CL-402: Chemical Process Technology

July-November session, 2018

7th semester, Department of Chemical Engineering

Indian Institute Of Technology Guwahati, Guwahati

Tutorial 1

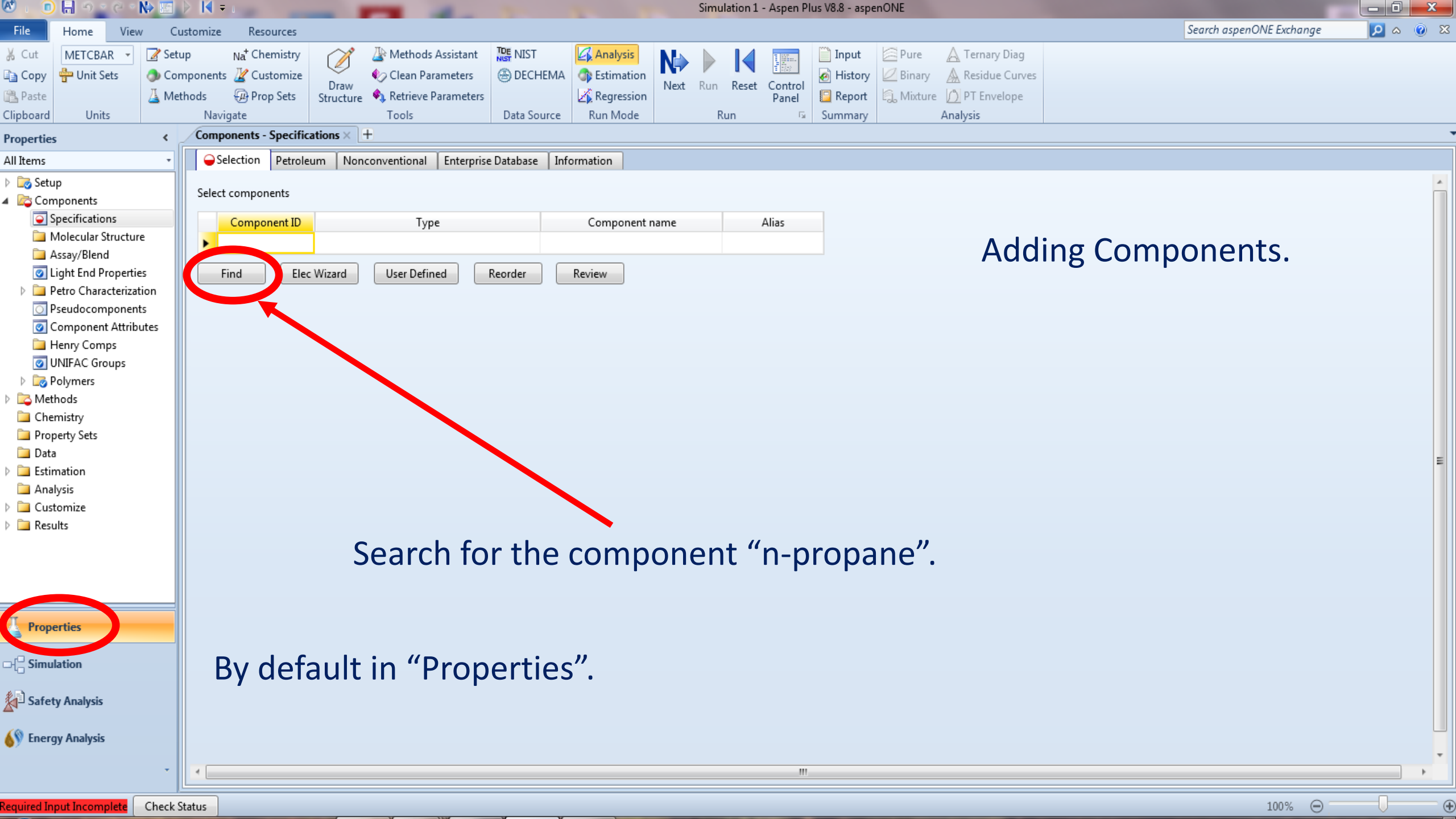
Use Aspen Plus V8.8 to solve all the problems.

1) Develop a process flow sheet for the liquefaction of propane. The process starts with propane vapor at ambient conditions (298 K and 1 bar), which is compressed to 15 bar, cooled back down to 298 K, expanded through an adiabatic valve to 1 bar, and then the resulting gaseous and liquid streams are separated. Use Peng-Robinson equation of state as the thermodynamic model and consider no recycle of the gaseous stream.

2) Repeat Problem 1 with Soave-Redlich-Kwong equation of state. Compare the compressor work required and the amount of liquefied propane produced with the values obtained using the Peng-Robinson equation.

3) Repeat Problem 1 with the Peng-Robinson equation of state using an increased compressor outlet pressure of 20 bar. Compare the compressor work required and the amount of liquefied propane produced with the operation at 15 bar.

4) All the previous examples were once-through calculation. Practically, it would not be acceptable to release the propane vapor leaving the separator to the atmosphere as propane is explosive as well as valuable resource. A simple way to deal with this is to recycle the propane vapor back into the process by mixing it with the feed and returning it to the compressor. This would increase the flows of all the process streams, since they would now be the sum of the feed flow and the recycle flow, increase the work needed in the compressor, and affect the heat to be removed in the heat exchanger, but would have the advantage that only liquid propane would be produced in the process. Repeat Problem 1 with recycle calculation using the Peng-Robinson equation of state. Compare the compressor work required and the amount of liquefied propane produced against the once-through operation.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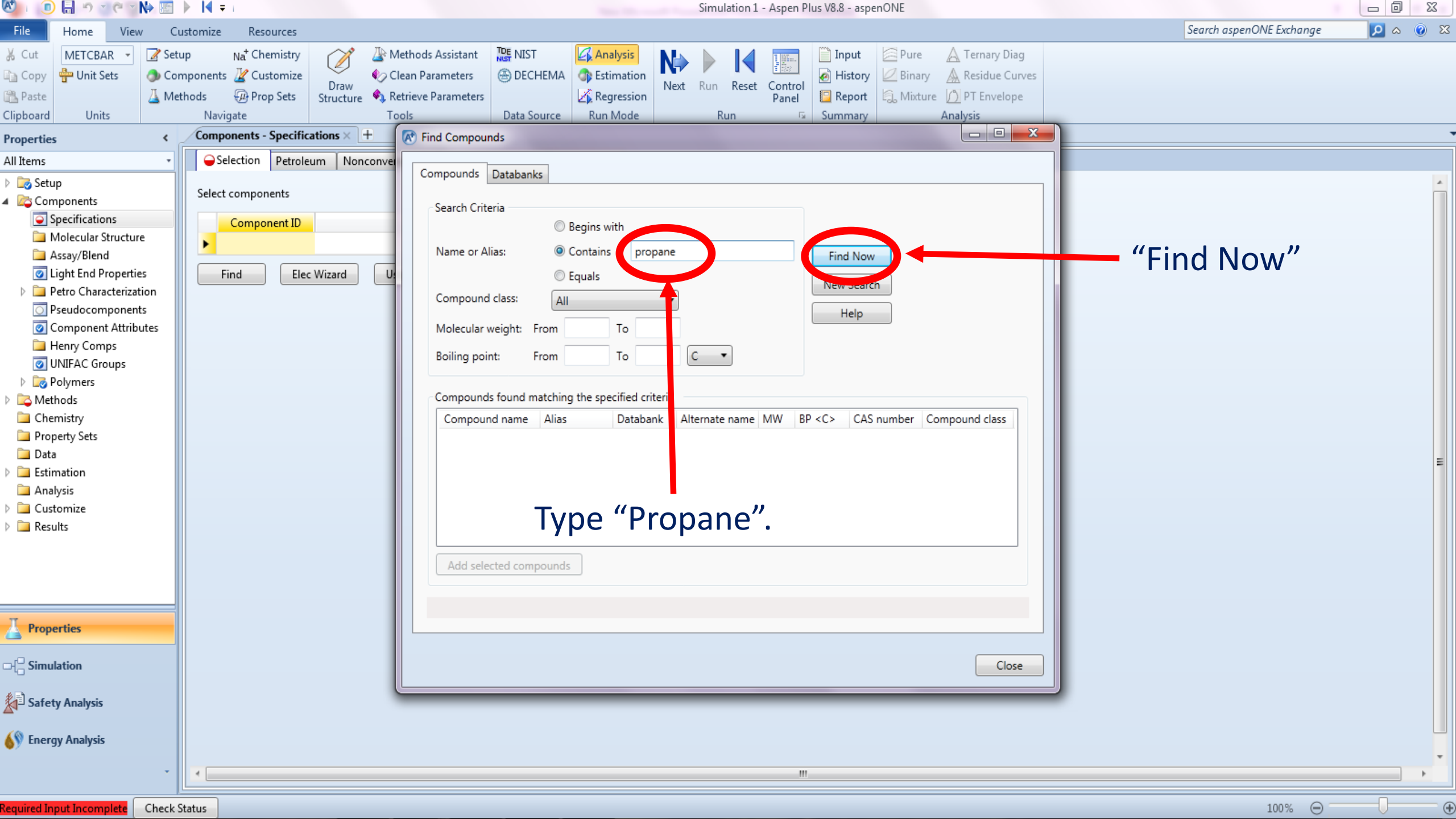
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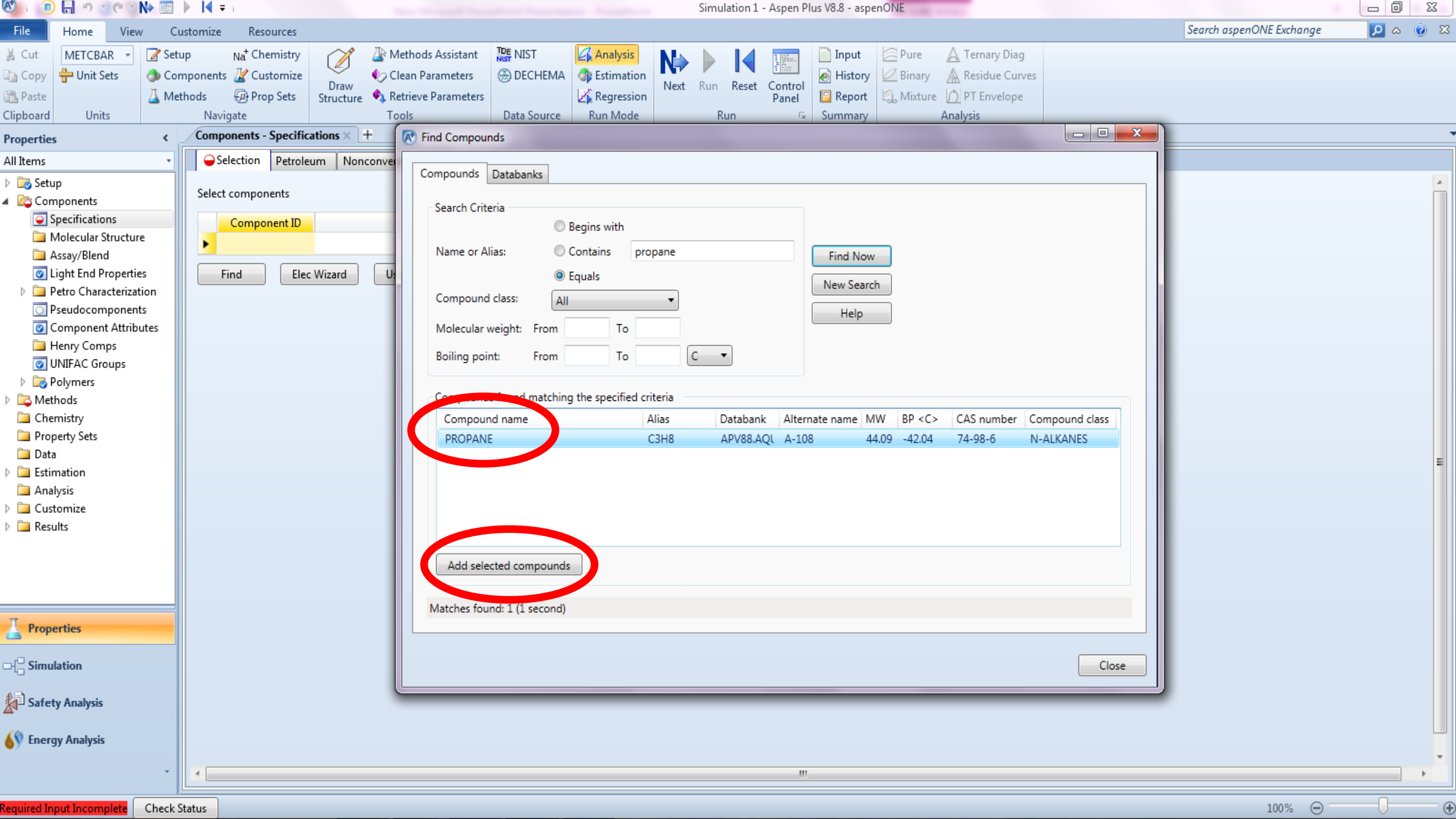
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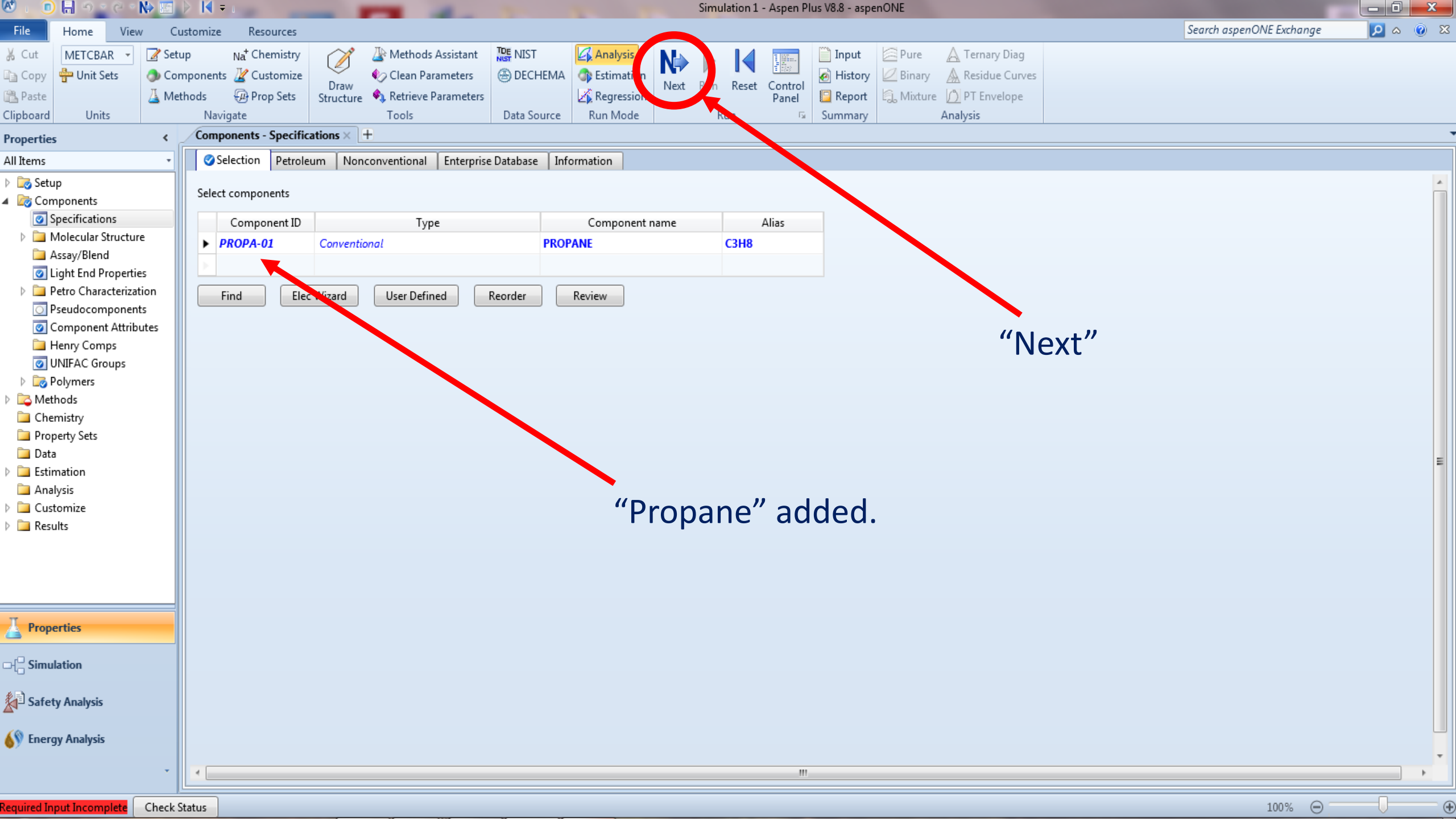
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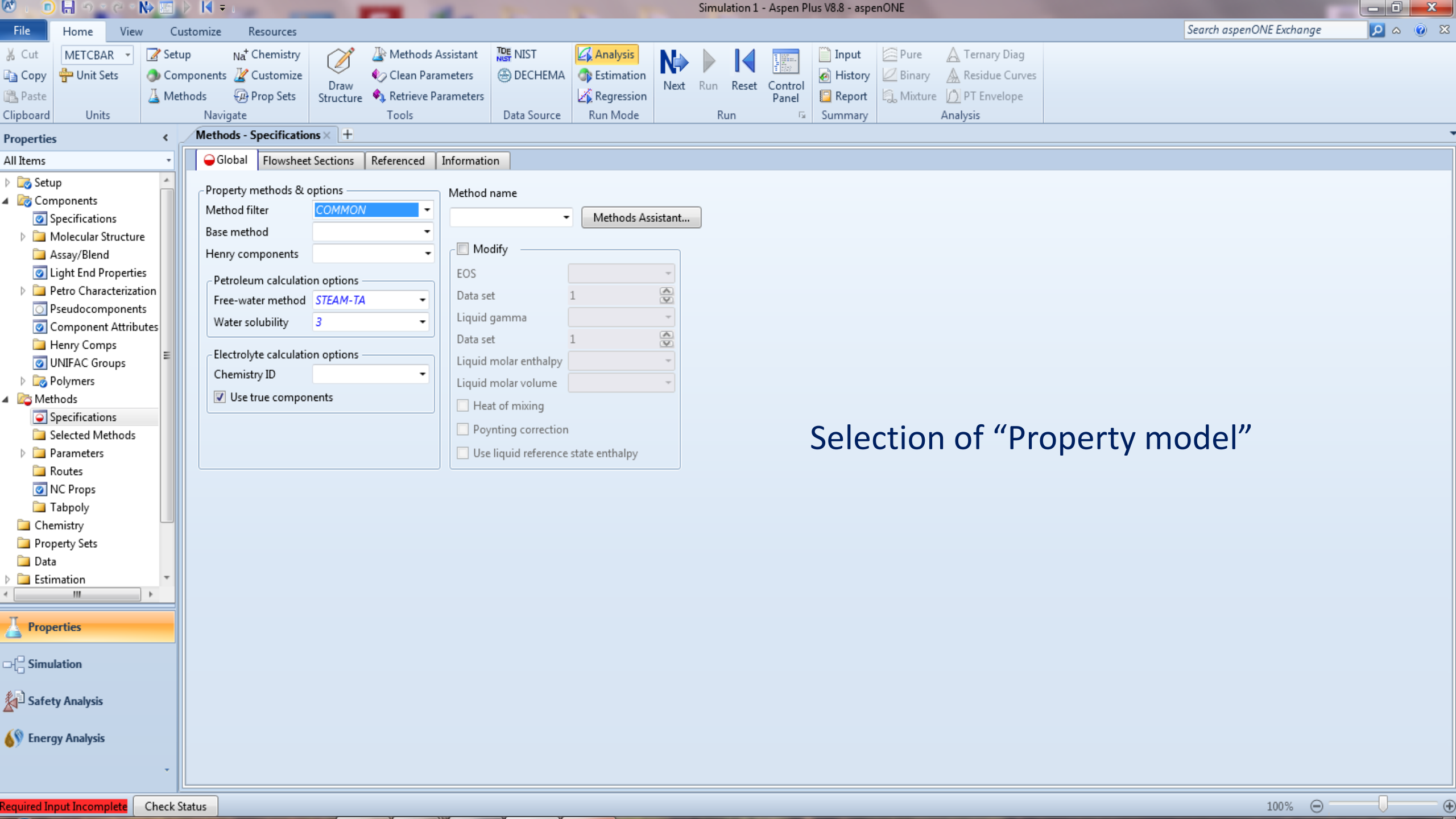
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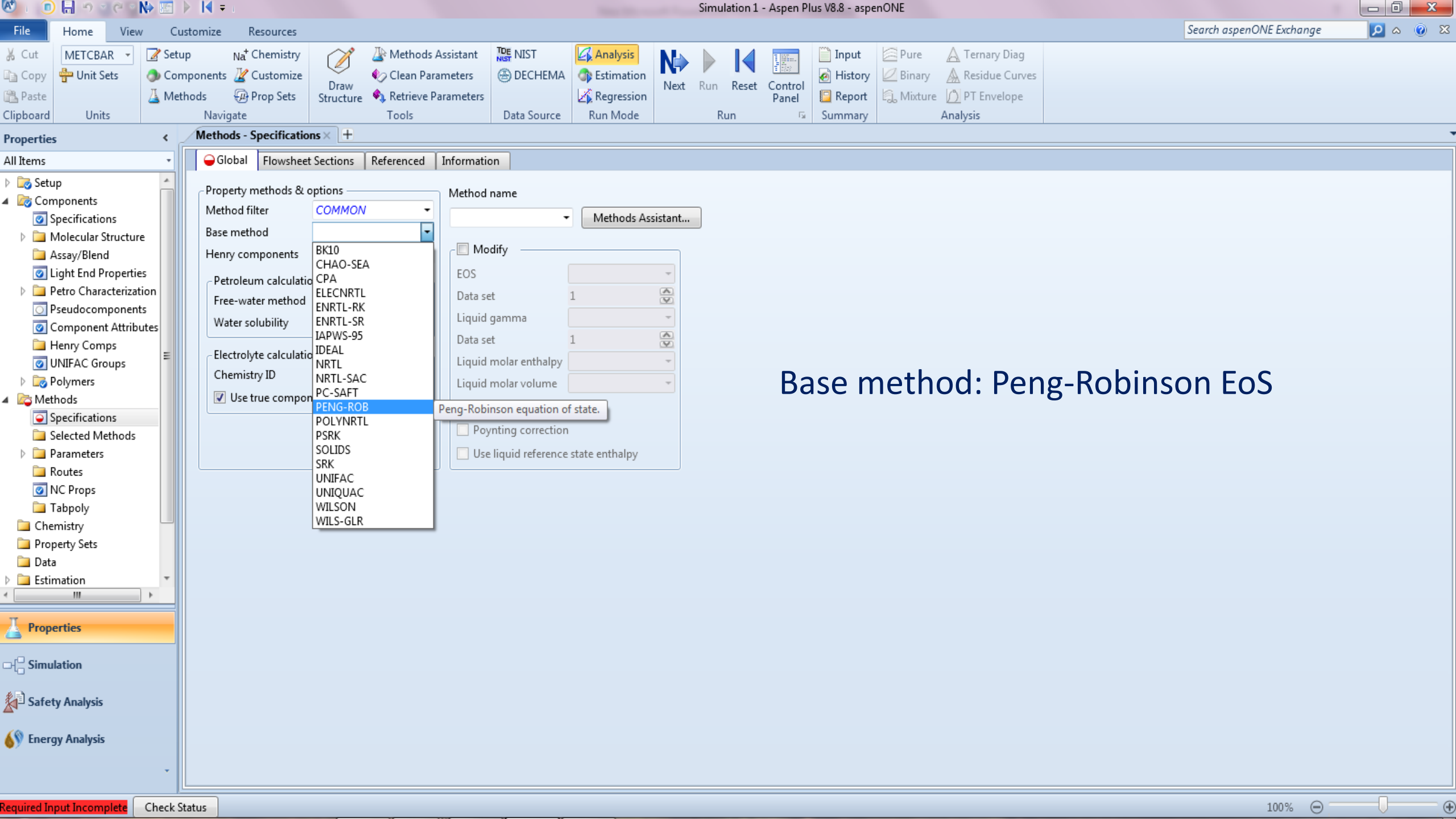
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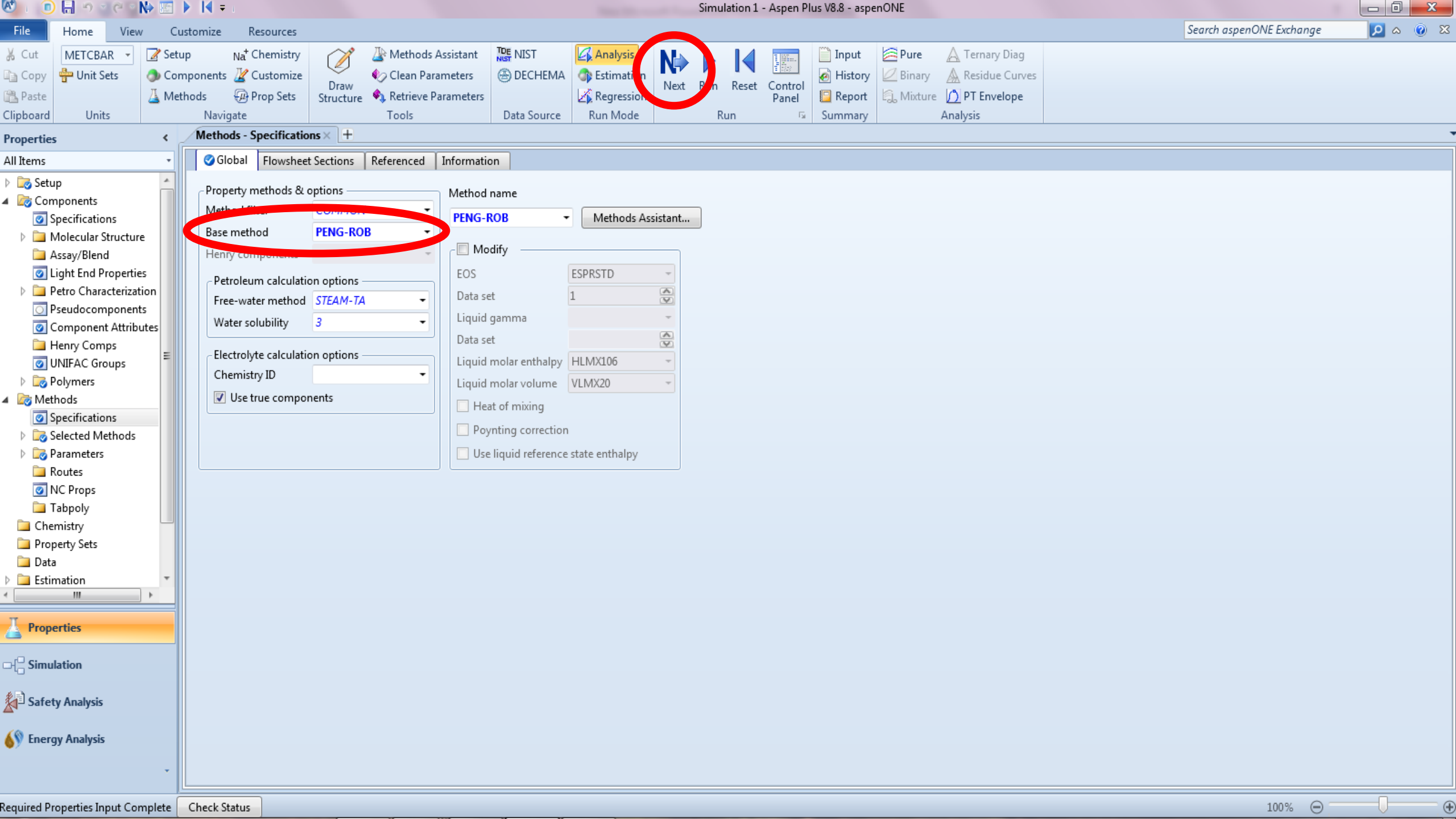
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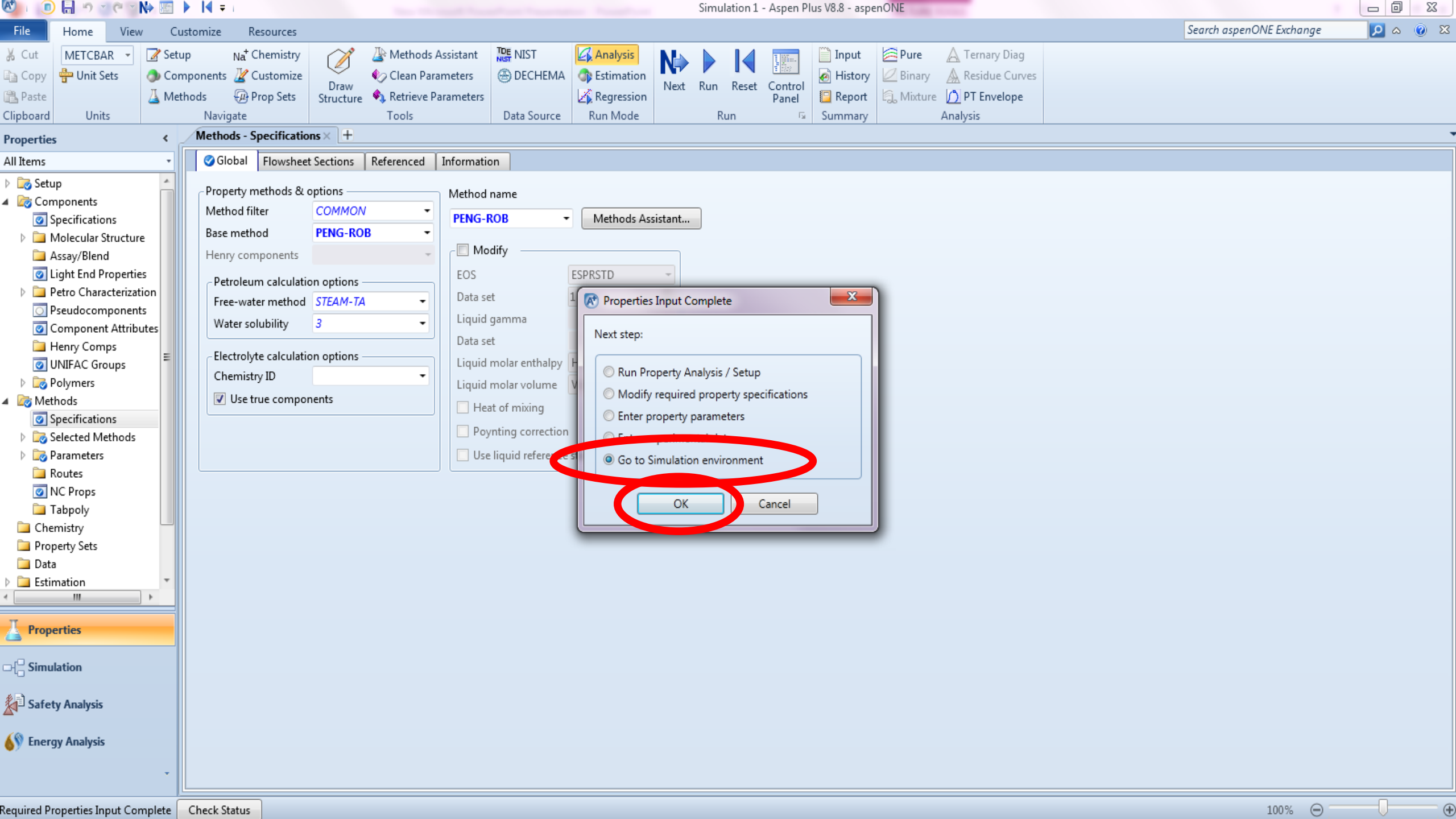
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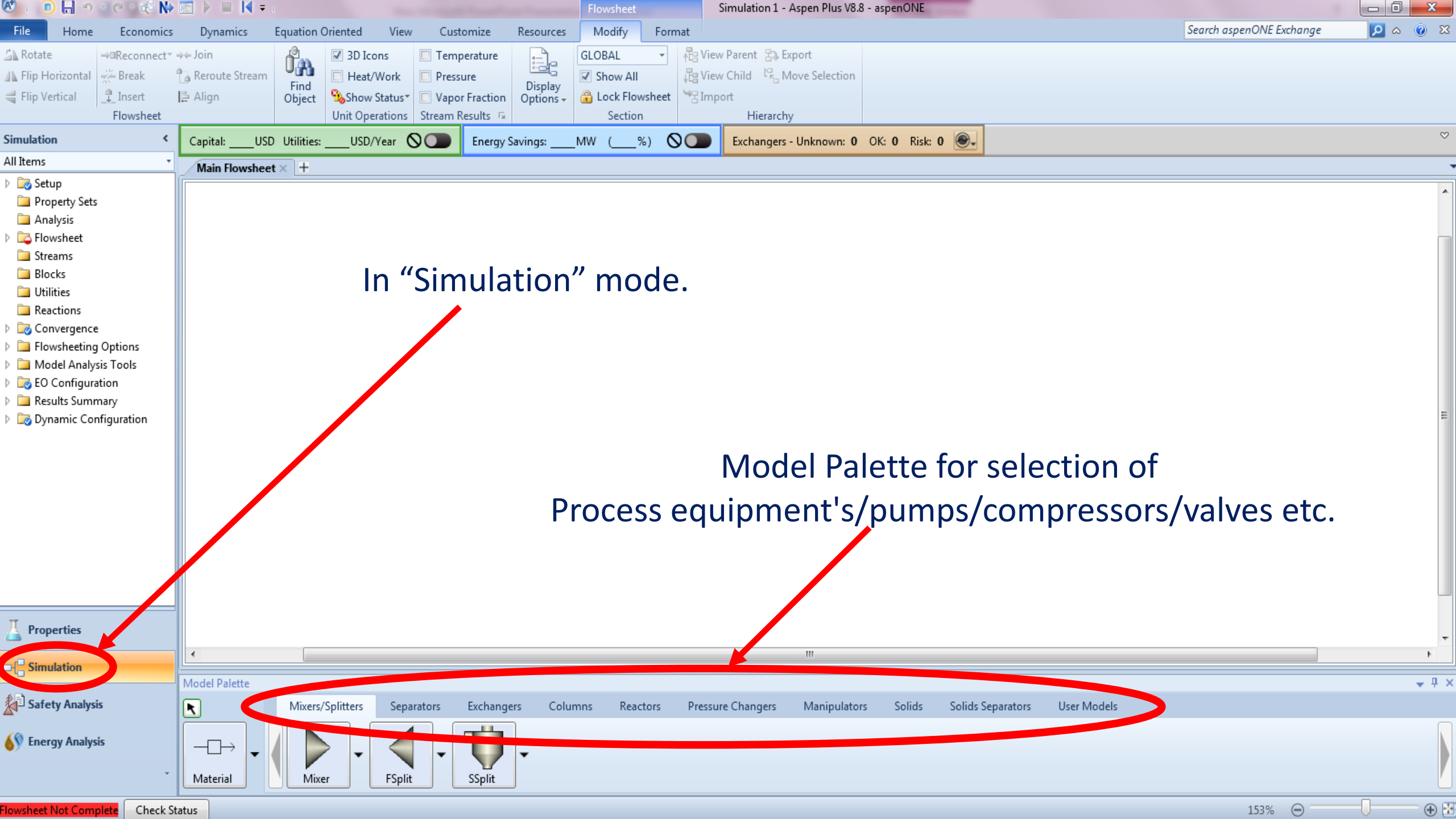
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Dynamic Configuration
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Energy Savings: ___MW (___%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
In “Simulation” mode.
Model Palette for selection of
Process equipment's/pumps/compressors/valves etc.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
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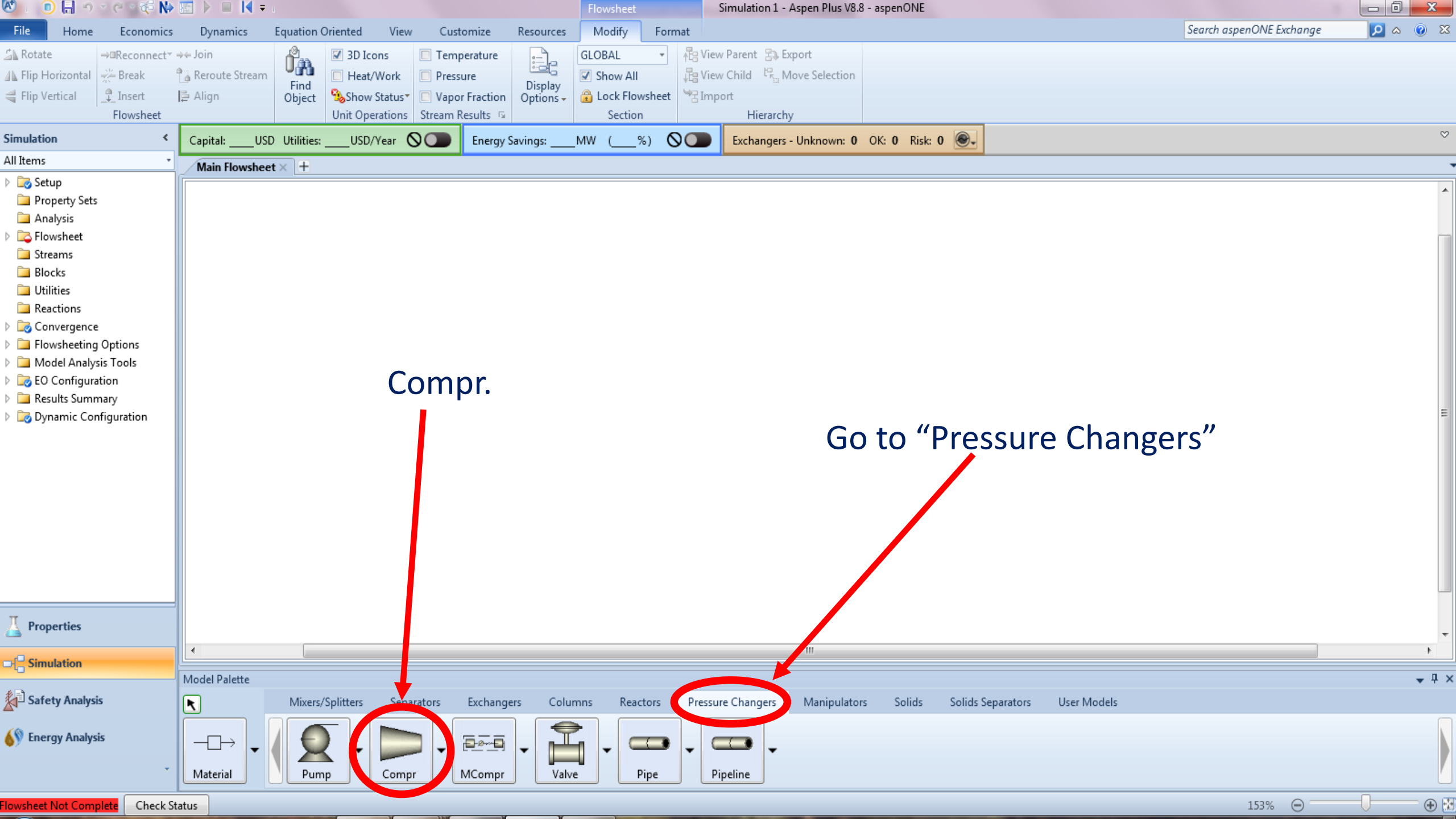
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Main Flowsheet
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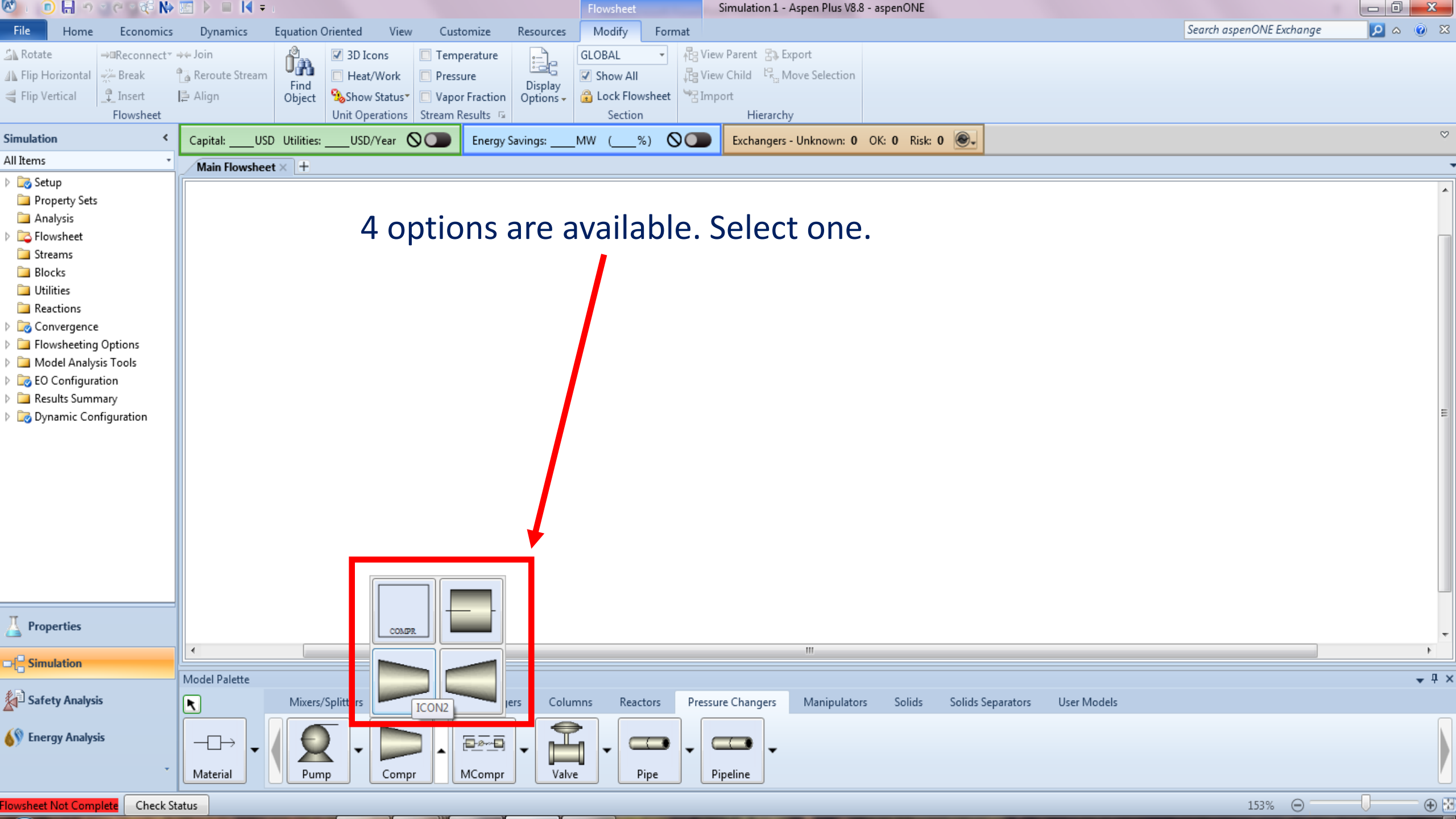
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Main Flowsheet
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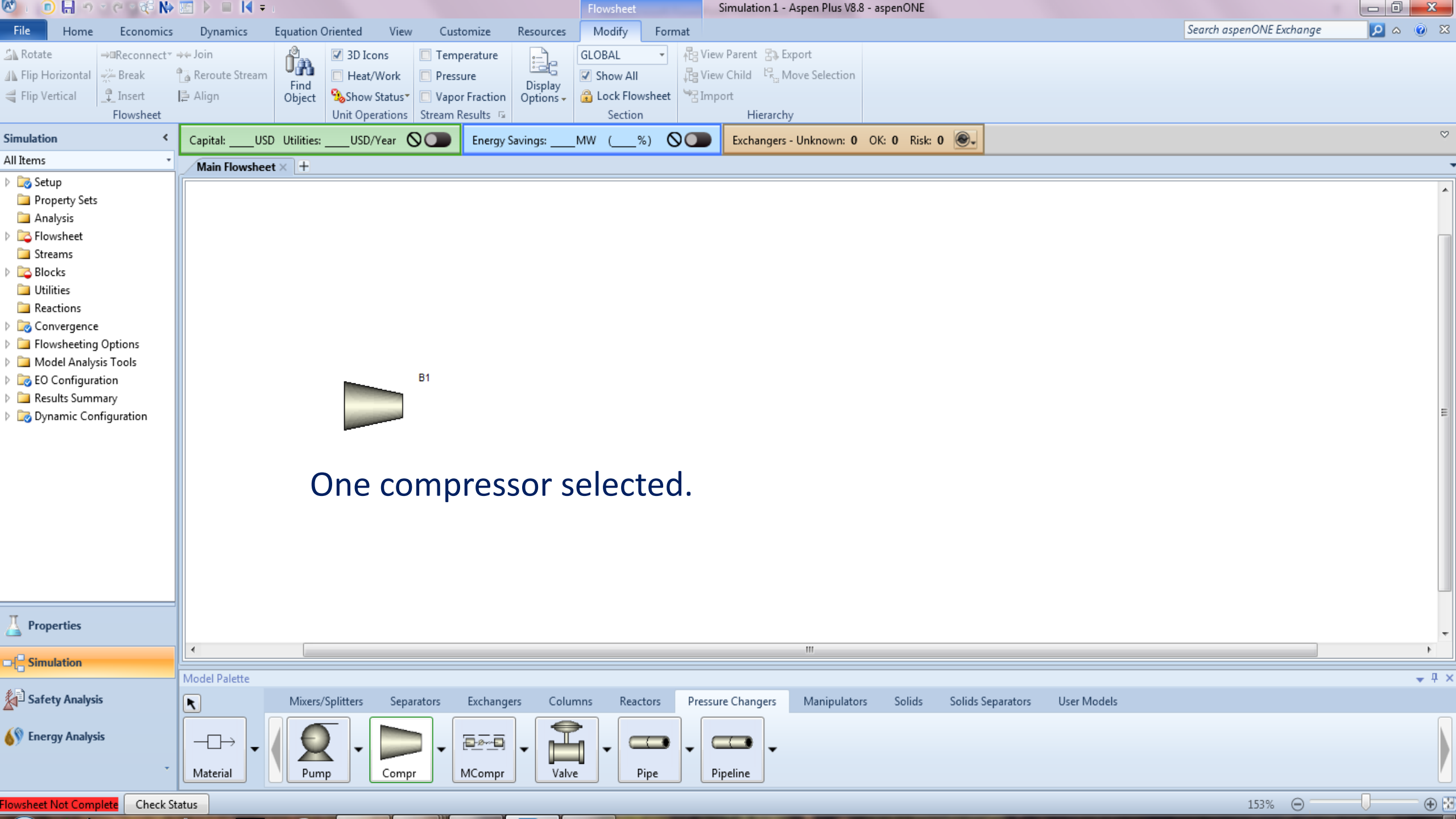
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EO Configuration
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Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
One compressor selected.
Properties
Simulation
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Model Palette
Mixers/Splitters
Separators
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Pressure Changers
Manipulators
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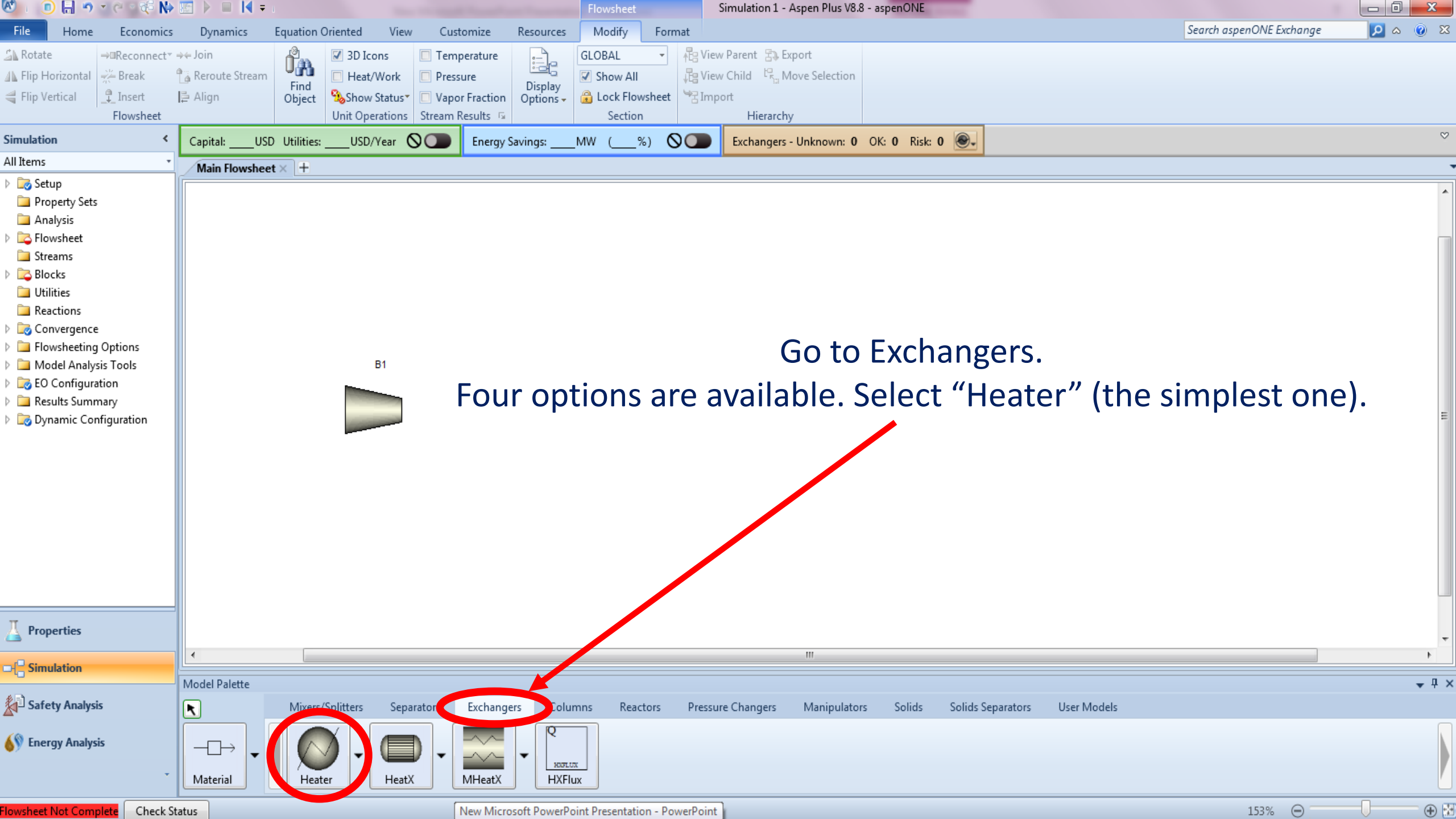
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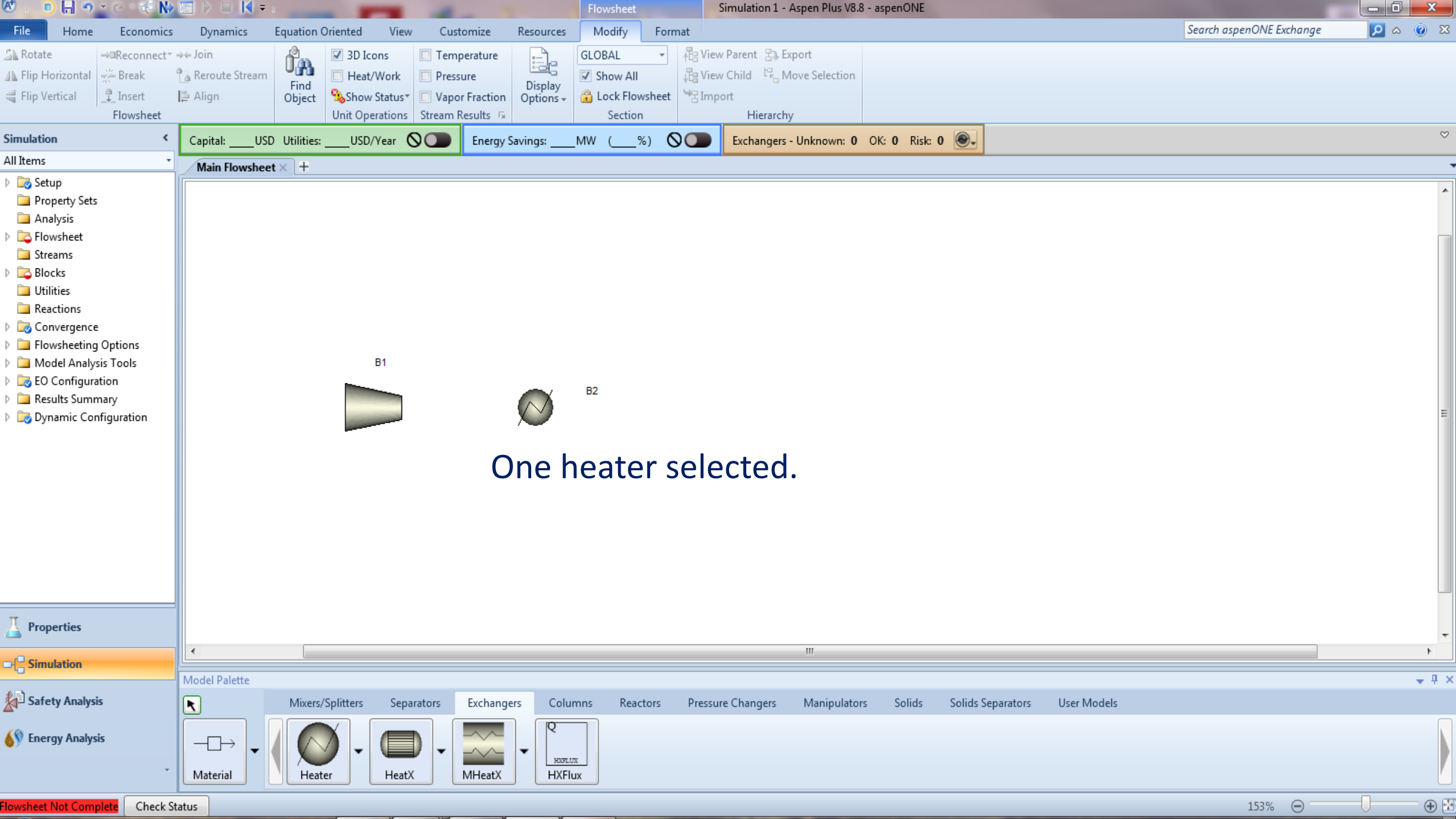
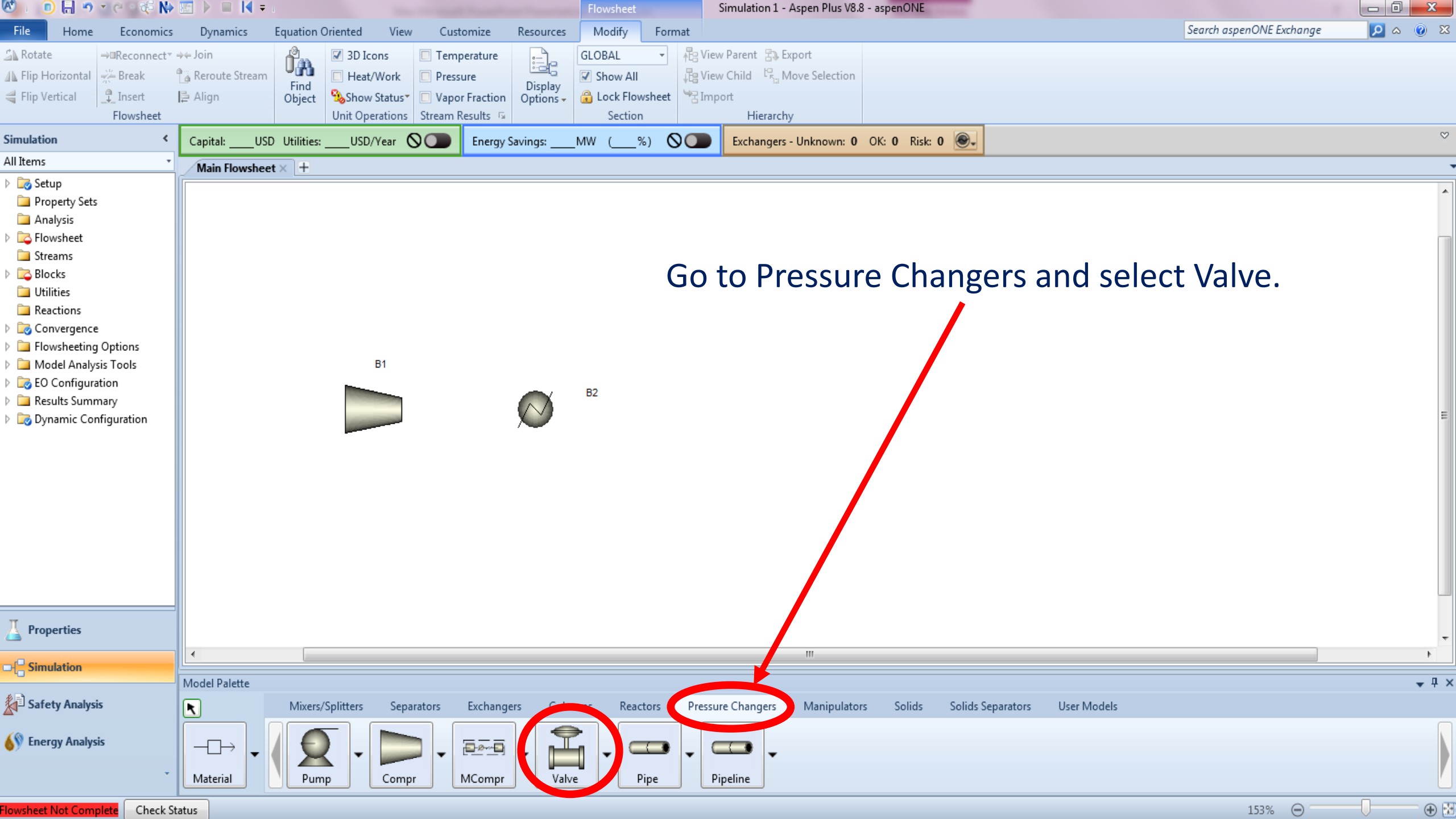
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
Go to Exchangers.
Four options are available. Select “Heater” (the simplest one).
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Heater
HeatX
MHeatX
HXFlux
Properties
Simulation
Safety Analysis
Energy Analysis
Flowsheet Not Complete
Check Status
New Microsoft PowerPoint Presentation - PowerPoint
153%


Flowsheet
Simulation 1 - Aspen Plus V8.8 - aspenONE
File
Home
Economics
Dynamics
Equation Oriented
View
Customize
Resources
Modify
Format
Search aspenONE Exchange
Rotate
Flip Horizontal
Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
B2
One heater selected.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Heater
HeatX
MHeatX
HXFlux
Flowsheet Not Complete
Check Status
153%


Flowsheet
Simulation 1 - Aspen Plus V8.8 - aspenONE
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Reconnect
Break
Insert
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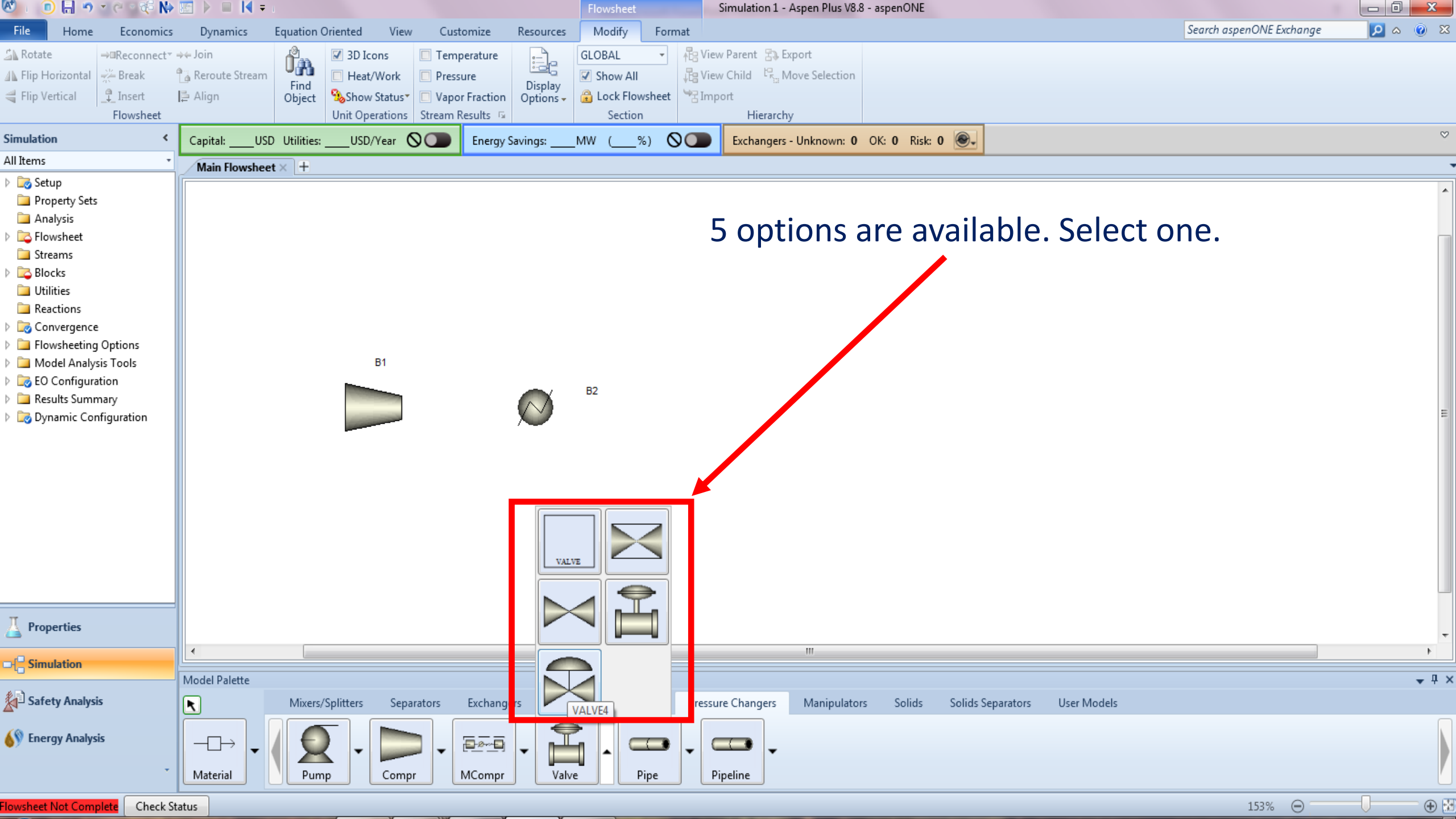
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
B2
Go to Pressure Changers and select Valve.
Model Palette
Mixers/Splitters
Separators
Exchangers
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Pump
Compr
MCompr
Valve
Pipe
Pipeline
Properties
Simulation
Safety Analysis
Energy Analysis
Flowsheet Not Complete
Check Status
153%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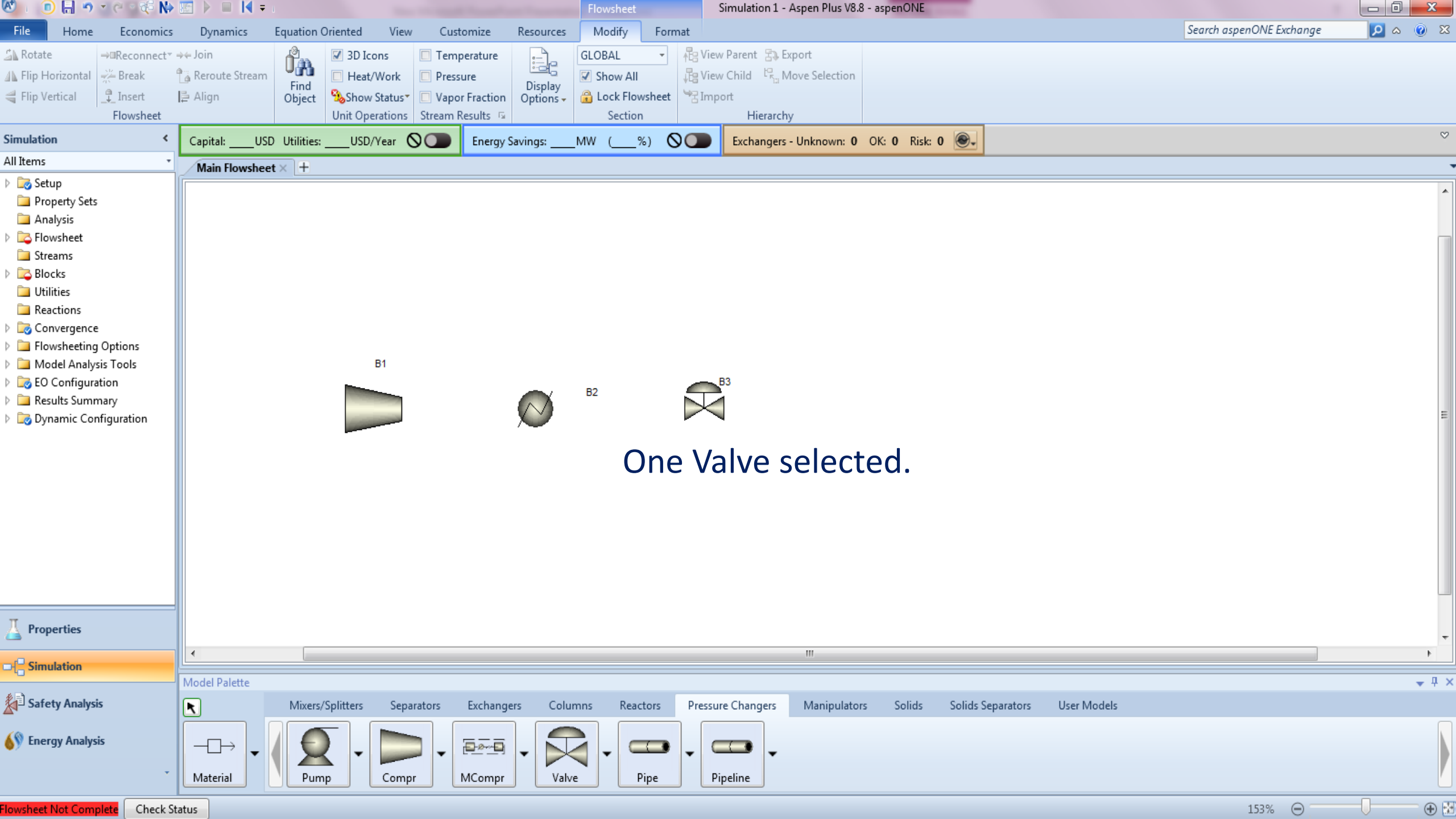
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ___USD Utilities: ___USD/Year
Energy Savings: ___MW (___%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
5 options are available. Select one.
B1
B2
VALVE
VALVE4
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Pump
Compr
MCompr
Valve
Pipe
Pipeline
Flowsheet Not Complete
Check Status
153%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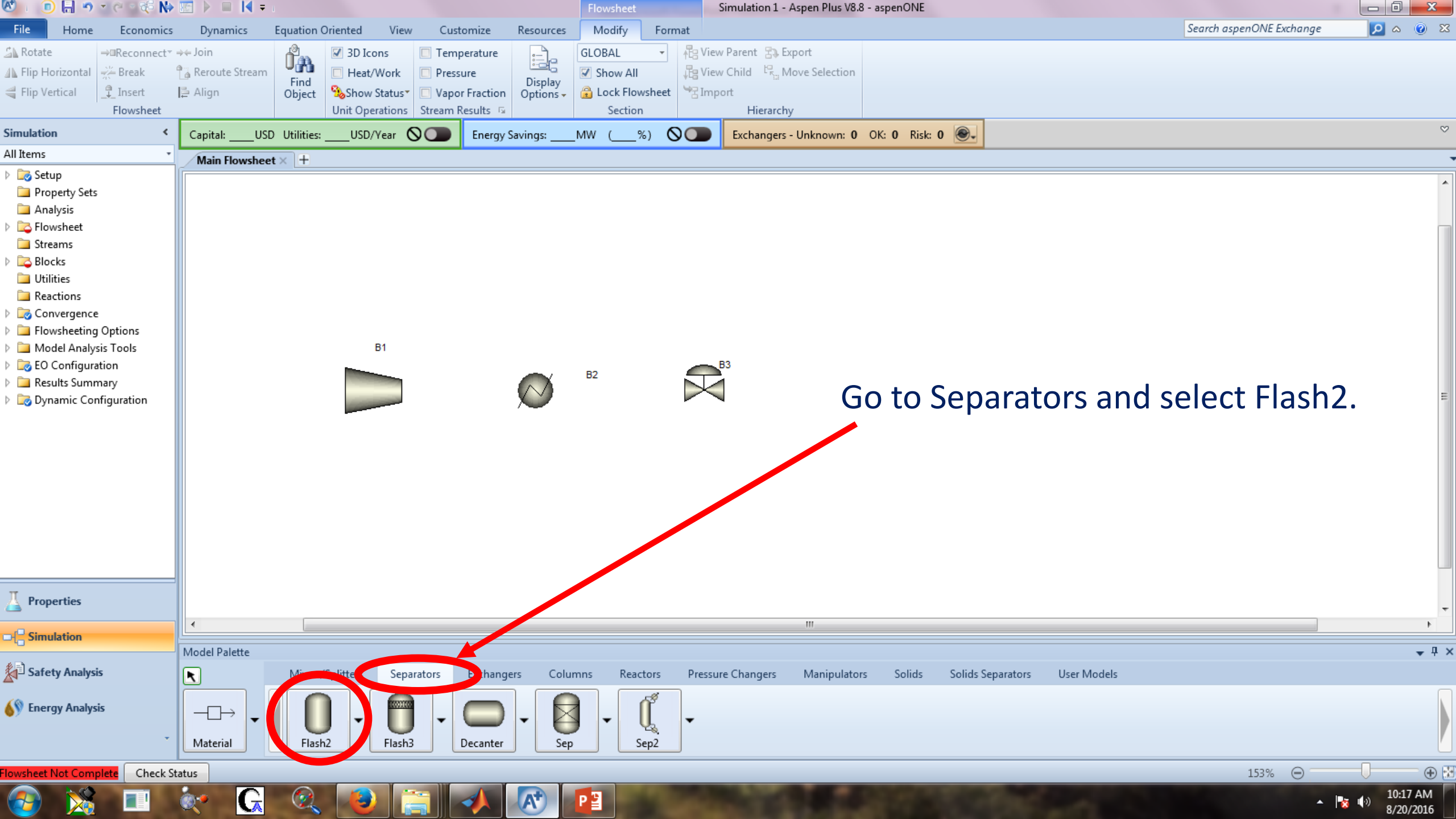
Search aspenONE Exchange
Rotate
Flip Horizontal
Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
B2
B3
One Valve selected.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Pump
Compr
MCompr
Valve
Pipe
Pipeline
Flowsheet Not Complete
Check Status
153%


Flowsheet
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Rotate
Flip Horizontal
Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
B2
B3
Go to Separators and select Flash2.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Separators
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Flowsheet Not Complete
Check Status
153%
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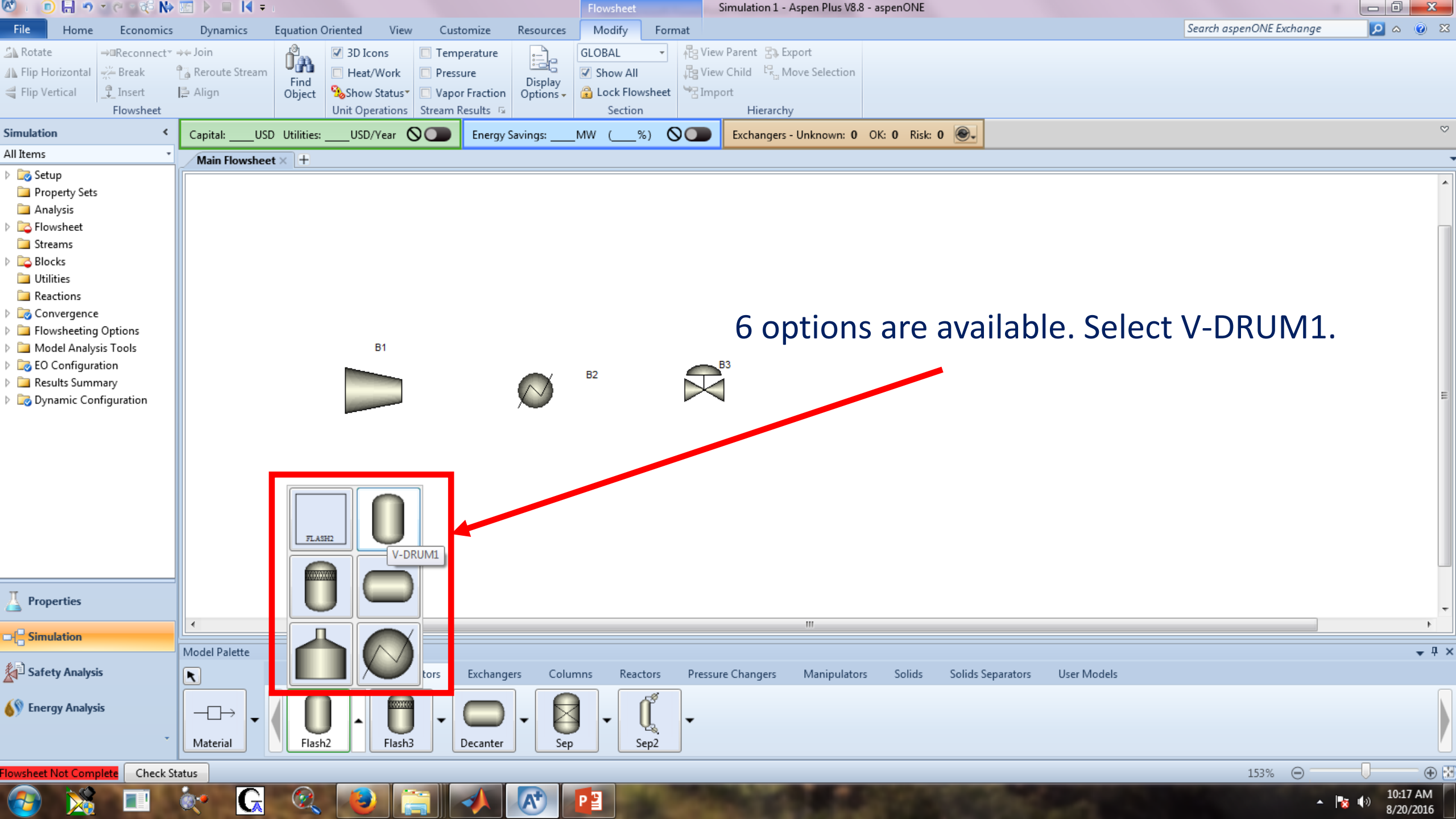
8/20/2016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Reroute Stream
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Flowsheet
Find Object
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Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
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Show All
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View Parent
View Child
Import
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Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
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Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
B2
B3
6 options are available. Select V-DRUM1.
FLASH2
V-DRUM1
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Flowsheet Not Complete
Check Status
153%
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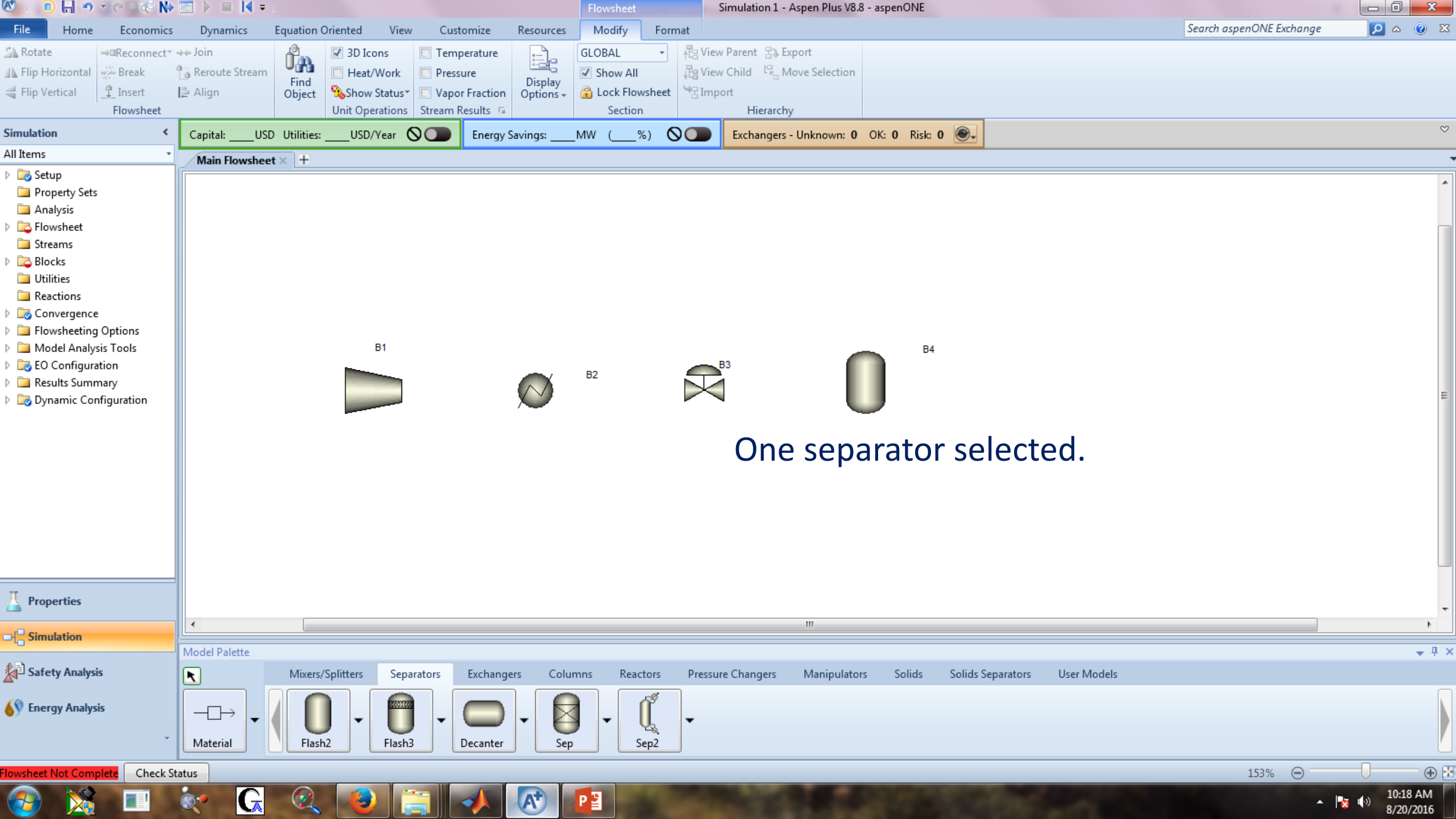
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Flip Horizontal
Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
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View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
B2
B3
B4
One separator selected.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Flowsheet Not Complete
Check Status
153%
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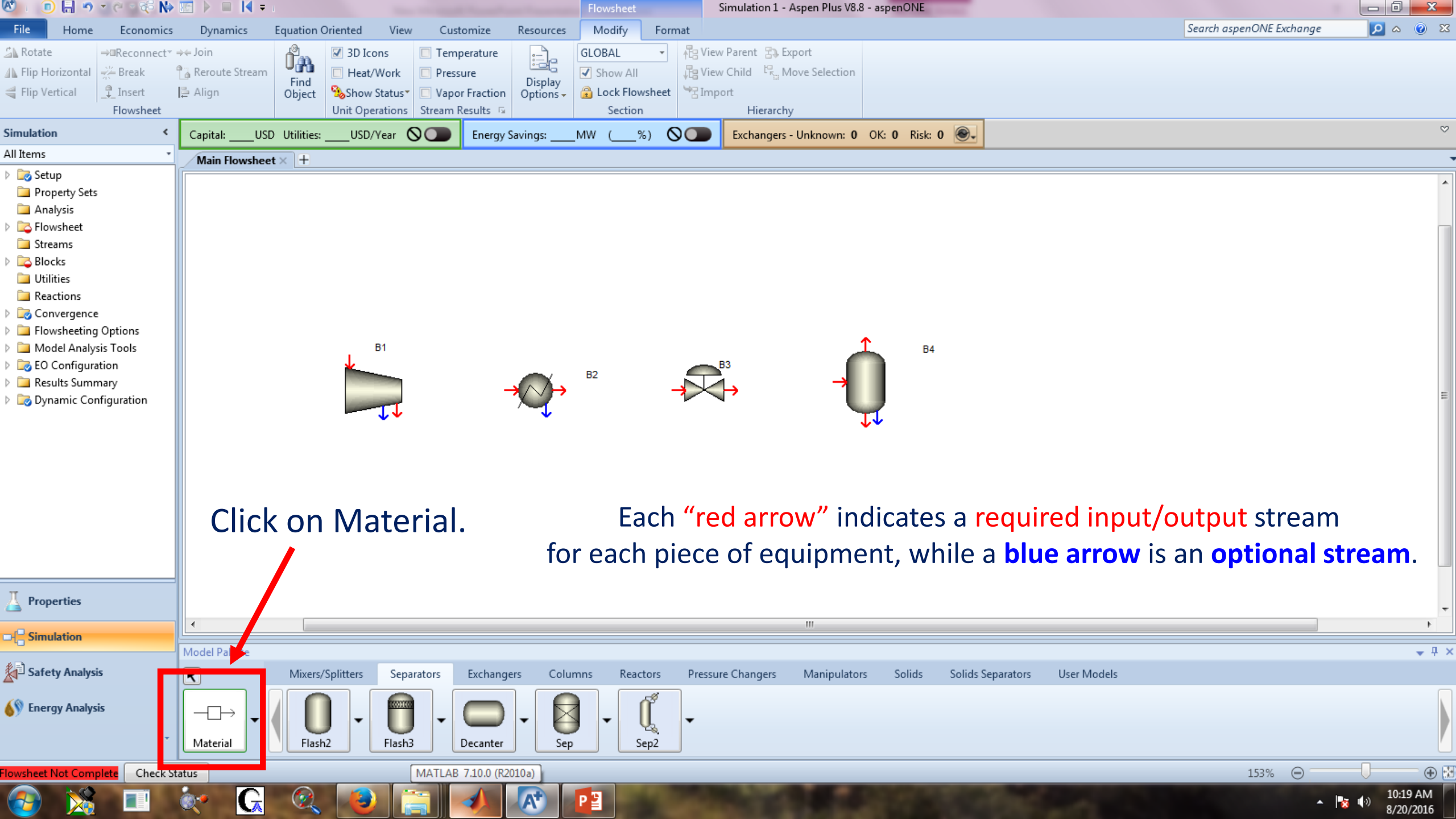
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Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
B1
B2
B3
B4
Click on Material.
Each "red arrow" indicates a required input/output stream
for each piece of equipment, while a blue arrow is an optional stream.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Flowsheet Not Complete
Check Status
MATLAB 7.10.0 (R2010a)
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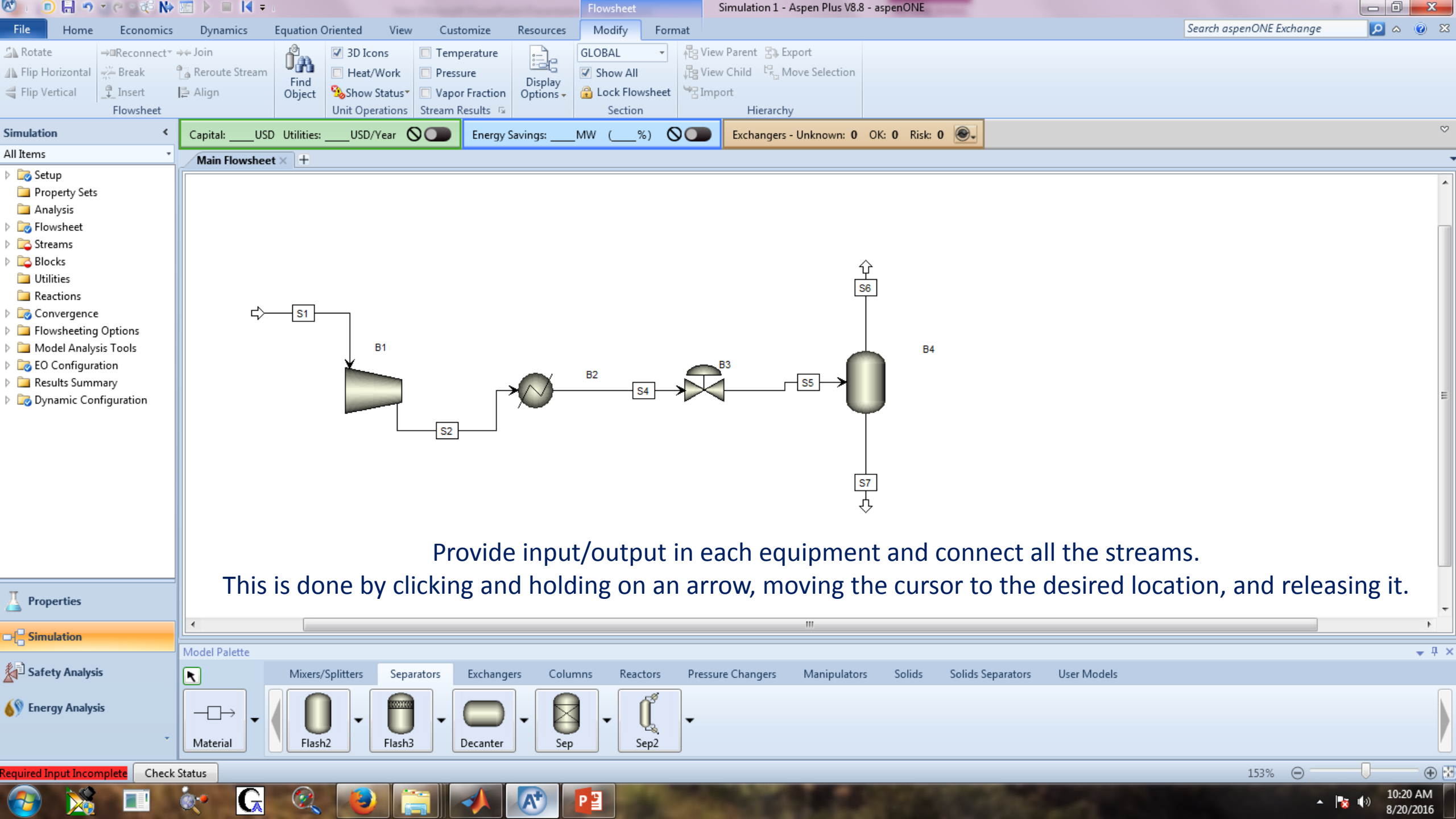
Flowsheet
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Rotate
Flip Horizontal
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Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
S1
B1
S2
B2
S4
B3
S5
B4
S6
S7
Provide input/output in each equipment and connect all the streams.
This is done by clicking and holding on an arrow, moving the cursor to the desired location, and releasing it.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Required Input Incomplete
Check Status
153%
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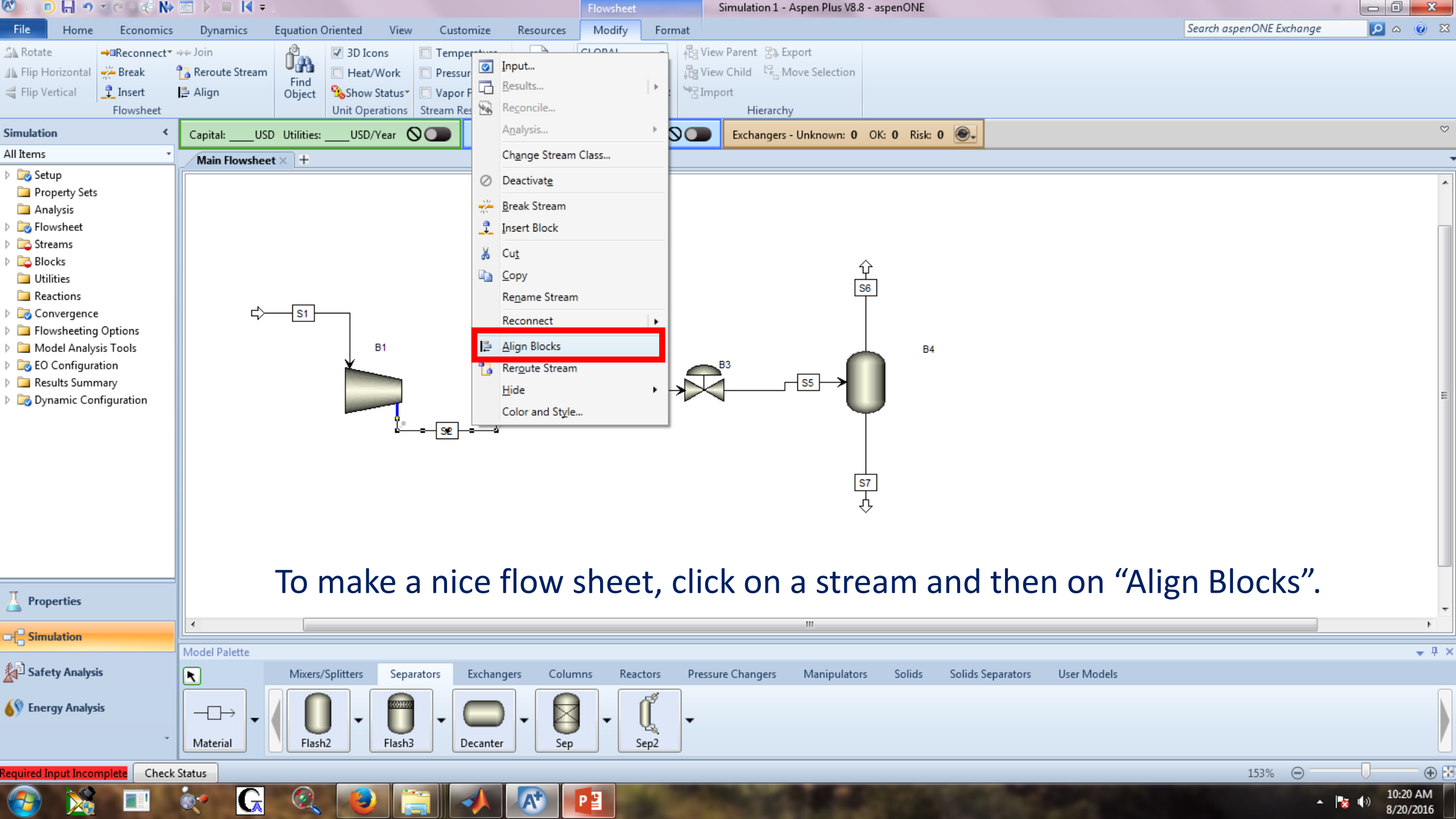
8/20/2016


Flowsheet
Simulation 1 - Aspen Plus V8.8 - aspenONE
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Equation Oriented
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Customize
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Format
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Rotate
Flip Horizontal
Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
Input...
Results...
Reconcile...
Analysis...
Change Stream Class...
Deactivate
Break Stream
Insert Block
Cut
Copy
Rename Stream
Reconnect
Align Blocks
Reroute Stream
Hide
Color and Style...
S1
B1
S2
B3
S5
S6
B4
S7
To make a nice flow sheet, click on a stream and then on “Align Blocks”.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Required Input Incomplete
Check Status
153%
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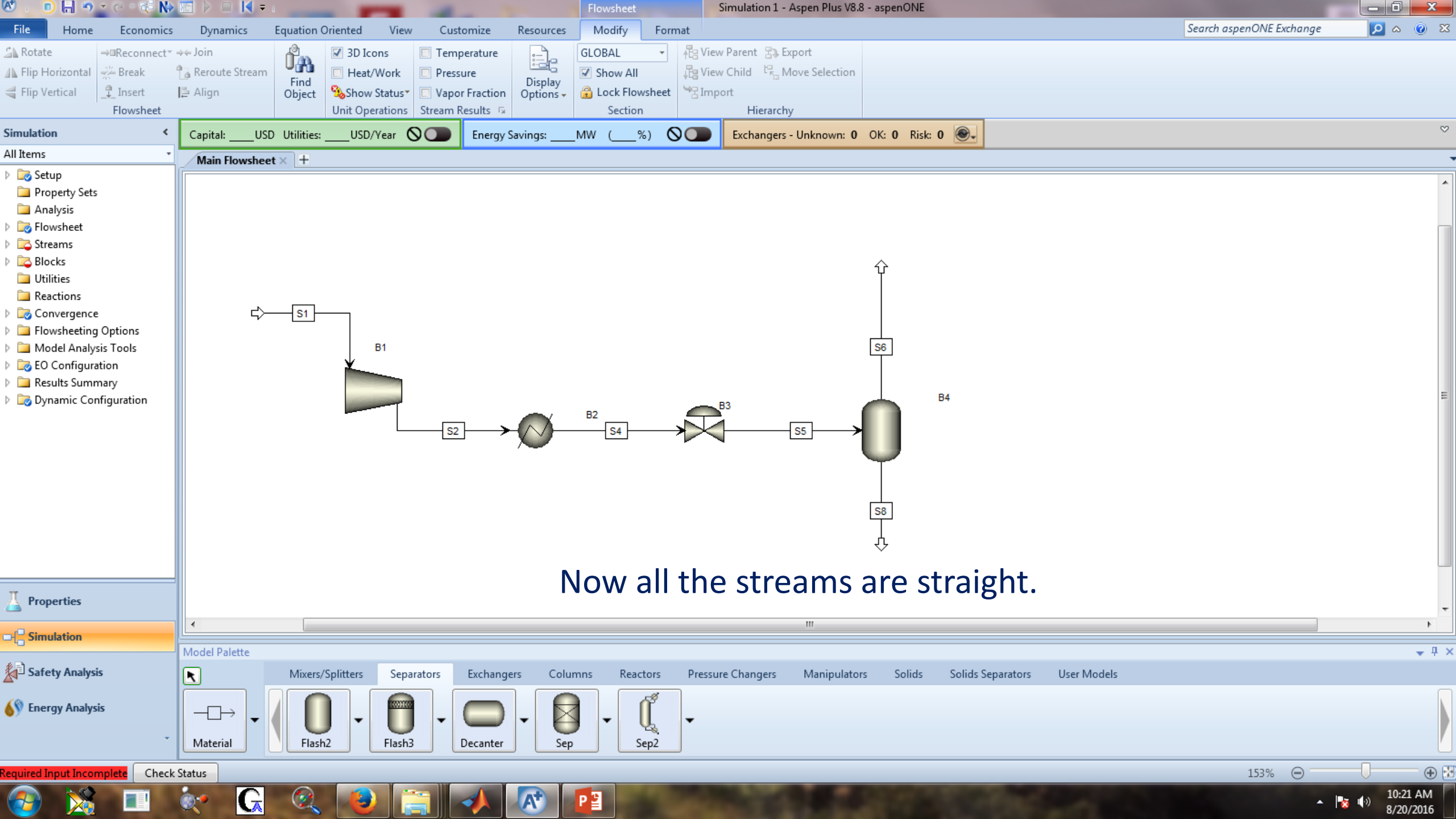
8/20/2016


Flowsheet
Simulation 1 - Aspen Plus V8.8 - aspenONE
File
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Economics
Dynamics
Equation Oriented
View
Customize
Resources
Modify
Format
Search aspenONE Exchange
Rotate
Flip Horizontal
Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
S1
B1
S2
B2
S4
B3
S5
B4
S6
S8
Now all the streams are straight.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Required Input Incomplete
Check Status
153%
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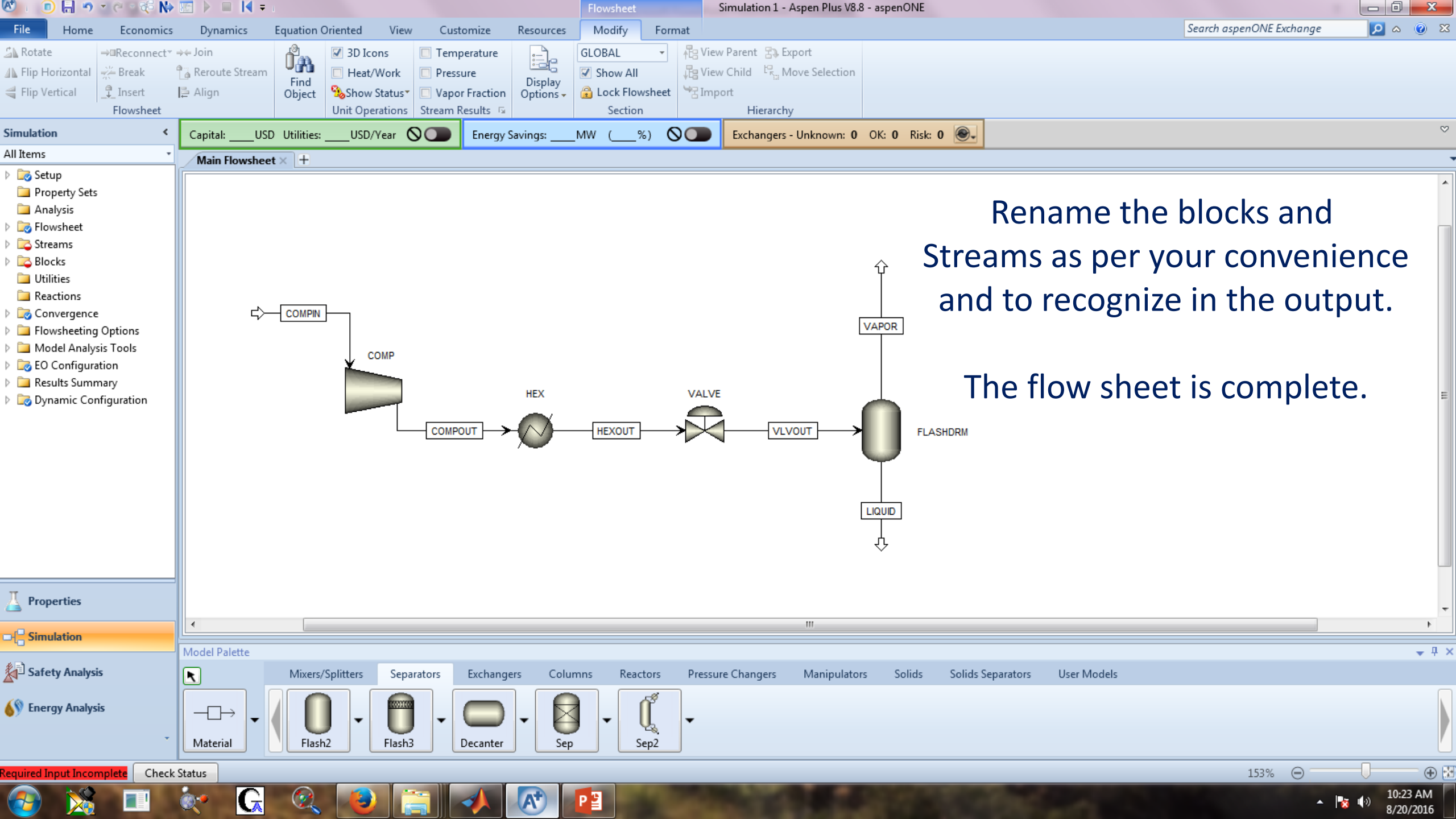
Flowsheet
Simulation 1 - Aspen Plus V8.8 - aspenONE
File
Home
Economics
Dynamics
Equation Oriented
View
Customize
Resources
Modify
Format
Search aspenONE Exchange
Rotate
Flip Horizontal
Flip Vertical
Reconnect
Break
Insert
Join
Reroute Stream
Align
Flowsheet
Find Object
3D Icons
Heat/Work
Show Status
Unit Operations
Temperature
Pressure
Vapor Fraction
Stream Results
Display Options
GLOBAL
Show All
Lock Flowsheet
Section
View Parent
View Child
Import
Export
Move Selection
Hierarchy
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
COMPIN
COMP
COMPOUT
HEX
HEXOUT
VALVE
VLVOUT
VAPOR
FLASHDRM
LIQUID
Rename the blocks and Streams as per your convenience and to recognize in the output.
The flow sheet is complete.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Required Input Incomplete
Check Status
153%
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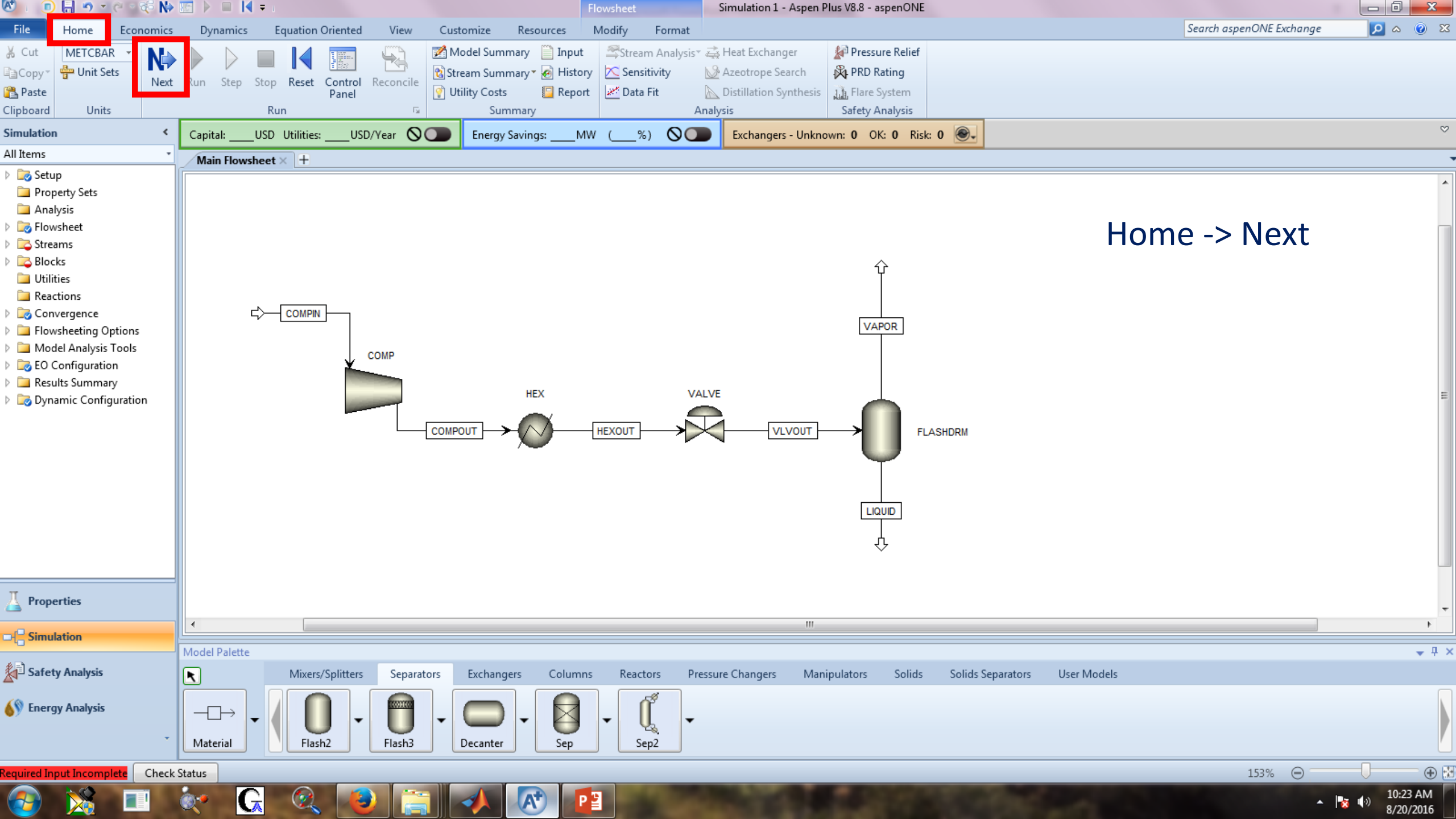
8/20/2016


Flowsheet
Simulation 1 - Aspen Plus V8.8 - aspenONE
File
Home
Economics
Dynamics
Equation Oriented
View
Customize
Resources
Modify
Format
Search aspenONE Exchange
Cut
Copy
Paste
Clipboard
METCBAR
Unit Sets
Units
Next
Run
Step
Stop
Reset
Control Panel
Reconcile
Run
Model Summary
Stream Summary
Utility Costs
Input
History
Report
Summary
Stream Analysis
Sensitivity
Data Fit
Heat Exchanger
Azeotrope Search
Distillation Synthesis
Analysis
Pressure Relief
PRD Rating
Flare System
Safety Analysis
Simulation
All Items
Setup
Property Sets
Analysis
Flowsheet
Streams
Blocks
Utilities
Reactions
Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Dynamic Configuration
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
Home -> Next
COMPIN
COMP
COMPOUT
HEX
HEXOUT
VALVE
VLVOUT
VAPOR
FLASHDRM
LIQUID
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Required Input Incomplete
Check Status
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Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Input | Stream Summary | History | Utility Costs | Report | Summary | Stream Analysis | Heat Exchanger | Sensitivity | Azeotrope Search | Data Fit | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Simulation

All Items

- Setup
- Property Sets
- Analysis
- Flowsheet
- Streams
  - COMPIN
    - Input
    - Results
    - EO Variables
    - Stream Results (Cus
  - COMPOUT
  - HEXOUT
  - LIQUID
  - VAPOR
  - VLVOUT
- Blocks
- Utilities
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary

Properties | Simulation | Safety Analysis | Energy Analysis

Main Flowsheet | COMPIN (MATERIAL) - Input

Mixed | CI Solid | NC Solid | Flash Options | EO Options | Costing | Information

Specifications

Flash Type: Temperature | Pressure

State variables

Temperature		C
Pressure		bar
Vapor fraction		
Total flow basis	Mole	
Total flow rate		kmol/hr
Solvent		

Reference Temperature

Volume flow reference temperature: C

Component concentration reference temperature: C

Composition

Mole-Flow | kmol/hr

Component	Value
PROPA-01	

Total 0

Component Attributes

Particle Size Distribution

Input for “COMPIN” stream.

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Required Input Incomplete | Check Status

100%

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8/20/2016

Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Input | Stream Summary | History | Utility Costs | Report | Summary | Stream Analysis | Heat Exchanger | Sensitivity | Azeotrope Search | Data Fit | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Simulation

All Items

- Setup
- Property Sets
- Analysis
- Flowsheet
- Streams
  - COMPIN
    - Input
    - Results
    - EO Variables
    - Stream Results (Cus
  - COMPOUT
  - HEXOUT
  - LIQUID
  - VAPOR
  - VLVOUT
- Blocks
- Utilities
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary

Properties | Simulation | Safety Analysis | Energy Analysis

Main Flowsheet | COMPIN (MATERIAL) - Input

Mixed | CI Solid | NC Solid | Flash Options | EO Options | Costing | Information

Specifications

Flash Type: Temperature | Pressure

State variables

Temperature	298	K
Pressure	1	bar
Vapor fraction		
Total flow basis	Mass	
Total flow rate	1	kg/min
Solvent		

Reference Temperature

Volume flow reference temperature: C

Component concentration reference temperature: C

Composition

Mass-Flow | kg/min

Component	Value
PROPA-01	1

Total 1

Component Attributes

Particle Size Distribution

Fill the “COMPIN” stream information.

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Required Input Incomplete | Check Status

100%

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Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Stream Summary | Utility Costs | Input | History | Report | Summary | Stream Analysis | Sensitivity | Data Fit | Heat Exchanger | Azeotrope Search | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Simulation

All Items

- Setup
- Property Sets
- Analysis
- Flowsheet
- Streams
  - COMPIN
    - Input
    - Results
    - EO Variables
    - Stream Results (Cus
  - COMPOUT
  - HEXOUT
  - LIQUID
  - VAPOR
  - VLVOUT
- Blocks
  - COMP
    - Setup
    - Performance Curve
    - User Subroutine
    - Dynamic
    - Block Options
    - EO Modeling

Properties | Simulation | Safety Analysis | Energy Analysis

Main Flowsheet | COMP (Compr) - Setup

Specifications | Calculation Options | Power Loss | Convergence | Integration Parameters | Utility | Information

Model and type

Model: Compressor / Turbine

Type: Isentropic

Outlet specification

- Discharge pressure: 15 bar
- Pressure increase: bar
- Pressure ratio:
- Power required: kW
- Use performance curves to determine discharge conditions

Efficiencies

Isentropic: 1 | Polytropic: | Mechanical: 1

Fill the “COMP” conditions.

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Required Input Incomplete | Check Status | 100%

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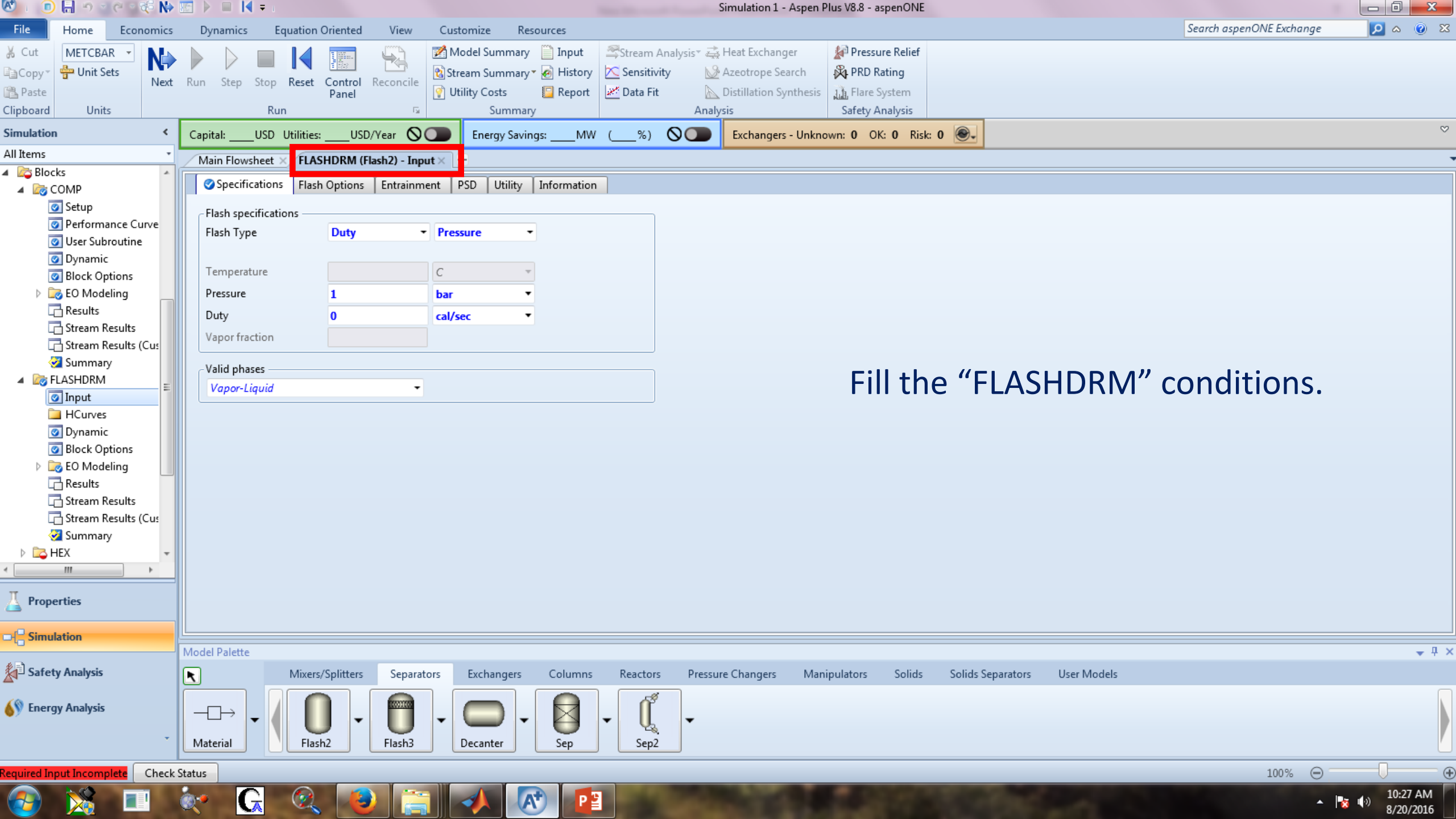
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FLASHDRM
Input
HCurves
Dynamic
Block Options
EO Modeling
Results
Stream Results
Stream Results (Cus
Summary
HEX
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
FLASHDRM (Flash2) - Input
Specifications
Flash Options
Entrainment
PSD
Utility
Information
Flash specifications
Flash Type
Duty
Pressure
Temperature
C
Pressure
1
bar
Duty
0
cal/sec
Vapor fraction
Valid phases
Vapor-Liquid
Fill the “FLASHDRM” conditions.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Required Input Incomplete
Check Status
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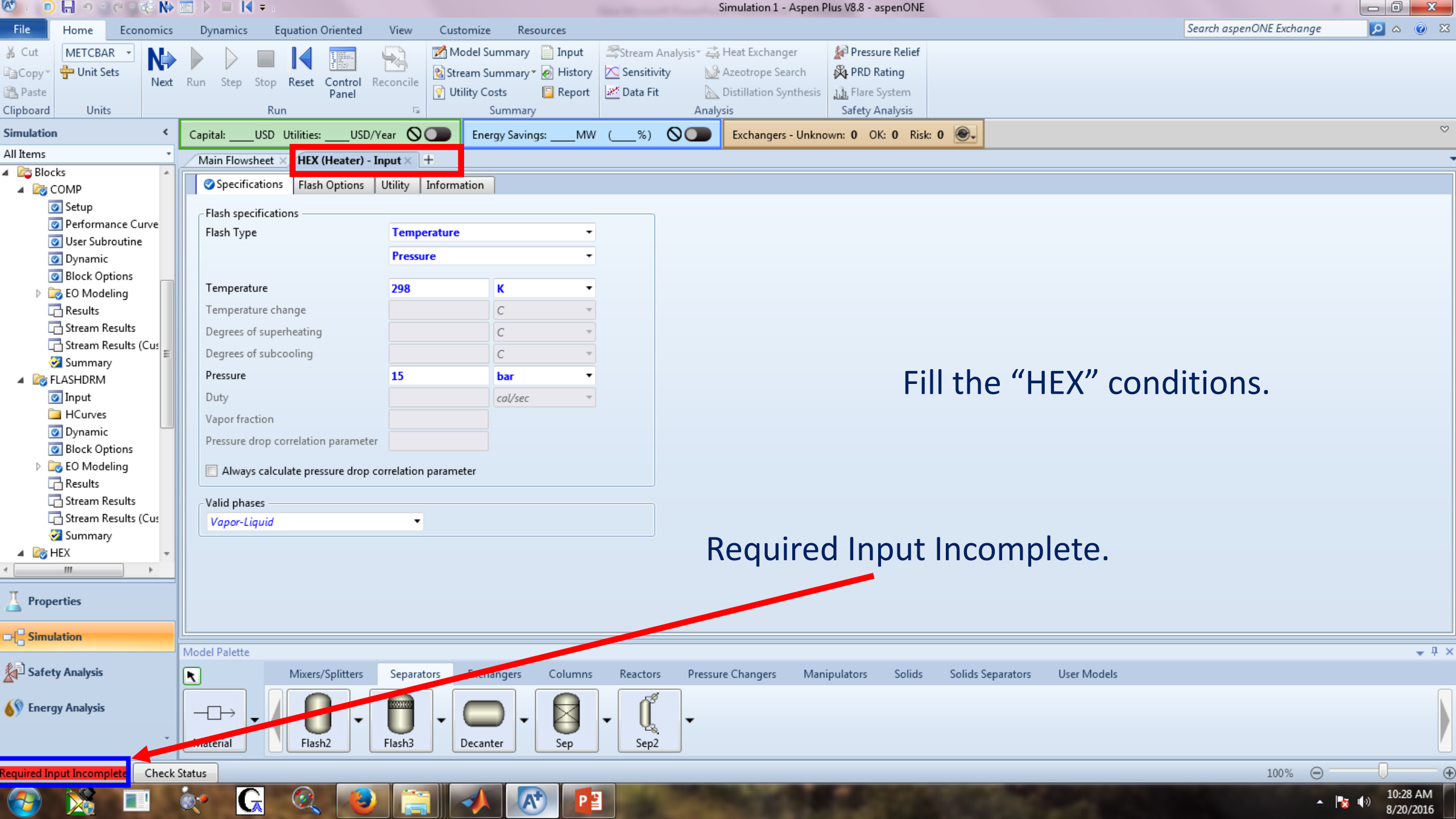
8/20/2016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Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
HEX (Heater) - Input
Specifications
Flash Options
Utility
Information
Flash specifications
Flash Type
Temperature
Pressure
Temperature
298
K
Temperature change
C
Degrees of superheating
C
Degrees of subcooling
C
Pressure
15
bar
Duty
cal/sec
Vapor fraction
Pressure drop correlation parameter
Always calculate pressure drop correlation parameter
Valid phases
Vapor-Liquid
Fill the “HEX” conditions.
Required Input Incomplete.
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Required Input Incomplete
Check Status
100%
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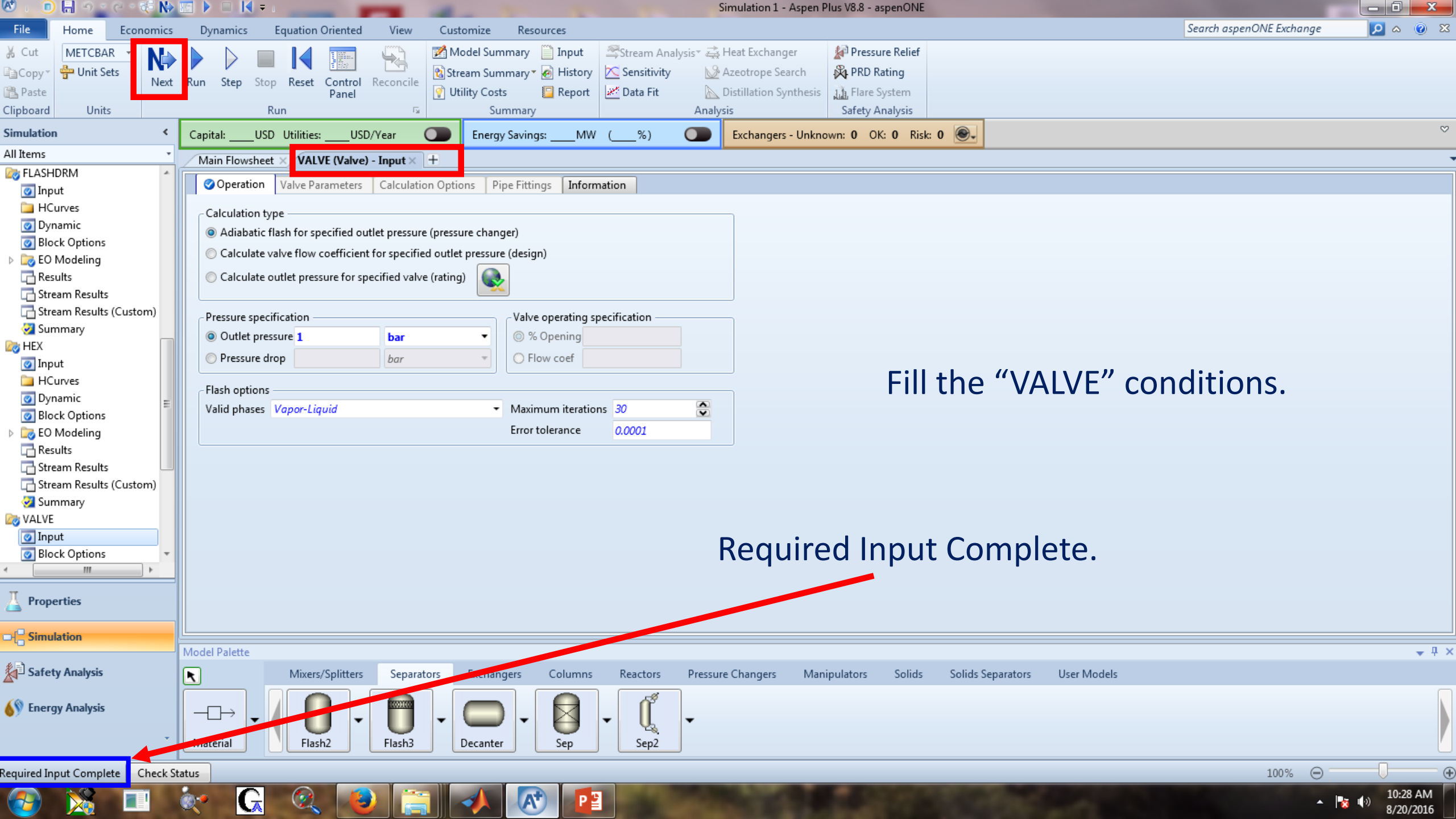
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HCurves
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Block Options
EO Modeling
Results
Stream Results
Stream Results (Custom)
Summary
VALVE
Input
Block Options
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Operation
Valve Parameters
Calculation Options
Pipe Fittings
Information
Calculation type
Adiabatic flash for specified outlet pressure (pressure changer)
Calculate valve flow coefficient for specified outlet pressure (design)
Calculate outlet pressure for specified valve (rating)
Pressure specification
Outlet pressure 1 bar
Pressure drop bar
Valve operating specification
% Opening
Flow coef
Flash options
Valid phases Vapor-Liquid
Maximum iterations 30
Error tolerance 0.0001
Fill the “VALVE” conditions.
Required Input Complete.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Required Input Complete
Check Status
100%
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Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units

Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run

Model Summary | Input | Stream Summary | History | Utility Costs | Report | Summary

Stream Analysis | Heat Exchanger | Sensitivity | Azeotrope Search | Data Fit | Distillation Synthesis | Analysis

Pressure Relief | PRD Rating | Flare System | Safety Analysis

Simulation

All Items

- FLASHDRM
  - Input
  - HCurves
  - Dynamic
  - Block Options
  - EO Modeling
  - Results
  - Stream Results
  - Stream Results (Custom)
  - Summary
- HEX
  - Input
  - HCurves
  - Dynamic
  - Block Options
  - EO Modeling
  - Results
  - Stream Results
  - Stream Results (Custom)
  - Summary
- VALVE
  - Input
  - Block Options

Properties | Simulation | Safety Analysis | Energy Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Main Flowsheet | VALVE (Valve) - Input

Operation | Valve Parameters | Calculation Options | Pipe Fittings | Information

Calculation type

- Adiabatic flash for specified outlet pressure (pressure changer)
- Calculate valve flow coefficient for specified outlet pressure (design)
- Calculate outlet pressure for specified valve (rating)

Pressure specification

- Outlet pressure 1 bar
- Pressure drop bar

Flash options

Valid phases Vapor-Liquid

Required Input Complete

All required input is complete. You can run the simulation now, or enter more input. To enter more input, select Cancel, then select the input you want from the Simulation pane.

Run the simulation now?

OK | Cancel

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Required Input Complete | Check Status

100%

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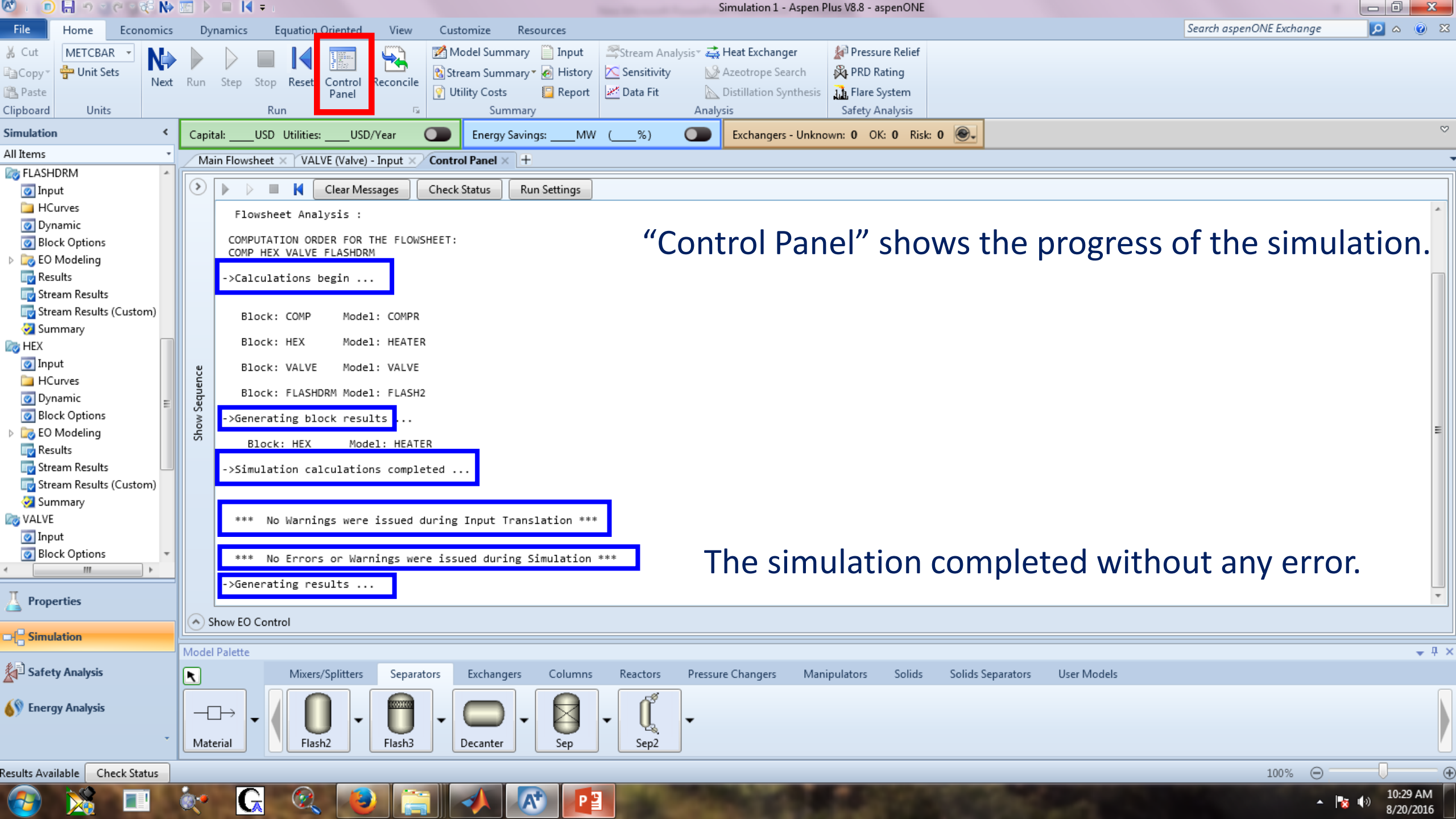
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Safety Analysis
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Clear Messages
Check Status
Run Settings
Show Sequence
Flowsheet Analysis :
COMPUTATION ORDER FOR THE FLOWSHEET:
COMP HEX VALVE FLASHDRM
->Calculations begin ...
Block: COMP Model: COMPR
Block: HEX Model: HEATER
Block: VALVE Model: VALVE
Block: FLASHDRM Model: FLASH2
->Generating block results ...
Block: HEX Model: HEATER
->Simulation calculations completed ...
*** No Warnings were issued during Input Translation ***
*** No Errors or Warnings were issued during Simulation ***
->Generating results ...
Show EO Control
“Control Panel” shows the progress of the simulation.
The simulation completed without any error.
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Results Available
Check Status
100%
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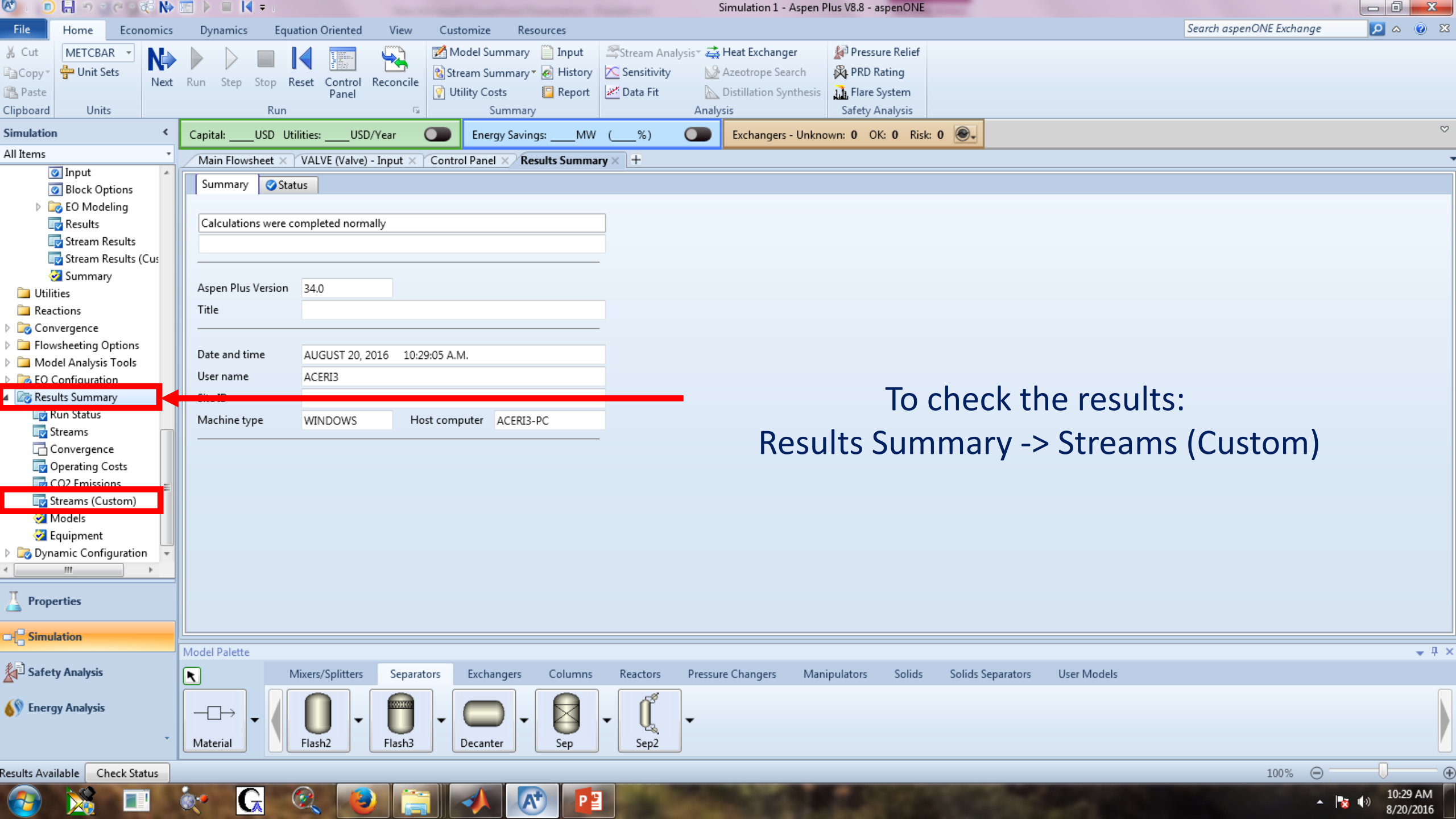
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Flare System
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Convergence
Flowsheeting Options
Model Analysis Tools
EO Configuration
Results Summary
Run Status
Streams
Convergence
Operating Costs
CO2 Emissions
Streams (Custom)
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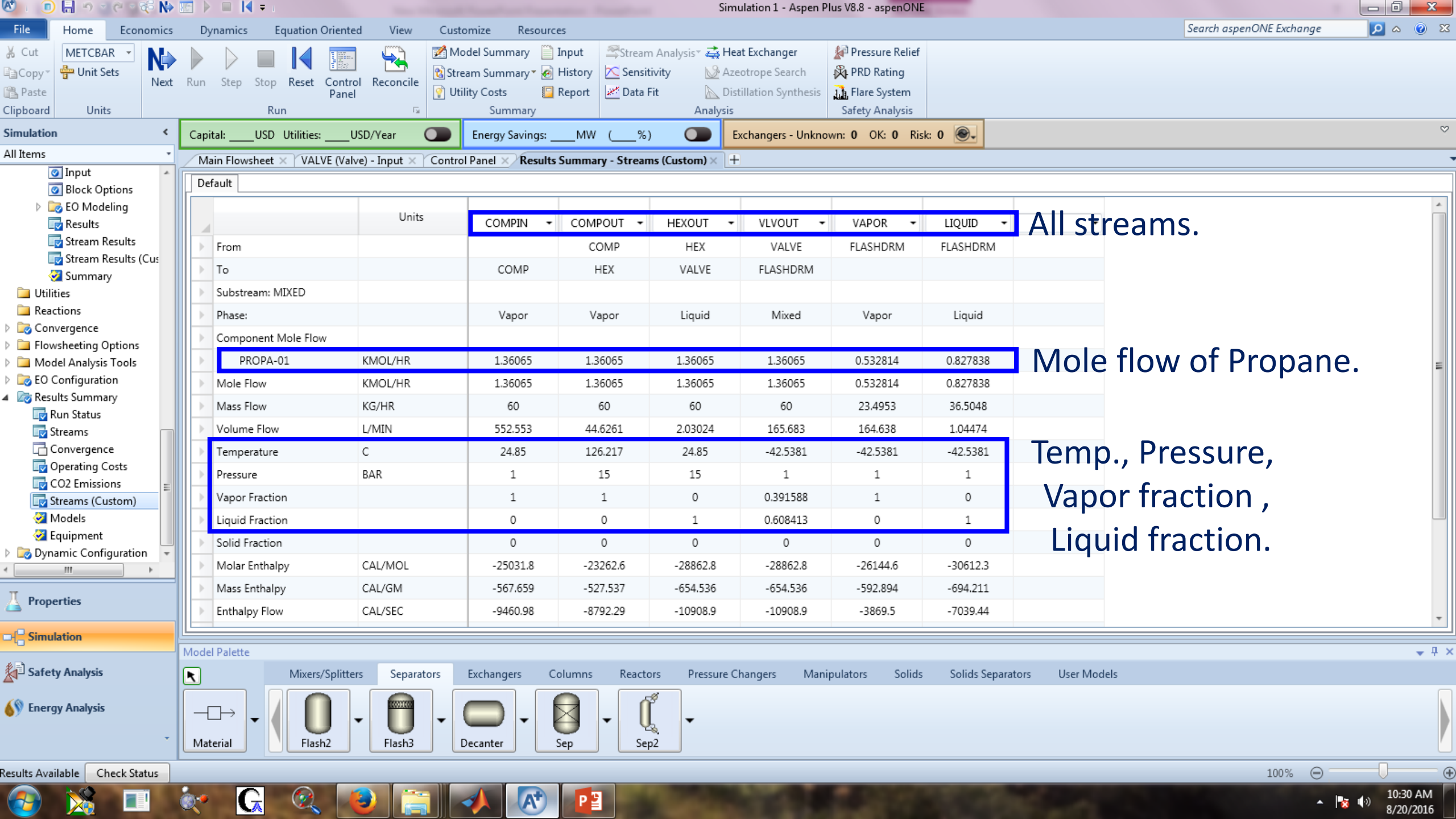
Equipment
Dynamic Configuration
Properties
Simulation
Safety Analysis
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Results Summary
Summary
Status
Calculations were completed normally
Aspen Plus Version
34.0
Title
Date and time
AUGUST 20, 2016 10:29:05 A.M.
User name
ACERI3
Machine type
WINDOWS
Host computer
ACERI3-PC
To check the results:
Results Summary -> Streams (Custom)
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Results Available
Check Status
100%
10:29 AM
8/20/2016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Streams (Custom)
Models
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Dynamic Configuration
Properties
Simulation
Safety Analysis
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Results Summary - Streams (Custom)
Default
Units
COMPIN
COMPOUT
HEXOUT
VLVOUT
VAPOR
LIQUID
From
COMP
HEX
VALVE
FLASHDRM
FLASHDRM
To
COMP
HEX
VALVE
FLASHDRM
Substream: MIXED
Phase:
Vapor
Vapor
Liquid
Mixed
Vapor
Liquid
Component Mole Flow
PROPA-01
KMOL/HR
1.36065
1.36065
1.36065
1.36065
0.532814
0.827838
Mole Flow
KMOL/HR
1.36065
1.36065
1.36065
1.36065
0.532814
0.827838
Mass Flow
KG/HR
60
60
60
60
23.4953
36.5048
Volume Flow
L/MIN
552.553
44.6261
2.03024
165.683
164.638
1.04474
Temperature
C
24.85
126.217
24.85
-42.5381
-42.5381
-42.5381
Pressure
BAR
1
15
15
1
1
1
Vapor Fraction
1
1
0
0.391588
1
0
Liquid Fraction
0
0
1
0.608413
0
1
Solid Fraction
0
0
0
0
0
0
Molar Enthalpy
CAL/MOL
-25031.8
-23262.6
-28862.8
-28862.8
-26144.6
-30612.3
Mass Enthalpy
CAL/GM
-567.659
-527.537
-654.536
-654.536
-592.894
-694.211
Enthalpy Flow
CAL/SEC
-9460.98
-8792.29
-10908.9
-10908.9
-3869.5
-7039.44
All streams.
Mole flow of Propane.
Temp., Pressure,
Vapor fraction ,
Liquid fraction.
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
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Manipulators
Solids
Solids Separators
User Models
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Flash2
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Sep2
Results Available
Check Status
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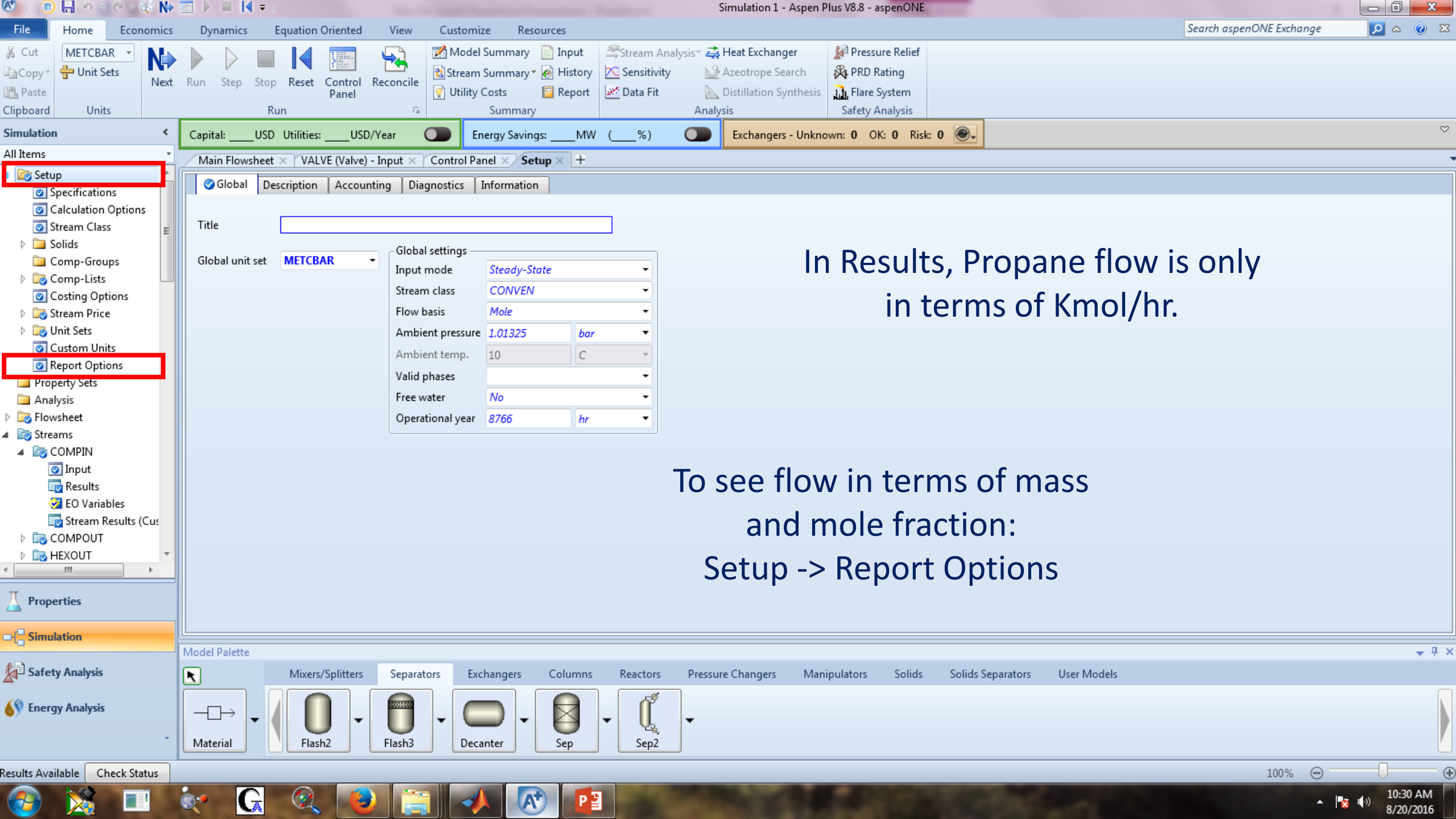
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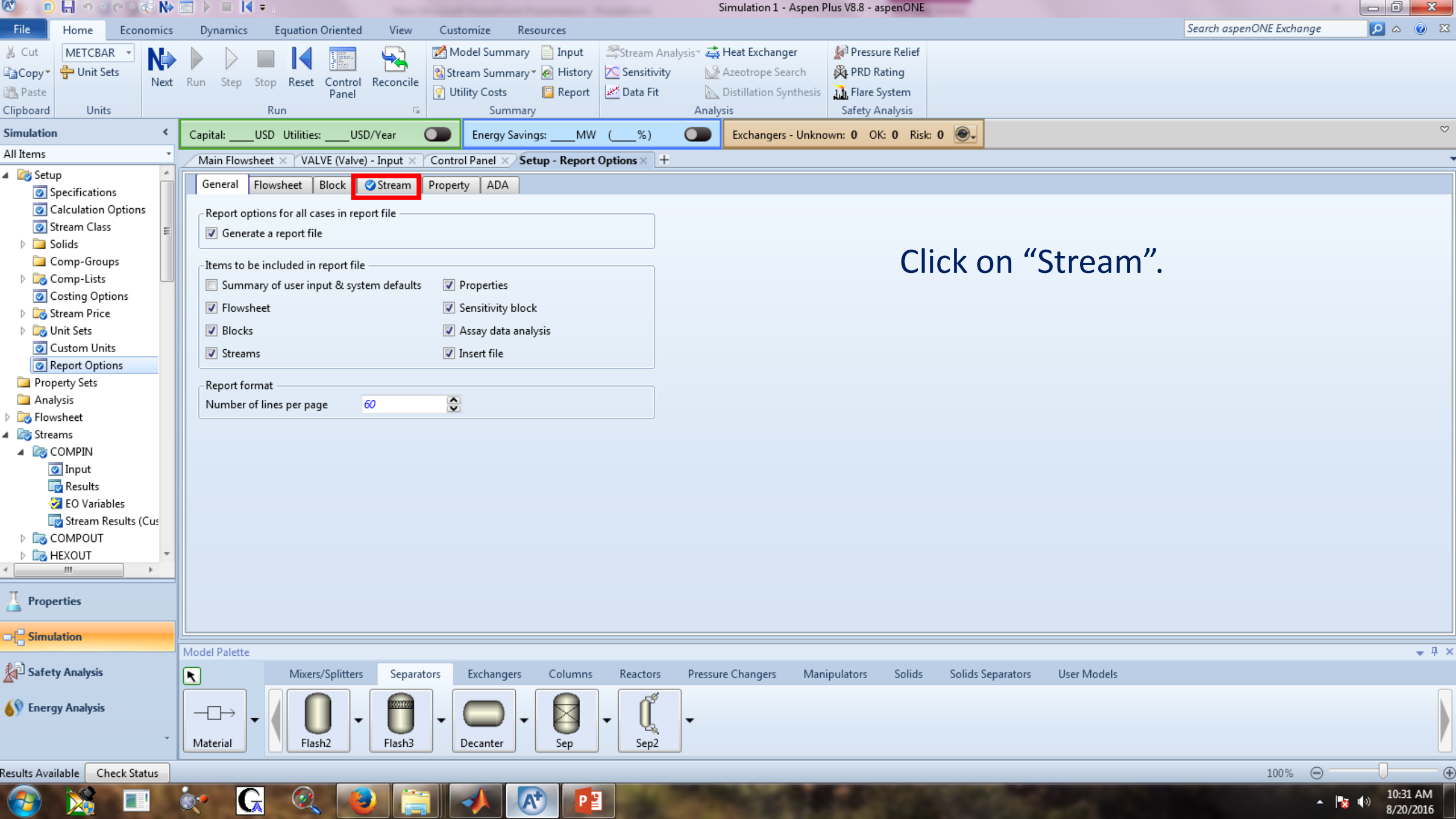
Stream Results (Cus
COMPOUT
HEXOUT
Properties
Simulation
Safety Analysis
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Setup
Global
Description
Accounting
Diagnostics
Information
Title
Global unit set
METCBAR
Global settings
Input mode
Steady-State
Stream class
CONVEN
Flow basis
Mole
Ambient pressure
1.01325
bar
Ambient temp.
10
C
Valid phases
Free water
No
Operational year
8766
hr
In Results, Propane flow is only
in terms of Kmol/hr.
To see flow in terms of mass
and mole fraction:
Setup -> Report Options
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Results Available
Check Status
100%
10:30 AM
8/20/2016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Comp-Lists
Costing Options
Stream Price
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Custom Units
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Stream Results (Cus
COMPOUT
HEXOUT
Properties
Simulation
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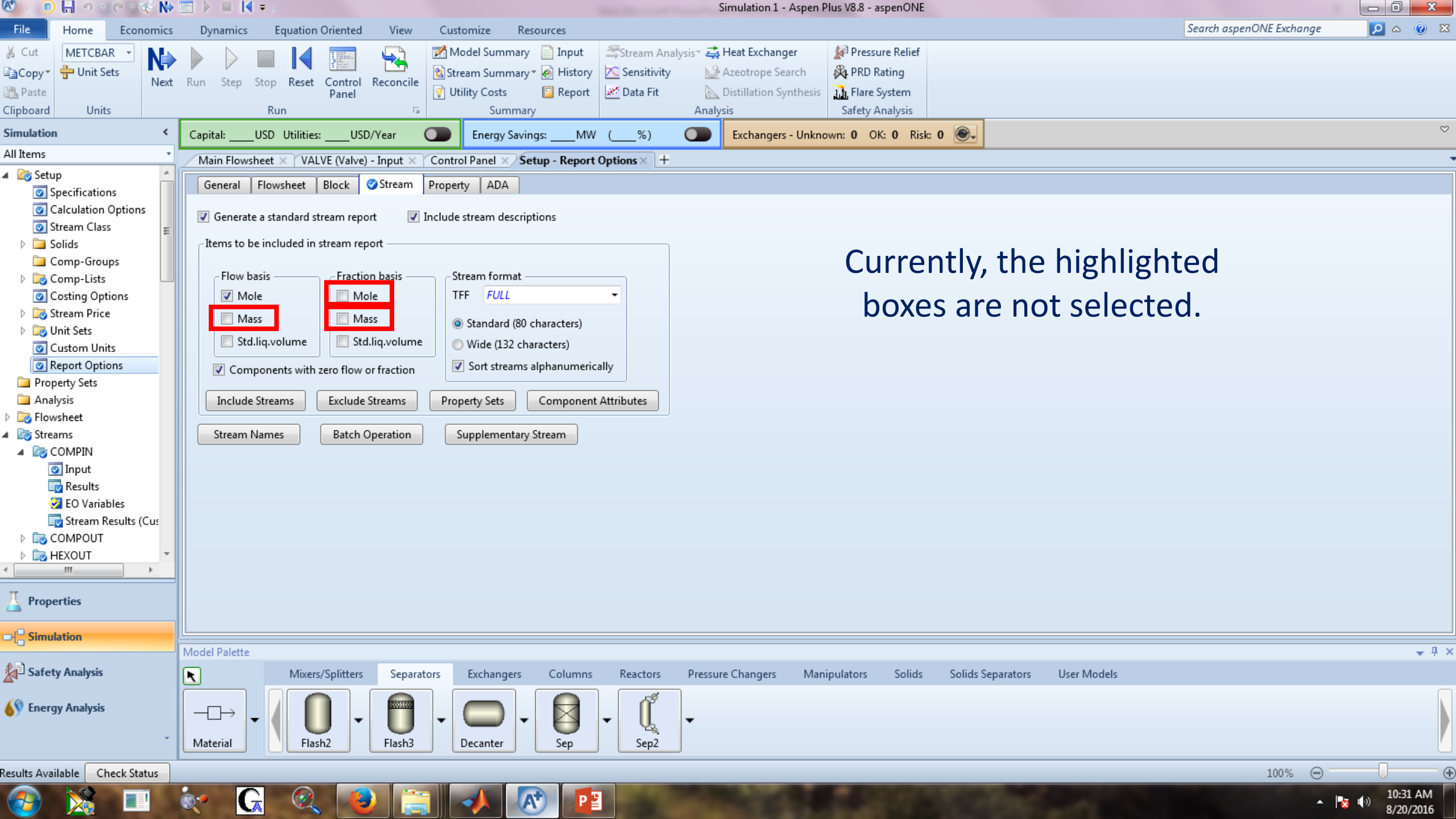
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Setup - Report Options
General
Flowsheet
Block
Stream
Property
ADA
Report options for all cases in report file
Generate a report file
Items to be included in report file
Summary of user input & system defaults
Flowsheet
Blocks
Streams
Properties
Sensitivity block
Assay data analysis
Insert file
Report format
Number of lines per page
60
Click on “Stream”.
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Results Available
Check Status
100%
10:31 AM
8/20/2016


Simulation 1 - Aspen Plus V8.8 - aspenONE
File
Home
Economics
Dynamics
Equation Oriented
View
Customize
Resources
Search aspenONE Exchange
Cut
Copy
Paste
Clipboard
METCBAR
Unit Sets
Units
Next
Run
Step
Stop
Reset
Control Panel
Reconcile
Run
Model Summary
Stream Summary
Utility Costs
Input
History
Report
Summary
Stream Analysis
Sensitivity
Data Fit
Heat Exchanger
Azeotrope Search
Distillation Synthesis
Analysis
Pressure Relief
PRD Rating
Flare System
Safety Analysis
Simulation
All Items
Setup
Specifications
Calculation Options
Stream Class
Solids
Comp-Groups
Comp-Lists
Costing Options
Stream Price
Unit Sets
Custom Units
Report Options
Property Sets
Analysis
Flowsheet
Streams
COMPIN
Input
Results
EO Variables
Stream Results (Cus
COMPOUT
HEXOUT
Properties
Simulation
Safety Analysis
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Setup - Report Options
General
Flowsheet
Block
Stream
Property
ADA
Generate a standard stream report
Include stream descriptions
Items to be included in stream report
Flow basis
Mole
Mass
Std.liq.volume
Fraction basis
Mole
Mass
Std.liq.volume
Stream format
TFF
FULL
Standard (80 characters)
Wide (132 characters)
Sort streams alphanumerically
Components with zero flow or fraction
Include Streams
Exclude Streams
Property Sets
Component Attributes
Stream Names
Batch Operation
Supplementary Stream
Currently, the highlighted boxes are not selected.
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Results Available
Check Status
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Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units

Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run

Model Summary | Input | Stream Summary | History | Utility Costs | Report | Summary

Stream Analysis | Heat Exchanger | Sensitivity | Azeotrope Search | Data Fit | Distillation Synthesis | Analysis

Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year

Energy Savings: ____MW (____%)

Exchangers - Unknown: 0 OK: 0 Risk: 0

Simulation

All Items

- Setup
  - Specifications
  - Calculation Options
  - Stream Class
  - Solids
  - Comp-Groups
  - Comp-Lists
  - Costing Options
  - Stream Price
  - Unit Sets
  - Custom Units
  - Report Options
- Property Sets
- Analysis
- Flowsheet
- Streams
  - COMPIN
    - Input
    - Results
    - EO Variables
    - Stream Results (Cus
  - COMPOUT
  - HEXOUT

Properties

Simulation

Safety Analysis

Energy Analysis

Main Flowsheet | VALVE (Valve) - Input | Control Panel | Setup - Report Options

General | Flowsheet | Block | Stream | Property | ADA

Generate a standard stream report

Include stream descriptions

Items to be included in stream report

Flow basis
- Mole
- Mass
- Std.liq.volume

Fraction basis
- Mole
- Mass
- Std.liq.volume

Stream format
TFF FULL
- Standard (80 characters)
- Wide (132 characters)

Sort streams alphanumerically

Components with zero flow or fraction

Include Streams | Exclude Streams | Property Sets | Component Attributes

Stream Names | Batch Operation | Supplementary Stream

Select the boxes.

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Input Changed | Check Status

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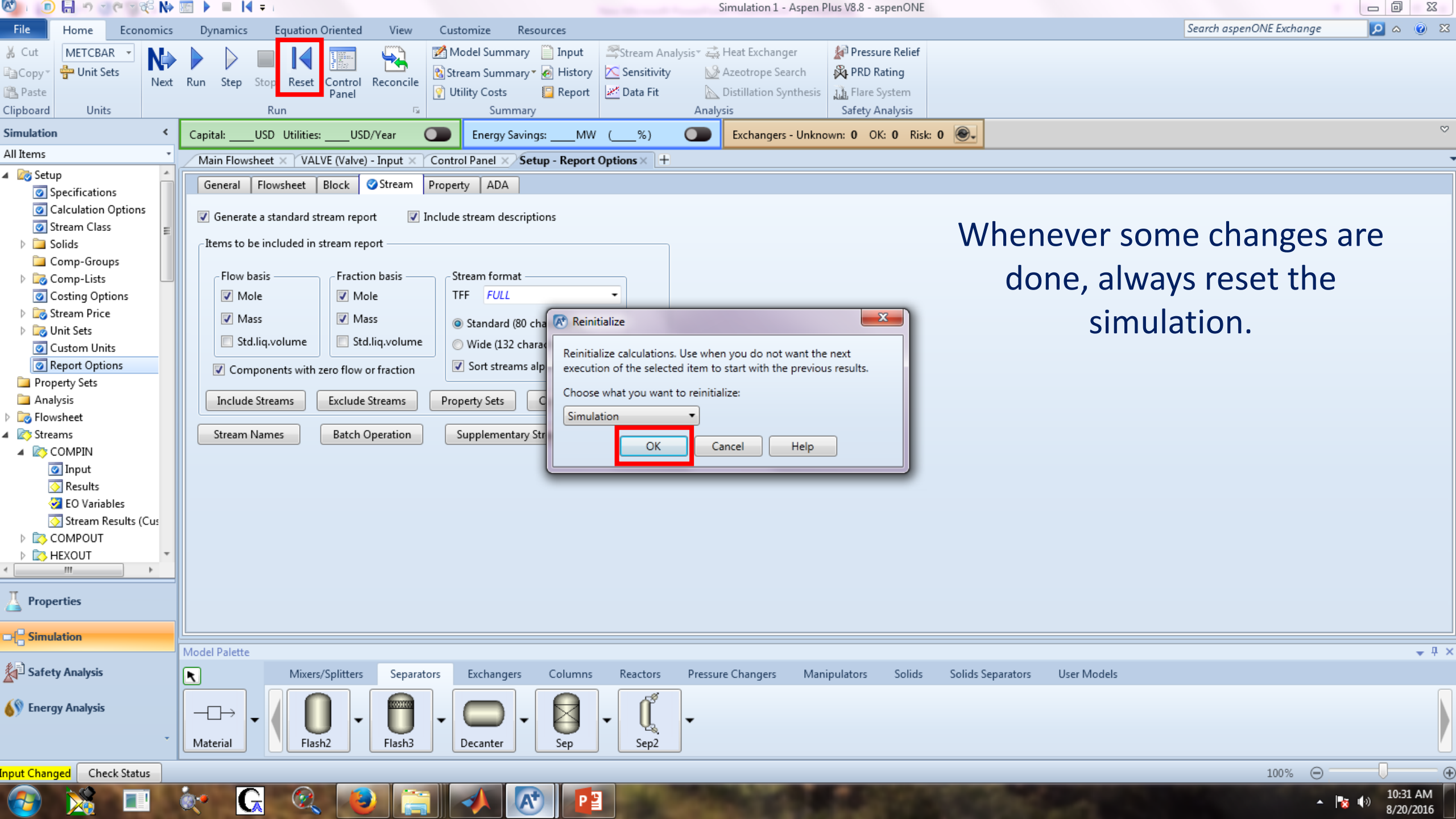
8/20/2016


Simulation 1 - Aspen Plus V8.8 - aspenONE
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Costing Options
Stream Price
Unit Sets
Custom Units
Report Options
Property Sets
Analysis
Flowsheet
Streams
COMPIN
Input
Results
EO Variables
Stream Results (Cus
COMPOUT
HEXOUT
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Setup - Report Options
General
Flowsheet
Block
Stream
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ADA
Generate a standard stream report
Include stream descriptions
Items to be included in stream report
Flow basis
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Mass
Std.liq.volume
Fraction basis
Mole
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Stream format
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Sort streams alp
Components with zero flow or fraction
Include Streams
Exclude Streams
Property Sets
Stream Names
Batch Operation
Supplementary Str
Reinitialize
Reinitialize calculations. Use when you do not want the next execution of the selected item to start with the previous results.
Choose what you want to reinitialize:
Simulation
OK
Cancel
Help
Whenever some changes are done, always reset the simulation.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Flash2
Flash3
Decanter
Sep
Sep2
Input Changed
Check Status
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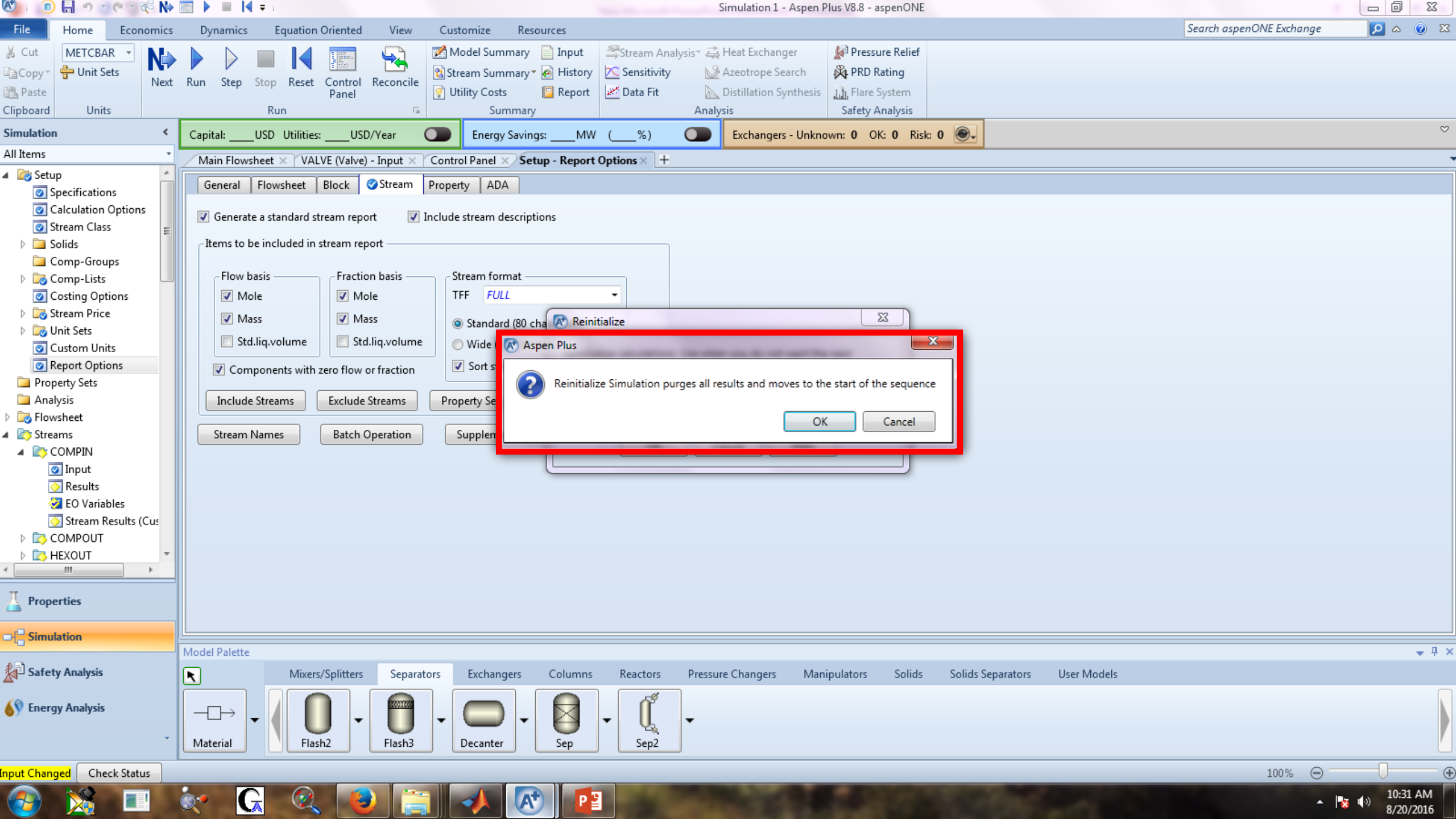
8/20/2016


Simulation 1 - Aspen Plus V8.8 - aspenONE
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Costing Options
Stream Price
Unit Sets
Custom Units
Report Options
Property Sets
Analysis
Flowsheet
Streams
COMPIN
Input
Results
EO Variables
Stream Results (Cus
COMPOUT
HEXOUT
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Setup - Report Options
General
Flowsheet
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Stream
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ADA
Generate a standard stream report
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Items to be included in stream report
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Mole
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Std.liq.volume
Fraction basis
Mole
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Std.liq.volume
Stream format
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Wide
Sort s
Components with zero flow or fraction
Include Streams
Exclude Streams
Property Se
Stream Names
Batch Operation
Supplen
Reinitialize
Aspen Plus
Reinitialize Simulation purges all results and moves to the start of the sequence
OK
Cancel
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
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Solids
Solids Separators
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Sep2
Input Changed
Check Status
100%
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8/20/2016

Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Stream Summary | Utility Costs | Input | History | Report | Summary | Stream Analysis | Sensitivity | Data Fit | Heat Exchanger | Azeotrope Search | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Main Flowsheet | VALVE (Valve) - Input | Control Panel | Results Summary - Streams (Custom)

Default

	Units	COMPIN	COMPOUT	HEXOUT	VLVOUT	VAPOR	LIQUID
From			COMP	HEX	VALVE	FLASHDRM	FLASHDRM
To		COMP	HEX	VALVE	FLASHDRM		
Substream: MIXED							
Phase:		Vapor	Vapor	Liquid	Mixed	Vapor	Liquid
Component Mole Flow							
PROPA-01	KMOL/HR	1.36065	1.36065	1.36065	1.36065	0.532814	0.827838
Component Mole Fraction							
PROPA-01		1	1	1	1	1	1
Component Mass Flow							
PROPA-01	KG/HR	60	60	60	60	23.4953	36.5048
Component Mass Fraction							
PROPA-01		1	1	1	1	1	1
Mole Flow	KMOL/HR	1.36065	1.36065	1.36065	1.36065	0.532814	0.827838
Mass Flow	KG/HR	60	60	60	60	23.4953	36.5048
Volume Flow	L/MIN	552.553	44.6261	2.03024	165.683	164.638	1.04474
Temperature	C	24.85	126.217	24.85	-42.5381	-42.5381	-42.5381
Pressure	BAR	1	15	15	1	1	1

Results are available in: Kmol/hr, Kg/hr and in terms of mole fraction.

Simulation
All Items
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- Block Options
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- Results
- Stream Results
- Stream Results (Cus
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- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary
  - Run Status
  - Streams
  - Convergence
  - Operating Costs
  - CO2 Emissions
  - Streams (Custom)
  - Models
  - Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Results Available | Check Status

100%

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Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Input | Stream Summary | History | Utility Costs | Report | Summary | Stream Analysis | Heat Exchanger | Sensitivity | Azeotrope Search | Data Fit | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Simulation

All Items

- Input
- Block Options
- EO Modeling
- Results
- Stream Results
- Stream Results (Cus
- Summary
- Utilities
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary
  - Run Status
  - Streams
  - Convergence
  - Operating Costs
  - CO2 Emissions
  - Streams (Custom)
  - Models
  - Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Main Flowsheet | VALVE (Valve) - Input | Control Panel | Results Summary - Streams (Custom)

Default

	Units	COMPIN	COMPOUT	HEXOUT	VLVOUT	VAPOR	LIQUID	
PROPA-01		1	1	1	1	1	1	
Mole Flow	KMOL/HR	1.36065	1.36065	1.36065	1.36065	0.532814	0.827838	
Mass Flow	KG/HR	60	60	60	60	23.4953	36.5048	
Volume Flow	L/MIN	552.553	44.6261	2.03024	165.683	164.638	1.04474	
Temperature	C	24.85	126.217	24.85	-42.5381	-42.5381	-42.5381	
Pressure	BAR	1	15	15	1	1	1	
Vapor Fraction		1	1	0	0.391588	1	0	
Liquid Fraction		0	0	1	0.608413	0	1	
Solid Fraction		0	0	0	0	0	0	
Molar Enthalpy	CAL/MOL	-25031.8	-23262.6	-28862.8	-28862.8	-26144.6	-30612.3	
Mass Enthalpy	CAL/GM	-567.659	-527.537	-654.536	-654.536	-592.894	-694.211	
Enthalpy Flow	CAL/SEC	-9460.98	-8792.29	-10908.9	-10908.9	-3869.5	-7039.44	
Molar Entropy	CAL/MOL-K	-64.3595	-64.3595	-81.426	-80.3676	-68.5807	-87.9539	
Mass Entropy	CAL/GM-K	-1.45951	-1.45951	-1.84654	-1.82254	-1.55524	-1.99458	
Molar Density	MOL/CC	4.10413e-05	0.000508168	0.0111698	0.000136873	5.39379e-05	0.0132064	
Mass Density	GM/CC	0.00180978	0.0224084	0.492552	0.00603563	0.00237847	0.582359	
Average Molecular Weight		44.0965	44.0965	44.0965	44.0965	44.0965	44.0965	

All information are available for all streams.

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Results Available | Check Status

100%

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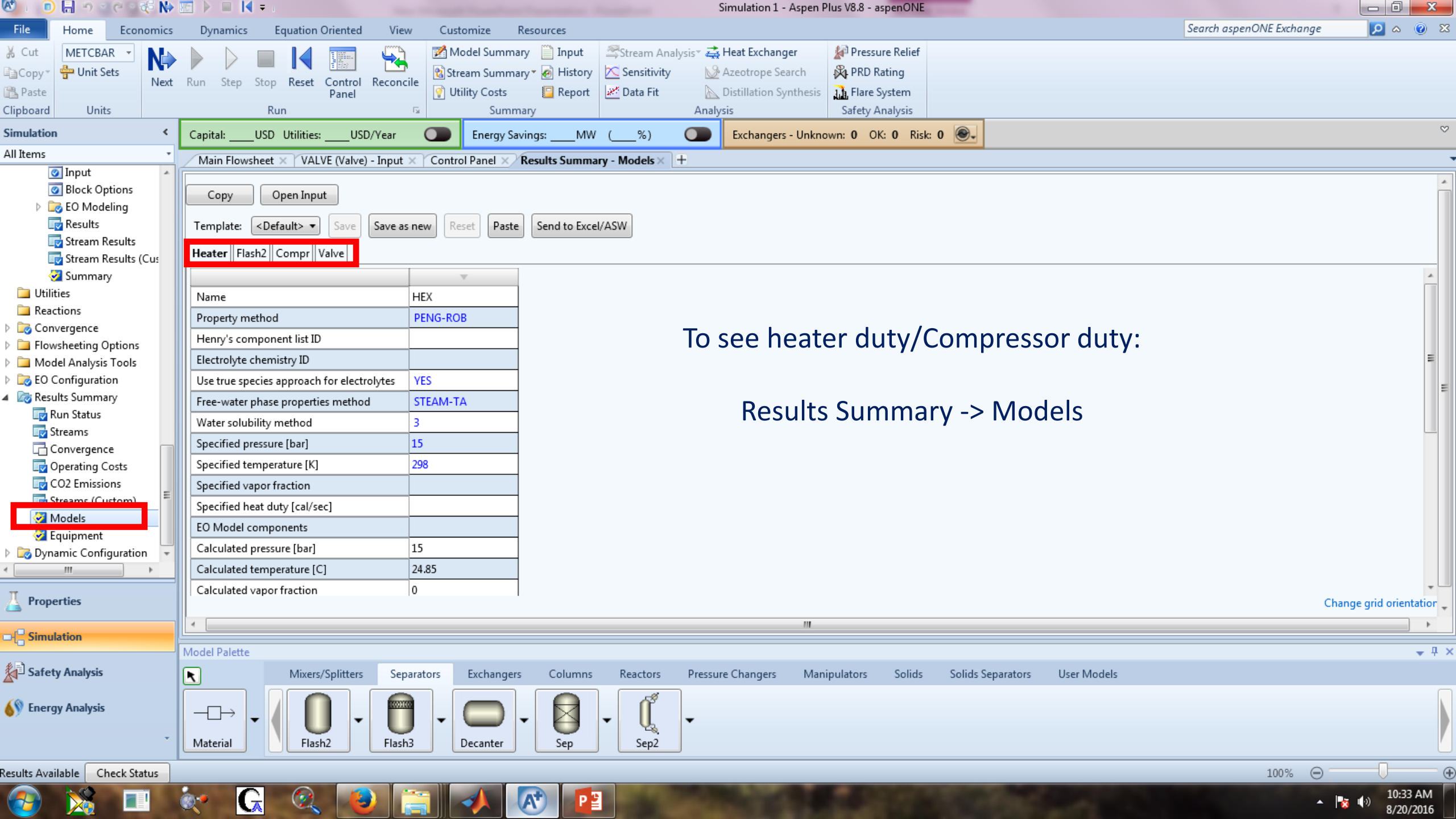
Simulation 1 - Aspen Plus V8.8 - aspenONE
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Convergence
Operating Costs
CO2 Emissions
Streams (Custom)
Models
Equipment
Dynamic Configuration
Properties
Simulation
Safety Analysis
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VALVE (Valve) - Input
Control Panel
Results Summary - Models
Copy
Open Input
Template:
<Default>
Save
Save as new
Reset
Paste
Send to Excel/ASW
Heater
Flash2
Compr
Valve
Name
HEX
Property method
PENG-ROB
Henry's component list ID
Electrolyte chemistry ID
Use true species approach for electrolytes
YES
Free-water phase properties method
STEAM-TA
Water solubility method
3
Specified pressure [bar]
15
Specified temperature [K]
298
Specified vapor fraction
Specified heat duty [cal/sec]
EO Model components
Calculated pressure [bar]
15
Calculated temperature [C]
24.85
Calculated vapor fraction
0
To see heater duty/Compressor duty:
Results Summary -> Models
Change grid orientation
Model Palette
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Exchangers
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Manipulators
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Solids Separators
User Models
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Sep
Sep2
Results Available
Check Status
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Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Input | Stream Summary | History | Utility Costs | Report | Summary | Stream Analysis | Heat Exchanger | Sensitivity | Azeotrope Search | Data Fit | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year

Energy Savings: ____MW (____%)

Exchangers - Unknown: 0 OK: 0 Risk: 0

Simulation

All Items

- Input
- Block Options
- EO Modeling
- Results
- Stream Results
- Stream Results (Cus
- Summary
- Utilities
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary
  - Run Status
  - Streams
  - Convergence
  - Operating Costs
  - CO2 Emissions
  - Streams (Custom)
  - Models
  - Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Main Flowsheet | VALVE (Valve) - Input | Control Panel | **Results Summary - Models**

Copy | Open Input

Template: <Default> | Save | Save as new | Reset | Paste | Send to Excel/ASW

Heater | Flash2 | Compr | Valve

Calculated vapor fraction	0
Calculated heat duty [cal/sec]	-2116.65
Temperature change [C]	
Degrees of superheating [C]	
Degrees of subcooling [C]	
Pressure-drop correlation parameter	
Net duty [cal/sec]	-2116.65
First liquid / total liquid	1
Total feed stream CO2e flow [kg/hr]	0
Total product stream CO2e flow [kg/hr]	0
Net stream CO2e production [kg/hr]	0
Utility CO2e production [kg/hr]	0
Total CO2e production [kg/hr]	0
Utility usage	
Utility cost	
Utility ID	

Change grid orientation

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Results Available | Check Status

100%

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Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units

Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run

Model Summary | Stream Summary | Utility Costs | Input | History | Report | Summary

Stream Analysis | Sensitivity | Data Fit | Heat Exchanger | Azeotrope Search | Distillation Synthesis | Analysis

Pressure Relief | PRD Rating | Flare System | Safety Analysis

Simulation

All Items

- Input
- Block Options
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  - Run Status
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  - Convergence
  - Operating Costs
  - CO2 Emissions
  - Streams (Custom)
  - Models
  - Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Main Flowsheet | VALVE (Valve) - Input | Control Panel | **Results Summary - Models**

Copy | Open Input

Template: <Default> | Save | Save as new | Reset | Paste | Send to Excel/ASW

Heater | Flash2 | **Compr** | Valve

Name	COMP
Property method	PENG-ROB
Henry's component list ID	
Electrolyte chemistry ID	
Use true species approach for electrolytes	YES
Free-water phase properties method	STEAM-TA
Water solubility method	3
Model Type	
Specified discharge pressure [bar]	15
Specified pressure increase [bar]	
Specified pressure ratio	
Specified power required [kW]	
Isentropic efficiency	1
Mechanical efficiency	1
Polytropic efficiency	

Change grid orientation

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Results Available | Check Status

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Simulation 1 - Aspen Plus V8.8 - aspenONE

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Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Input | Stream Summary | History | Utility Costs | Report | Summary | Stream Analysis | Heat Exchanger | Sensitivity | Azeotrope Search | Data Fit | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Simulation

All Items

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- Block Options
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  - Convergence
  - Operating Costs
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  - Streams (Custom)
  - Models
  - Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Main Flowsheet | VALVE (Valve) - Input | Control Panel | **Results Summary - Models**

Copy | Open Input

Template: <Default> | Save | Save as new | Reset | Paste | Send to Excel/ASW

Heater | Flash2 | **Compr** | Valve

Isentropic efficiency	1
Mechanical efficiency	1
Polytropic efficiency	
EO Model components	
Indicated horsepower [kW]	2.79968
Calculated brake horsepower [kW]	2.79968
Net work required [kW]	2.79968
Power loss [kW]	0
Efficiency (polytropic / isentropic) used	1
Calculated discharge pressure [bar]	15
Calculated pressure change [bar]	14
Calculated pressure ratio	15
Outlet temperature [C]	126.217
Isentropic outlet temperature [C]	126.217
Vapor fraction	1

Change grid orientation

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Results Available | Check Status

100%

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Simulation 1 - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Stream Summary | Utility Costs | Input | History | Report | Summary | Stream Analysis | Sensitivity | Data Fit | Heat Exchanger | Azeotrope Search | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Simulation

All Items

- Input
- Block Options
- EO Modeling
- Results
- Stream Results
- Stream Results (Cus
- Summary
- Utilities
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary
  - Run Status
  - Streams
  - Convergence
  - Operating Costs
  - CO2 Emissions
  - Streams (Custom)
  - Models
  - Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Main Flowsheet | Results Summary - Streams (Custom)

Default | Sum: -215995.1334538

	Units	COMPIN	COMPOUT	HEXOUT	LIQUID	VAPOR	VLVOUT	
From			COMP	HEX	FLASHDRM	FLASHDRM	VALVE	
To		COMP	HEX	VALVE			FLASHDRM	
Substream: MIXED								
Phase:		Vapor	Vapor	Liquid	Liquid	Vapor	Mixed	
Component Mole Flow								
PROPA-01	KMOL/HR	1.36065	1.36065	1.36065	0.827838	0.532814	1.36065	
Component Mole Fraction								
PROPA-01		1	1	1	1	1	1	
Component Mass Flow								
PROPA-01	KG/HR	60	60	60	36.5048	23.4953	60	
Component Mass Fraction								
PROPA-01		1	1	1	1	1	1	
Mole Flow	KMOL/HR	1.36065	1.36065	1.36065	0.827838	0.532814	1.36065	
Mass Flow	KG/HR	60	60	60	36.5048	23.4953	60	
Volume Flow	L/MIN	552.553	44.6261	2.03024	1.04474	164.638	165.683	
Temperature	C	24.85	126.217	24.85	-42.5381	-42.5381	-42.5381	
Pressure	BAR	1	15	15	1	1	1	

All streams information can be selected and copied to excel.

Select all -> copy all

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Flash2 | Flash3 | Decanter | Sep | Sep2

Results Available | Check Status | 100%

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Book1 - Excel

FILE HOME Data Entry INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW ADD-INS FOXIT PDF Foxit Reader PDF Sign in

Paste Cut Copy Format Painter | Calibri 11 | Wrap Text | General | Conditional Formatting | Format as Table | Normal Bad Good Neutral | Insert Delete Format | AutoSum Fill Clear | Sort & Filter Find & Select

Clipboard Font Alignment Number Styles Cells Editing

K18

	A	B	C	D	E	F	G	H
1		Units	COMPIN	COMPOUT	HEXOUT	LIQUID	VAPOR	VLVOUT
2	From			COMP	HEX	FLASHDRM	FLASHDRM	VALVE
3	To		COMP	HEX	VALVE			FLASHDRM
4	Substream: MIXED							
5	Phase:		Vapor	Vapor	Liquid	Liquid	Vapor	Mixed
6	Component Mole Flow							
7	PROPA-01	KMOL/HR	1.360652	1.360652	1.360652	0.8278375	0.5328141	1.360652
8	Component Mole Fraction							
9	PROPA-01		1	1	1	1	1	1
10	Component Mass Flow							
11	PROPA-01	KG/HR	60	60	60	36.50475	23.49525	60
12	Component Mass Fraction							
13	PROPA-01		1	1	1	1	1	1
14	Mole Flow	KMOL/HR	1.360652	1.360652	1.360652	0.8278375	0.5328141	1.360652
15	Mass Flow	KG/HR	60	60	60	36.5	23.5	60
16	Volume Flow	L/MIN	552.5534	44.62607	2.030243	1.044739	164.6382	165.6829
17	Temperature	C	24.85	126.2168	24.85	-42.53807	-42.53807	-42.53807
18	Pressure	BAR	1	15	15	1	1	1
19	Vapor Fraction		1	1	0	0	1	0.3915875
20	Liquid Fraction		0	0	1	1	0	0.6084125
21	Solid Fraction		0	0	0	0	0	0
22	Molar Enthalpy	CAL/MOL	-25031.77	-23262.55	-28862.77	-30612.27	-26144.56	-28862.77
23	Mass Enthalpy	CAL/GM	-567.6587	-527.5372	-654.5362	-694.2105	-592.894	-654.5362
24	Enthalpy Flow	CAL/SEC	-9460.978	-8792.286	-10908.94	-7039.44	-3869.498	-10908.94
25	Molar Entropy	CAL/MOL-K	-64.35947	-64.35946	-81.42603	-87.95393	-68.58067	-80.36761
26	Mass Entropy	CAL/GM-K	-1.459513	-1.459513	-1.846541	-1.994578	-1.55524	-1.822539
27	Molar Density	MOL/CC	4.10E-05	0.000508168	0.0111698	0.0132064	5.39E-05	0.000136873
28	Mass Density	GM/CC	0.00180978	0.0224084	0.4925518	0.5823587	0.00237847	0.00603563
29	Average Molecular Weight		44.09652	44.09652	44.09652	44.09652	44.09652	44.09652
30								

Paste the information in Excel

Sheet1

READY 100%

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Results

	Property methods	
	Peng-Robinson	**Soave-Redlich- Kwong (SRK)**
Liquid flow, Kg/hr	36.5	36.3
Vapor flow, Kg/hr	23.5	23.7
Compressor work required, kW	2.8	2.8
Compressor outlet pressure, bar	15	15

	Property methods	
	Peng-Robinson	**Peng-Robinson**
Liquid flow, Kg/hr	36.5	36.5
Vapor flow, Kg/hr	23.5	23.5
Compressor work required, kW	2.8	3.1
Compressor outlet pressure, bar	15	20

Recycle Vapor Stream

Flowsheet | Tutorial 1.bkp - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources | Modify | Format

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Stream Summary | Utility Costs | Input | History | Report | Summary | Stream Analysis | Sensitivity | Data Fit | Heat Exchanger | Azeotrope Search | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Simulation

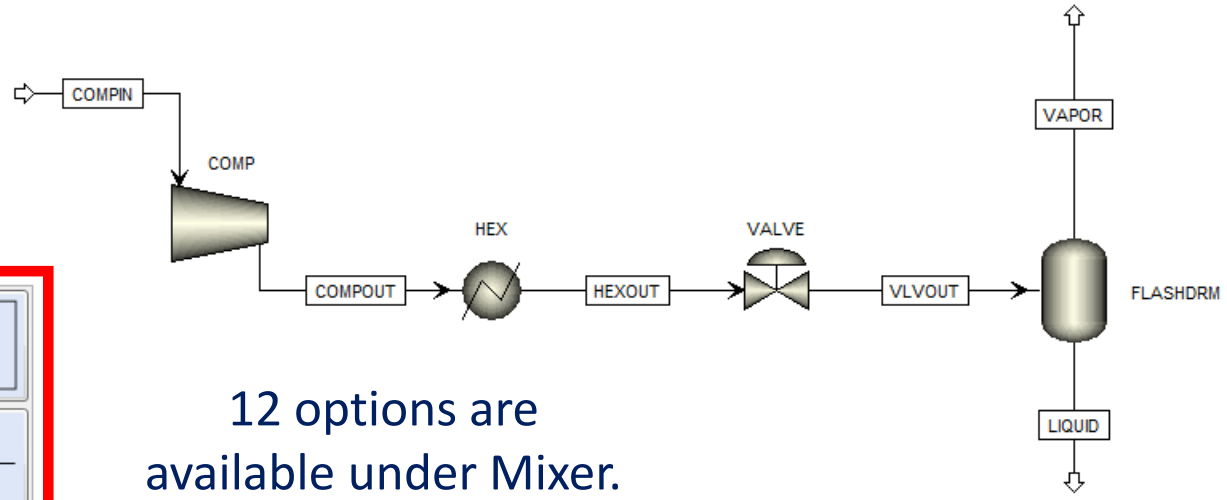
All Items

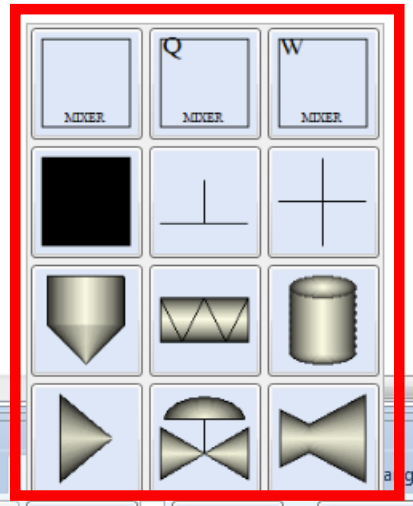
- Block Options
- EO Modeling
- Results
- Stream Results
- Stream Results (Cus
- Summary
- VALVE
- Utilities
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary
  - Run Status
  - Streams
  - Convergence
  - Operating Costs
  - CO2 Emissions
  - Streams (Custom)
  - Models
  - Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Main Flowsheet





12 options are available under Mixer. Select option: 1st column and 4th row.

Model Palette

Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Mixer | FSplit | SSplit

Results Available | Check Status

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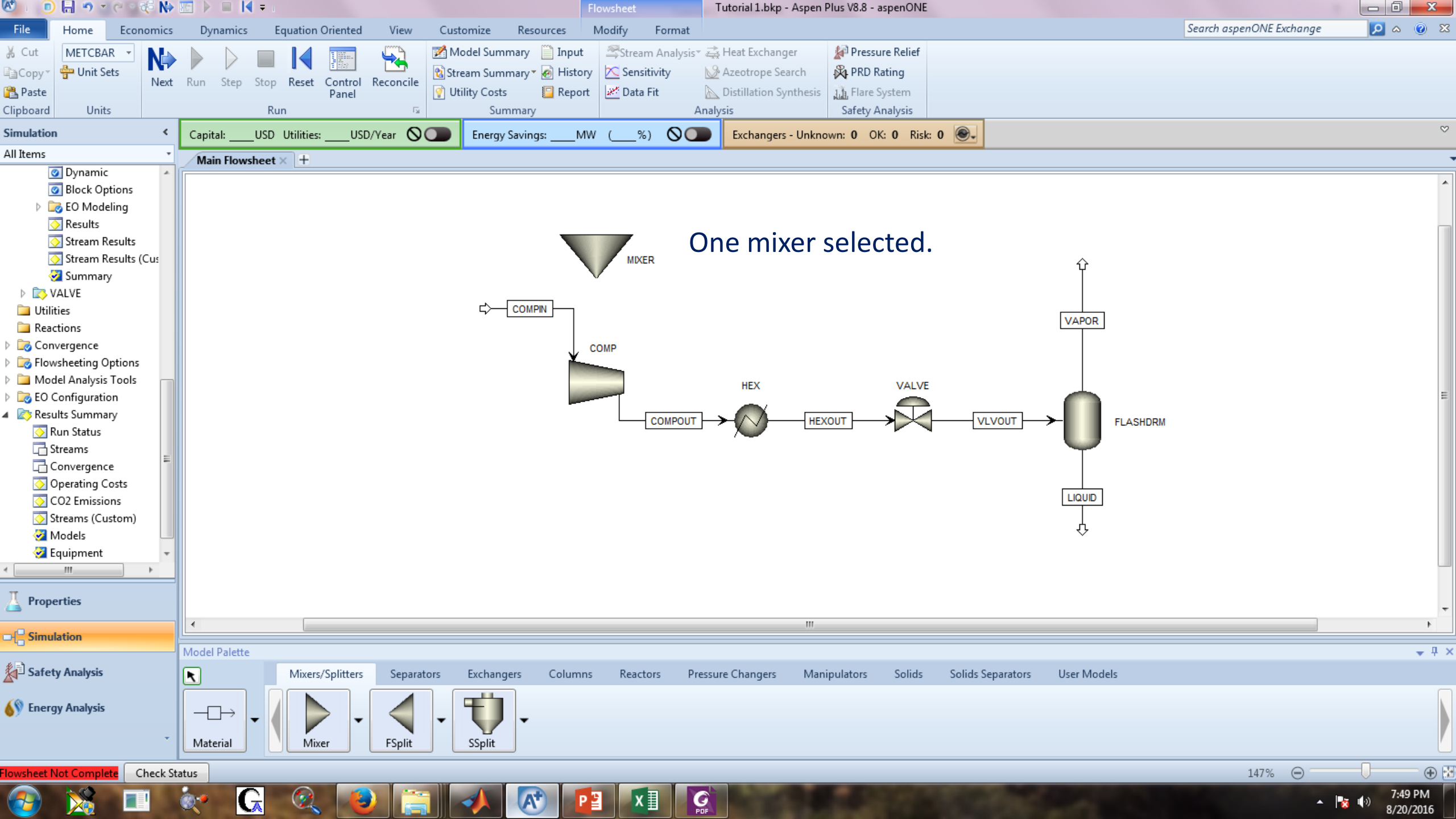
Flowsheet
Tutorial 1.bkp - Aspen Plus V8.8 - aspenONE
File
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Search aspenONE Exchange
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Paste
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METCBAR
Unit Sets
Units
Next
Run
Step
Stop
Reset
Control Panel
Reconcile
Run
Model Summary
Stream Summary
Utility Costs
Input
History
Report
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Stream Analysis
Sensitivity
Data Fit
Heat Exchanger
Azeotrope Search
Distillation Synthesis
Analysis
Pressure Relief
PRD Rating
Flare System
Safety Analysis
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Model Analysis Tools
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Results Summary
Run Status
Streams
Convergence
Operating Costs
CO2 Emissions
Streams (Custom)
Models
Equipment
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
One mixer selected.
MIXER
COMPIN
COMP
COMPOUT
HEX
HEXOUT
VALVE
VLVOUT
VAPOR
FLASHDRM
LIQUID
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
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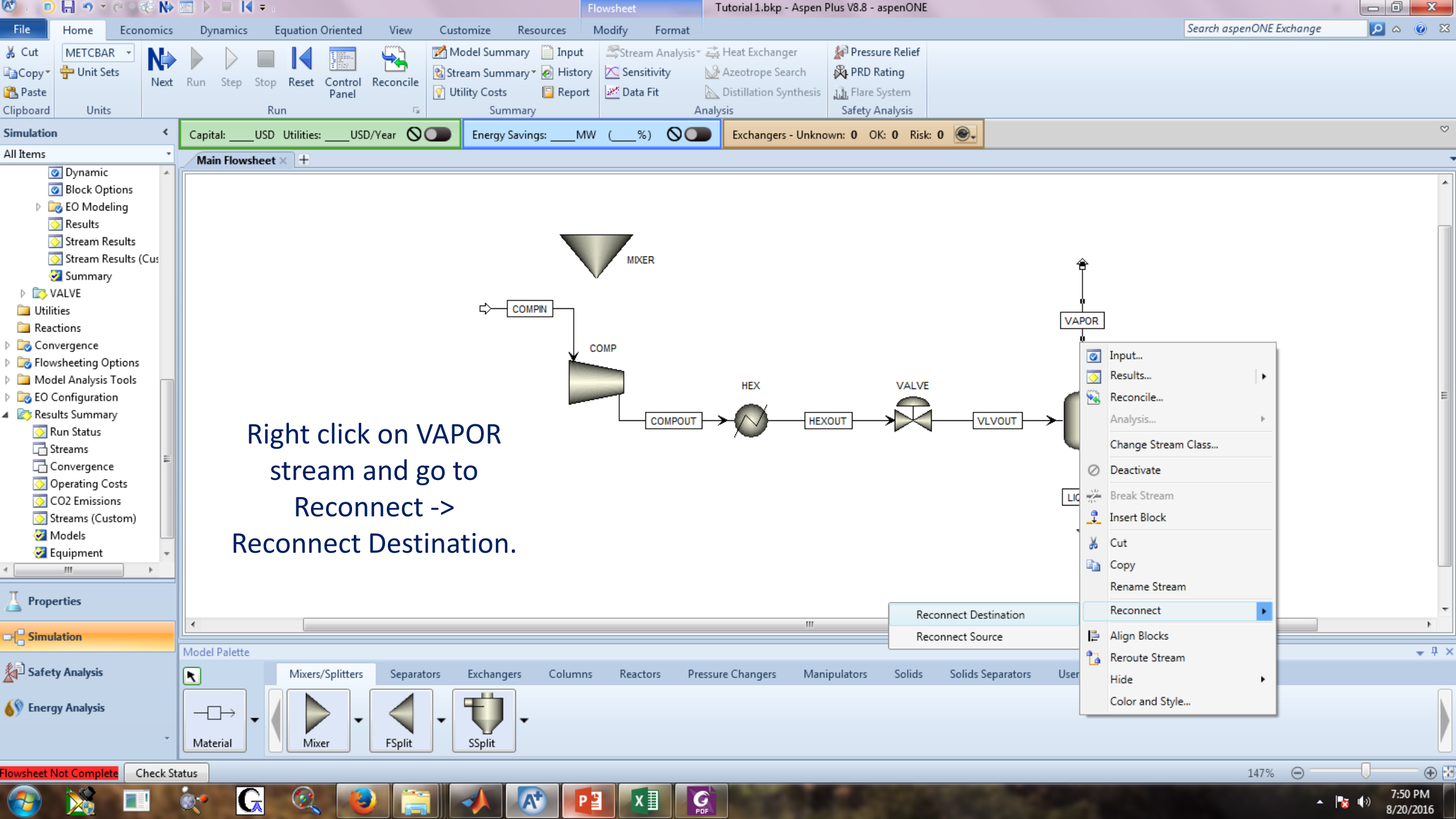
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Results Summary
Run Status
Streams
Convergence
Operating Costs
CO2 Emissions
Streams (Custom)
Models
Equipment
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Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
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COMPOUT
HEX
HEXOUT
VALVE
VLVOUT
VAPOR
Right click on VAPOR stream and go to Reconnect -> Reconnect Destination.
Input...
Results...
Reconcile...
Analysis...
Change Stream Class...
Deactivate
Break Stream
Insert Block
Cut
Copy
Rename Stream
Reconnect
Align Blocks
Reroute Stream
Hide
Color and Style...
Reconnect Destination
Reconnect Source
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
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Solids Separators
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Flowsheet Not Complete
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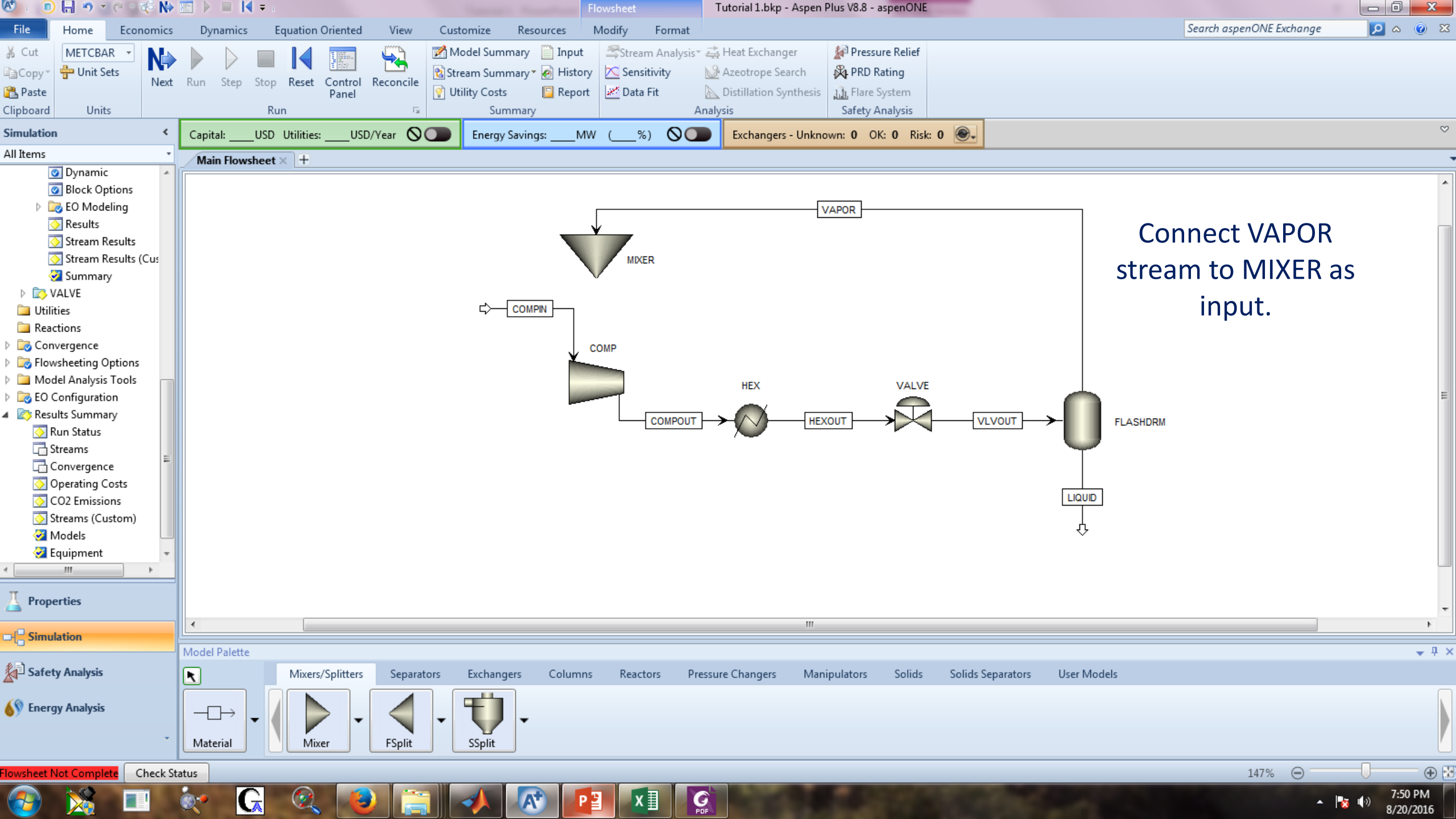
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Operating Costs
CO2 Emissions
Streams (Custom)
Models
Equipment
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VAPOR
MIXER
COMPIN
COMP
HEX
VALVE
COMPOUT
HEXOUT
VLVOUT
FLASHDRM
LIQUID
Connect VAPOR stream to MIXER as input.
Properties
Simulation
Safety Analysis
Energy Analysis
Model Palette
Mixers/Splitters
Separators
Exchangers
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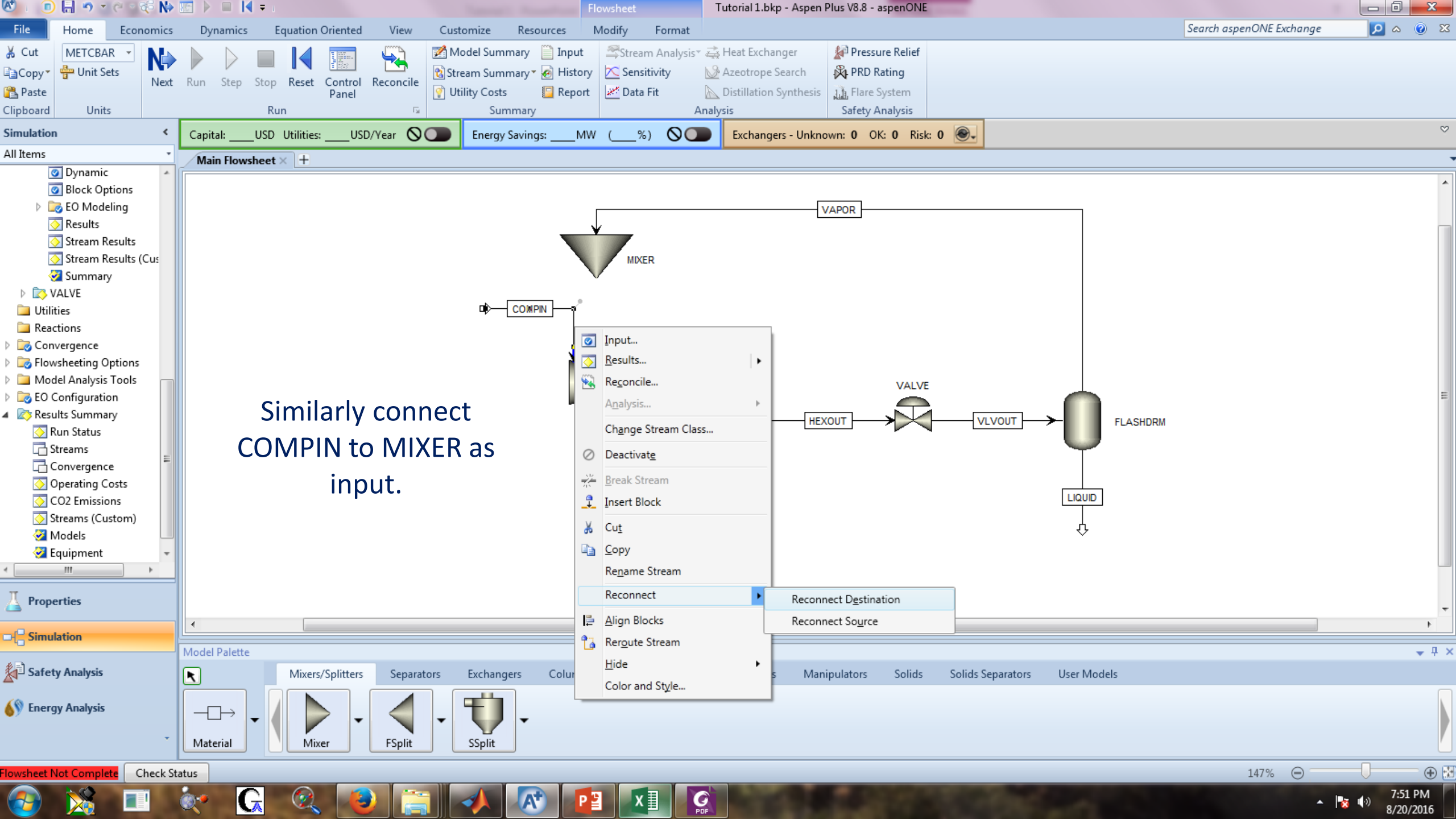
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Heat Exchanger
Azeotrope Search
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PRD Rating
Flare System
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Streams
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Operating Costs
CO2 Emissions
Streams (Custom)
Models
Equipment
Properties
Simulation
Safety Analysis
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
VAPOR
MIXER
COMPIN
VALVE
HEXOUT
VLVOUT
FLASHDRM
LIQUID
Similarly connect COMPIN to MIXER as input.
Input...
Results...
Reconcile...
Analysis...
Change Stream Class...
Deactivate
Break Stream
Insert Block
Cut
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Rename Stream
Reconnect
Reconnect Destination
Reconnect Source
Align Blocks
Reroute Stream
Hide
Color and Style...
Model Palette
Mixers/Splitters
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Manipulators
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SSplit
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Check Status
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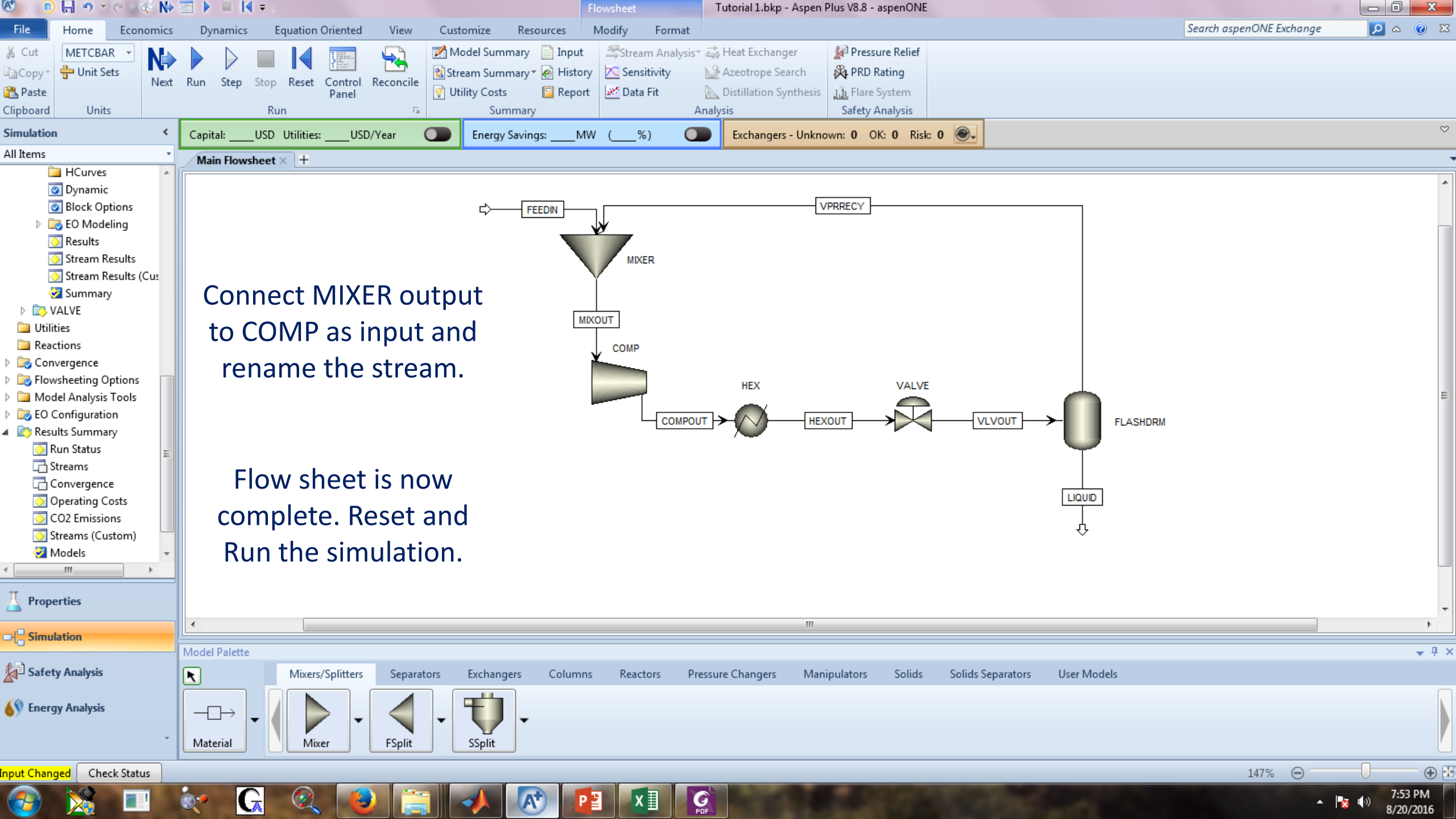
Flowsheet
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Models
Properties
Simulation
Safety Analysis
Energy Analysis
Capital: ____USD Utilities: ____USD/Year
Energy Savings: ____MW (____%)
Exchangers - Unknown: 0 OK: 0 Risk: 0
Main Flowsheet
FEEDIN
VPRRECY
MIXER
MIXOUT
COMP
HEX
VALVE
COMPOUT
HEXOUT
VLVOUT
FLASHDRM
LIQUID
Connect MIXER output to COMP as input and rename the stream.
Flow sheet is now complete. Reset and Run the simulation.
Model Palette
Mixers/Splitters
Separators
Exchangers
Columns
Reactors
Pressure Changers
Manipulators
Solids
Solids Separators
User Models
Material
Mixer
FSplit
SSplit
Input Changed
Check Status
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Tutorial 1.bkp - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Stream Summary | Utility Costs | Input | History | Report | Summary | Stream Analysis | Sensitivity | Data Fit | Heat Exchanger | Azeotrope Search | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Main Flowsheet | Control Panel | Results Summary - Streams (Custom)

Default

	Units	FEEDIN	VPRRECY	MIXOUT	COMPOUT	HEXOUT	VLVOUT	LIQUID	VPRRECY	
From			FLASHDRM	MIXER	COMP	HEX	VALVE	FLASHDRM	FLASHDRM	
To		MIXER	MIXER	COMP	HEX	VALVE	FLASHDRM	MIXER		
Substream: MIXED										
Phase:		Vapor	Vapor	Vapor	Vapor	Liquid	Mixed	Liquid	Vapor	
Component Mole Flow										
PROPA-01	KMOL/HR	1.36065	0.875744	2.2364	2.2364	2.2364	2.2364	1.36065	0.875744	
Component Mole Fraction										
PROPA-01		1	1	1	1	1	1	1	1	
Component Mass Flow										
PROPA-01	KG/HR	60	38.6173	98.6173	98.6173	98.6173	98.6173	60	38.6173	
Component Mass Fraction										
PROPA-01		1	1	1	1	1	1	1	1	
Mole Flow	KMOL/HR	1.36065	0.875744	2.2364	2.2364	2.2364	2.2364	1.36065	0.875744	
Mass Flow	KG/HR	60	38.6173	98.6173	98.6173	98.6173	98.6173	60	38.6173	
Volume Flow	L/MIN	552.553	270.603	827.232	66.526	3.33695	272.32	1.71716	270.603	
Temperature	C	24.85	-42.5381	-0.451644	100.782	24.85	-42.5381	-42.5381	-42.5381	
Pressure	BAR	1	1	1	15	15	1	1	1	

Recycle flow = 38.62 Kg/hr.

Liquid Propane = 60.0 Kg/hr.

Recycle Temp = -42.5 Deg C.

Inlet stream to comp. = -0.45 Deg C.

Simulation | All Items

- Block Options
- EO Modeling
- Results
- Stream Results
- Stream Results (Custor
- Summary
- VALVE
- Utilities
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary
- Run Status
- Streams
- Convergence
- Operating Costs
- CO2 Emissions
- Streams (Custom)
- Models
- Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Mixer | FSplit | SSplit

Results Available | Check Status

100%

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Tutorial 1.bkp - Aspen Plus V8.8 - aspenONE

File | Home | Economics | Dynamics | Equation Oriented | View | Customize | Resources

Search aspenONE Exchange

Cut | Copy | Paste | Clipboard | METCBAR | Unit Sets | Units | Next | Run | Step | Stop | Reset | Control Panel | Reconcile | Run | Model Summary | Stream Summary | Utility Costs | Input | History | Report | Summary | Stream Analysis | Sensitivity | Data Fit | Heat Exchanger | Azeotrope Search | Distillation Synthesis | Analysis | Pressure Relief | PRD Rating | Flare System | Safety Analysis

Capital: ____USD Utilities: ____USD/Year | Energy Savings: ____MW (____%) | Exchangers - Unknown: 0 OK: 0 Risk: 0

Simulation

All Items

- Block Options
- EO Modeling
- Results
- Stream Results
- Stream Results (Custor
- Summary
- VALVE
- Utilities
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary
  - Run Status
  - Streams
  - Convergence
  - Operating Costs
  - CO2 Emissions
  - Streams (Custom)
  - Models
  - Equipment
- Dynamic Configuration

Properties | Simulation | Safety Analysis | Energy Analysis

Main Flowsheet | Control Panel | Results Summary - Models

Copy | Open Input

Template: <Default> | Save | Save as new | Reset | Paste | Send to Excel/ASW

Heater | Flash2 | Compr | Valve | Mixer

Isentropic efficiency	1
Mechanical efficiency	1
Polytropic efficiency	
EO Model components	
Indicated horsepower [kW]	4.19913
Calculated brake horsepower [kW]	4.19913
Net work required [kW]	4.19913
Power loss [kW]	0
Efficiency (polytropic / isentropic) used	1
Calculated discharge pressure [bar]	15
Calculated pressure change [bar]	14
Calculated pressure ratio	15
Outlet temperature [C]	100.782
Isentropic outlet temperature [C]	100.782
Vapor fraction	1
Displacement	

Compressor Net work = 4.199 kW.

Change grid orientation

Model Palette

Mixers/Splitters | Separators | Exchangers | Columns | Reactors | Pressure Changers | Manipulators | Solids | Solids Separators | User Models

Material | Mixer | FSplit | SSplit

Results Available | Check Status

100%

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Results

	Without Recycle	Recycle
Liquid Propane, Kg/hr	36.5	60
Compressor work required, kW	2.8	4.2
Energy cost, W per Kg liquid Propane per hr	**76.7**	**70.0**

Conclusion: Recycle process is more efficient in terms of the energy required per kg of liquid propane produced apart from Stopping the venting the vapor propane.

THE END