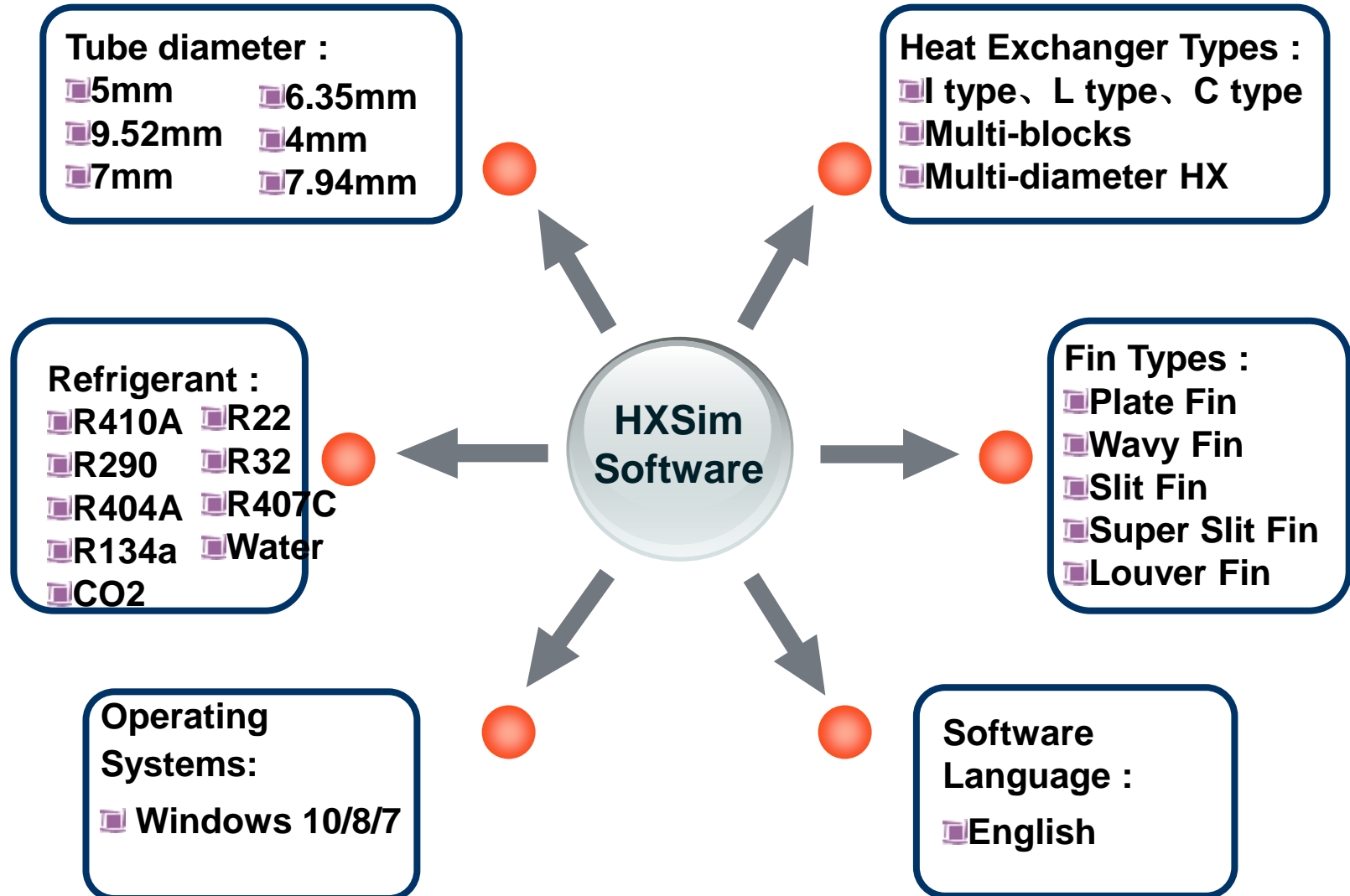


# HXSim Simulation Software GETTING STARTED

V3.3  
2021

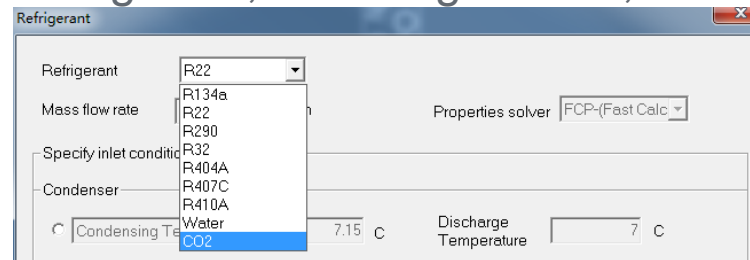




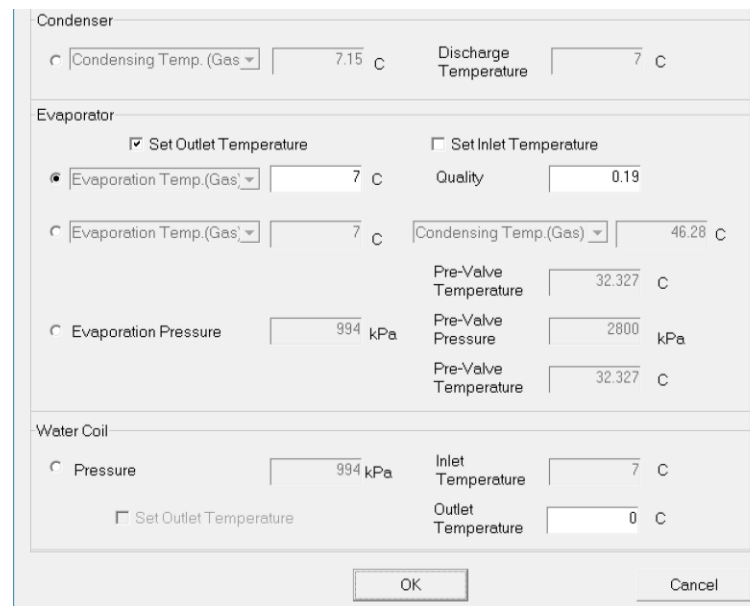
# Improvement of Latest Version HXSim v3.3

Cu

- ✓ Add 5 kinds of new refrigerant, including R404A, R407C, R134a, Water, CO<sub>2</sub>.



- ✓ Add different heat exchanger roles, including condenser, evaporator and water coil.



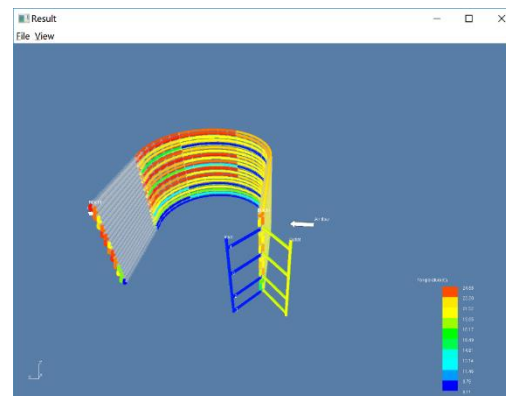
# Improvement of Latest Version HXSim v3.3

Cu

- ✓ Add 5 kinds of new 5mm tubes and 12 kinds of 5mm fins. And switch to database.

ID	Tube Diameter	Pt	Pl	Fin Type
1	5	19.05	16.5	Louver
2	5	19.05	16.5	Wavy
3	5	19.05	16.5	Sine
4	7	19.05	16.5	Slit
5	7	19.05	16.5	Wavy
6	7	21	12.7	Louver
7	7	21	18.2	Wavy
8	7	21	18.2	Slit
9	7	25	12.5	Louver

- ✓ Optimize the algorithm to make calculation faster. And update the graphical display to show the different temperature.



# Installation and Registration

Cu

- ✓ Run HXSim.msi, the following dialog will pop out for register as shown in Fig.1. Send the registered ID via email to [yyli@craheta.org](mailto:yyli@craheta.org), you will get the registered code within 1-2 days.
- ✓ Input the registered code as Fig.2. Click the button “Register”, a dialog of “Succeed to login” will pop out to finish the installation.

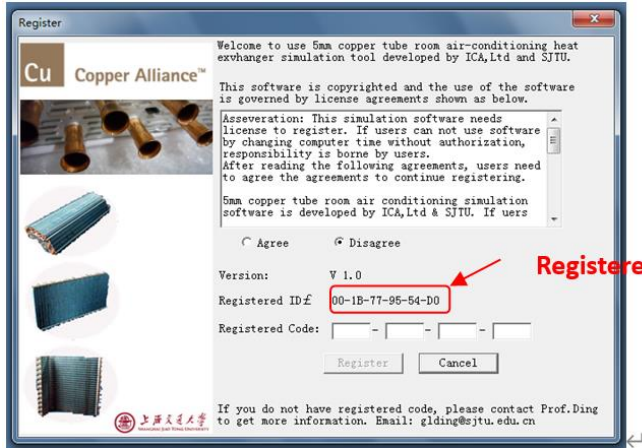


Fig.1

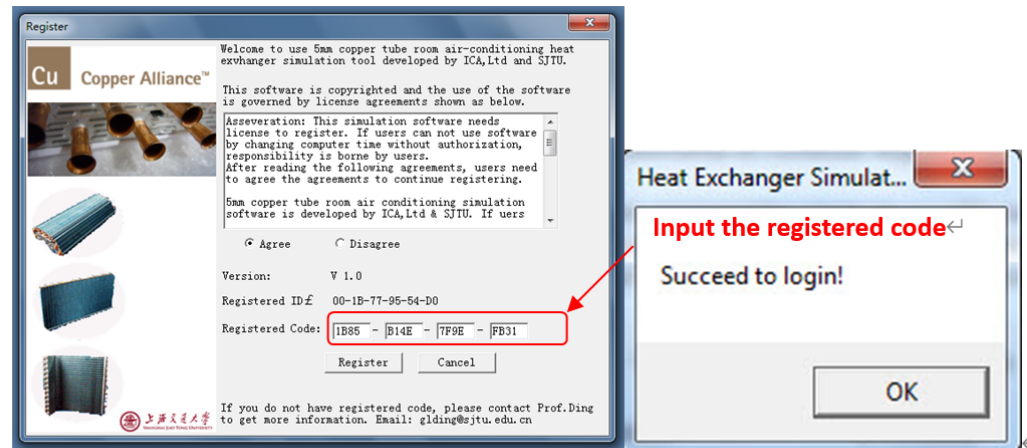
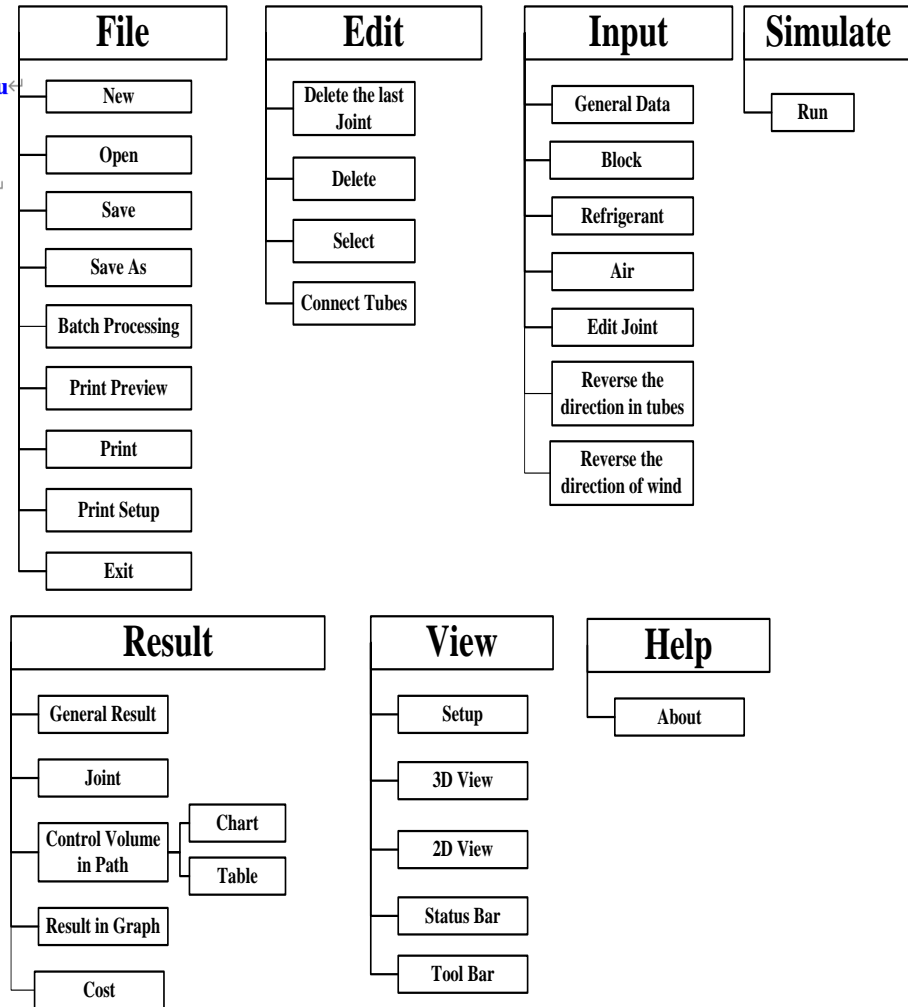
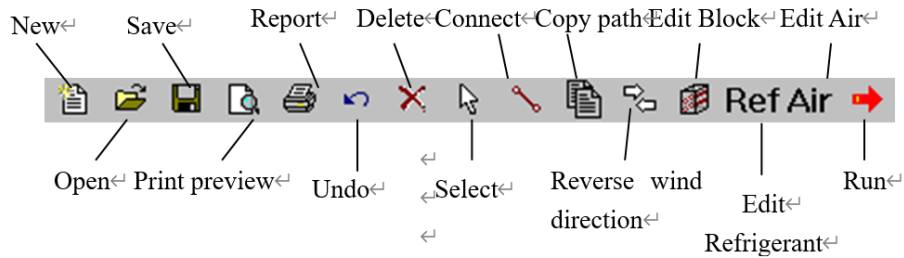
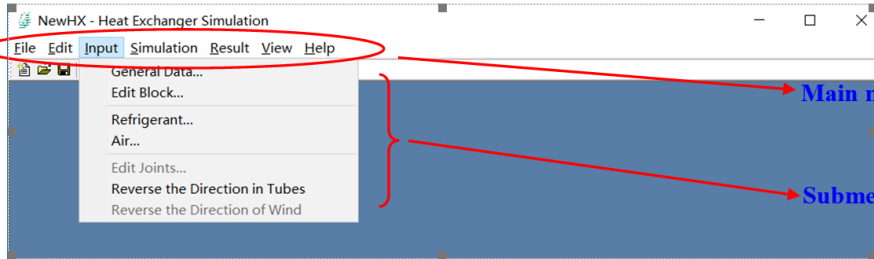


Fig2

# Main Menu and Toolbar

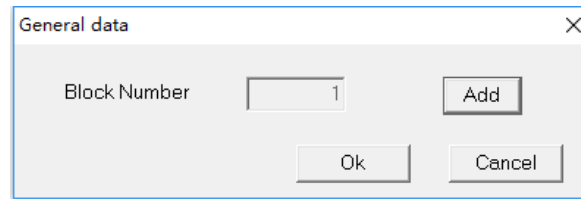
Cu



# Data Input

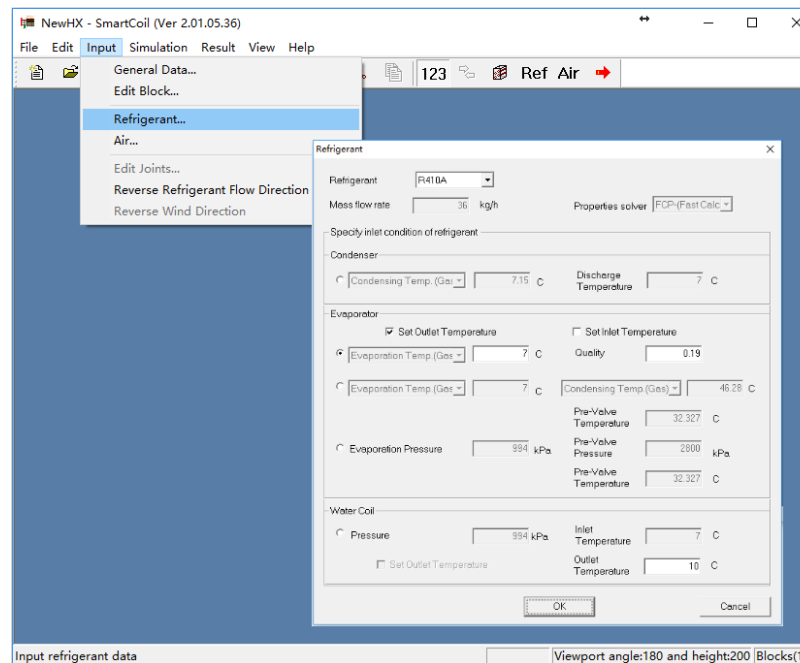
Cu

- ✓ General data input window



A dialog box titled "General data" with a close button (X) in the top right corner. It contains a text input field labeled "Block Number" with the value "1" entered. To the right of the input field is an "Add" button. Below the input field are two buttons: "Ok" and "Cancel".

- ✓ Refrigerant status input window



A screenshot of the "NewHX - SmartCoil (Ver 2.01.05.36)" software interface. The "Input" menu is open, showing options: "General Data...", "Edit Block...", "Refrigerant...", "Air...", "Edit Joints...", "Reverse Refrigerant Flow Direction", and "Reverse Wind Direction". The "Refrigerant..." option is selected. A "Refrigerant" dialog box is open over the main interface. The dialog box contains the following fields and options:

- Refrigerant: R410A
- Mass flow rate: 36 kg/h
- Properties solver: FCP-(Fast Calc)
- Spooly inlet condition of refrigerant:
- Condenser:
  - Condensing Temp. (Gas): 7.15 C
  - Discharge Temperature: 7 C
- Evaporator:
  - Set Outlet Temperature
  - Set Inlet Temperature
  - Evaporation Temp. (Gas): 7 C
  - Quality: 0.19
  - Evaporation Temp. (Gas): 7 C
  - Condensing Temp. (Gas): 46.28 C
  - Evaporation Pressure: 894 kPa
  - Pre-Valve Temperature: 32.327 C
  - Pre-Valve Pressure: 2800 kPa
  - Pre-Valve Temperature: 32.327 C
- Water Coil:
  - Pressure: 894 kPa
  - Inlet Temperature: 7 C
  - Set Outlet Temperature
  - Outlet Temperature: 10 C

Buttons: "OK" and "Cancel".

Input refrigerant data Viewport angle:180 and height:200 Blocks(1)

# Data Input

Cu

## ✓ Inlet airflow input window

NewHX - Heat Exchanger Simulation

File Edit **Input** Simulation Result View Help

General Data...  
Edit Block...  
Refrigerant...  
**Air...**  
Edit Joints...  
Reverse the Direction in T...  
Reverse the Direction of V...

Inlet air

Block 1

Velocity | Dry-bulb temperature | Wet-bulb temperature | Pressure

Set values

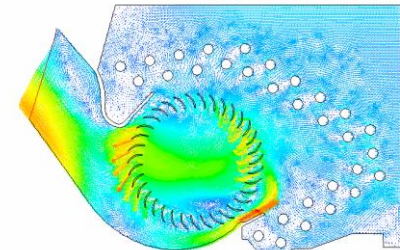
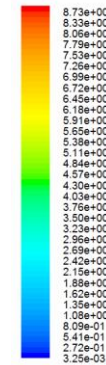
Set values of the selected cells  
Unit.(m/s) Update

Set average air flow rate  
0 Unit.(m3/h) Update

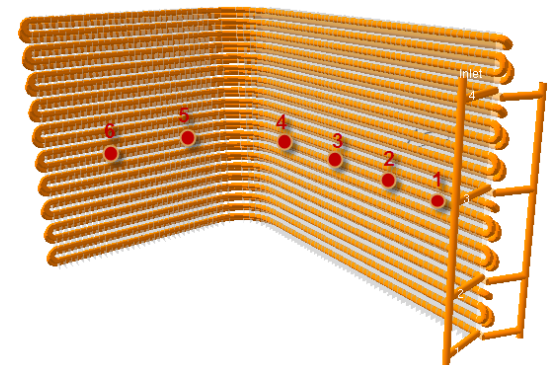
Column	CV1	CV2	CV3
1	1.000	1.000	1.000
2	1.000	1.000	1.000
3	1.000	1.000	1.000
4	1.000	1.000	1.000
5	1.000	1.000	1.000
6	1.000	1.000	1.000
7	1.000	1.000	1.000
8	1.000	1.000	1.000
9	1.000	1.000	1.000
10	1.000	1.000	1.000
11	1.000	1.000	1.000
12	1.000	1.000	1.000

OK Cancel

Input Air data Viewport angle:0 and height: Bloc



Velocity Vectors Colored By Velocity Magnitude (m/s)





# Data Input

Cu

✓ Heat exchanger dimension input window

Input

Block1

Fin

Fin Info ID=6,φ7.00, Pt=21.00, Pl=12.7 Fins

Fin type LouverFin Material: Aluminum

Fin pitch 1.8 mm Thickness: 0.105 mm

Continuous fin  Separated fin

Tubes

Block type I type Holes 20 Rows 2

Tube Arrangement Staggered-aAa Tube Type

Height 420 mm Depth 25.4 mm

Set sub block

Sub block Subordinates to No

Relative height to main block 0 mm Relative angle to main block 0

Air Flow

Direction of Air Flow From Right to Left

Section

Length 500 mm Control volume number 3

Ok Cancel

(a) I type

Input

Block1

Fin

Fin Info ID=6,φ7.00, Pt=21.00, Pl=12.7 Fins

Fin type LouverFin Material: Aluminum

Fin pitch 1.8 mm Thickness: 0.105 mm

Continuous fin  Separated fin

Tubes

Block type L type Holes 20 Rows 2

Tube Arrangement Staggered-aAa Tube Type

Height 420 mm Depth 25.4 mm

Set sub block

Sub block Subordinates to No

Relative height to main block 0 mm Relative angle to main block 0

Air Flow

Direction of Air Flow From Right to Left

First Section

Length 500 mm Control volume number 3

Second section

Inner Radius 100 mm Input Style Length of Each Projection

Length of Each Section ?

Angle 90° Control volume number 3

Third section

Length 200 mm Control volume number 3

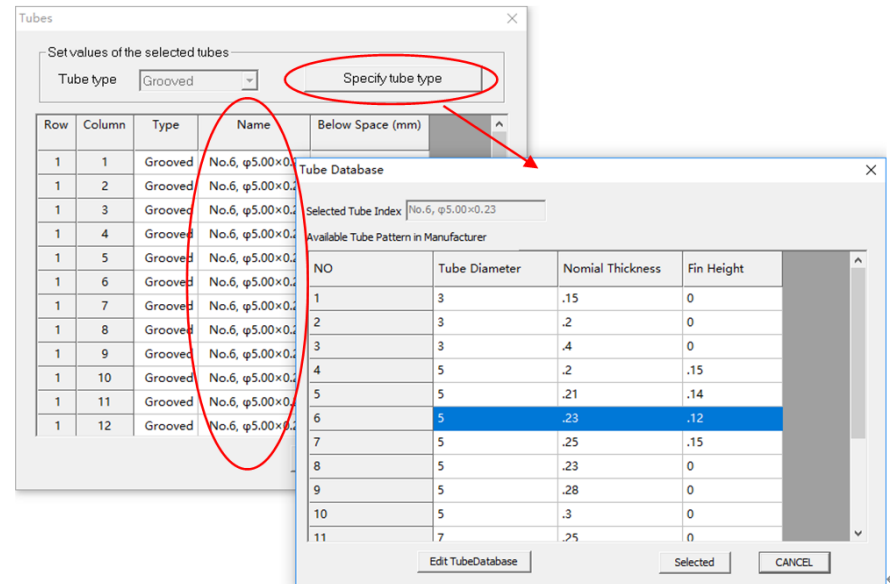
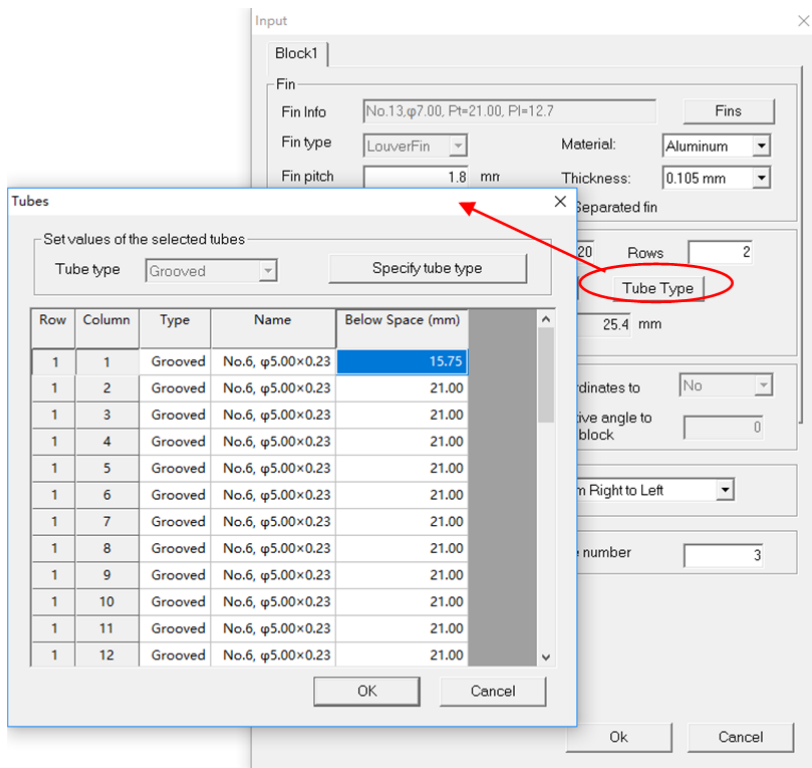
Ok Cancel

(b) L type

# Data Input



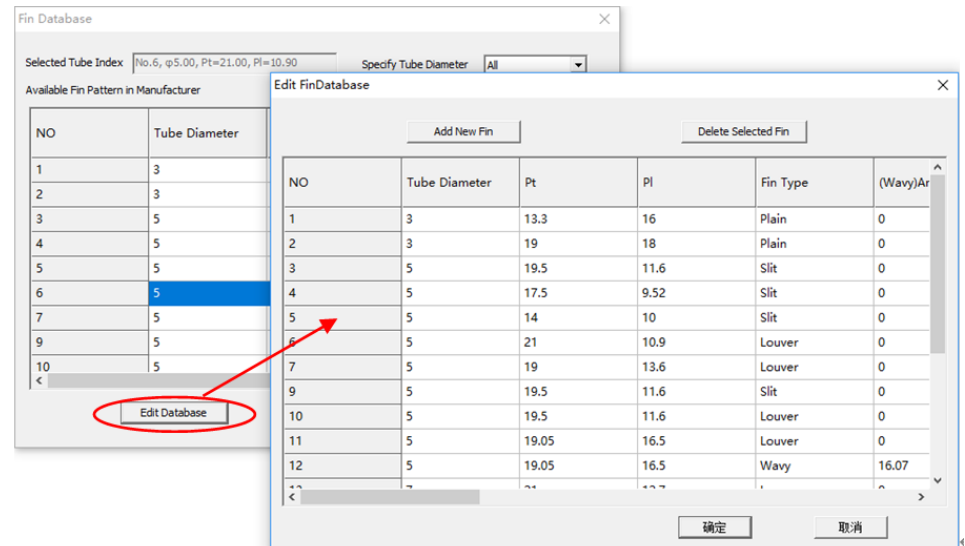
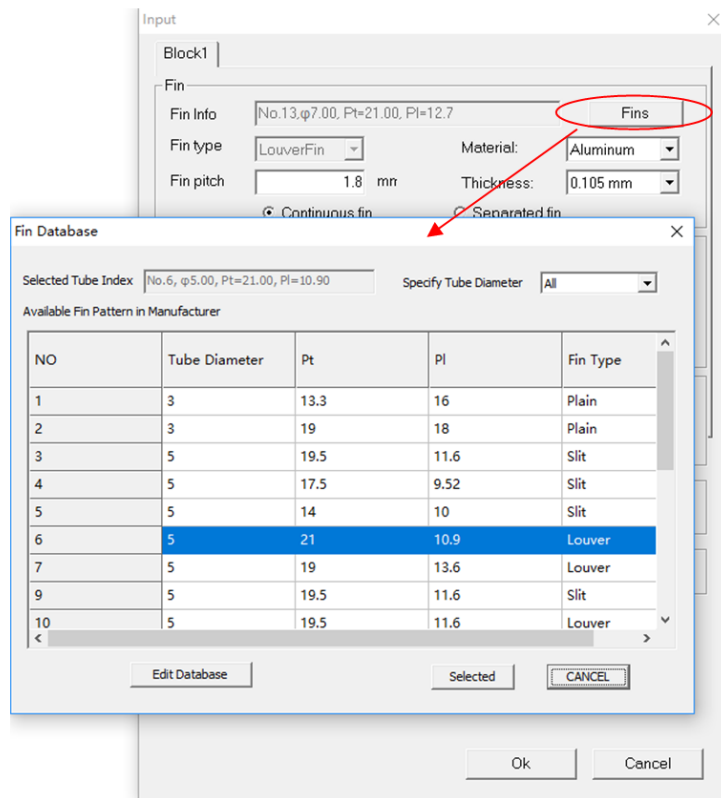
## ✓ Tube structure input window



# Data Input

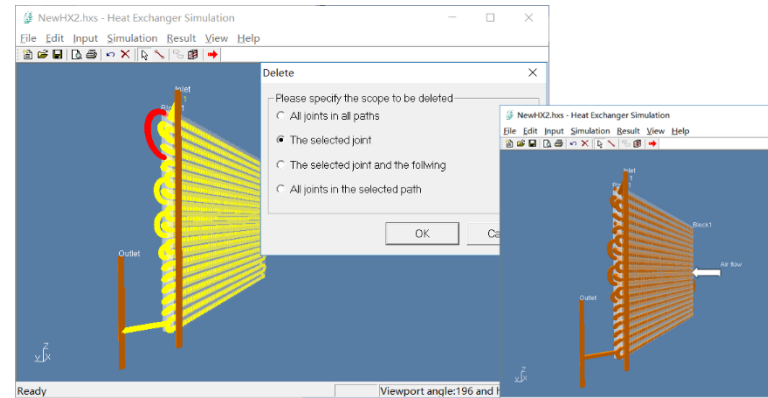
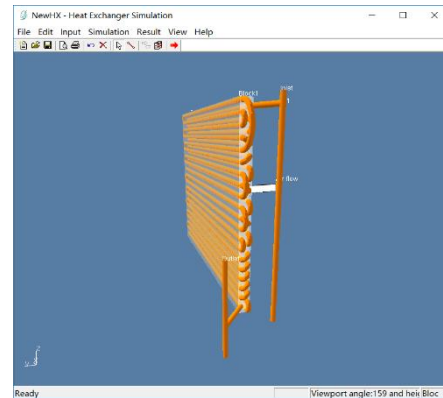
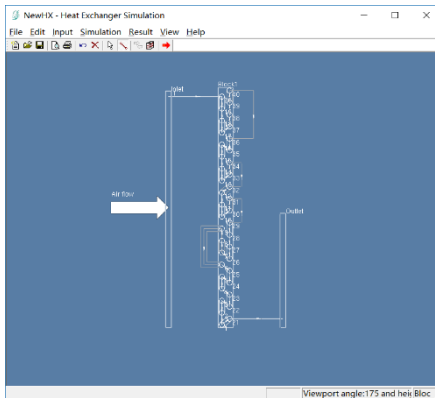
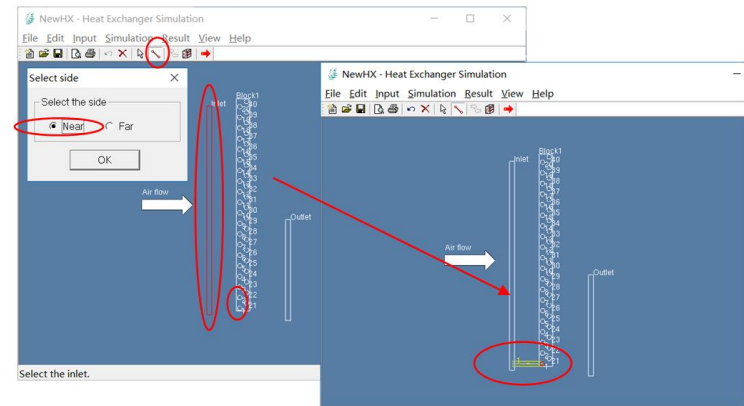
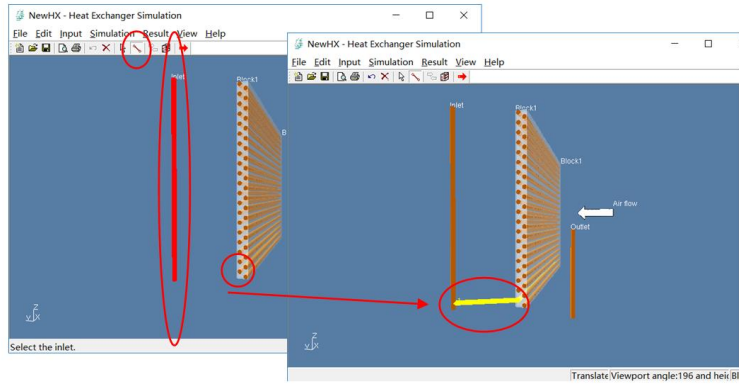
Cu

## ✓ Fin type input window



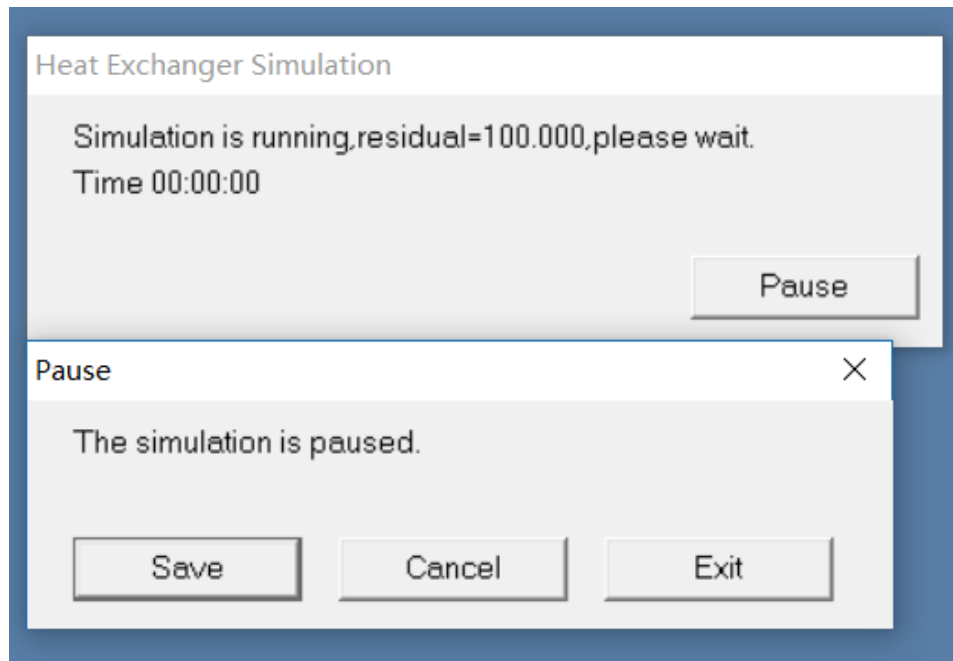
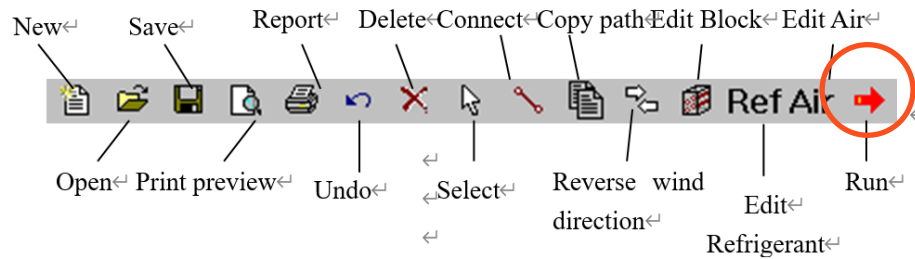
# Connect Tubes

Cu



# Run a Simulation

Cu



# Simulation Results

Cu

## ✓ General results

**Export Report**

Choose Results Template

Condenser Template
  Evaporator Template
  Water Coil Template

Simulation Results

Click "Print Results" to print the results. Double click a cell to edit it.

Customer			
Date			
Project			
<b>COIL SIDE</b>			
Fin Type	Louver	Utilized Tubes	9
Fin Material	Aluminum	Non Utilized Tubes	31
Fin Spacing [mm]	1.80	Circuits	1
Fin Thickness [mm]	0.105	Tubes Per Circuit	9.00
Tube Type	Grooved	Coil Length [mm]	500.00
Tube Material	Copper	Coil Depth [mm]	25.40
Tube Dimension [mm]	7.00*0.28*0.10	Coil Height [mm]	420.00
Holes	20	Outer Area [m2]	1.227
Rows	2	Inner Area [m2]	0.091
Tube Vertical Space [mm]	21.00	Coil Face Area [m2]	0.21
Tube Horizontal Space [mm]	12.70	Inner Volume [L]	0.147
Distributor [mm]	9.5	Header Out [mm]	9.5
<b>AIR SIDE</b>		<b>REFRIGERANT SIDE</b>	
Air Inlet DB. Temp. [°C]	27.0	Refrigerant	R410A
Relative Humidity %	47.0	Evaporator Temp [°C]	7.007
Air Outlet DB. Temp. [°C]	23.4	Superheating [°C]	0.000
Relative Humidity %	54.9	Quality / Mass Fraction	0.188
Air Flow [m3/h]	749.6	Mass Flow [kg/h]	36.0
Air Mass Flow [kg/h]	962.8	Coil Pressure Drop [kPa]	7.877
Frontal Velocity [m/s]	1.0	Outlet Pressure [kPa]	989.588
Air Pressure Drop [Pa]	4.1	Ref. Charge [kg]	0.03
Atmospheric Pressure [kPa]	101.3	Ref. Side H.T.C. [W/m2*K]	5623.211
Air Side H.T.C. [W/m2*K]	118.983		

Print Results    Close

**General results**

Heat Exchange	4940.223 W	Print	
Refr Pressure Drop	43.025 kPa	Save As CSV	
Air Pressure Drop	35.8 Pa		
A_ref	0.622 m <sup>2</sup>	h_ref	4796.565 W/m2K
Q_2ph	0.000 W	h_2ph	0.000 W/m2K
Q_l	-4936.193 W	h_l	4796.565 W/m2K
Q_g	0.000 W	h_g	0.000 W/m2K

Refrigerant of inlet

Pressure	600.000 kPa	Temperature	7.000 C
Enthalpy	30.080 kJ/kg	Mass Quality	-0.311
Subcooling	154.481 C	Mass Flow Rate	219.722 g/s

Refrigerant of outlet

Pressure	556.975 kPa	Temperature	12.368 C
Enthalpy	52.560 kJ/kg	Mass Quality	-0.292
Subcooling	145.890 C		

Block1

Heat Capacity	4936.176 W	
Air flow rate	680.219 m3/h	
Heat transfer area	8.437 m <sup>2</sup>	Details
Heat transfer coefficient	95.199 W/m2K	

Air of inlet

Tdb	27.000 C	Twb	19.530 C	Pressure	101.300 kPa
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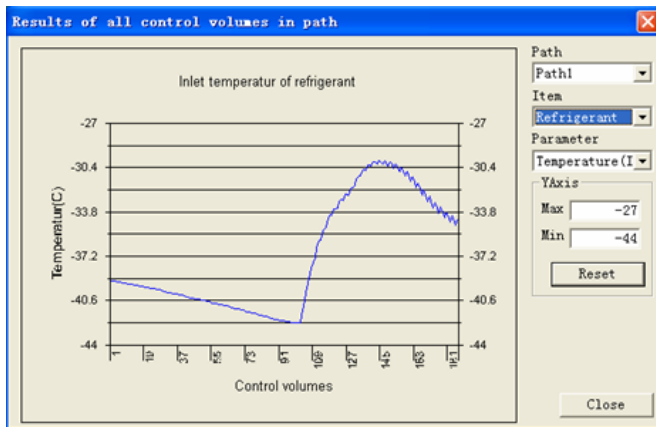
Air of outlet

Tdb	11.525 C	Twb	11.518 C	Pressure	101.264 kPa
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# Simulation Results

Cu

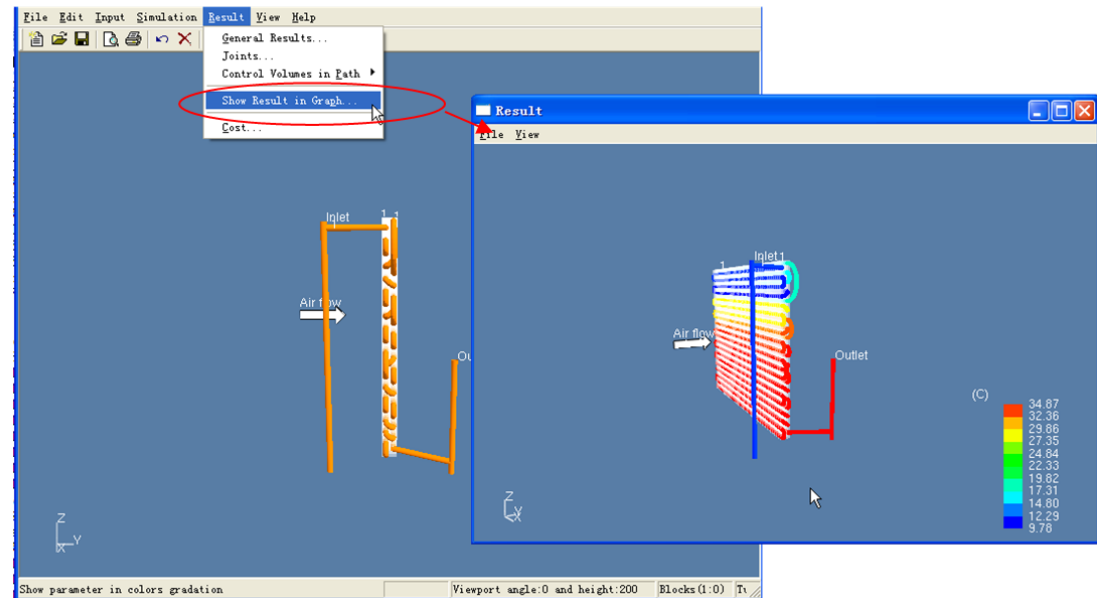
✓ Simulation results of path



Result in all control volumes in path-refrigerant

frigerant weight: 10.636 g Heat exchange: 152.605 W

Column	Control volume	Temperature (In) (C)	Temperature (Out) (C)
1	3	-39.09	-39.10
1	2	-39.10	-39.10
1	1	-39.10	-39.11
12	2	-39.16	-39.17
12	1	-39.17	-39.18
12	2	-39.18	-39.18
2	3	-39.24	-39.25
2	2	-39.25	-39.25
2	1	-39.25	-39.26
13	2	-39.32	-39.32
13	1	-39.32	-39.33
13	2	-39.33	-39.34
3	3	-39.40	-39.41



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# Thank you

For more information, please contact

[kerry.song@copperalliance.org](mailto:kerry.song@copperalliance.org)