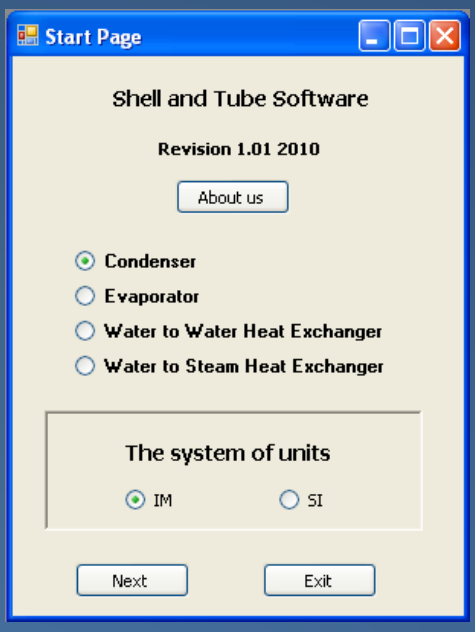
Applied Engineering Solutions Co.

Shell & Tube Heat Exchanger Simulation Software

Introduction

Applied Engineering Solutions is an innovative software development company in the fields of Air conditioning, Refrigeration & Freezing. Our long experience and professionalism of about 23 years has enabled us to develop software for all tasks related to the fields above.
Our main objective in Applied Engineering Solutions Co. is satisfying all our clients, by advance high quality, high accuracy with very competitive price & by matching all our clients' requirements. All our products have 12 months warranty, which really is not available with any other competitive software's company. That of course reflects our looking for long terms cooperation with all clients by after sales service which include (training, reply all questions, development where request & helping in some study).
We are know that we are not alone, but we sure that we are the best.

This software is done for simulation the shell & tube design, which could be used by consultants, research & development engineers and manufacturing Engineers to design and determine the specifications data required for shell & tube heat exchanger manufacturing and control all variables which affect on the heat exchanger performance.



Unit with SI or Imperial

Using squared or triangular pitch.

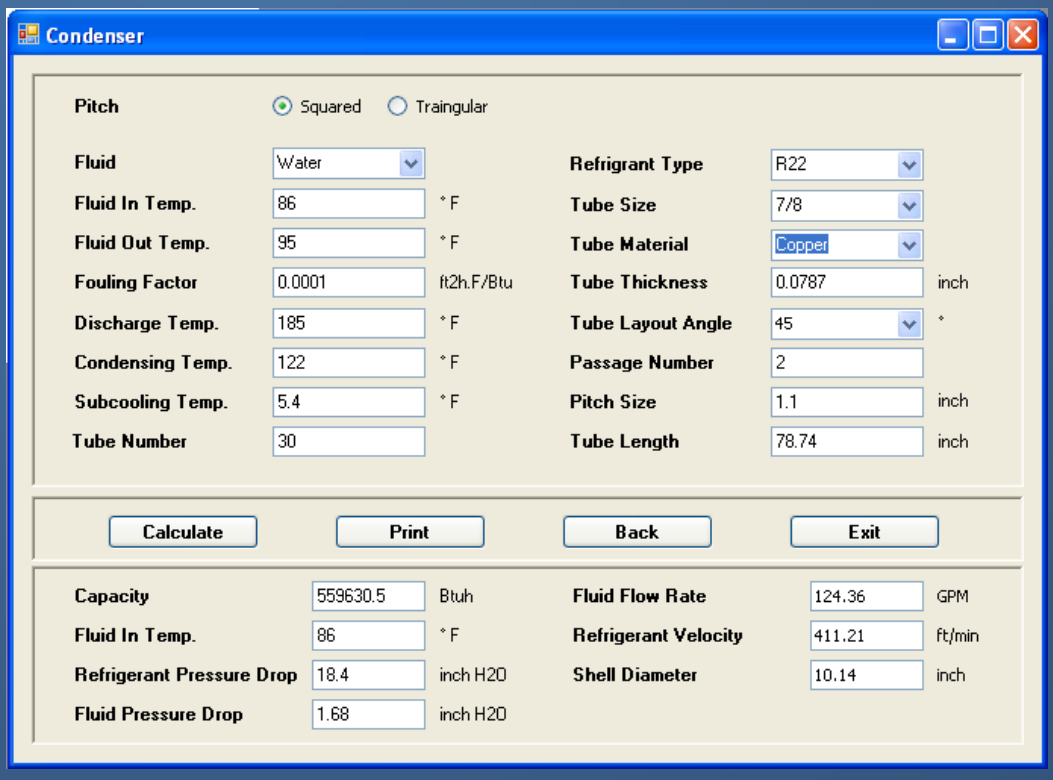
Select either condenser, evaporator, water to water or water to steam applications.

The ability for calculating depending on required fouling factor.

Many refrigerants (R 22 , R407 C, R 134 A & R 410 A)

Many fluid application for (water cooling & water heating applications) such as ethylene & propylene fluid at different concentrations.

Professional report & many other things.



Evaporator

Pitch: Squared / Traingular

Fluid	Water		Refrigrant Type	R22	
Fluid In Temp.	12	°C	Tube Size	3/8	
Fluid Out Temp.	7	°C	Tube Material	Copper	
Fouling Factor	1.8E-05	m2.K/W	Tube Thickness	0.002	m
Evaporating Temp.	2	°C	Tube Layout Angle	45	°
Condensing Temp.	50	°C	Passage Number	2	
Subcooling Temp.	3	°C	Pitch Size	0.01425	m
Superheating Temp.	5	K	Tube Length	2.5	m
Expected Capacity	10000	W	Baffle Spacing	0.18	m
			Tube Number	260	

Calculate | Print | Back | Exit

Capacity	694051.16	W	Fluid Flow Rate	33.22	l/s
Fluid In Temp.	12	°C	Refrigerant Velocity	46.29	m/s
Refrigerant Pressure Drop	135811.09	Pa	Shell Diameter	0.27	m
Fluid Pressure Drop	190937.52	Pa			

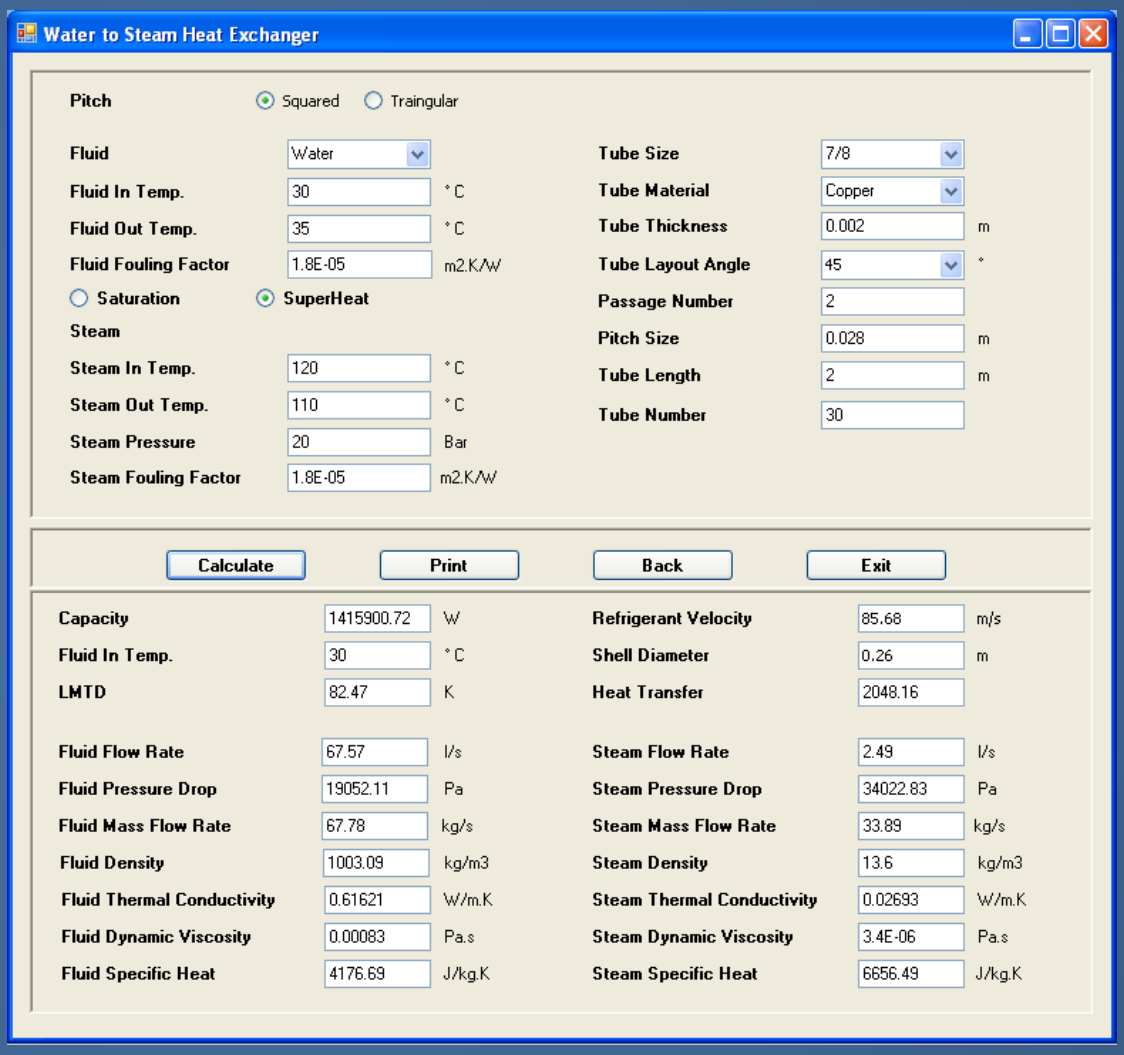
Water to Water Heat Exchanger

Pitch: Squared / Traingular

Cold Fluid	Water		Tube Size	7/8	
Cold Fluid In Temp.	30	°C	Tube Material	Copper	
Cold Fluid Out Temp.	35	°C	Tube Thickness	0.002	m
Cold Fluid Fouling Factor	1.8E-05	m2.K/W	Tube Layout Angle	45	°
Hot Fluid	Water		Passage Number	2	
Hot Fluid In Temp.	120	°C	Pitch Size	0.028	m
Hot Fluid Out Temp.	110	°C	Tube Length	2	m
Hot Fluid Fouling Factor	1.8E-05	m2.K/W	Tube Number	30	

Calculate | Print | Back | Exit

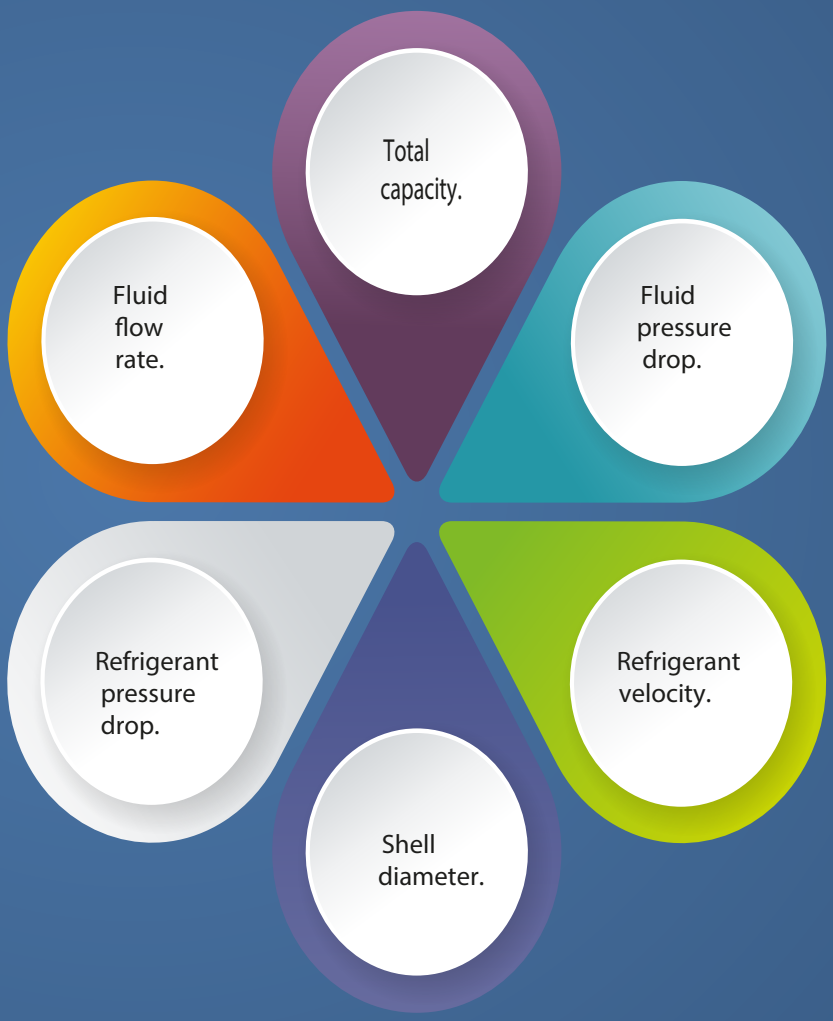
Capacity	2221150.15	W	Refrigerant Velocity	1.9	m/s
Cold Fluid In Temp.	30	°C	Shell Diameter	0.26	m
LMTD	82.47	K	Heat Transfer	3212.99	W/m2.K
Cold Fluid Flow Rate	106	l/s	Hot Fluid Flow Rate	0.06	l/s
Cold Fluid Pressure Drop	42847.37	Pa	Hot Fluid Pressure Drop	2806.24	Pa
Cold Fluid Mass Flow Rate	106.33	kg/s	Hot Fluid Mass Flow Rate	53.16	kg/s
Cold Fluid Density	1003.09	kg/m3	Hot Fluid Density	959.91	kg/m3
Cold Fluid Thermal Conductivity	0.61621	W/m.K	Hot Fluid Thermal Conductivity	0.65901	W/m.K
Cold Fluid Dynamic Viscosity	0.00083	Pa.s	Hot Fluid Dynamic Viscosity	0.0004	Pa.s
Cold Fluid Specific Heat	4176.69	J/kg.K	Hot Fluid Specific Heat	4138.33	J/kg.K


Water to Steam Heat Exchanger
Pitch
Squared
Traingular
Fluid
Water
Fluid In Temp.
30
°C
Fluid Out Temp.
35
°C
Fluid Fouling Factor
1.8E-05
m2.K/W
Saturation
SuperHeat
Steam
Steam In Temp.
120
°C
Steam Out Temp.
110
°C
Steam Pressure
20
Bar
Steam Fouling Factor
1.8E-05
m2.K/W
Tube Size
7/8
Tube Material
Copper
Tube Thickness
0.002
m
Tube Layout Angle
45
°
Passage Number
2
Pitch Size
0.028
m
Tube Length
2
m
Tube Number
30
Calculate
Print
Back
Exit
Capacity
1415900.72
W
Fluid In Temp.
30
°C
LMTD
82.47
K
Fluid Flow Rate
67.57
l/s
Fluid Pressure Drop
19052.11
Pa
Fluid Mass Flow Rate
67.78
kg/s
Fluid Density
1003.09
kg/m3
Fluid Thermal Conductivity
0.61621
W/m.K
Fluid Dynamic Viscosity
0.00083
Pa.s
Fluid Specific Heat
4176.69
J/kg.K
Refrigerant Velocity
85.68
m/s
Shell Diameter
0.26
m
Heat Transfer
2048.16
Steam Flow Rate
2.49
l/s
Steam Pressure Drop
34022.83
Pa
Steam Mass Flow Rate
33.89
kg/s
Steam Density
13.6
kg/m3
Steam Thermal Conductivity
0.02693
W/m.K
Steam Dynamic Viscosity
3.4E-06
Pa.s
Steam Specific Heat
6656.49
J/kg.K

Input data :

- SI or Imperial unit measurements.
- Squared or traingular pitch.
- Condenser, evaporator, water to water or water to steam applications.
- Fluid (Water, Ethylene or Propylene) with required concentration percentage.
- Glycol in temp.
- Glycol out temp.
- Fouling factor.
- Refrigerant (R 22 , R 134 A, R 407 C & R 410A).
- Evaporating temp.
- Condensing temp.
- Sub cooling temp.
- Superheating temp.
- Tube size (1 & "¼ 1 ,"1 ,"8/7 , «4/3 , «8/5 ,« 2/1 ,« 8/3 ," 16/5 ,"4/1 ½").
- Tube material (Copper. Hastalloy C 276-, Incolay 825, Inconel 600, Monel 400, Nickel 200 , Stainless steel & Titanum).
- Tube thickness
- Passage number 2 , 1or 3
- Pitch size.
- Tube length.
- Tube #.
- Passage #.
- Tube layout angel for evaporator application.
- Baffle spacing for evaporator application.

Output :


Total capacity.
Fluid flow rate.
Fluid pressure drop.
Refrigerant pressure drop.
Refrigerant velocity.
Shell diameter.

Shell and Tube Software

Condenser

SI

INPUT DATA

Pitch	Squared				
Fluid	Water		Refrigerant Type	R22	
Fluid In Temp.	30	°C	Tube Size	7/8	
Fluid Out Temp.	35	°C	Tube Material	Copper	
Fouling Factor	1.8E-05	m2.K/W	Tube Thickness	0.002	m
Discharge Temp.	85	°C	Tube Layout Angle	45	°
Condensing Temp.	50	°C	Passage Number	2	
Subcooling Temp.	3	°C	Pitch Size	0.028	m
Tube Number	30		Tube Length	2	m

OUTPUT DATA

Capacity	570663.07	W			
Fluid In Temp.	30	°C	Fluid Flow Rate	27.32	l/s
Refrigerant Pressure Drop	74848.21	Pa	Refrigerant Velocity	1.67	m/s
Fluid Pressure Drop	40764.76	Pa	Shell Diameter	0.18	m

Shell and Tube Software

Evaporator

SI

INPUT DATA

Pitch	Squared		Refrigerant Type	R22	
Fluid	Water		Tube Size	3/8	
Fluid In Temp.	12	°C	Tube Material	Copper	
Fluid Out Temp.	7	°C	Tube Thickness	0.002	m
Fouling Factor	1.8E-05	m2.K/W	Tube Layout Angle	45	°
Evaporating Temp.	2	°C	Passage Number	2	
Condensing Temp.	50	°C	Pitch Size	0.01425	m
Subcooling Temp.	3	°C	Tube Length	2.5	m
Superheating Temp.	5	°C	Baffle Spacing	0.18	m
Expected Capacity	10000	W	Tube Number	260	

OUTPUT DATA

Capacity	694051.16	W			
Fluid In Temp.	12	°C	Fluid Flow Rate	33.22	l/s
Refrigerant Pressure Drop	135811.09	Pa	Refrigerant Velocity	46.29	m/s
Fluid Pressure Drop	190937.52	Pa	Shell Diameter	0.27	m

Shell and Tube Software

Water to Water Heat Exchanger

SI

INPUT DATA

Pitch	Squared				
Cold Fluid	Water		Tube Size	7/8	
Cold Fluid In Temp.	30	°C	Tube Material	Copper	
Cold Fluid Out Temp.	35	°C	Tube Thickness	0.002	m
Cold Fluid Fouling Factor	1.8E-05	m2.K/W	Tube Layout Angle	45	°
Hot Fluid	Water		Passage Number	2	
Hot Fluid In Temp.	120	°C	Pitch Size	0.028	m
Hot Fluid Out Temp.	110	°C	Tube Length	2	m
Hot Fluid Fouling Factor	1.8E-05	m2.K/W	Tube Number	30	

OUTPUT DATA

Capacity	2221150.15	W	Refrigerant Velocity	1.9	m/s
Cold Fluid In Temp.	30	°C	Shell Diameter	0.26	m
LMTD	82.47	K	Heat Transfer	3212.99	W/m2.K
Cold Fluid Flow Rate	106	l/s	Hot Fluid Flow Rate	0.06	l/s
Cold Fluid Pressure Drop	42847.37	Pa	Hot Fluid Pressure Drop	2806.24	Pa
Cold Fluid Mass Flow Rate	106.33	kg/s	Hot Fluid Mass Flow Rate	53.16	kg/s
Cold Fluid Density	1003.09	kg/m3	Hot Fluid Density	959.91	kg/m3
Cold Fluid Thermal Conductivity	0.61621	W/m.K	Hot Fluid Thermal Conductivity	0.65901	W/m.K
Cold Fluid Dynamic Viscosity	0.00083	Pa.s	Hot Fluid Dynamic Viscosity	0.0004	Pa.s
Cold Fluid Specific Heat	4176.69	J/kg.K	Hot Fluid Specific Heat	4138.33	J/kg.K

Shell and Tube Software

Water to Steam Heat Exchanger

SI

INPUT DATA

Pitch	Squared				
Fluid	Water		Tube Size	7/8	
Fluid In Temp.	30	°C	Tube Material	Copper	
Fluid Out Temp.	35	°C	Tube Thickness	0.002	m
Fluid Fouling Factor	1.8E-05	m2.K/W	Tube Layout Angle	45	°
Steam	SuperHeat		Passage Number	2	
Steam In Temp.	120	°C	Pitch Size	0.028	m
Steam Out Temp.	110	°C	Tube Length	2	m
Steam Pressure	20	Bar	Tube Number	30	
Steam Fouling Factor	1.8E-05	m2.K/W			

OUTPUT DATA

Capacity	1415900.72	W	Refrigerant Velocity	85.68	m/s
Fluid In Temp.	30	°C	Shell Diameter	0.26	m
LMTD	82.47	K	Heat Transfer	2048.16	W/m2.K
Fluid Flow Rate	67.57	l/s	Steam Flow Rate	2.49	l/s
Fluid Pressure Drop	19052.11	Pa	Steam Pressure Drop	34022.83	Pa
Fluid Mass Flow Rate	67.78	kg/s	Steam Mass Flow Rate	33.89	kg/s
Fluid Density	1003.09	kg/m3	Steam Density	13.6	kg/m3
Fluid Thermal Conductivity	0.61621	W/m.K	Steam Thermal Conductivity	0.02693	W/m.K
Fluid Dynamic Viscosity	0.00083	Pa.s	Steam Dynamic Viscosity	3.4E-06	Pa.s
Fluid Specific Heat	4176.69	J/kg.K	Steam Specific Heat	6656.49	J/kg.K

Amazing Feature

- This software helping the user in all configurations and specifications for shell & tube design and manufacturing.
- Designer can check all possibilities to get the capacity for application at requested conditions.
- User can use easily his preferred unit measurement SI or Imperial.
- The ability of selecting suitable fluid (ethylene, propylene or water) with any concentration percentage and fouling factor.
- The ability to use saturated steam or superheated steam at any pressure value request.
- Designer can control all variables that affect the Shell & Tube HE such as Shell diameter, Baffles No. , Baffles space distance, tube size, tube and shell material, tube length and tubes qty.
- All above data are extracted with professional technical report.

Contact us :

Soheil Assayed for Applied Engineering Solutions

applied_eng@yahoo.com
saleapplied_eng@yahoo.com
sales@applied-eng.com

www.applied-eng.com

Mobile: +962799733254 - Fax: +96265604411
P.O.Box “212827”, Amman – 11121 - Jordan