Release Notes

INSTED Ver. 10.1

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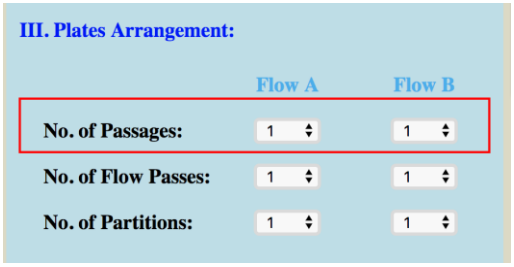
Release Features of INSTED Ver. 10.1

The latest version of INSTED (Ver. 10.1) includes the following enhancements to INSTED 9.2.

Allowance for Single-Passage Configuration in Plate-Fin HEX

- In previous versions of INSTED, the minimum number of flow passages allowed for a Plate-Fin heat exchanger is two. In INSTED 10.1, a single flow passage can now be modeled for both the hot and cold streams. (Note that a passage consists of many flow channels and the channels are separated by fins. Thus, a single passage does not mean a single flow channel, but rather a single "row" of many flow channels.)



Allowance for End-Passage Effects in Plate-Fin HEX

- In INSTED 10.1, the analytical procedure has been modified to account for end-passage effects when rating a Plate-Fin heat exchanger. Compared to the internal passages where a stream transfers heat (to the other stream) on both sides of the passage, the stream in an end-passage transfers heat to the other stream only on one side.

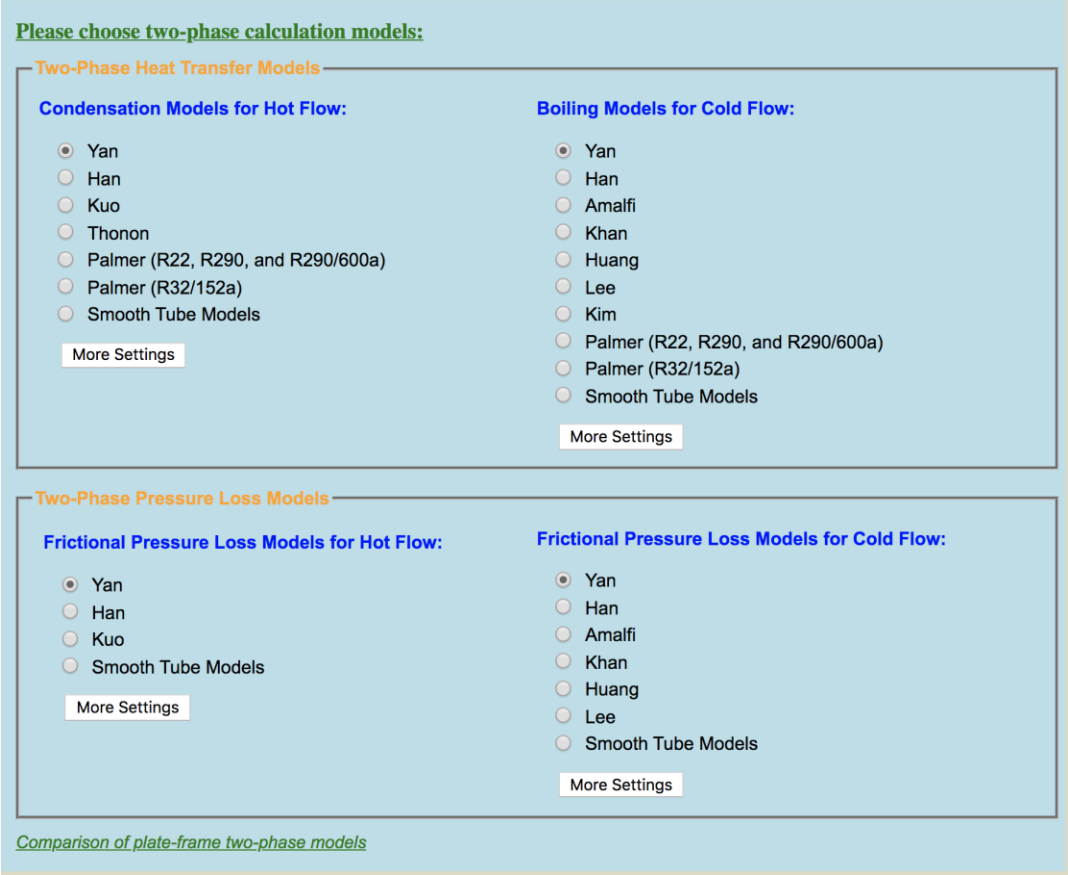
- Compared to the internal passages, an end passage usually has a lower fin efficiency and smaller heat transfer area. When the number of flow passages is relatively few, the effects of end passages become more significant.

- In INSTED 10.1, the analytical procedures have been modified so that end passages are treated separately in order to obtain better rating results when a Plate-Fin heat exchanger has only a few number of flow passages.

Advanced Two-Phase Models for Plate-Frame HEX

- In INSTED 10.1, more sophisticated boiling and condensation models have been added for rating a Plate-Frame heat exchanger.

- The boiling and condensation models that are supported in INSTED/Plate-Frame are listed in the screen shot below. Note that in addition to the two-phase models that have been specifically developed for plate-frame heat exchangers, and are contained in the screen shot below, two-phase models for flow in smooth tubes are also available. The latter can be accessed via the last radio button in each group of the dialog box.

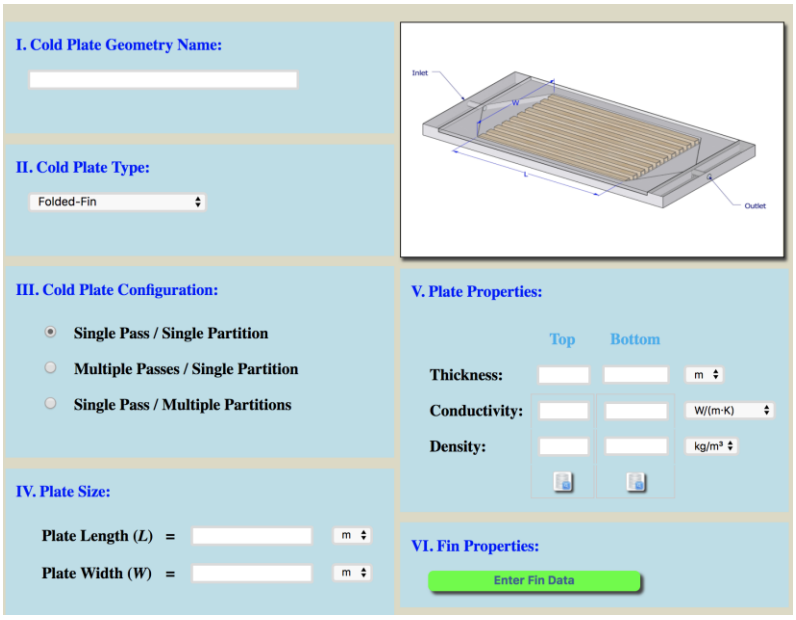


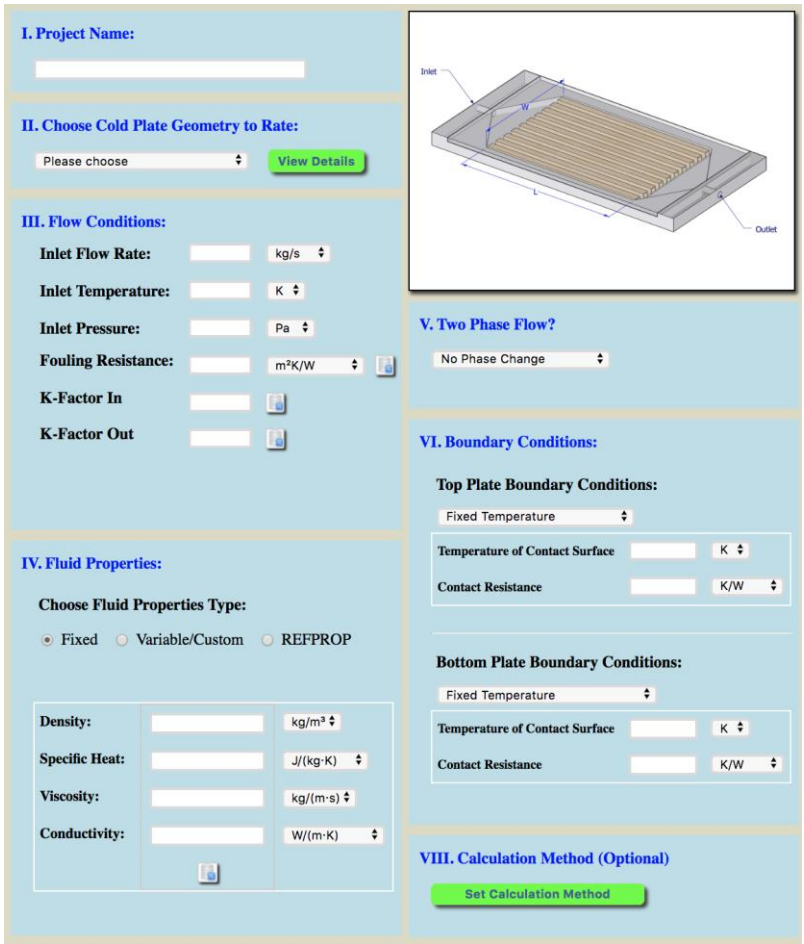
A Cold Plate Analysis Module Has Been Developed

- The new INSTED version, Ver. 10.1, contains a new module for a Cold Plate heat exchanger. In this module, you can design a cold plate geometry, rate an existing cold plate by specifying the flow and boundary conditions, investigate the effects of the geometry or flow parameters by using the multiple-rating feature, and size a cold plate device by providing a design target.

- The following sub-modules are available for the Cold Plate module
  - Create Cold Plate Geometry
  - Rate Cold Plate
  - Multiple-Rate Cold Plate
  - Size Cold Plate

- The Cold Plate module has been developed based on the Plate-Fin HEX module. Although there are significant differences in the problem setup and solution procedure – since a cold plate involves a single stream while our Plate-Fin involves two - many of the features available in our Plate-Fin module are also supported in the new Cold Plate module. These include the following:
  - The fin set
  - Kays & London fins and data
  - Custom j/f data (both Discrete and Analytic modes)
  - All the two-phase models


I. Cold Plate Geometry Name:
II. Cold Plate Type:
Folded-Fin
III. Cold Plate Configuration:
Single Pass / Single Partition
Multiple Passes / Single Partition
Single Pass / Multiple Partitions
IV. Plate Size:
Plate Length (L) =
m
Plate Width (W) =
m
Inlet
W
L
Outlet
V. Plate Properties:
Top
Bottom
Thickness:
m
Conductivity:
W/(m·K)
Density:
kg/m³
VI. Fin Properties:
Enter Fin Data

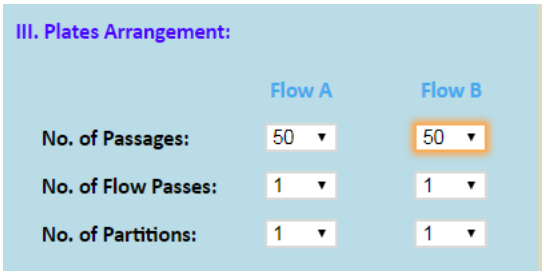

I. Project Name:
II. Choose Cold Plate Geometry to Rate:
Please choose
View Details
III. Flow Conditions:
Inlet Flow Rate:
kg/s
Inlet Temperature:
K
Inlet Pressure:
Pa
Fouling Resistance:
m²K/W
K-Factor In
K-Factor Out
IV. Fluid Properties:
Choose Fluid Properties Type:
Fixed
Variable/Custom
REFPROP
Density:
kg/m³
Specific Heat:
J/(kg·K)
Viscosity:
kg/(m·s)
Conductivity:
W/(m·K)
Inlet
W
L
Outlet
V. Two Phase Flow?
No Phase Change
VI. Boundary Conditions:
Top Plate Boundary Conditions:
Fixed Temperature
Temperature of Contact Surface
K
Contact Resistance
K/W
Bottom Plate Boundary Conditions:
Fixed Temperature
Temperature of Contact Surface
K
Contact Resistance
K/W
VIII. Calculation Method (Optional)
Set Calculation Method

Availability of the Cold Plate Module to the Public

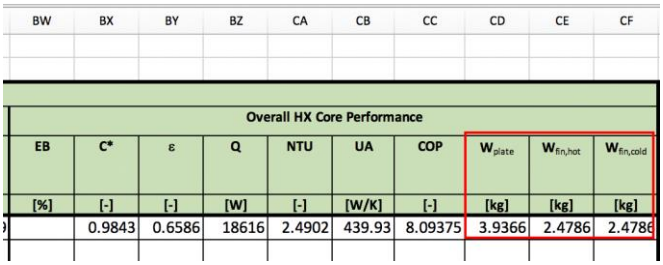
The new Cold Plate module in INSTED has been custom-developed for a particular client. As a result, the module is currently available only to this customer. It will be available to TTC's general customer base in November 2020.

Other Improvements on the User Interface

- **Support for the tab key:** In INSTED 10.1, you can now quickly navigate the input fields by using the tab key, instead of using the mouse. All the input fields are affected (textbox, radio button, dropdown list, buttons, etc.). When the tab key is pressed, the border of the focused input field will be highlighted with the yellow color, as shown in the screen shot below.



- **Additions to the output fields:** In INSTED 10.1, the following new columns have been added to the Excel spreadsheet of Plate-Fin Rating results:
  - Plate weight
  - Fin weight in the hot stream
  - Fin weight in the cold stream



BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF
Overall HX Core Performance									
EB	C*	ε	Q	NTU	UA	COP	W_{plate}	$W_{fin,hot}$	$W_{fin,cold}$
[%]	[-]	[-]	[W]	[-]	[W/K]	[-]	[kg]	[kg]	[kg]
	0.9843	0.6586	18616	2.4902	439.93	8.09375	3.9366	2.4786	2.4786