

Getting started with ProSimPlus®

Use Case 1: Main features overview

Software & Services In Process Simulation

We guide You to efficiency



ProSim

Introduction

ProSimPlus is a process engineering software that performs rigorous mass and energy balance calculations for a wide range of industrial steady-state processes. It is used in design as well as in operation of existing plants for process optimization, units troubleshooting or debottlenecking, plants revamping or performing front-end engineering analysis.

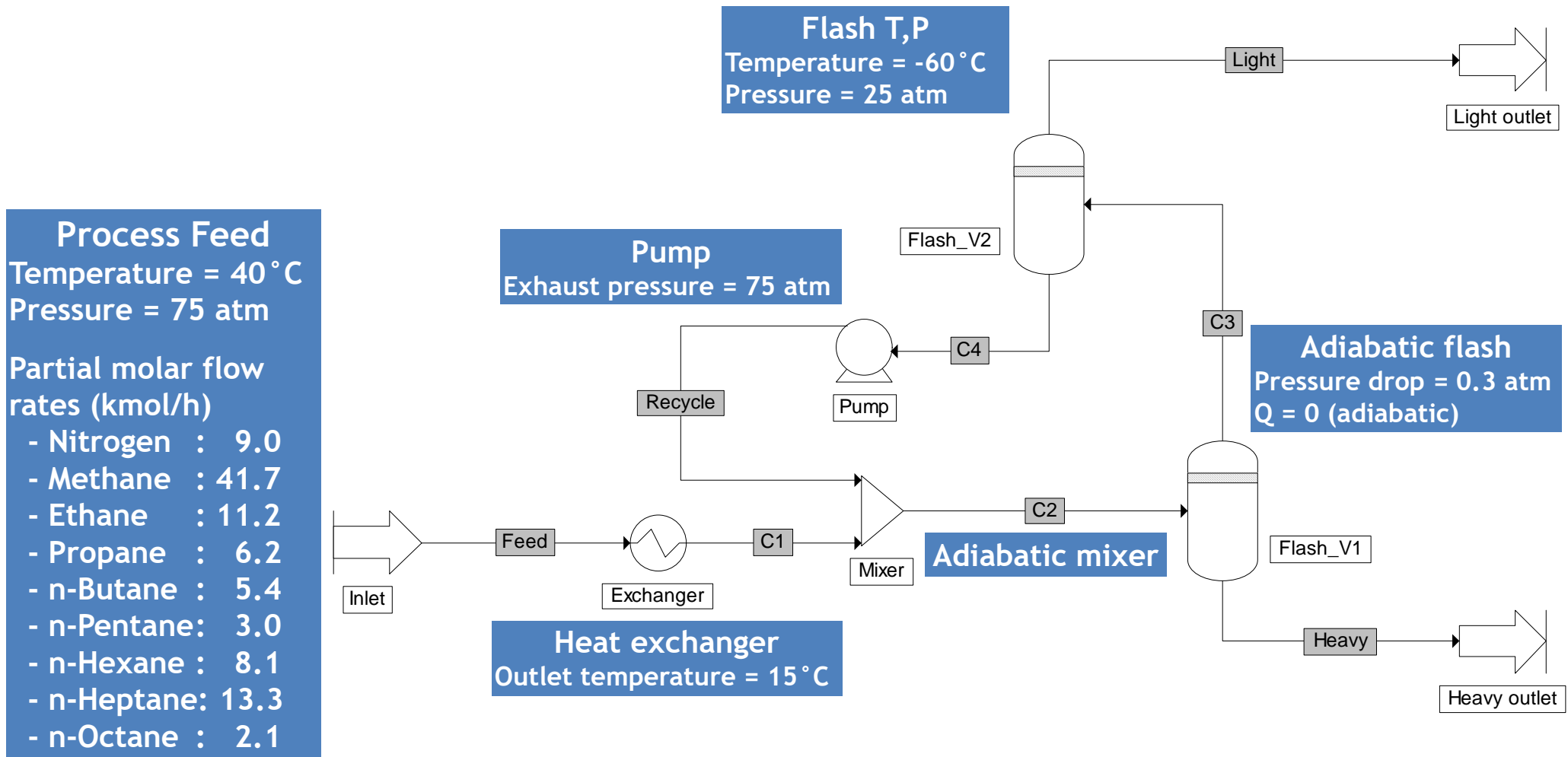
This document gives a general overview of ProSimPlus features. It is based on the “*Simple example*”, available on ProSim web site: www.prosim.net.

The steps to create and analyze the flowsheet are the following:

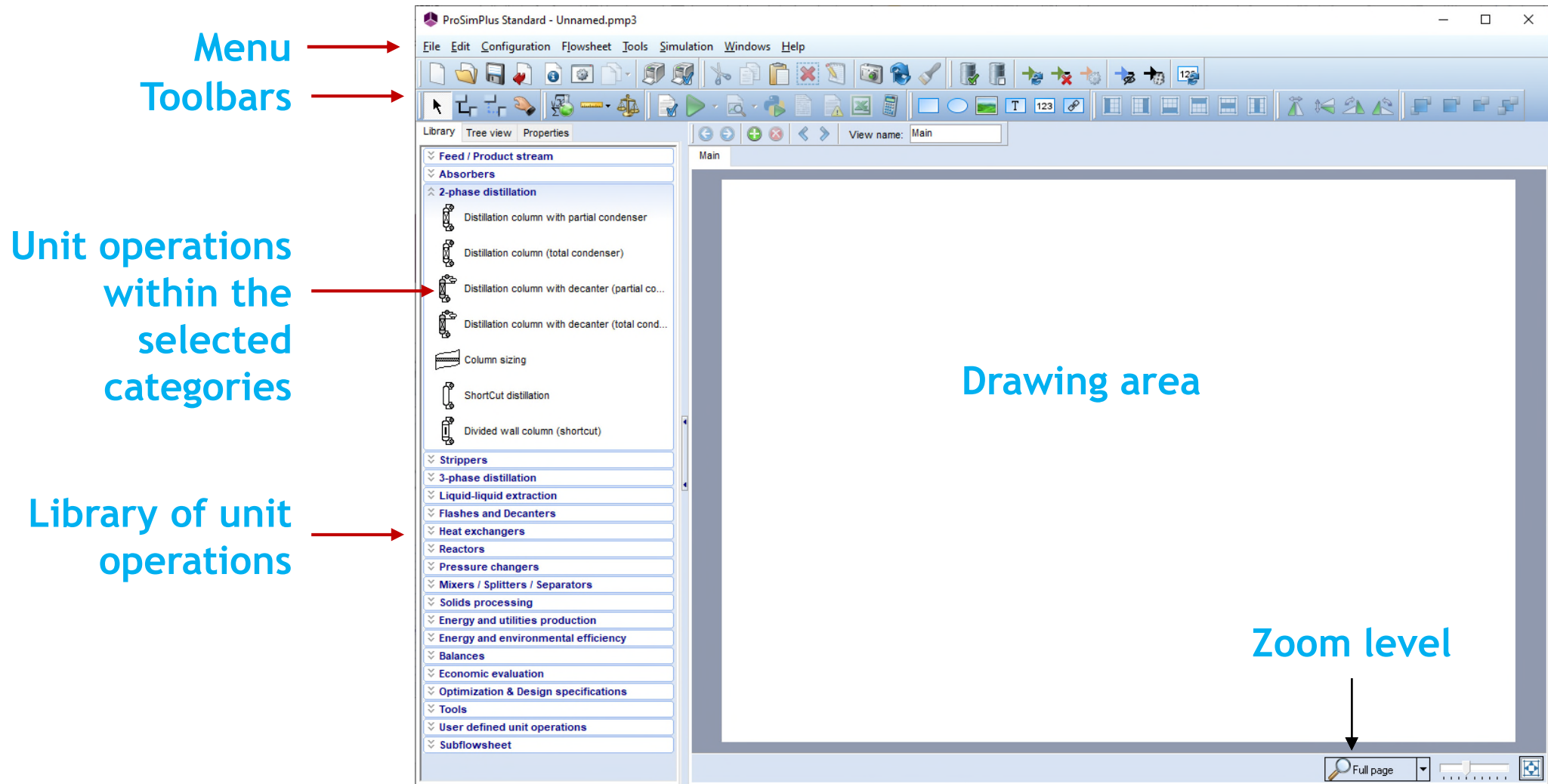
- **Step 1** - Select the components
- **Step 2** - Select the thermodynamic model
- **Step 3** - Create the flowsheet
- **Step 4** - Run the simulation
- **Step 5** - Analyze generated reports
- **Step 6** - Analyze results from the flowsheet
- **Step 7** - Graphical User Interface

Presentation of the example

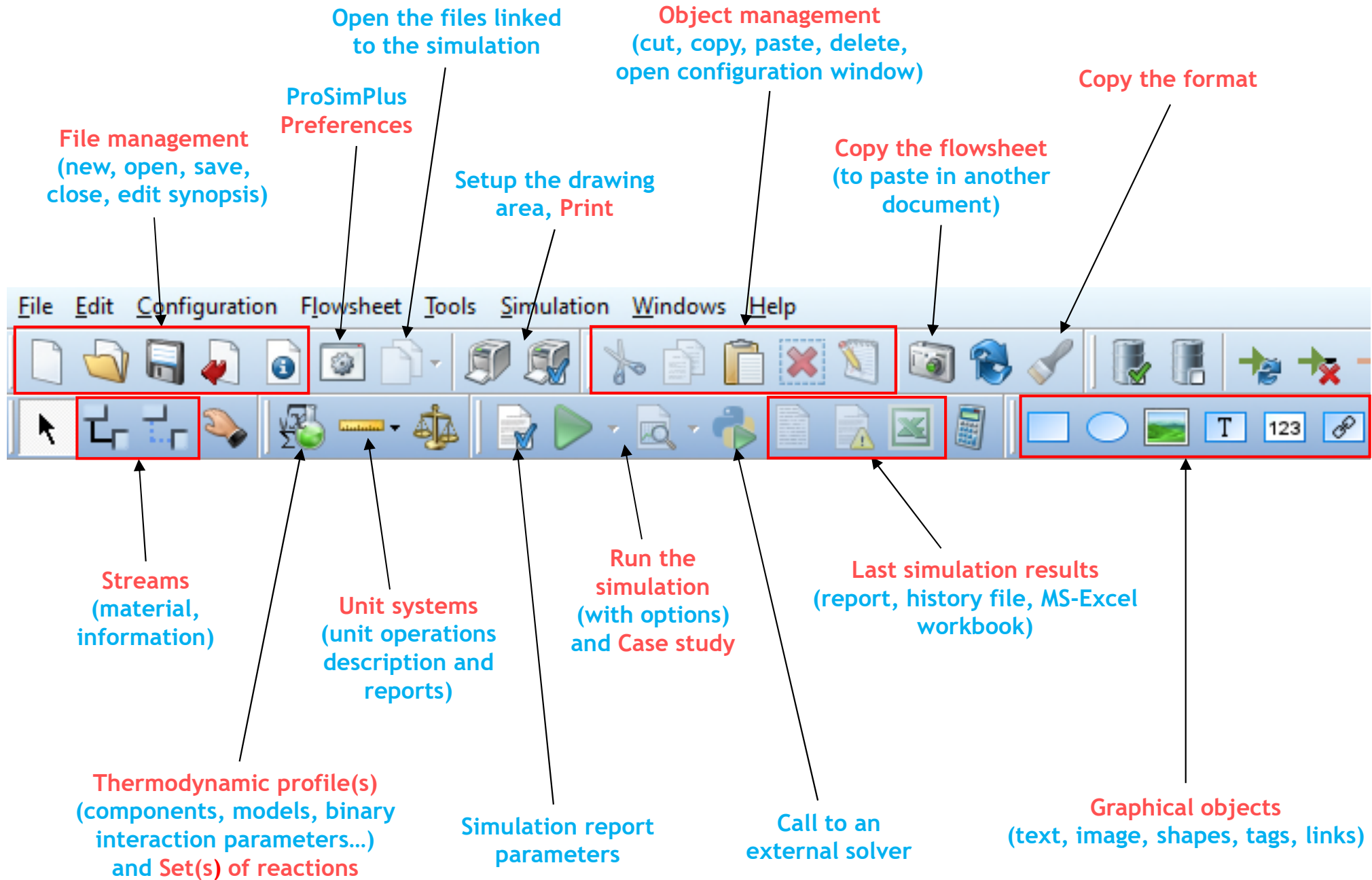
The “simple example” consists in separating a hydrocarbons mixture into heavy and light components:



Before we start: Graphical User Interface



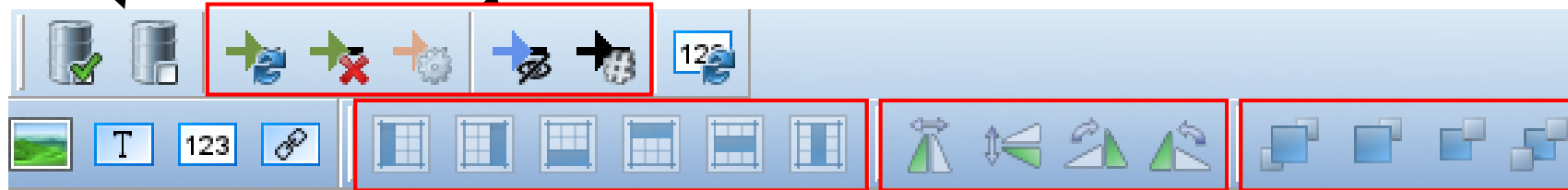
Before we start: Graphical User Interface



Before we start: Graphical User Interface

TBP/ASTM Assay curves of material streams (select, deselect)

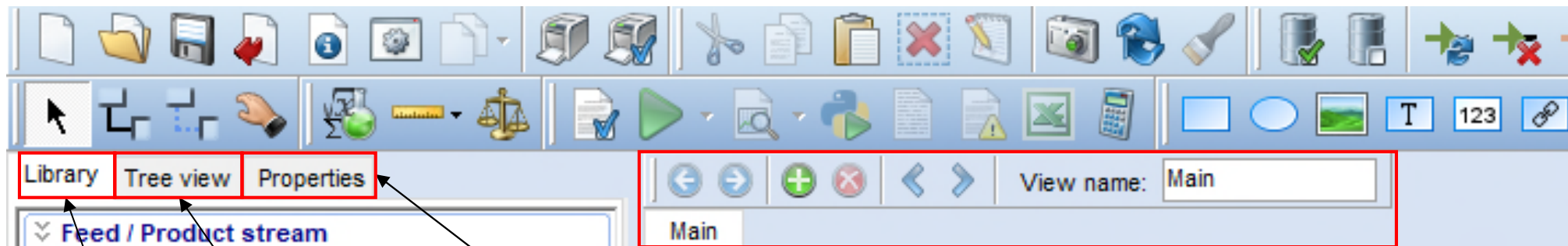
Streams management (link, initialization, number...)



Arrange the graphical objects on the flowsheet (align, center...)

Objects position (mirror, inverse, rotate...)

Arrange the objects layout in the flowsheet (front, back...)



Access to the library of unit operations

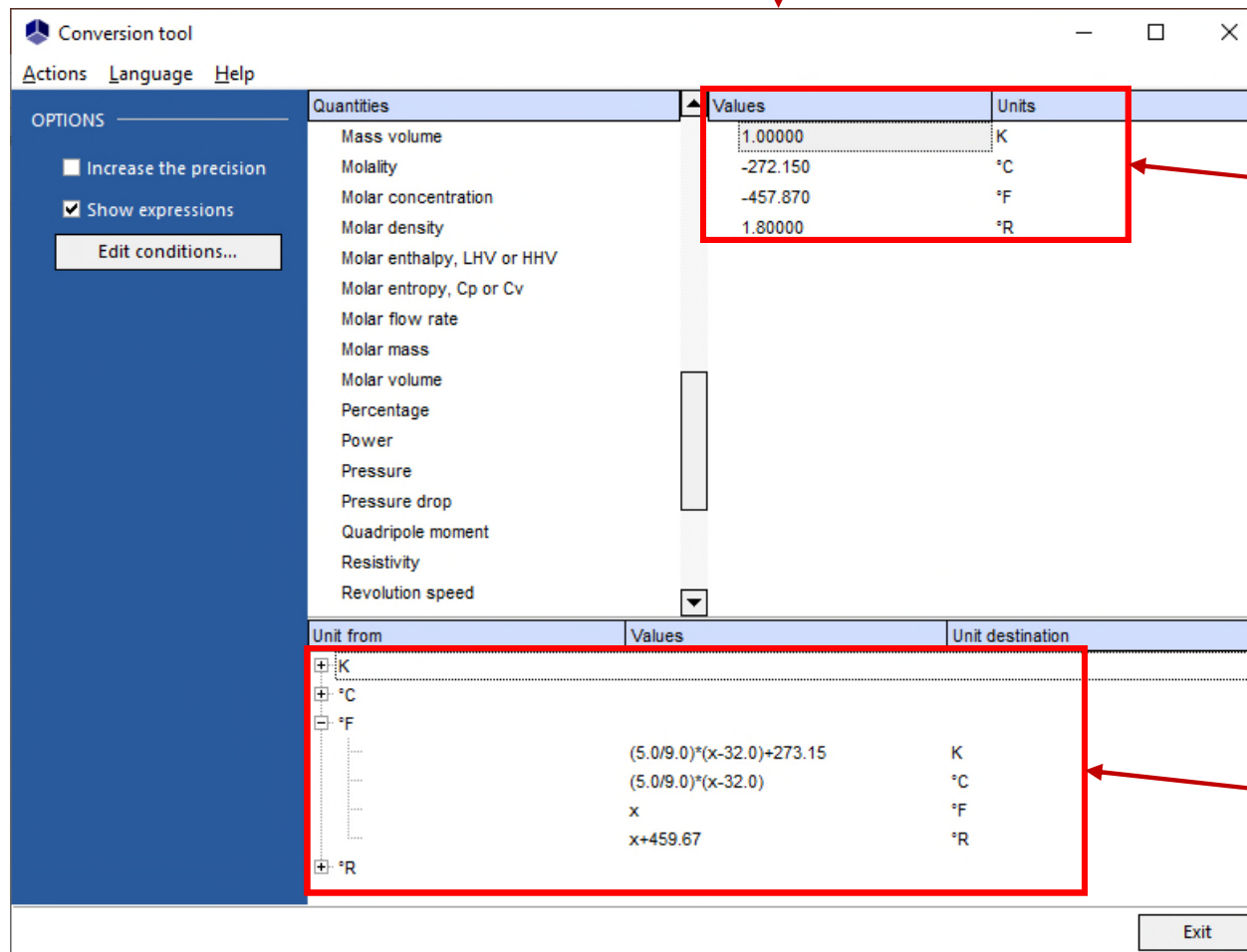
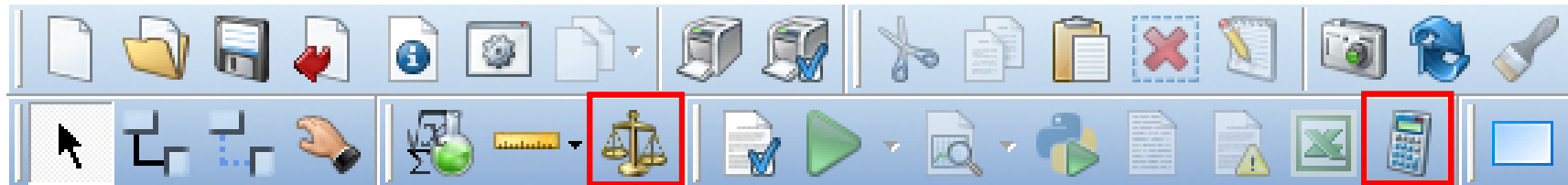
Access to the existing object on the flowsheet

Access to the graphical properties and the name of the selected object

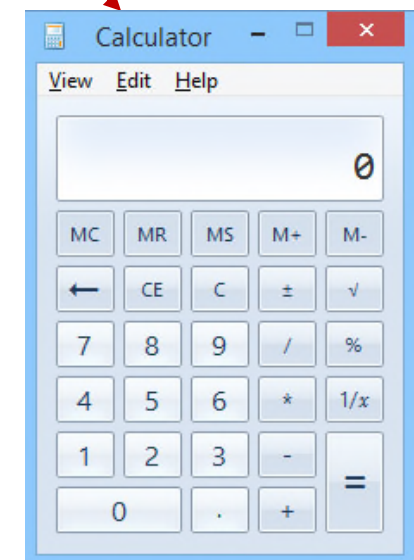
Management of the views of the flowsheet (creating, moving, renaming...)

Before we start: Graphical User Interface

Tools: conversion tool and calculator



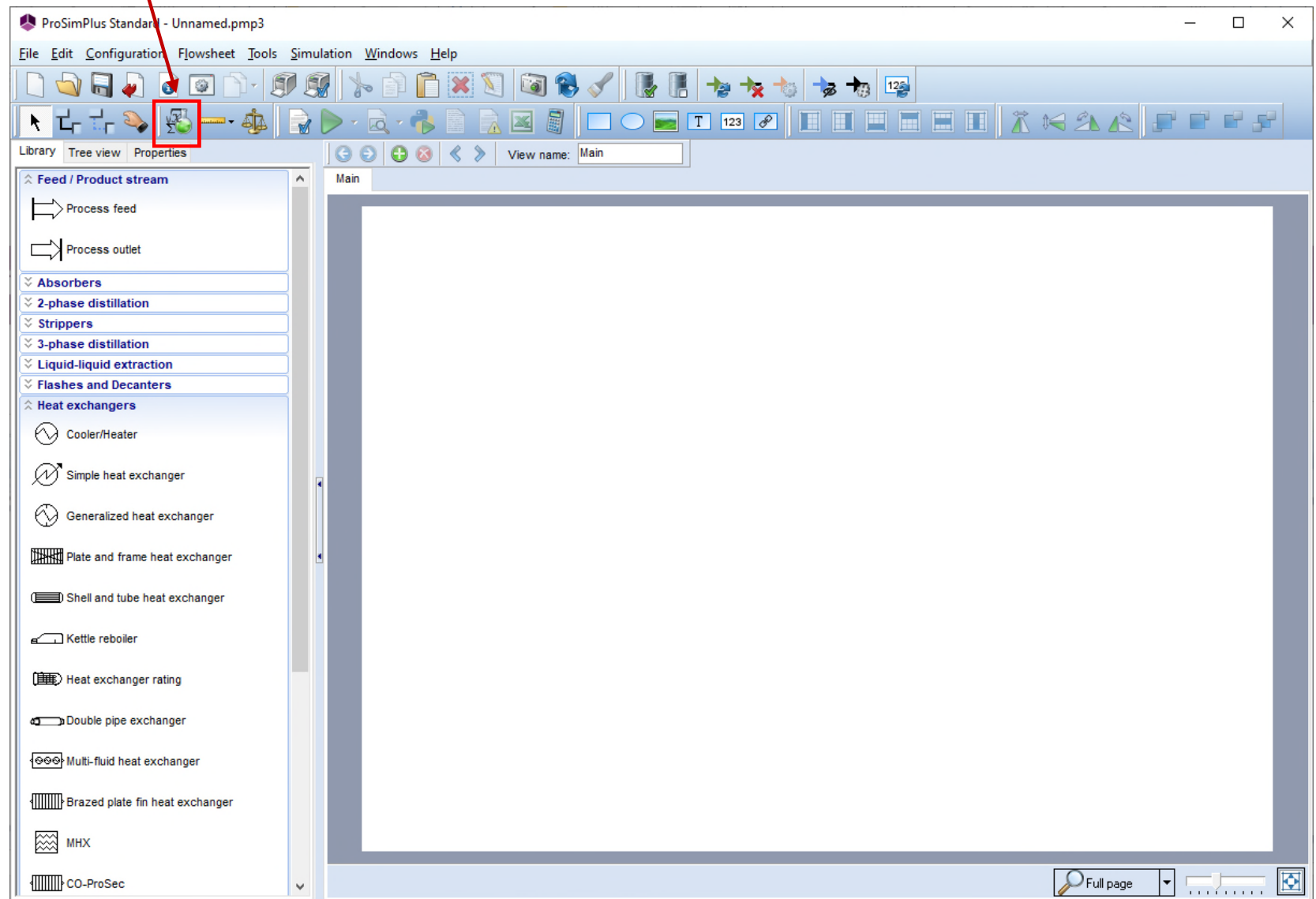
Conversions



Mathematical expressions used by the conversion tool

STEP #1: Select your components

Click on the “Thermodynamics and Compounds” icon

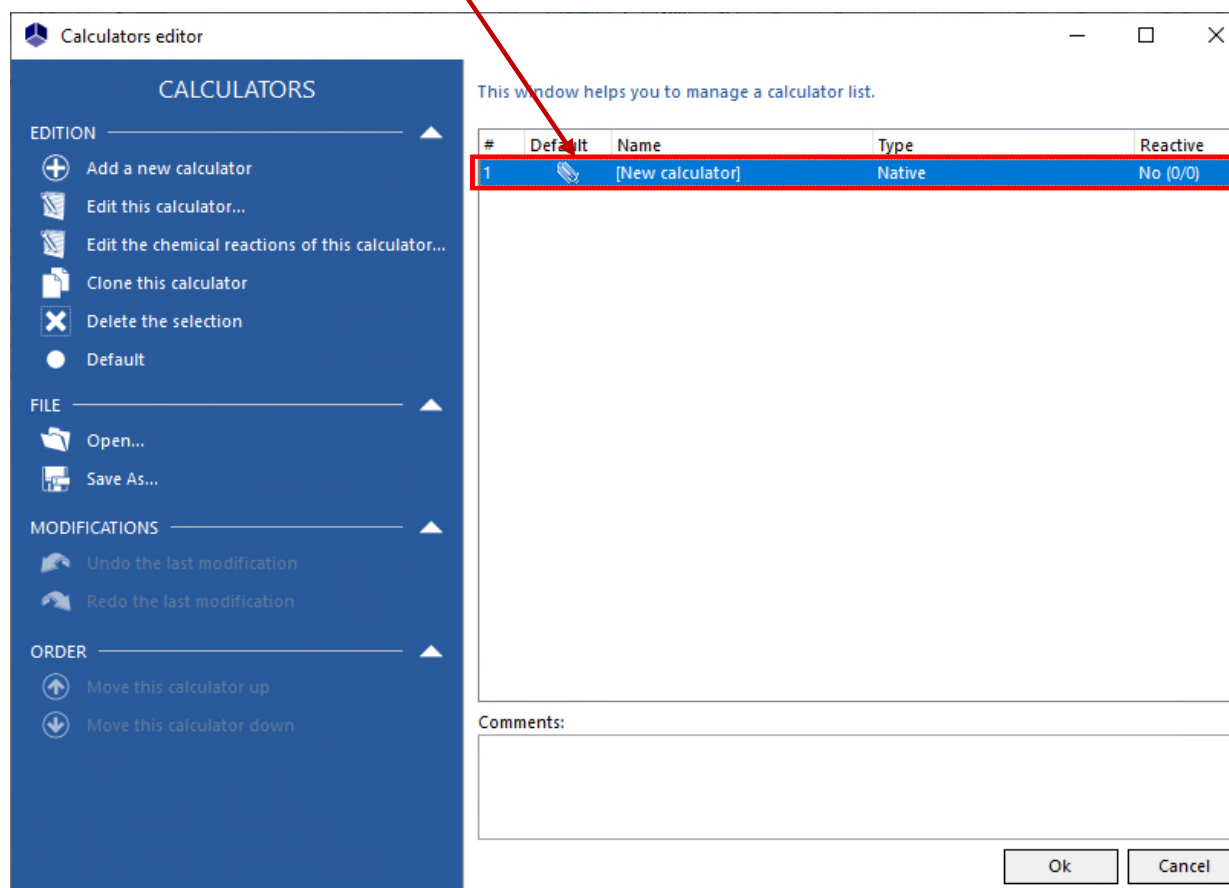


STEP #1: Select your components

Double click on the calculator to open its configuration window

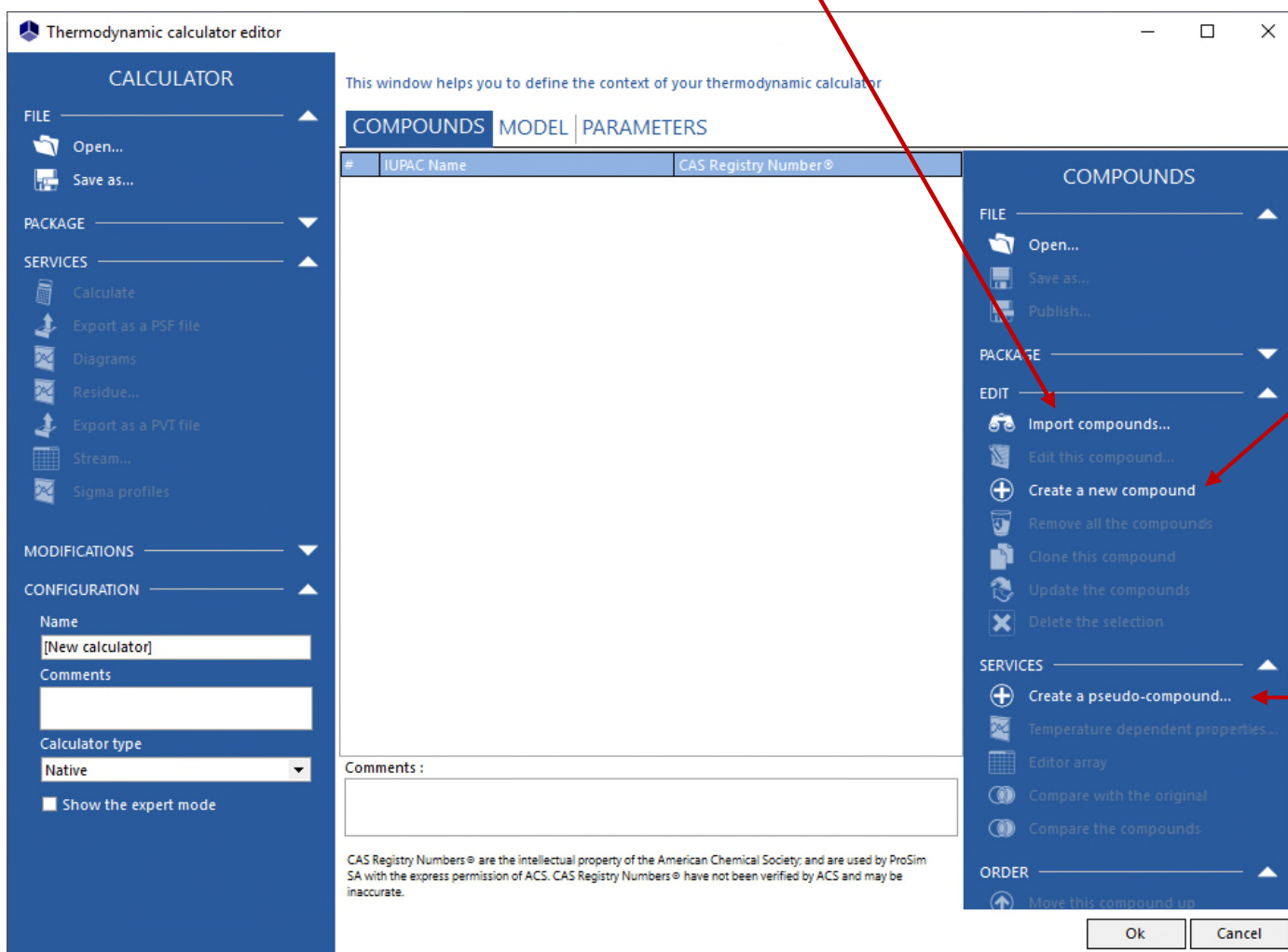


For more information about ProSimPlus thermodynamic package (called Simulis Thermodynamics), please consult « Getting Started with Simulis Thermodynamics » documents



STEP #1: Select your components

Click on “Select compounds” to import the compounds from the databases available on your computer



You can create your own compounds, by clicking on “Add a new compound”



You can create pseudo-compounds corresponding to a petroleum cut, by clicking on “Create a pseudo-compound”

STEP #1: Select your components

3. Click on the “Search” button to get the list of compounds that match your criteria

4. The search results are shown in this area

2. You have access to multiple search criteria (in this example, search “Nitrogen” by name)

1. Select the compounds server(s) (databases or packages) in which you want to search the compounds

Search results

COMPOUNDS

CRITERIA

Search

• Name or synonym
nitrogen

☒ Exact name

• CAS Registry Number®

• Chemical formula

• Specific ID

• Advanced

OPTIONS

☒ Clear previous results

New Help

SEARCH IN

☒ All servers

☐ Simulis® Compounds Files

☐ Simulis® SQLite Databases

☒ Common databases

☒ Standard 2021

☐ User databases

Name: NITROGEN
Location: Standard 2021 (Simulis® SQLite Databases\Common databases)
CAS Registry Number®: 7727-37-9
Specific ID: {B9212495-E88D-42B8-BB8F-1E6294BC71F0}

Search results Favorites History

#	IUPAC name (or compo...	Chemical form...	CAS Regi...	Molecular wei...	Bubble temper...	Chemical
1	NITROGEN	N2	7727-37-9	28,0134	77,3440	Elements

Selected compounds:

Name

CAS Registry Numbers® are the intellectual property of the American Chemical Society; and are used by ProSim SA with the express permission of ACS. CAS Registry Numbers® have not been verified by ACS and may be inaccurate.

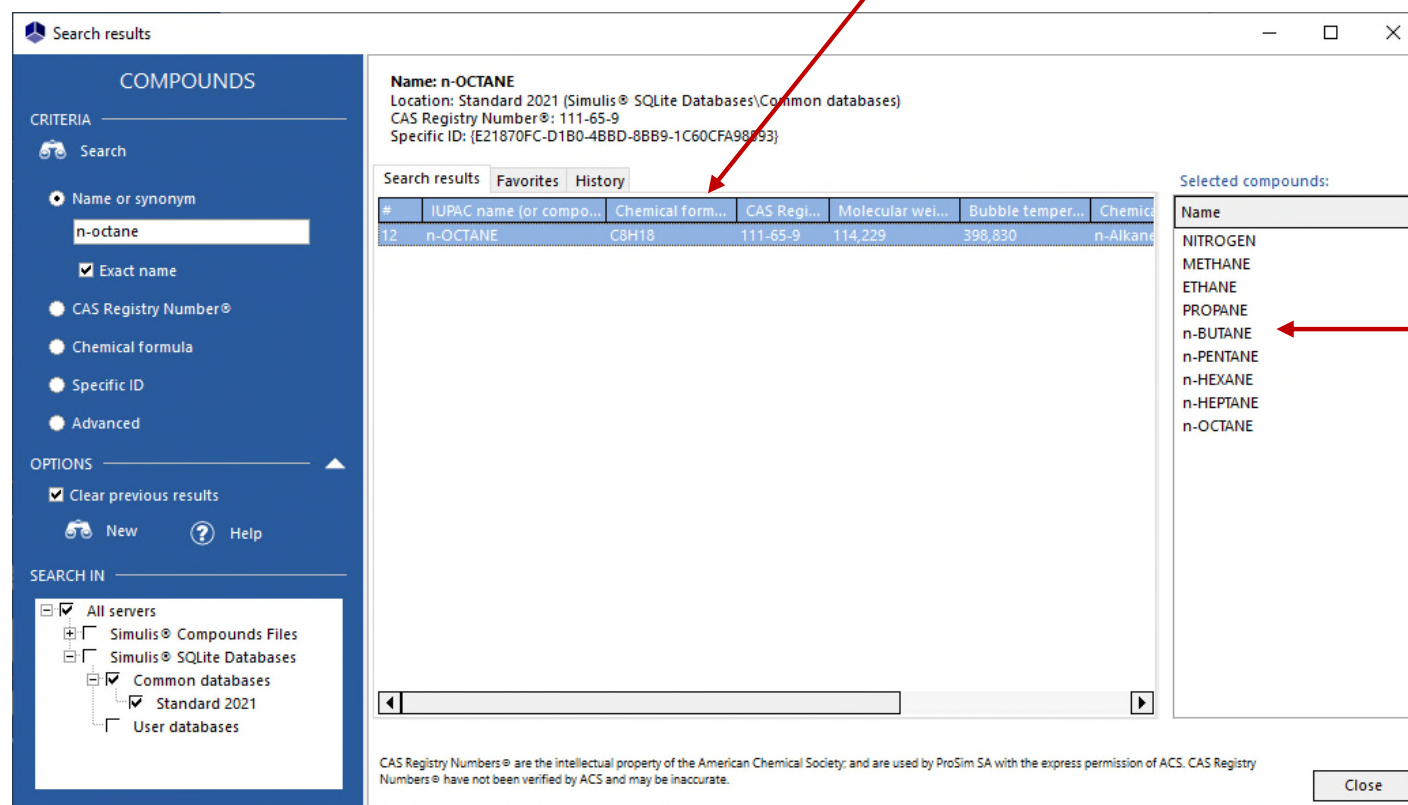
Close



You can run multiple searches without closing this window

STEP #1: Select your components

1. Double click to add the compound (Nitrogen) to your final selection



2. Repeat this operation for the other compounds (Methane, Ethane, Propane, n-Butane, n-Pentane, n-Hexane, n-Heptane, n-Octane)

3. Click on "Close" to end the compounds selection process

STEP #2: Select your thermodynamic model

1. Click on the “Model” tab to enter the thermodynamic models editor

The “Binaries” tab appears automatically when you select a model that requires binary interaction parameters

2. Select the Thermodynamic profile (in this example, SRK)

The screenshot shows the 'Thermodynamic calculator editor' window. The 'MODEL' tab is selected and highlighted with a red box. The window contains several sections:

- Left sidebar:** Contains 'CALCULATOR' (FILE, PACKAGE, SERVICES), 'MODIFICATIONS', and 'CONFIGURATION' sections.
- Top tabs:** 'COMPOUNDS', 'MODEL' (selected), 'BINARIES', and 'PARAMETERS'.
- Main area:**
 - Name:** Soave-Redlich-Kwong (SRK)
 - Category:** All the profiles
 - Profile:** Soave-Redlich-Kwong (SRK) (highlighted with a red box)
 - Approach type:** Using Equation of state
 - Equation of state:** RK Generalized
 - Alpha function:** Soave
 - Mixing rules:** Standard
 - Activity coefficient model:** Not defined
 - Pure liquid fugacity standard state:** Standard
 - Liquid molar volume:** Lee-Kesler-Plöcker (LKP)
 - Transport properties:** Ely-Hanley model (TRAPP method)
 - Enthalpy calculation:** $H^*=0$, ideal gas, 25°C, 1 atm
 - User-defined thermodynamic model:** None
 - Model index:** 1
 - Comments:** A text area for additional notes.
- Right sidebar:** 'THERMODYNAMIC MODEL' section with 'DOCUMENTATION' (Thermodynamic assistant, Thermodynamic help), 'ADDITIONAL PARAMETERS', 'MODEL INFORMATION', 'WATER-HYDROCARBON', and 'PURE WATER'.
- Bottom:** 'Ok' and 'Cancel' buttons.

3. You can adjust the thermodynamic profile if it is necessary

STEP #2: Select your thermodynamic model

1. Click on the “Binaries” tab to enter the binaries search window (if required by the model)

If binary interaction parameters are available, they are automatically loaded.

Thermodynamic calculator editor

Calculator

FILE

Open...

Save as...

PACKAGE

SERVICES

Calculate

Export as a PSF file

Diagrams

Residue...

Export as a PVT file

Stream...

Sigma profiles

MODIFICATIONS

CONFIGURATION

Name

[New calculator]

Comments

Calculator type

Native

Show the expert mode

This window helps you to define the context of your thermodynamic calculator

COMPOUNDS | MODEL | **BINARIES** | PARAMETERS

These parameters correspond to the general values and are used if the user has not provided specific parameters (buttons to the right of each option in the thermodynamic profile)

Binaries view: ☒ Grid ☐ Matrix

Formulation : $K_{ij} = K_{ij0} + K_{ijT} \cdot T$

Compound	Compound	Kij0	KijT
NITROGEN	METHANE	0,0278	0
NITROGEN	ETHANE	0,0407	0
NITROGEN	PROPANE	0,0763	0
NITROGEN	n-BUTANE	0,07	0
NITROGEN	n-PENTANE	0,0878	0
NITROGEN	n-HEXANE	0,1496	0
NITROGEN	n-HEPTANE	0,1422	0
NITROGEN	n-OCTANE	0	0
METHANE	ETHANE	-0,0078	0
METHANE	PROPANE	0,009	0
METHANE	n-BUTANE	0,0056	0
METHANE	n-PENTANE	0,019	0
METHANE	n-HEXANE	0,0374	0
METHANE	n-HEPTANE	0,0307	0
METHANE	n-OCTANE	0,0448	0
ETHANE	PROPANE	-0,0022	0
ETHANE	n-BUTANE	0,0067	0
ETHANE	n-PENTANE	0,0056	0
ETHANE	n-HEXANE	-0,0156	0
ETHANE	n-HEPTANE	0,0041	0

Not supplied Supplied Imported Estimated Error

Comments :

BINARIES

ACTIONS

Import binaries...

Clear all binaries...

Estimate binaries...

Save the binaries...

OPTIONS

Unit

parameters will be ignored

☒ parameters are automatically loaded

Ok Cancel

Possibility to inactivate the automatic loading of the binary interaction parameters

STEP #2: Select your thermodynamic model

Click on “Import binaries...” to search for the binary interaction parameters in the databases if some parameters are missing, the automatic loading is inactivated, etc.

Thermodynamic calculator editor

Calculator

FILE

- Open...
- Save as...

PACKAGE

SERVICES

- Calculate
- Export as a PSF file
- Diagrams
- Residue...
- Export as a PVT file
- Stream...
- Sigma profiles

MODIFICATIONS

CONFIGURATION

Name

[New calculator]

Comments

Calculator type

Native

Show the expert mode

This window helps you to define the context of your thermodynamic calculator

COMPOUNDS | MODEL | **BINARIES** | PARAMETERS

These parameters correspond to the general values and are used if the user has not provided specific parameters (buttons to the right of each option in the thermodynamic profile)

Binaries view: ☒ Grid ☐ Matrix

Formulation : $K_{ij} = K_{ij0} + K_{ijT} \cdot T$

Compound	Compound	Kij0	KijT
NITROGEN	METHANE		
NITROGEN	ETHANE		
NITROGEN	PROPANE		
NITROGEN	n-BUTANE		
NITROGEN	n-PENTANE		
NITROGEN	n-HEXANE		
NITROGEN	n-HEPTANE		
NITROGEN	n-OCTANE		
METHANE	ETHANE		
METHANE	PROPANE		
METHANE	n-BUTANE		
METHANE	n-PENTANE		
METHANE	n-HEXANE		
METHANE	n-HEPTANE		
METHANE	n-OCTANE		
ETHANE	PROPANE		
ETHANE	n-BUTANE		
ETHANE	n-PENTANE		
ETHANE	n-HEXANE		
ETHANE	n-HEPTANE		

Not supplied Supplied Imported Estimated Error

Comments :

BINARIES

ACTIONS

- Import binaries...
- Clear all binaries...
- Estimate binaries...
- Save the binaries...

OPTIONS

Unit

parameters will be ignored

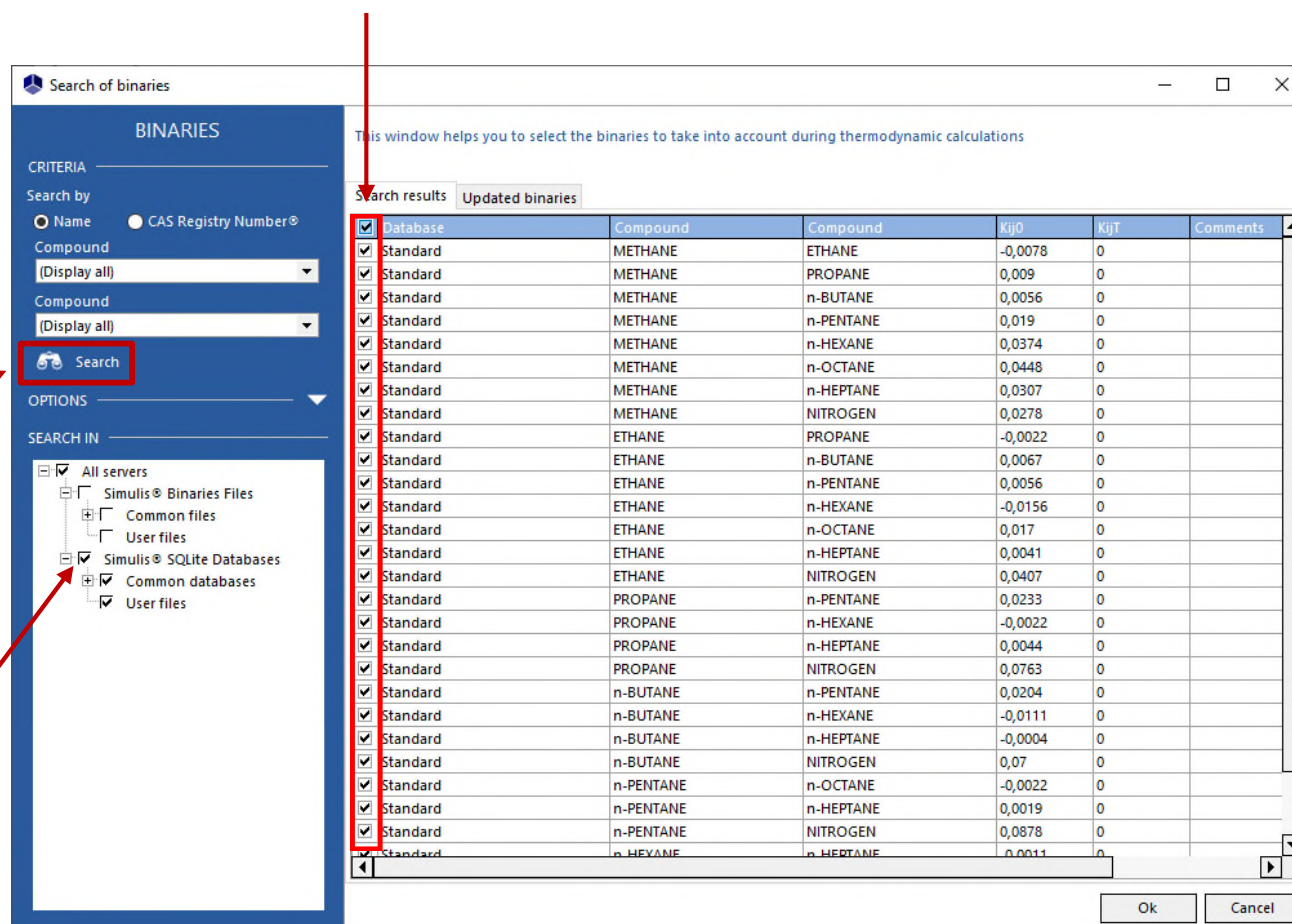
parameters are automatically loaded

Ok Cancel

STEP #2: Select your thermodynamic model

3. Select the binary interaction parameters to be used and click on “OK”

2. Select the compounds and click on “Search”



1. Select the binaries server(s) that you want to use for your research

STEP #2: Select your thermodynamic model

You can display the binaries as a grid or a matrix

Thermodynamic calculator editor

FILE
Open...
Save as...

PACKAGE

SERVICES
Calculate
Export as a PSF file
Diagrams
Residue...
Export as a PVT file
Stream...
Sigma profiles

MODIFICATIONS

CONFIGURATION
Name
[New calculator]
Comments
Calculator type
Native
Show the expert mode

COMPOUNDS | MODEL | **BINARIES** | PARAMETERS

This window helps you to define the context of your thermodynamic calculator

These parameters correspond to the general values and are used if the user has not provided specific parameters (buttons to the right of each option in the thermodynamic profile)

Binaries view: ☒ Grid ☐ Matrix

Formulation : $K_{ij} = K_{ij}^0 + K_{ij}^T \cdot T$

Compound	Compound	K_{ij}^0	K_{ij}^T
NITROGEN	METHANE	0,0278	0
NITROGEN	ETHANE	0,0407	0
NITROGEN	PROPANE	0,0763	0
NITROGEN	n-BUTANE	0,07	0
NITROGEN	n-PENTANE	0,0878	0
NITROGEN	n-HEXANE	0,1496	0
NITROGEN	n-HEPTANE	0,1422	0
NITROGEN	n-OCTANE	0	0
METHANE	ETHANE	-0,0078	0
METHANE	PROPANE	0,009	0
METHANE	n-BUTANE	0,0056	0
METHANE	n-PENTANE	0,019	0
METHANE	n-HEXANE	0,0374	0
METHANE	n-HEPTANE	0,0307	0
METHANE	n-OCTANE	0,0448	0
ETHANE	PROPANE	-0,0022	0
ETHANE	n-BUTANE	0,0067	0
ETHANE	n-PENTANE	0,0056	0
ETHANE	n-HEXANE	-0,0156	0
ETHANE	n-HEPTANE	0,0041	0

Not supplied Supplied Imported Estimated Error

Comments :

BINARIES

ACTIONS
Import binaries...
Clear all binaries...
Estimate binaries...
Save the binaries...

OPTIONS
Unit
parameters will be ignored
parameters are automatically loaded

Ok Cancel

Click on "OK" to validate

Your thermodynamic calculator is now defined:

- Components
- Thermodynamic model
- Binary interaction parameters (if necessary)

STEP #3: Create your flowsheet

1. Select the process inlet icon
(simple click)

2. Drop the icon in the flowsheet
(simple click)

3. Double click on the unit to describe it

Process feed (SALIM)

Name: FEED

Desc:

Identification Parameters Scripts Report Streams Notes Advanced parameters

Copy Paste

Flowrates and fractions Thermal state Options

Flowrate specification Partial molar flowrates

Partial molar flowrates

Unit kmo/h

#	Components	Molar flow rates
1	NITROGEN	9
2	METHANE	41.7
3	ETHANE	11.2
4	PROPANE	6.2
5	n-BUTANE	5.4
6	n-PENTANE	3
7	n-HEXANE	8.1
8	n-HEPTANE	13.3
9	n-OCTANE	2.1

Data link:

OK Cancel



At least one Process feed (inlet) and one Process outlet are necessary to run a simulation

For a process feed, parameters to be furnished:

- Flowrates and fractions
- Temperature
- Pressure

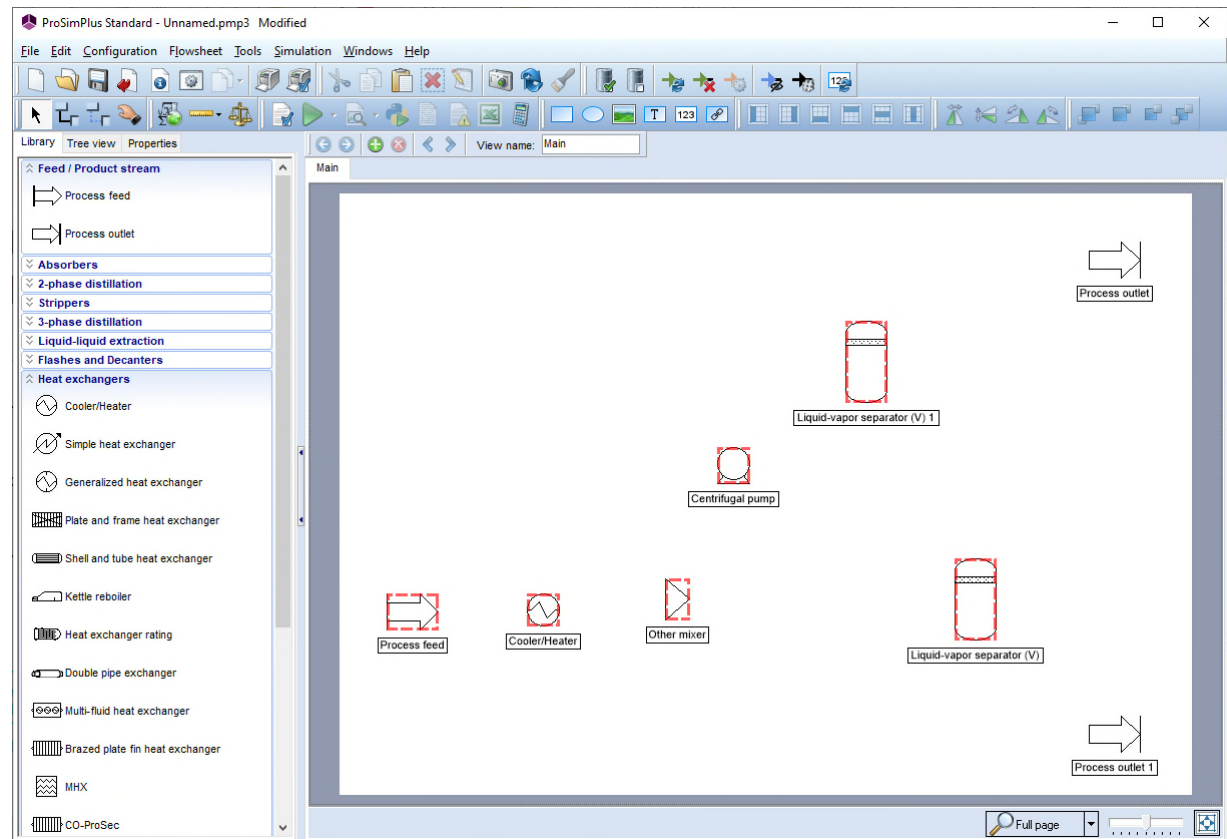
STEP #3: Create your flowsheet

Repeat the operation for all the modules:

1. Click to select a unit operation
2. Move the mouse on to the drawing sheet and reach the desired position
3. Click again, to release the unit. Operating parameters of the unit operation can be set at any time



A comprehensive set of features allows you to resize, rotate, reposition, align, etc. the element on the drawing area



STEP #3: Create your flowsheet

Configure each unit operation:

1. To configure a unit operation, double click on it or select “Edit” in the drop-down menu accessible by a right-click

The screenshot displays the ProSimPlus Standard interface. The main window shows a flowsheet with units: Process feed, Centrifugal pump, and two Liquid-vapor separator (V) units. A right-click context menu is open over the 'Cooler' unit, with the 'Edit...' option highlighted. A red arrow points from this menu to the 'Cooler/Heater (STCONS)' configuration dialog box.

The 'Cooler/Heater (STCONS)' dialog box is shown with the following details:

- Name:** E101
- Desc:**
- Identification** tab is active.
- Outlet temperature** dropdown menu is open, showing options:
 - Supplied by user
 - Equal to the feed stream temperature
 - Supplied by user (highlighted)
 - Equal to bubble point temperature
 - Equal to dew point temperature
- Utility** section:
 - ☐ Utility
 -
- Pressure drop:** 0 Pa
- Heat duty setpoint:** 0 W
- ☐ Display temperature as a function of heat duty
- Flash Type:** Flash (T - P)
- Number of points to be calculated:** 10
- Buttons:** OK, Cancel



Missing information or inconsistent parameters are signaled with red fields

STEP #3: Create your flowsheet

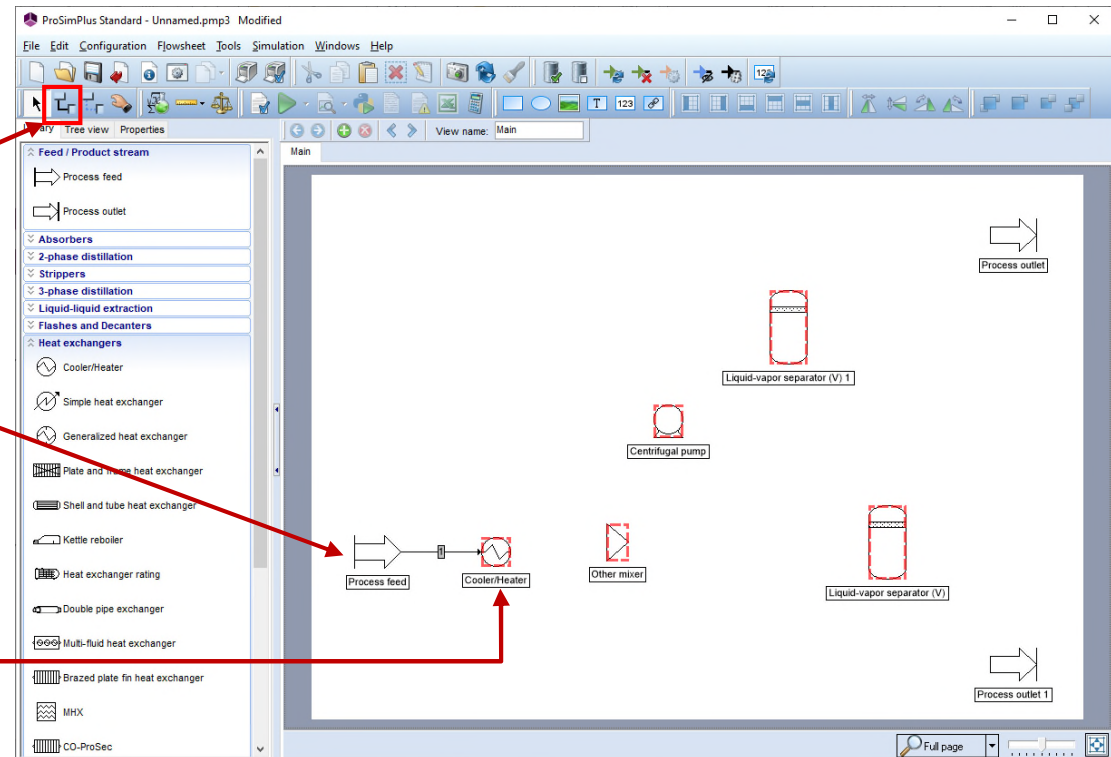
Connect the unit operations:

1. Select the “Material Stream” icon

2. Select the first unit operation (source) by clicking on it

3. Select the second unit operation (target) by clicking on it

4. Both unit operations are automatically connected



TIP : Press “shift” and click on the “Material stream” icon to connect successively several unit operations.

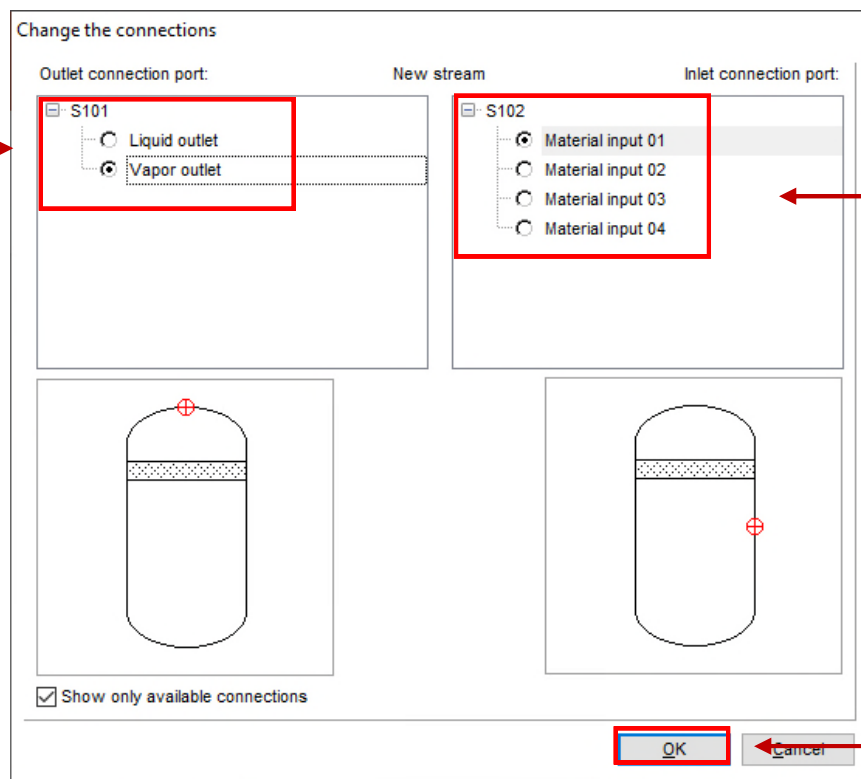


Material streams can be colored in order to ease the reading of the flowsheet. Right click on it to access this feature.

STEP #3: Create your flowsheet

When several connections are available, the following window appears allowing to select the right connection point:

1. Select the unit operation outlet



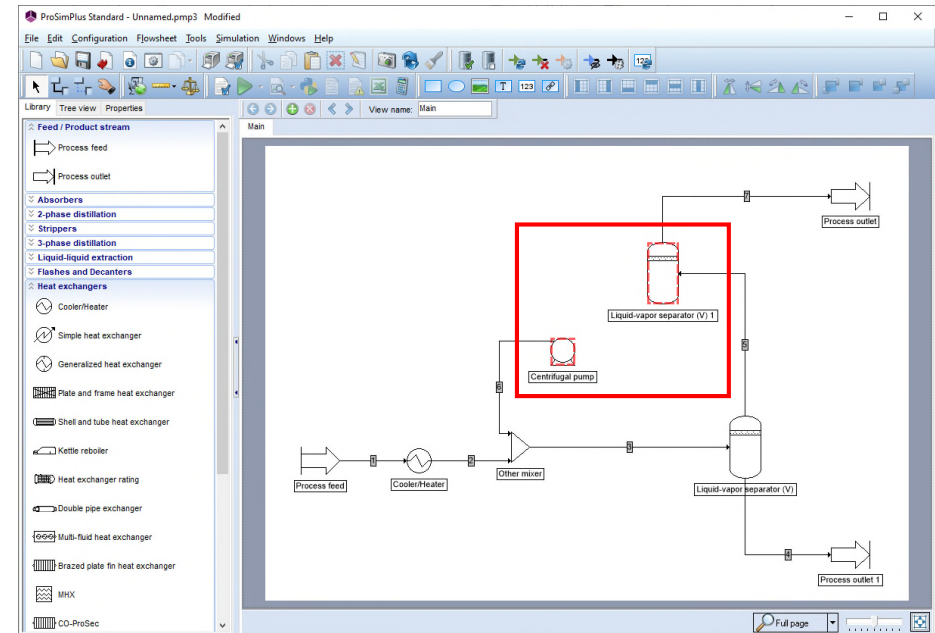
2. Select the unit operation inlet

3. Confirm by clicking on "OK"

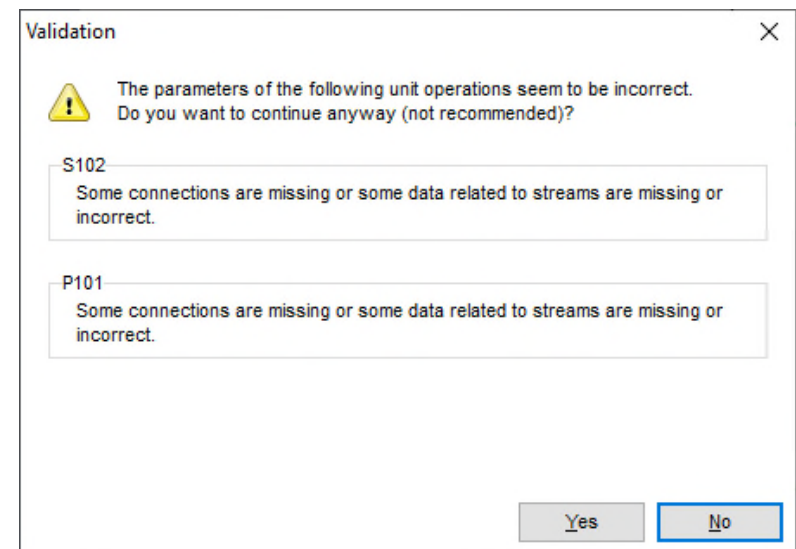
STEP #4: Run the simulation

Checking the flowsheet:

- At the flowsheet level, you can easily verify the consistency of your connections. If for a unit operation, a connection is missing it is identified with a red square. Placing your mouse on the unit operation will display a warning message



- If the simulation is run and an error is detected, a warning message will appear, with the name of the incorrect unit operation



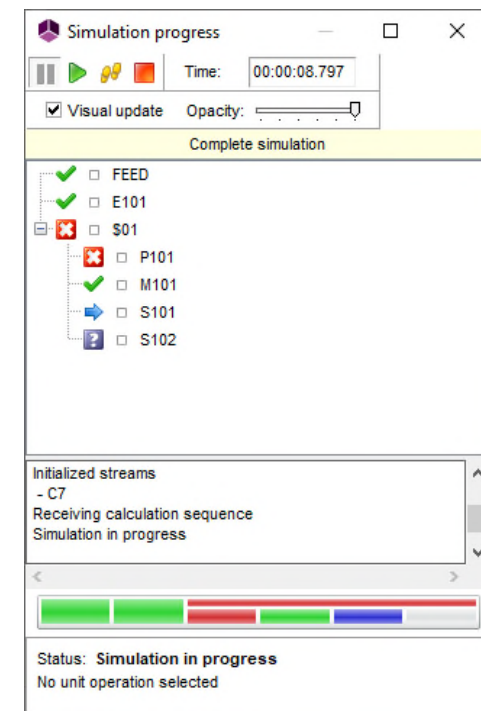
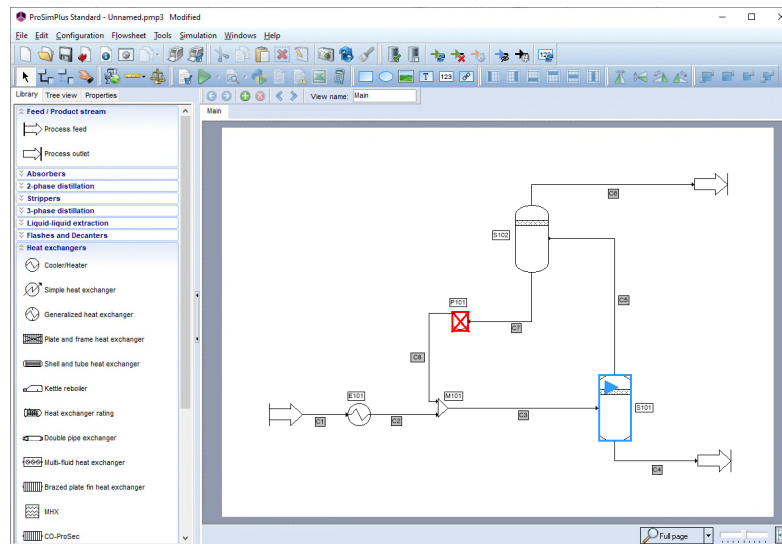
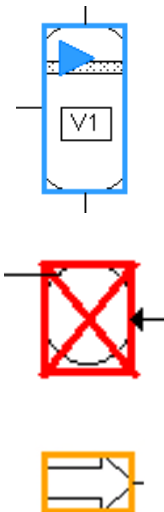
STEP #4: Run the simulation

Click on the green arrow or press “F9” to run the simulation



During the calculation, different symbols and indications will appear and disappear in the “Simulation progress” window and in the drawing area:

- ❓ A blue question mark indicates that the module has not been calculated yet
- ➡ A blue arrow indicates that calculation is in progress
- ✔ A green validation mark indicates that the module has been correctly calculated
- ✖ A red cross indicates a convergence error
- ⚠ A yellow frame indicates a warning on the module results

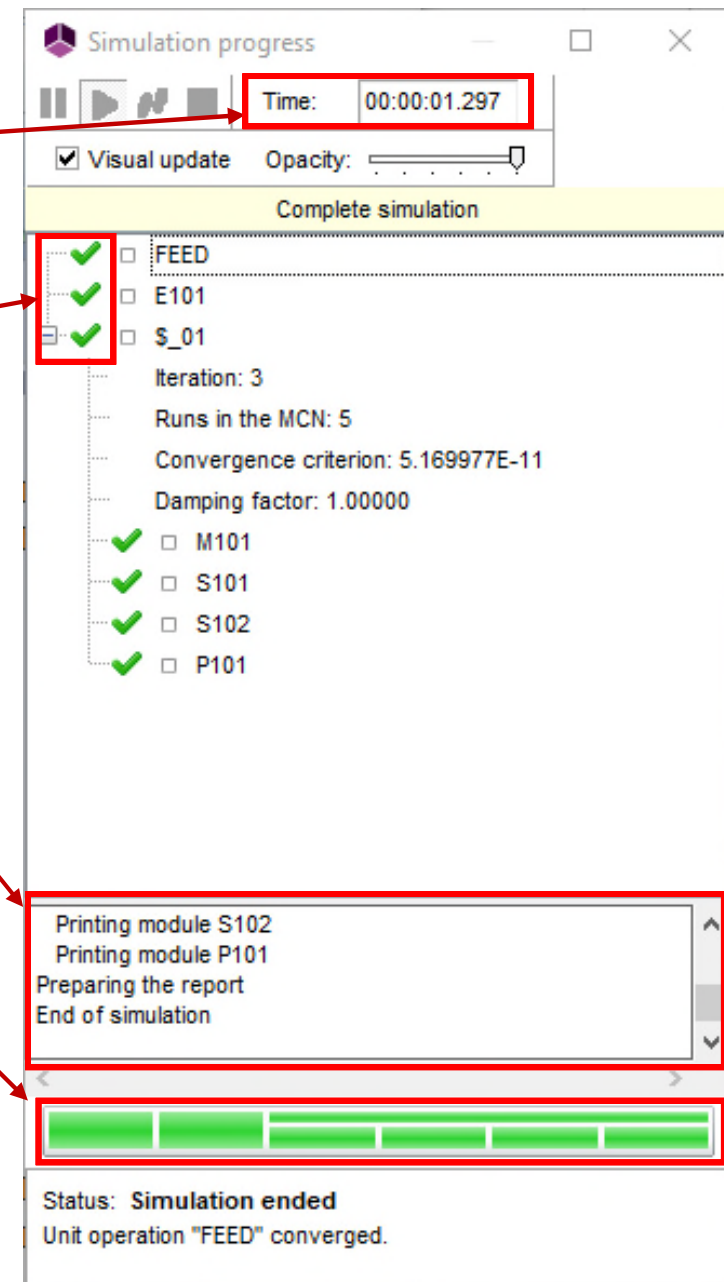


STEP #4: Run the simulation

Running the simulation:

- Simulation time
- If all modules go with a green validation, the simulation is successful
- Display of modules simulation progress, results prints (streams, modules, HCurves, TBP/ASTM curves...)
- Progress bars of the simulation

Closing the simulation progress window allows to access the simulation results



STEP #5: Simulation reports



An HTML report is automatically generated and gives you a convenient access to the results:

Calculation sequence

Thermodynamic models

Stream properties

Module results

ProSimPlus Simulation Report (V:\getting started prosim\prosimplus standard\en\PSPS_GS01_EN-Main-features-overview\PSPS_GS01_EN-Main-fe...

Table of content
Table of streams
Table of modules
Data file
Calculation sequence 1
Thermodynamic models
SRK
Process matrix
Calculation sequence 2
Simulation report
Streams
C1
C2
C3
C4
C5
C6
C7
C8
Equipments
(S_01)
E101
FEED
M101
P101
S101
S102
Equipments (grouped)
Elapsed times

Enthalpic flow ▾ -344535 kcal/h ▾ = -400,426 kW ▾

Units conversion

STREAM NAME: C3
DESCRIPTION:

THERMO. CALCULATOR: [SRK](#)
FROM: [M101](#)
TO: [S101](#)
PHASE: VAP/LIQ

COMPONENT	(kmol/h)	MOL-FR	(kg/h)	MAS-FR
1 NITROGEN	9.03223	8.824443E-02	253.023	5.724531E-02
2 METHANE	42.2660	0.412936	678.050	0.153406
3 ETHANE	11.9560	0.116809	359.505	8.133612E-02
4 PROPANE	6.75820	6.602723E-02	298.007	6.742257E-02
5 n-BUTANE	5.66450	5.534192E-02	329.233	7.448744E-02
6 n-PENTANE	3.06495	2.994440E-02	221.132	5.003011E-02
7 n-HEXANE	8.16432	7.976500E-02	703.563	0.159178
8 n-HEPTANE	13.3455	0.130384	1337.24	0.302544
9 n-OCTANE	2.10308	2.054609E-02	240.232	5.435125E-02
TOTAL	102.355		4419.99	
TOTAL VOLUME FLOWRATE			16.6291	(m3/h)
VAPOR FRACTION		0.373095		0.179958
LIQUID FRACTION		0.626905		0.820042
TEMPERATURE	13.4908	(°C)		
PRESSURE	75.0000	(atm)		
ENTHALPY	-344535.	(kcal/h)		
ENTROPY	-1348.13	(kcal/h/K)		
MOLECULAR WEIGHT	43.1830	(g/mol)		

VAPOR PHASE OF STREAM C3

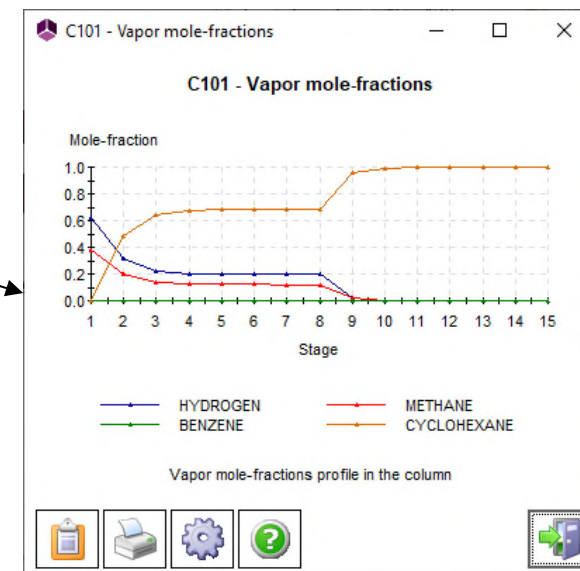
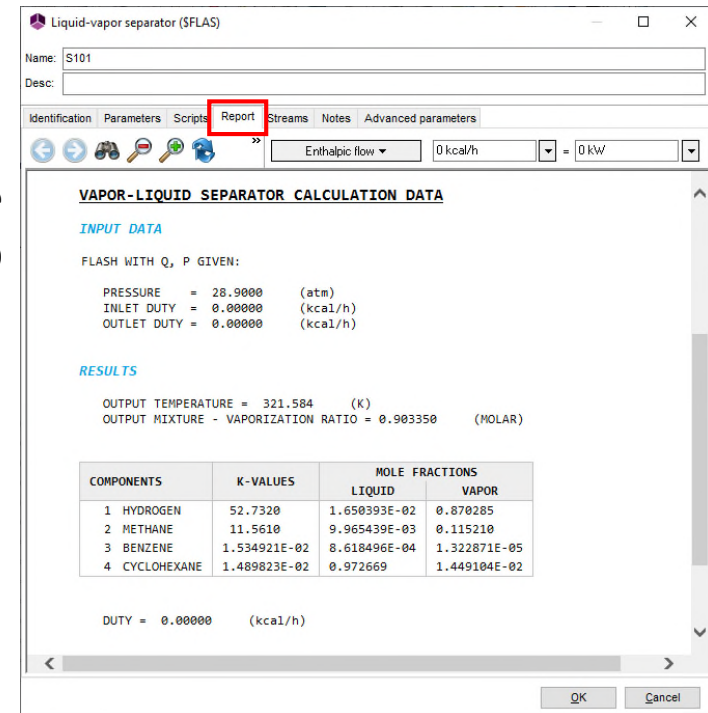
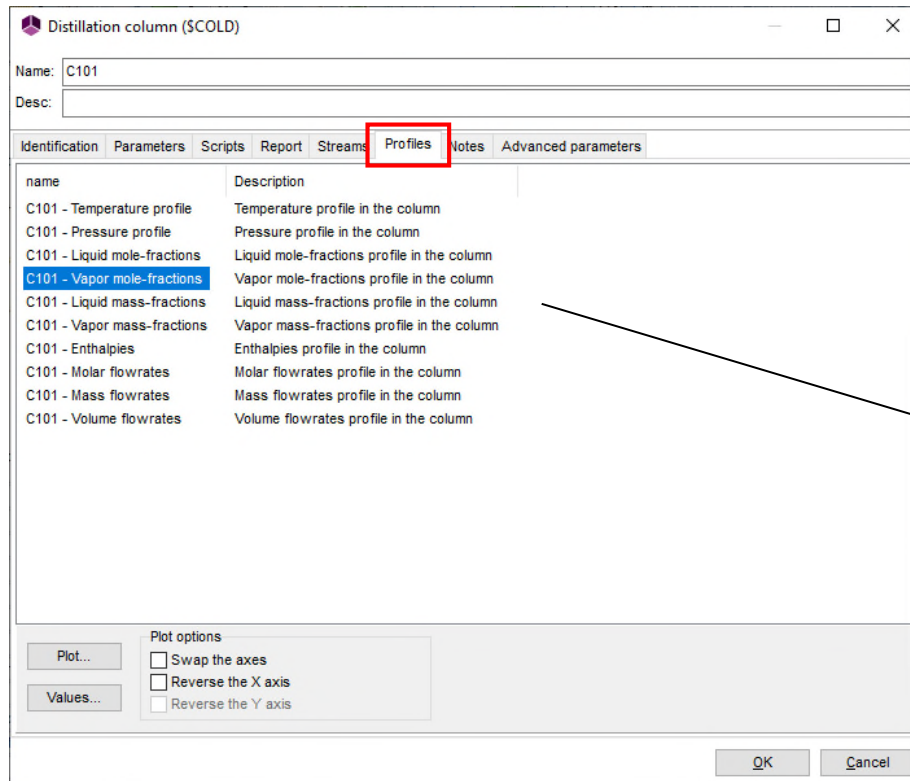
COMPONENT	(kmol/h)	MOL-FR	(kg/h)	MAS-FR
-----------	----------	--------	--------	--------

ProSim

STEP #5: Simulation reports

Unit operations

- You can double-click on any module of the flowsheet, and then click on the “Report” tab to access the results for this specific module.
- For some modules (columns for example), a “Profiles” tab is also available.



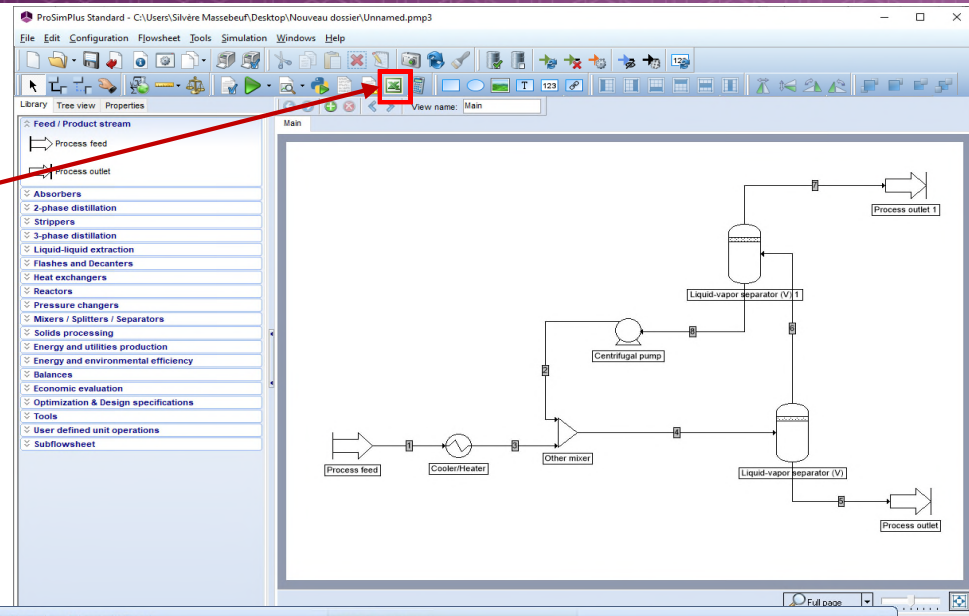
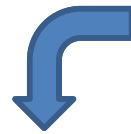
STEP #5: Simulation reports

1. Click on the “Excel file” icon to open the Excel report

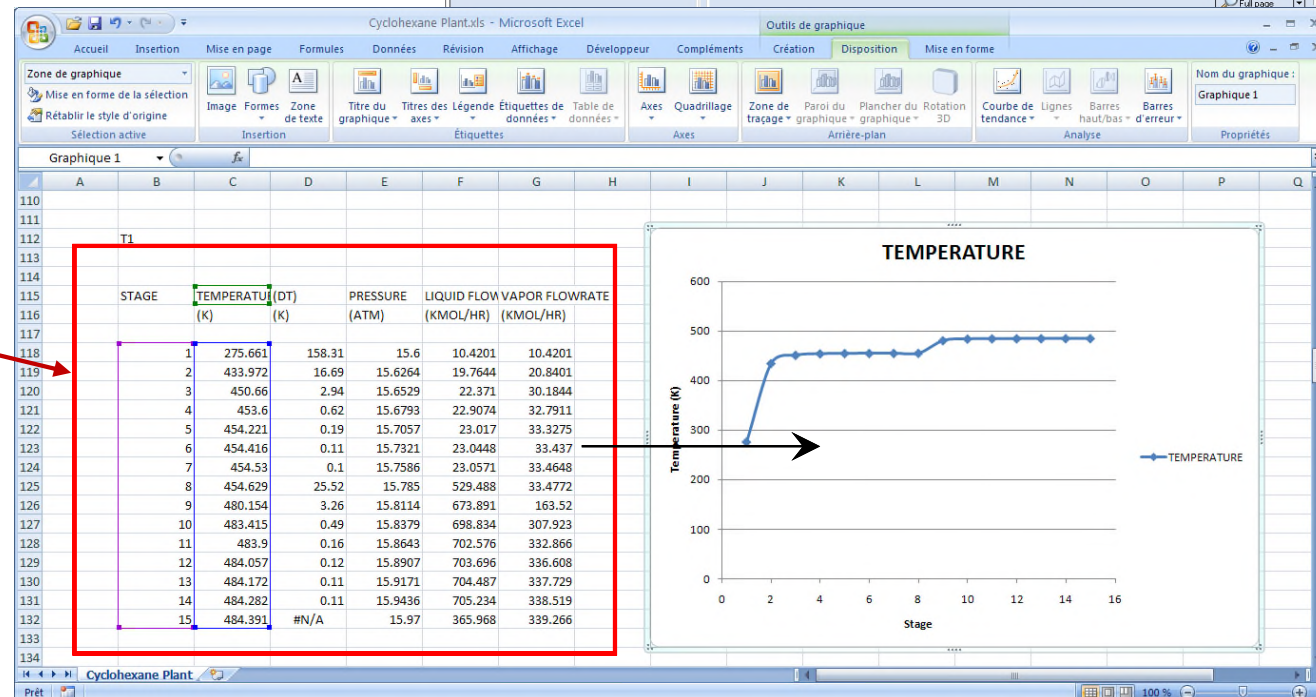


Excel file (csv format)

- Balances on process streams
- Equipment profiles
- Etc...



2. Recover the results in order to exploit them in Excel



STEP #5: Simulation reports

1. Click on the “History file” icon



History file

- List of calculations
- List of encountered errors

2. For each module, display of the possible errors or warning messages

ProSimPlus Standard - C:\Users\Silvère Massebeuf\Desktop\Nouveau dossier\Unnamed.pmp3

File Edit Configuration Flowsheet Tools Simulation Windows Help

Library Tree view Properties

Process feed
Process outlet

Product stream

Absorbers
2-phase distillation
Strippers
3-phase distillation
Liquid-liquid extraction
Flashes and Decanters
Heat exchangers
Reactors
Pressure changers
Mixers / Splitters / Separators
Solids processing
Energy and utilities production
Energy and environmental efficiency
Balances
Economic evaluation
Optimization & Design specifications
Tools

View name: Main

Process outlet 1

Liquid-vapor separator (V1)

Centrifugal pump

ProSimPlus Standard - C:\Users\Silvère Massebeuf\Documents\ProSim\Examples\ProSimPlus Standard\en\psps...

File Edit Search Options

EXECUTING

```
> EQUIPMENT FEED OF TYPE Process feed
> EQUIPMENT E101 OF TYPE Cooler/Heater
> EQUIPMENT Constraints and r... OF TYPE Constraints and recycles
> EQUIPMENT P101 OF TYPE Centrifugal pump
  ZERO INPUT FLOW: CALCULATION NOT RUN
> EQUIPMENT M101 OF TYPE Other mixer
> EQUIPMENT S101 OF TYPE Liquid-vapor separator
> EQUIPMENT S102 OF TYPE Liquid-vapor separator
> EQUIPMENT Constraints and r... OF TYPE Constraints and recycles
> EQUIPMENT P101 OF TYPE Centrifugal pump
> EQUIPMENT M101 OF TYPE Other mixer
> EQUIPMENT S101 OF TYPE Liquid-vapor separator
> EQUIPMENT S102 OF TYPE Liquid-vapor separator
> EQUIPMENT Constraints and r... OF TYPE Constraints and recycles
```

ITERATION : 0 RUN IN THE M.C.N : 2
CRITERION= 2.194778E-02 DAMPING FACTOR= 1.00000

MAX DEVIATIONS:

```
- PARTIAL FLOWRATE OF 'ETHANE' IN STREAM 'C7', 3.06163E-02 (kmol/h)
- TEMPERATURE OF STREAM 'C7', 0.0000 (K)
```

> EQUIPMENT P101 OF TYPE Centrifugal pump
> EQUIPMENT M101 OF TYPE Other mixer
> EQUIPMENT S101 OF TYPE Liquid-vapor separator
> EQUIPMENT S102 OF TYPE Liquid-vapor separator
> EQUIPMENT Constraints and r... OF TYPE Constraints and recycles


ITERATION : 1 RUN IN THE M.C.N : 3
CRITERION= 4.839137E-05 DAMPING FACTOR= 1.00000

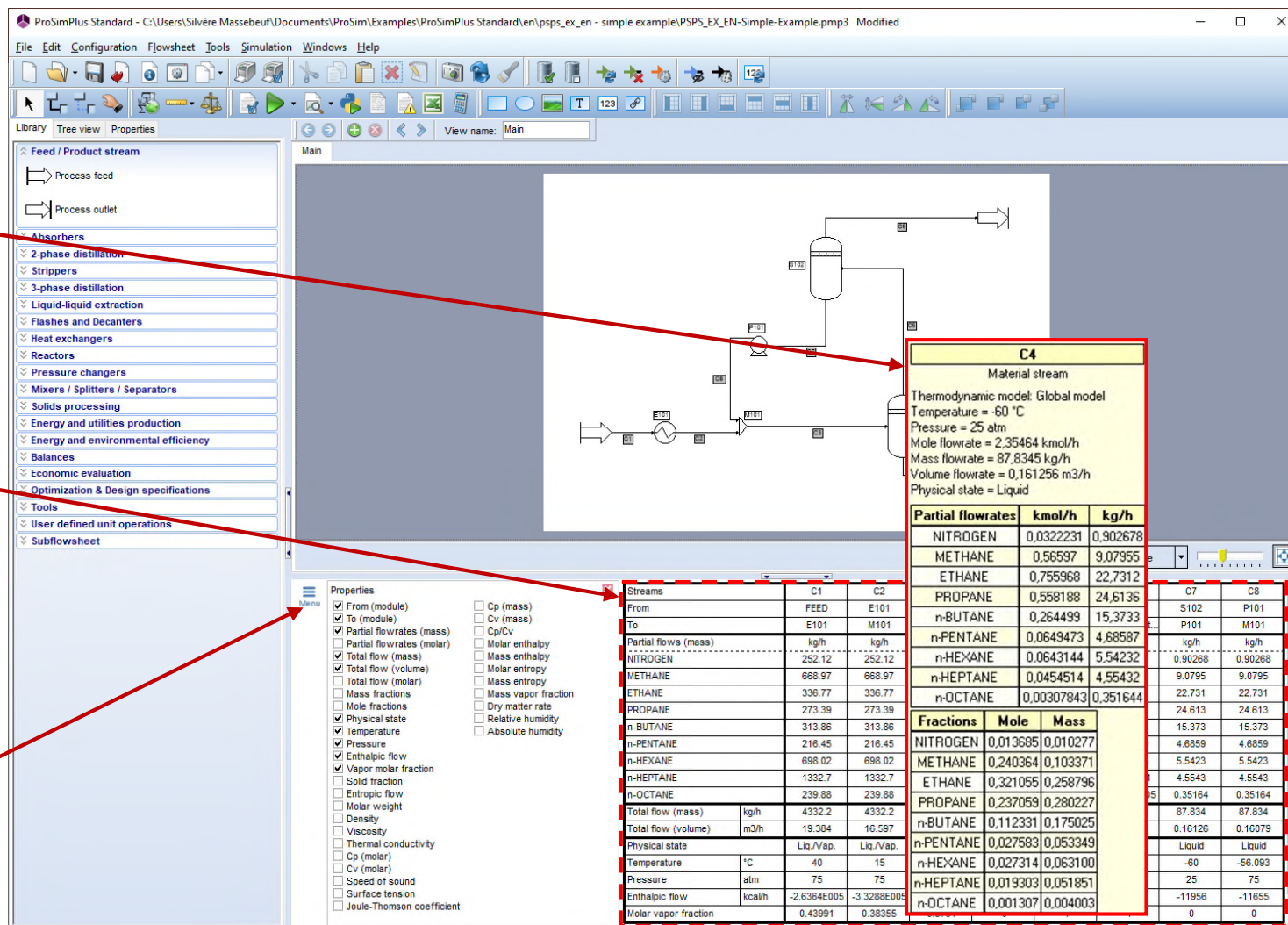
STEP #6: Results analysis

You can analyze the results directly from the flowsheet

Hints: move the cursor over a stream to display its properties

Streams summary:
Summary of streams properties

Click on  to configure the streams properties for the display and the export in MS-Excel



The screenshot displays the ProSimPlus Standard software interface. The main window shows a process flowsheet with various units and streams. A red arrow points from the 'Hints' text to a stream in the flowsheet. Another red arrow points from the 'Streams summary' text to the 'Streams' table. A third red arrow points from the 'Click on Menu' text to the 'Menu' icon in the bottom left corner.

Stream C4 Properties:

Material stream
Thermodynamic model: Global model
Temperature = -60 °C
Pressure = 25 atm
Mole flowrate = 2,35464 kmol/h
Mass flowrate = 87,8345 kg/h
Volume flowrate = 0,161256 m3/h
Physical state = Liquid

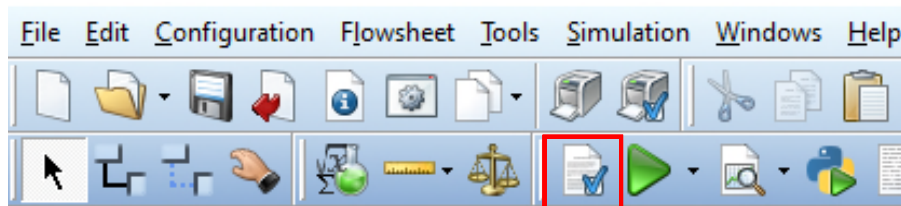
Partial flowrates	kmol/h	kg/h
NITROGEN	0,0322231	0,902678
METHANE	0,56597	9,07955
ETHANE	0,755968	22,7312
PROPANE	0,558188	24,6136
n-BUTANE	0,264499	15,3733
n-PENTANE	0,0649473	4,68587
n-HEXANE	0,0643144	5,54232
n-HEPTANE	0,0454514	4,55432
n-OCTANE	0,00307843	0,351644

Fractions	Mole	Mass
NITROGEN	0,013685	0,010277
METHANE	0,240364	0,103371
ETHANE	0,321055	0,258796
PROPANE	0,237059	0,280227
n-BUTANE	0,112331	0,175025
n-PENTANE	0,027583	0,053349
n-HEXANE	0,027314	0,063100
n-HEPTANE	0,019303	0,051851
n-OCTANE	0,001307	0,004003

Streams	C1	C2
From	FEED	E101
To	E101	M101
Partial flows (mass)	kg/h	kg/h
NITROGEN	252,12	252,12
METHANE	668,97	668,97
ETHANE	336,77	336,77
PROPANE	273,39	273,39
n-BUTANE	313,86	313,86
n-PENTANE	216,45	216,45
n-HEXANE	698,02	698,02
n-HEPTANE	1332,7	1332,7
n-OCTANE	239,88	239,88
Total flow (mass)	kg/h	4332,2
Total flow (volume)	m3/h	19,384
Physical state	Liq/Vap.	Liq/Vap.
Temperature	°C	40
Pressure	atm	75
Enthalpic flow	kcal/h	-2,6364E005
Molar vapor fraction		0,38355

STEP #6: Results analysis

Streams summary: Displaying physical properties



“Streams” tab

Report parameters

Equipment **Streams** Data TBP/ASTM Curves Others

Printed streams

☐ None

☐ Selection

☒ All

Print true species ☐

Restricted to calculator's compounds ☐

Print format

☐ Standard

☐ Medium

☒ Extended

Deselect all Select all

OK Cancel

By default, all the physical properties are calculated

Streams		C1	C2	C3	C4	C5	C6	C7	C8
From		FEED	E101	M101	S101	S101	S102	S102	P101
To		E101	M101	S101	Process out...	S102	Process out...	P101	M101
Total flow (mass)	kg/h	4332.2	4332.2	4420	3622.6	797.37	709.54	87.835	87.835
Total flow (volume)	m3/h	19.384	16.597	16.629	6.4803	10.211	21.561	0.16126	0.16079
Physical state		Liq./Vap.	Liq./Vap.	Liq./Vap.	Liquid	Vapor	Vapor	Liquid	Liquid
Temperature	°C	40	15	13.491	13.451	13.451	-60	-60	-56.093
Pressure	atm	75	75	75	74.7	74.7	25	25	75
Enthalpic flow	kcal/h	-2.6364E005	-3.3288E005	-3.4453E005	-3.2579E005	-18746	-32320	-11956	-11655
Molar vapor fraction		0.43991	0.38355	0.37309	0	1	1	0	0
Density	kg/m3	223.49	261.02	265.8	559.02	78.087	32.908	544.69	546.26
Viscosity	Pa.s	(*)	(*)	(*)	0.00019512	1.4091E-005	9.6913E-006	0.00017653	0.00017764
Thermal conductivity	W/m/K	(*)	(*)	(*)	0.12498	0.039226	0.026939	0.14875	0.1497
Cp (mass)	J/kg/K	(*)	(*)	(*)	2371.2	2432.3	2118.2	2449.9	2414.9

(*): Indicates a missing or undefined value.
Set the print format option to Extended to calculate more properties.

Physico-chemical properties are printed in the grid only for monophasic streams liquid or vapor

Physico-chemical properties for di- or triphasic streams are available in the report

Print format “Standard” or “Medium”:

Streams		C1	C2	C3	C4	C5	C6	C7	C8
From		FEED	E101	M101	S101	S101	S102	S102	P101
To		E101	M101	S101	Process out...	S102	Process out...	P101	M101
Total flow (mass)	kg/h	4332.2	4332.2	4420	3622.6	797.37	709.54	87.835	87.835
Total flow (volume)	m3/h								
Physical state		Liq./Vap.	Liq./Vap.	Liq./Vap.	Liquid	Vapor	Vapor	Liquid	Liquid
Temperature	°C	40	15	13.491	13.451	13.451	-60	-60	-56.093
Pressure	atm	75	75	75	74.7	74.7	25	25	75
Enthalpic flow	kcal/h	-2.6364E005	-3.3288E005	-3.4453E005	-3.2579E005	-18746	-32320	-11956	-11655
Molar vapor fraction		0.43991	0.38355	0.37309	0	1	1	0	0
Density	kg/m3	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Viscosity	Pa.s	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Thermal conductivity	W/m/K	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Cp (mass)	J/kg/K	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)

(*): Indicates a missing or undefined value.
Set the print format option to Extended to calculate more properties.

STEP #6: Results analysis

Add a tag (label, process value or simulation result)

123

1. Click on the “tag” icon and drop it on the flowsheet

2. Double-click on the “tag” object to open its configuration window

3. Select the object and parameter to display

4. You can add text

In this example, the pressure value of the “C5” stream will be displayed

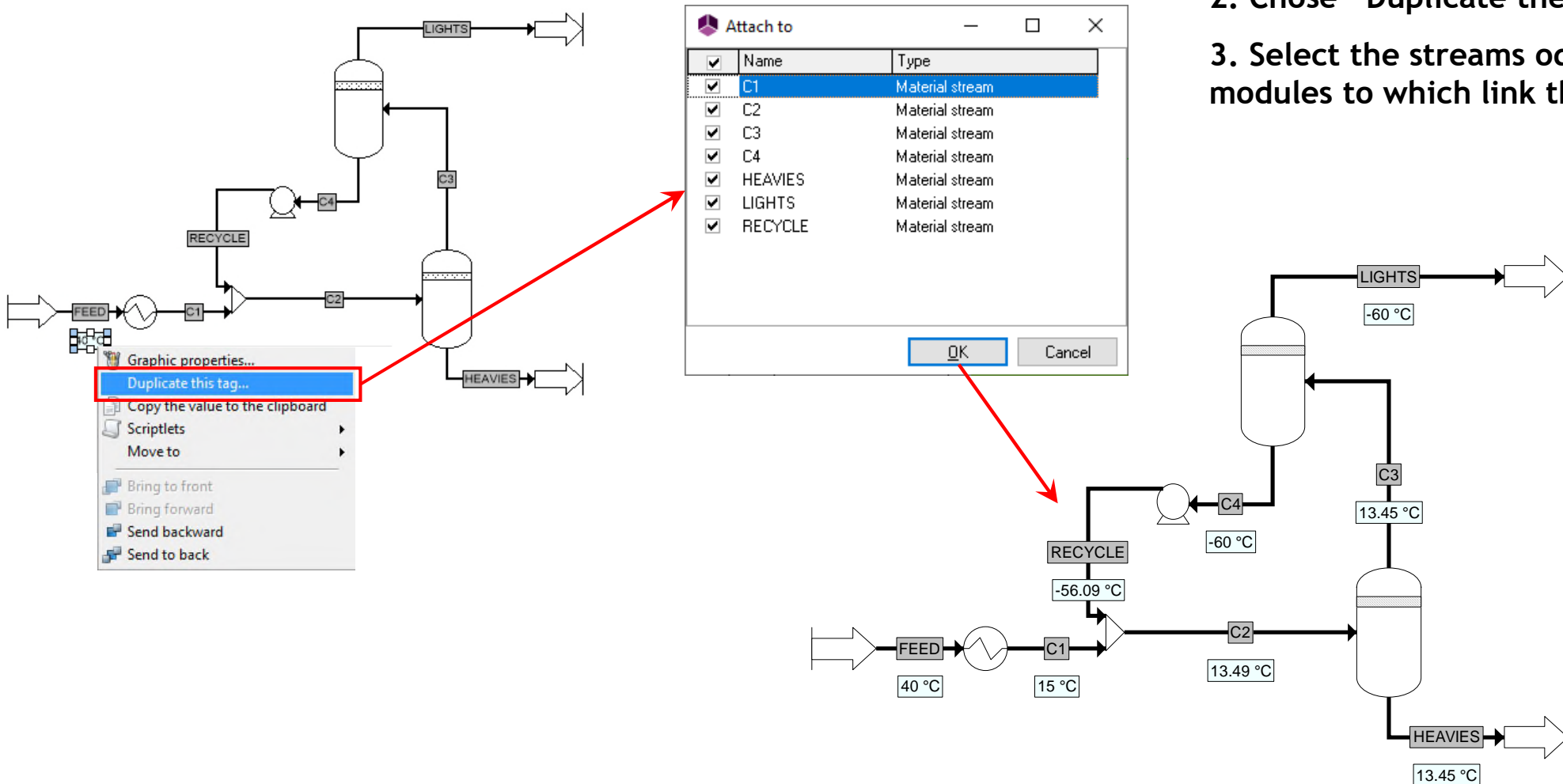
The screenshot displays the ProSim S.A. software interface. On the left is a library of process units. The main workspace shows a flowsheet with a pump and streams labeled C1, C2, and C5. A 'Tag' configuration window is open, showing the 'Value' tab. In this window, 'Material stream' is selected as the data source, and 'C5' is chosen from the source list. 'Pressure' is selected as the parameter to display. The formula is set to 'Pressure', and the starting text is 'P ='. The preview shows the resulting text 'P = 74,7 atm'.

STEP #6: Results analysis

Duplicate a tag for a stream or a module property



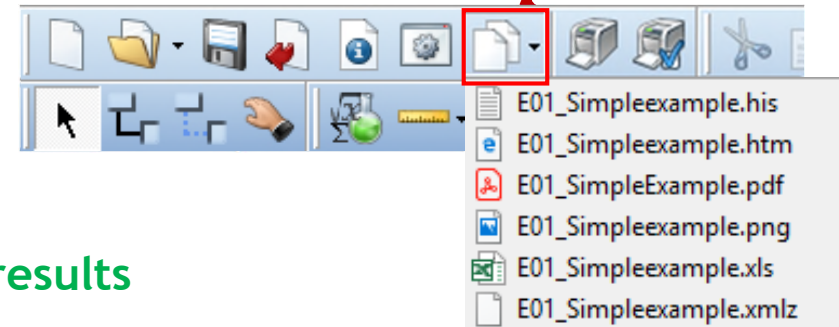
1. Right click on the “tag”
2. Chose “Duplicate the tag”
3. Select the streams od the modules to which link this tag



STEP #6: Results analysis

List of files that are generated in the same directory as the simulation file

- ***.pmp3** : ProSimPlus3 simulation file
- ***.his** : history file
- ***.htm** : html file of the simulation results
- ***.xls** : MS-Excel file of the simulation results
- ***.xmlz** : results file corresponding to the summary grid
- ***.don** : data file with the generated keywords
- ***.sim** : data file with the generated keywords in restart mode
- ***.tem** : temporary file which manages the restart mode
- ***.views** : file which manages the graphical interface (flowsheet printing)
- ...
- ***.~**: backup copy of all the previous files



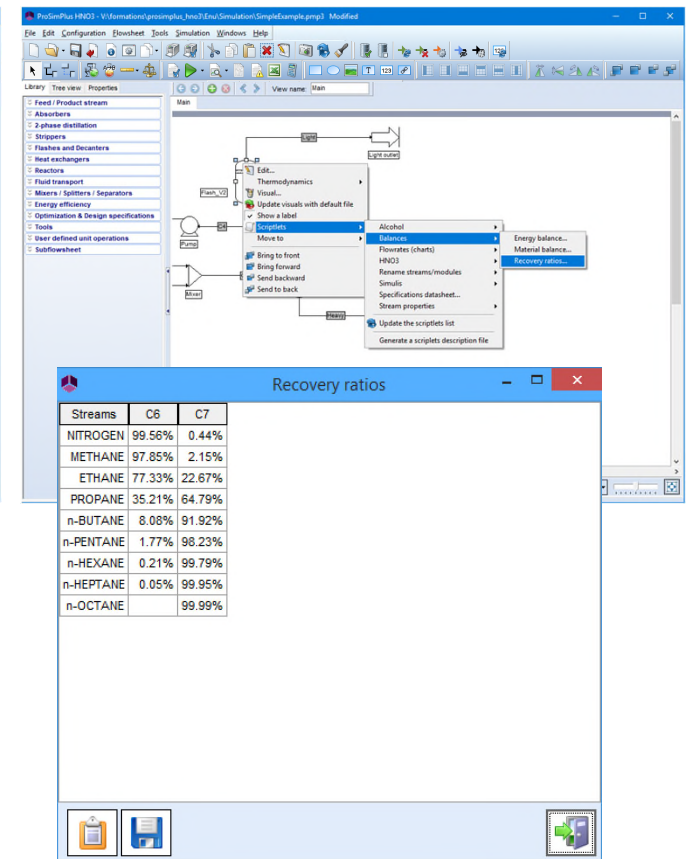
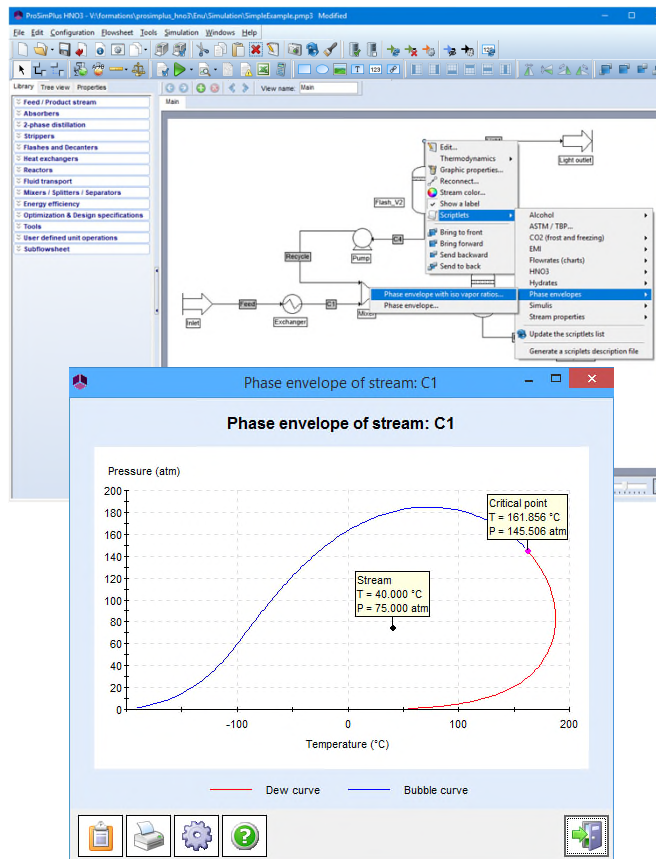
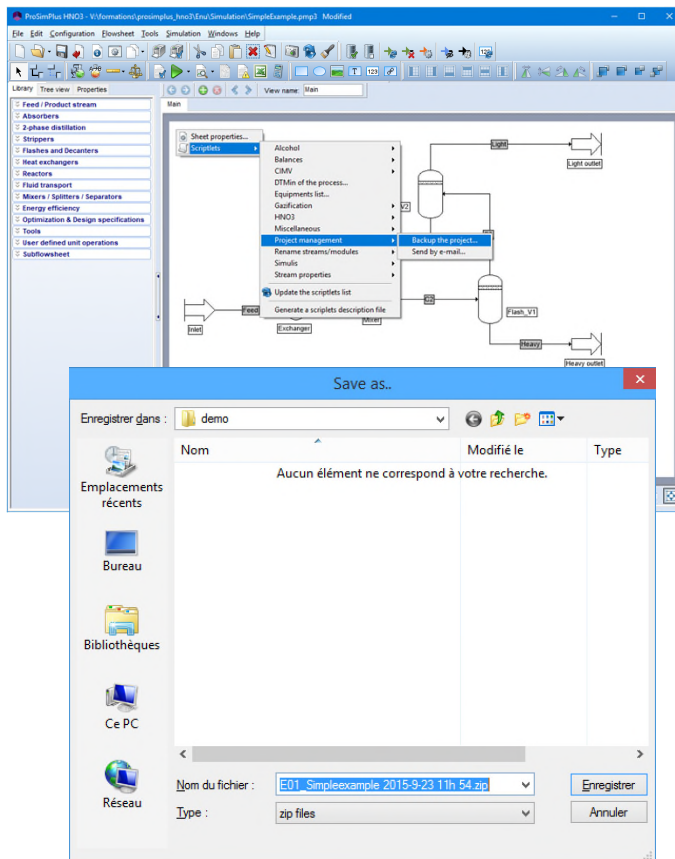
STEP #6: Results analysis

“Scriptlets”: right click on an object (project, stream, module, set of modules) to access specific scriptlets dedicated to results analysis

Project: Backup the project,
Send by email, Material
balance, Alcohol properties,
Stream color and thickness...

Stream: Properties,
Calculation service,
Combustion, Graphs,
Phase envelope...

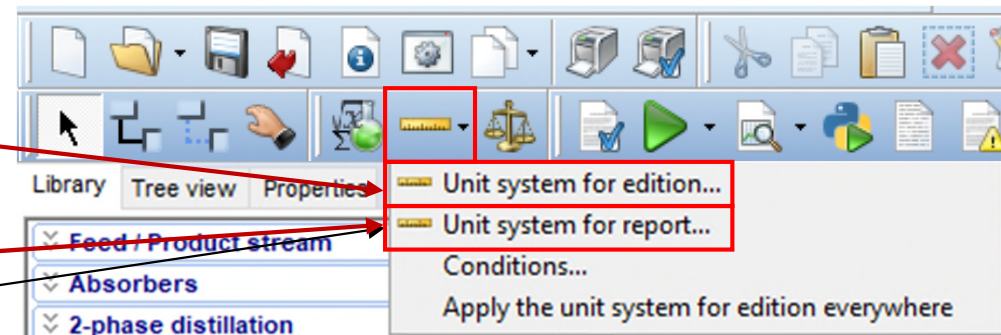
Module(s): Material balance,
Recovery ratio, Graphs,
Specification data sheet
(Columns, heat exchanger...),
Columns export...



STEP #7: Graphical User Interface

1. Click here to access the unit system used for input data (unit operations, streams...)

2. Click here to access the unit system used in the simulation reports (report, summary, hint,...)

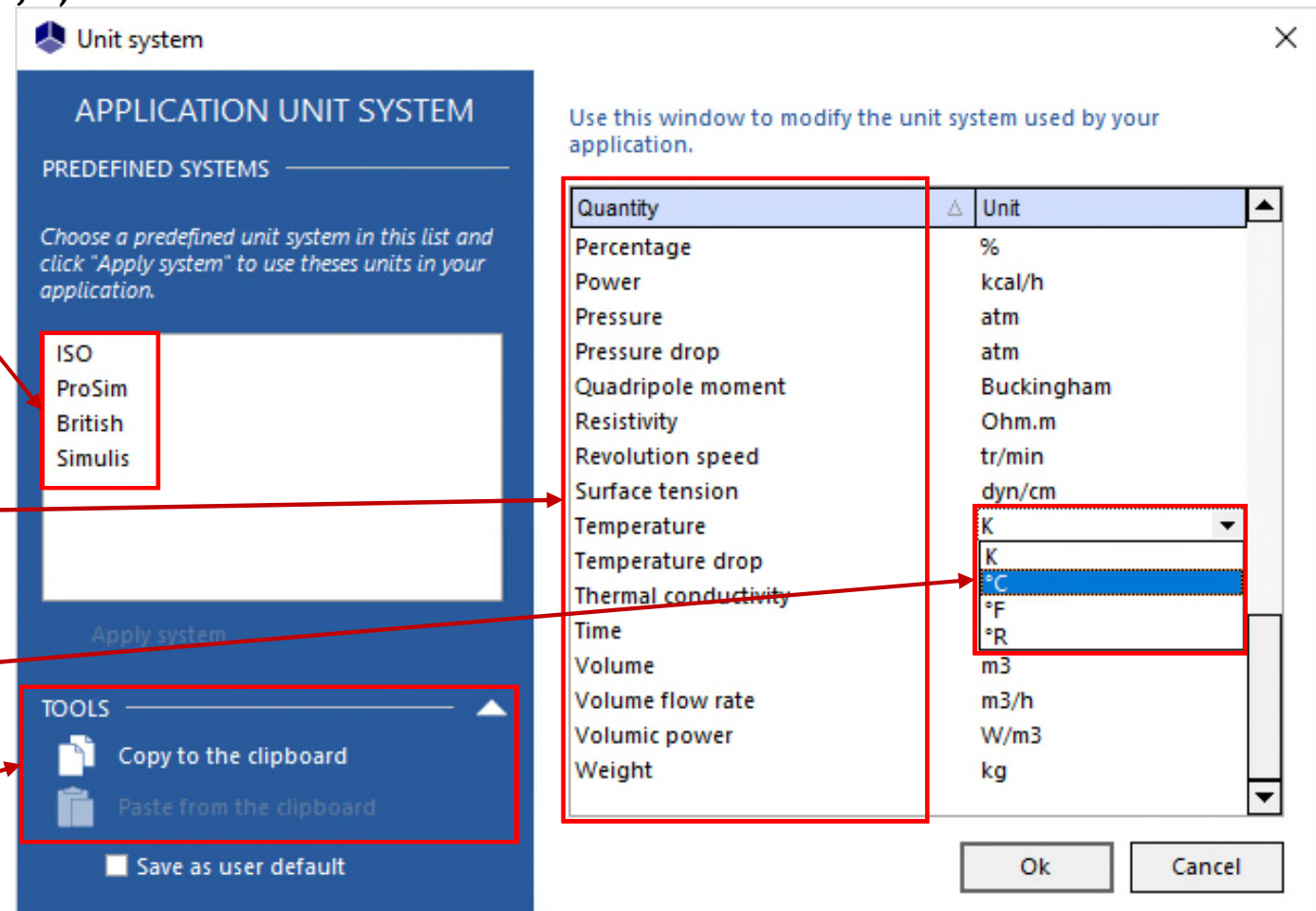


Predefined unit system

List of all the available quantities

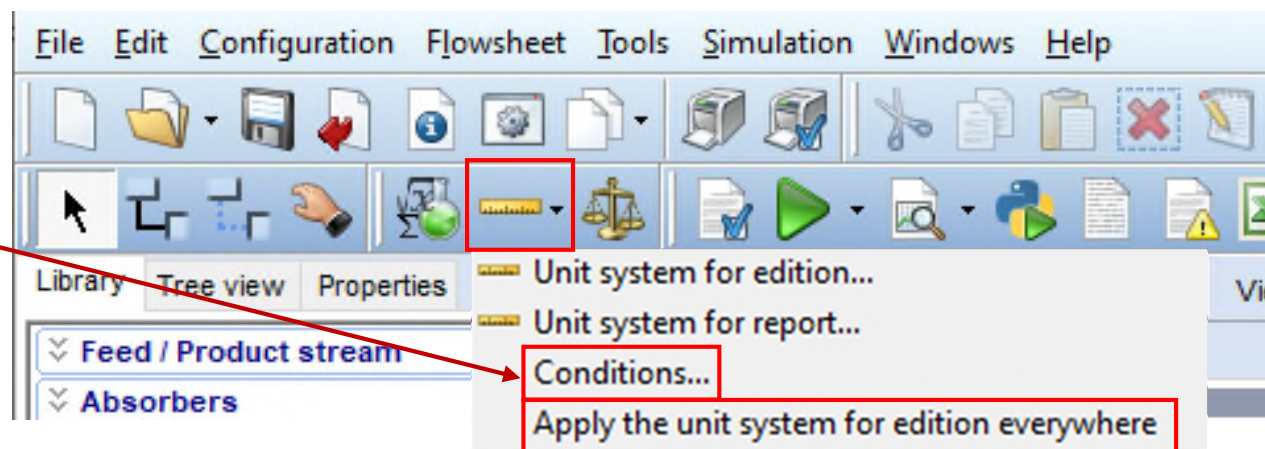
For each quantity, list of the available units

Copy/Paste all the unit system



STEP #7: Graphical User Interface

1. Click on “Conditions” if you want to modify the default normal and standard conditions



2. Click here if you want to apply the updated units system to the modules already on the flowsheet

The 'Units conditions' dialog box has three sections, each with a red border:

- Normal conditions:** Temperature: 273.15 K, Pressure: 101325 Pa.
- Standard conditions:** Temperature: 273.15 K, Pressure: 100000 Pa.
- Atmospheric pressure:** Value: 101325 Pa.

Normal conditions (T and P)

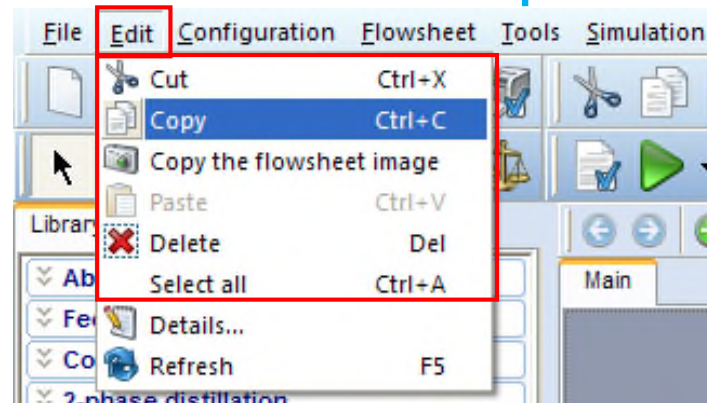
Standard conditions (T and P)

Atmospheric pressure for pressure conversion in relative unit

STEP #7: Graphical User Interface

You can apply following functions on one or more unit operations:

- Cut (CTRL+ X)
- Copy (CTRL+ C)
- Paste (CTRL+ V)
- Select all (CTRL+ A)

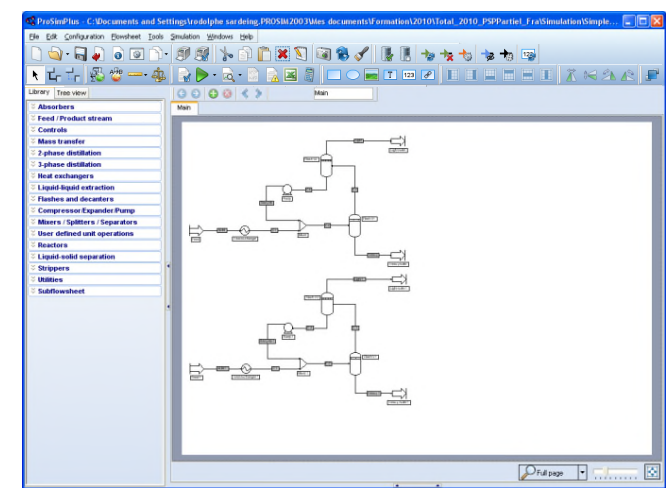
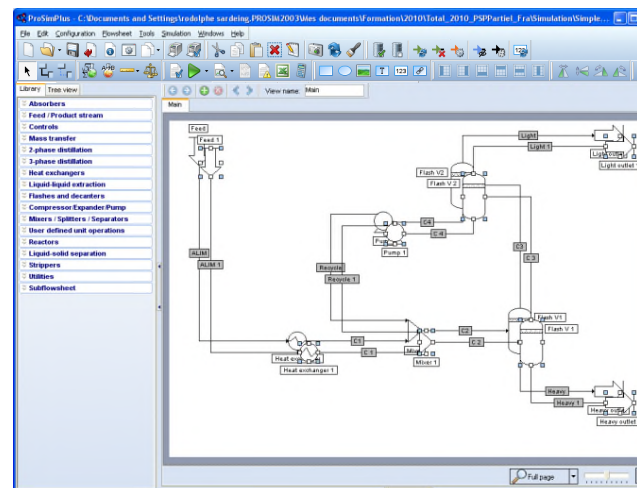
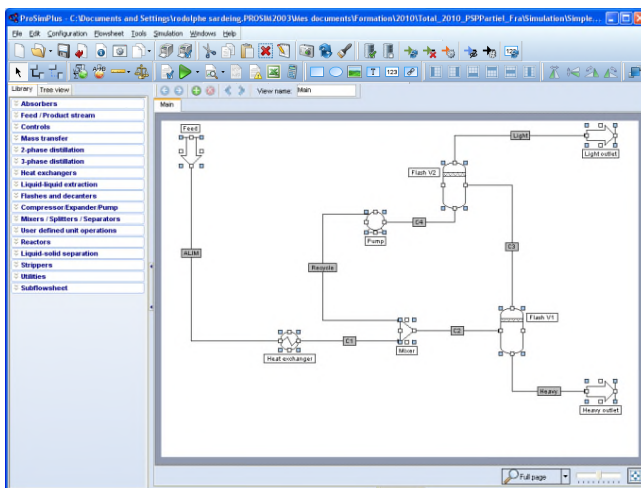


Example:

1. Press “CTRL+A” to select all the units in the flowsheet

2. Press “CTRL+C” then “CTRL+V” to duplicate the flowsheet

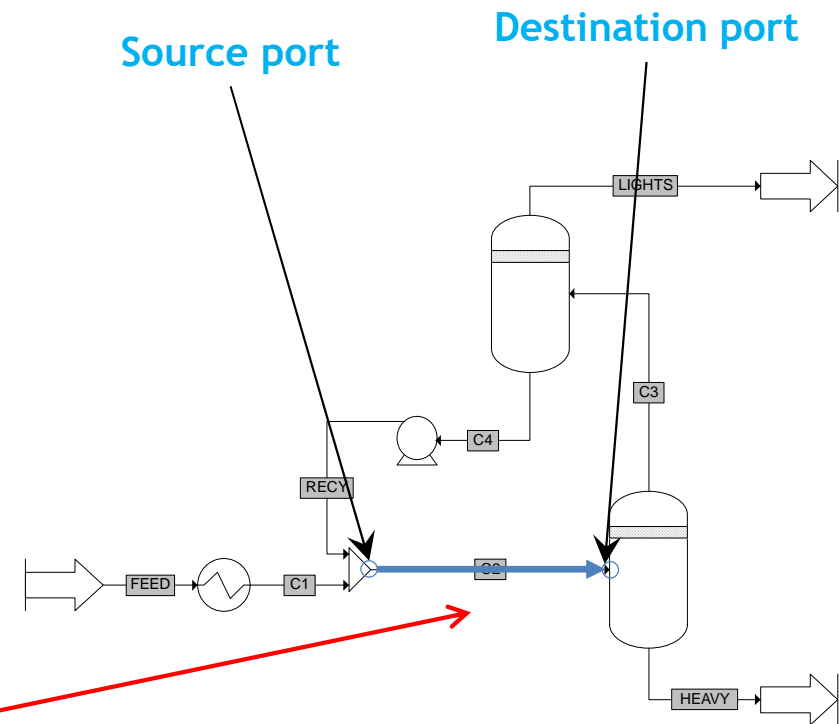
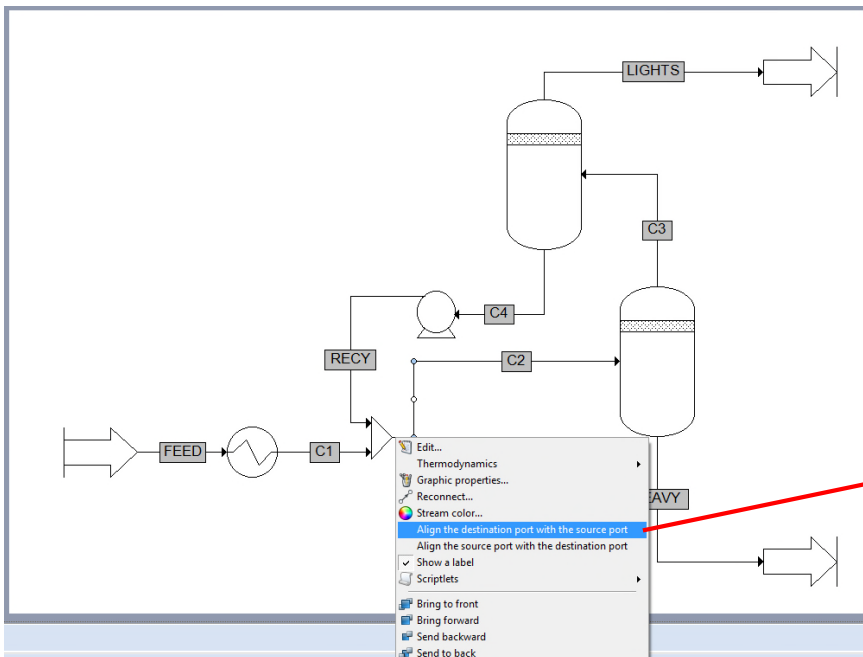
3. Move the new flowsheet and run the simulation (all unit operations parameters are also copied)



STEP #7: Graphical User Interface

You can obtain rectilinear lines:

1. Right click on the stream
2. Select:
 - Align the destination port with the source port
 - Align the source port with the destination port



STEP #7: Graphical User Interface

Graphical properties of objects

Link to a document (pdf, web site...)

Layout of the graphical object (front, background...)

Graphic properties...
Scriptlets
Move to

Bring to front
Bring forward
Send backward
Send to back

Color, width... modification of the streams and equipments tags

Color and thickness modification of the streams

Inserting text blocks

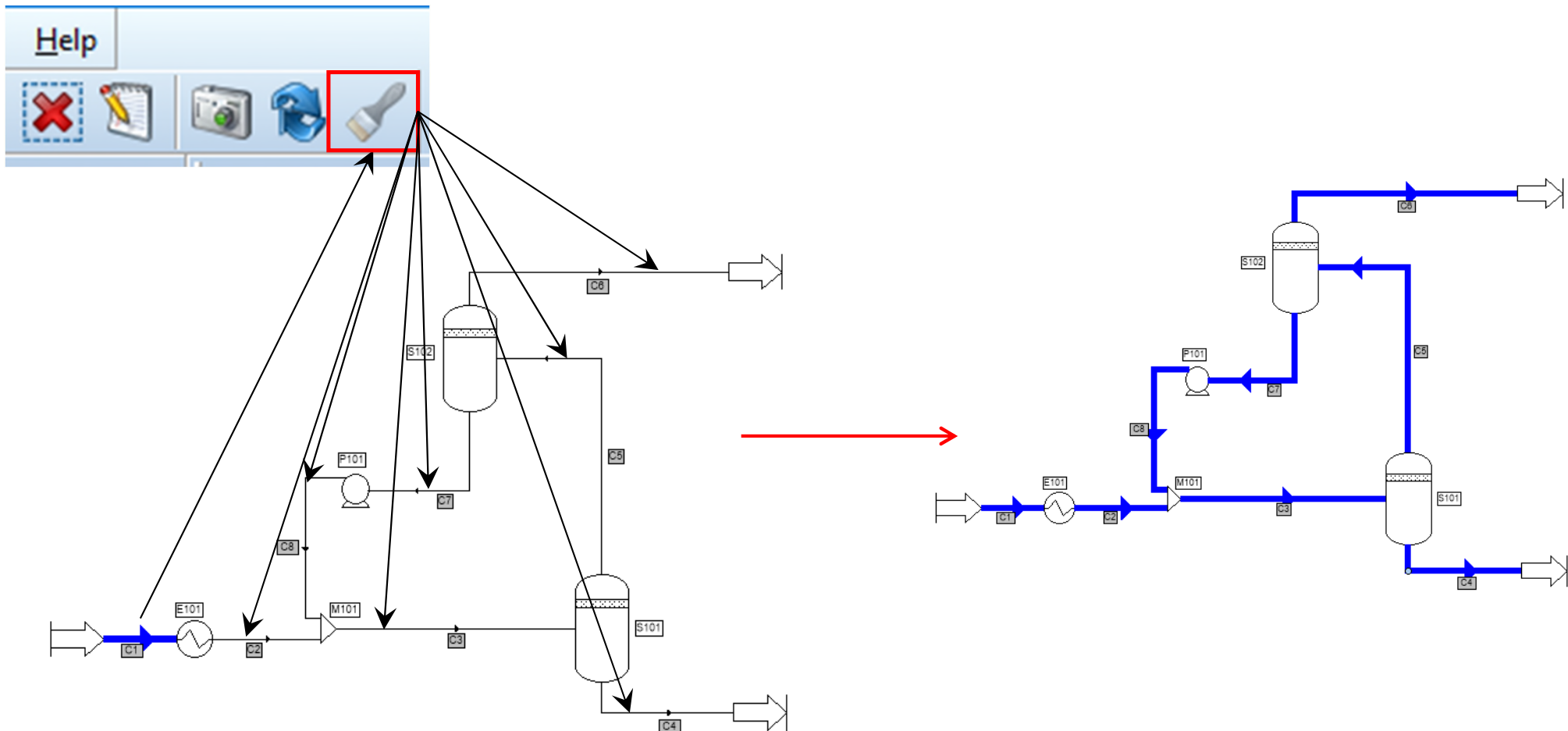
Inserting predefined shapes

Inserting images (logo...)

STEP #7: Graphical User Interface

You can reproduce the graphical aspect of the selected item (stream, label, form) on other elements

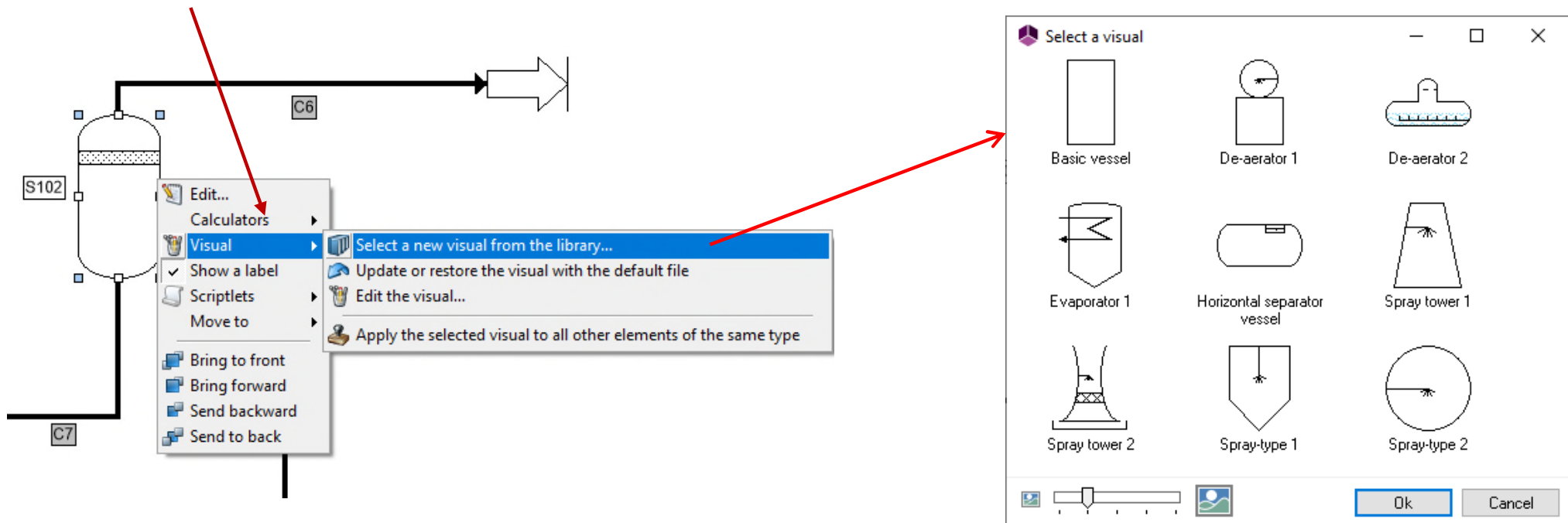
1. Click on the element from which you want to reproduce the graphical aspect
2. Click on the “Paint brush” icon 
3. Click on the element for which you want to change the graphical aspect



STEP #7: Graphical User Interface

You can modify the icon by another picture and modify the connection ports

1. Done a right click on the module, then, select “Visual”



2. You can:

- Select a new visual from the library: possibility to choose a visual in the library of visuals
- Update or restore the visual with the default file
- Edit the visual: possibility to create your visuals and to save them in the library to be able to reuse them
- Apply the selected visual to all other elements of the same type

The screenshot shows a software interface with a diagram of a tank and piping. A context menu is open over the diagram, with the 'Visual' option selected. A red arrow points from the 'Visual' option in the menu to a folder icon in the 'Visual' menu.



- Load a visual (*.puox file)
- Save a visual
- Load a picture
- Retore the original visual

Visual editor

Connection ports

English label	X (% from left)	Y (% from top)	Orientation	Connected
Material input 01	100	50	Right	In
Material input 02	0	50	Left	
Material input 03	100	75	Right	
Material input 04	0	75	Left	
Vapor outlet	50	0	Top	Out
Liquid outlet	50	100	Bottom	Out
Information input/output 01	100	15	Right	
Information input/output 02	0	15	Left	
Information input/output 03	100	85	Right	
Information input/output 04	0	85	Left	

Move the connection ports:

-  **Material stream**
-  **Information stream**

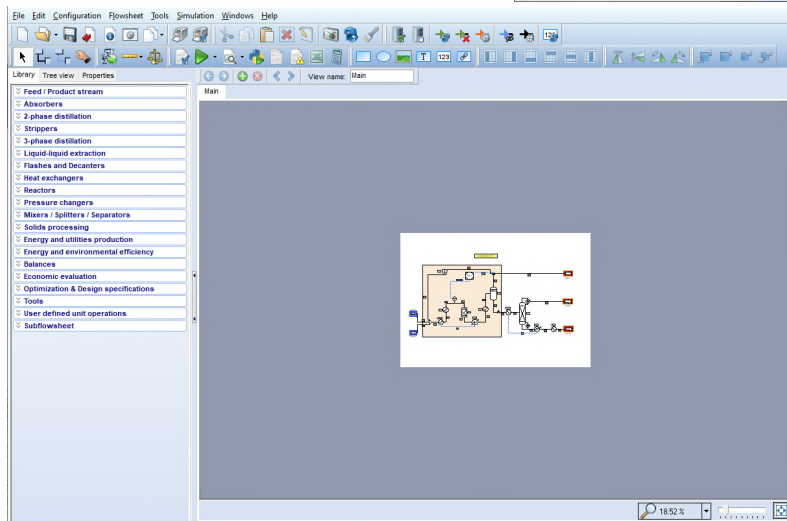
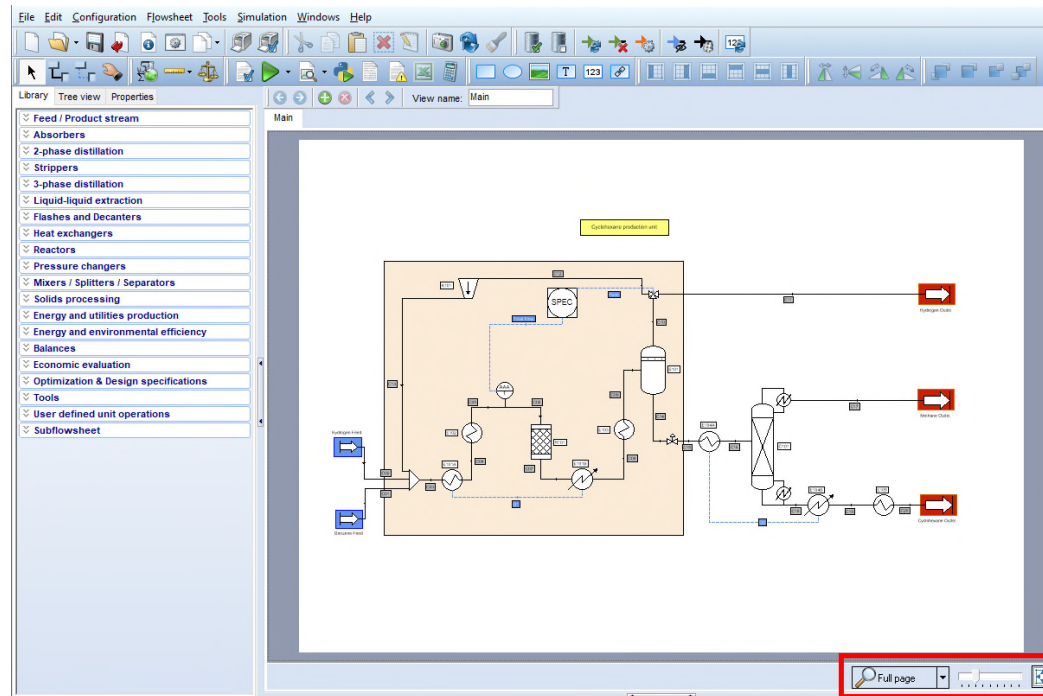
☒ Show details

Full page

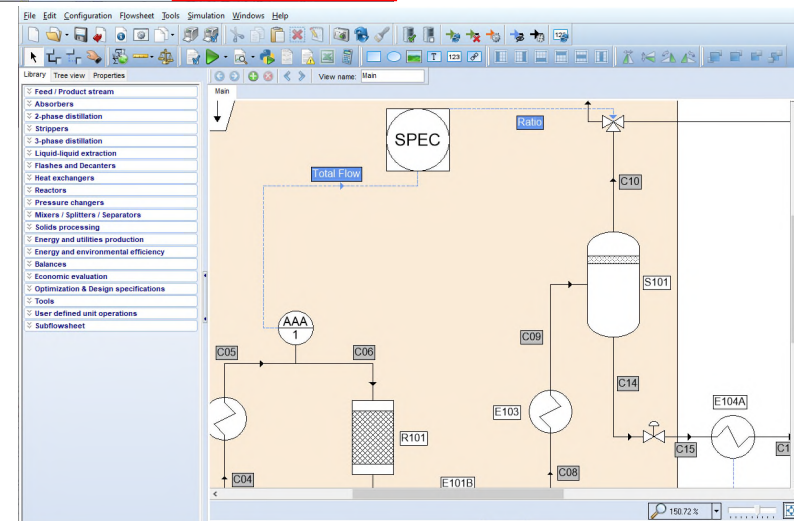
OK Cancel

STEP #7: Graphical User Interface

You can create zoom a flowsheet



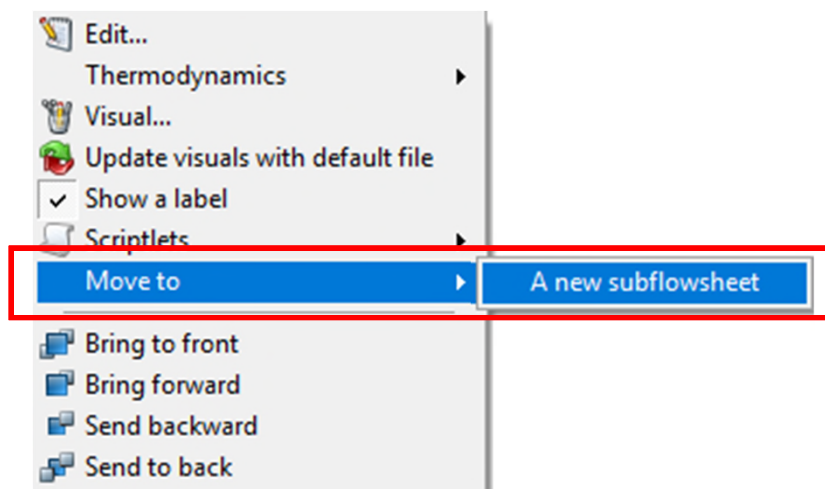
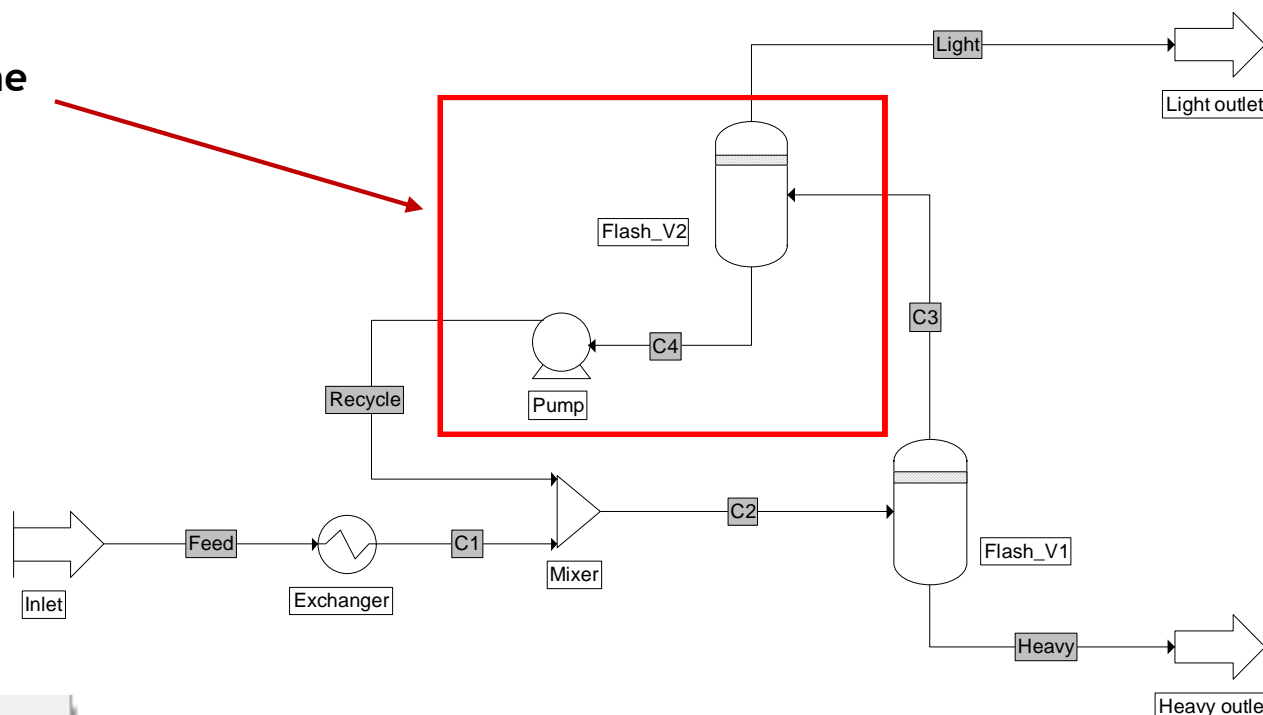
CTRL +
mouse wheel



STEP #7: Graphical User Interface

Organization of the PFD: You can create subflowsheets

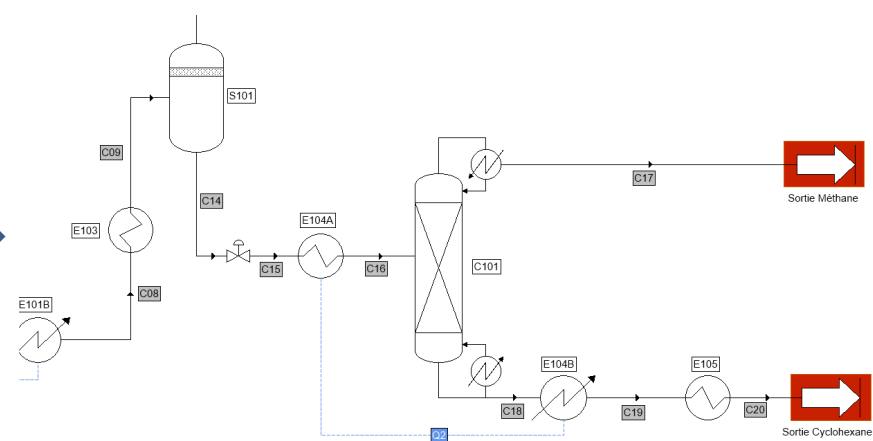
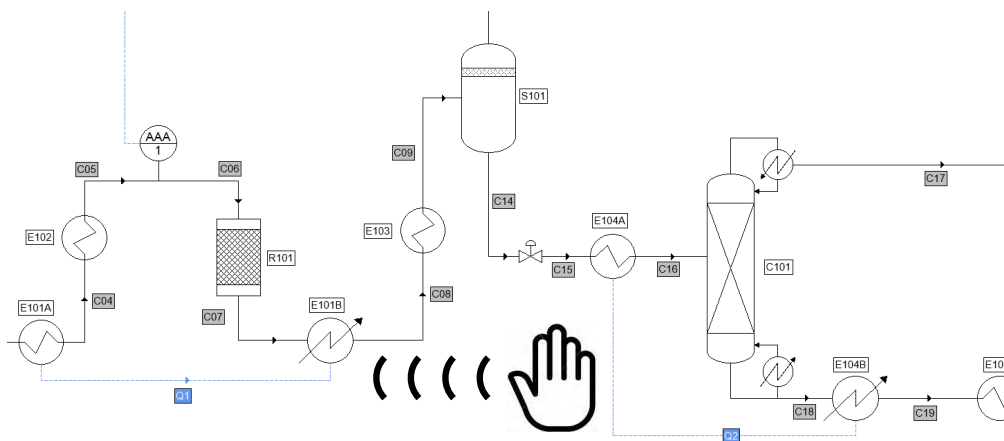
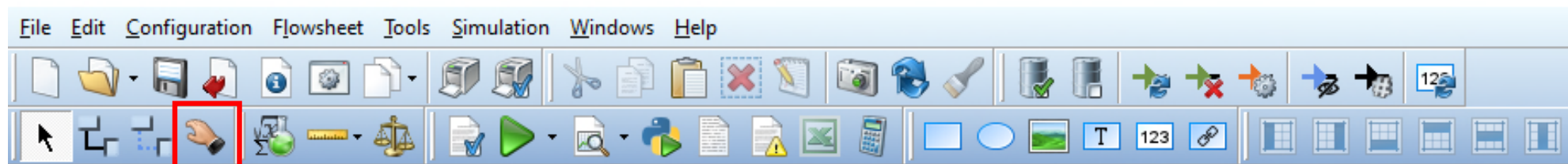
1. Select the modules to include in the subflowsheet



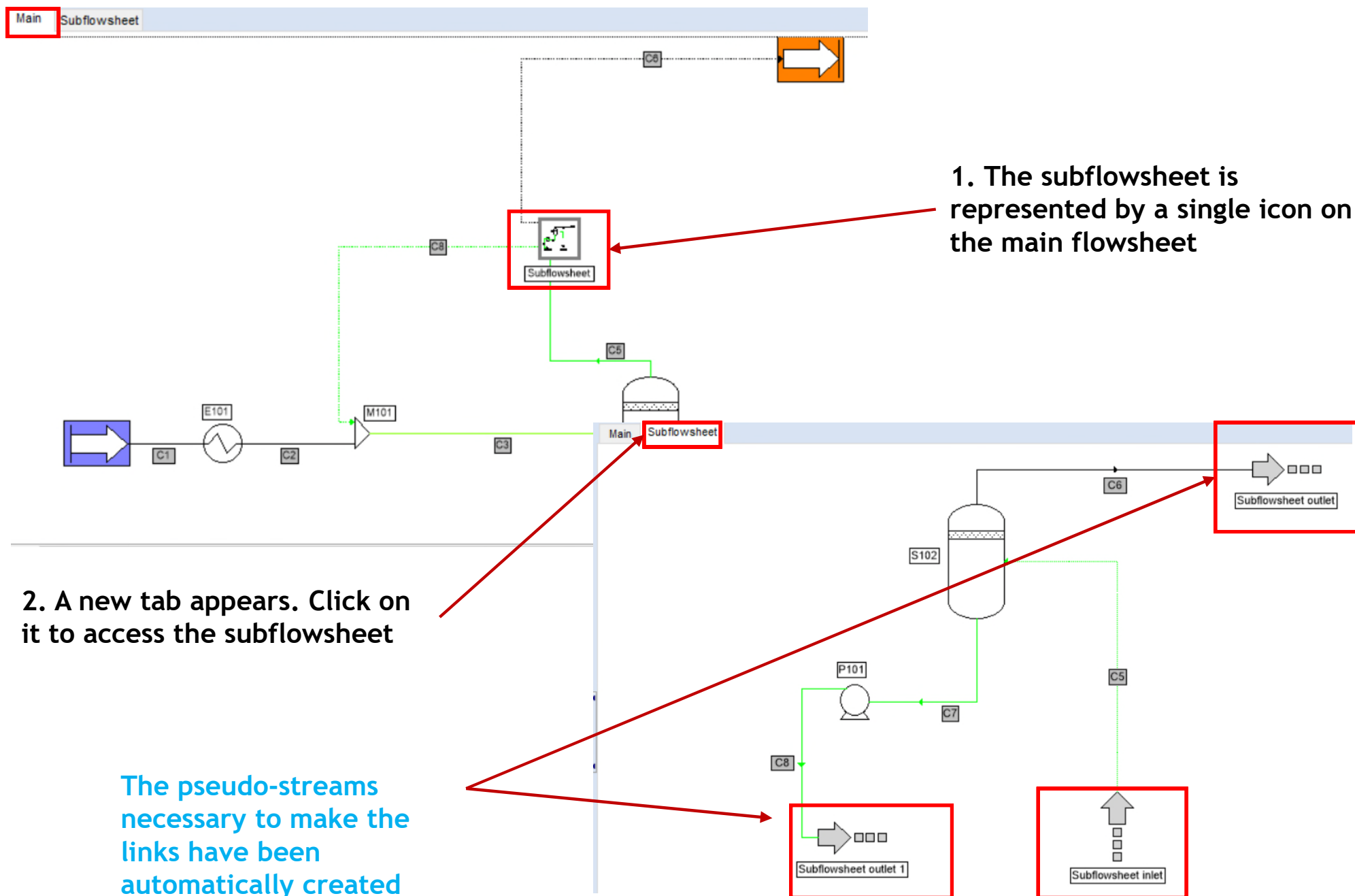
2. Do a Right click and select “Move to”, then select “A new subflowsheet”

STEP #7: Graphical User Interface

Once zoomed you can move a flowsheet

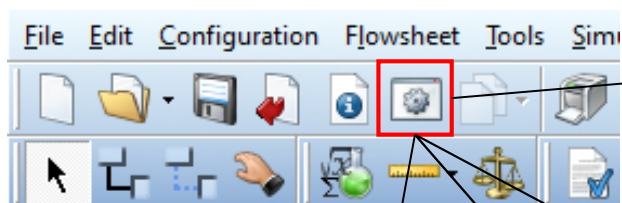


STEP #7: Graphical User Interface

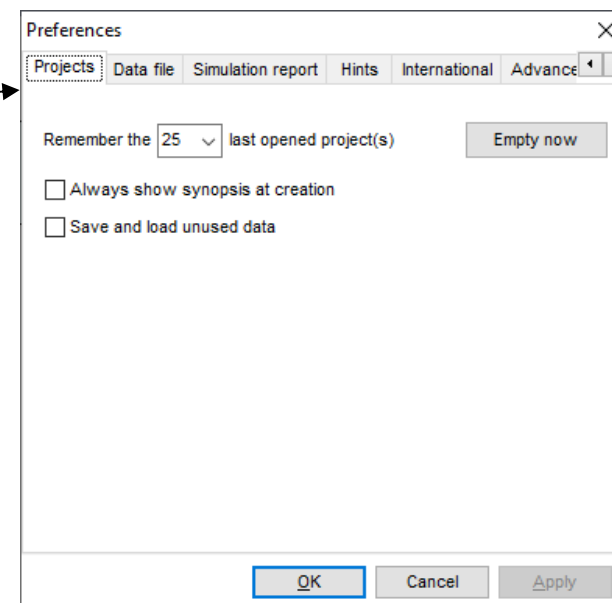


STEP #7: Graphical User Interface

Preferences

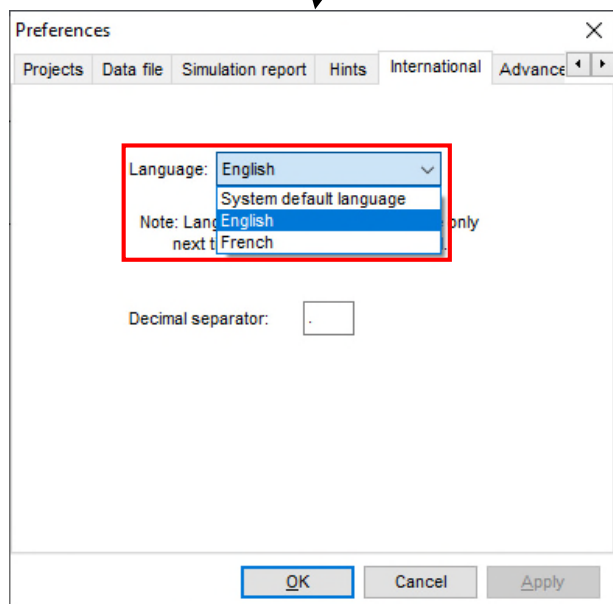


Projects

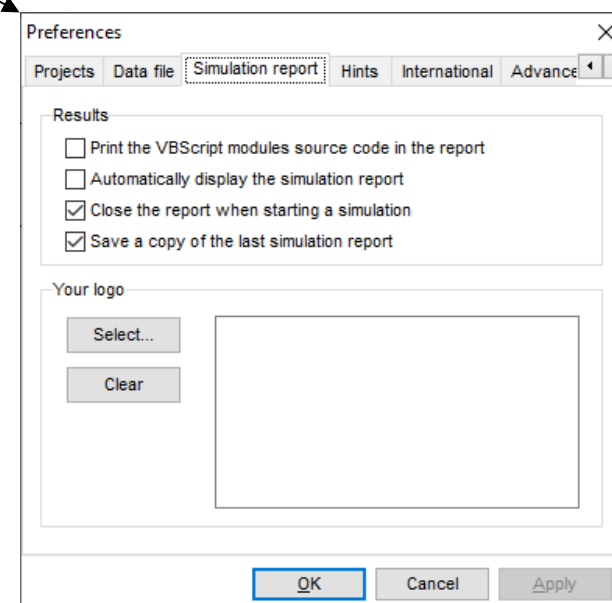
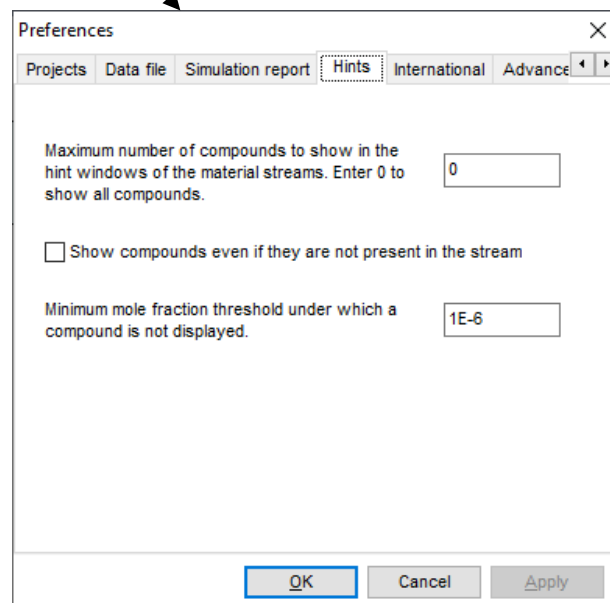


- Automatically display the simulation report
- Add your logo in the simulation report

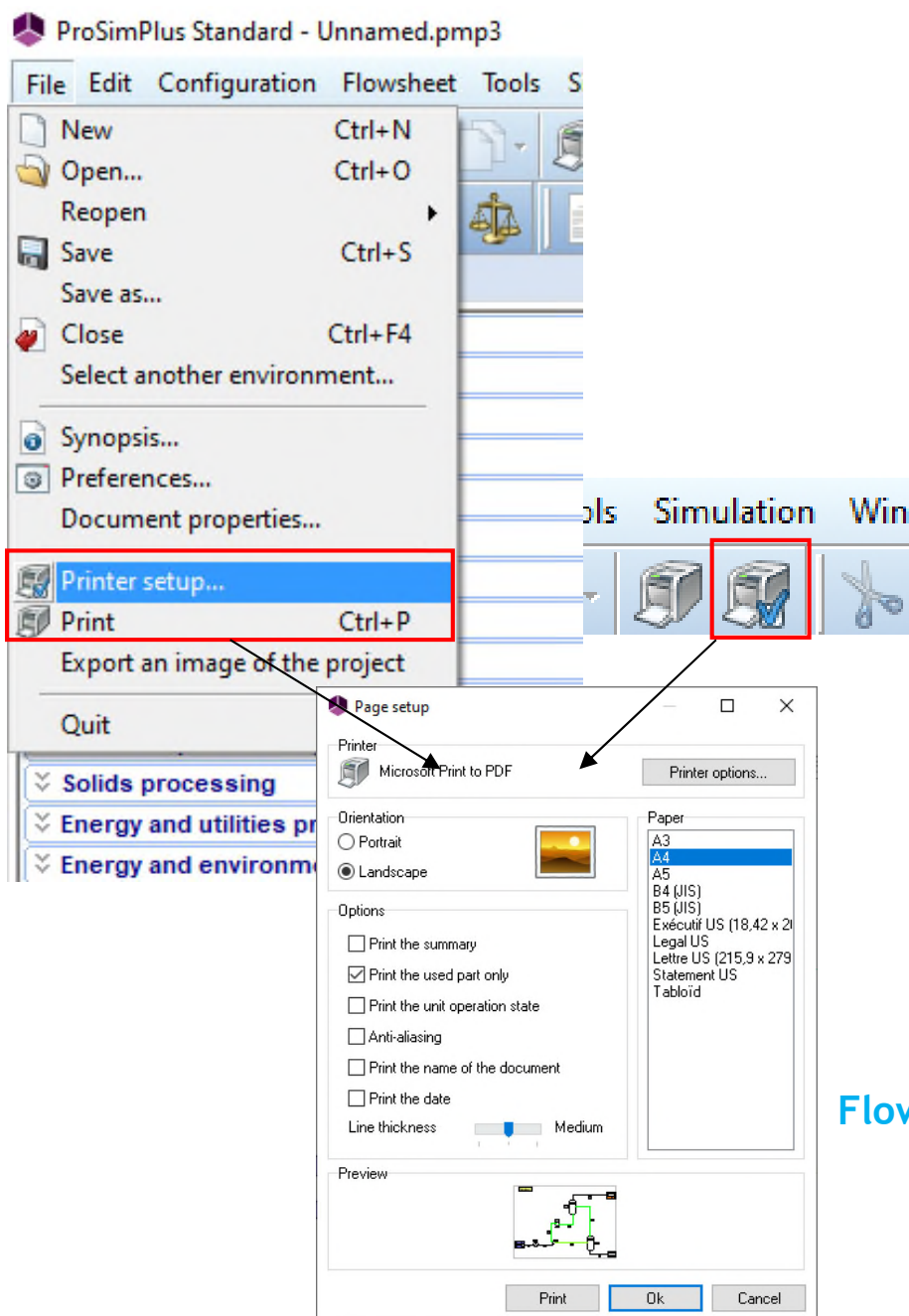
Language



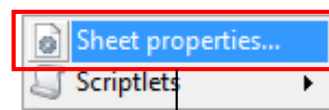
Hints



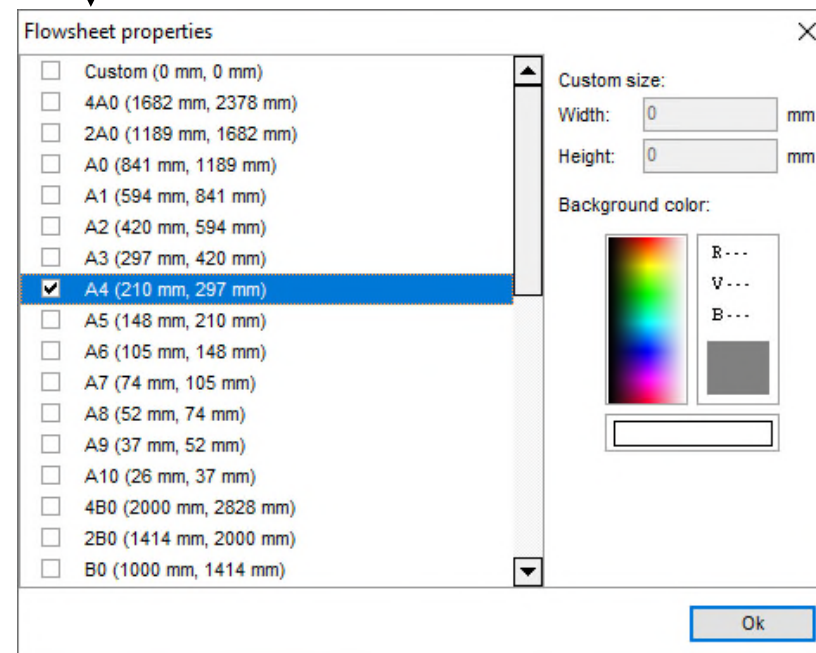
STEP #7: Graphical User Interface



Right-click on the flowsheet



Size and background color of the PFD



Flowsheet printing



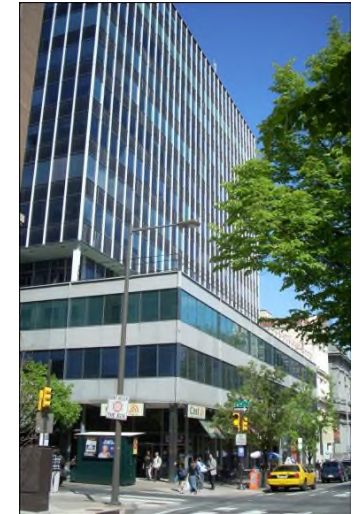
ProSim SA
51, rue Ampère
Immeuble Stratège A
F-31670 Labège
France

☎: +33 (0) 5 62 88 24 30



Software & Services In Process Simulation

www.prosim.net
info@prosim.net



ProSim, Inc.
325 Chestnut Street, Suite 800
Philadelphia, PA 19106
U.S.A.

☎: +1 215 600 3759