HTRI heat-exchanger (Xist) within ProSimPlus®

Use Case 4: Use of HTRI shell and tubes heat-exchanger (Xist) within ProSimPlus

Software & Services In Process Simulation

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ProSim

Introduction

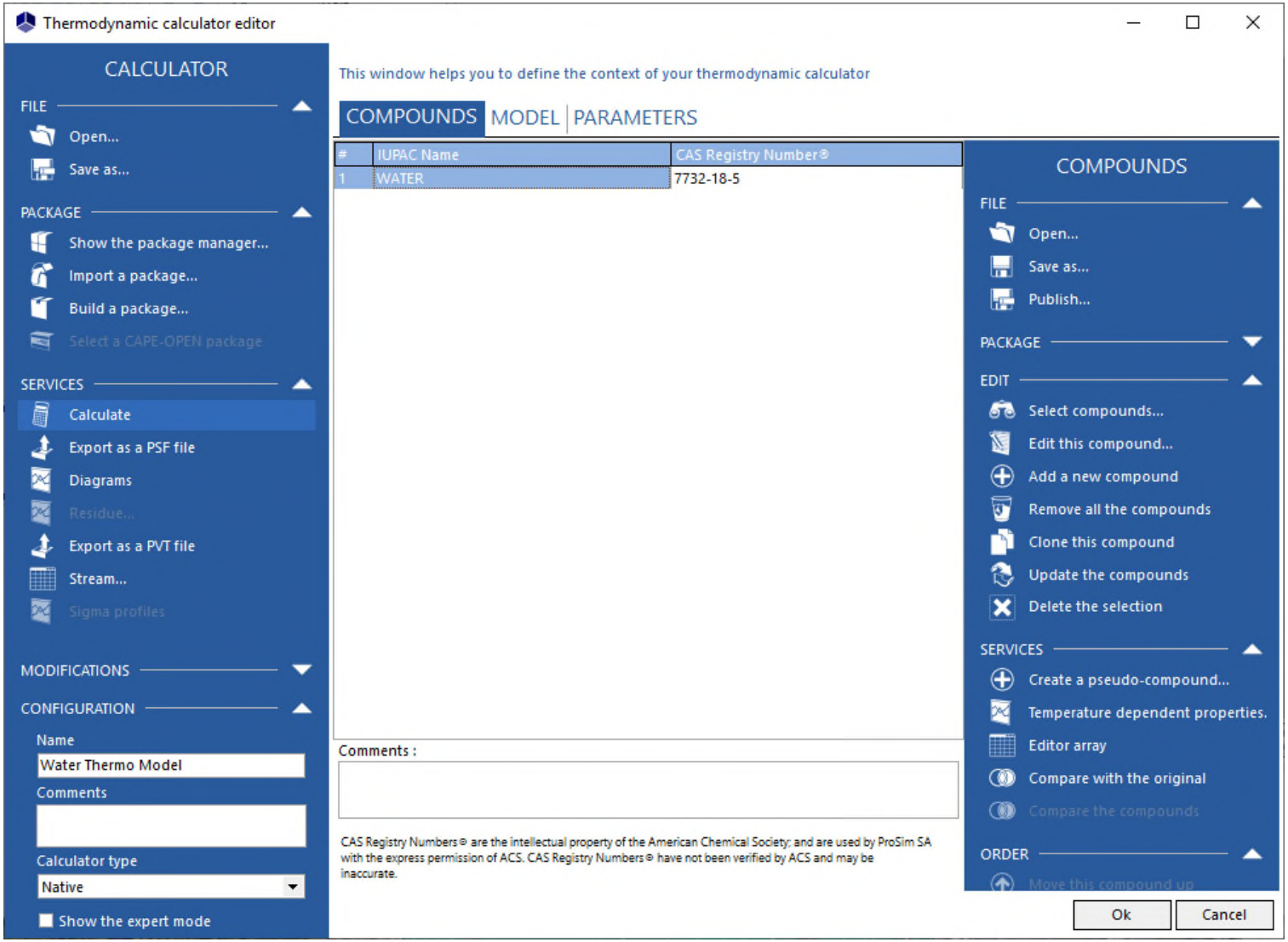
ProSimPlus® is a process engineering software that performs rigorous mass and energy balance calculations for a wide range of industrial steady-state processes. It is used in design as well as in operation of existing plants for process optimization, units troubleshooting or debottlenecking, plants revamping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

This document gives an example of use of HTRI (Heat Transfer Research, Inc.) shell and tubes heat-exchangers (Xist) within ProSimPlus®.

Note: as a prerequisite for a better understanding of this document, the user should know the general use of ProSimPlus®.

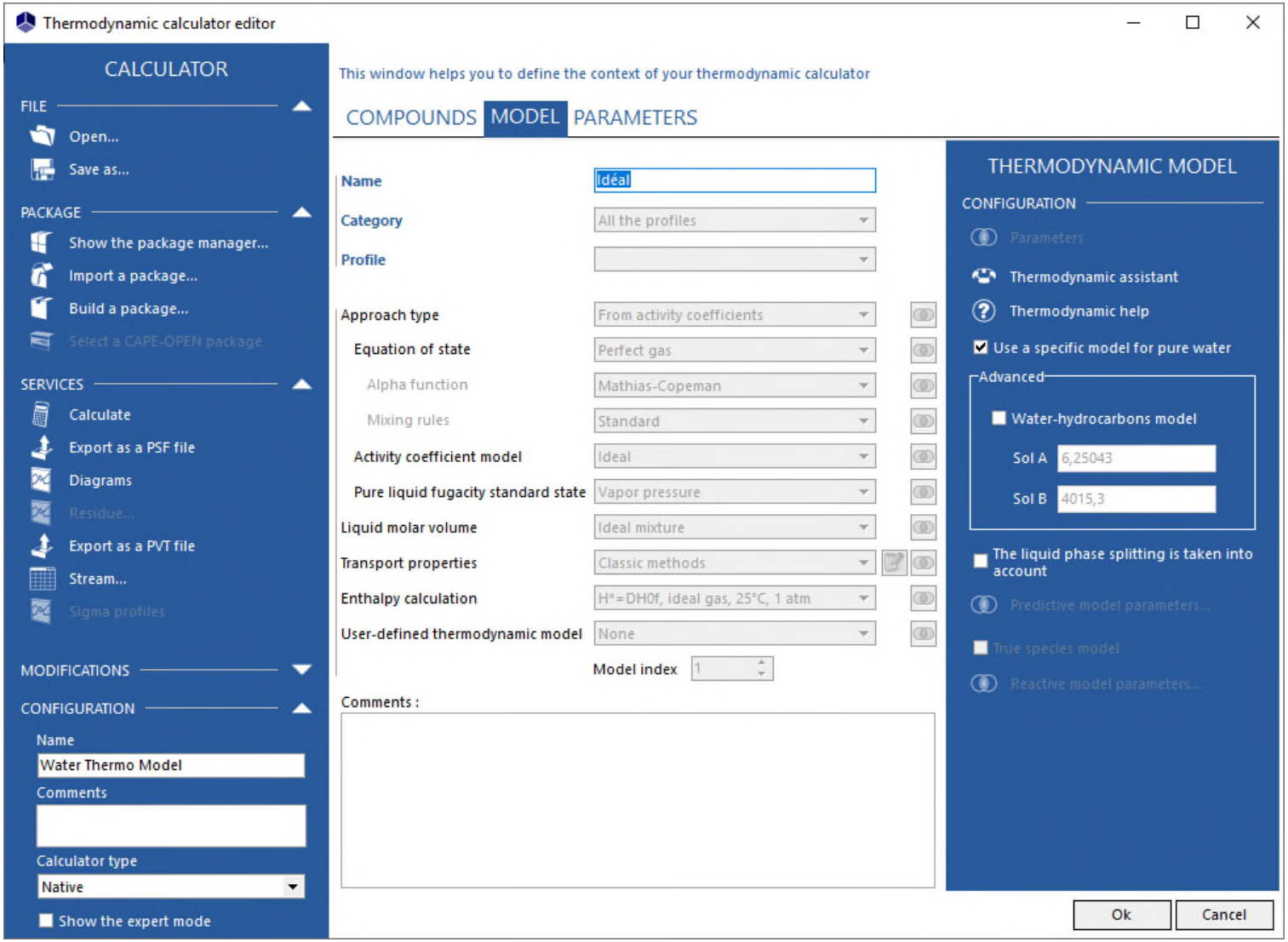
STEP #1: Select your compounds

Select your compounds like for any usual case:



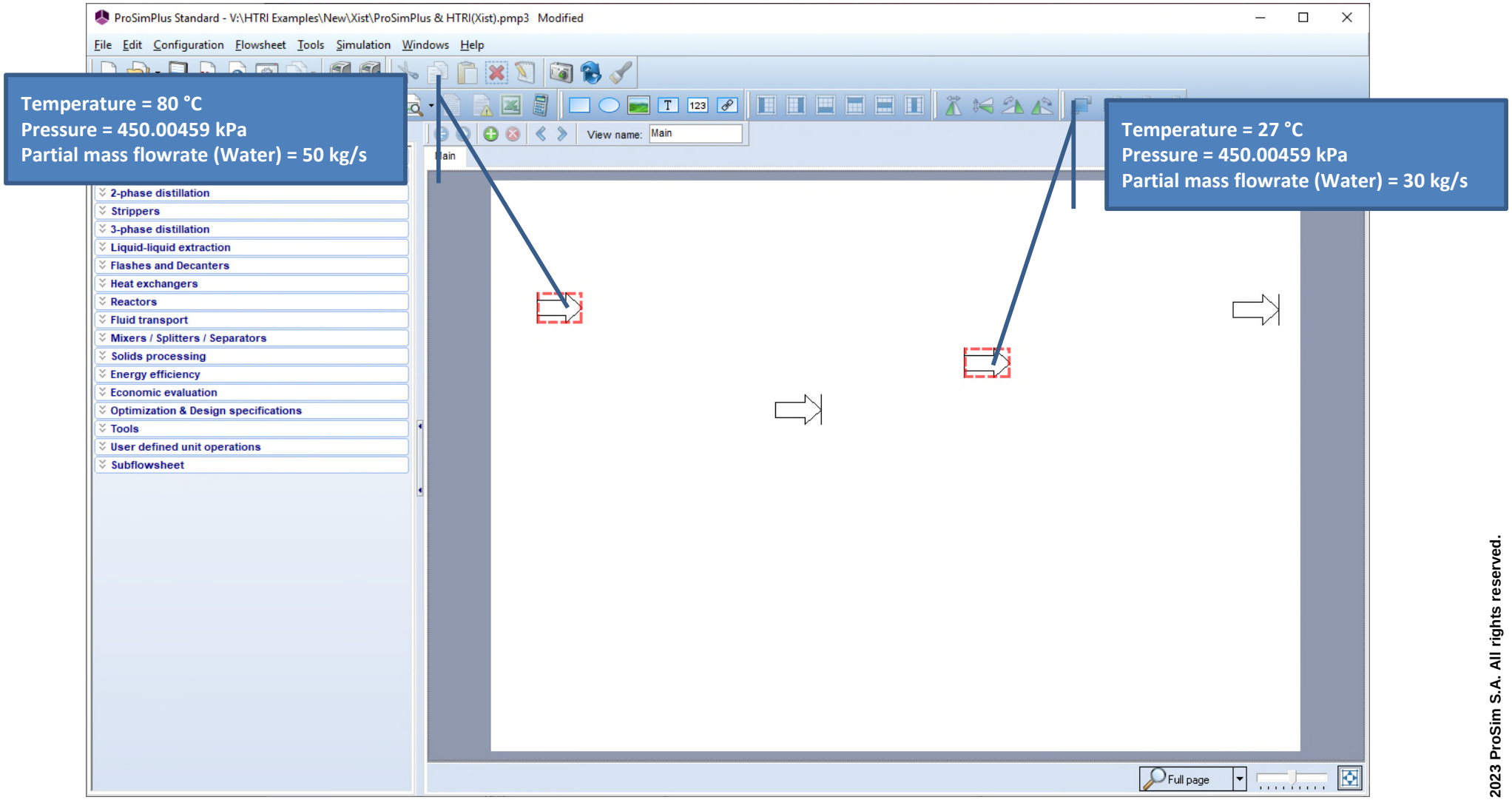
STEP #2: Select your thermodynamic model

Select your thermodynamic model like for any usual case:



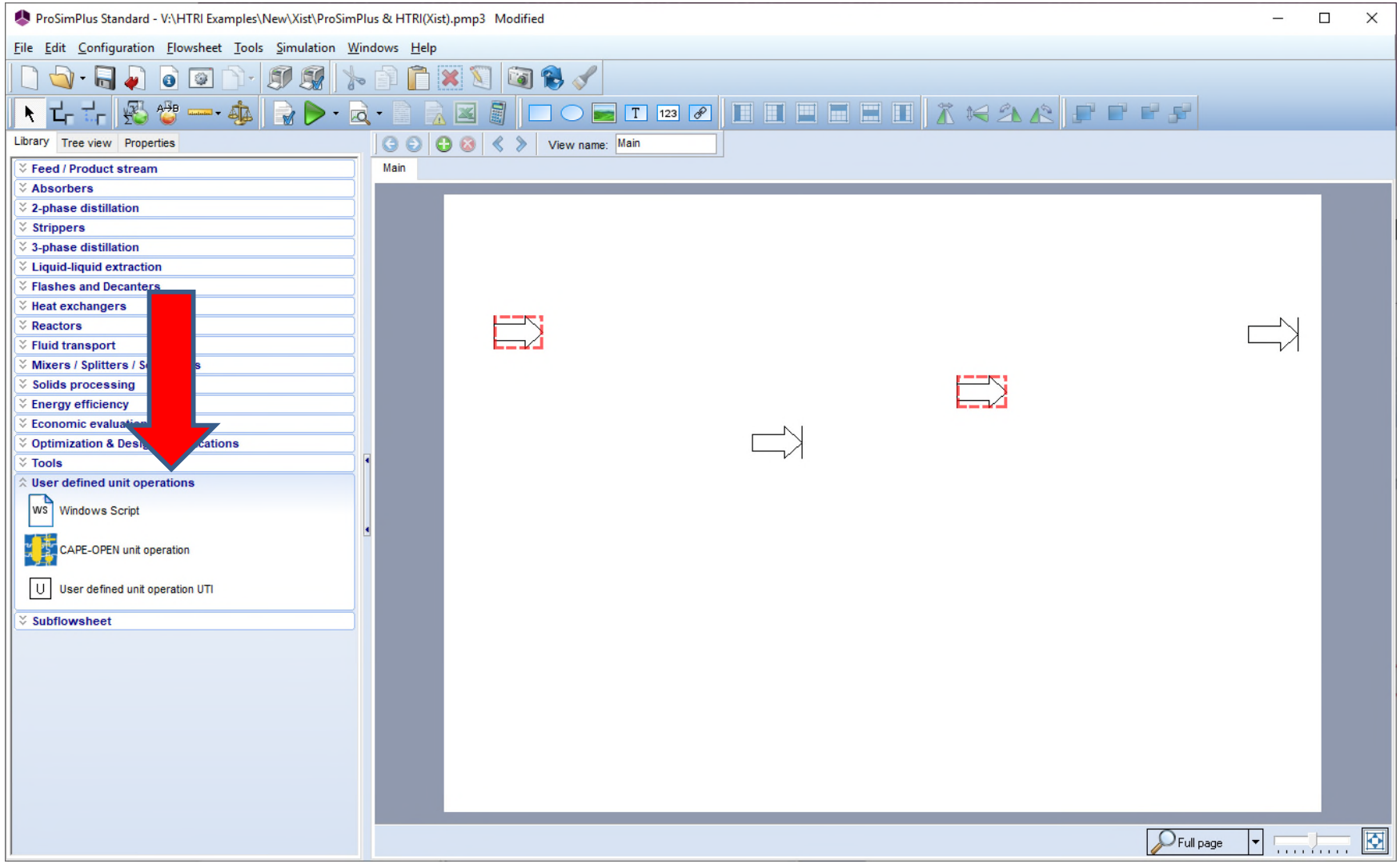
STEP #3: Create your flowsheet

Like for any usual case, add the feeds and the product streams needed for your flowsheet, then edit the parameters (temperature, pressure, partial flowrates) for each feed:



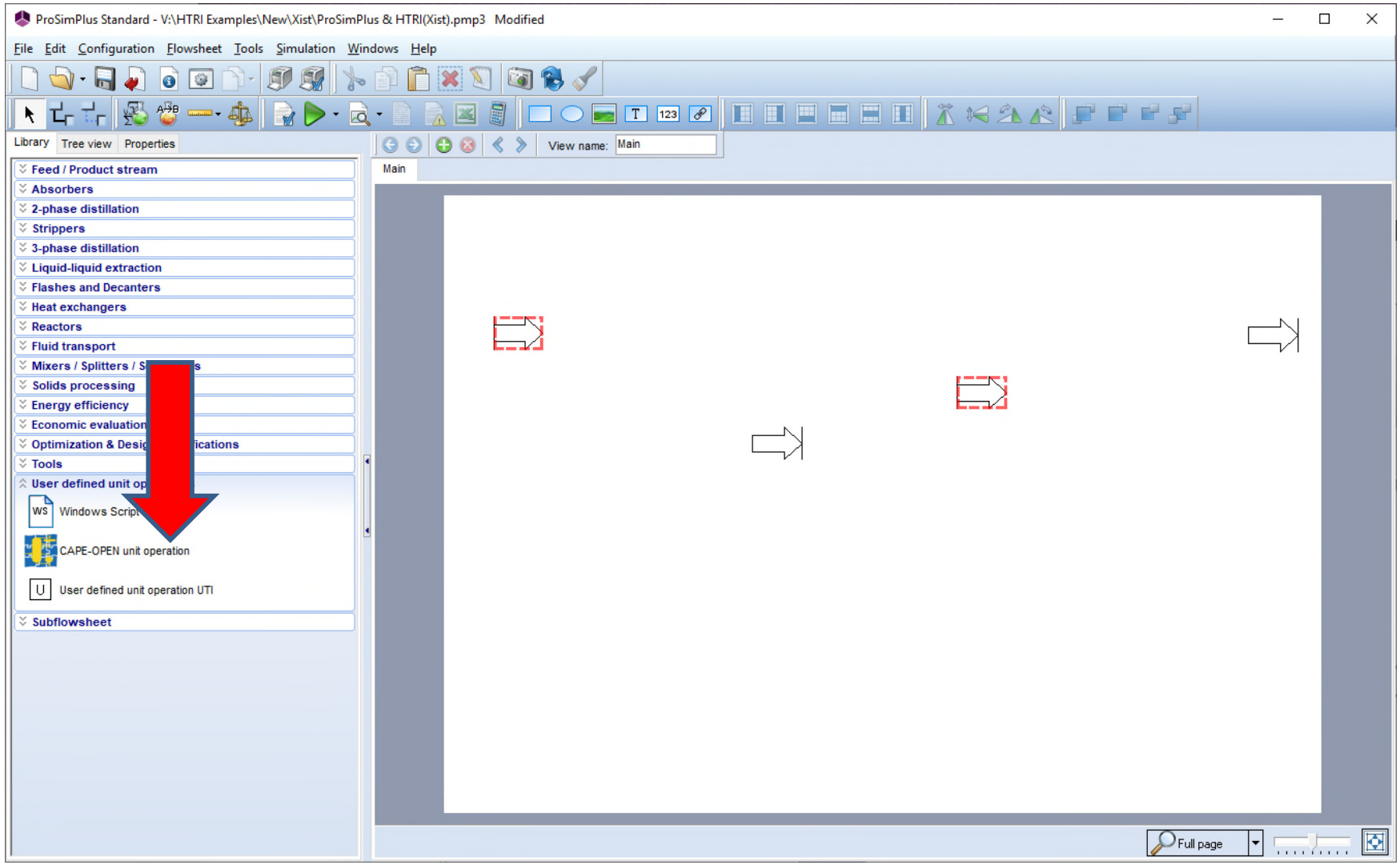
STEP #3: Create your flowsheet

To add a Xist heat-exchanger (shell and tubes module), click on the category “User defined operations” in the “Library” of unit operations:



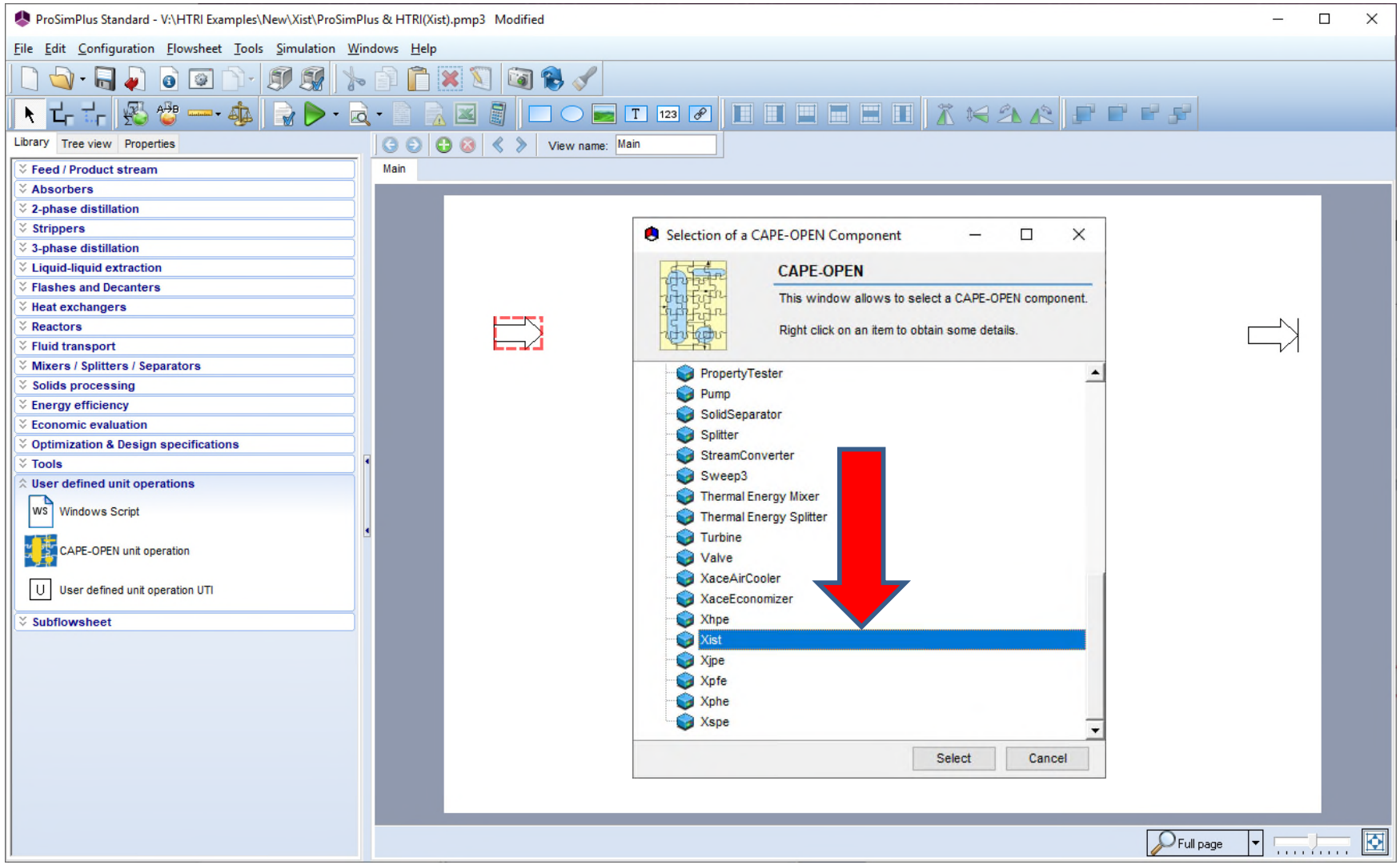
STEP #3: Create your flowsheet

Then click on “CAPE-OPEN unit operation”, then click on the flowsheet to add it:



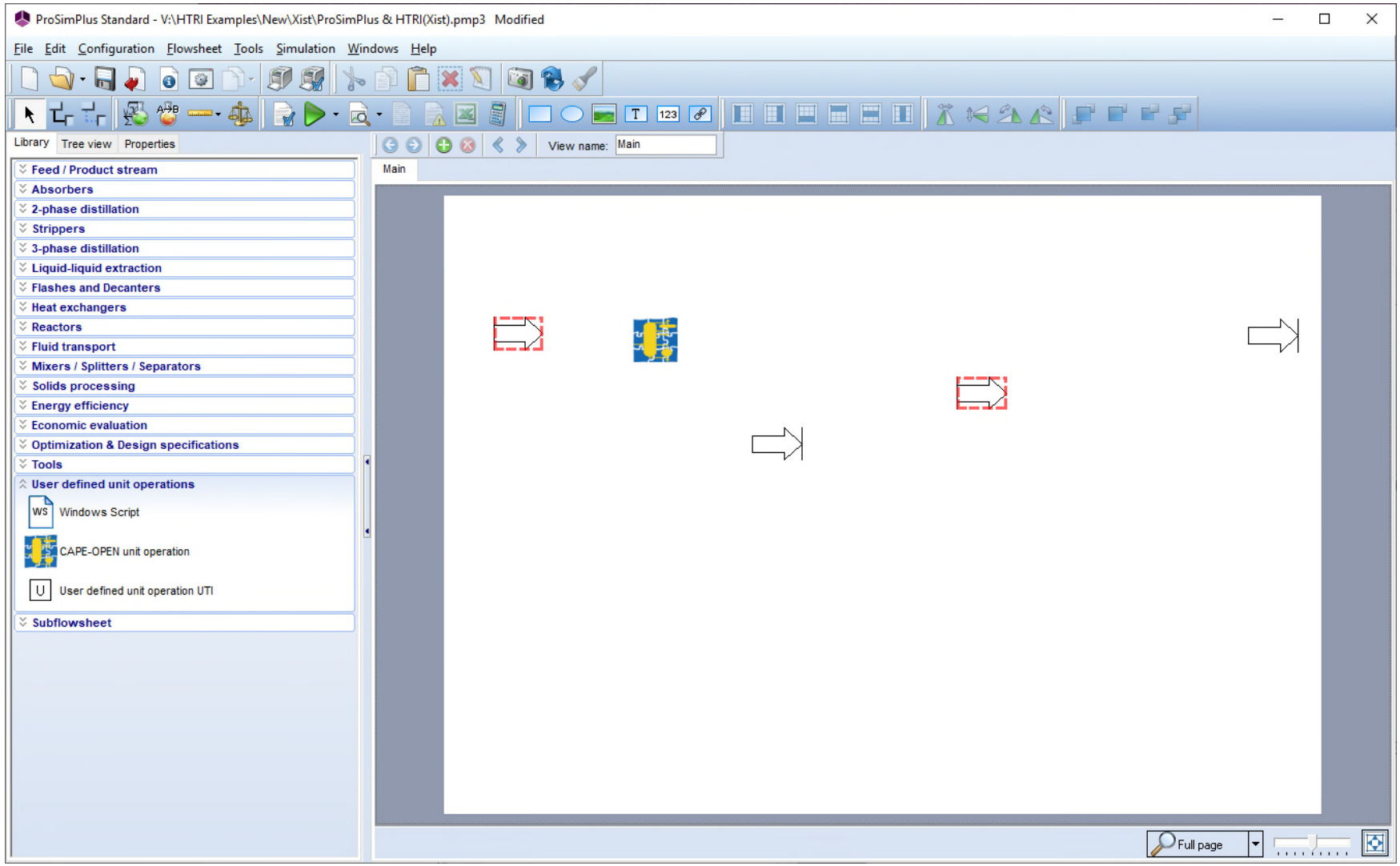
STEP #3: Create your flowsheet

The list of CAPE-OPEN unit operations available on your computer is displayed, select "Xist" and then click on the button "Select" to validate your choice:



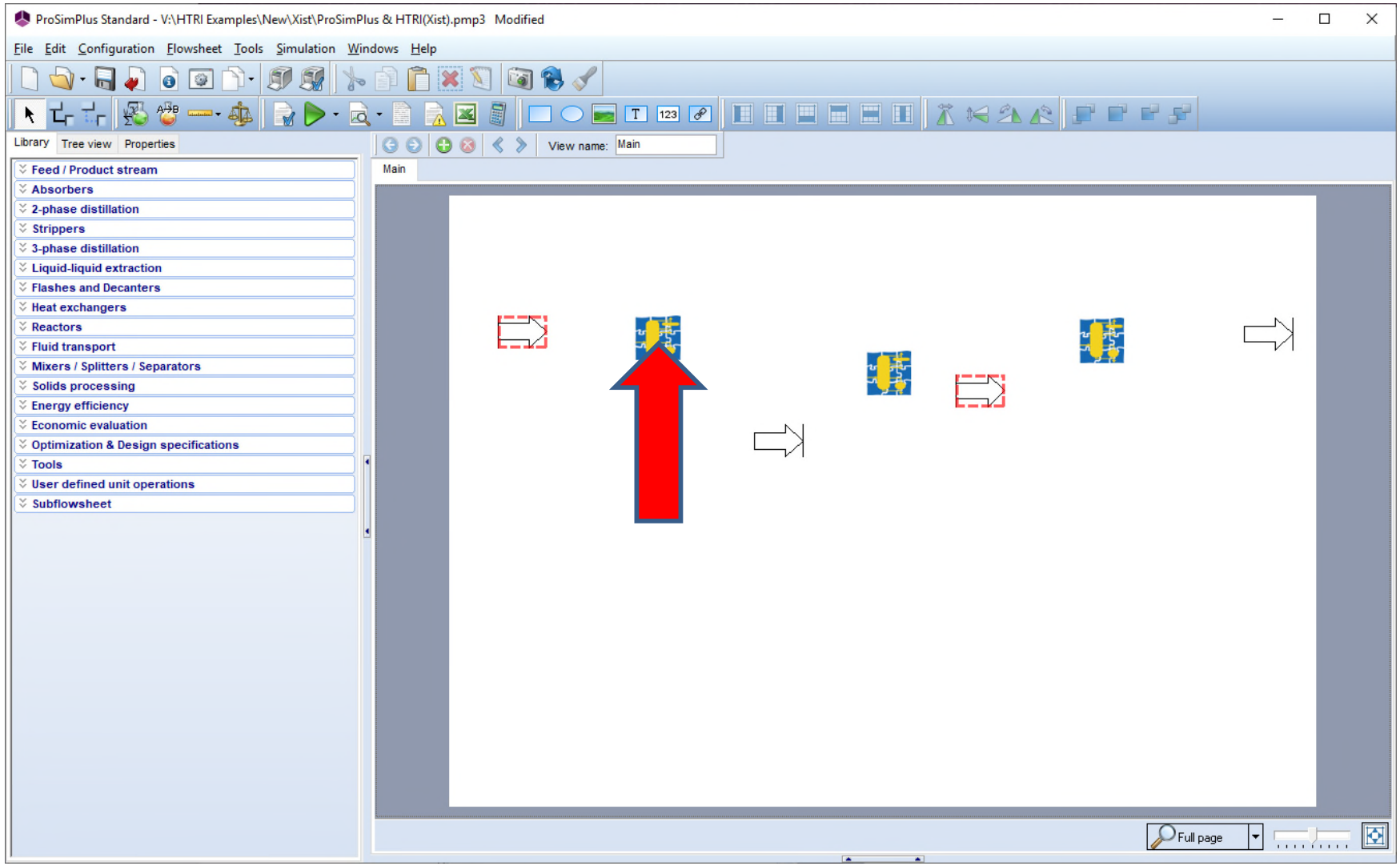
STEP #3: Create your flowsheet

The Xist heat-exchanger icon is added, then repeat if needed (in this example there are 3 Xist heat-exchangers):



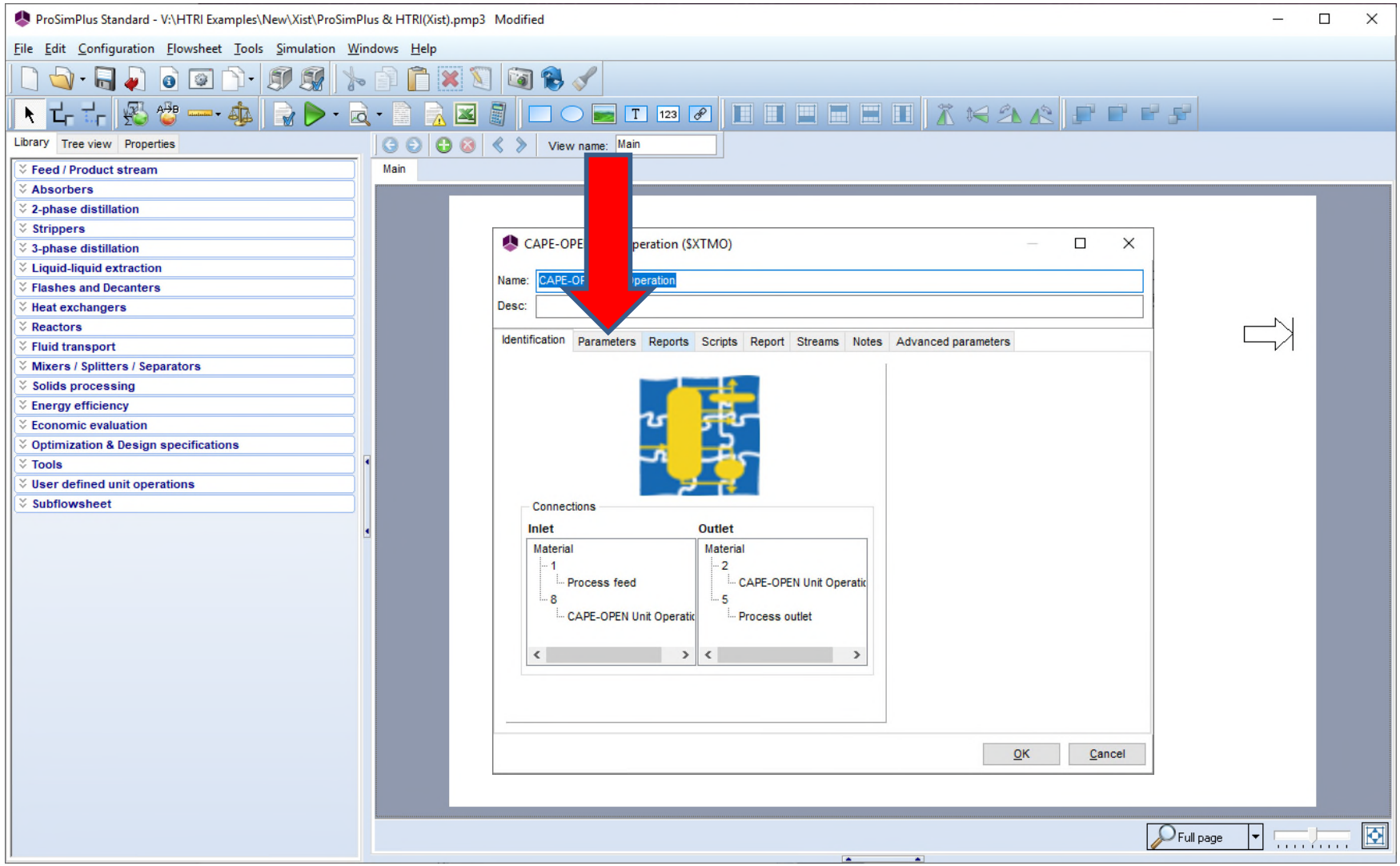
STEP #3: Create your flowsheet

Edit the parameters with a double-click on the selected unit operation:



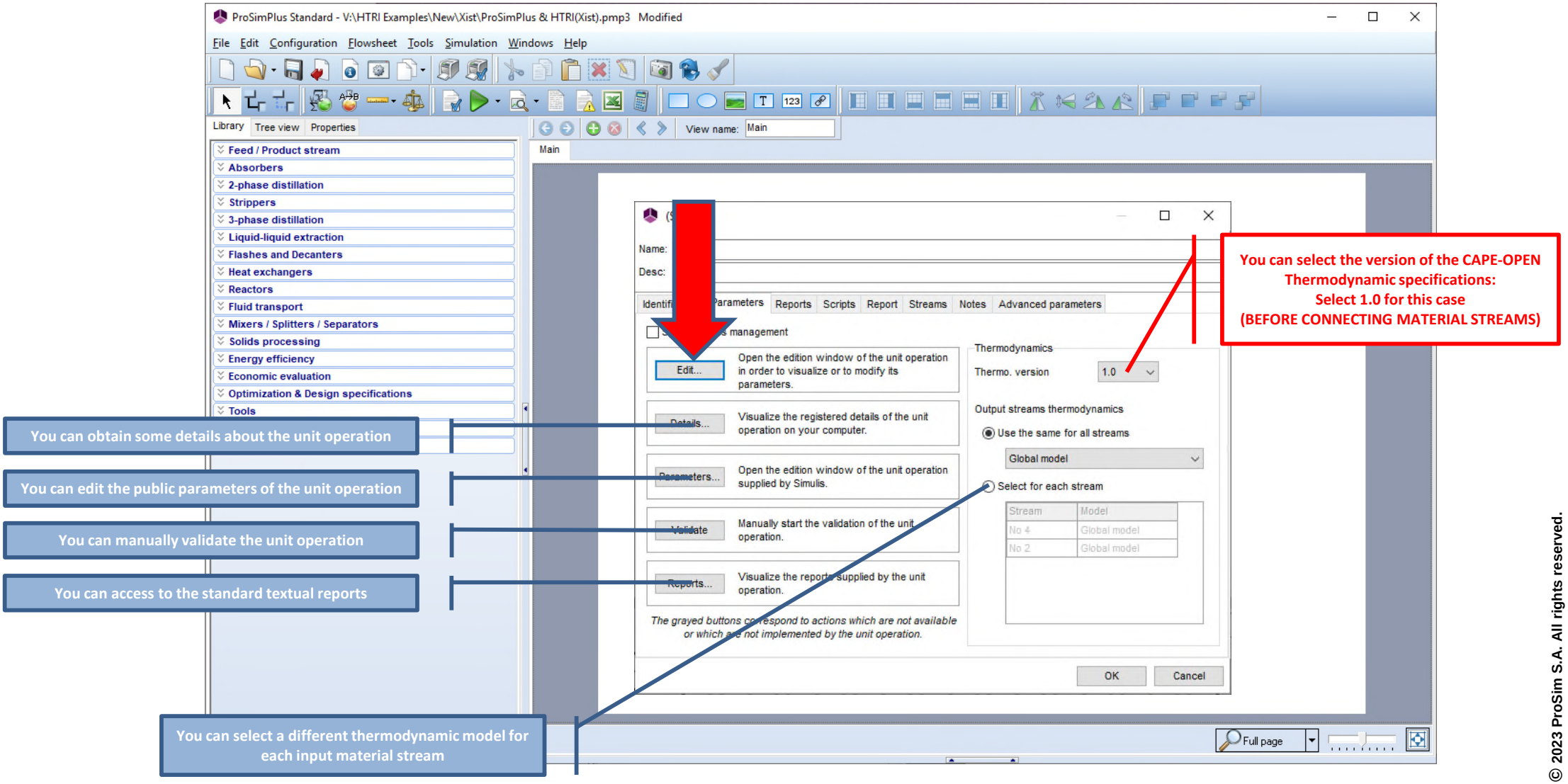
STEP #3: Create your flowsheet

Select the “Parameters” tab:



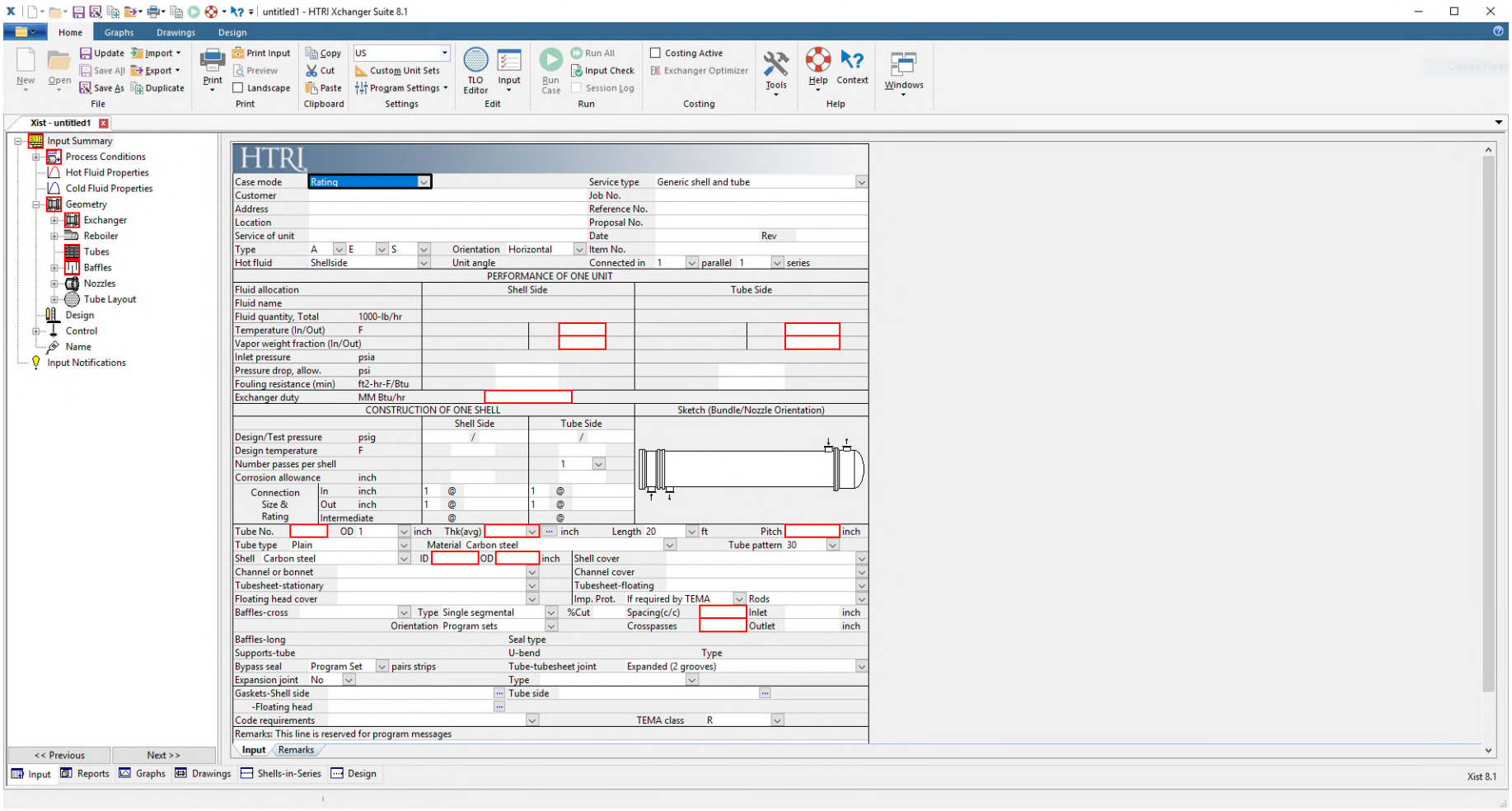
STEP #3: Create your flowsheet

Then click on the “Edit…” button to open the specific dialog of a Xist heat-exchanger:



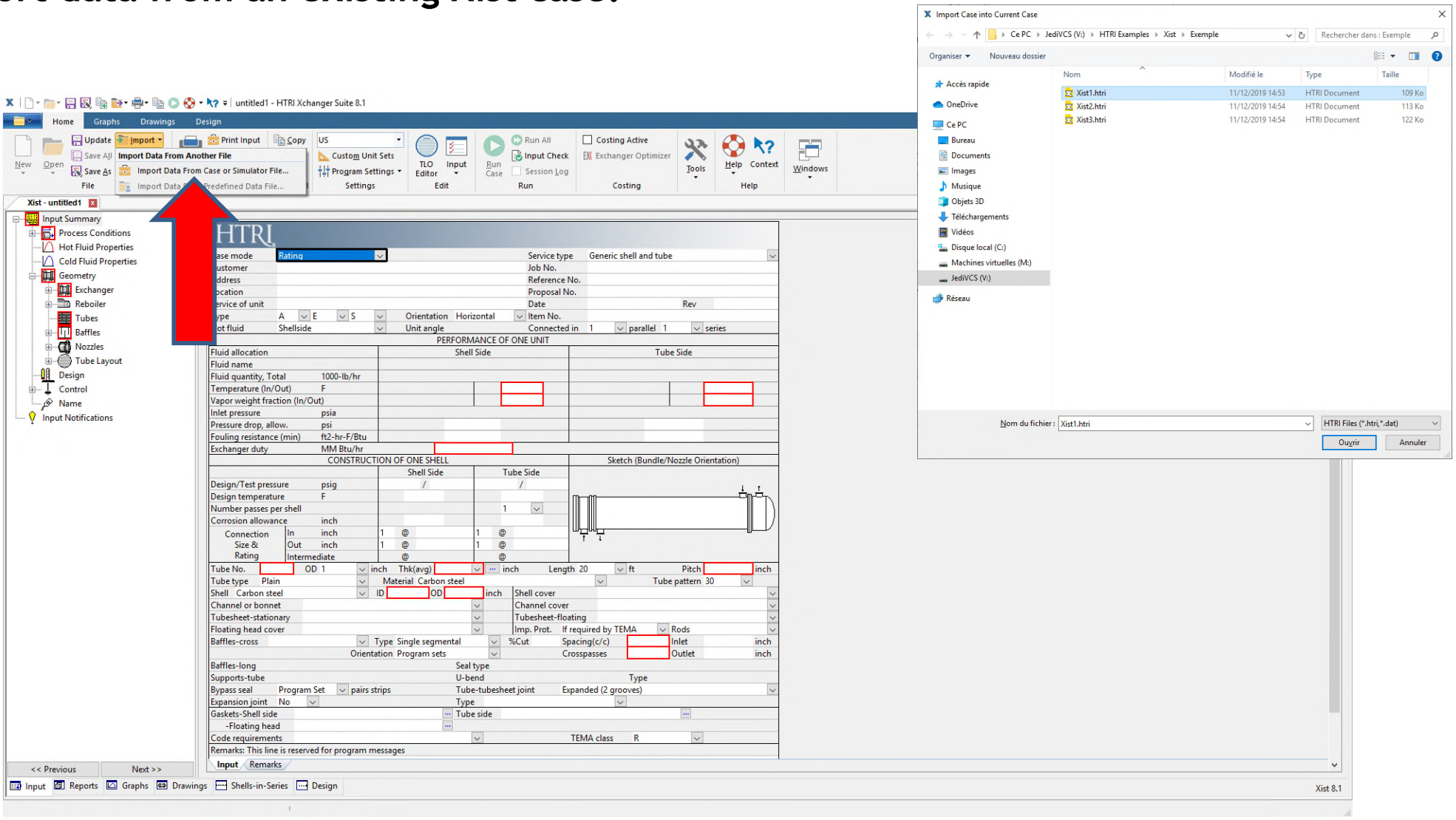
STEP #3: Create your flowsheet

Then enter the parameters of the selected heat-exchanger (see HTRI user guides):



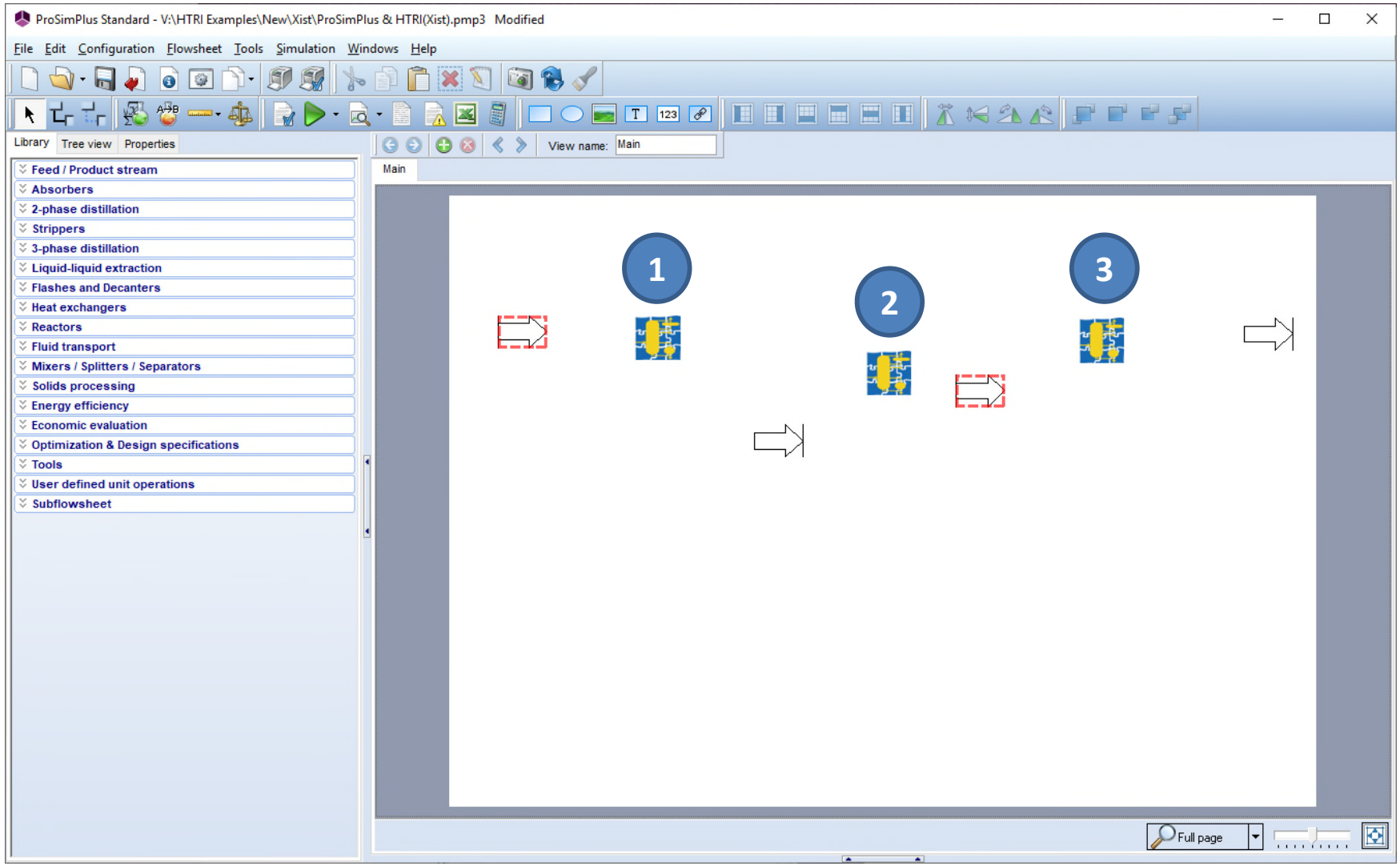
STEP #3: Create your flowsheet

Or import data from an existing Xist case:



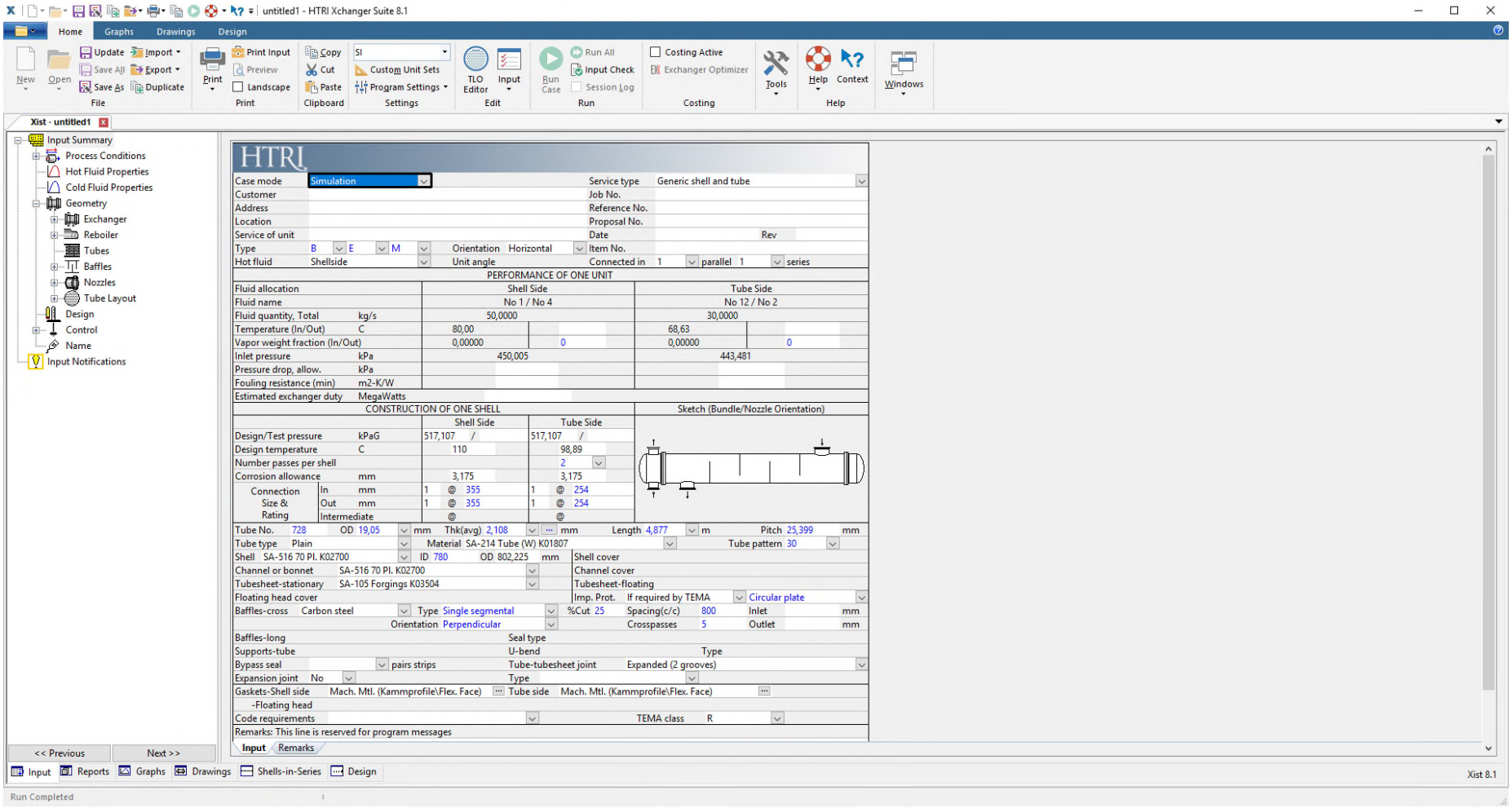
STEP #3: Create your flowsheet

Edit the parameters for each unit operation:



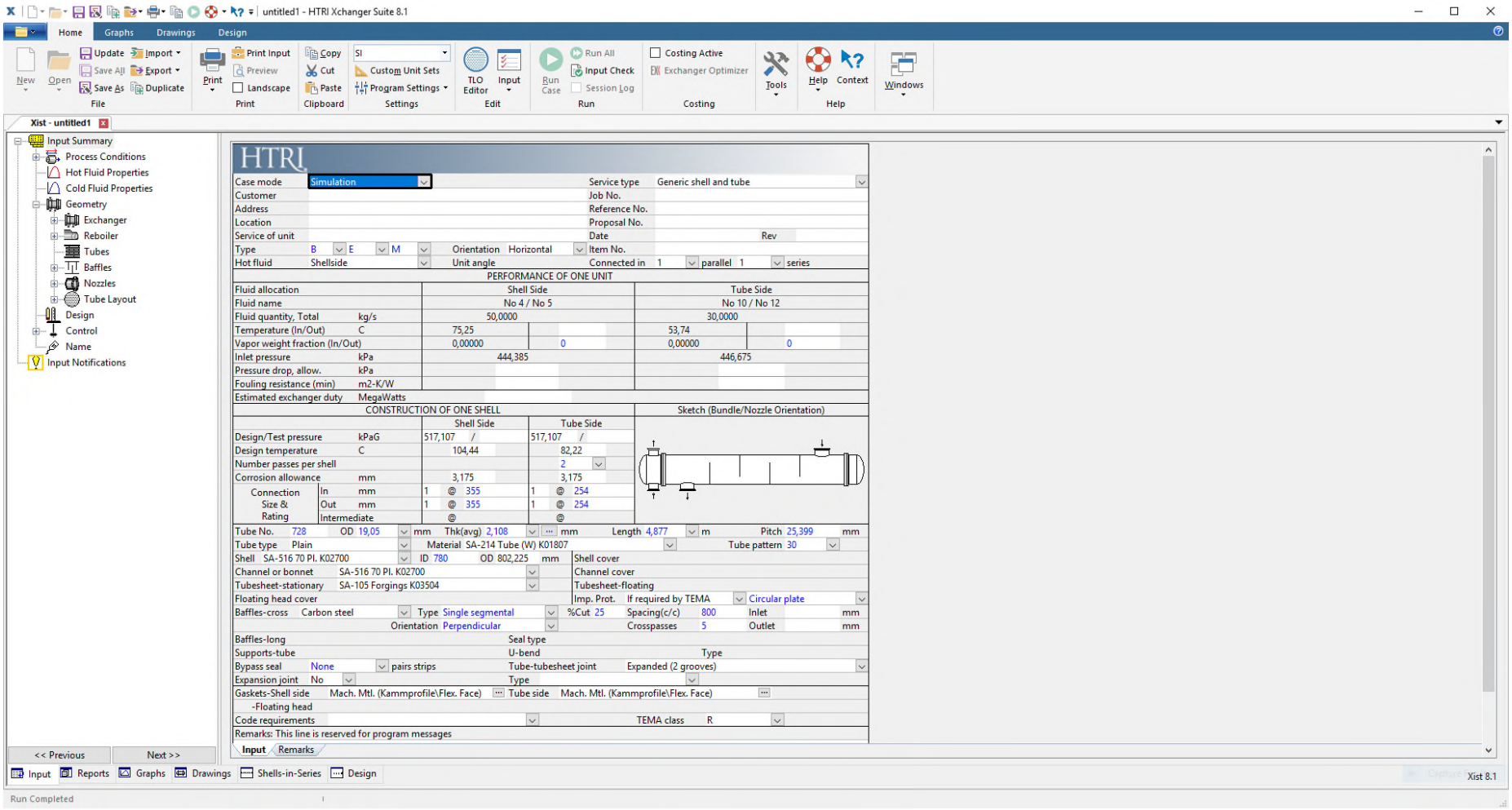
STEP #3: Create your flowsheet

Data for the heat-exchanger (summary) 1



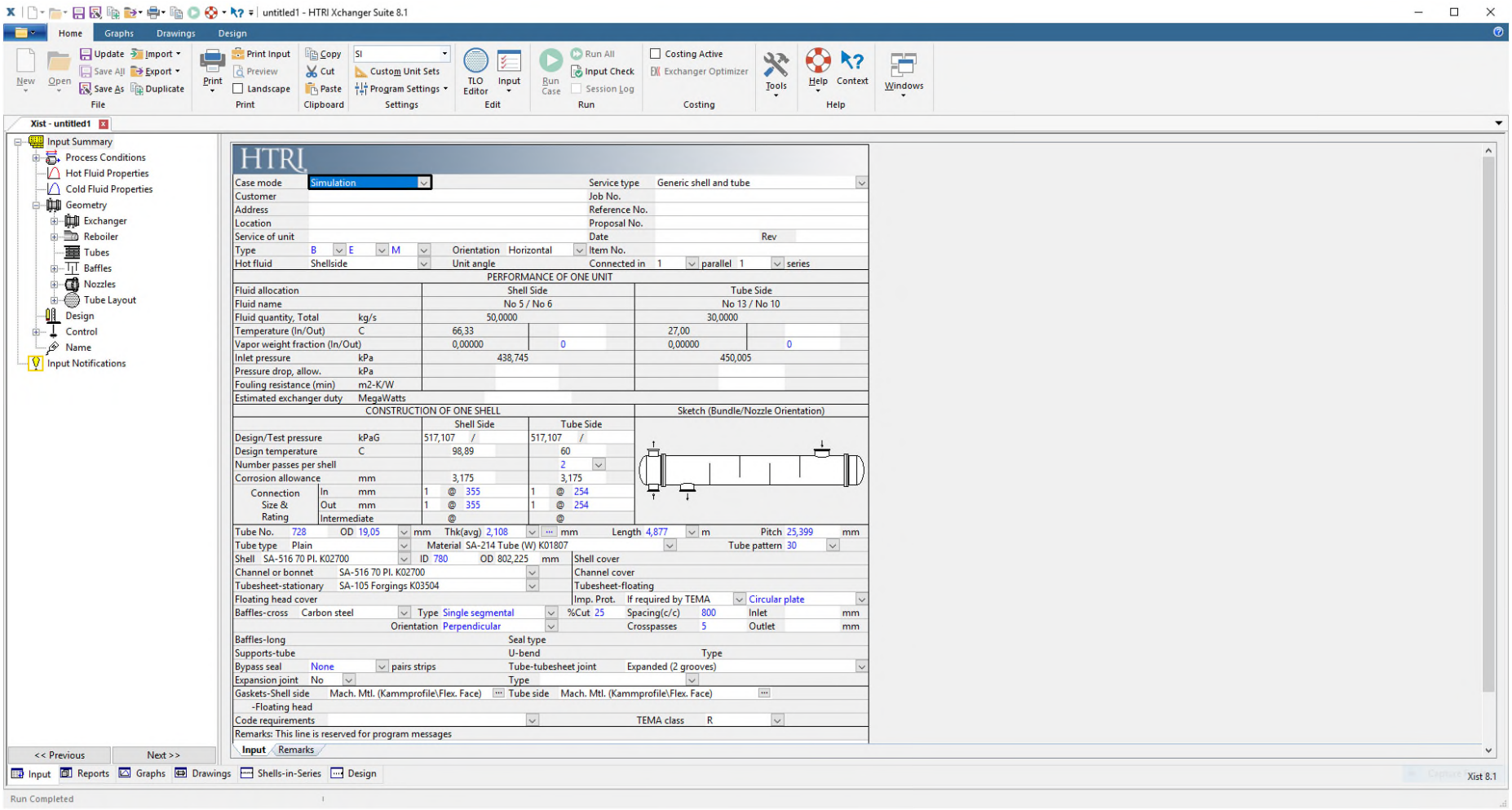
STEP #3: Create your flowsheet

Data for the heat-exchanger (summary) 2



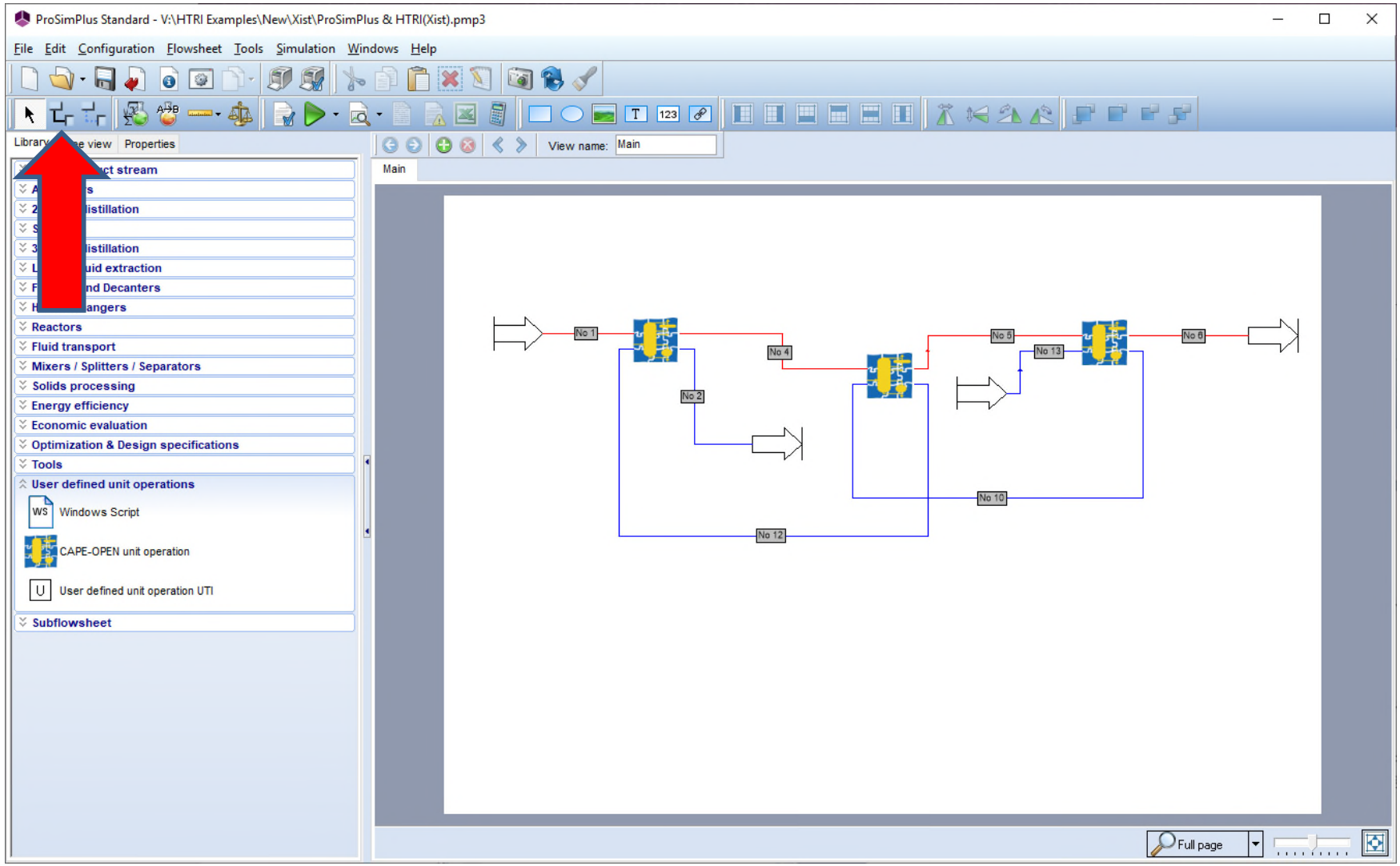
STEP #3: Create your flowsheet

Data for the heat-exchanger (summary) 3



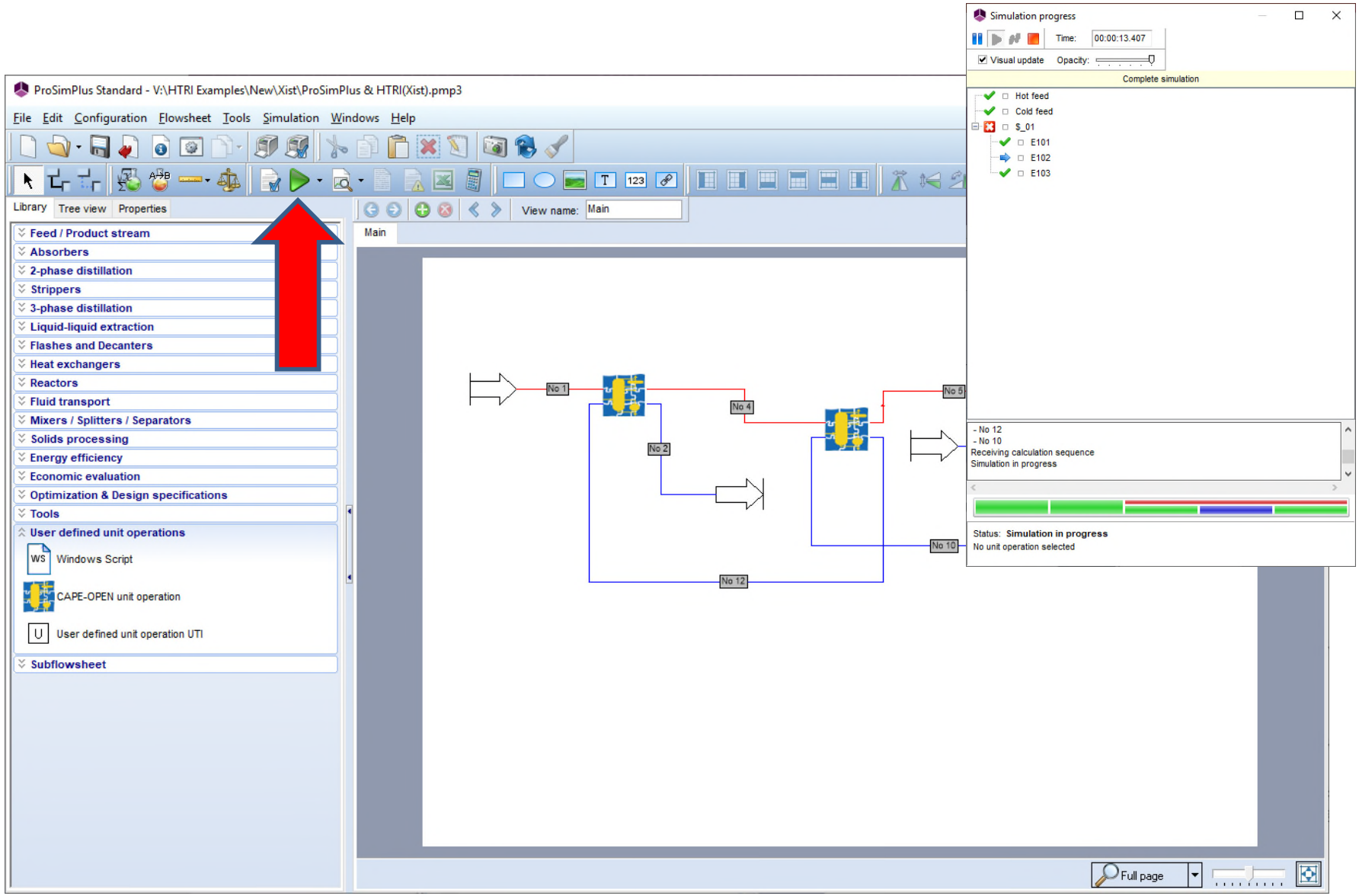
STEP #3: Create your flowsheet

Like for any usual case, connect your material streams between the unit operations:



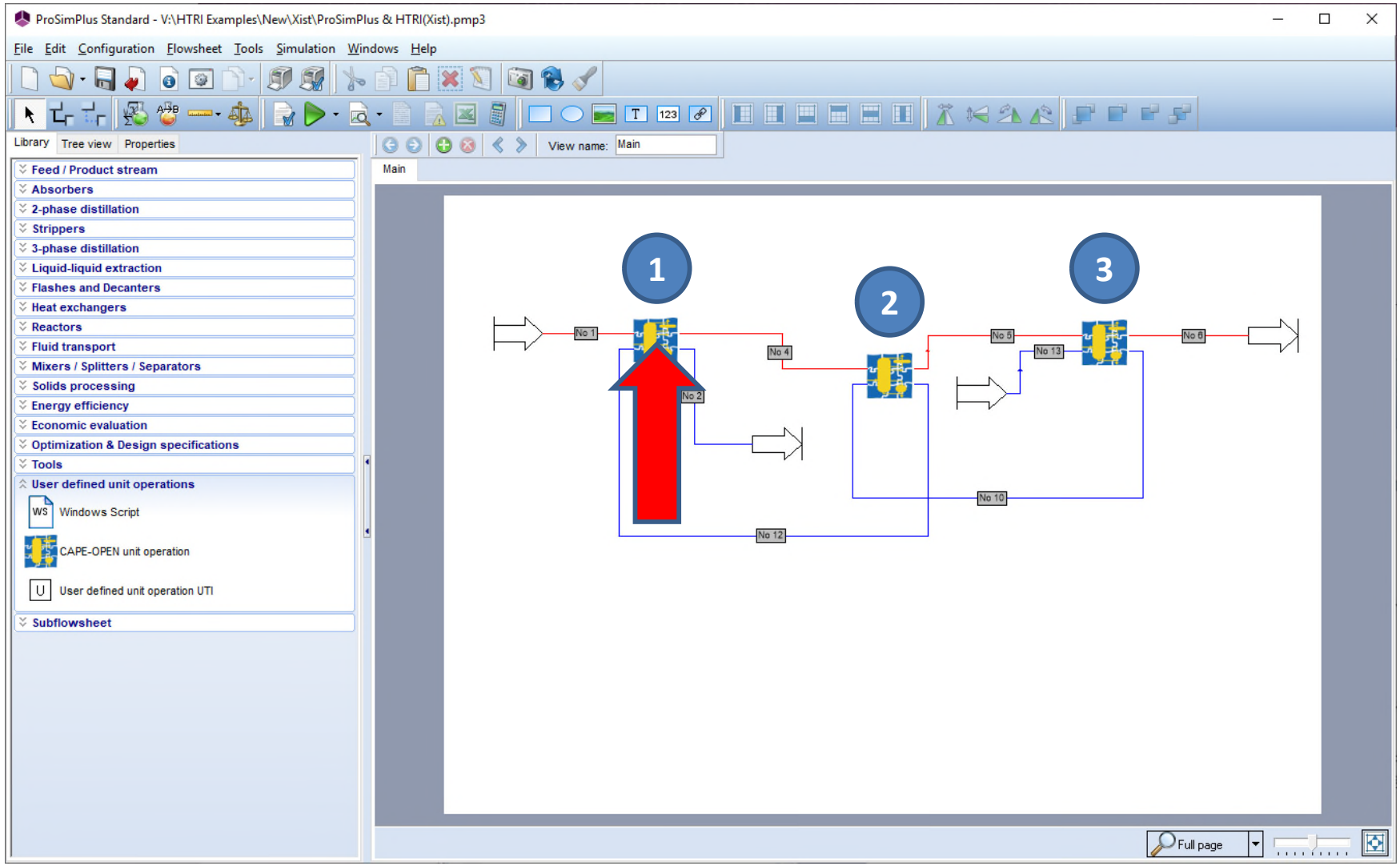
STEP #4: Run the simulation

When the input data is complete, click on the icon to run the simulation:



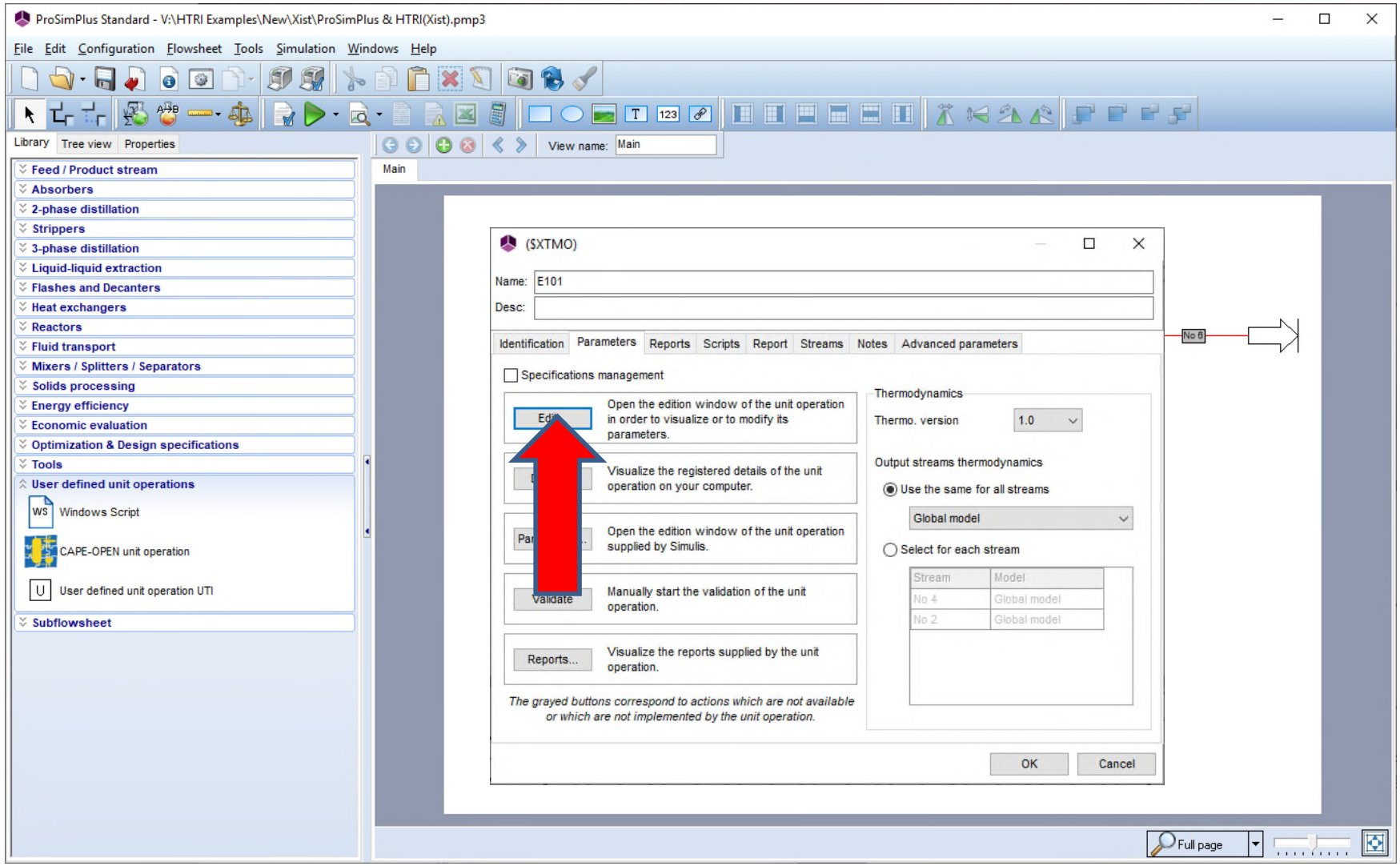
STEP #5: Analyze the results

When the simulation is complete, you can edit the reports for each Xist heat-exchanger with a double-click on the corresponding icon:



STEP #5: Analyze the results

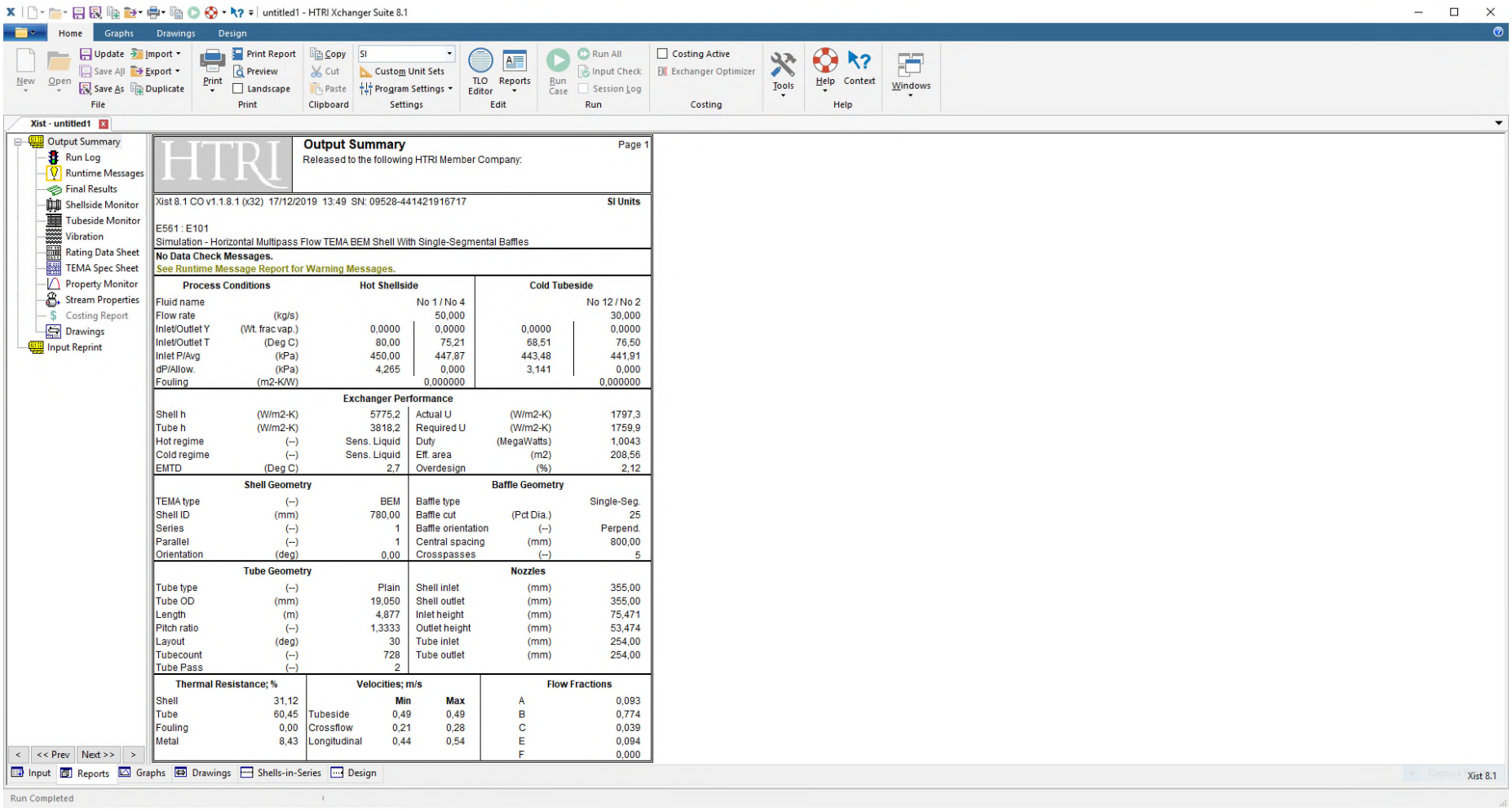
Then click on the "Edit…" button to access to the various specific reports of the Xist heat-exchanger:



STEP #5: Analyze the results

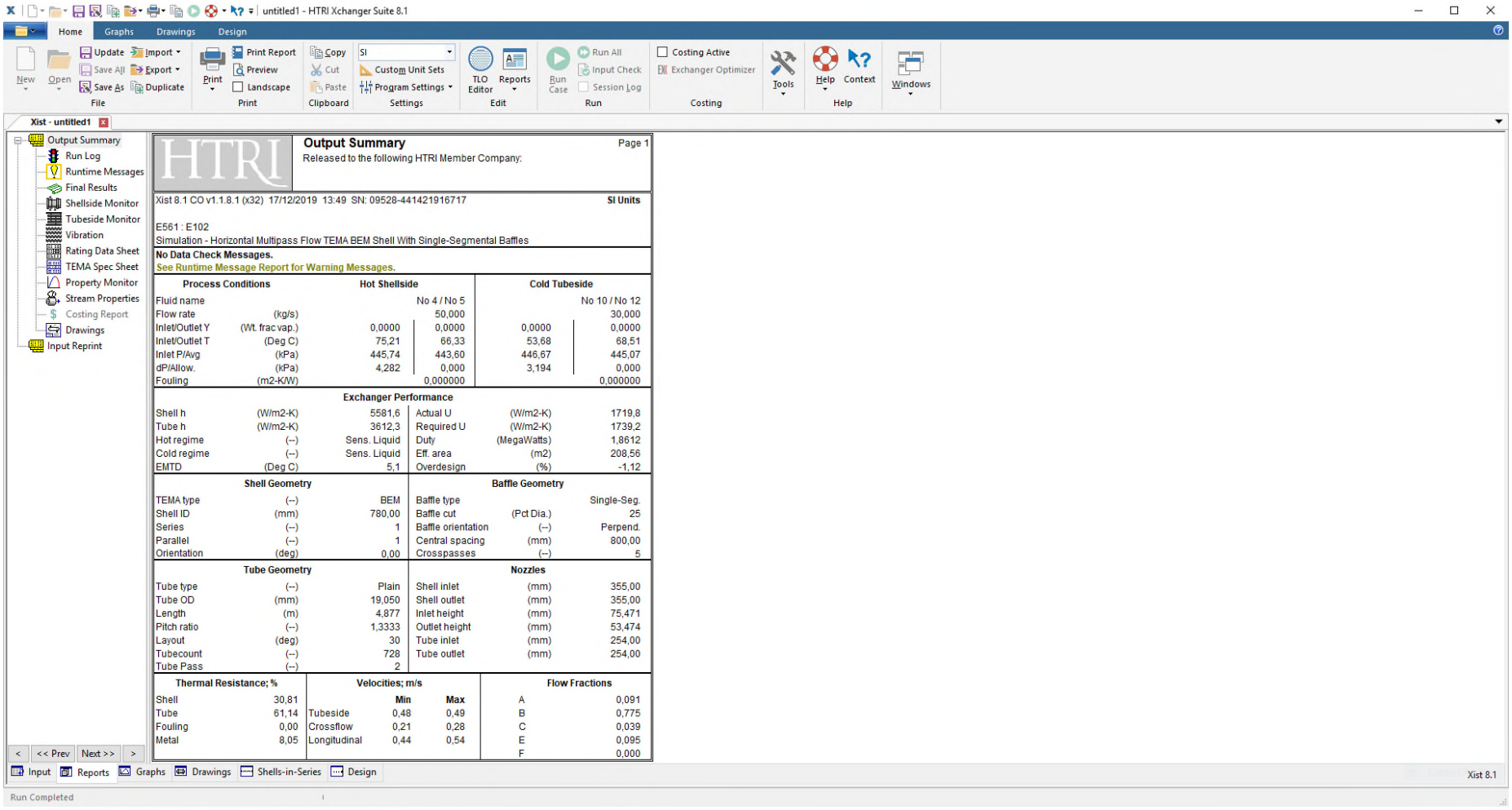
Analyze the reports of your heat-exchanger (see HTRI user guides):

Results (output summary) for the heat-exchanger 1



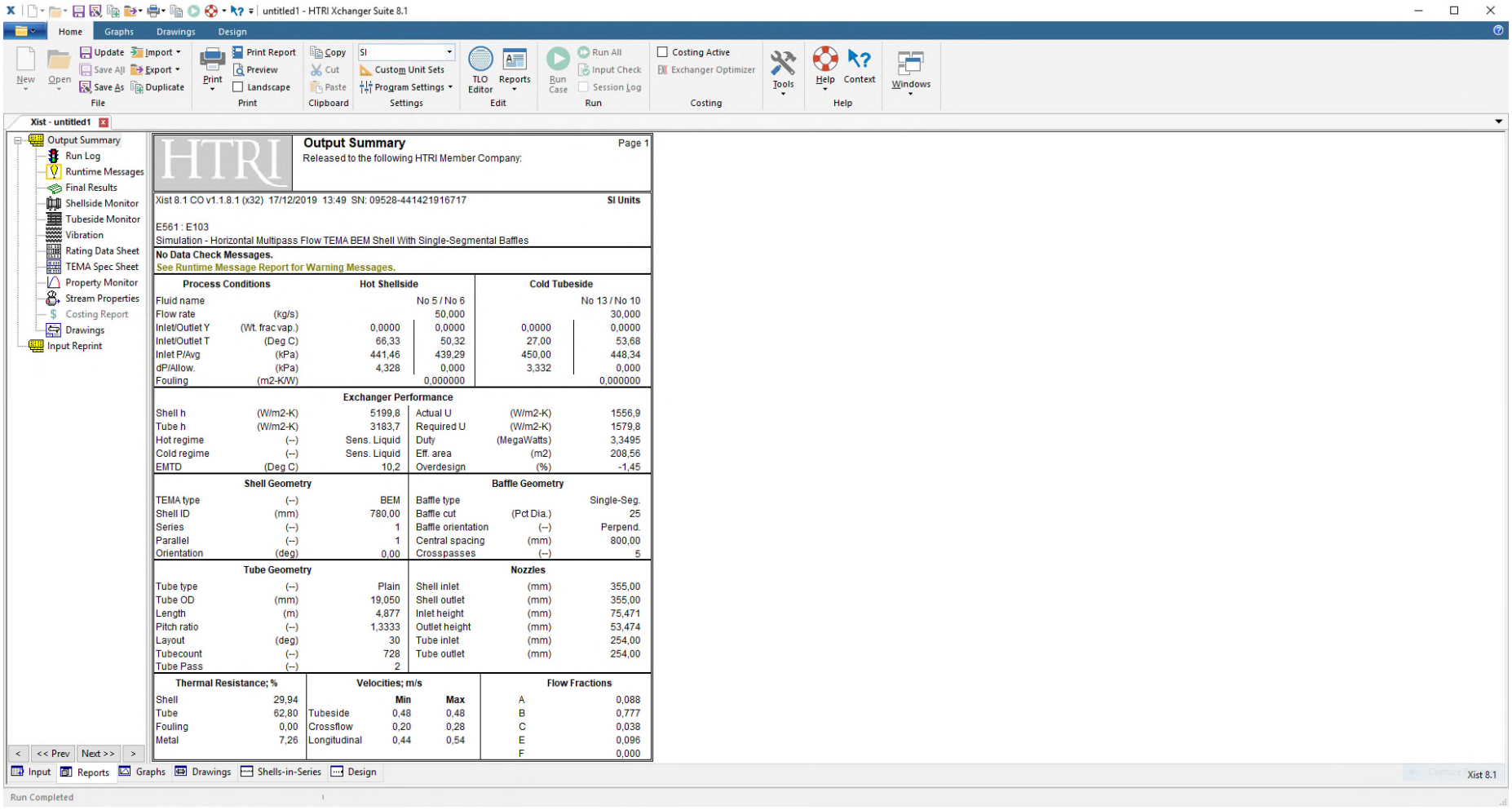
STEP #5: Analyze the results

Results (output summary) for the heat-exchanger 2



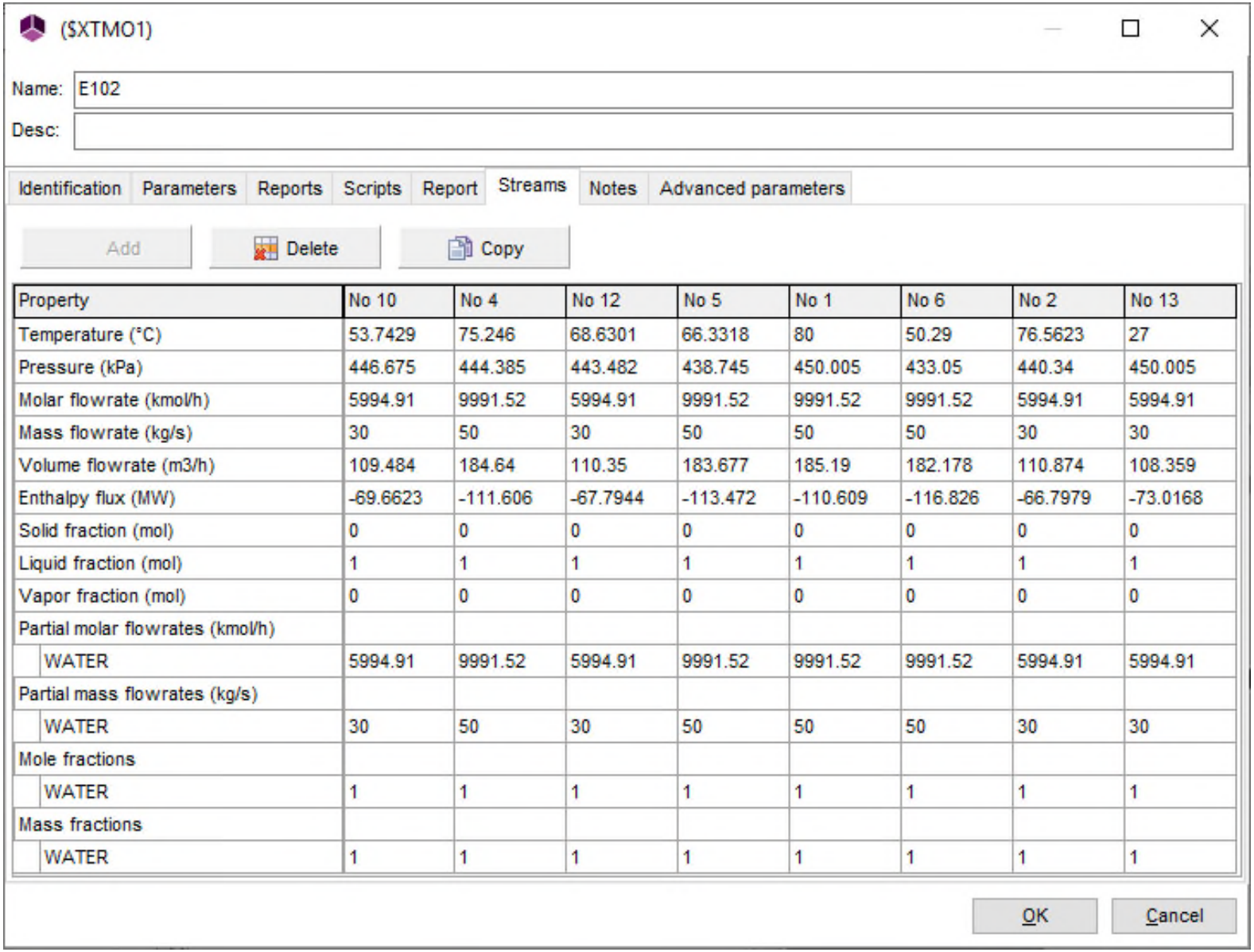
STEP #5: Analyze the results

Results (output summary) for the heat-exchanger 3



STEP #5: Analyze the results

Material streams



Property	No 10	No 4	No 12	No 5	No 1	No 6	No 2	No 13
Temperature (°C)	53.7429	75.246	68.6301	66.3318	80	50.29	76.5623	27
Pressure (kPa)	446.675	444.385	443.482	438.745	450.005	433.05	440.34	450.005
Molar flowrate (kmol/h)	5994.91	9991.52	5994.91	9991.52	9991.52	9991.52	5994.91	5994.91
Mass flowrate (kg/s)	30	50	30	50	50	50	30	30
Volume flowrate (m3/h)	109.484	184.64	110.35	183.677	185.19	182.178	110.874	108.359
Enthalpy flux (MW)	-69.6623	-111.606	-67.7944	-113.472	-110.609	-116.826	-66.7979	-73.0168
Solid fraction (mol)	0	0	0	0	0	0	0	0
Liquid fraction (mol)	1	1	1	1	1	1	1	1
Vapor fraction (mol)	0	0	0	0	0	0	0	0
Partial molar flowrates (kmol/h)								
WATER	5994.91	9991.52	5994.91	9991.52	9991.52	9991.52	5994.91	5994.91
Partial mass flowrates (kg/s)								
WATER	30	50	30	50	50	50	30	30
Mole fractions								
WATER	1	1	1	1	1	1	1	1
Mass fractions								
WATER	1	1	1	1	1	1	1	1

ProSim

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