Release Notes

INSTED Ver. 8.3



TTC TECHNOLOGIES, INC.

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Release Features

INSTED Ver. 8.3

The latest version of INSTED (Ver. 8.3) includes the following enhancements to INSTED 8.2.1.

Improved Plate-Fin Solver

- The plate-fin solver now allows you to input user-defined fin data when rating a heat exchanger. This functionality allows you to use any type of fins in a plate-fin heat exchanger. Thus, if your fin type is not directly supported by INSTED, you will need to provide the following data:
 - a. Plate spacing (*b*), unit of [m]
 - b. Equivalent diameter (D_e) , unit of [m]
 - c. Flow area per passage (S_a) , unit of $[m^2]$
 - d. Fin (enhancement) heat transfer area per unit plate area (A_f) per passage, non-dimensional value
 - e. Base heat transfer (un-finned) area per unit plate area (A_b) per passage, non-dimensional value
 - f. Fin efficiency (η_f)
 - g. Fin weight per plate area (W_f) per passage, unit of [kg/m²]
 - h. Custom j/f data specified as a function of $\operatorname{Re}(D_e)$

To use this functionality:

(1) When defining plate-fin HEX geometry in the standard INSTED Rating procedure, you will still need to input arbitrary geometry data for the fins. However, the values entered will be overwritten subsequently by the user-defined fin data.

I. Fin Shape (Frontal):		
Rectangular T		
	Specify arb	itary fin data here
II. Fin Profile (Flow Dir	ection):	
Plain 🔻		
III. Fin Properties:		
Fin Height (<i>h'</i>):	0.31496063	in 🔻
Fin Thickness (t):	0.007874016	in 🔻
Fin Pitch (p):	0.118110236	in 🔻
Fin Conductivity:	8.66683975	btu/(h·ft·°F) ▼
Fin Density:	168.555493555	lb/ft³ ▼

Start Page 🗴 🛃 Plate-Fi	in: Rating	y ×					
I. Project Name: UDF Test II. Choose Heat Exchan UDF HEX III. Flow Assignment: • Fluid A is hot	ger Geon	netry to R	ate: A Denne	Fluid A			aaaaa maaa maaa Fiuid B
IV. Flow Direction: Co-Current	Ο Cοι	unter-Curr	ent	VII. Fluid Propert	ies: operties:		
V. Two Phase Flow?				• Fixed	 Variable, 	/Custom 🤇	REFPROP
No Phase Change	•						
				★ Cold Fluid P	roperties:		
VI. Flow Conditions:	Hot	Cold		 Fixed 	 Variable, 	/Custom 🤇	REFPROP
Inlet Flow Rate:	55.9974	55.11556	lb/s ▼		Hot	Cold	
Inlet Temperature:	860.017	572.0179	°F 🔻	Density:	0.03371109	0.30339988	lb/ft³ ▼
Inlet Pressure:	0.	0.	psi 🔻	Specific Heat:	0.25317665	0.25317665	Btu/(Ib·°F) ▼
Fouling Resistance:	0.	0.	ft²-s-°F/btu ▼	Viscosity:	2.150301e-	2.150301e-{	lb/(ft·s) ▼
K-Factor In				Conductivity:	0.02888946	0.02888946	btu/(h·ft·°F) ▼
	0.4	0.4		·	13	131	
K-Factor Out	0.4	0.3					
New S	ave	Sav	e As	VIII. Calculation N	Aethod (Optimition Mathod	tional)	Compute

(2) When rating the HEX, click "Set Calculation Method" button.

(3) Check "Use user-defined fin geometry in the hot stream?" and "Use user-defined fin geometry in the cold stream?" if you want to specify user-defined fin data for the fins in the hot and cold streams. Note that you can specify user-defined fin geometries for the hot stream, the cold steam, or both streams.

I. Calculation Method: Methods Default Bulk Discrete	Fluid A	Annonangananan Annonanganan Annonanganan Annonanganan Annonanganan Annonanganan Annonangan Annonangan Annonanganan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonangan Annonan Annonangan Annonangan Annonan Annonangan Annonangan Annonan Ann
II. User Defined Fin Geometry: Use user-defined fin geometry in the hot stream? Use user-defined fin geometry in the cold stream?		

(4) After clicking the check box, e enter the custom fin data. The data input here will override any previously entered fin geometry data defined in the "Heat Exchanger Geometry" task, as mentioned above

Iser Defined Fin Geometry: 🛛 🕜		
Use user-defined geometry data for fin in hot stream?		
Plate Spacing:	0.0057	m 🗸
Equivalent Diameter:	0.002775	m 🗸
Free Flow Area per Passage:	0.0092075	m² ~
Fin (Enhanced) Heat Transfer Area per Unit Plate Area:	5.55	
Base (Unfinned) Heat Transfer Area per Unit Plate Area:	1.85	
Fin Efficiency:	77.5	%
Fin Weight per Unit Plate Area:	1.53	kg/m² ∨
Custom j/f Data:	UDF Hot 🗸	Edit Create
_		
Use user-defined geometry data for fin in cold stream?		
Plate Spacing:	0.0057	m 🗡
Equivalent Diameter:	0.002775	m 🗸
Free Flow Area per Passage:	0.0046204	m² ~
Fin (Enhanced) Heat Transfer Area per Unit Plate Area:	5.55	
Base (Unfinned) Heat Transfer Area per Unit Plate Area:	1.85	
Fin Efficiency:	68.60000000000001	%
Fin Weight per Unit Plate Area:	1.530000001	kg/m² ∨

(5) Save the project, and you are now ready to rate with your user-defined fin data.

The required variables in user-defined fin data are illustrated below using the rectangular fin as an example:



Note that the number of enhancement flow passages = W/p, where W is the width of the passage. Note that W is the width of the heat exchanger and L in the flow direction.

The base area for heat transfer per passage is 2(p-t) *WL/p. It is non-dimensionalized by WL.

The fin area for enhanced heat transfer per passage is 2h * W/p. It is non-dimensionalized by WL.

The effective heat transfer area per passage is $WL(A_b + \eta_f A_f)$