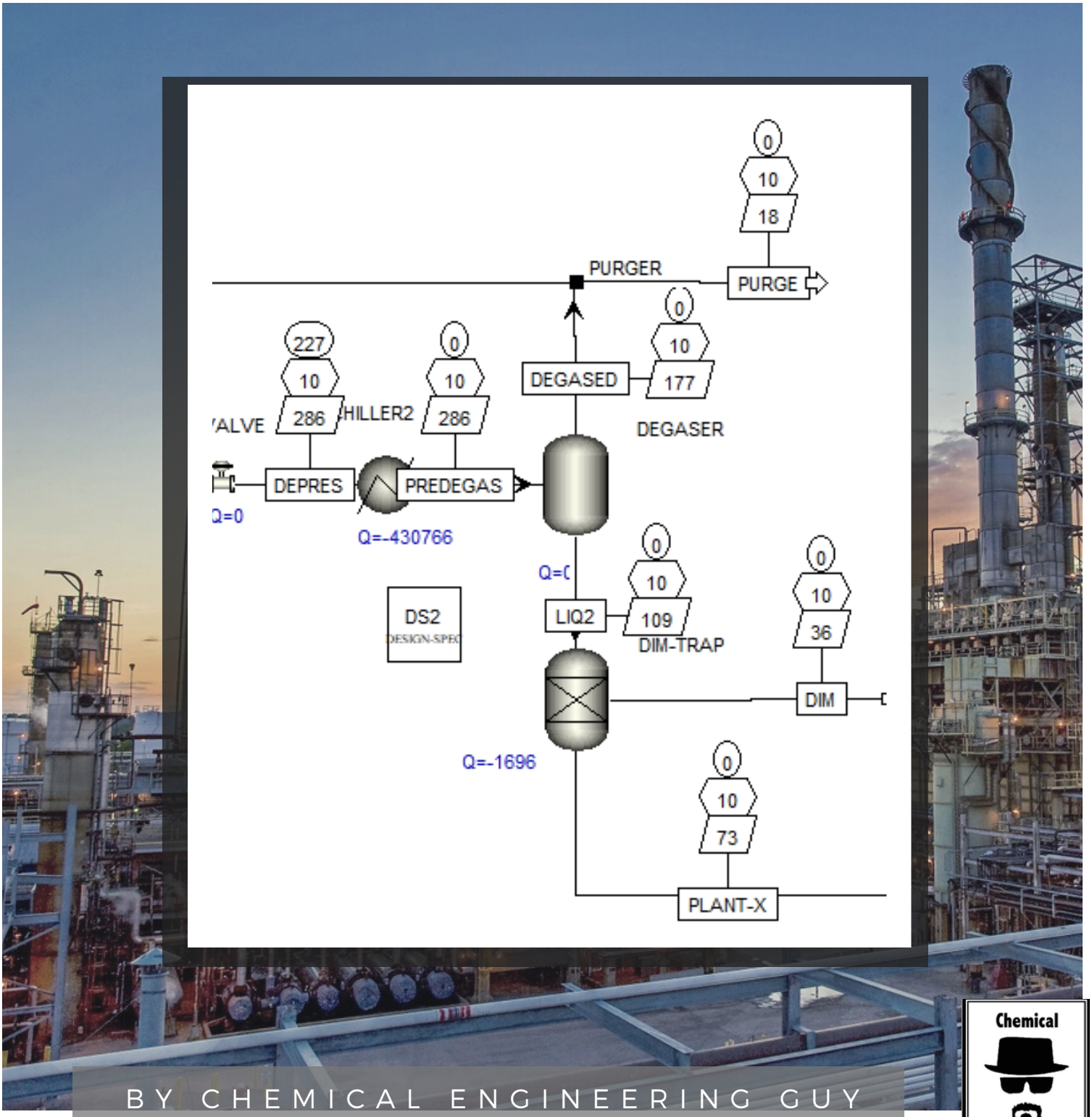
BEST TIPS

FOR PROCESS SIMULATION



BY CHEMICAL ENGINEERING GUY
AKA EMMANUEL ORTEGA

Chemical Engineering Guy

TIPS

01 DISPLAY T/P/F LABELS

Adding temperature, pressure flow, heat duties and other interesting labels in the flowsheet

02 ADD A TABLE OF RESULTS

Adding a table of results might facilitate study of the process

03 FORMAT FLOWSHEET

Formatting the flowsheet is one of the most important parts, specially when presenting to other colleagues. Color and visuals are important too!

04 GETTING HELP ONLINE

The best way to get help in your Simulation? Join us in the Forum!

05 USEFUL SHORTCUTS

Don't spend time in searching for buttons and commands! Use your time wisely! Use shortcuts!

Chemical Engineering Guy

TIPS

06 HIERARCHY LEVELS

Have a repeating process? Why not use the hierarchy block. Save time and simplicity in the process simulation!

07 PLOT, PLOT, PLOT!

FPE = F*cking Plot everything. Plots literally will open a new VISUAL panorama for you to analyse further in the process!

08 EXPORT TO EXCEL

We all have a love-hate relationship with Excel, but we know we couldn't live without it!
Learn to use it with Aspen!

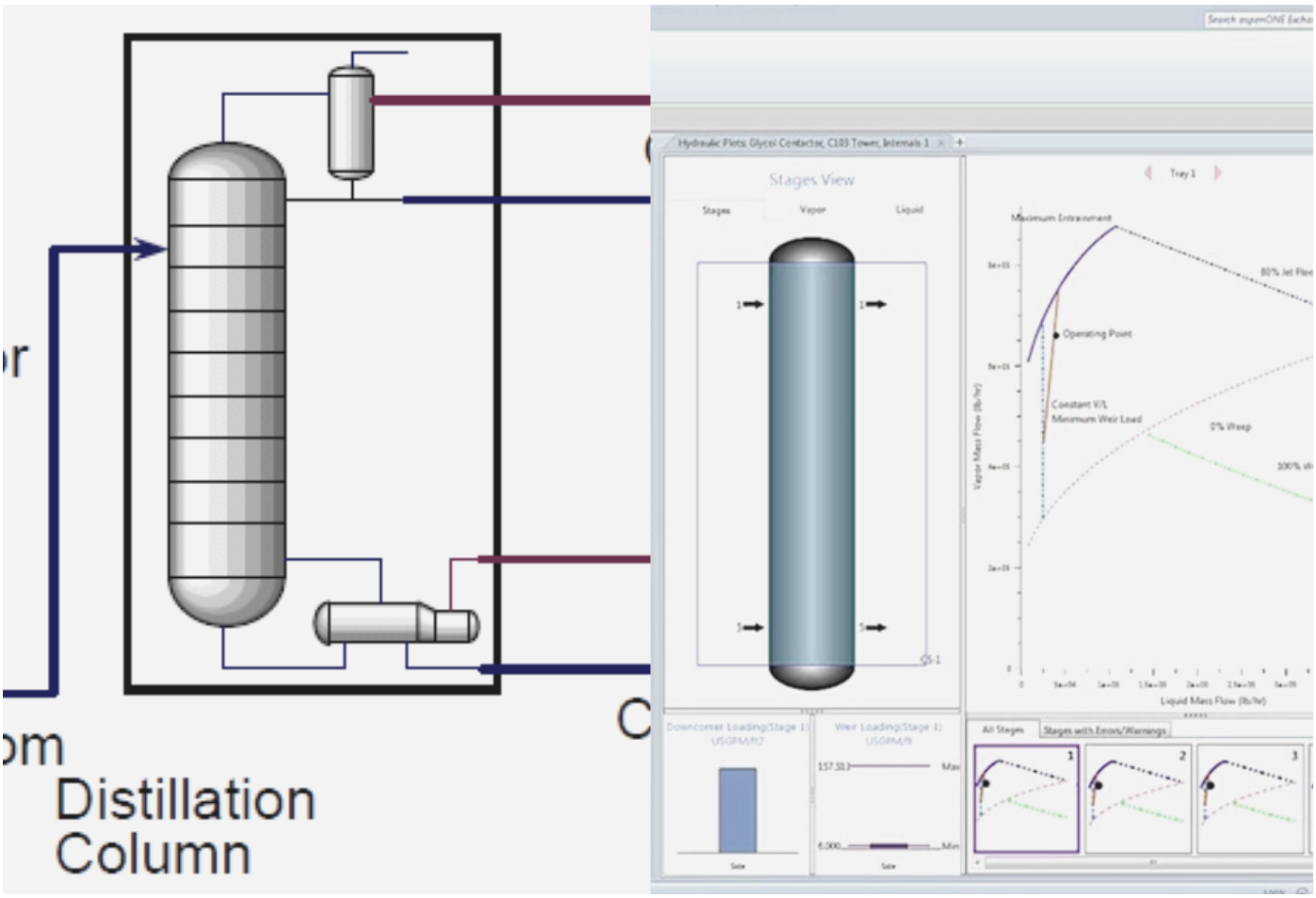
09 SENSITIVITY ANALYSIS

Ever wonder what will happen if we change gradually a variable? Well... this is your best friend then!

10 BE PATIENT!

LEARNING = TIME
TIME = PATIENCE

Chemical Engineering Guy



ABOUT THIS E-BOOK

WRITTEN EMMANUEL ORTEGA

Hey there! I'm happy you decided to pump up your Process Simulations skills!

In this small E-book we will learn basic tips that will improve **your simulation technique and save you lot of time, effort and tears**

The tips are not related between each other, so you can just skip to the desired tip.

Most of these tips are taught in my courses, so feel free to **join us** anytime!

JOIN US!

Chemical Engineering Guy

ABOUT THE AUTHOR

EMMANUEL ORTEGA

AKA

CHEMICAL ENGINEERING GUY

I am a Chemical Engineer with a minor in Industrial Engineering, graduated in 2012 (ITESM in Monterrey, Mexico)

As a young Engineer, I used to work in Plant Simulation Processes in INEOS KOLN, Germany. Mostly hydrocarbon systems, Naphtha treating and byproduct separations.

In Mexico, I worked as a Process Engineer in charge of Polymerization, Extrusion and Textile Yarn Production (PET)

Since the last few years:

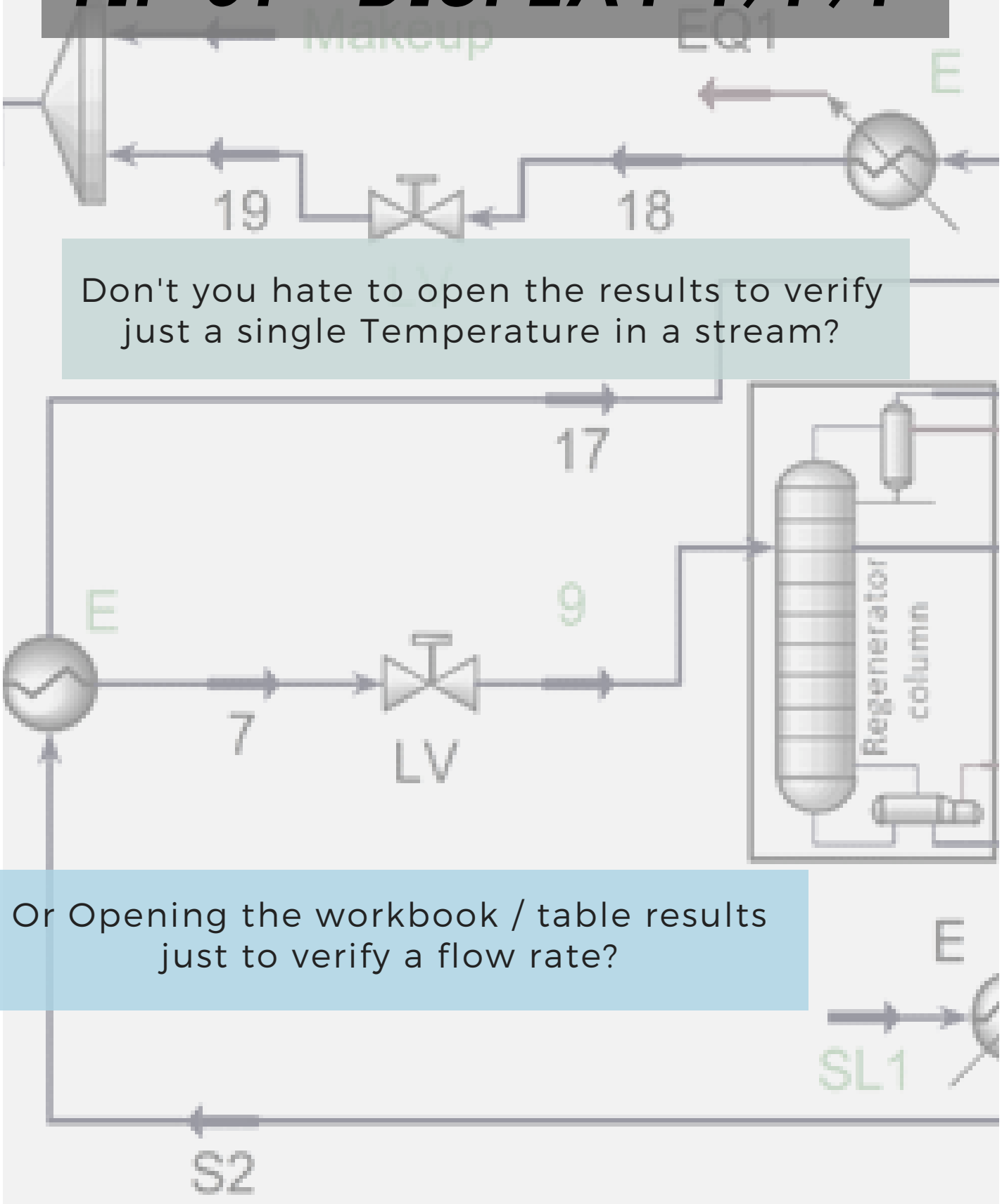
I decided to take the educational path specifically Process & Chemical Engineering & Process Simulation, and tutoring ... all this ...

ONLINE!

Let's begin!

Contact me: Hello@ChemicalEngineeringGuy.com

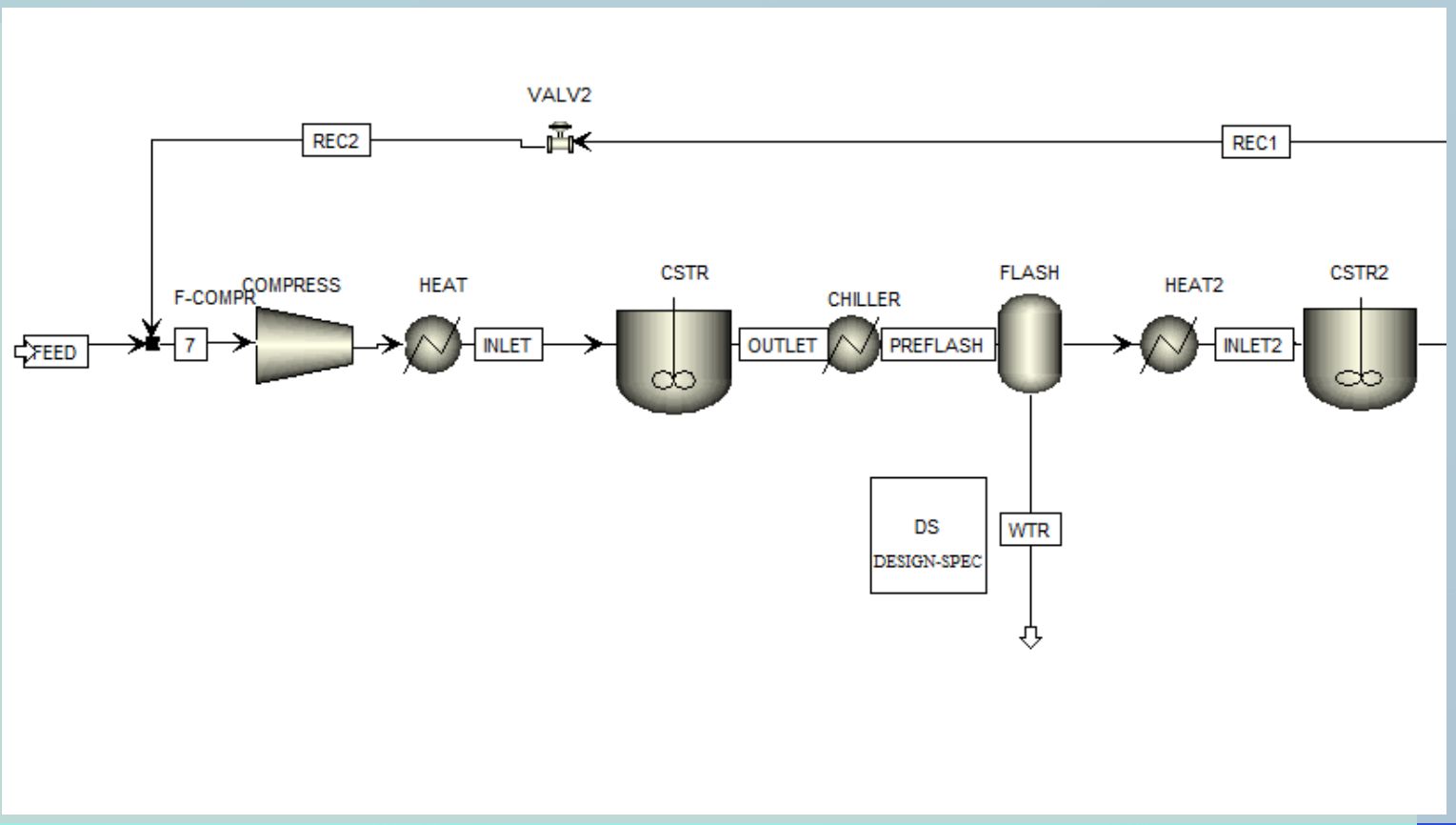
TIP 01 - DISPLAY T/P/F



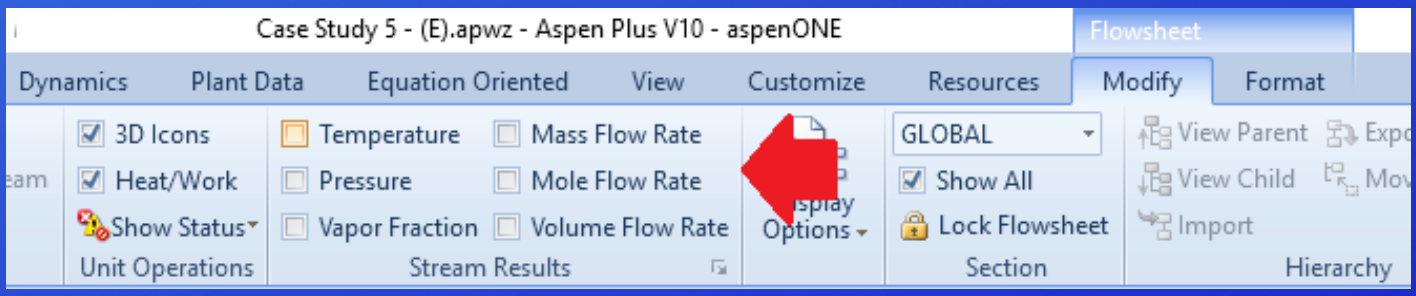
Don't you hate to open the results to verify just a single Temperature in a stream?

Or Opening the workbook / table results just to verify a flow rate?

SIMPLIFY YOUR LIFE!

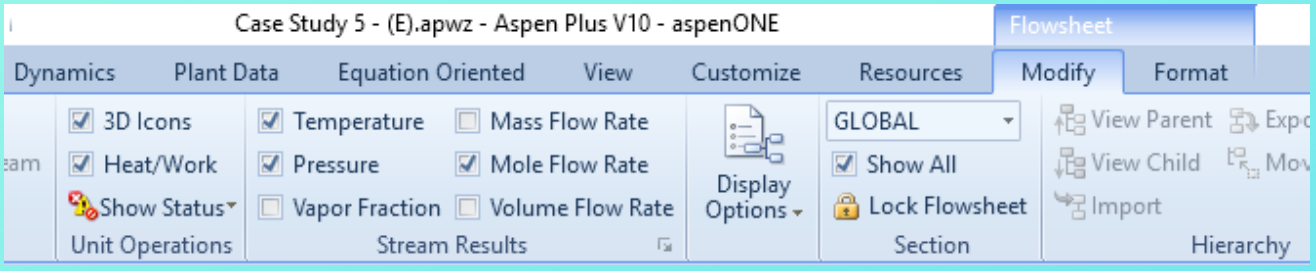


Mole or Mass:
even Volumetric Flow

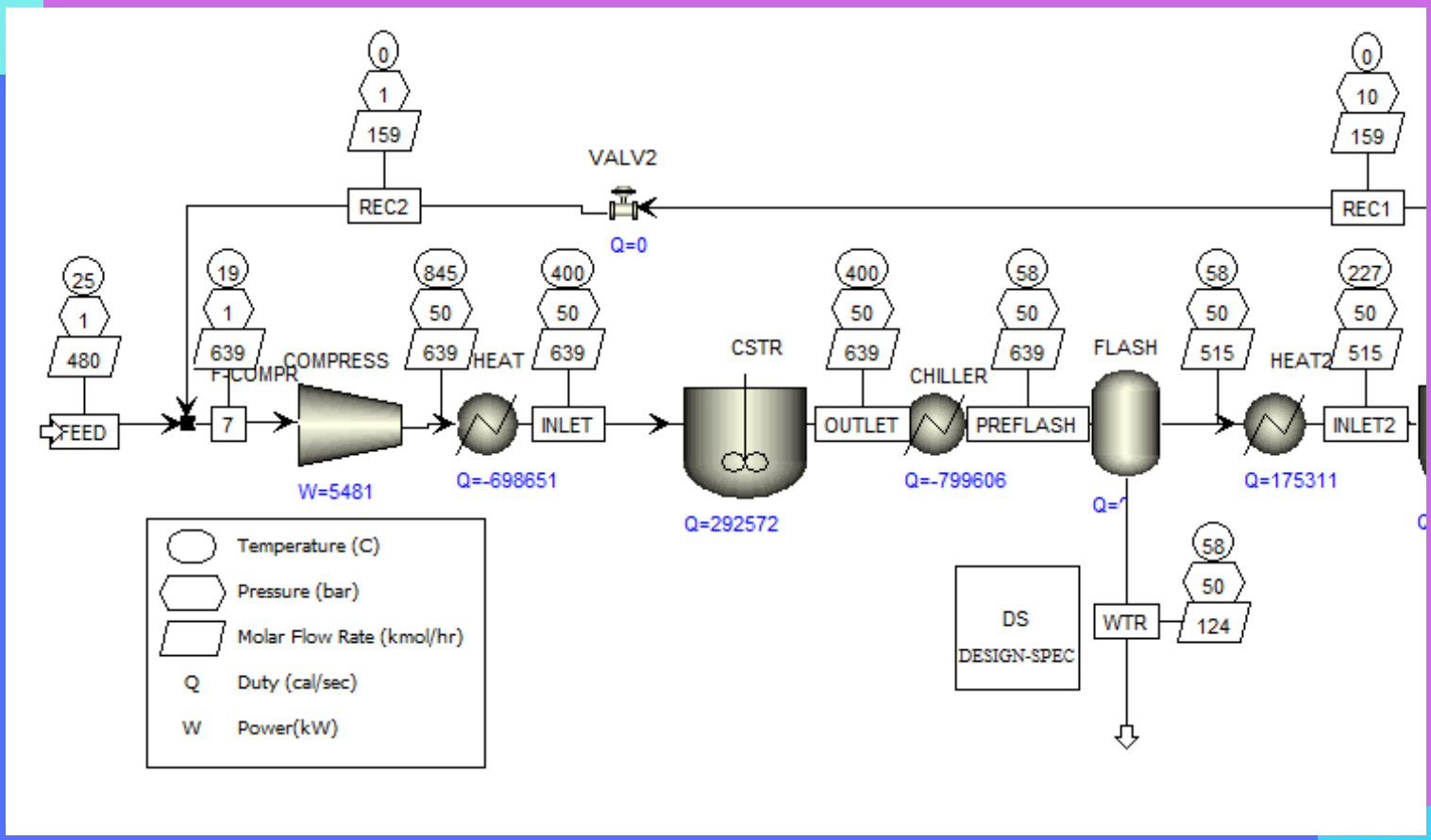


Get more in this Course!

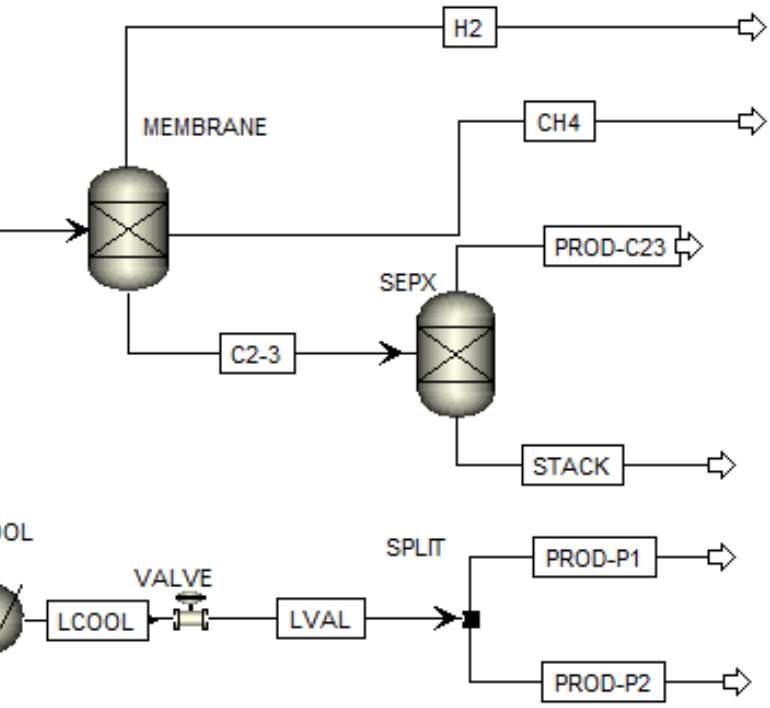
SIMPLIFY YOUR LIFE!



Select Required!



Also Work & Heat duty!

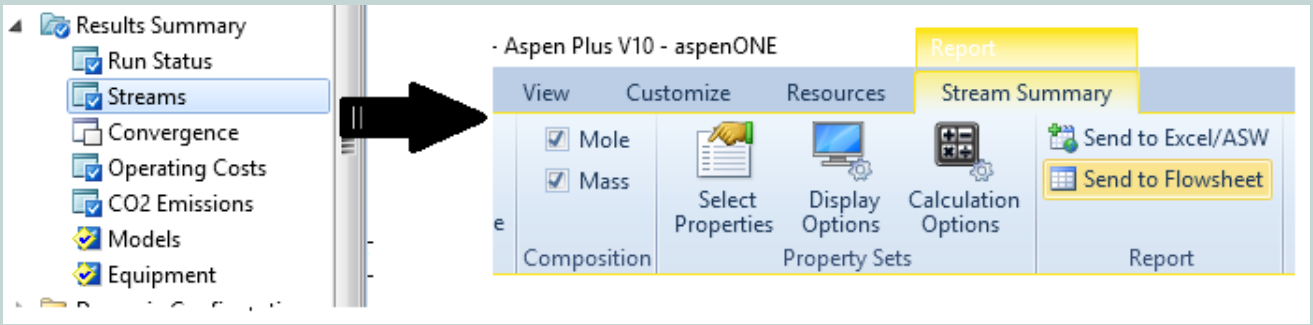


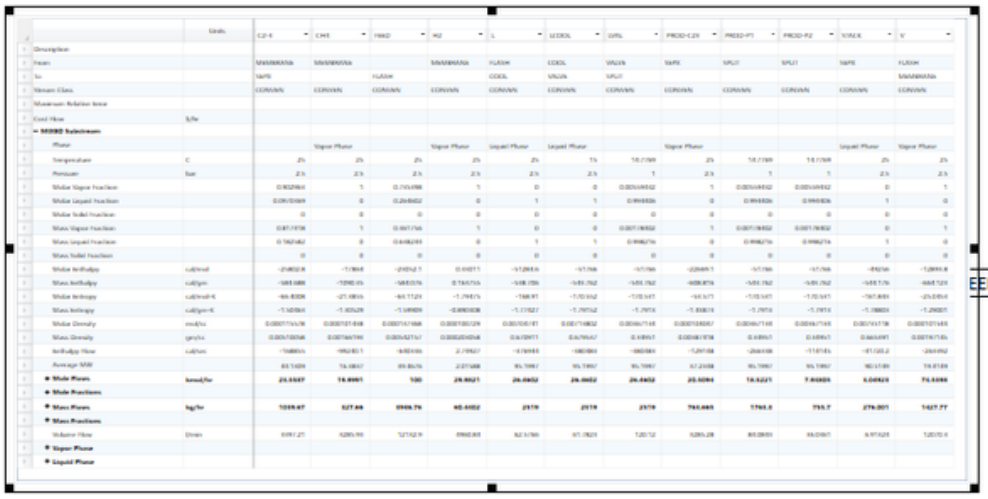
TIP 2 - TABLE OF RESULTS

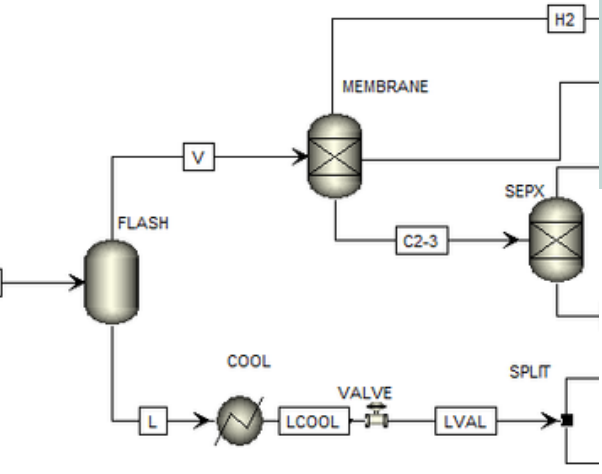
Adding a Table of Results is recommended specially when running the simulation directly in the flowsheet.

The results will be updated depending on the given data.

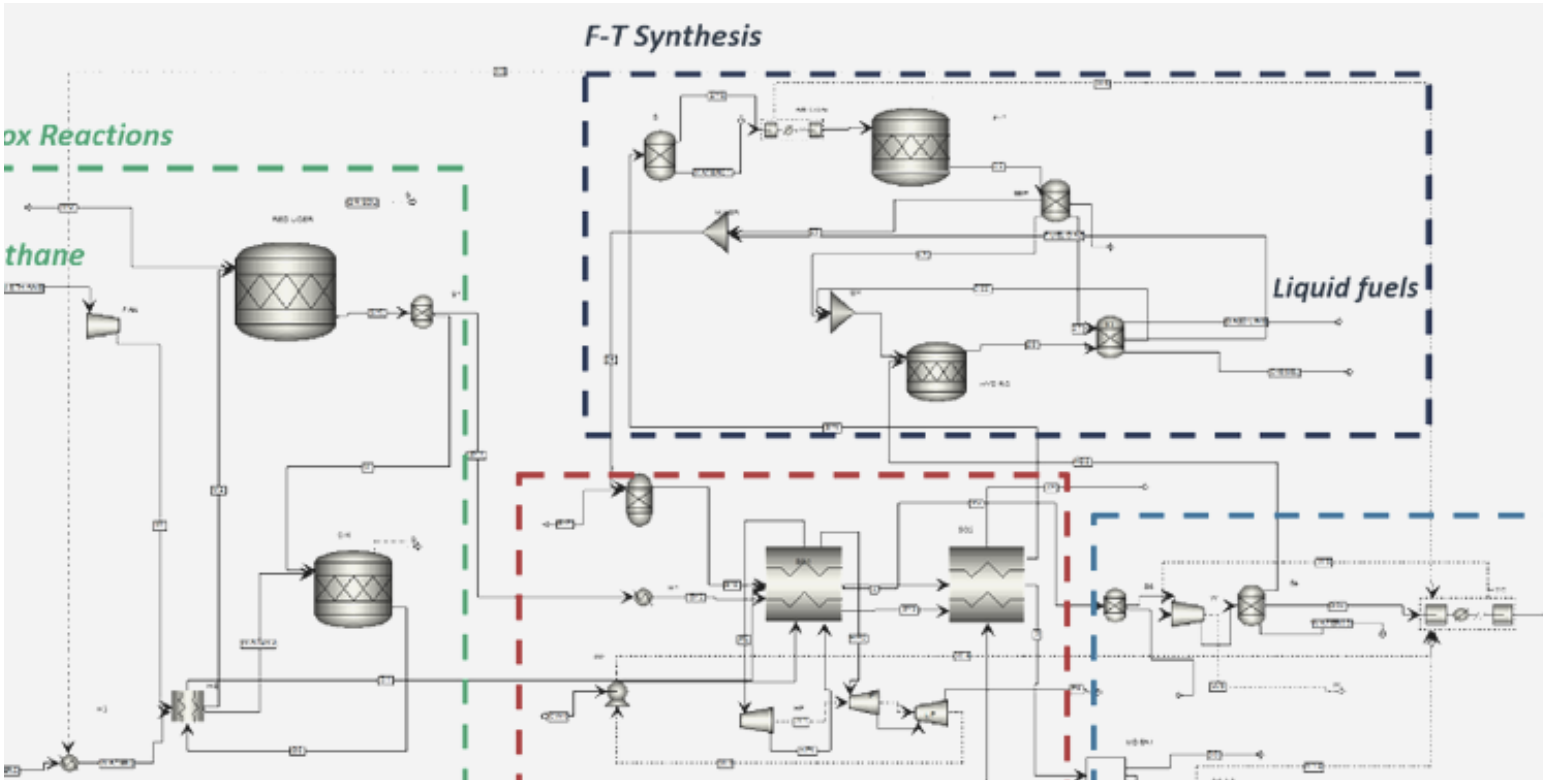
Also convenient for printing and screenshots







”
VISUAL IS EVERYTHING WHEN PRSENTING
“



TIP 3 - FORMAT YOUR FLOWSHEET!

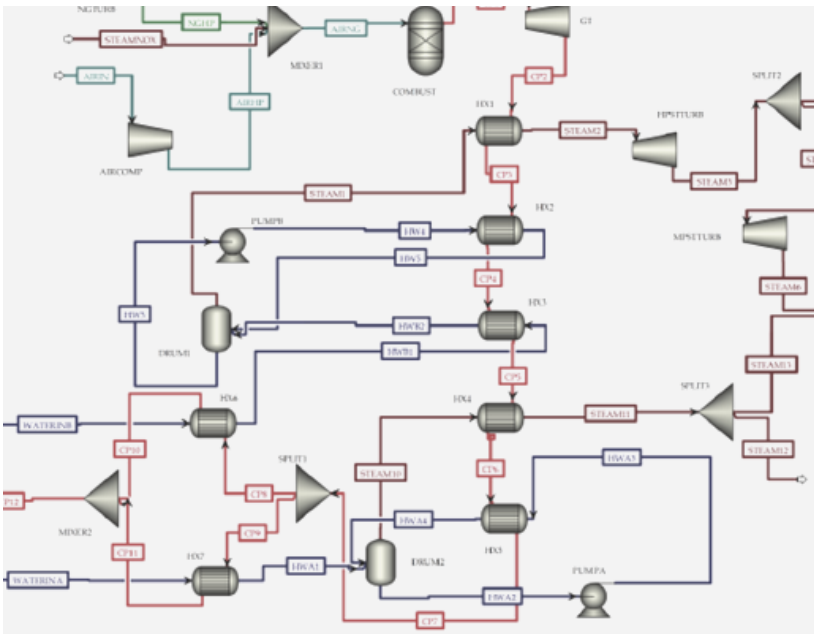
Use rectangle to denote:

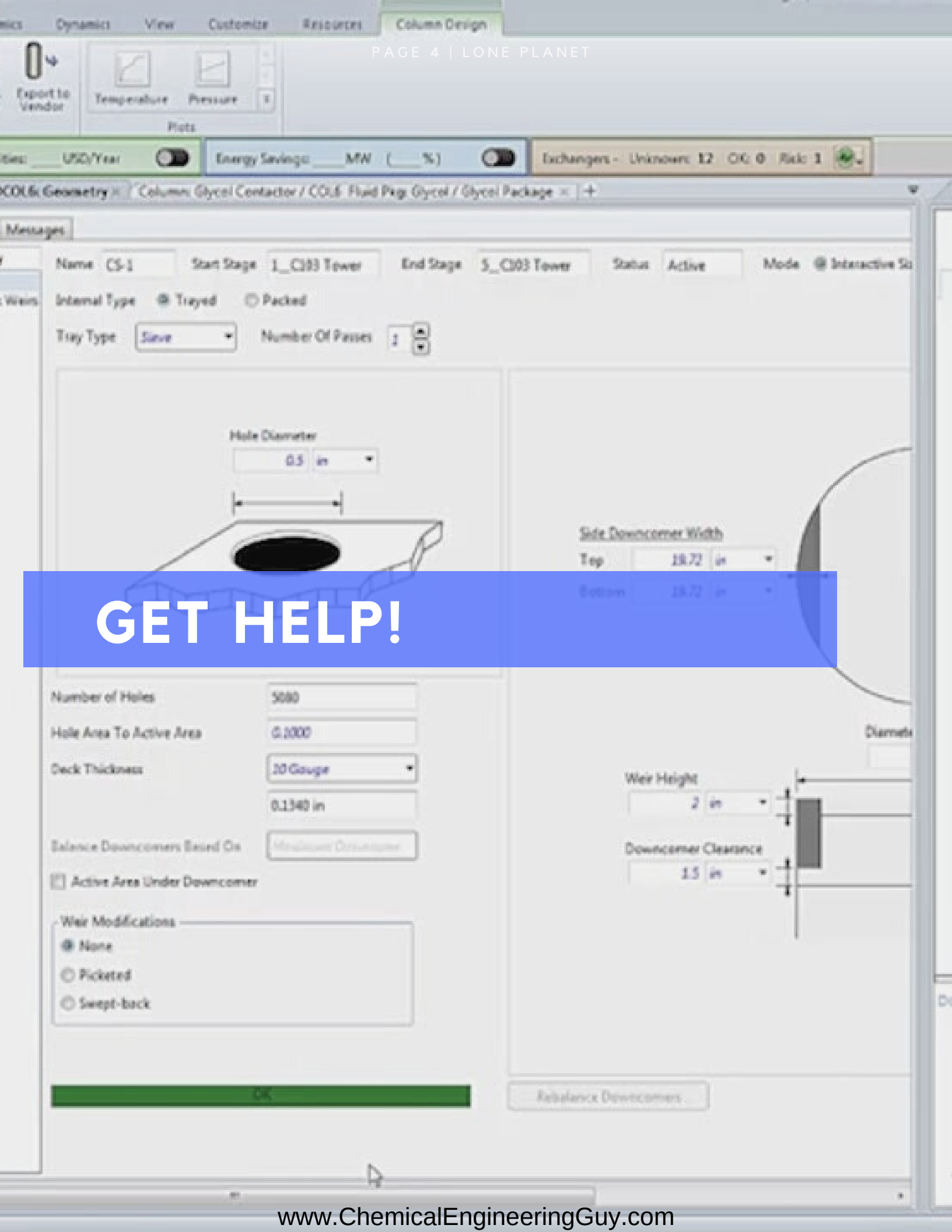
- Reaction Area
- Heating/Cooling Zones
- Product Lines
- Compression Areas

Use Colored Lines for:

- Raw Materials
- Final Product
- Track Catalyst
- "HOT" Streams
- "COLD" Streams

YES, EVEN JUST FOR YOU!




Dynamics
View
Customize
Resources
Column Design
Export to Vendor
Temperature
Pressure
Plots
Energy Savings: ___MW (___%)
Exchangers - Unknowns: 12 OK: 0 Risk: 1
Messages
Name CS-1
Start Stage 1_C103 Tower
End Stage 5_C103 Tower
Status Active
Mode
Internal Type
Trayed
Packed
Tray Type
Sieve
Number Of Passes
Hole Diameter
0.5 in
Side Downcomer Width
Top 19.72 in
Number of Holes 5080
Hole Area To Active Area 0.1000
Deck Thickness
10 Gauge
0.1340 in
Balance Downcomers Based On
Active Area Under Downcomer
Weir Modifications
None
Picketed
Swept-back
Weir Height
2 in
Downcomer Clearance
1.5 in
OK
Rebalance Downcomers

GET HELP!

TIP 4

GETTING HELP ONLINE

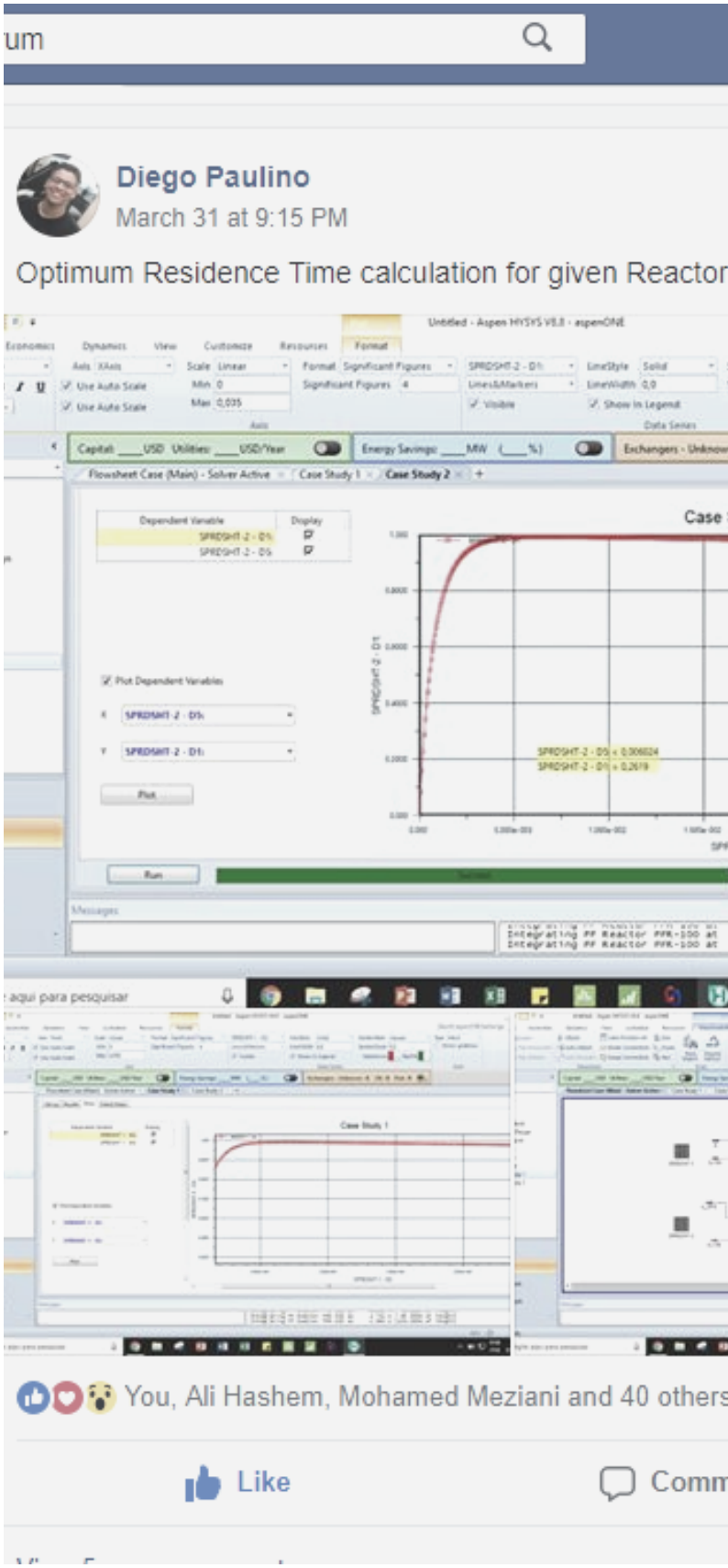
The best way to get help is not reading the "help" guide!

Its going online!

Check out the communities!

My top pick:

Aspen Plus & HYSYS Forum



Aspen Plus & HYSYS Forum

Aspen Plus & HYSYS Forum

Closed group

Interacting as Chemical...

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Toastmasters TEC D... 5

NXT Learning 20+

Asamblea Unal Med... 18

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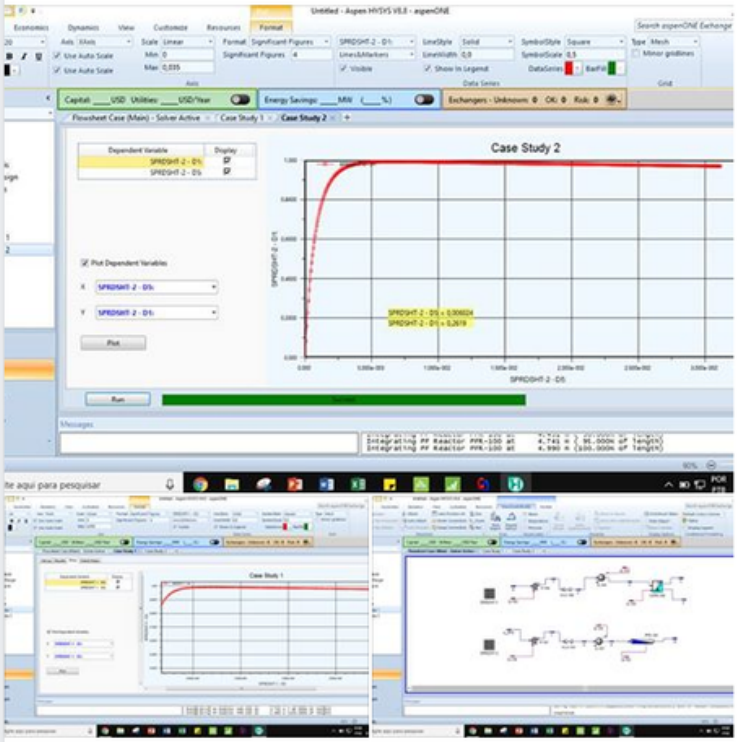
Diego Paulino
March 31 at 9:15 PM

Optimum Residence Time calculation for given Reactor in Aspen HYSYS.



You, Ali Hashem, Mohamed Meziani and 40 others 16 Comments

Like Comment

Aspen Plus & HYSYS Forum Emmanuel

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Interacting as Chemical...

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Chats 1

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Moderate Group

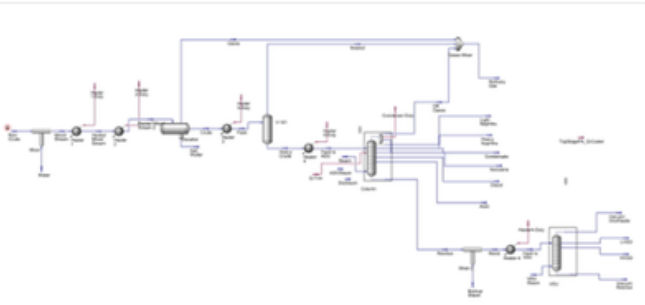
Search this group

Shortcuts

Aspen Plus & HYSYS F...

Write a comment...

Yasir Shahzad shared a link.
13 hrs



FIVERR.COM

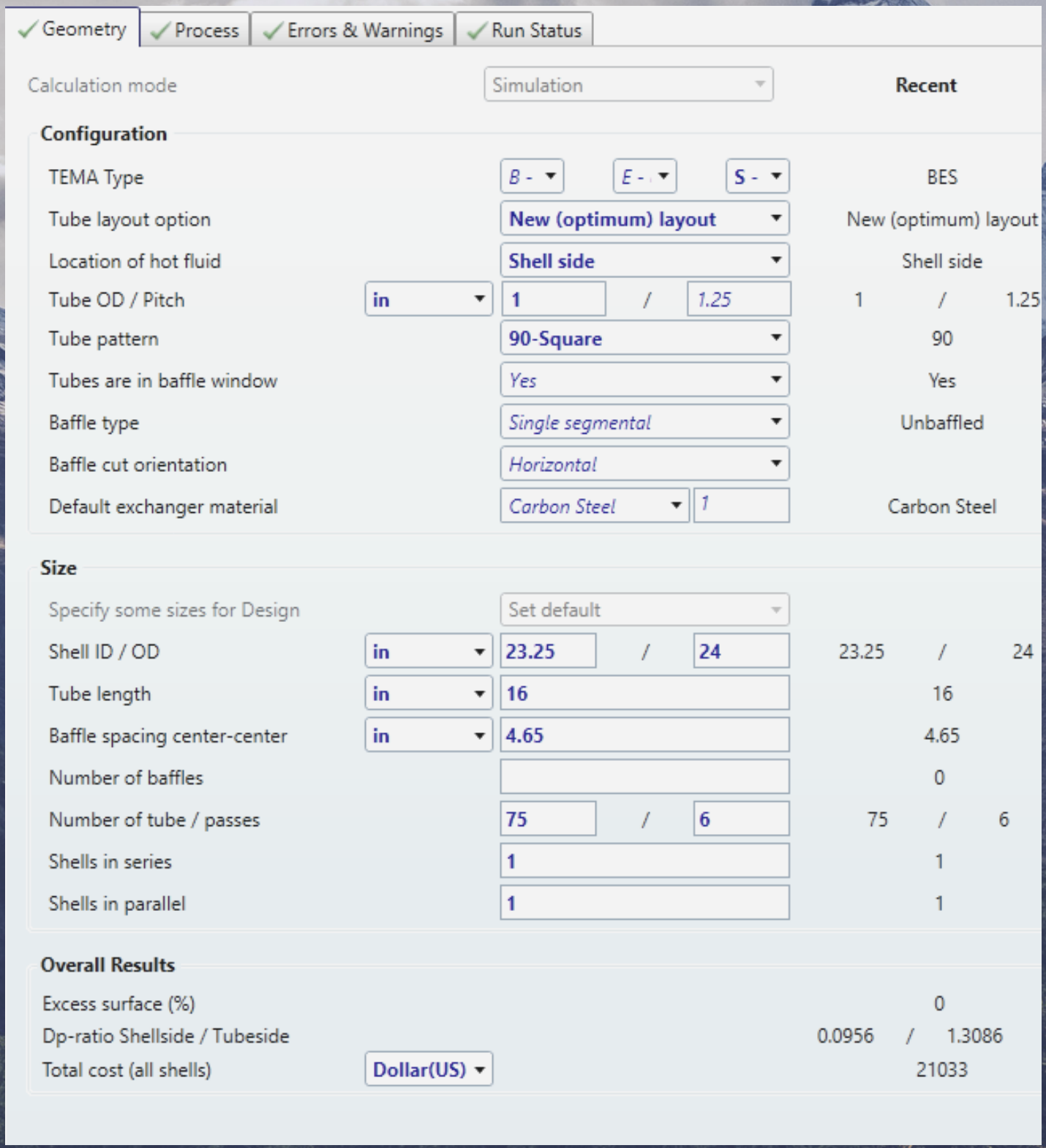
yasirshehzad0 : I will do process simulations on aspen hysys and chemcad for $5 on www.fiverr.com

Samaphon Phromsamlee, Francis Antonio and 7 others 1 Comment

Like Comment

www.ChemicalEngineeringGuy.com

TIP 5
USEFUL SHORTCUTS!



TIP 5
USEFUL SHORTCUTS!

Manage Views	F3
Center View	CTRL+HOME
Page Break Preview	F2
Pan	CTRL+F3
Print	CTRL+P
Reset Page Breaks	SHIFT+F2
Select All	CTRL+A
Zoom to Fit	HOME
Zoom In	SHIFT+PAGE UP or CTRL+UP ARROW
Zoom in by small steps	PAGE UP or mouse wheel up
Zoom Out	SHIFT+PAGE DOWN or CTRL+DOWN ARROW
Zoom out by small steps	PAGE DOWN or mouse wheel down

Item	Shortcut Key
Check Results	CTRL+F8
Reinitialize	SHIFT+F5
Run	F5
Settings	CTRL+F7
Step	CTRL+F5

Item	Shortcut Key
Align Blocks	CTRL+B
Change Section	CTRL+F11
Change Stream Class	CTRL+Q
Exchange Icons	CTRL+K
Find Object	CTRL+F
Flowsheet Sections	F11
Hide/Show Annotation	CTRL+ALT+L
Hide/Show Connections	CTRL+ALT+C
Hide/Show Global Data	CTRL+ALT+G
Hide ID	CTRL+H
Hide/Show Measurements	CTRL+ALT+M
Move Blocks or Streams	Arrow keys
Reroute Streams	CTRL+J
Undo a change	CTRL+Z
Redo an undone change	CTRL+Y

MOST COMMON & USEFUL!

LEARN THEM, USE THEM!

TIP 6 - HIERARCHY LEVELS

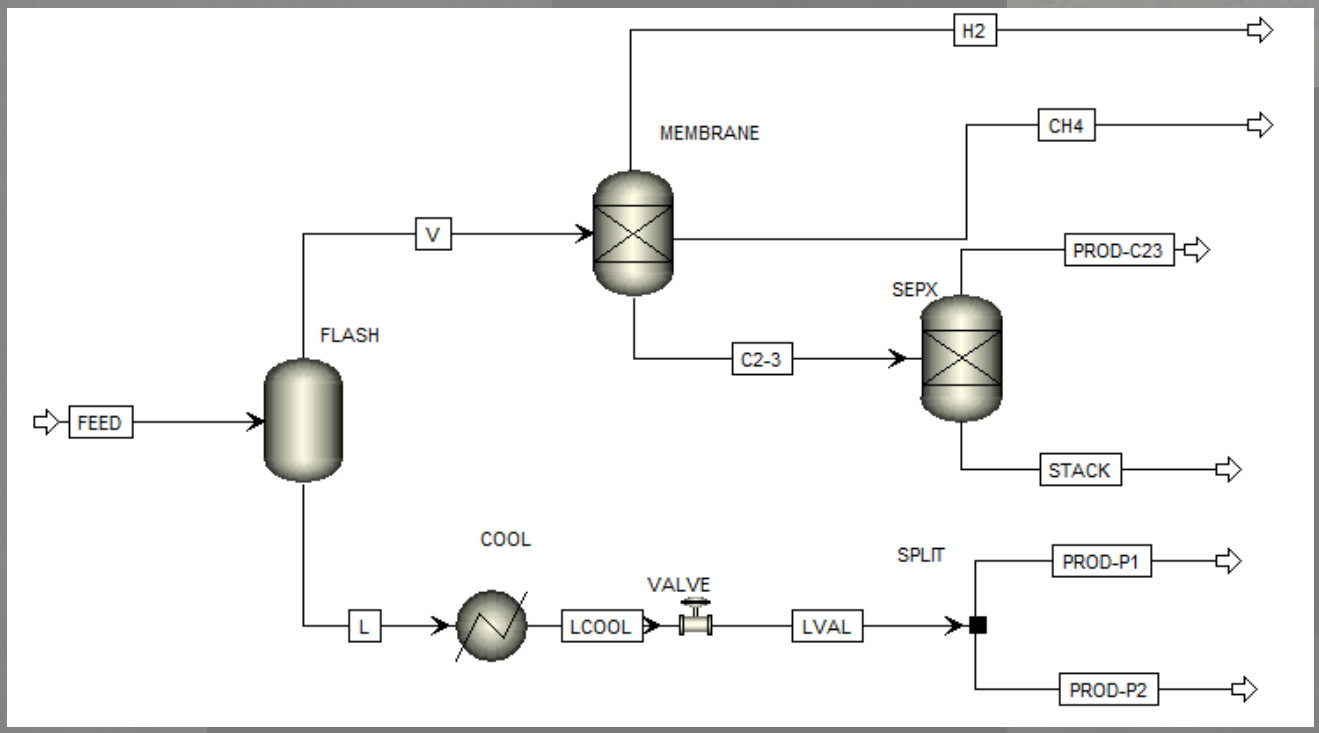
Have a Repeating Process?

Hate repeating the flowsheeting?

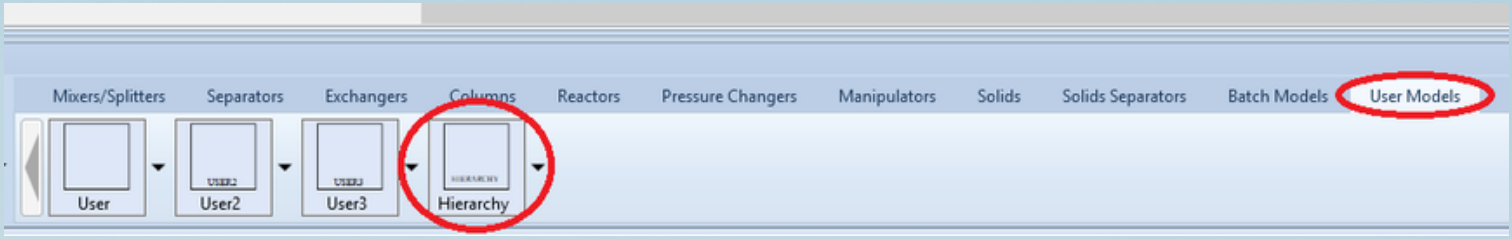
Can't simply copy & paste it?

Use hierarchy BLOCK!

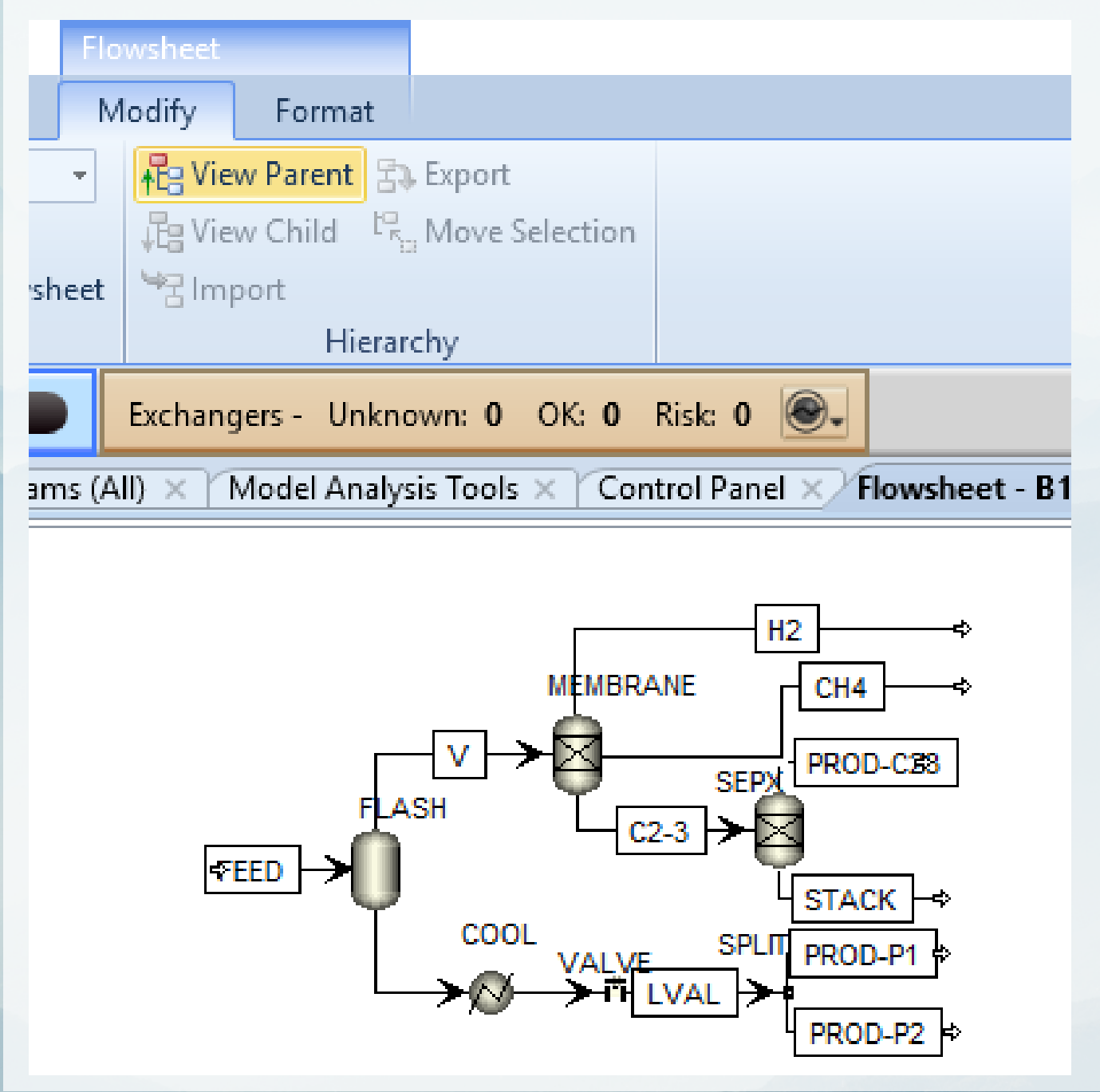
Step 1 - Build "Child" Process



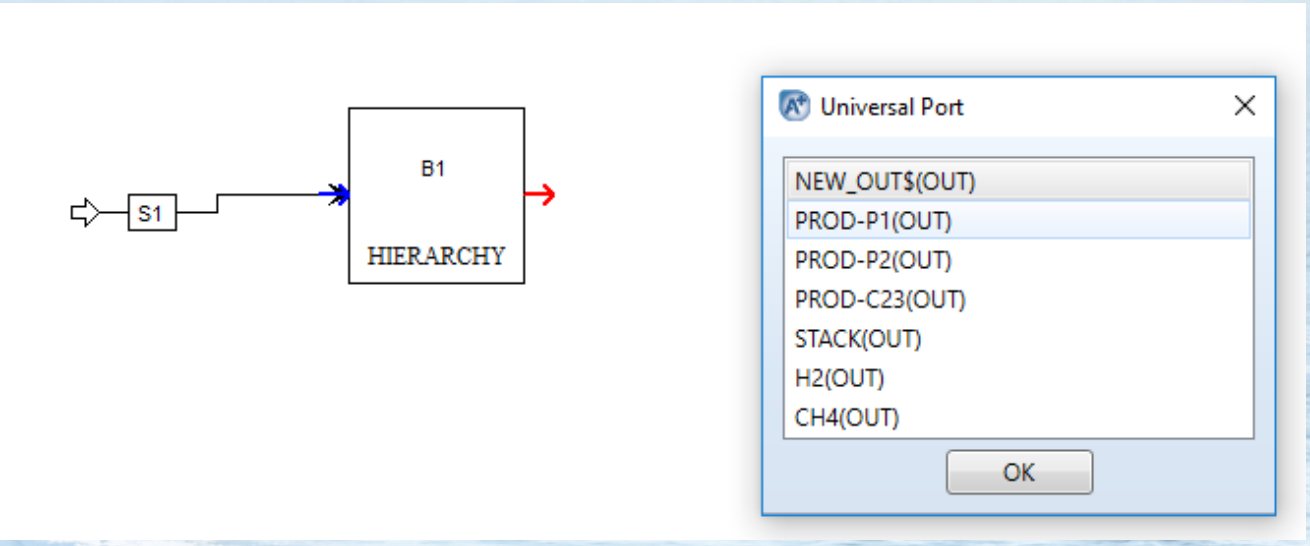
Step 2 - Select the hierarchy Block



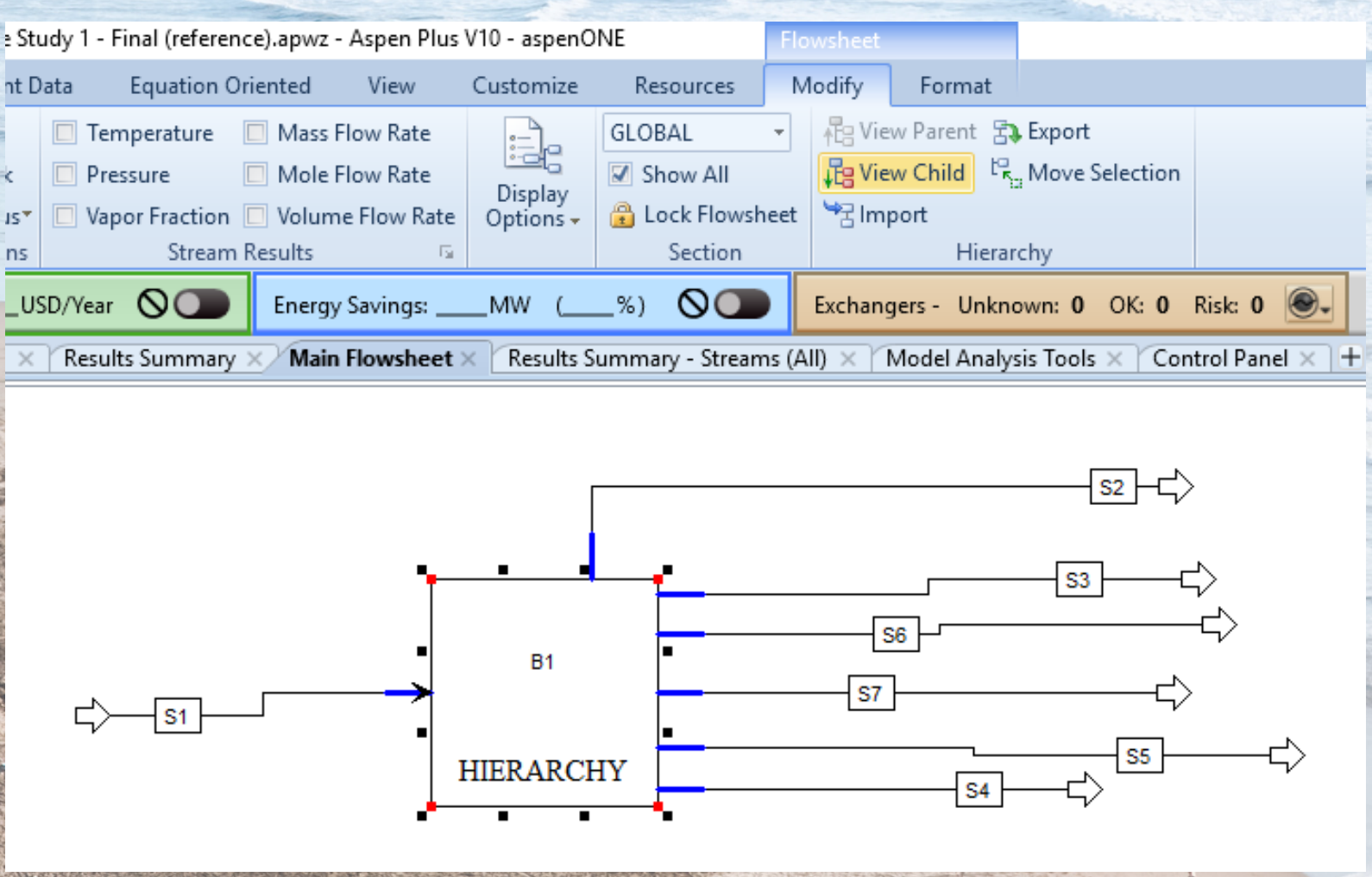
Step 3 - Build the "Child" Process



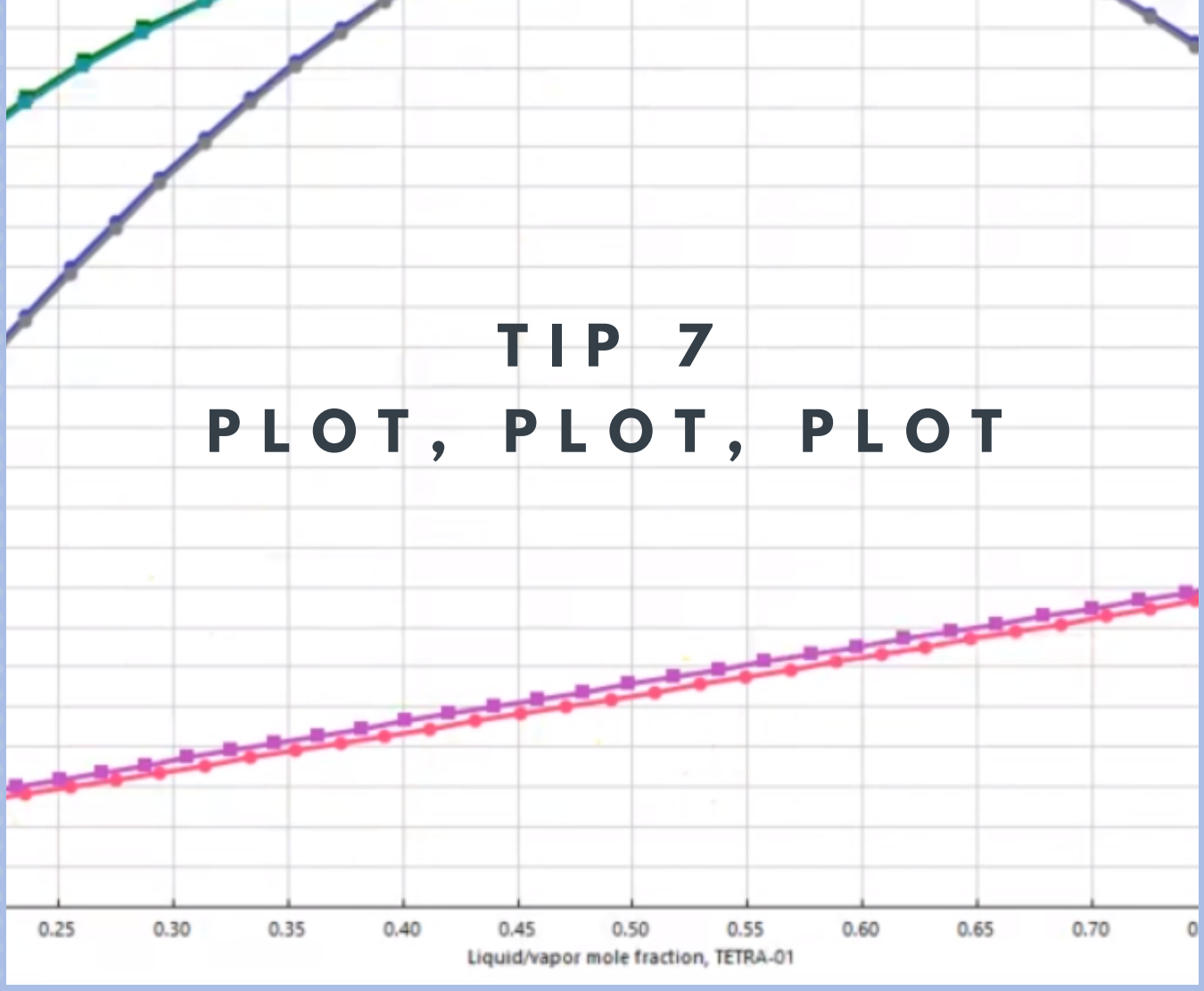
Step 4 - Connect Streams from Parent



Step 5 - Verify Parent / Child



Master Hierarchy Levels HERE



TIP 7
PLOT, PLOT, PLOT

"FPE" TECHNIQUE

F*cking Plot Everything

Some Say:

"A photo says a thousand words"

Well, then a Plot says a million photos!

Most of the Plots can be custom made:

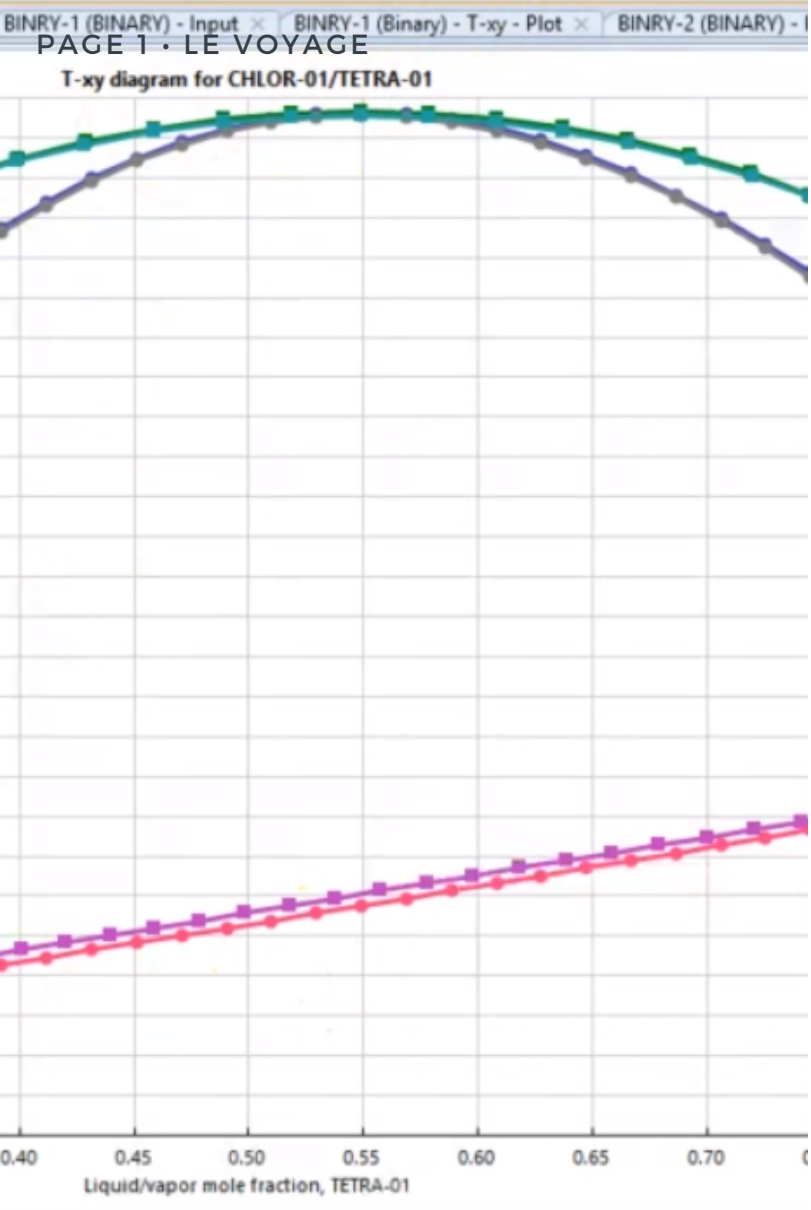
You choose the "X-Axis"

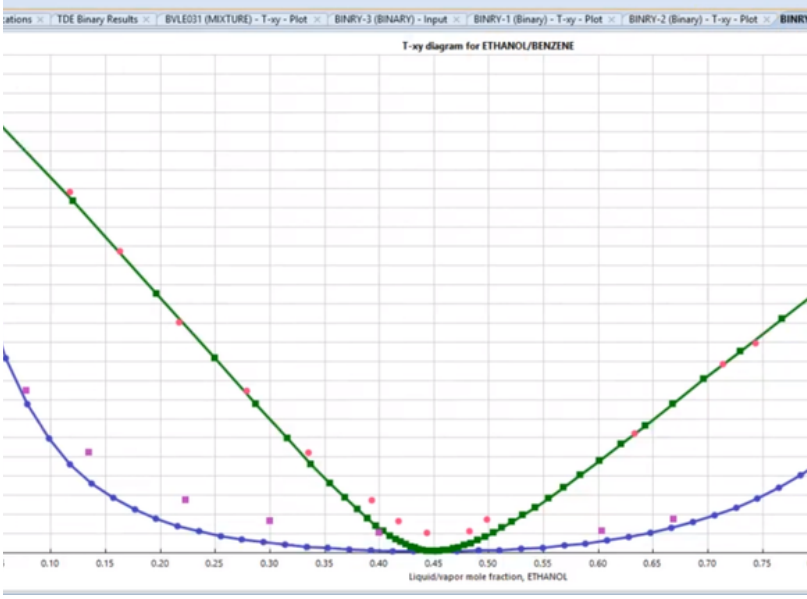
You choose your "Y-Axis"

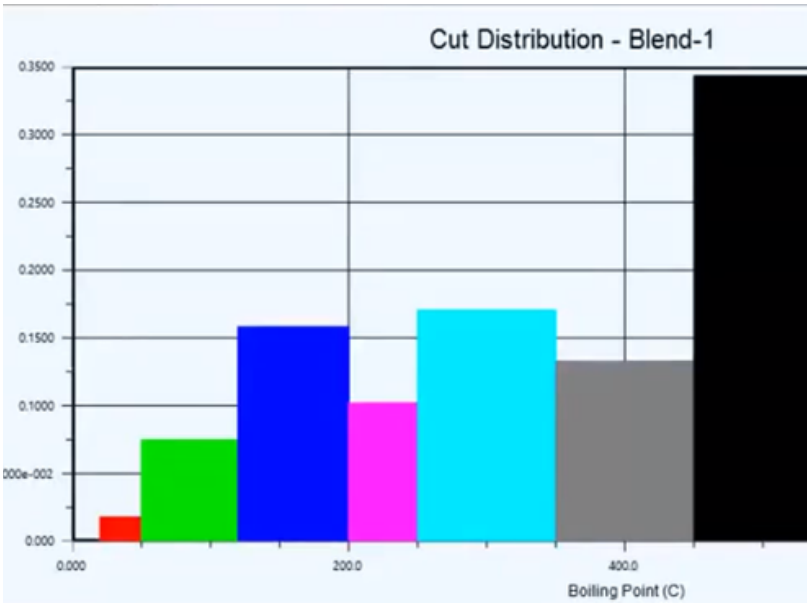
Plot intervals

Learn how to PLOT Physical Properties HERE

Plot Crude Oils & Petroleum Assays HERE







SOME USEFUL PLOTS:

- ***Binary T vs. XY Diagrams***
- ***Binary P vs. XY Diagrams***
- Regression & Data
- ***Ternary Properties***
- ***Concentration, Vapor Quality, Temperature & Pressure Profiles***
- ***Crude Oil Cuts***
- ***Crude Oil Distribution***
- ***Trays Performance***

BLOCKS WITH PLOTS:

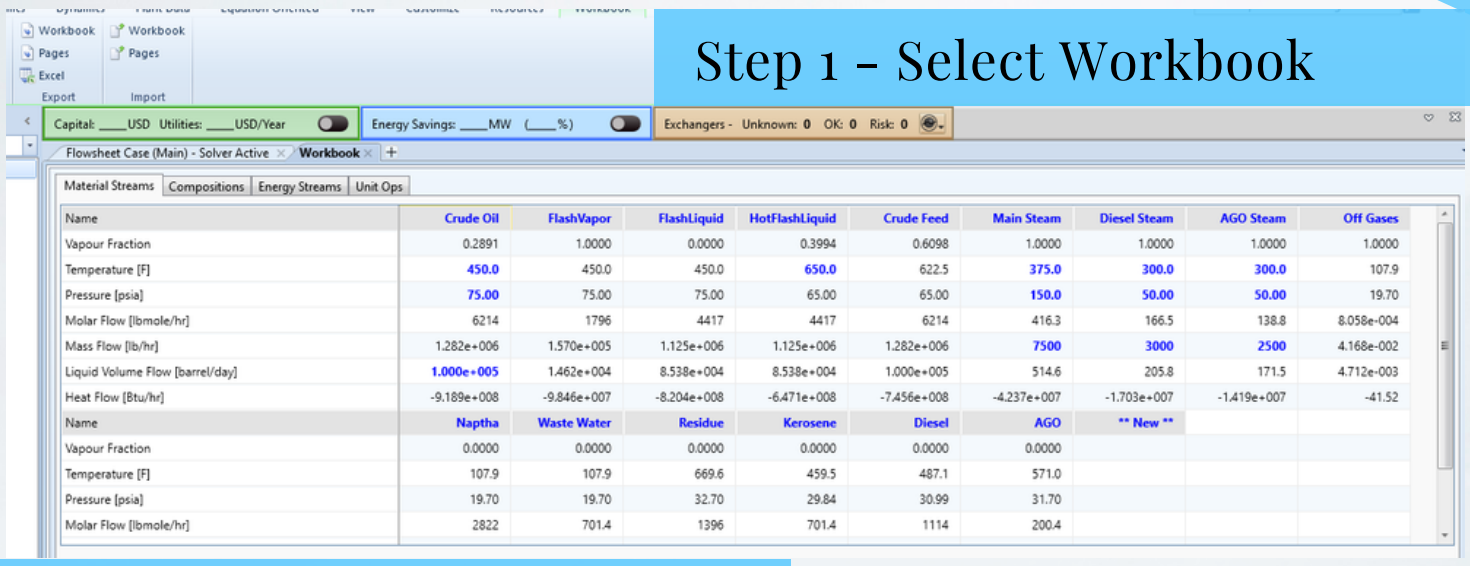
- ***Distillation Column***
- ***Reactors***
- ***Pumps & Compression***
- ***Heat Exchangers***

TIP 8
EXPORT TO EXCEL

BETTER DATA MANIPULATION

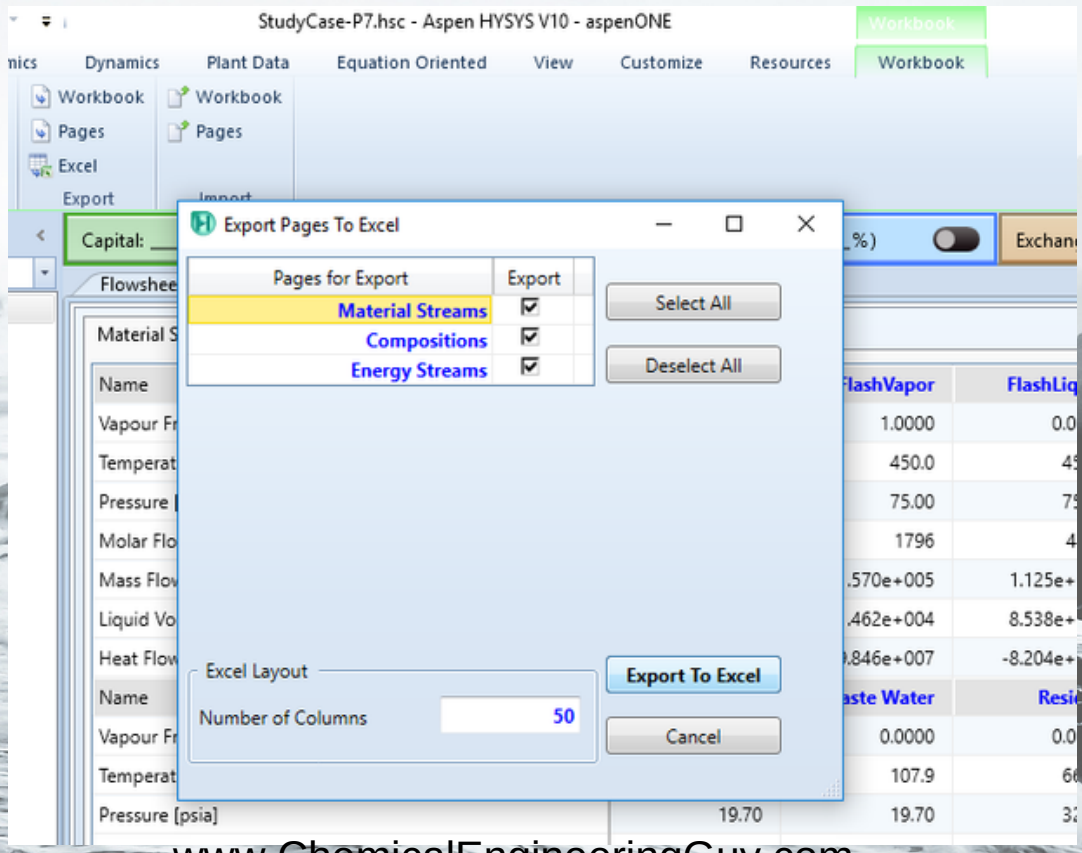
- We all love (and hate...) Excel!
- It is an amesing tool which can facilitate our labor (or complex it 100x)
- All data can be exporte from Aspen to Excel!

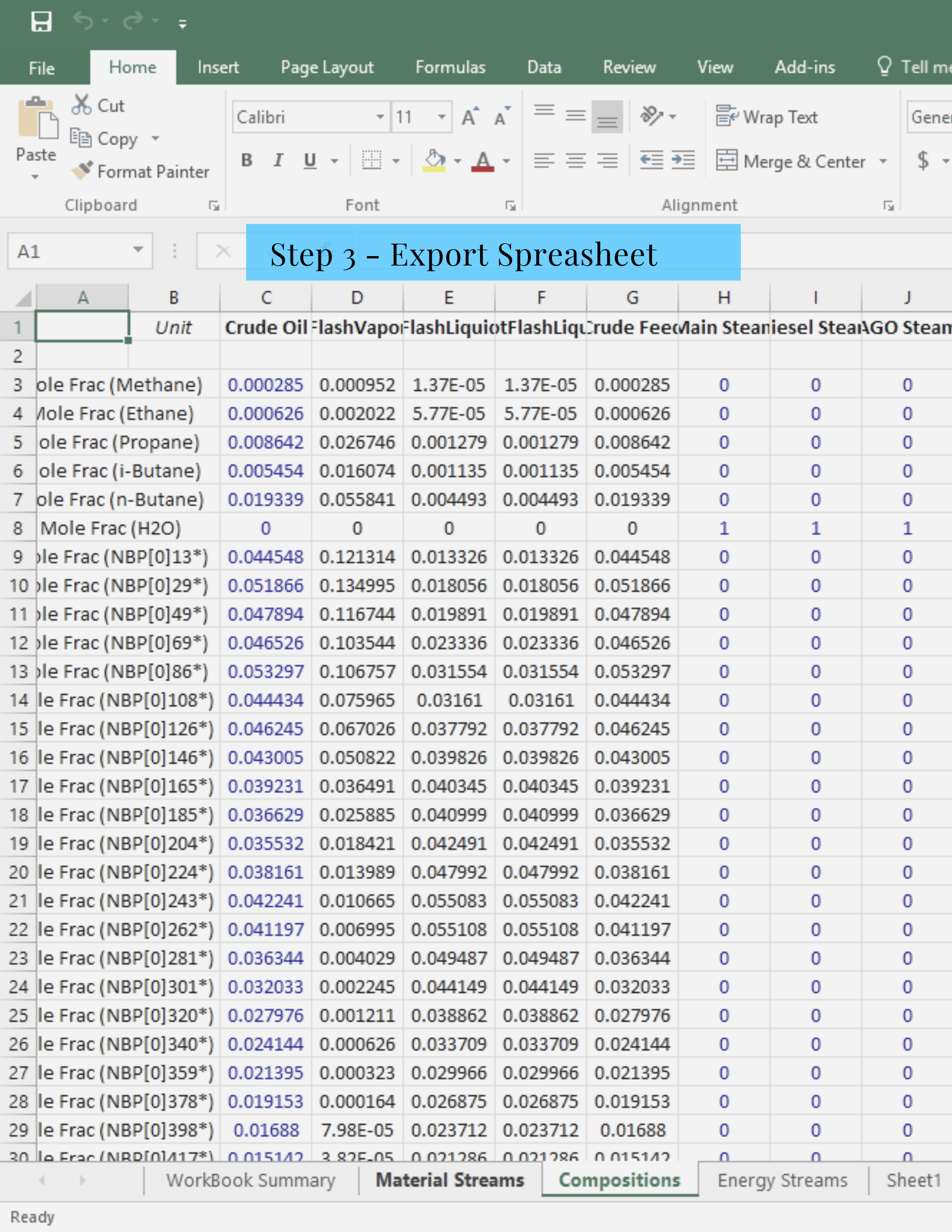
Step 1 - Select Workbook



Name	Crude Oil	FlashVapor	FlashLiquid	HotFlashLiquid	Crude Feed	Main Steam	Diesel Steam	AGO Steam	Off Gases
Vapour Fraction	0.2891	1.0000	0.0000	0.3994	0.6098	1.0000	1.0000	1.0000	1.0000
Temperature [F]	450.0	450.0	450.0	650.0	622.5	375.0	300.0	300.0	107.9
Pressure [psia]	75.00	75.00	75.00	65.00	65.00	150.0	50.00	50.00	19.70
Molar Flow [lbmole/hr]	6214	1796	4417	4417	6214	416.3	166.5	138.8	8.058e-004
Mass Flow [lb/hr]	1.282e+006	1.570e+005	1.125e+006	1.125e+006	1.282e+006	7500	3000	2500	4.168e-002
Liquid Volume Flow [barrel/day]	1.000e+005	1.462e+004	8.538e+004	8.538e+004	1.000e+005	514.6	205.8	171.5	4.712e-003
Heat Flow [Btu/hr]	-9.189e+008	-9.846e+007	-8.204e+008	-6.471e+008	-7.456e+008	-4.237e+007	-1.703e+007	-1.419e+007	-41.52
Name	Naptha	Waste Water	Residue	Kerosene	Diesel	AGO	** New **		
Vapour Fraction	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			
Temperature [F]	107.9	107.9	669.6	459.5	487.1	571.0			
Pressure [psia]	19.70	19.70	32.70	29.84	30.99	31.70			
Molar Flow [lbmole/hr]	2822	701.4	1396	701.4	1114	200.4			

Step 2 - Select Tabs to Export



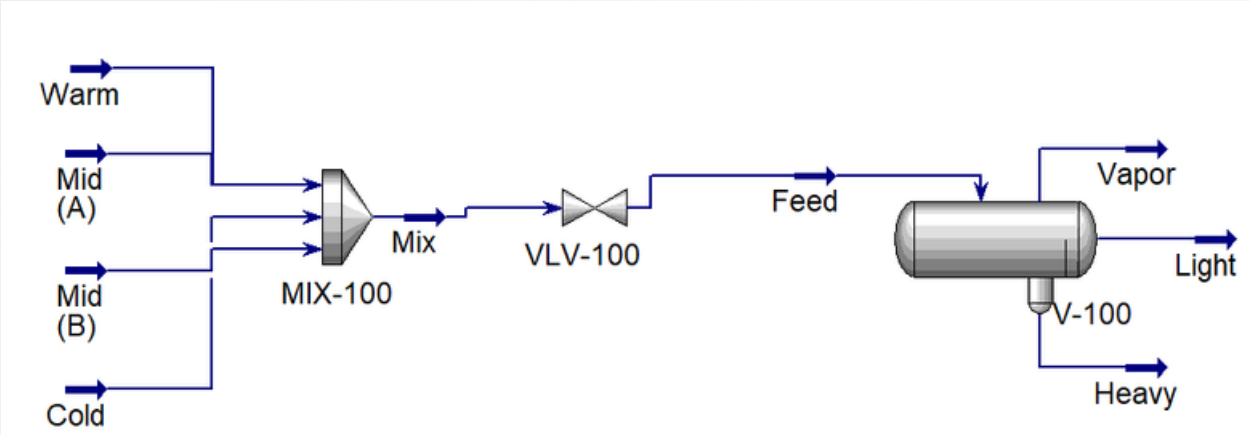


	A	B	C	D	E	F	G	H	I	J
1		*Unit*	Crude Oil	FlashVapo	FlashLiquid	tFlashLiq	Crude Feed	Main Steam	iesel Steam	AGO Steam
2										
3	ole Frac (Methane)		0.000285	0.000952	1.37E-05	1.37E-05	0.000285	0	0	0
4	Mole Frac (Ethane)		0.000626	0.002022	5.77E-05	5.77E-05	0.000626	0	0	0
5	ole Frac (Propane)		0.008642	0.026746	0.001279	0.001279	0.008642	0	0	0
6	ole Frac (i-Butane)		0.005454	0.016074	0.001135	0.001135	0.005454	0	0	0
7	ole Frac (n-Butane)		0.019339	0.055841	0.004493	0.004493	0.019339	0	0	0
8	Mole Frac (H2O)		0	0	0	0	0	1	1	1
9	ole Frac (NBP[0]13*)		0.044548	0.121314	0.013326	0.013326	0.044548	0	0	0
10	ole Frac (NBP[0]29*)		0.051866	0.134995	0.018056	0.018056	0.051866	0	0	0
11	ole Frac (NBP[0]49*)		0.047894	0.116744	0.019891	0.019891	0.047894	0	0	0
12	ole Frac (NBP[0]69*)		0.046526	0.103544	0.023336	0.023336	0.046526	0	0	0
13	ole Frac (NBP[0]86*)		0.053297	0.106757	0.031554	0.031554	0.053297	0	0	0
14	le Frac (NBP[0]108*)		0.044434	0.075965	0.03161	0.03161	0.044434	0	0	0
15	le Frac (NBP[0]126*)		0.046245	0.067026	0.037792	0.037792	0.046245	0	0	0
16	le Frac (NBP[0]146*)		0.043005	0.050822	0.039826	0.039826	0.043005	0	0	0
17	le Frac (NBP[0]165*)		0.039231	0.036491	0.040345	0.040345	0.039231	0	0	0
18	le Frac (NBP[0]185*)		0.036629	0.025885	0.040999	0.040999	0.036629	0	0	0
19	le Frac (NBP[0]204*)		0.035532	0.018421	0.042491	0.042491	0.035532	0	0	0
20	le Frac (NBP[0]224*)		0.038161	0.013989	0.047992	0.047992	0.038161	0	0	0
21	le Frac (NBP[0]243*)		0.042241	0.010665	0.055083	0.055083	0.042241	0	0	0
22	le Frac (NBP[0]262*)		0.041197	0.006995	0.055108	0.055108	0.041197	0	0	0
23	le Frac (NBP[0]281*)		0.036344	0.004029	0.049487	0.049487	0.036344	0	0	0
24	le Frac (NBP[0]301*)		0.032033	0.002245	0.044149	0.044149	0.032033	0	0	0
25	le Frac (NBP[0]320*)		0.027976	0.001211	0.038862	0.038862	0.027976	0	0	0
26	le Frac (NBP[0]340*)		0.024144	0.000626	0.033709	0.033709	0.024144	0	0	0
27	le Frac (NBP[0]359*)		0.021395	0.000323	0.029966	0.029966	0.021395	0	0	0
28	le Frac (NBP[0]378*)		0.019153	0.000164	0.026875	0.026875	0.019153	0	0	0
29	le Frac (NBP[0]398*)		0.01688	7.98E-05	0.023712	0.023712	0.01688	0	0	0
30	le Frac (NBP[0]417*)		0.015142	3.82E-05	0.021286	0.021286	0.015142	0	0	0

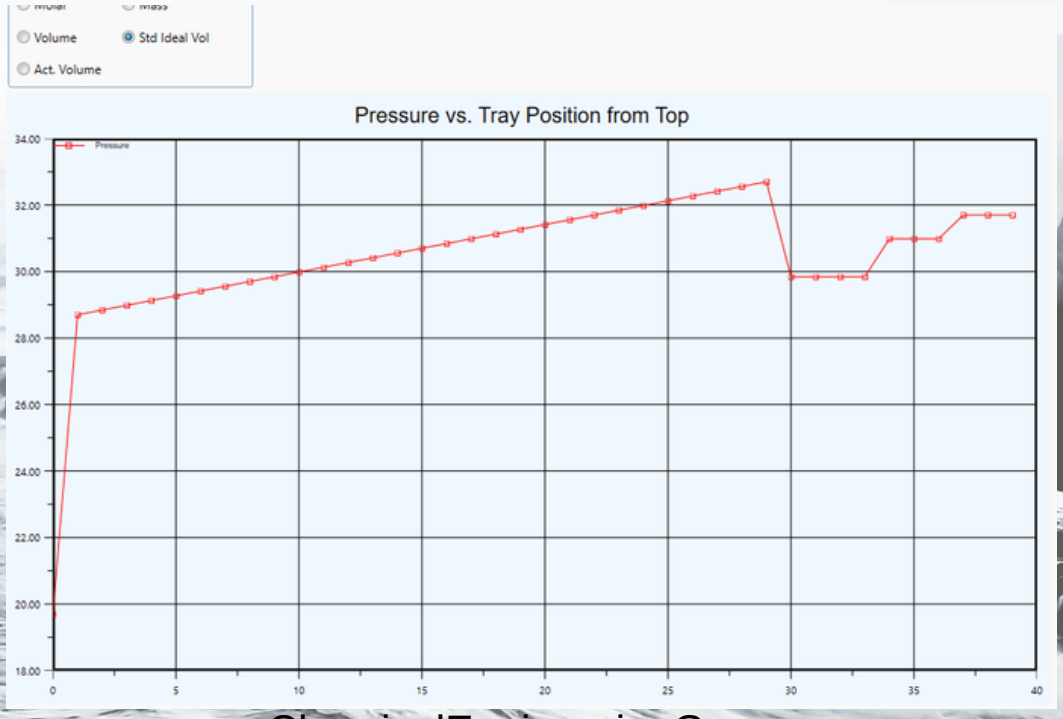
TIP 9

SENSITIVITY ANALYSIS

Ever wonder what will happen if T1 changes from 25°C to 50°?
to 55°?
to 100°?
or to 120°?

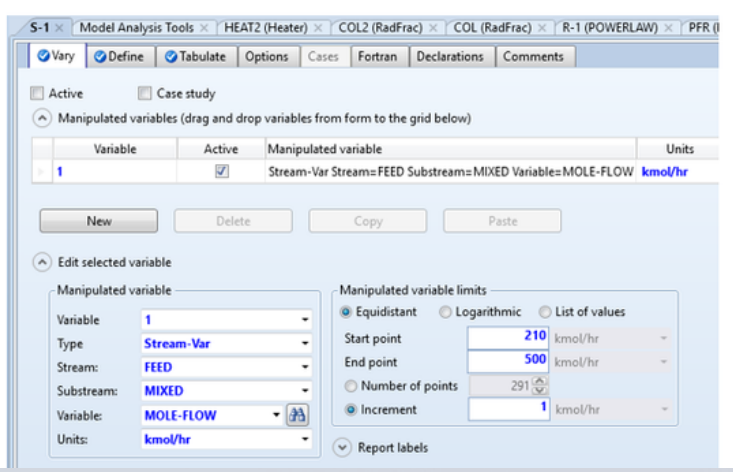


Simulate individually...
Nah... too much time!
...You get the point...

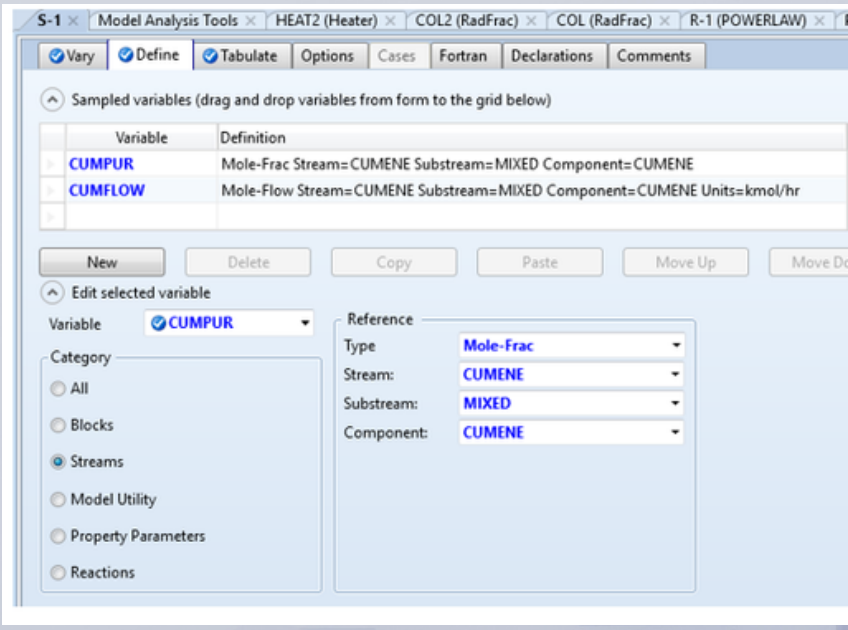


USE CASE STUDIES / SENSITIVITY ANALYSIS

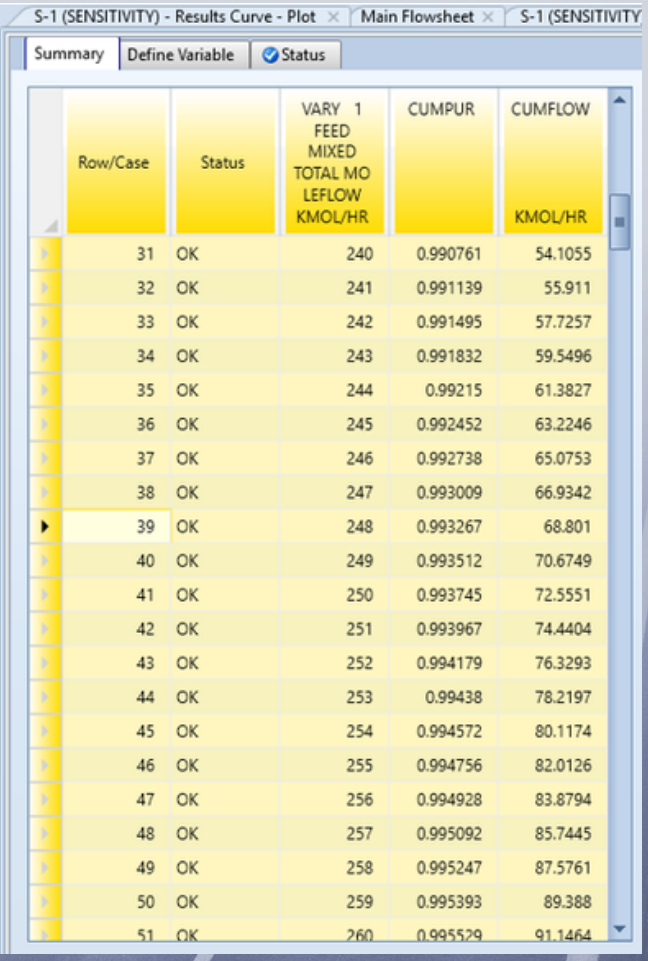
Step 1 - Set Variable to "VARY"



Step 2 - Define OUTPUT

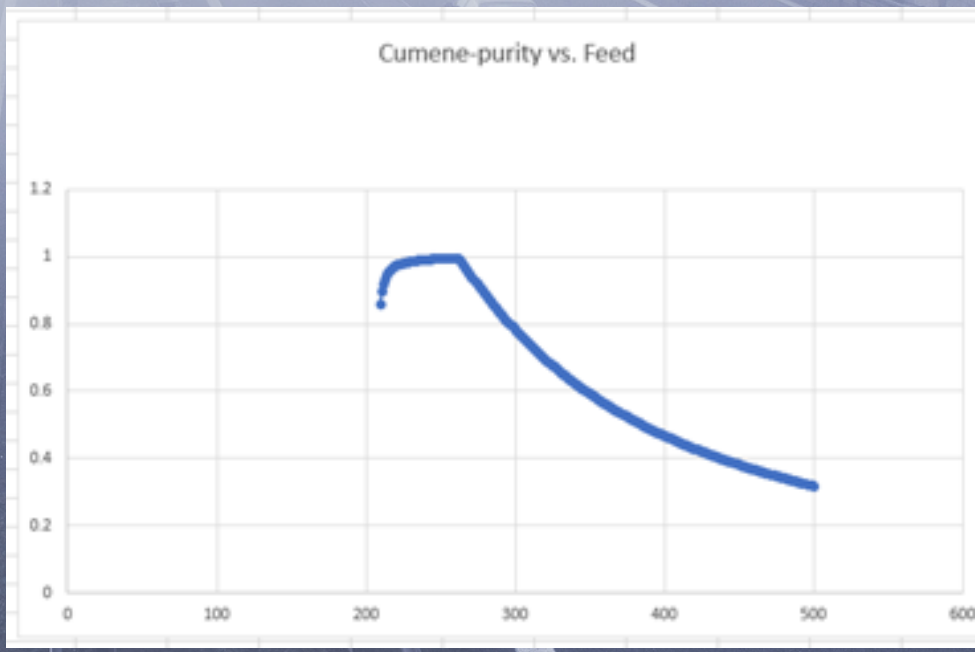


Step 3 - Taublate



Row/Case	Status	VARY 1 FEED MIXED TOTAL MOLEFLOW KMOL/HR	CUMPUR	CUMFLOW KMOL/HR
31	OK	240	0.990761	54.1055
32	OK	241	0.991139	55.911
33	OK	242	0.991495	57.7257
34	OK	243	0.991832	59.5496
35	OK	244	0.99215	61.3827
36	OK	245	0.992452	63.2246
37	OK	246	0.992738	65.0753
38	OK	247	0.993009	66.9342
39	OK	248	0.993267	68.801
40	OK	249	0.993512	70.6749
41	OK	250	0.993745	72.5551
42	OK	251	0.993967	74.4404
43	OK	252	0.994179	76.3293
44	OK	253	0.99438	78.2197
45	OK	254	0.994572	80.1174
46	OK	255	0.994756	82.0126
47	OK	256	0.994928	83.8794
48	OK	257	0.995092	85.7445
49	OK	258	0.995247	87.5761
50	OK	259	0.995393	89.388
51	OK	260	0.995529	91.1464

Step 4 - Graph Results



Learn More --> Sensitivity Analysis Here...

TIP 10 - BE PATIENT!

As any skill, learning to simulate processes will take **TIME**!

Be patient! But WORK!

Work in different:

- Processes
- Workshops
- Industries
- Companies
- Unit Operations
- Courses

disciplines & intent will make you learn!

I SAW,
I PROCESSED,
I SIMULATED.

FINAL NOTES

EMMANUEL ORTEGA
AKA
CHEMICAL ENGINEERING GUY

I hope you enjoyed this simple tricks and tips!

They will help you improve your simulation procedures!

Remember that in order to improve yourself, YOU need to put the hard work in!

Nobody is going to learn for you!

Keep it up guys! I wish you the best of EPIC SIMULATIONS!

Contact me: Hello@ChemicalEngineeringGuy.com

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