, untimely failure of the heating system,... ) etc.
- 2** During the calculation, you can graphically and numerically visualize the evolution of the parameters which you are interested in ( composition profiles in the column,... ). At the end of the simulation, the results are directly exploitable, with more or less details:
  - charts showing the main parameters evolution : temperatures, compositions, reflux, heat duty, pressure drop, flooding, etc.;
  - simulation report with the data linked to the problem faced, the hypothesis put forward and the detailed results ( temperature profiles, pressure, holdups, compositions in the column, ... );
  - automatic export of the results into a Lotus or Excel spreadsheet ( for a more customized exploitation of the whole results );
  - selection of units as it is the case for data input.

use ProSim Batch Colonne so as to

- Optimize an existing equipment yielding.
- Efficiently develop new batch distillation process.
- Adapt an existing equipment to a new process.
- Define your control strategies.
- Cut down on your running costs.
- Carry out safety studies.
- Expand your know how.
- Perpetuate your knowledge.

the best at your disposal

**An easy to use**  
**software**

Windows graphical user interface, on-line help.

**An integrated**  
**environment**

full compatibility with ProSim Batch Réacteur (simulation of discontinuous chemical reactors and identification of reactional kinetics).

**A software**  
**with no limits**

regarding the number of components, feeds, side streams, operating steps, ...

The ability to simulate

a **reactive distillation**

**A variable level modeling**

depending on the objective to be achieved.

**A rigorous calculation**  
**of heat transfers**

in the boiler; ability to combine several heating systems, influence of the shape of the vessel bottom on the heat exchange area, numerous correlations depending on the stirrer, calculation in free convection, influence of the thermal fluids properties on the service-side film coefficient, modeling of the heating loops along with the related controls.

**A rigorous calculation**  
**of the condensate**

depending on the technological features of the condenser, the vapors to be condensed, the type of cooling fluid.

**Calculation**

**of the column hydrodynamics**

pressure drops, flooding, liquid holdups....

**Fast calculations** thanks to efficient and robust **numerical methods**

**A complete and validated**  
**thermodynamic package**

gained through a lot of experience in process simulation, allowing to process **three-phase** systems for instance.

**An open software**

within which your own column internals, boilers heating systems, condensation devices, components, thermodynamic models... can be easily introduced.

make the most  
of **ProSim**  
**environment**

**ProSim Batch Colonne, is also:**

- a technical assistance provided by modeling experts, dedicated to users support;
- specific training courses;
- the fulfillment of your requirements to finalize new versions endowed with higher performances;
- consultancy services to solve penalizing difficulties encountered in complex problems;
- a complete range of simulation softwares: continuous processes, calculations of thermodynamic properties and fluid phase equilibria, heat exchangers design, ...;
- a constant contact with research centers: the teams from the Chemical Engineering Laboratory of Toulouse (UMR/CNRS 5503), who designed the software, and keep on improving it thanks to an advanced research on modeling techniques;
- two-language version (english, french).



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