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CoilDesigner® Frequently Asked Questions (FAQ)

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1. What are the hardware and software requirements for CoilDesigner?

- Hardware Requirements
 - Dual Core Intel/AMD Processor 2.0 GHz, 4GB RAM, 1GB Disk space
 - Monitor resolution of 1600 X 900 or higher
- Software Requirements
 - Microsoft (MS) Windows Operating System. Following versions are supported:
 - Windows 7 32/64bit, with Office 2003-2016.
 - Windows 8.1 32/64 bit, with Office 2003-2016
 - Win 10, 32/64-bit, with Office 2003-Office 2016
 - .NET Framework 2.0 and 4.7

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2. What is the difference between a standard and single-solver version of CoilDesigner?

The standard version of CoilDesigner has the capability to model tube-fin, microchannel, wire-fin, and tube-in-tube liquid-to-liquid heat exchangers. A single-solver version can only be used to model tube-fin or microchannel heat exchangers.

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3. Can I purchase CoilDesigner DLL files?

Yes. Optimized Thermal Systems offer CoilDesigner DLLs. Such work is typically conducted as a one-time project for the software development effort. Please contact the sales department at sales@optimizedthermalsystems.com for more details.

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4. I receive an error message that my license file has expired or cannot be found. What should I do?

If you receive this error message, please check the following:

- Make sure that the license file was renamed to 'CoilDesigner.license'. Check spelling.
- Make sure that the license file is located in the 'CoilDesigner 4.6' folder (C:/Program Files (x86)/UMCPCEEE/CoilDesigner 4.6).
- Open the license file using Notepad and check the license expiration date. The license expiration date is located in the 5th row of the file (e.g., "HXTF:2019-Dec-31|HXTT:2019-Dec-31|HXMC:2019-Dec-31" indicates an expiration of December 31, 2019).

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5. How should I select the number of segments?

It is recommended to select one segment per every 4 in or 100 mm of tube length.

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6. What solver should I use?

- 'Fast Solver' assumes a uniform refrigerant mass distribution and should be used in heat exchangers that have the same circuit length.
- 'Massflow Based General Solver' calculates the refrigerant mass flow rates based on the pressure drop in circuits and should be used in heat exchangers with different circuit lengths.
- 'General Solver' was used in the previous versions of CoilDesigner and was replaced by the 'Fast Solver'.
- 'Fast Solver with Fin Conduction' is a variation of the 'Fast Solver', which accounts for tube-to-tube heat conduction. It provides more accurate simulation results than the 'Fast Solver'.

However, the computation time is longer.

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7. How do I select the right correlations?

Selecting the appropriate correlations depends heavily on your application, refrigerant, and heat exchanger type. User information about the correlations implemented in the software can be found in the main menu under **Tools > Correlation Information**. General guidelines for correlation selection include the following:

- Select correlations developed for the specific type of fins or tubes. For example, use wavy-fin correlations with wavy-fins or micro-fin correlations with micro-fin tubes.
- Select correlations developed for evaporation in evaporator models. Select correlations developed for condensation in condenser models. The evaporation and condensation correlations are marked as 'Evap' and 'Cond', respectively. The correlations that are not marked as 'Evap' nor 'Cond' can be used in evaporator and condenser models.

Note that you can also add custom correlations. For further support on custom correlation development and/or correlation selection, please contact us at support@optimizedthermalsystems.com.

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8. How do I calculate air relative humidity if the wet-bulb temperature is known?

The air relative humidity can be calculated by using the 'Fluid Properties Calculator' located in the top right-hand sidebar within the main screen of CoilDesigner.

Fluid Properties Calculator

Fluid Properties
 Air Properties Refrigerant Properties
 Unit System : SI English

Air Properties - Options
 Input T, P, RH Input T, P, Tw

Temperature 300 K
 Pressure 101325 Pa
 Wet Bulb 293 K

Outputs

Property	Value	Units
Temperature	300.00	K
Wet Bulb	293.00	K
Relative Humidity	52.66	%
Density	1.15498	kg/m ³

General Fluid Properties Calculator Coil Parameters

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9. What refrigerant input parameters should be used for the evaporator/condenser?

The refrigerant entering an evaporator is usually in two-phase. Thus, the quality/mass fraction (x) should be one of the input parameters for an evaporator model. The recommended input parameters are 'Saturation P and x ', 'Saturation T and x ', and 'Mixture P, T, x '.

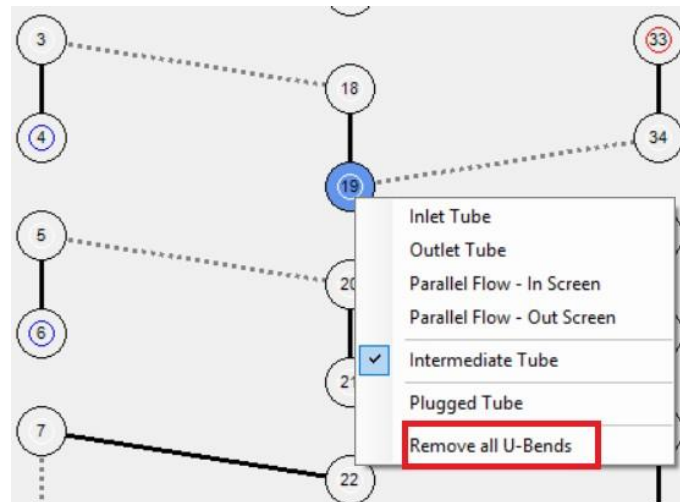
The refrigerant entering a condenser is usually a superheated vapor. The recommended input parameters are 'Saturation P/Delta', 'Saturation T/Delta', and 'Single Phase P, T'.

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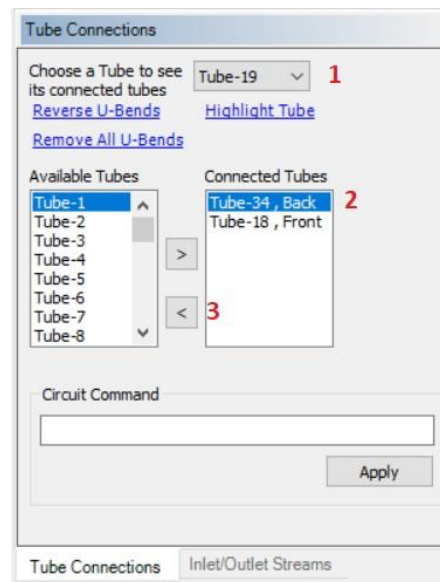
10. How can I remove a U-bend in the coil model?

A U-bend can be removed in two ways.

- Click on the tube with the right mouse click and select the 'Remove all U-Bends' function from the drop-down menu.



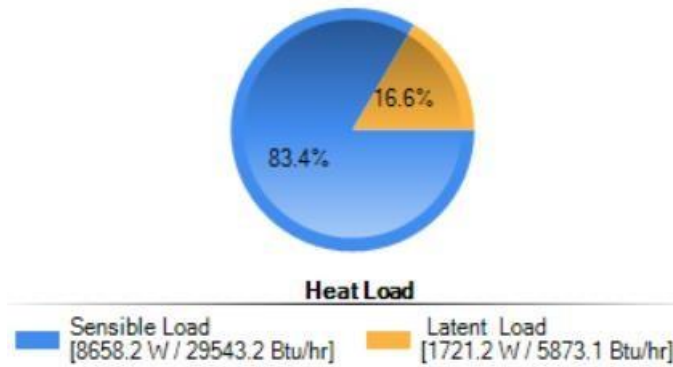
- Select the tube from the drop-down menu on 'Tube Connections' tab located in the bottom-right corner of the CoilDesigner window (Step 1). Select the other tube in the 'Connected Tubes' window and move the tube to the 'Available Tubes' window by clicking the bottom arrow (Steps 2 and 3).



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11. What is the difference between sensible and latent loads in CoilDesigner?

CoilDesigner calculates sensible and latent loads on the air side. The sensible load refers to the amount of heat removed from the air. It reduces the dry-bulb temperature of the air. The latent load refers to the amount of moisture removed from the air. It reduces the wet-bulb temperature of the air.



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12. How do I know if I have subcooling/superheat?

The subcooling/superheat temperature or 'Ave. Refrigerant Sat. Delta' can be found in simulation results under 'Outlet Conditions'. The superheat temperature is positive, while the subcooling temperature is negative.

Outlet Conditions				
Avg. Air Outlet Temperature	17.0893 °C		290.2393 K	62.7608 °F
Avg. Air Outlet Wetbulb Temperature	16.7151 °C		289.8651 K	62.0872 °F
Avg. Air RH	96.4545 %		96.4545 %	96.4545 %
Avg. Refrigerant Outlet Pressure	1085654.1138 Pa		1085654.1138 Pa	157.4608 psi
Avg. Refrigerant Outlet Temperature	17.8936 °C		291.0436 K	64.2085 °F
Avg. Refrigerant Outlet Quality	1.0103		1.0103	1.0103
Avg. Refrigerant Sat. Delta	1.9999 °C		1.9999 K	3.5999 °F

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13. I receive an error message with a negative outlet pressure when I run two-phase calculations. Why?

The negative outlet pressure in two-phase calculations usually occurs when the refrigerant flow rate is too high, the inlet pressure is too low, or both. Please check your inlet conditions.

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14. How do I know what tube and fin materials are used in CoilDesigner?

Copper tubes and aluminum fins are the default material properties for tube-fin heat exchangers. Aluminum tubes and fins are the default material properties for microchannel heat exchangers. The coil material properties can be viewed and updated under **Projects > Edit Parameters > Material Properties**.

Material Physical Properties

Tube Thermal Conductivity	380.000	W/m K	Tube Materials...	Copper - 380.0 W/mK Aluminium - 237.0 W/mK Steel SS316 - 15.0 W/mK
Fin Thermal Conductivity	237.000	W/m K	Fin Materials...	
Tube Material Density	8900.000	kg/m³		
Fin Material Density	2700.000	kg/m³		

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15. What are common values for fin contact resistance?

Few research papers mention fin contact resistance values because it is very difficult to measure. Furthermore, the fin contact resistance depends on the specific manufacturing tools and procedures used to construct the heat exchanger. Generally, we recommend leaving the fin contact resistance value at 'zero' and applying a correction factor with the air-side heat transfer correlations to validate coil models.

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16. Should I use wet surface correlations in evaporator models?

The wet surface correlations have limitations because the effects of condensate on the air side transfer are not well understood. Thus, we recommend using them with caution. The air-side heat transfer correlations developed for dry conditions usually work well in evaporator models.

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17. How can I use the 'Use Fan Curve' feature on the 'Edit Air Side Parameters' tab?

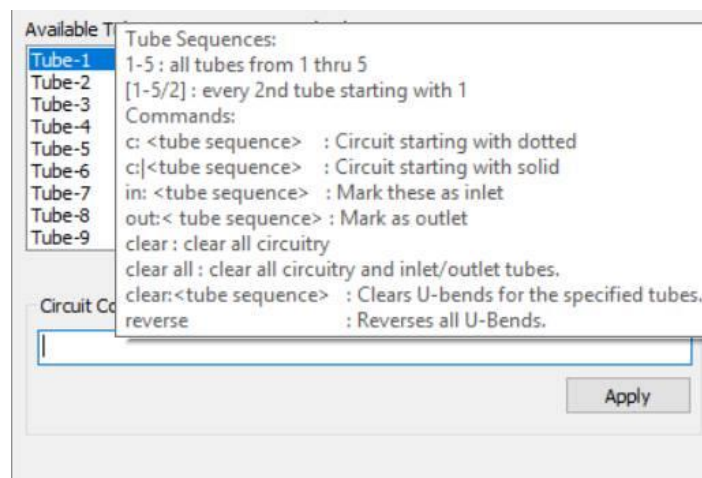
The fan curve feature calculates the air flow rate based on the calculated air-side pressure drop and previously defined fan curve. This feature is currently not available in CoilDesigner and, therefore, should not be used.

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18. What is the 'Circuit Command' for?

The 'Circuit Command' allows users to connect (far apart) tubes by typing short codes in the 'Circuit Command' window. The 'Circuit Command' is located on the low right side of the CoilDesigner tab. If you move the mouse cursor over the text box, you should see the help file. Some examples of commands are shown below:

- Connect tubes 1 and 174 with a front tube bend (c:|1,174)
- Connect tubes 121,122,62 starting with a back tube bend (c: 121,122,62)



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19. What is the material cost features on the 'Cost Information' tab?

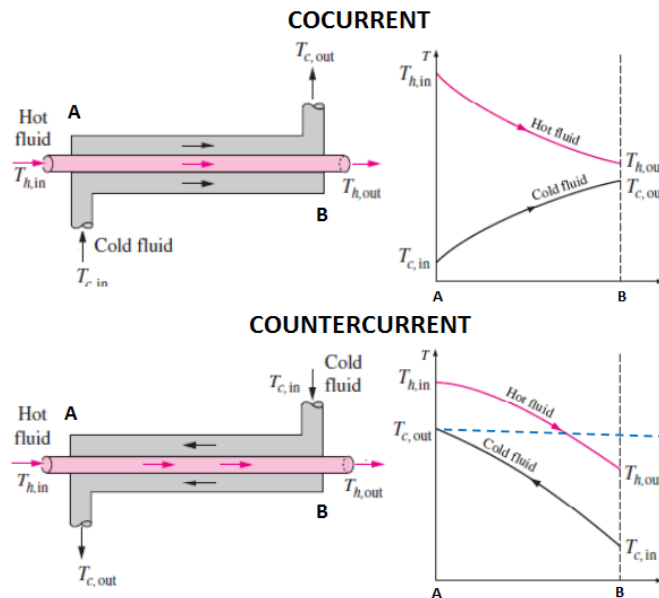
The cost is \$ per kg of tube or fin material. The 'Coil Cost (Simple)' is the total cost for tubes and fins in the coil.

Material Costs	
Tube Material Cost[\$]	<input type="text" value="6.00"/>
Fin Material Cost[\$]	<input type="text" value="4.00"/>

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20. Why is the refrigerant/brine outlet temperature lower than the air inlet temperature in an evaporator/cooler model? Why is the refrigerant/brine outlet temperature higher than the air inlet temperature in a condenser/heater model?

Tube-fin or microchannel heat exchangers with two or more tube banks/rows, as well as air and refrigerant inlets on the opposite sides, are quasi-countercurrent heat exchangers. Thus, the refrigerant/brine outlet temperature can be lower in an evaporator/cooler or higher in a condenser/heater. Tube-fin or microchannel heat exchangers with single tube banks/rows are quasi-concurrent heat exchangers.



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