

CH402 Chemical Engineering Process Design

Class Notes L9

Heat Exchanger Design – You are expected to know this!

Problem 14-15 using CHEMCAD

“3-Step” Heat Exchanger Design Method

(use desktop computer unless laptops have updated price index)

Problem Statement 14-15

2

The overhead vapor from the C2 splitter in Figure 3-13 is partially condensed in E-601. The process conditions for the vapor entering the condenser are

Temperature, °C	-30.1
Pressure, kPa	1945*

Species Flow rates, kg/s

CH ₄	0.003
C ₂ H ₆	0.0626
C ₂ H ₄	64.53

* Value has been changed from the book value. The authors report 2944 kPa.

A shell-and-tube heat exchanger is to be used to condense 73.5 % of the overhead vapor. Use an appropriate software package (based on TEMA guidelines) to obtain the overall heat transfer coefficient and the area required for the condensation if the tubes have an outside diameter of 0.0127 m and an inside diameter of 0.0094 m. Assuming that the maximum length of the tubes is 3.05 m long, **how many tubes** will be required and what **shell diameter** is recommended? Propylene at -46 °C and 125 kPa serves as the coolant for the condensation process.

Additional Questions: (1) Identify the **largest resistance** to heat transfer in the exchanger and, (2) determine the **total purchase cost** of the exchanger in Feb. 2026.

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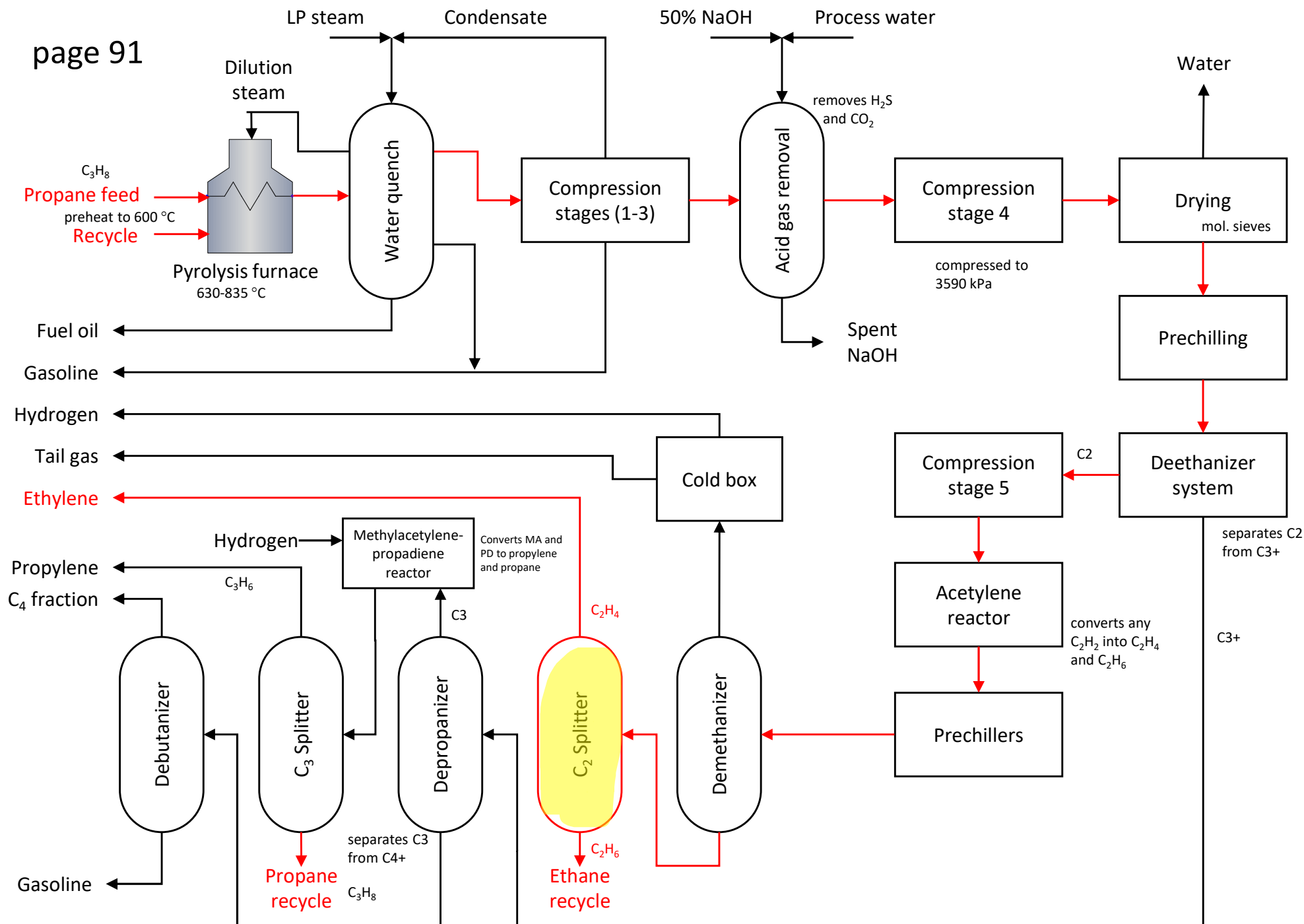


Figure 3-13. Product Separation Section

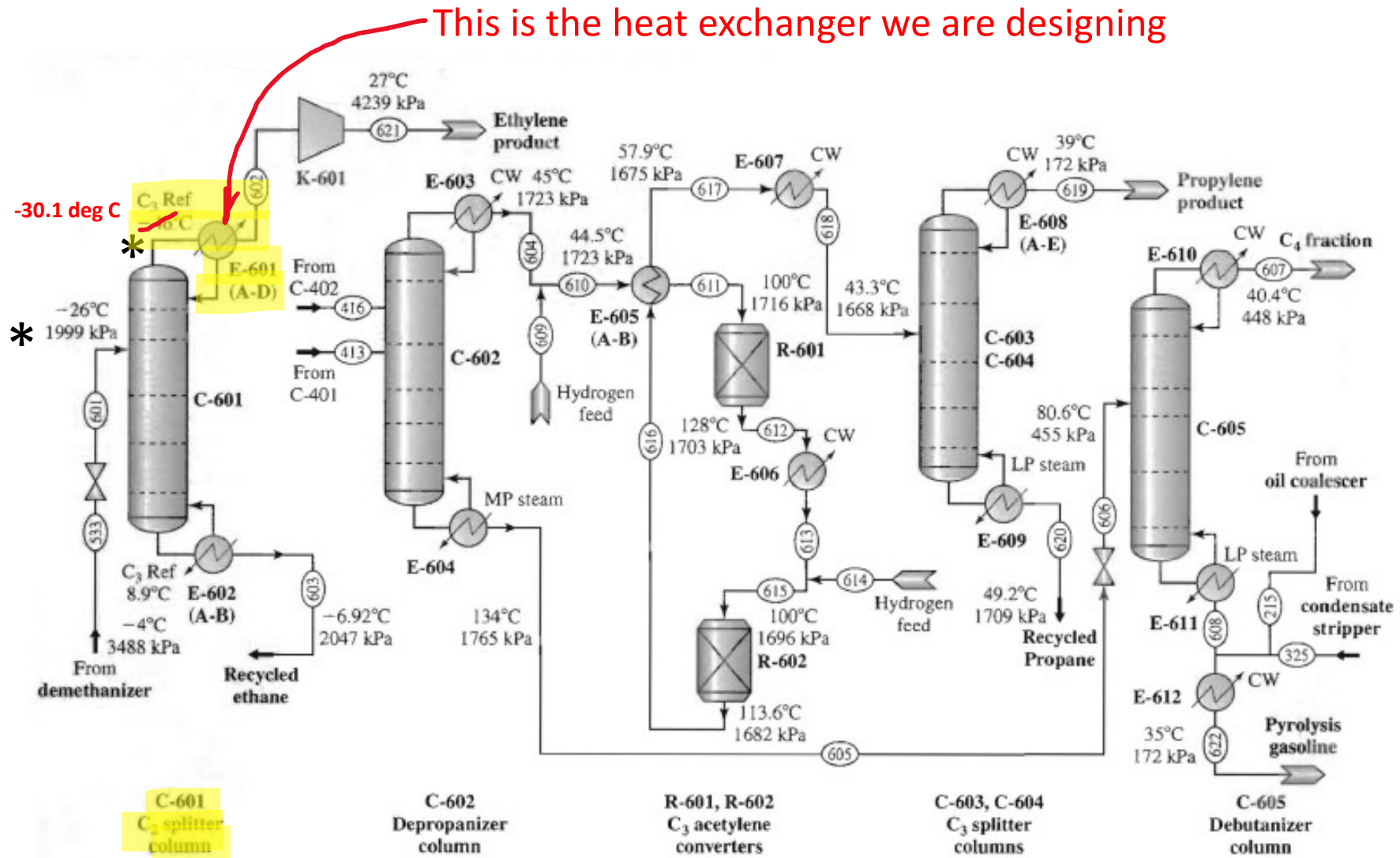


Figure 3-13. Product separation section.

Change engineering units

Change CEPCI to Feb 2026 for PS5

sec

kPa

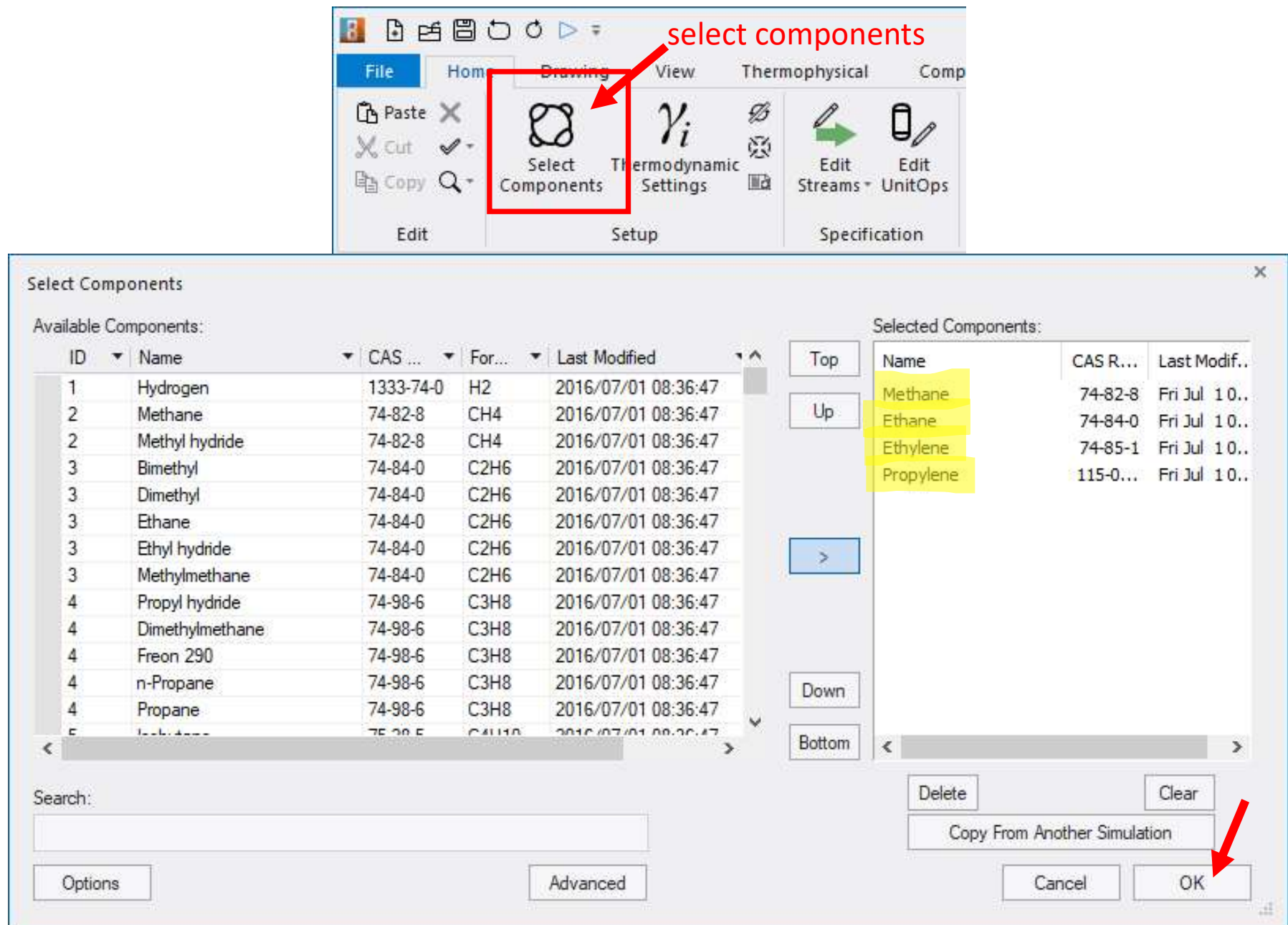
J

kJ

Apply

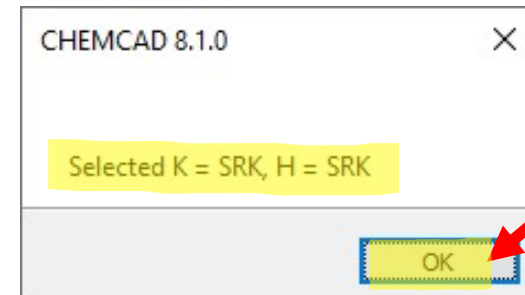
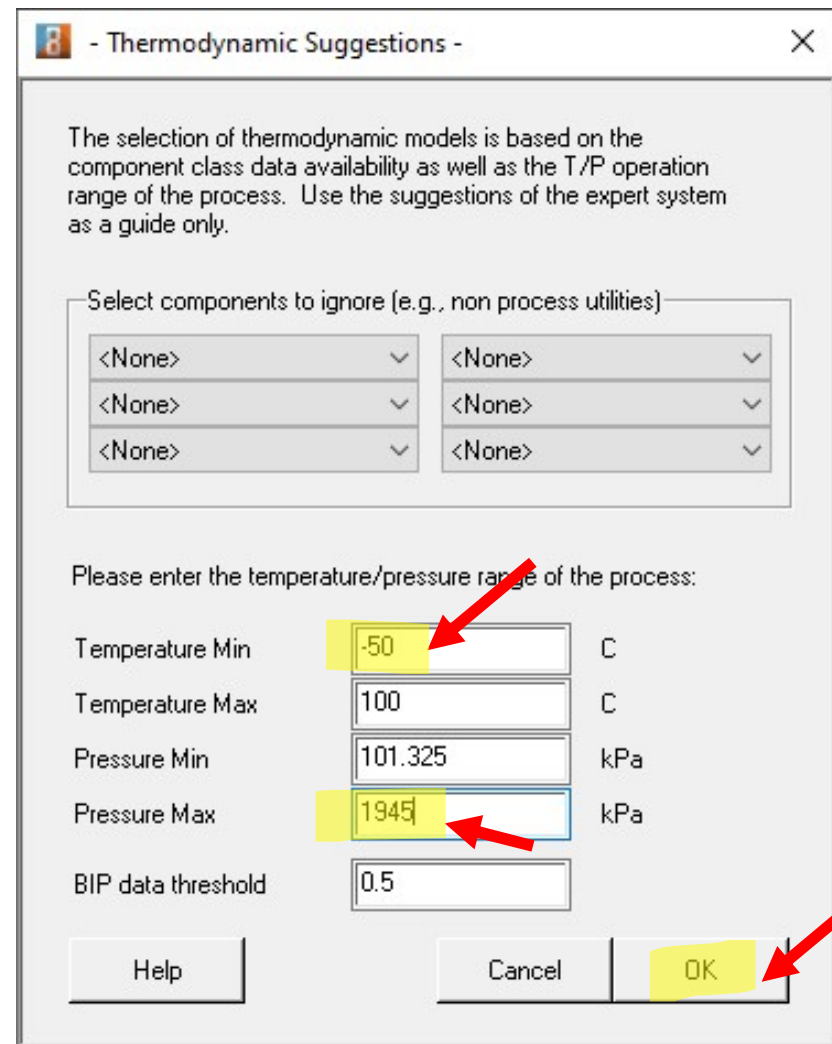
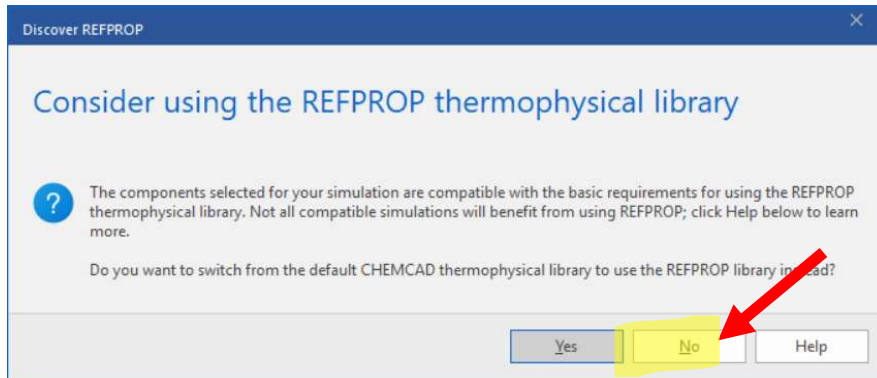
The screenshot displays the ChemCAD 8.1.0 software interface. The top menu bar includes File, Home, Drawing, View, Thermophysic, Component D, Specification, Analysis, Sizing, Tools, and CC-THERM. The 'Tools' tab is active, showing options like Steady State, Dynamic, Run All, Run from Initial State, Charts, and Reports. The 'Engineering Units' dialog box is open, showing 'Current Flowsheet Settings: Custom'. The 'System Profiles' section on the left has 'Common SI' selected. The 'Fundamental' units section shows Time as 'sec', Mole/Mass as 'kg', Temperature as 'C', Pressure as 'kPa', Enthalpy as 'J', and Work as 'kJ'. The 'Fluid Flow' section shows Liquid Volume Rate as 'm3/h', Vapor Volume Rate as 'm3/h', Vapor Density as 'kg/m3', Liquid Density/Con... as 'kg/m3', Crude Flow Rate as 'm3/h', and Velocity as 'm/sec'. The 'Fluid Properties' section shows Heat Capacity as 'kJ/kg-K', Specific Heat as 'kJ/kg', Heat Transfer Coef... as 'W/m2-K', Thermal Conductivity as 'W/m-K', Viscosity as 'N-s/m2', and Surface Tension as 'N/m'. The 'Stream Flow Units' section shows Total Flow as 'Default mole/r', Component Flow as 'Default mole/r', and Stream Edit as 'Automatic con'. The 'VBA Flow Units' section shows Flow unit option for some VBA functions as 'Mole'. The 'Atmospheric Pressure Reference' section shows 'Default' as '101.3249817 kPa'. The 'Vapor Reference Temperature' section shows 'Default' as '0.00 C'. The 'Apply' button is highlighted with a red arrow. The 'Palettes' panel on the right shows 'All UnitOps : Grayscale', 'Heat Exchangers : Gray', and 'Miscellaneous : Grayscale'. The 'Piping and Flow : Grayscale', 'Reactors : Grayscale', 'Separators : Grayscale', and 'Solids handling : Grayscale' are also listed. The status bar at the bottom shows 'Steady State' and '100.0%' zoom.

On my computer, I have Common SI set as the default.



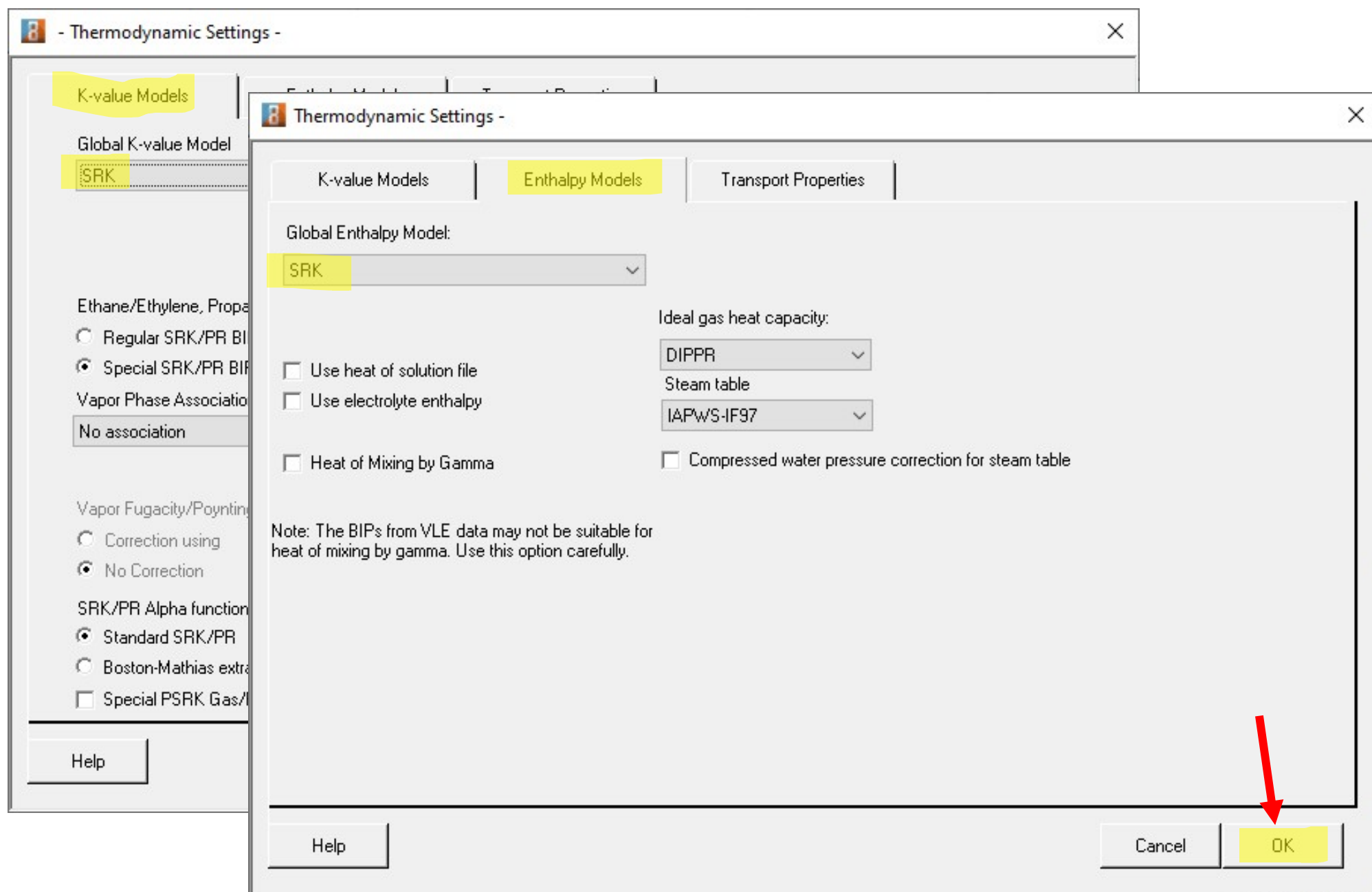
“Thermodynamic Suggestions” window launches automatically when you click OK.

Thermodynamic Suggestions



SRK is good!

Thermodynamic suggestions: Check defaults in both tabs and click OK.




Draw flowchart and solve m/e balances.

Step 1 – Lesson 8, slide 3.

Overhead vapor

Coolant – tube side

Heat Exchanger #4

Pro tip 1: default fonts can be set in the “drawing” tab by clicking “font” 

Pro tip 2: connect streams in the order shown here. Your streams should be numbered the same. This helps troubleshooting.

Steady State

124.0%

Set Feed Stream 1: Propylene

(Propylene at -46 °C and 125 kPa is available as a coolant.)

Place propylene coolant tubeside (Stream 1)

Tube-side coolant in a condenser is a good idea.

Given: Propylene at -46 °C and 125 kPa serves as the coolant for the condensation process.

The pressure was not specified in the book. Engineers “fill in the blanks.”

This will be explained further in slides 11 and 20.

We don't know the propylene flow rate.
Set it to 1 kg/s.

CHEMCAD will solve for the actual flow rate later.

Stream No.	1	3
Stream Name		
Temp C	-46	-30.1
Pres kPa	125	1945.806
Vapor Fraction	0	1
Enthalpy J/sec	-77463.29	1.114613e+08
Total flow	1	64.5956
Total flow unit	kg/sec	kg/sec
Comp unit	kg/sec	kg/sec
Methane	0	0.003
Ethane	0	0.0626
Ethylene	0	64.53
Propylene	1	0

Two specs needed:
Set temperature and vapor fraction.

Complete Specs on Heat Exchanger and Coolant Flow Rate

Heat Exchanger (HTXR) -

Specifications | Misc. Settings | Cost Estimations

Simulation mode: 0 Enter specifications (CHEMCAD simulation) ID: 1

Utility option: 3 Calculate flow of stream 1 Pressure drop: (default = 0)

Stream 1 kPa

Stream 3 kPa

Switch this to "3"

Assume! (see note 1)

Given (see slide 2)

Temperature stream 4 C

Vapor fraction stream 2 0.995

Vapor fraction stream 4 0.265

Subcooling stream 2 C

Superheat stream 4 C

Heat duty (specified) J/sec

Delta temperature specifications:

Minimum delta temperature C

Hot outlet - cold inlet C

Hot inlet - cold outlet C

Stream 2 - stream 4 C

Stream 2 - stream 1 C

Stream 4 - stream 3 C

Heat transfer coefficient and area specification:

Specifying both U and A counts as a single thermal specification.

Heat transfer coefficient (U) W/m²-K

Area (per shell) m²

Help Cancel OK

Note 1: The largest "thermal reservoir" in the coolant is the latent heat of the phase transition. Any further warming of the coolant beyond the phase change will involve relatively small enthalpy changes.

Click OK, then Run

Run the Simulation and Confirm Results (1/3)

The screenshot displays the CHEMCAD 8.1.0 interface. The main window shows a process flow diagram with four streams (1, 2, 3, 4) and a unit operation (1). The 'Steady State' tab is selected in the top menu, and a red arrow points to the 'Run All' button. The 'Edit Streams' dialog box is open, showing the properties for Stream 1. The 'Flash' tab is selected, and the 'Propylene' component is highlighted in the 'Total flow' row. A red arrow points to the 'Propylene' value, and a text box indicates that double-clicking stream 1 will check the results.

Steady State

Stream No. 1

Stream Name

Temp C -46

Pres kPa 125

Vapor Fraction 0

Enthalpy J/sec -2733769

Total flow 35.29116

Total flow unit kg/sec

Comp unit kg/sec

Methane 0

Ethane 0

Ethylene 0

Propylene 35.29116

Double-click stream 1 to check results

Confirm Results (2/3)

Heat Exchanger (HTXR) -

Specifications | Misc. Settings | Cost Estimations

Simulation mode: 0 Enter specifications (CHEMCAD simulation)

Utility option: 3 Calculate flow of stream 1

Pressure drop: (default = 0)

Stream 1 kPa

Stream 3 kPa

Enter two specifications, the flowrate of stream 1 will be recalculated

Temperature stream 2		C
Temperature stream 4		C
Vapor fraction stream 2	0.995	
Vapor fraction stream 4	0.265	
Subcooling stream 2		C
Subcooling stream 4		C
Superheat stream 2		C
Superheat stream 4		C
Heat duty (specified)		J/sec

Delta temperature specification

Minimum delta temperature

Hot outlet - cold inlet

Hot inlet - cold outlet

Stream 2 - stream 4

Stream 2 - stream 1

Stream 4 - stream 3

Heat transfer coefficient and area specification:

Specifying both U and A count

Heat transfer coefficient (U) W/m²-K

Area (per shell) m²

Help

Cancel OK

Note: there is no P-drop

Note: there is no A or U

Double-click heat exchanger to confirm results

Given

Confirm Results (3/3)

Heat Exchanger (HTXR) -

Specifications | **Misc. Settings** | Cost Estimations

ID: 1

Type: 0 Countercurrent

No. of Zones

Max. Percent of Pressure Drop

Percent

For evaporator utility side operating temp:

Utility operating T

C

Shells in Series

No. of SS Passes

No. of TS Passes

☐ Include holdup in dynamic calculation

Stream 1-2 holdup

m3

Stream 3-4 holdup

m3

Backcalc mode (for Autocalc): 0 No back calculation

Calculated Results

Calc Ht Duty	1.56566e+07	J/sec	Pinch Flag	
LMTD (End points)	14.2801	C	Wt. LMTD	
LMTD Corr Factor	1			
Calc U				
Calc Area (Total)				
Tube fouling				
Shell fouling		m2-K/W		

For more comprehensive heat exchanger design and rating, please contact us regarding our CC-THERM program.

Help Cancel OK

$$\ln[2] := \frac{(-30.1084 - (-46)) - (-30.1 - (-42.8813))}{\text{Log} \left[\frac{(-30.1084 - (-46))}{(-30.1000 - (-42.8813))} \right]}$$

$$\text{out}[2] = 14.28004$$

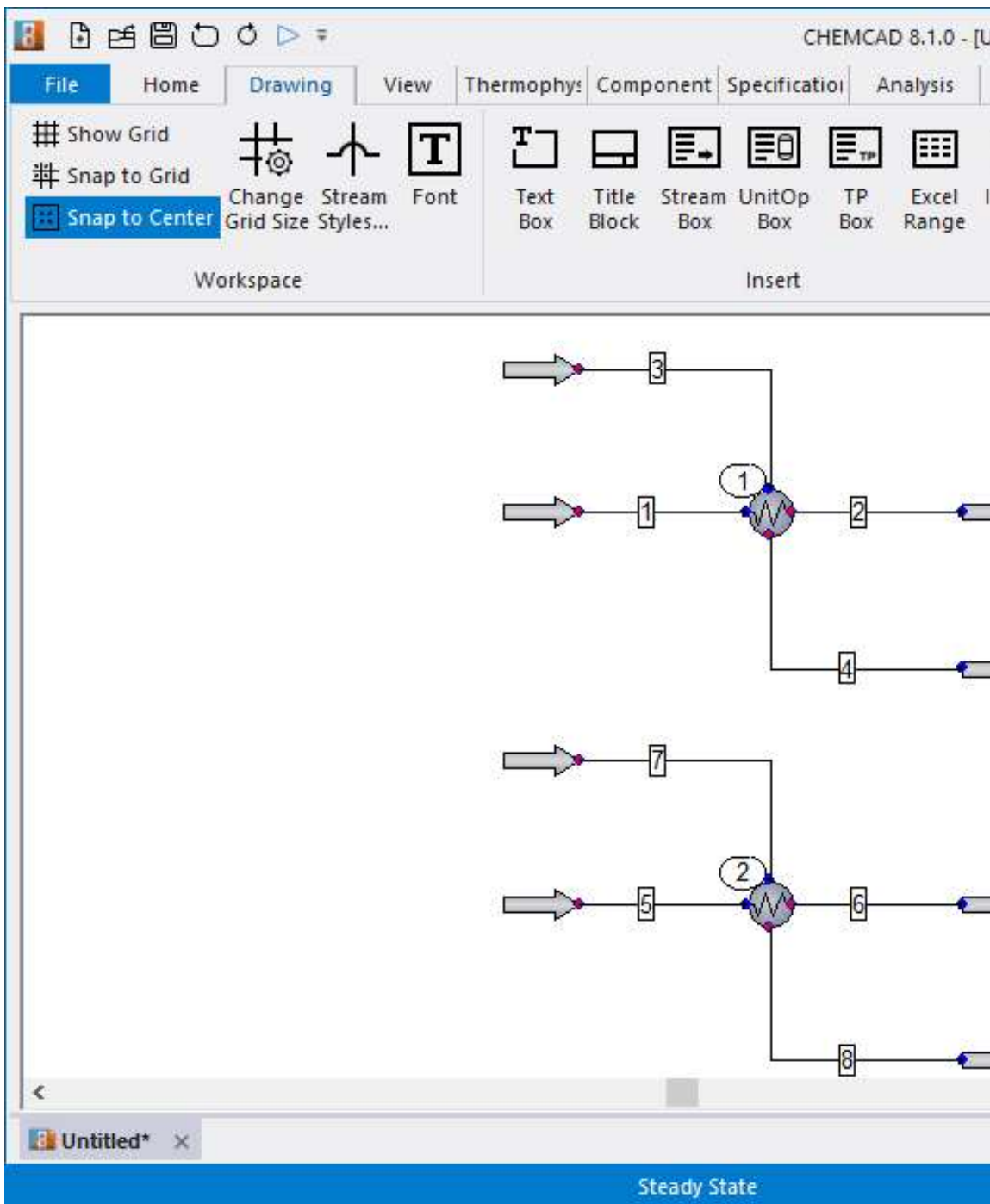
Numbers in gray fields were calculated by CHEMCAD

STOP HERE

Confirm results in slides 12 to 14 before proceeding

Step 1 (L8 Slide 3) is complete:

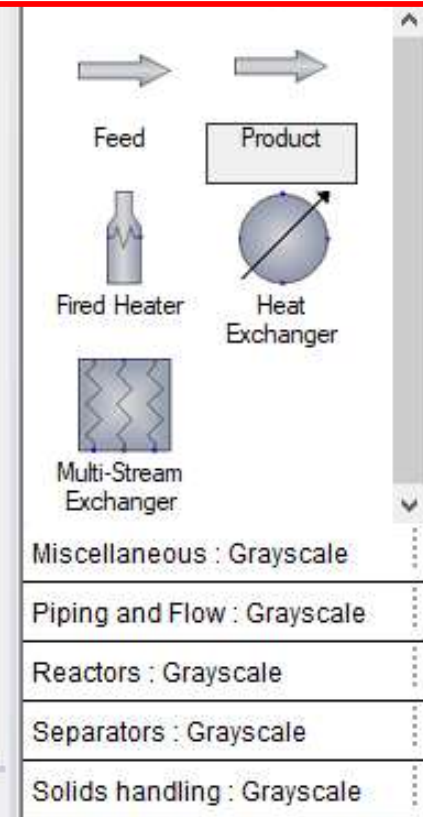
Determined the flow rates and heat transfer rates
necessary to meet the given conditions.

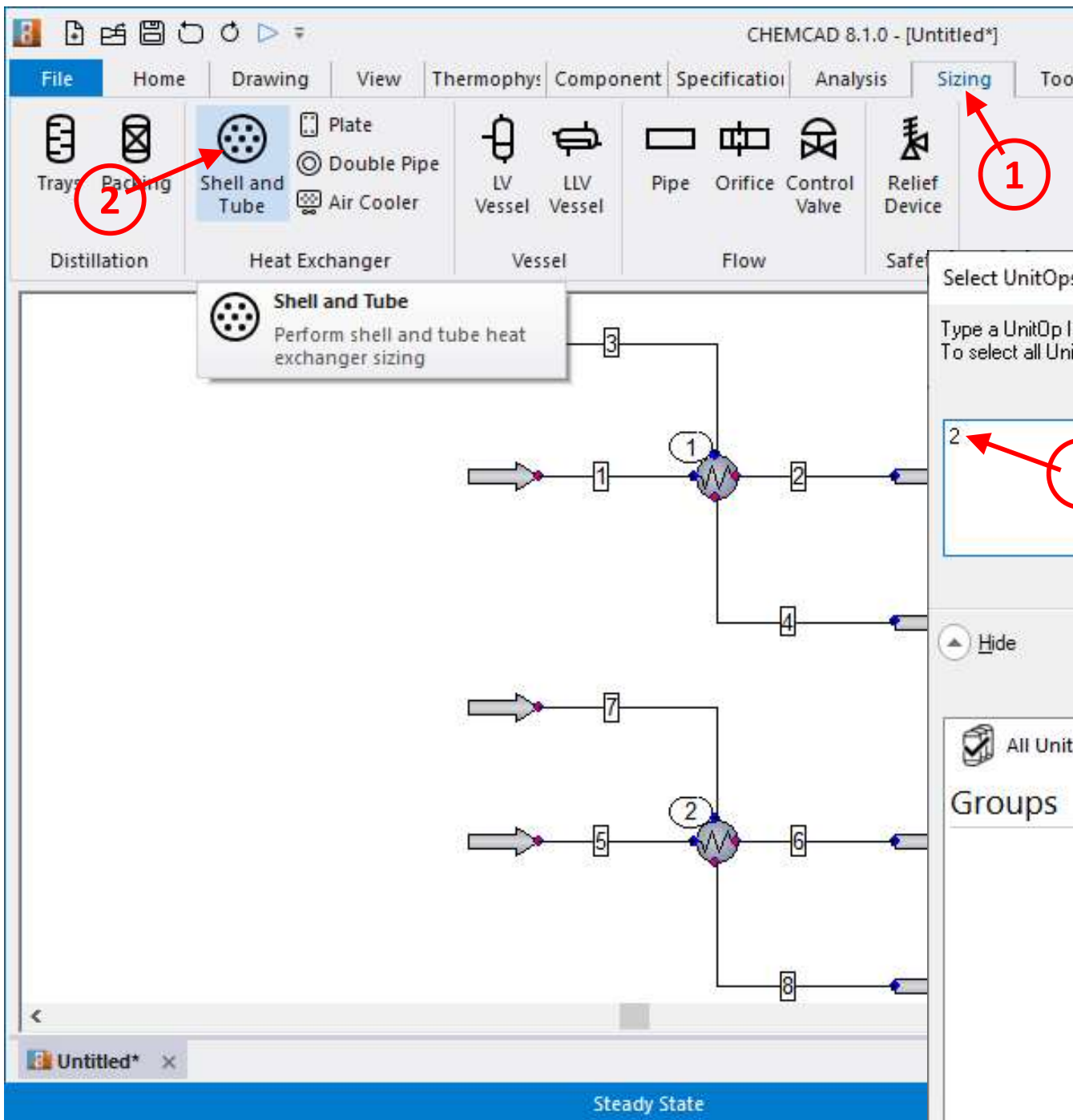


Save your simulation at this point.

Make a copy of the first exchanger and paste it to make a second exchanger. This is REQUIRED.

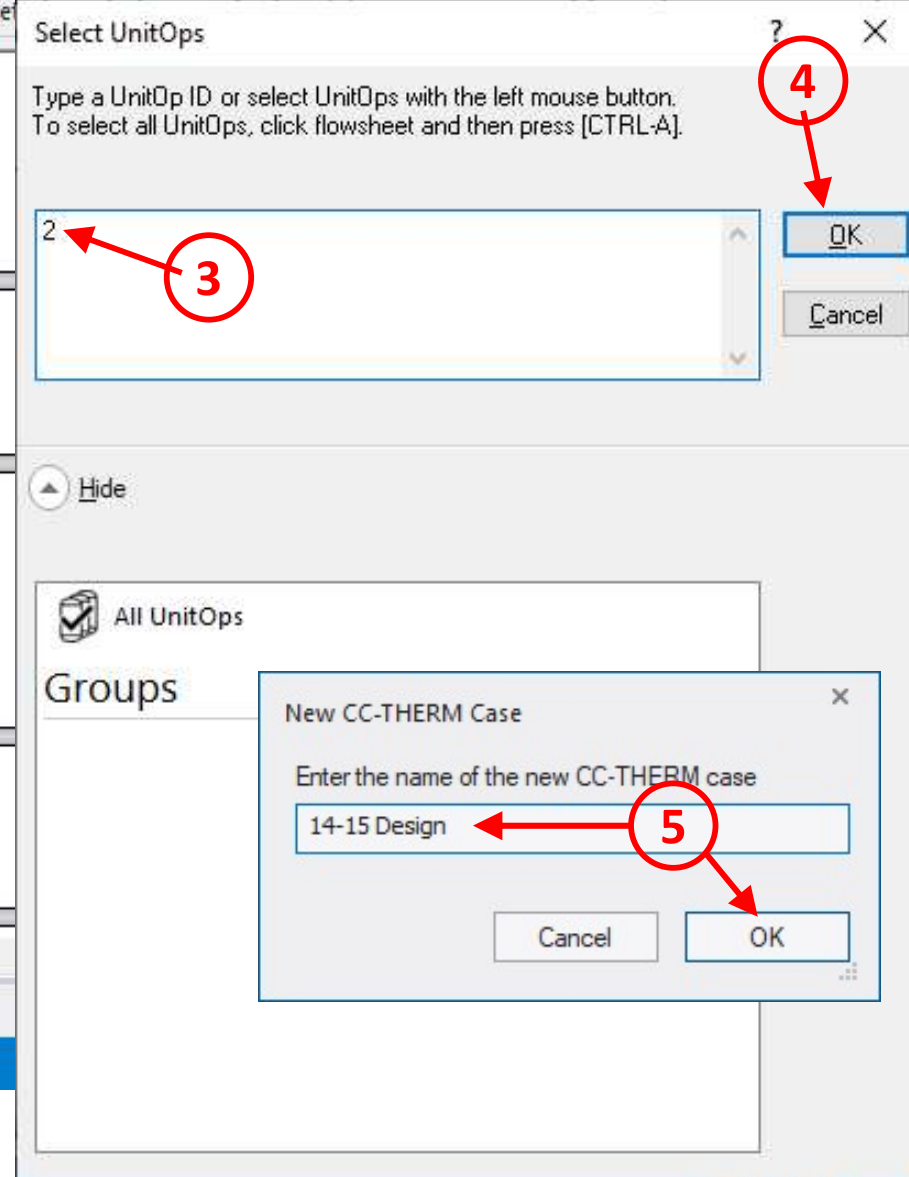
This is a backup of your work to safeguard against mistakes.





Click "Sizing," then "Shell-and-tube."

This initiates steps 2-5 of the design process (L8 slide 5).



CHEMCAD 8.1.0 - [Lesson9_AY232_Trial1*]

File Home Drawing View Thermophysic Component D Specification Analysis Sizing Tools CC-THERM

UnitOp ID 2 Type Shell and Tube

Case 14-15 Design

Select

General

Enter Stream Information Materials
Heat Curve Specification Label
Edit Heat Curve

Select Tube-side Inlet Stream

Please select the stream entering the exchanger tube side.

5

OK Cancel

Hide

All Streams
Feed Streams
Product Streams
Cut Streams

Groups

Lesson9_AY232_Trial1* Lesson9_AY232_Trial1_1

Steady State K:SRK H:SRK

1. CLICK THE CENTER OF THE GEAR WHEEL.

2.

3.

TEMA Type AEL Exchanger. Take all defaults.

General Specifications

General Information Modeling Methods

TEMA class/ standard: TEMA R

Orientation: Horizontal

TEMA front end head: A - Channel Removable Cover

TEMA shell type: E - One Pass

TEMA rear end head type: L - Fixed Tubesheet (A head)

Tube Side

Stream name:

Process type: Forced Evaporation

Fouling factor: 0.0001761094 $\text{m}^2\text{-K/W}$

Optional h Coeff.: $\text{W/m}^2\text{-K}$

Shell Side

Horiz Condensation

0.0001761094 $\text{m}^2\text{-K/W}$

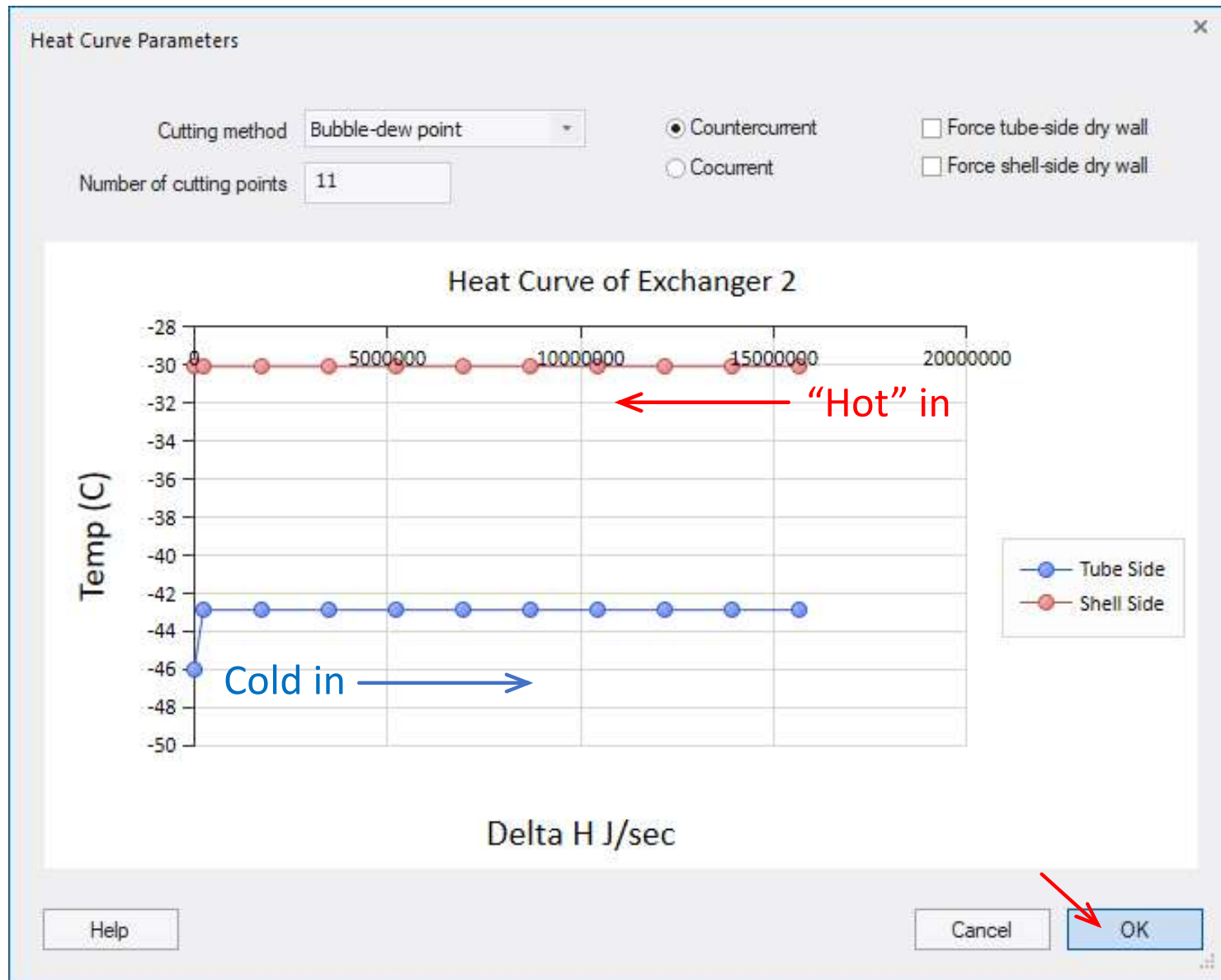
$\text{W/m}^2\text{-K}$

For fouling rating calculations: Calculate tube-side fouling only

Help Cancel OK

3

Heating-cooling curve can be seen by clicking “Heat Curve Specification.”



Bumping up the cold feed pressure to 125 kPa drops the first data point so I can identify the cold inlet in the heating-colling curve.

CHEMCAD 8.1.0 - [Lesson9_AY232_Trial1*]

File Home Drawing View Thermophysic Component D Specification Analysis Sizing Tools CC-THERM Style Help

UnitOp ID 2 Type Shell and Tube Case 14-15 Design Select

General Enter Stream Information Materials Heat Curve Specification Label Simulation Mode Design Constraints Reboiler Specifications

Tube Nozzle Shell Clearance Baffle Miscellaneous Geometry Run Results

Design Constraints

Design Criteria

Allowable tube pressure drop	34.473801	kPa
Allowable shell pressure drop	34.473801	kPa
Allowable tube velocity	76.199997	m/sec
Allowable shell velocity	76.199997	m/sec
Prefer tube length/shell diameter ratio	12	
Minimum excess %		

Sizing nozzle

- ☒ Tube, inlet
- ☒ Tube, outlet
- ☒ Shell, inlet
- ☒ Shell, outlet

Limits of Design Variables

	Lower Limits	Upper Limits	
Tube Length	3	3.1	m
Shell Diameter	0.1524	6	m
Baffle Cut	15	45	Percent of diameter
Baffle Spacing	0.050799999	3.175	m

☐ Optimize number of tube passes

Help Cancel OK

Steady State

Lesson9_AY232_Trial1* Lesson9_AY232_Trial1_1

Diagram showing a process flow with streams 4, 5, 6, 7, and 8, and a reboiler unit. Red circles and arrows highlight specific design constraints and variables in the Design Constraints dialog box.

Red annotations in the image:

- 1: Red circle around the 'General' tab in the Component D ribbon.
- 2: Red circle around the 'Limits of Design Variables' section header.
- 3: Red circle around the 'Upper Limits' column header.
- 4: Red circle around the '6' value in the 'Shell Diameter' upper limit field.
- 5: Red circle around the 'OK' button.

CH EMCAD 8.1.0 - [Lesson9_AY232_Trial1*]

File Home Drawing View Thermophysic Component D Specification Analysis Sizing Tools CC-THERM Style Help

UnitOp ID 2 Type Shell and Tube Case 14-15 Design

General Enter Stream Information Materials Heat Curve Specification Label Simulation Mode

Configuration

Tube Nozzle Shell Clearance Baffle Miscellaneous Geometry Run Results

Tube Access tube specifications

Heat Exchangers Gray

Feed Product Fired Heater Heat Exchanger Multi-Stream Exchanger

Miscellaneous : Grayscale Piping and Flow : Grayscale Reactors : Grayscale Separators : Grayscale Solids handling : Grayscale

Steady State K:SRK H:SRK 128.0%

Tube Specifications

Number of tubes * 1396

Number of tube passes * 1

Tube outer diameter .0127 m

Tube wall thickness 0.00165 m

Tube length * m

Roughness factor 1.5748e-06 m

Tube pattern Rotated Triangular (60) m

Tube pitch 0.023812501 m

Trufin tube code Plain tube

Turbulator No Turbulator

Tubesheet thickness 0.01905 m

Number of tubesheets 2

* Field may be recalculated when design calculation is run

Help Cancel OK

1

2

3

4

5

CHEMCAD NXT 1.2.0 - [Untitled*]

File Home Drawing View Thermophys Component Specification Analysis Sizing Economics Tools **CC-THERM** ^ Style ^ Help - [X]

UnitOp ID 2 Type Shell and Tube

Case 14-15 Design

Select

General Configuration

Enter Stream Information Materials
Heat Curve Specification Label
Edit Heat Curve Simulation Mode

Tube Shell Baffle (...) Design Charts Reports

Geometry

Design Rating Fouling Rating

1 dropdown

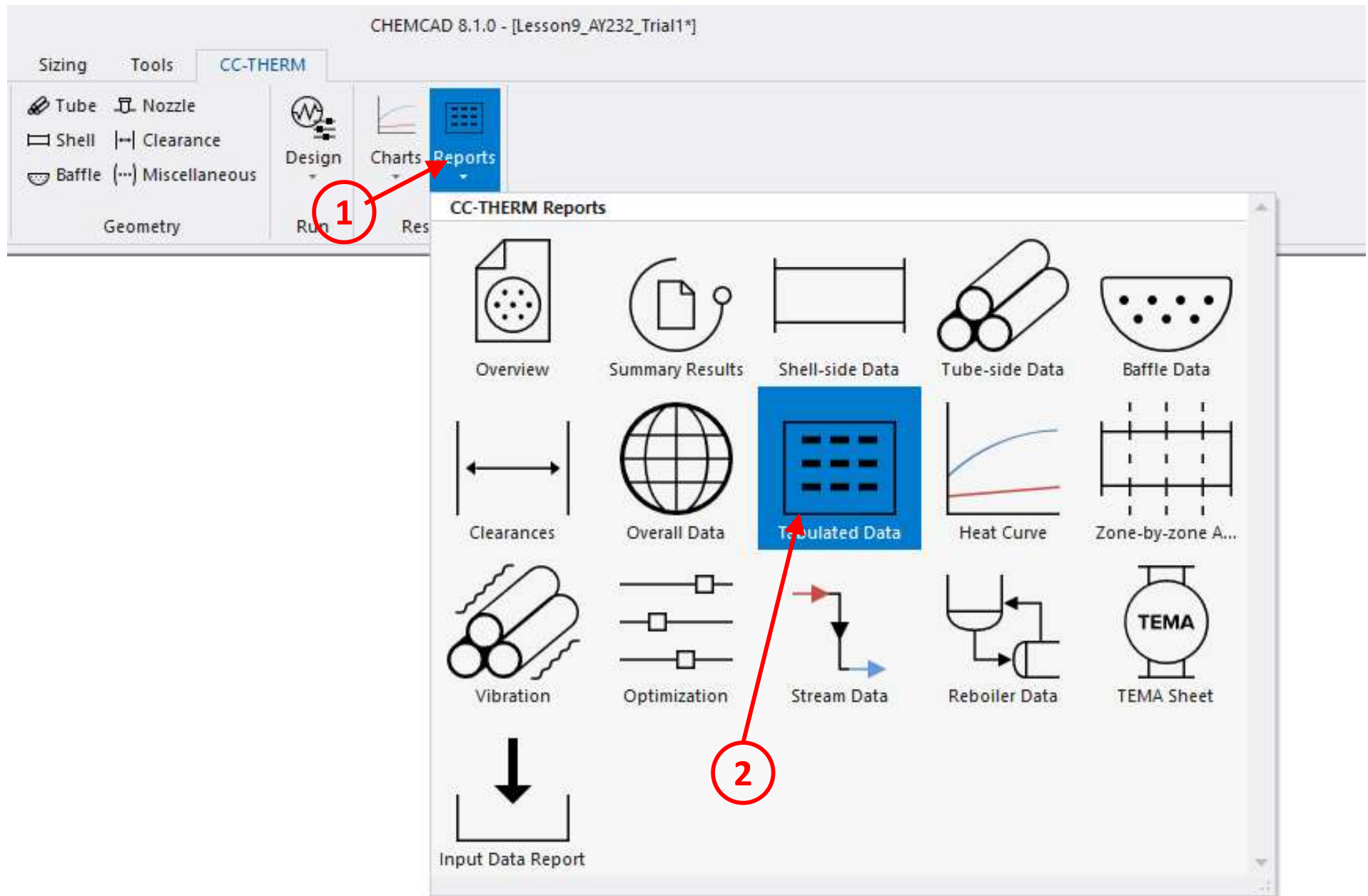
you should see 44 iterations

23

Iteration 44

Steady State K:SRK H:SRK

196.0%



Design Results – CHEMCAD NXT 1.2.0

TABULATED ANALYSIS

Overall Data:

Area Total	m2	2348.77	% Excess		6.13
Area Required	m2	2157.83	U Calc.	W/m2-K	566.94
Area Effective	m2	2290.05	U Service	W/m2-K	534.21
Area Per Shell	m2	2290.05	Heat Duty	J/sec	1.57E+07
Weight LMTD C	12.80	LMTD CORR Factor	1.0000	CORR LMTD C	12.80

Shell:

Shell O.D.	m	3.68	Orientation	H
Shell I.D.	m	3.66	Shell in Series	1
Bonnet I.D.	m	3.66	Shell in Parallel	1
Type		AEL	Max. Heat Flux Btu/ft2-hr	0.00
Imping. Plate		Impingement Plate	Sealing Strip	5

Tubes:

Number		19314	Tube Type	Bar
Length	m	3.05	Free Int. Fl Area	m2 0.00
Tube O.D.	m	0.013	Fin Efficiency	0.000
Tube I.D.	m	0.009	Tube Pattern	TRI60
Tube Wall Thk.	m	0.002	Tube Pitch	m 0.024
No. Tube Pass		1		
Inner Roughness	m	0.0000016		
Number of tubesheets		2	Tubesheet thickness, m	0.019

Resistances:

Shell-side Film	m2-K/W	0.00068
Shell-side Fouling	m2-K/W	0.00018
Tube Wall	m2-K/W	0.00004
Tube-side Fouling	m2-K/W	0.00018
Tube-side Film	m2-K/W	0.00047
Reference Factor (Total outside area/inside area based on tube ID)		1.351

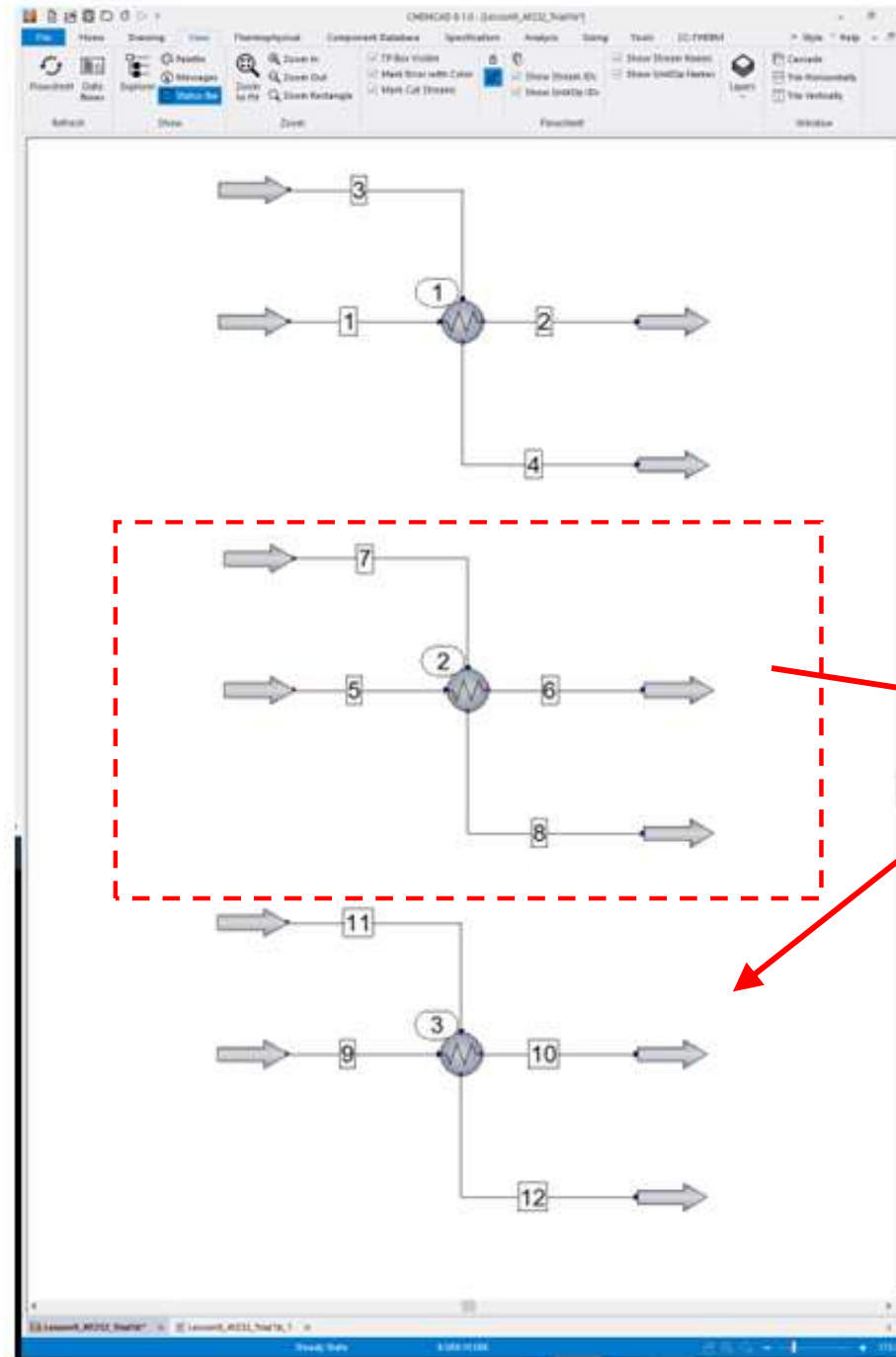
Answers to first three questions are found here. How many tubes? Shell diameter? Largest resistance?

STOP HERE

Confirm results in slide 25 and save your simulation before proceeding

Steps 2-5 of L8 Slide 3 are now complete:
Type of exchanger, geometric details, overall U, thermal driving force, area, and P-drops.

Exchanger Simulation



Copying and pasting is an important step.

It preserves the design work down in exchanger 2 as a backup.

copy this and paste here

Setting the "Simulation Mode" to "1 Shell & tube simulation initiates step 6 of the design process (L8 slide 3).

CH EMCAD 8.1.0 - [Lesson9_AY232_Trial3*]

File Home Drawing View Thermophys Component Specification Analysis Sizing To

Flowsheet Data Boxes Explorer Palette Messages Status Bar

Refresh Show Zoom Zoom to Fit

TP Box Visible Mark Error with Color Mark Cut Streams

Show Stream IDs Show UnitOp IDs

Flowsheet Window

double-click

1

2

Simulation mode: 1 Shell & tube simulation

Click OK to proceed to CC-THERM data entry.
Outlet conditions will be rigorously calculated by CC-THERM.
Change simulation mode to "Enter specifications" to use the specifications below

Specification	Value	Unit	Description
Temperature stream 10		C	Delta temperature specification
Temperature stream 12		C	Minimum delta temperature
Vapor fraction stream 10			Hot outlet - cold inlet
Vapor fraction stream 12			Hot inlet - cold outlet
Subcooling stream 10		C	Stream 10 - stream 12
Subcooling stream 12		C	Stream 10 - stream 9
Superheat stream 10		C	Stream 12 - stream 11
Superheat stream 12		C	Heat transfer coefficient and a
Heat duty (specified)		J/sec	Specifying both U and A count

Heat transfer coefficient (U)
Area (per shell)

Help Cancel OK

Lesson9_AY232_Trial3* Lesson9_AY232_Trial1b_1

Steady State

28

Heat Exchanger Before Running

29

Heat Exchanger (HTXR) -

Specifications Misc. Settings Cost Estimations

Simulation mode: 1 Shell & tube simulation ID: 2

Pressure drop: (default = 0)

Stream 5 kPa

Stream 7 kPa

Click OK to proceed to CC-THERM data entry.
Outlet conditions will be rigorously calculated by CC-THERM.
Change simulation mode to "Enter specifications" to use the specifications below

Temperature stream 6		C
Temperature stream 8		C
Vapor fraction stream 6		
Vapor fraction stream 8		
Subcooling stream 6		C
Subcooling stream 8		C
Superheat stream 6		C
Superheat stream 8		C
Heat duty (specified)		J/sec

Delta temperature specifications:

Minimum delta temperature		C
Hot outlet - cold inlet		C
Hot inlet - cold outlet		C
Stream 6 - stream 8		C
Stream 6 - stream 5		C
Stream 8 - stream 7		C

Heat transfer coefficient and area specification:
Specifying both U and A counts as a single thermal specification.

Heat transfer coefficient (U)		W/m ² -K
Area (per shell)		m ²

Help Cancel OK

The screenshot shows the 'Heat Exchanger (HTXR)' software window. It has three tabs: 'Specifications', 'Misc. Settings', and 'Cost Estimations'. The 'Cost Estimations' tab is active, showing a form for entering cost data. A red circle with the number '1' points to a checkbox labeled 'Run the costing report after running the unit', which is checked. Below this, there are fields for 'Cost model' (Shell and tube), 'Exchanger type' (Fixed head), and 'Evaporator type' (Forced circulation). To the right, there is a 'Material selection for this model' section with a dropdown menu showing 'Carbon steel'. Below that, a 'Calculated Results' section contains five rows of cost data, each with a text input field and a dollar sign. A red circle with the number '2' points to this section, and a red arrow points to it with the text 'Costs show up here after running.' A red circle with the number '3' points to the 'OK' button in a 'Select Simulation Case' dialog box that is open in the foreground. The dialog box contains the text 'Please choose from the options below to continue, or click Cancel to exit without changes' and 'Choose the case to use for this exchanger UnitOp in simulation mode.' with a radio button selected for '14-15 Design'.

Heat Exchanger (HTXR) -

Specifications | Misc. Settings | Cost Estimations

ID: 3

☒ Run the costing report after running the unit

Cost model: Shell and tube

Exchanger type: Fixed head

Evaporator type: Forced circulation

Design pressure: kPa

Install factor:

Material factor:

Pressure factor:

Type factor:

Material selection for this model:

Shell and tube

Carbon steel

Calculated Results:

Basic cost		\$
Total purchase cost		\$
Total installed cost		\$
Utility Cost		\$
Purchase Cost Override		\$

Costs show up here after running.

Select Simulation Case

Please choose from the options below to continue, or click Cancel to exit without changes

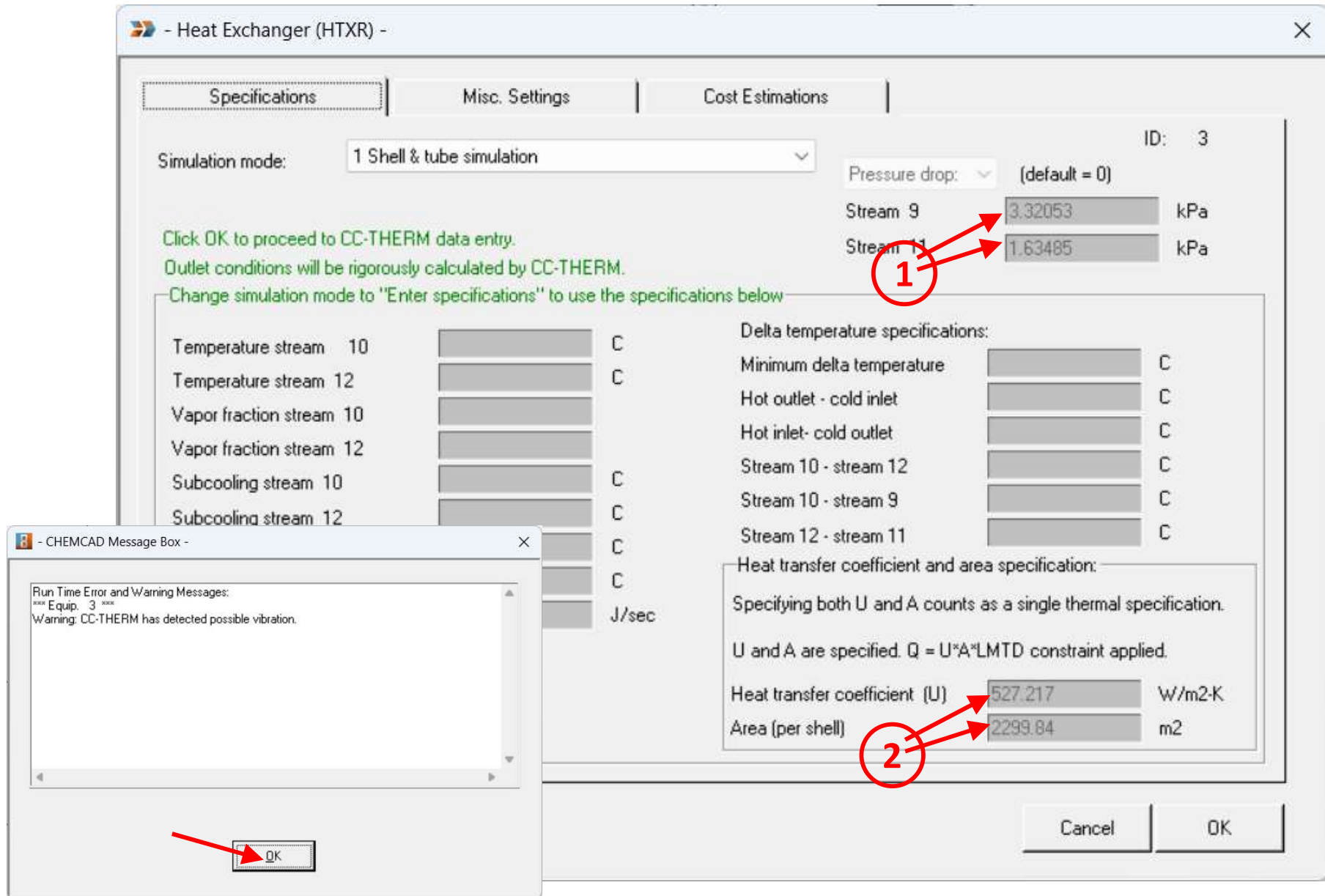
Choose the case to use for this exchanger UnitOp in simulation mode.

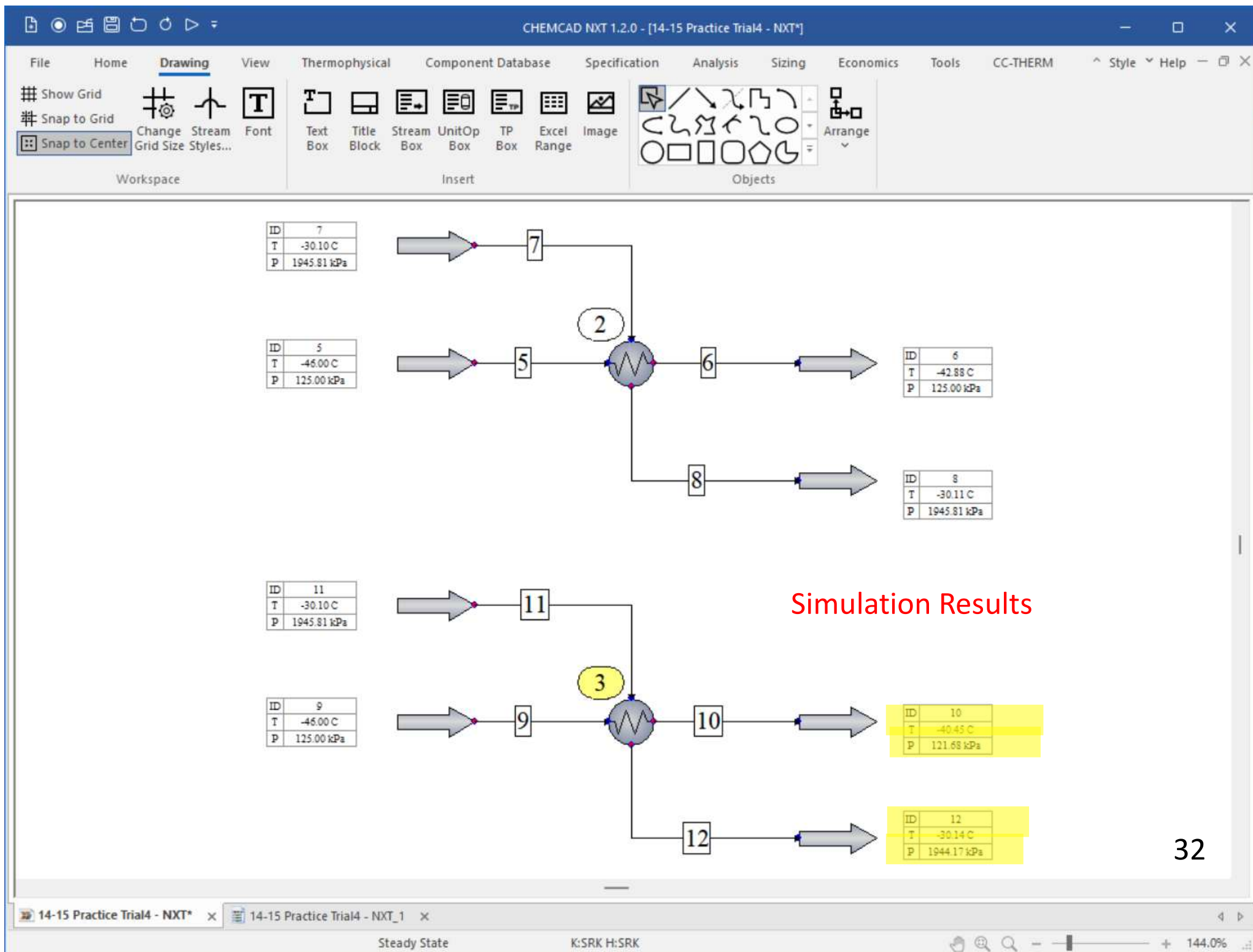
14-15 Design

OK Cancel

Click OK then run the simulation.

Heat Exchanger After Running





CHEMCAD NXT 1.2.0 - [14-15 Practice Trial4 - NXT*]

File Home Drawing View Thermophysical Component Database Specification Analysis Sizing Economics Tools CC-THERM Style Help

Save Data Map Save Data Map As View/Edit New Import... Select Costing Edit Cost Index Economics Execute Parser Units Converter Simple Calculator Visual Basic Editor Reaction Rate Regression CO2 Solid Hydrates Environmental Report... TOC/COD... Title Block Designer UnitOp Designer

Data Map

Chemical Engineering Plant Cost Index

Year/Month Selection for the Cost Index

Year 2026 Source Database

Month February } make sure to set this to February 2026

Type	Cost Index
CE Index	830.50
Equipment	1045.80
Heat exchangers and tanks	815.70
Process machinery	1057.50
Pipes, valves, and fittings	1410.40
Process instruments	620.50
Pumps and compressors	1677.10
Electrical equipment	917.90
Structural supports and misc.	1142.00
Construction labor	390.30
Buildings	835.10
Engineering and supervision	313.20

Help Cancel OK

ID 11
T -30.10 C
P 1945.81 kPa

ID 9
T -46.00 C
P 125.00 kPa

ID 10
T -40.45 C
P 121.68 kPa

ID 12
T -30.14 C
P 1944.17 kPa

Steady State K:SRK H:SRK

196.0%

CHEMCAD NXT 1.2.0 - [14-15 Practice Trial4 - NXT*]

File Home Drawing View Thermophysical Component Database Specification Analysis Sizing Economics **Tools** CC-THERM ^ Style v Help - □ X

Save Data Map Save Data Map As View/Edit New Import... Execution Rules

Select Costing Edit Cost Index Economics Sum

Execute Parser Units Converter Simple Calculator Visual Basic Editor Reaction Rate Regression

CO2 Solid Hydrates TOC/COD... Environmental Report...

Title Block Designer UnitOp Designer

Data Map Costing General Environmental Flowsheet

11

9

10

12

8

3

1

double-click

ID	8
T	-30.11 C
P	1945.81 kPa

ID	11
T	-30.10 C
P	1945.81 kPa

ID	9
T	-46.00 C
P	125.00 kPa

ID	10
T	-40.45 C
P	121.68 kPa

ID	12
T	-30.14 C
P	1944.17 kPa

14-15 Practice Trial4 - NXT* x 14-15 Practice Trial4 - NXT_1 x

HTXR.my Steady State K:SRK H:SRK

196.0%

Cost Results

Heat Exchanger (HTXR) -

Specifications | Misc. Settings | Cost Estimations

ID: 3

☒ Run the costing report after running the unit

Cost model: Shell and tube

Exchanger type: Fixed head

Evaporator type: Forced circulation

Design pressure: kPa

Install factor: 2

Material factor: 1

Pressure factor: 1.28102

Type factor: 0.819535

Material selection for this model

Shell and tube

Carbon steel

Calculated Results

Basic cost	317634	\$
Total purchase cost	810750	\$
Total installed cost	1.6215e+06	\$
Utility cost		\$/sec
Purchase cost override		\$

317634 \$

767912 \$

1.53582e+06 \$

CC NXT 1.2.0

Help Cancel OK

Answer to last question is found here (total purchase cost in Feb 2026).

STOP HERE

Finished.

Submit CHEMCAD file, tabulated results report,
and answers to the four (4) questions