Heat Exchanger Networks

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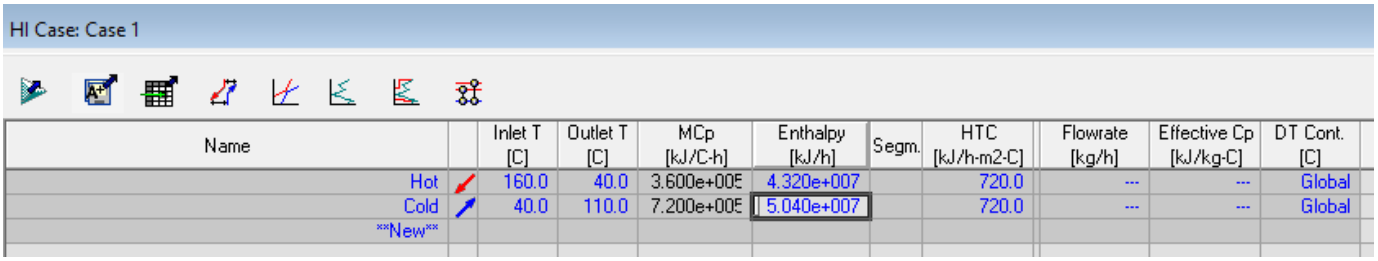
Entry no.: 2022CHB1048

Q1.

Stream Type	T_in	T_out	Heat load	C_p
Cold	40	110	14	0.2
Hot	160	40	-12	0.1

del T_min = 10 C

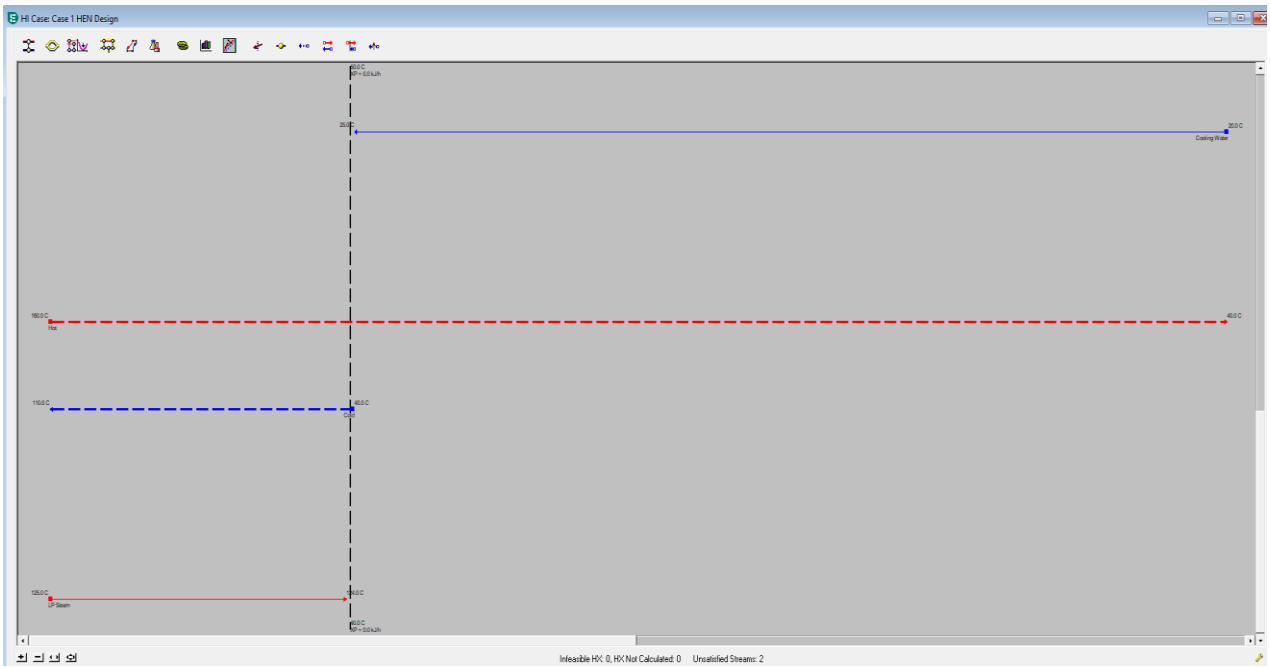


Using Low pressure for hot utility and cooling water for cold utility.

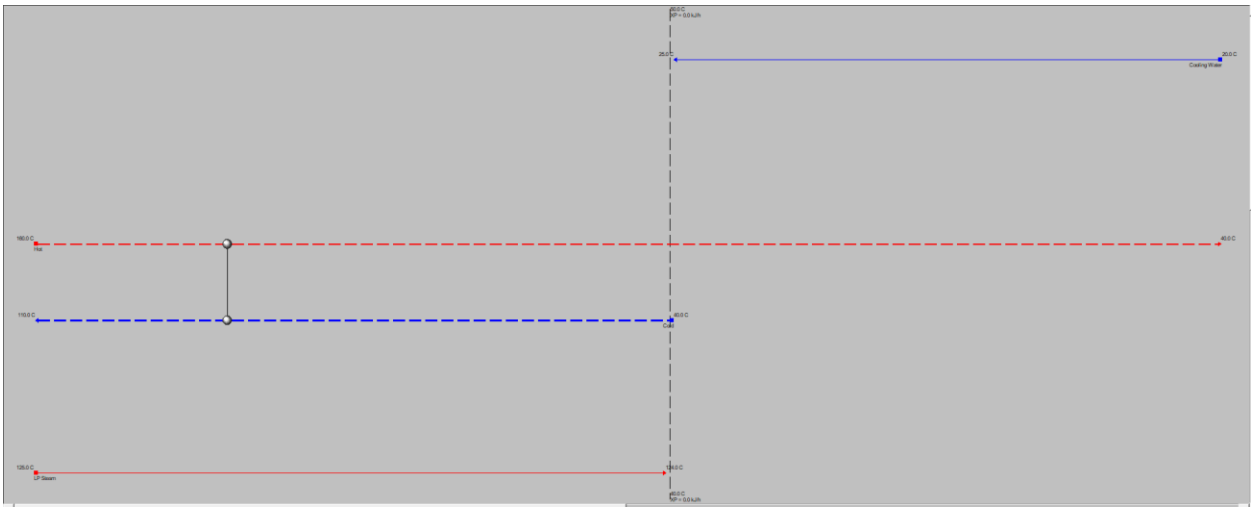
Doing pinch analysis on HEN.

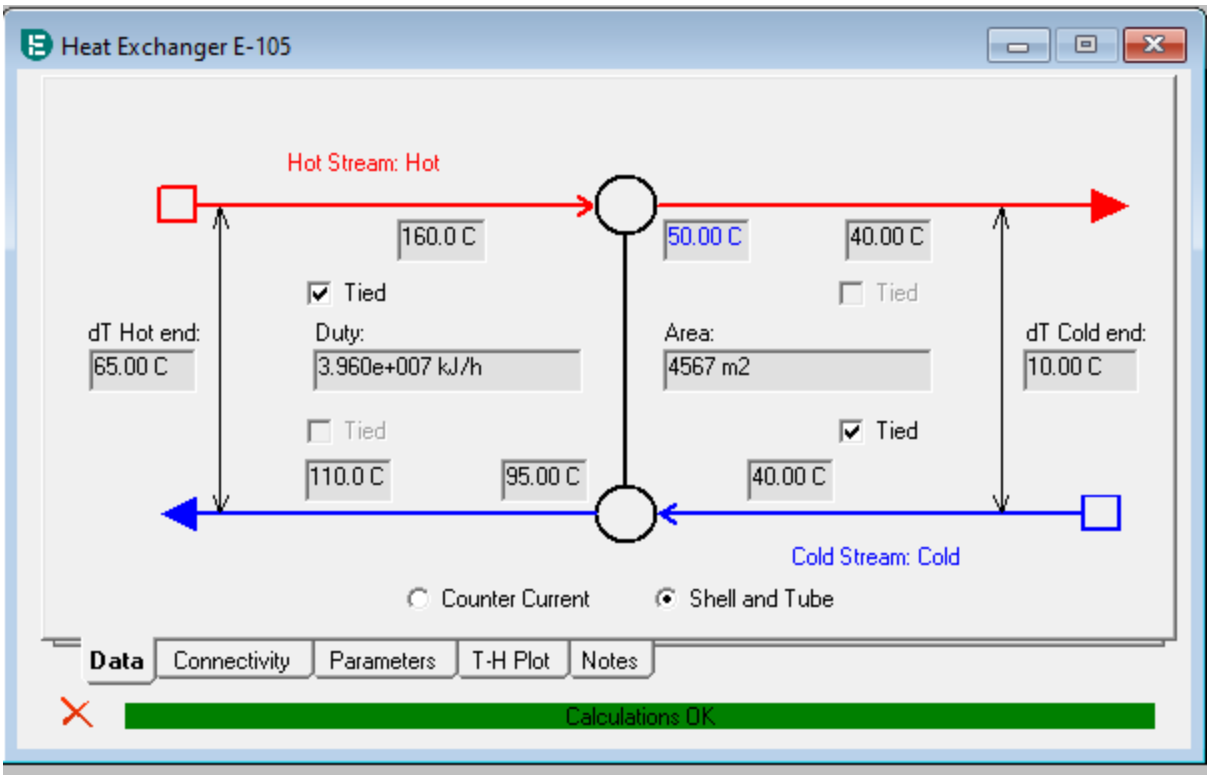
We got hot pinch at 50 C

and cold pinch at 40 C

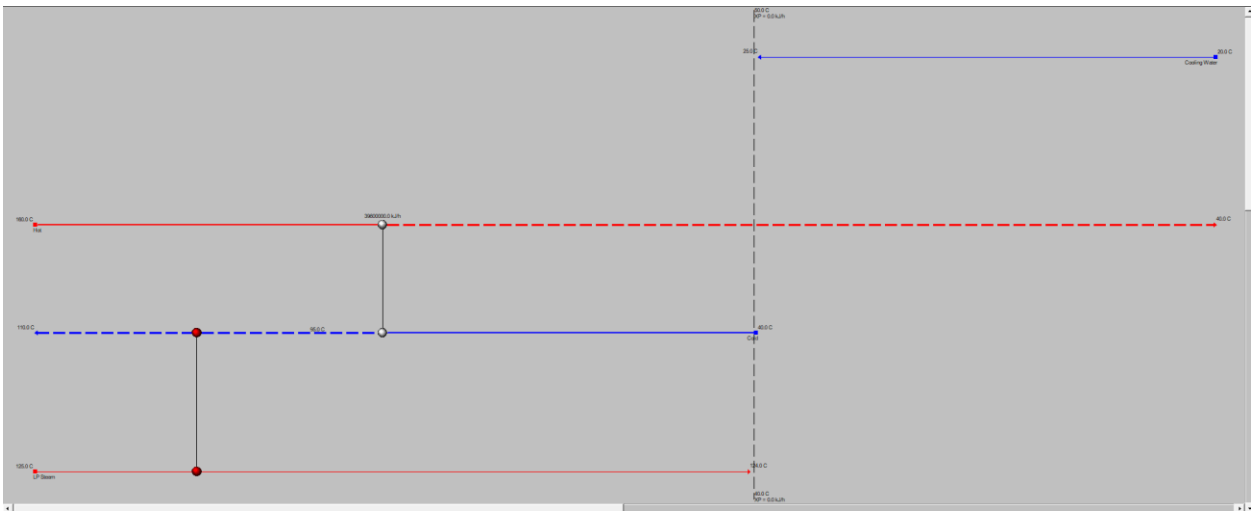


Putting Heat exchanger above pinch on hot and cold stream.

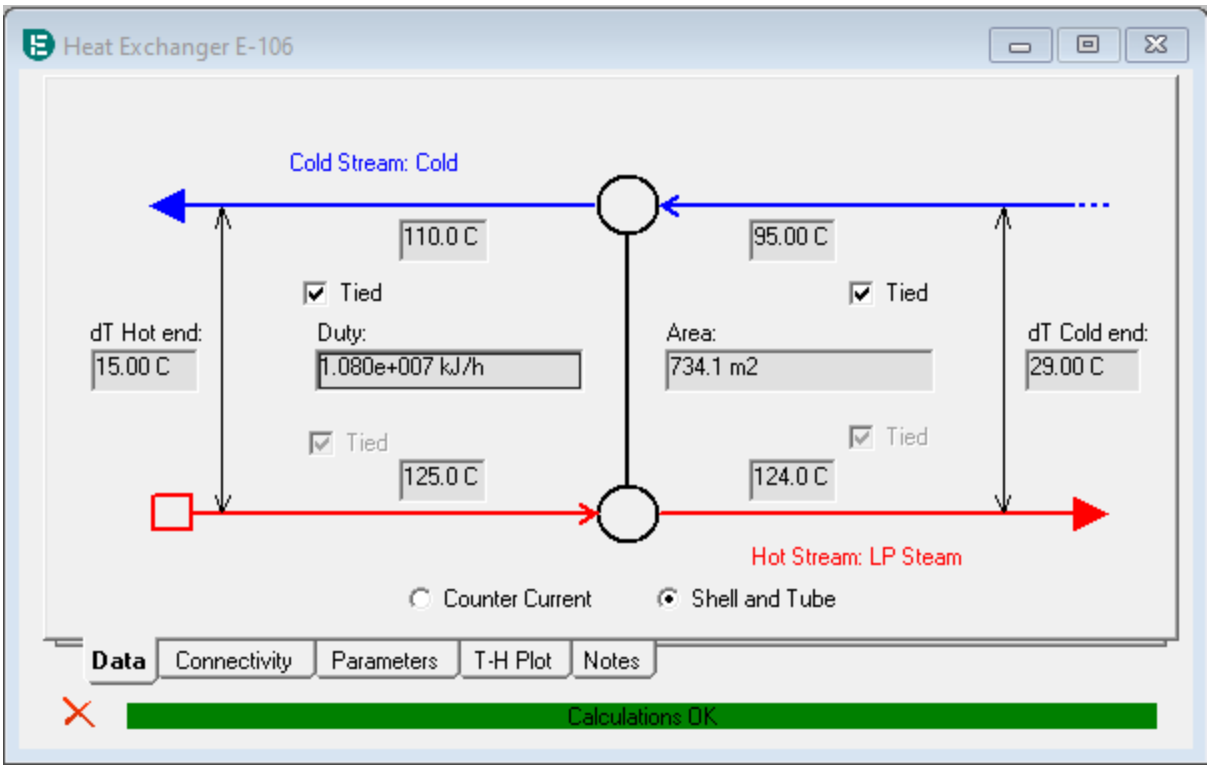




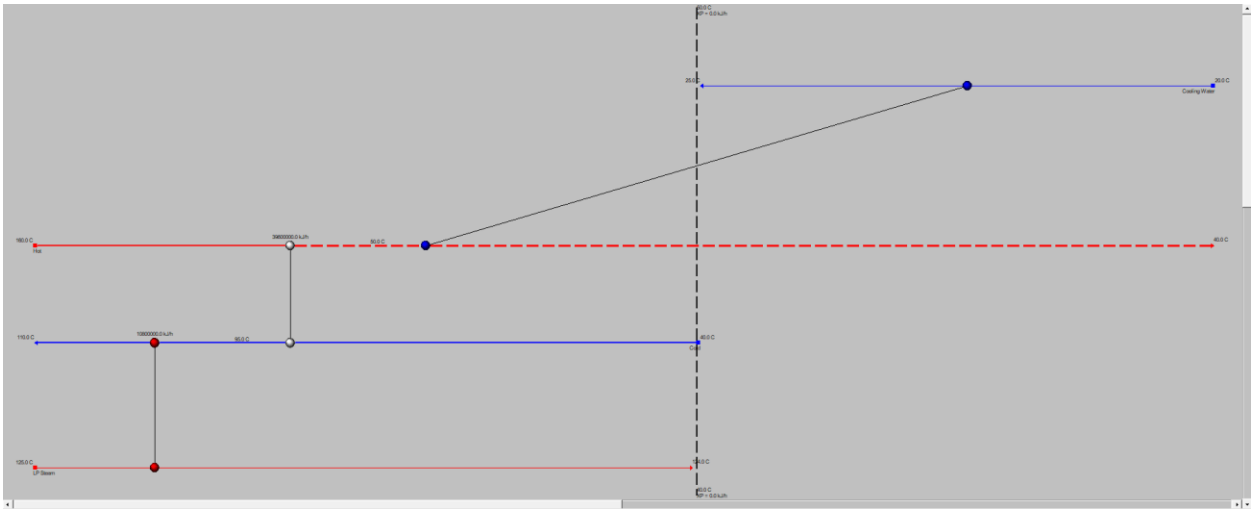
Then a reboiler for hot utility:



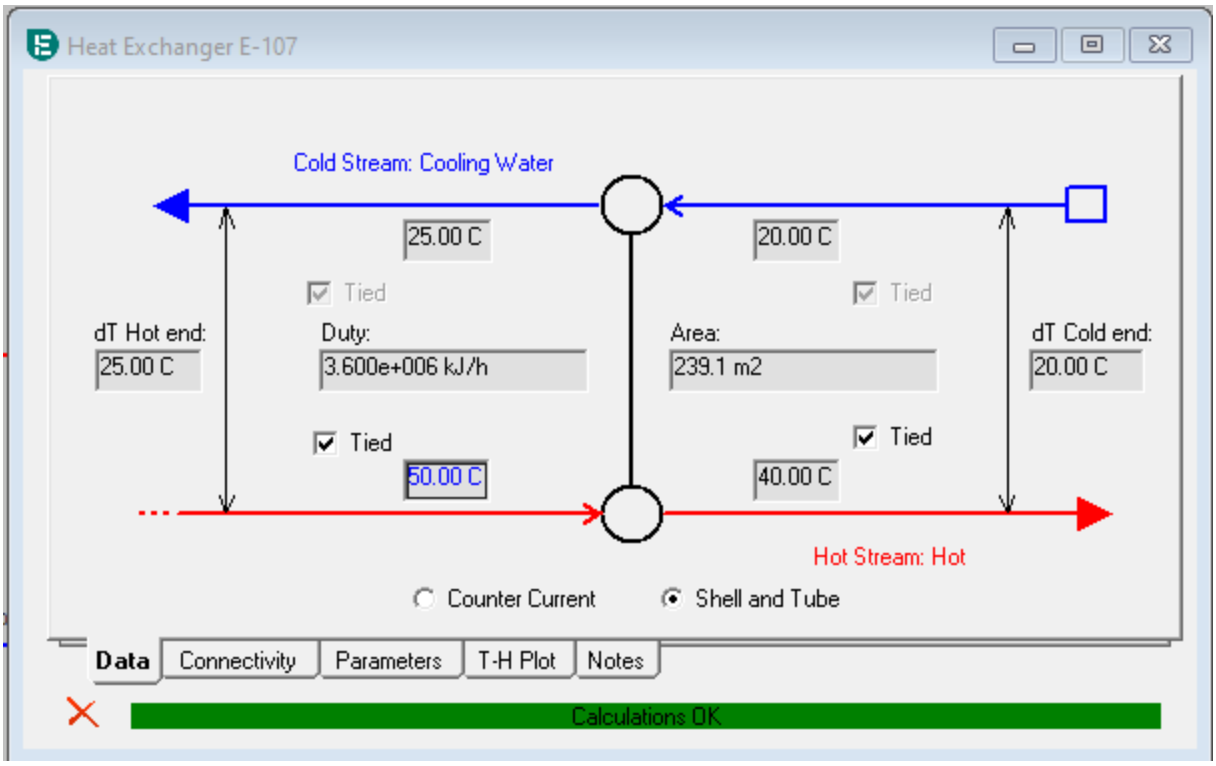
A reboiler of 3 MW utility is required here.



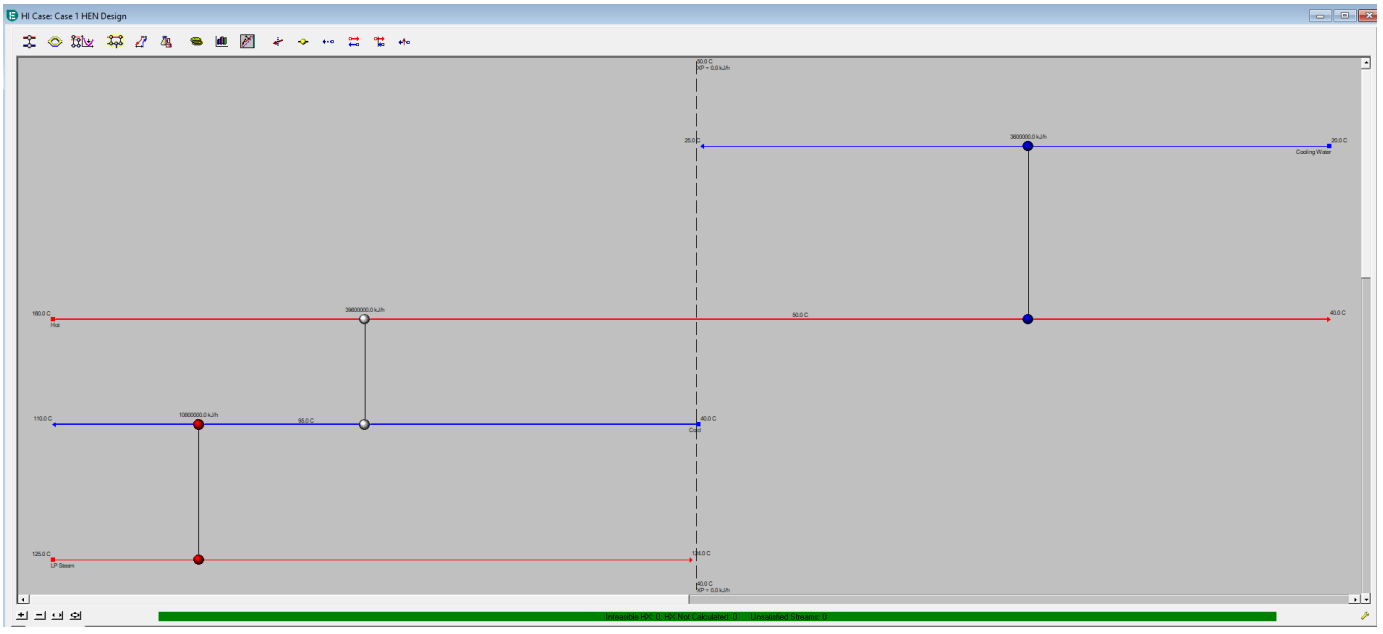
Then a condenser for cold utility



A condenser of 1 MW utility is required here.



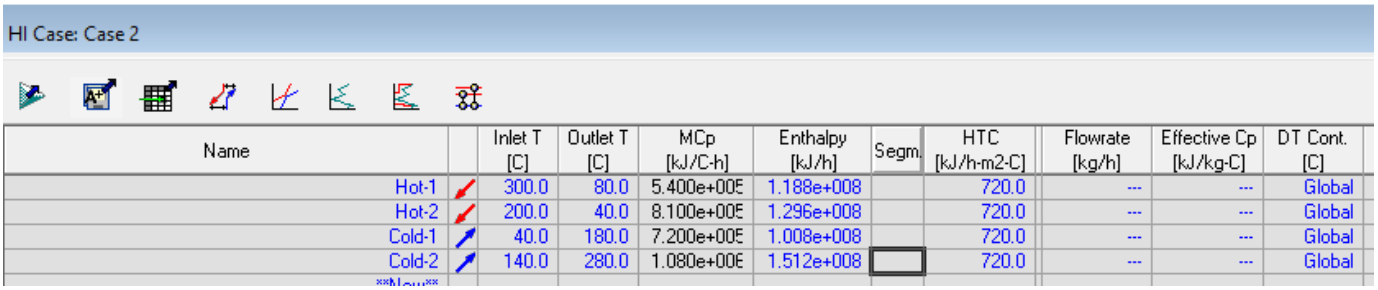
Finally, the heat exchanger networks look like this.



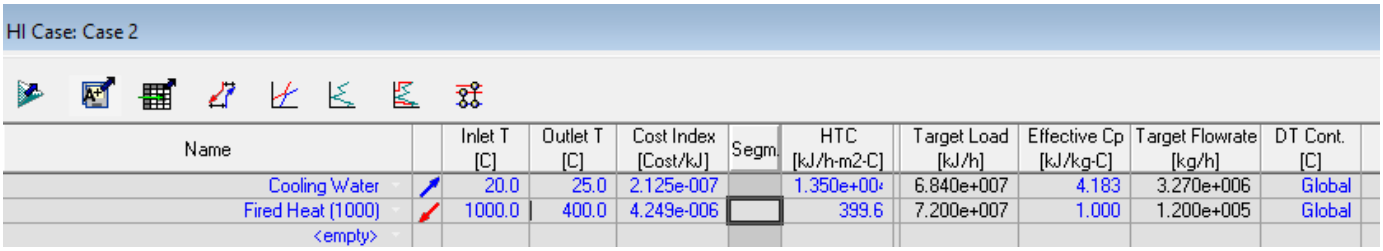
Q2.

	Stream	T_in	T_out	C_p	Heat load
1	Hot-1	300	80	0.15	-33
2	Hot-2	200	40	0.225	-36
3	Cold-1	40	180	0.2	28
4	Cold-2	140	280	0.3	42

del T_min = 20 C



For hot utility we are using fired heat, and for cold utility cooling water is used.

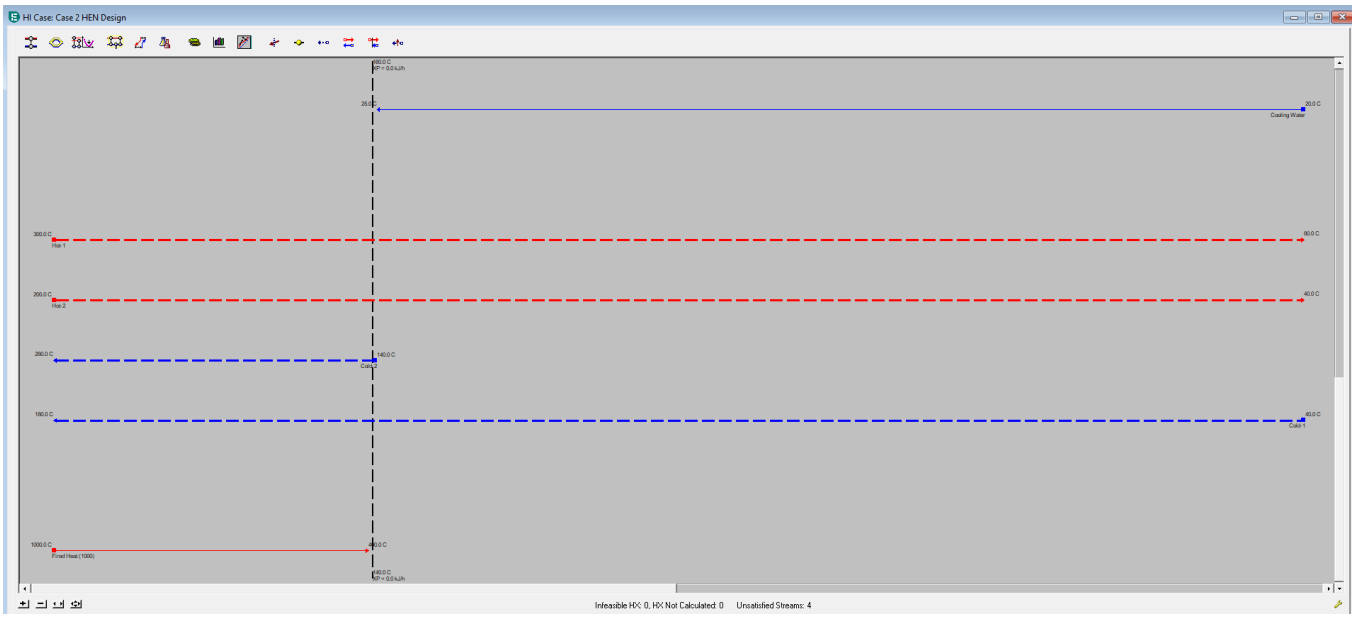


del T_min = 20 C

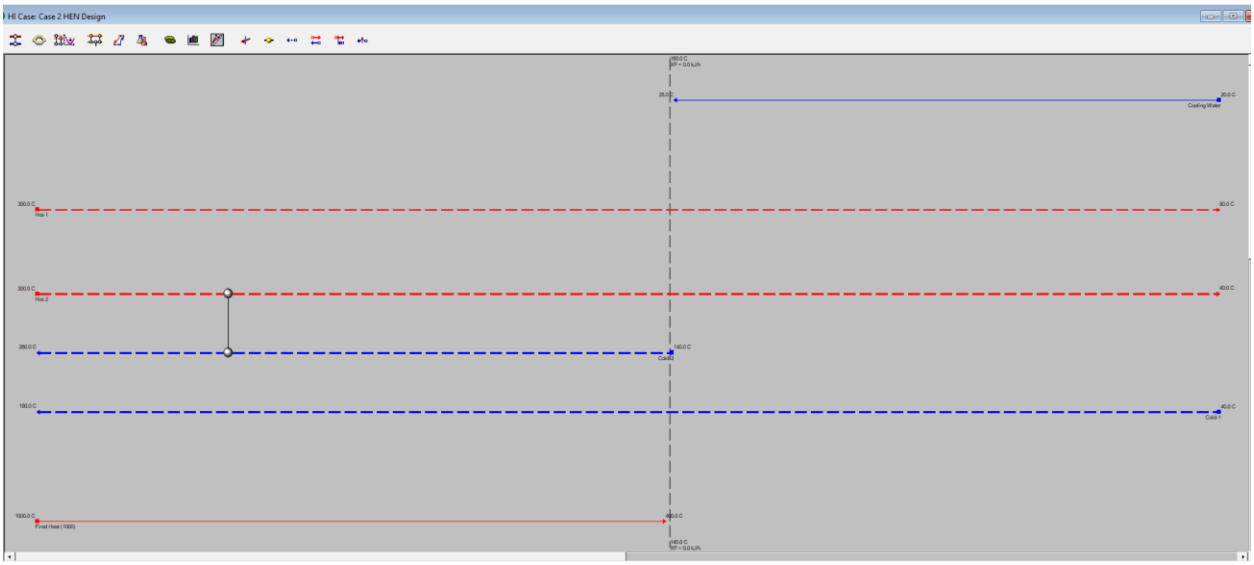
Doing pinch analysis, we got:

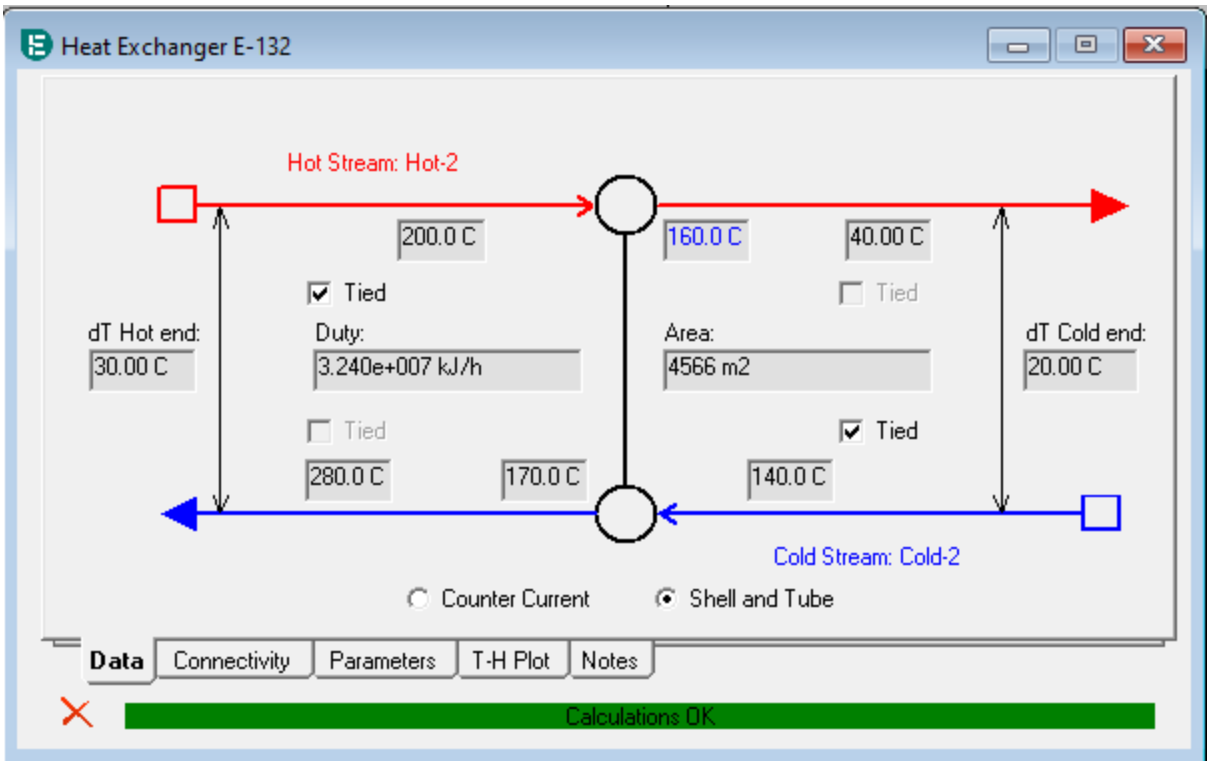
Hot pinch at 160 C

Cold pinch at 140 C

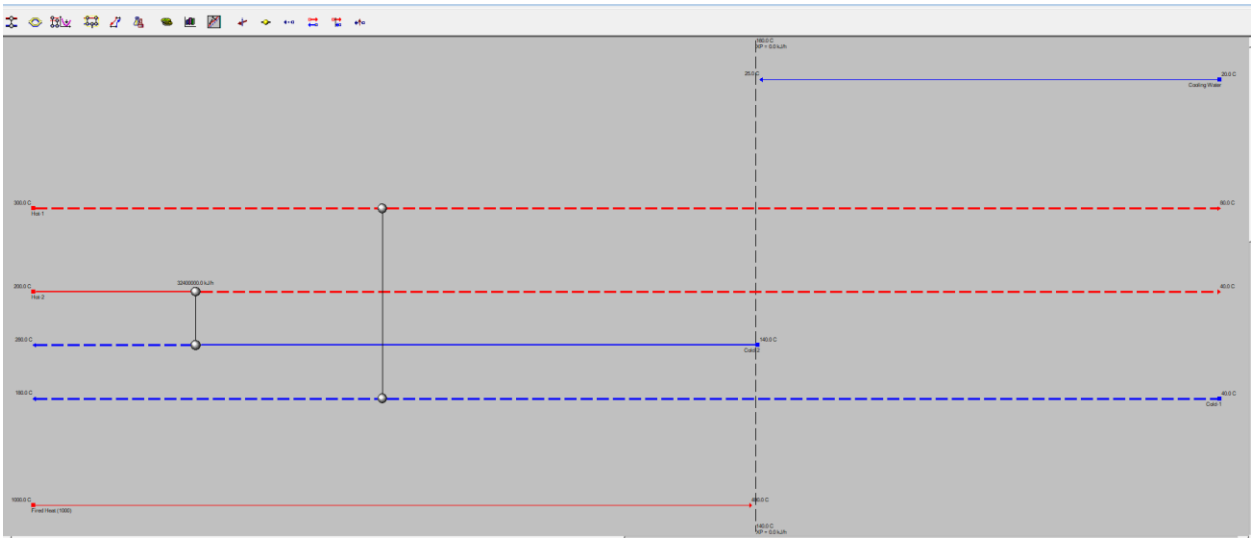


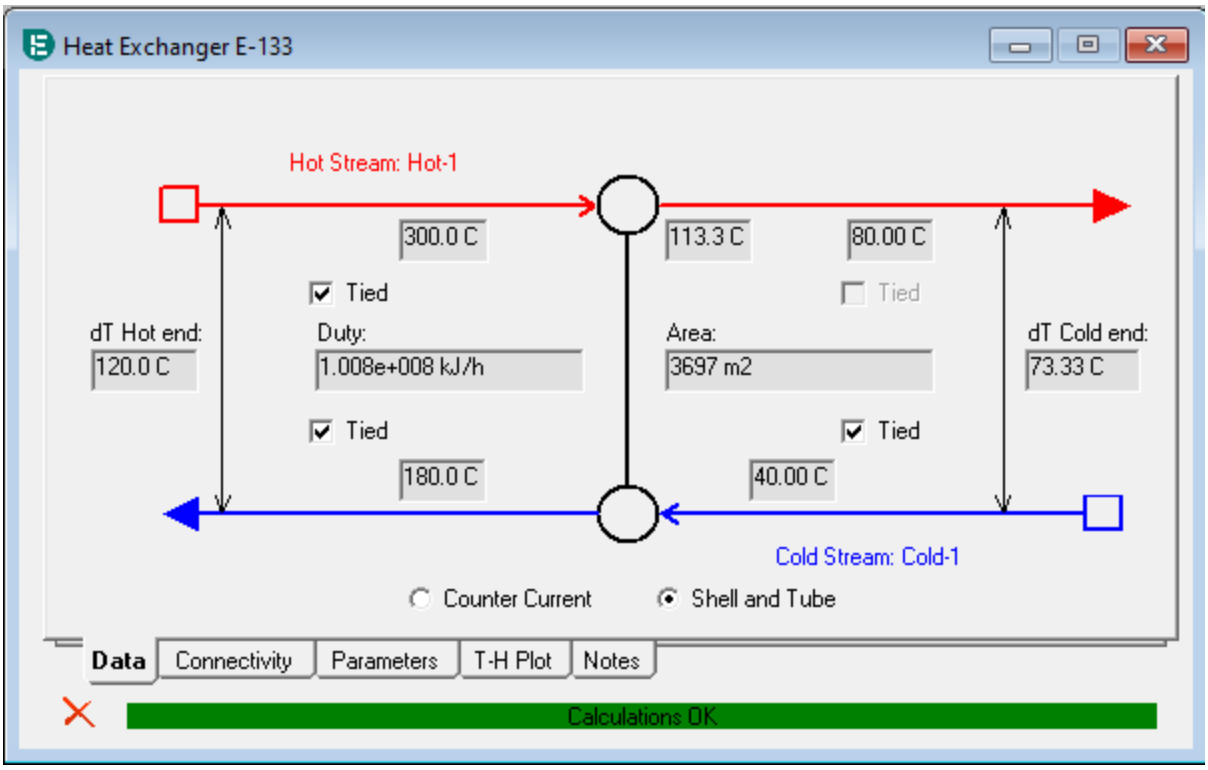
Putting heat exchanger between hot-2 and cold-2.



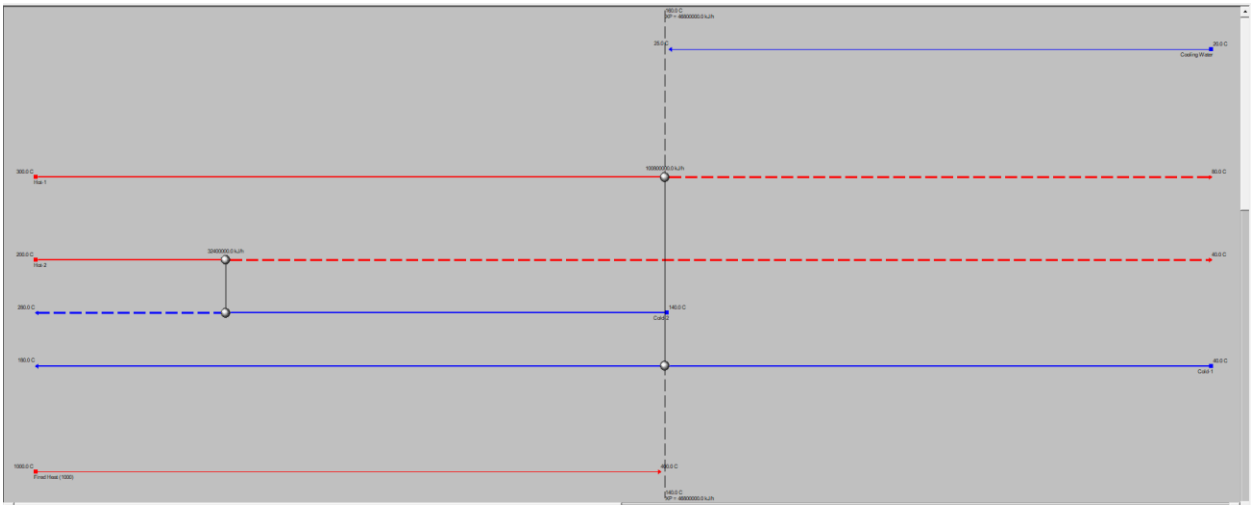


Putting heat exchanger between hot-1 and cold-1.

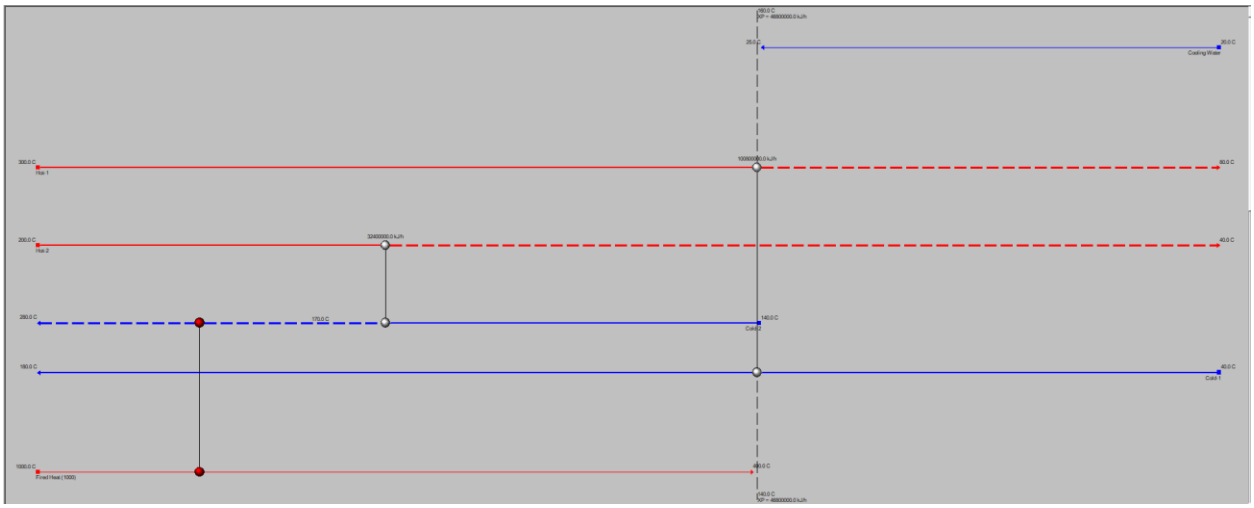


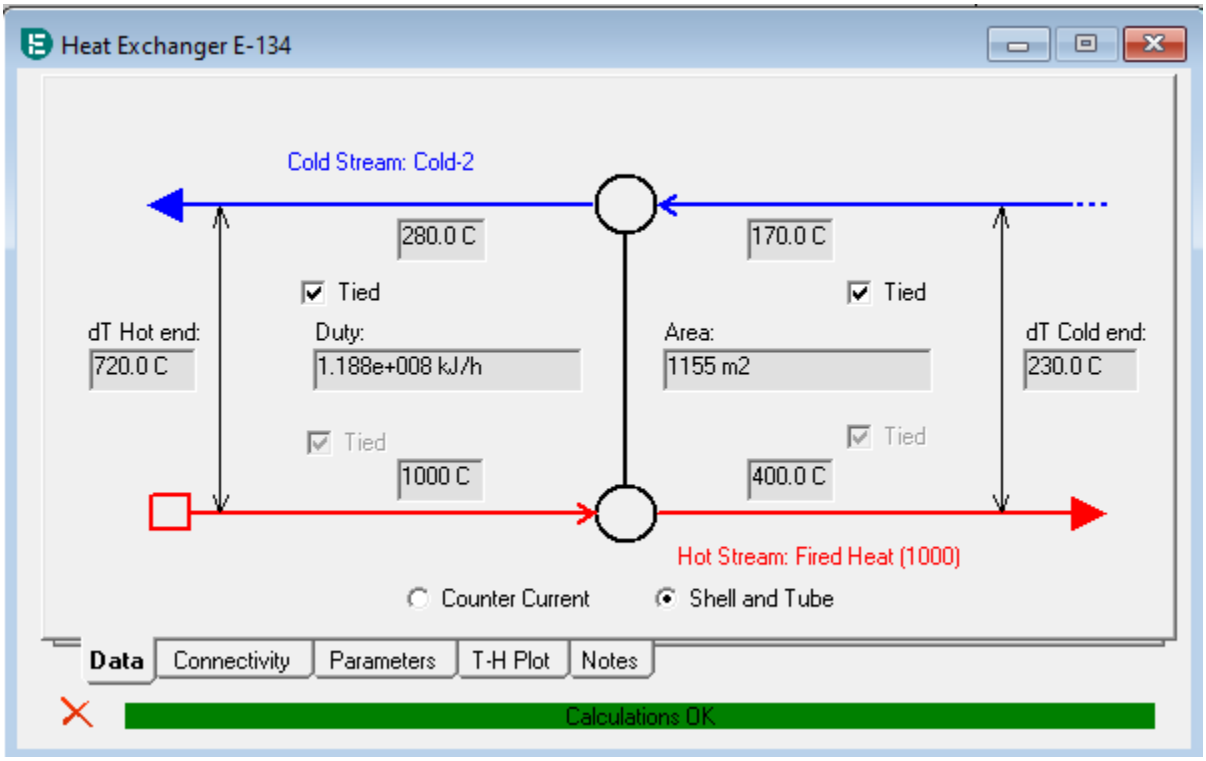


For the remaining streams, put the utilities, hot utility above pinch and cold utility below pinch.

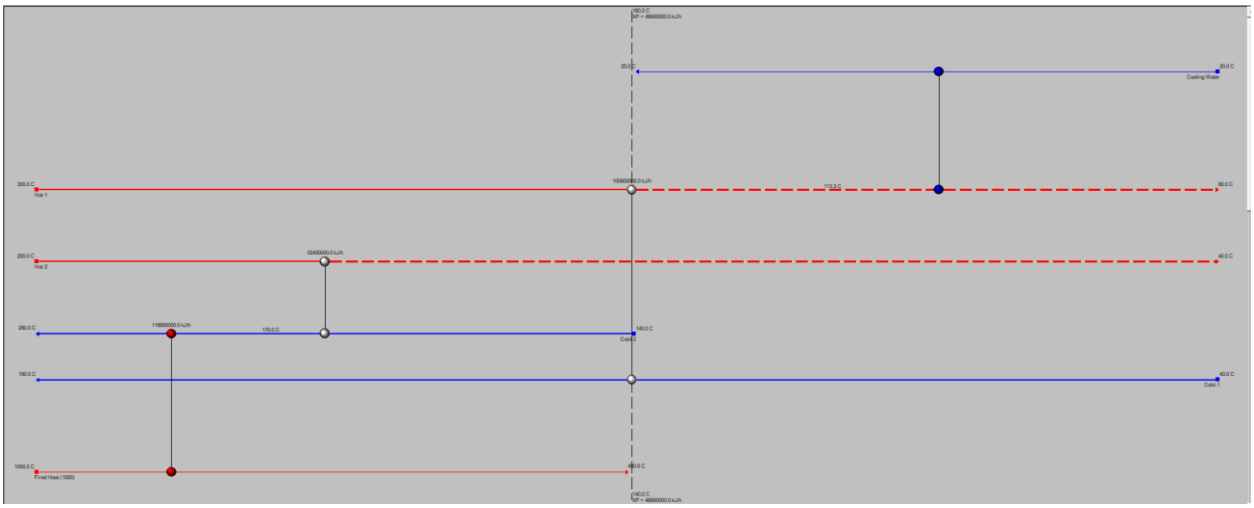


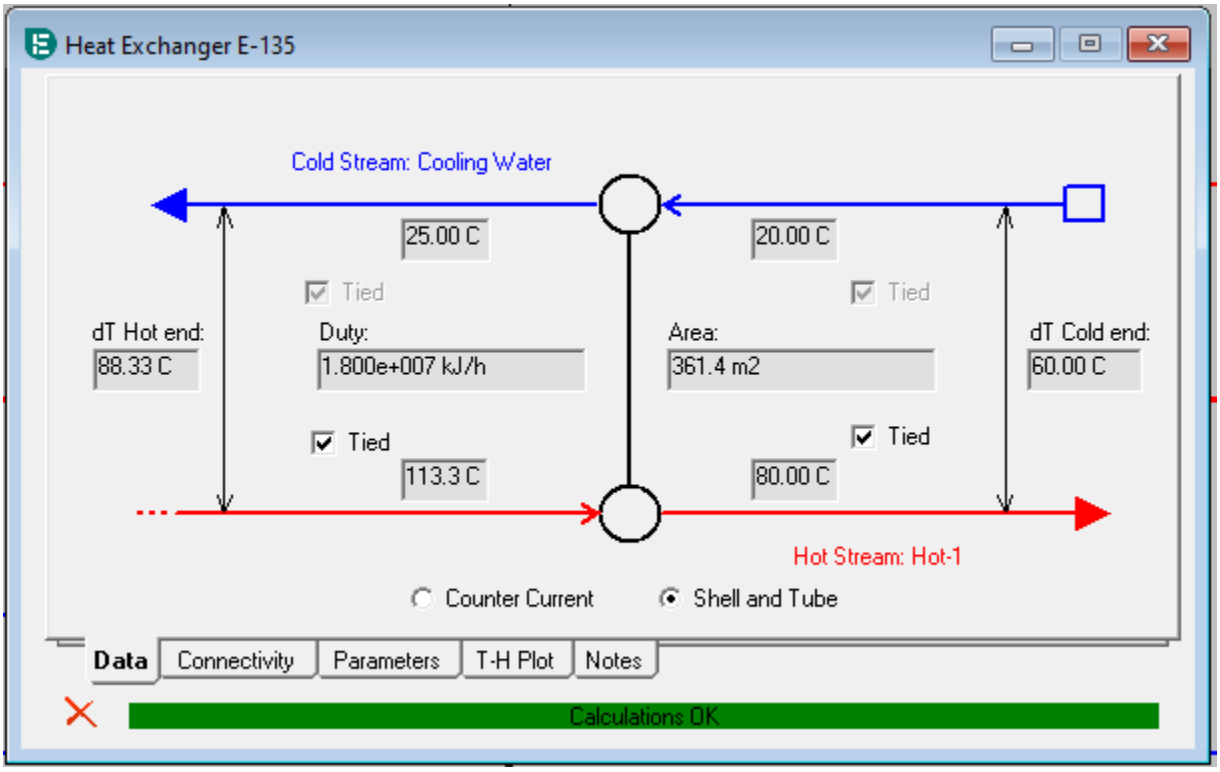
Putting hot utility on stream cold-2:



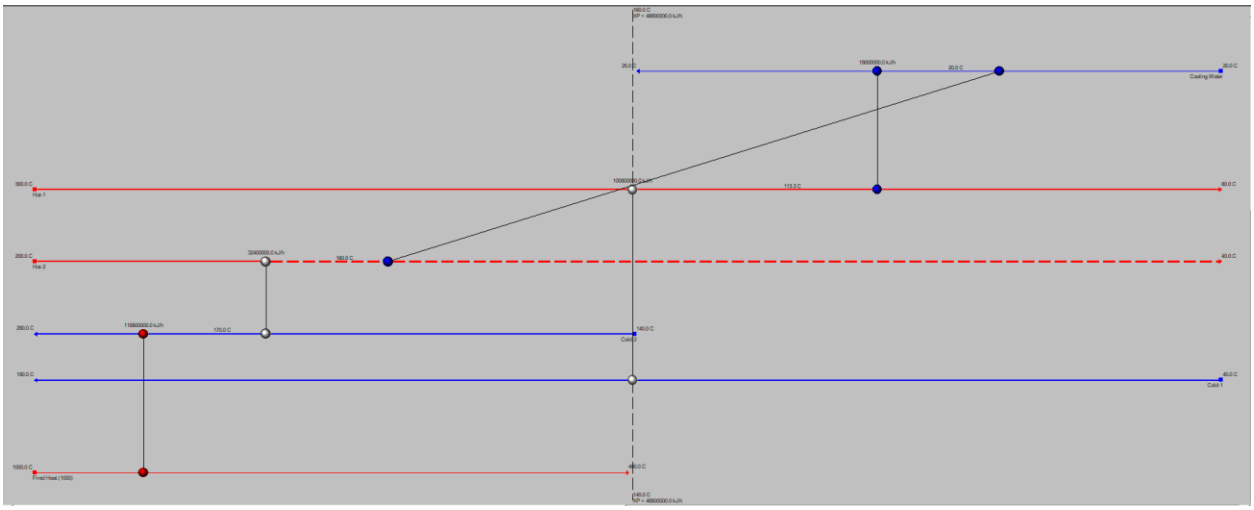


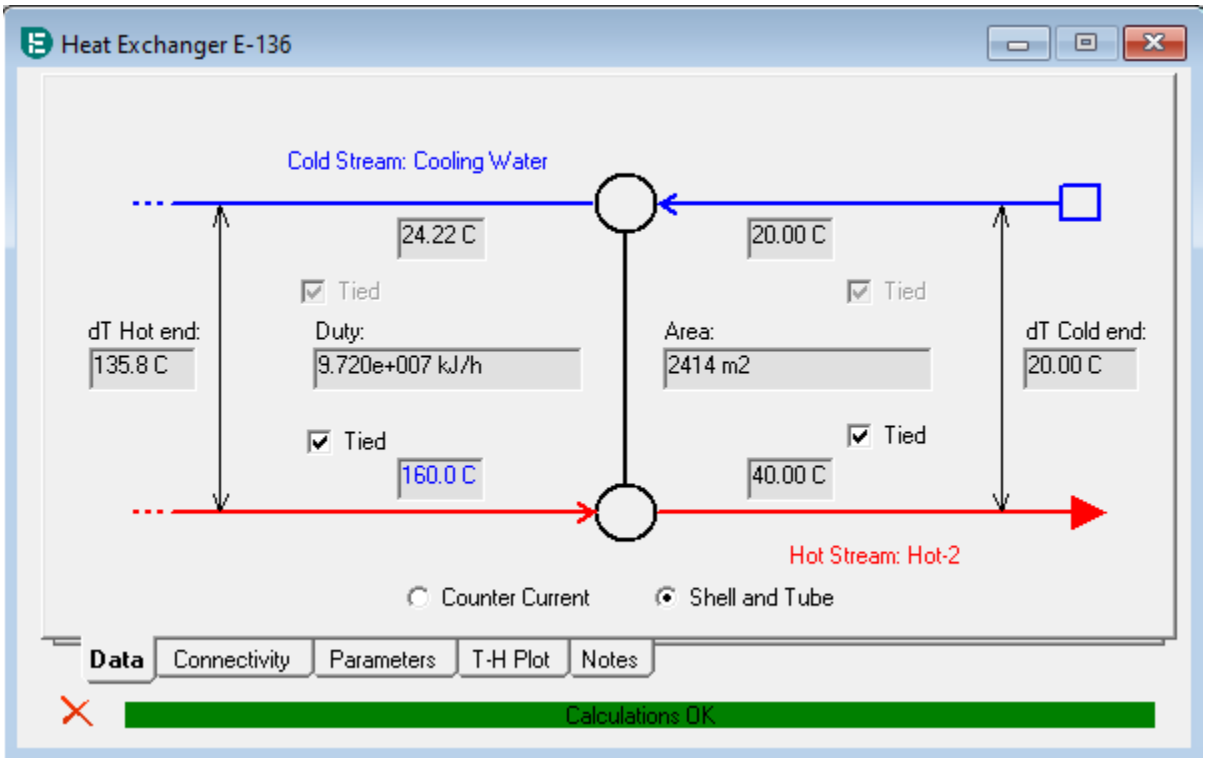
Putting cold utility on hot-1 stream:





Putting cold utility on hot-2 stream:





So, the final heat exchanger network looks like this with 2 heat exchanger, 1 hot utility and 2 cold utility.