Release Notes

INSTED CLOUD Ver. 8.1

TTC TECHNOLOGIES, INC.

March 2, 2016

Release Features

INSTED CLOUD Ver. 8.1

INSTED is your one-stop software suite for empirical thermal and hydraulic analysis of engineering systems and components, with a focus on finned and un-finned heat exchangers, flow over tube banks, performance of isolated fins and fin arrays, analysis of heat conduction in composite solids, internal and external flow and heat transfer, performance analysis of flows in piping systems, design analysis of pipe flows, and power calculations for pump selection. INSTED calculations are very fast, leading to fast turnaround in the analysis cycle. The interface is easy and fun to use. With the CLOUD deployment of INSTED, you can carry out your thermal-hydraulic analysis of heat exchangers and other engineering systems/components anytime, anywhere, and even on your smartphones or tablets.

The most recent version of INSTED (Ver. 8.1) includes significant enhancements, changes, and bug fixes, to further improve your experience on INSTED CLOUD. The new features include the following:

Improved Plate-Fin Solver

- An option to use a “Bulk” or “Discrete” method for rating calculations is now available.
- “REFPROP” and “Custom Fluids” can now be used for “Bulk” calculations!
- Warning messages for temperatures that are outside the range of REFPROP support are now displayed.
- The search schemes in “Sizing” and “Optimization” calculations have been improved to reduce the incidence of “No Realization Found” situations.

Bugs Fixed in the Plate-Fin Module

- Can now pass back fluid properties from “REFPROP Tool” to “INSTED” when using the Internet Explorer browser.
- The “No Fluid Found” message displayed in certain Multiple Rating tasks has been been fixed.
- Fixed the bug relating to copying the plate-fin Sample Problem "Che.510 (with custom j/f data)" to user account.
- The "Lost Connection" warning message displayed after 20 minutes of inactivity, has been removed.

New Features in Plate-Fin

- The "Calculation Method" input tab has been added. You can now choose the "Default,” "Bulk," or "Discrete" method for rating calculations.
- You can now plot the distribution of "Density," "Specific Heat," "Thermal Conductivity," and "Viscosity" along the streams for the rating projects.
- You can now save one of the “Multiple-Rating” calculation points into a separate, regular, rating project.
- You can now save a realization of the “Sizing” calculations into a separate, regular, rating project.
- You can now save a realization of the “Optimization” calculations into a separate, regular, rating project.

- You can now export an existing project into a plain XML text file and mail out to another INSTED user.
- You can now import an XML project file back to INSTED from another INSTED user.
- In “Project Management,” you can now open an INSTED project directly by just clicking on the project name.

Improvements to the user interface (UI)

- In the “Recent Projects” list under “Start Page,” if the project name is too long to fit into the edit box, by placing the mouse on the project’s name, more text will automatically scroll from right to left, to show additional information.
- You can now choose “REFPROP” and “Custom Fluids” directly from the “Rating Details” tab.

Changes to Other Modules in INSTED

- The “Preliminary Design” task is now supported in the CLOUD version of the Shell and Tubes HEX.
- The “Length Calculation” task is now supported in the CLOUD version of the Concentric Tubes HEX.
- The “Multiple Rating” tasks task is now supported in the CLOUD version of the Plate-Frame HEX.
- The “Bulk/Discrete” options are now supported in the CLOUD version of the Shell & Tubes and Concentric Tubes HEXs.
- You can now plot the stream-wise distributions of "Density," "Specific Heat," "Thermal Conductivity," and "Viscosity" from the rating results in all HEX modules.
- You can now save a “Preliminary Design” realization into a regular rating project for the Shell & Tubes HEX.
- You can now save a “Length Calculation” result into a regular rating project for the Concentric Tubes HEX.
- You can now save one point of a “Multiple Rating” analysis into a regular rating project for Plate-Frame HEX.
- Additional warning/error messages have been added for the Plate-Frame solver.
- For all INSTED modules, you can now “Export”/“Import” an existing INSTED project in an XML file format to/from other INSTED users.

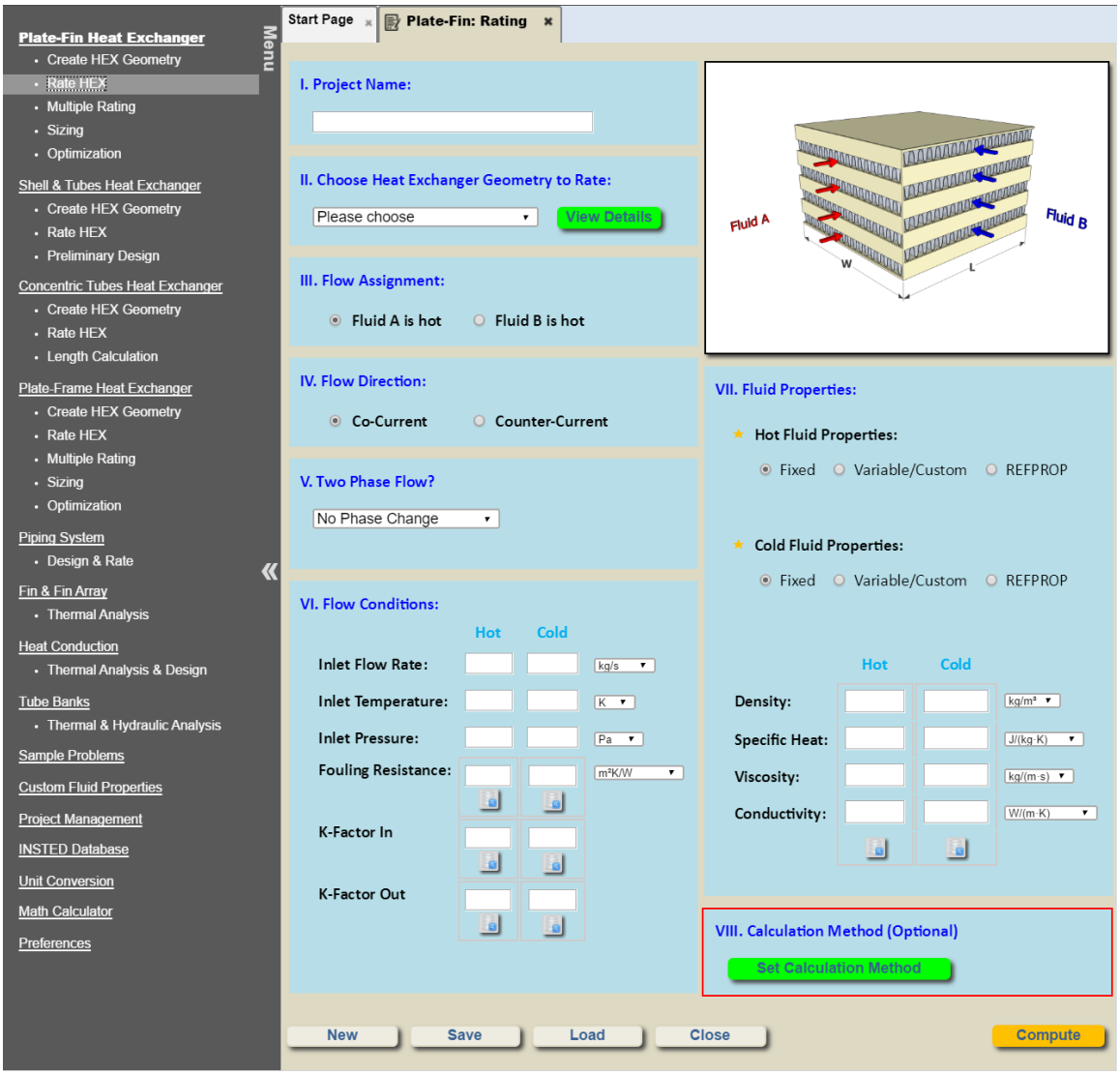
More details on the release features can be found in the following sections.

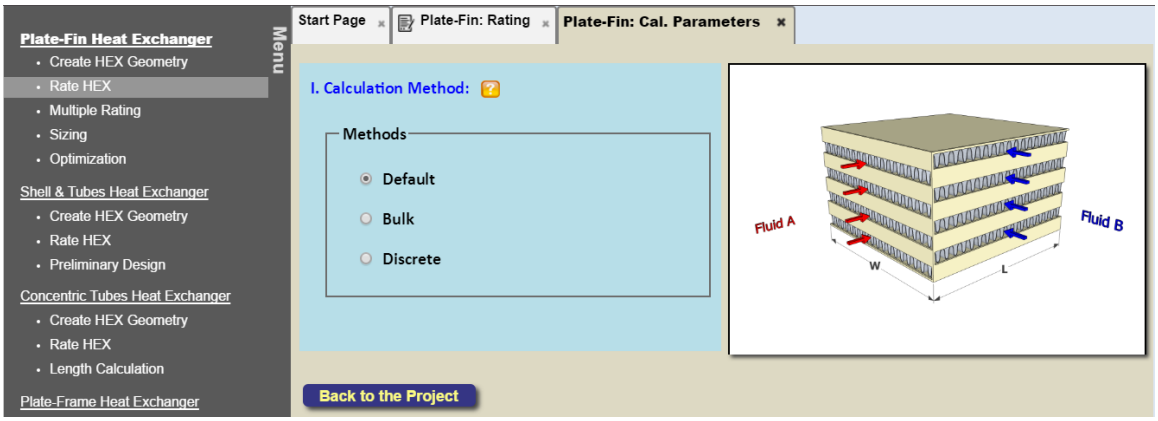
New Features

Many new features have been added to INSTED in this new version.

#1. You can now choose either "Bulk" or "Discrete" methods for rating calculations.

In the Bulk method, fluid properties are held constant. In the Discrete method, they are allowed to vary stream-wise, depending on the local temperature and pressure. These options can be accessed from the "Calculation Method" button.





There are three available options:

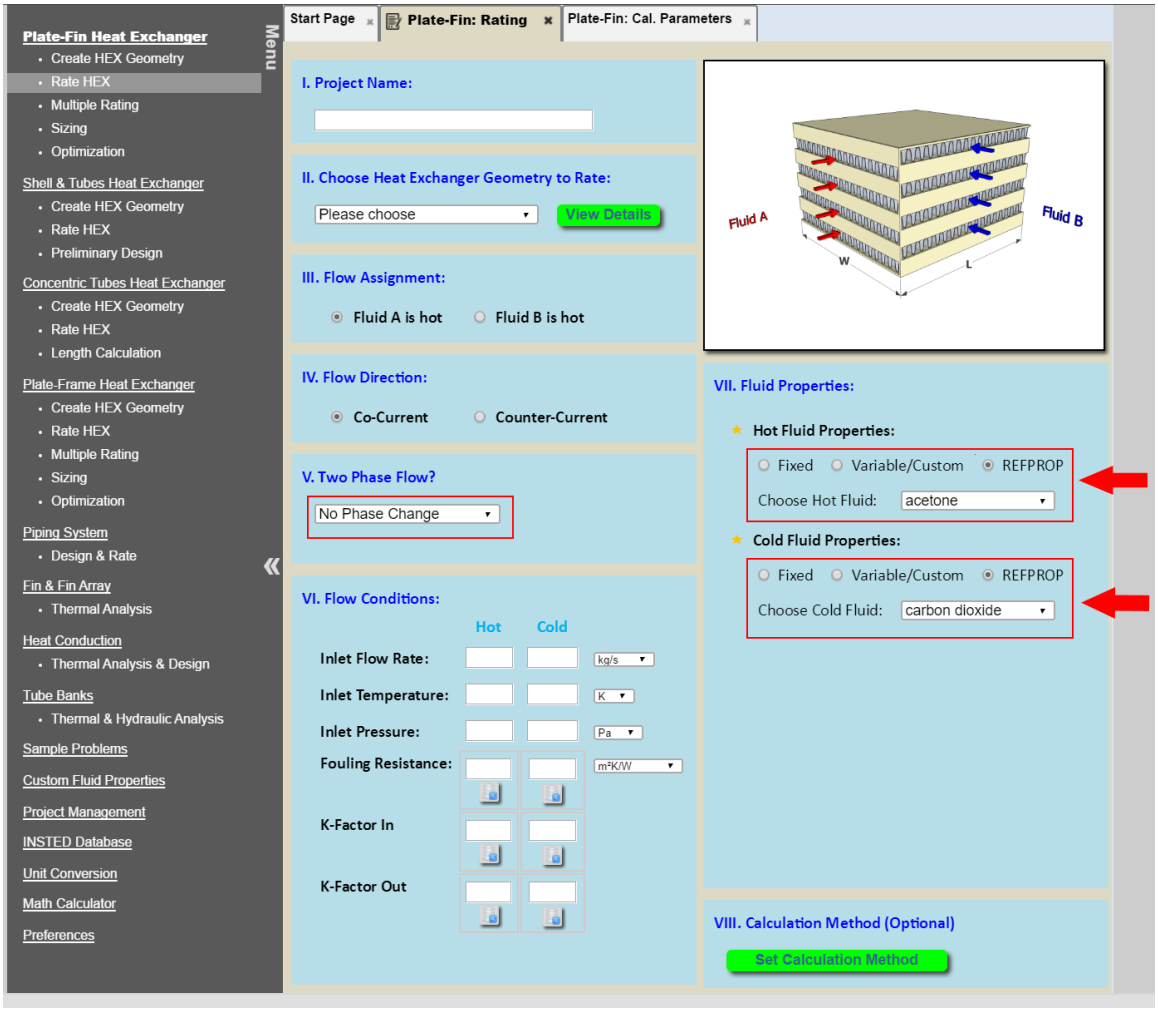
- Default: INSTED will automatically choose the calculation method based on your input. If the calculation is single phase and fixed thermal-physical fluid properties are used for both hot and cold streams, the bulk calculation method will be chosen, otherwise the discrete method will be chosen.
- Bulk: In this method, the thermal-physical properties of the fluids will be fixed. If “REFPROP” or “Custom Fluid” is selected, the average temperature of the stream is used to obtain the constant thermal-physical properties.
- Discrete: In this method, the thermal-physical properties of the fluids will be allowed to vary with the local temperature of the streams.

Note that:

- The Bulk calculation method cannot be used if “two-phase” is selected for a rating calculation.

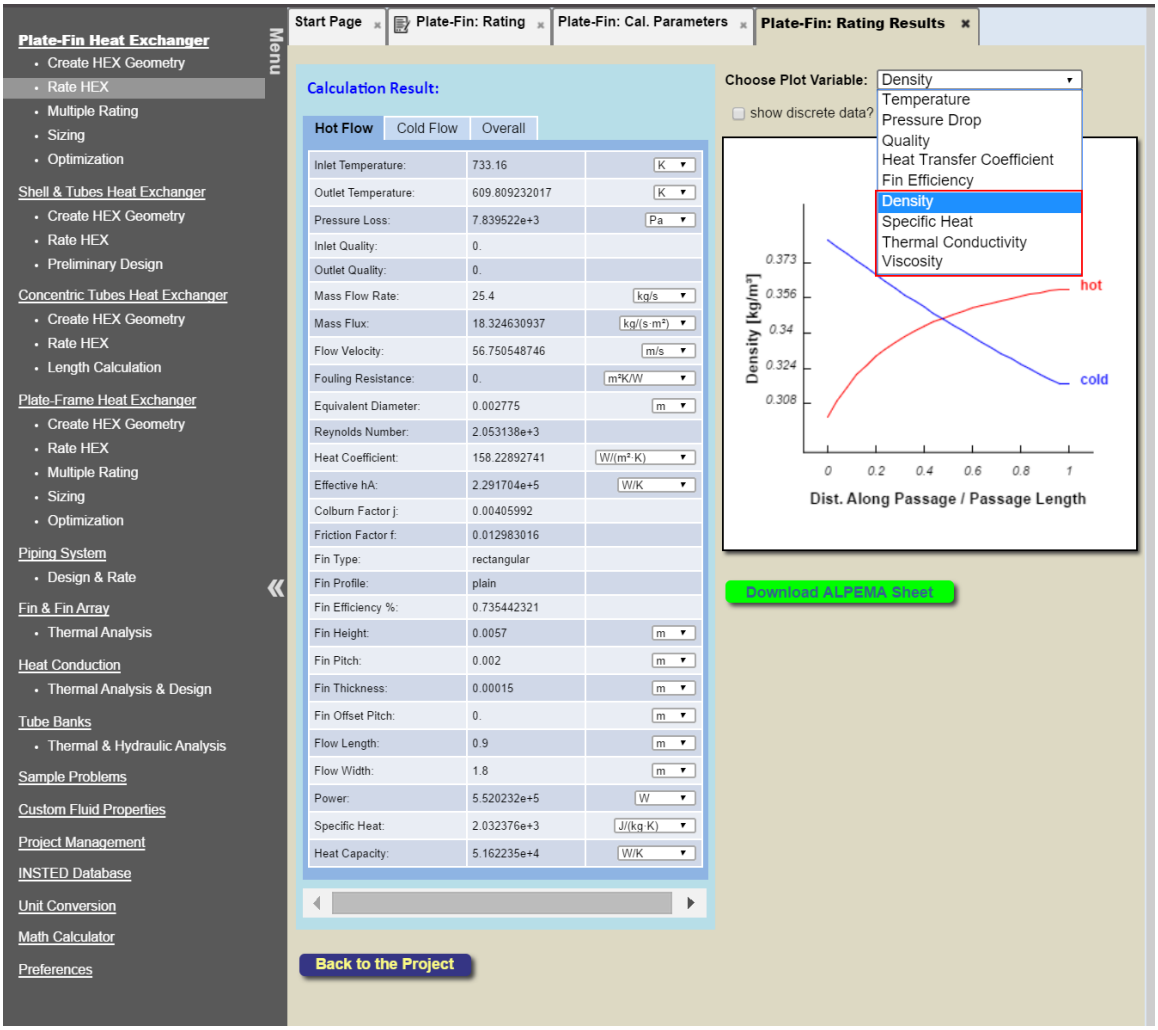
#2. You can now use REFPROP for single-phase rating calculations.

In previous versions of INSTED, REFPROP was used mainly for two-phase flows (boiling and condensation). In the new version, a “REFPROP Fluids” selection box is available for single phase calculations as well.



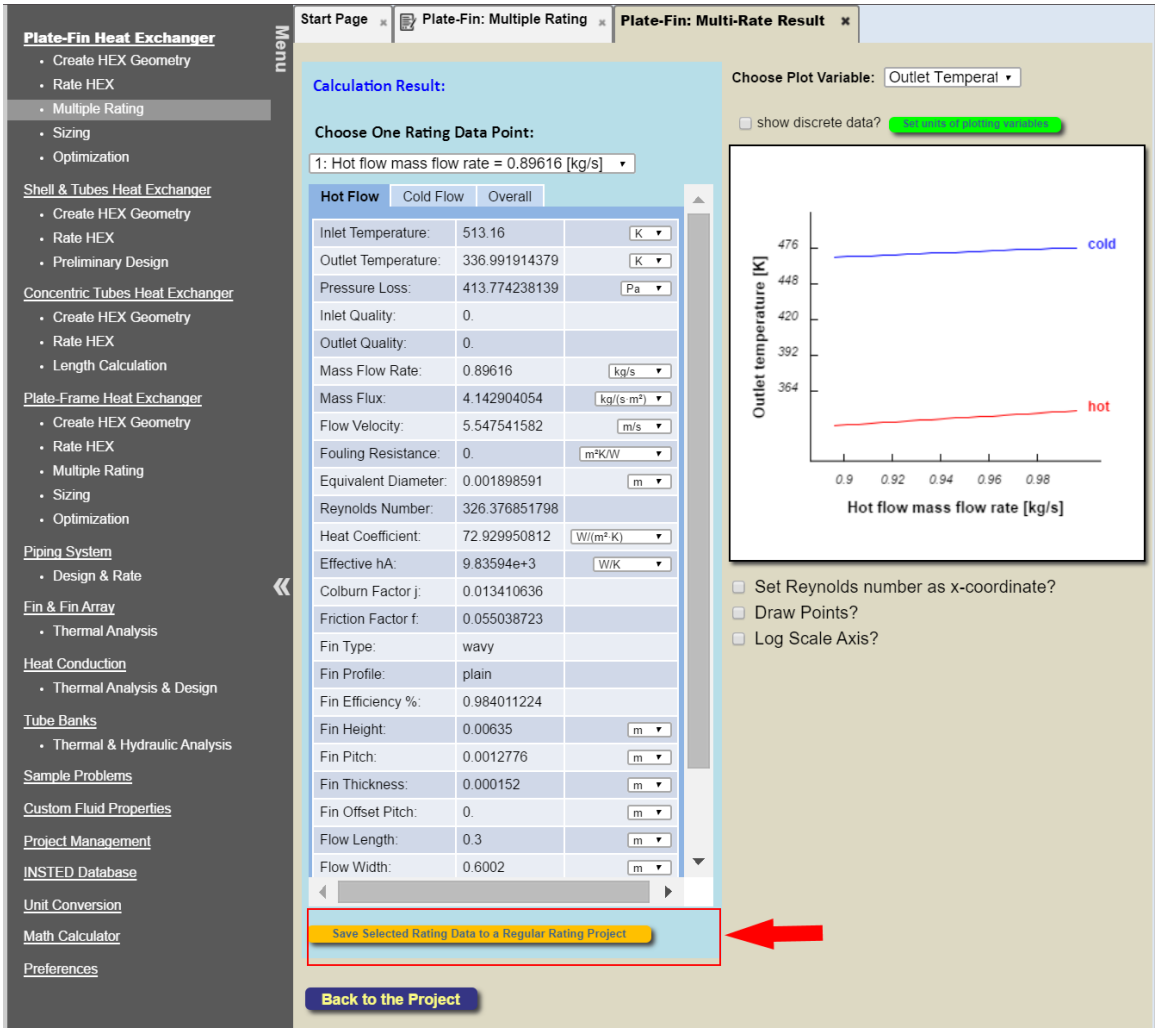
#3. Plot "Density," "Specific Heat," "Viscosity," and "Thermal Conductivity" curves from the rating calculations.

You can now plot these thermal-physical properties curves along the streams to visually assess their stream-wise variation patterns. The units of the thermal-physical properties in the plots can also be changed depending on your preference.

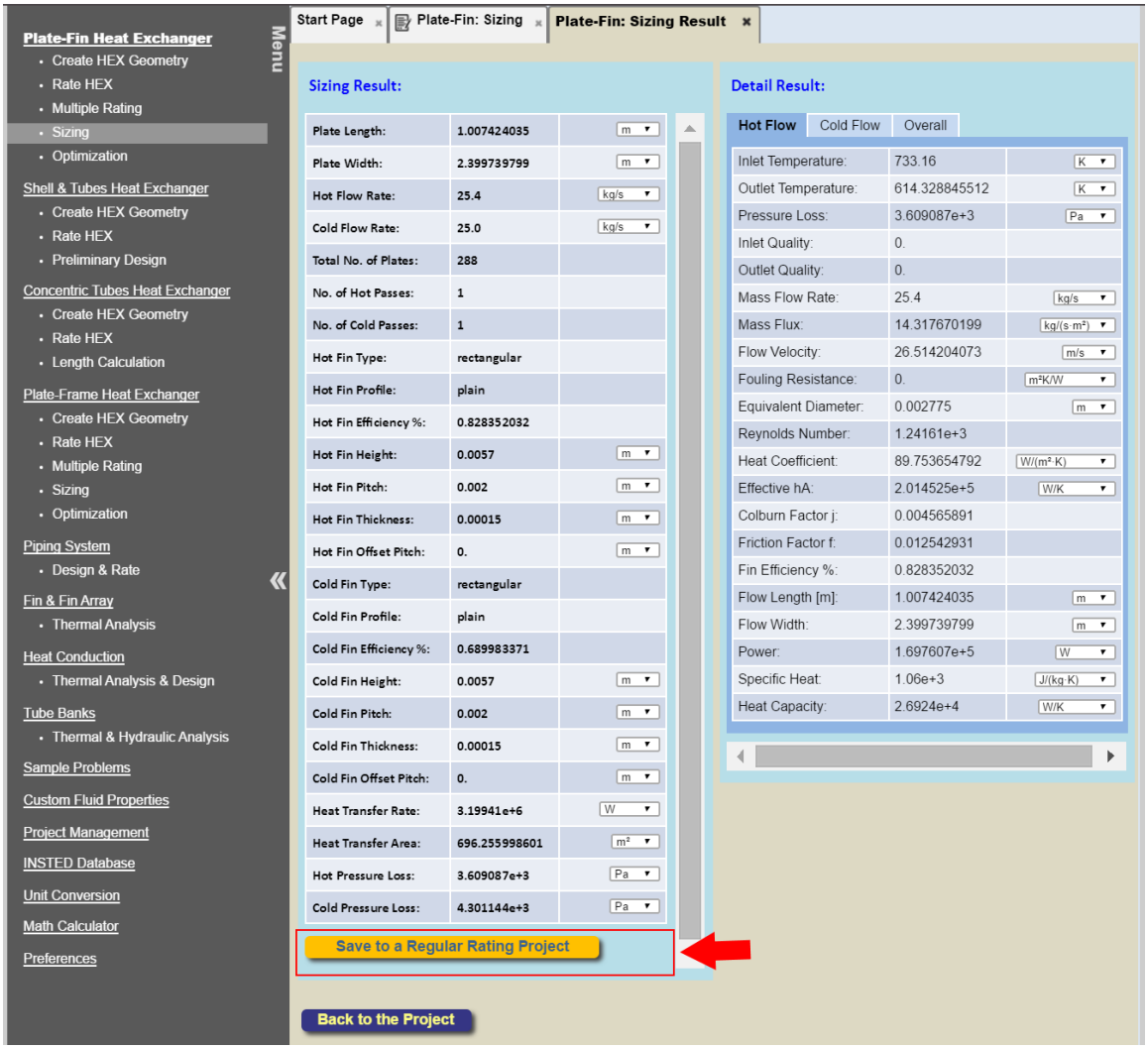


#4. You can now save "Multiple Rating," "Sizing," and "Optimization" calculation result into a regular "Rating" project directly.

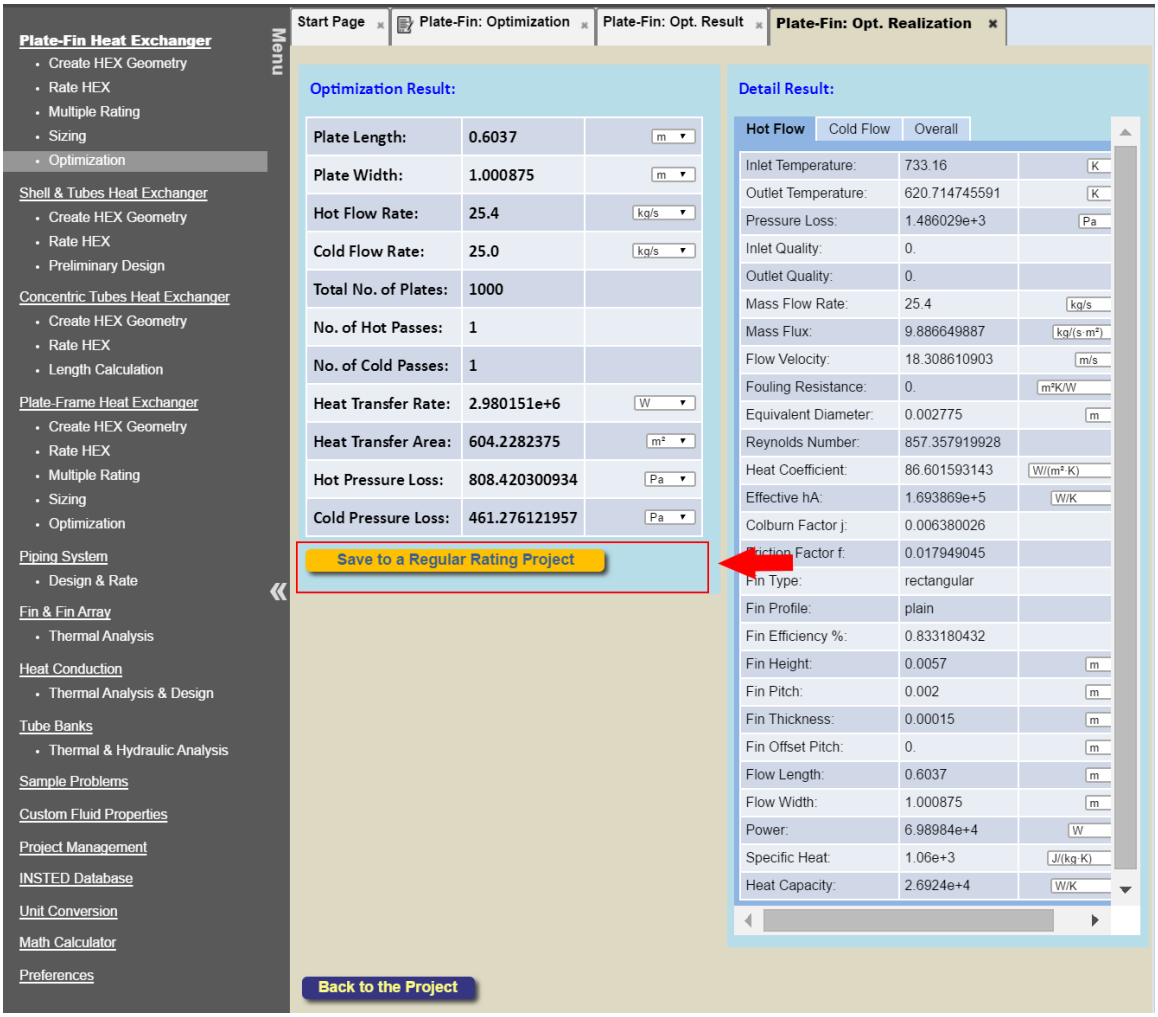
Multiple-Rating: Choose a rating point and click the "Save Selected Rating Data to a Regular Rating Project" button.



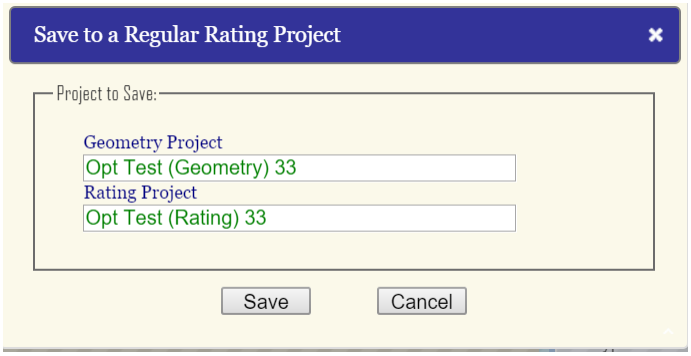
Sizing: Click the "Save to a Regular Rating Project" button.



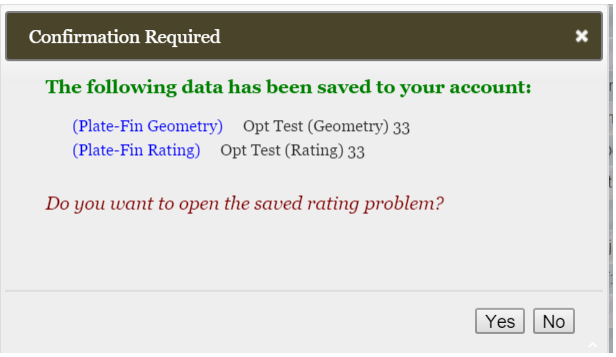
Optimization: Click the "Save to a Regular Rating Project" button.



In all cases, a dialog box will be presented to you; input the names of the project and click the "Save" button.

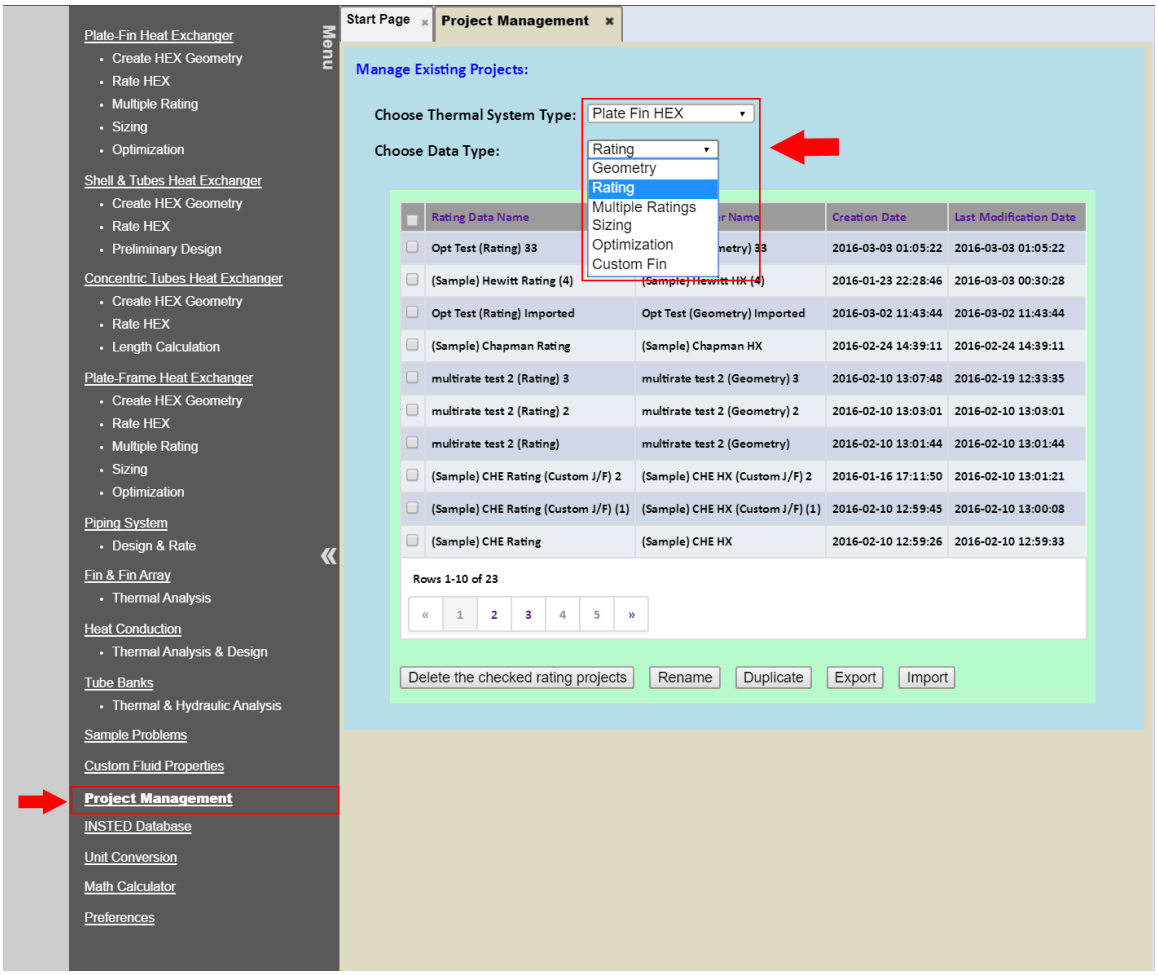


A confirmation dialog will be shown.

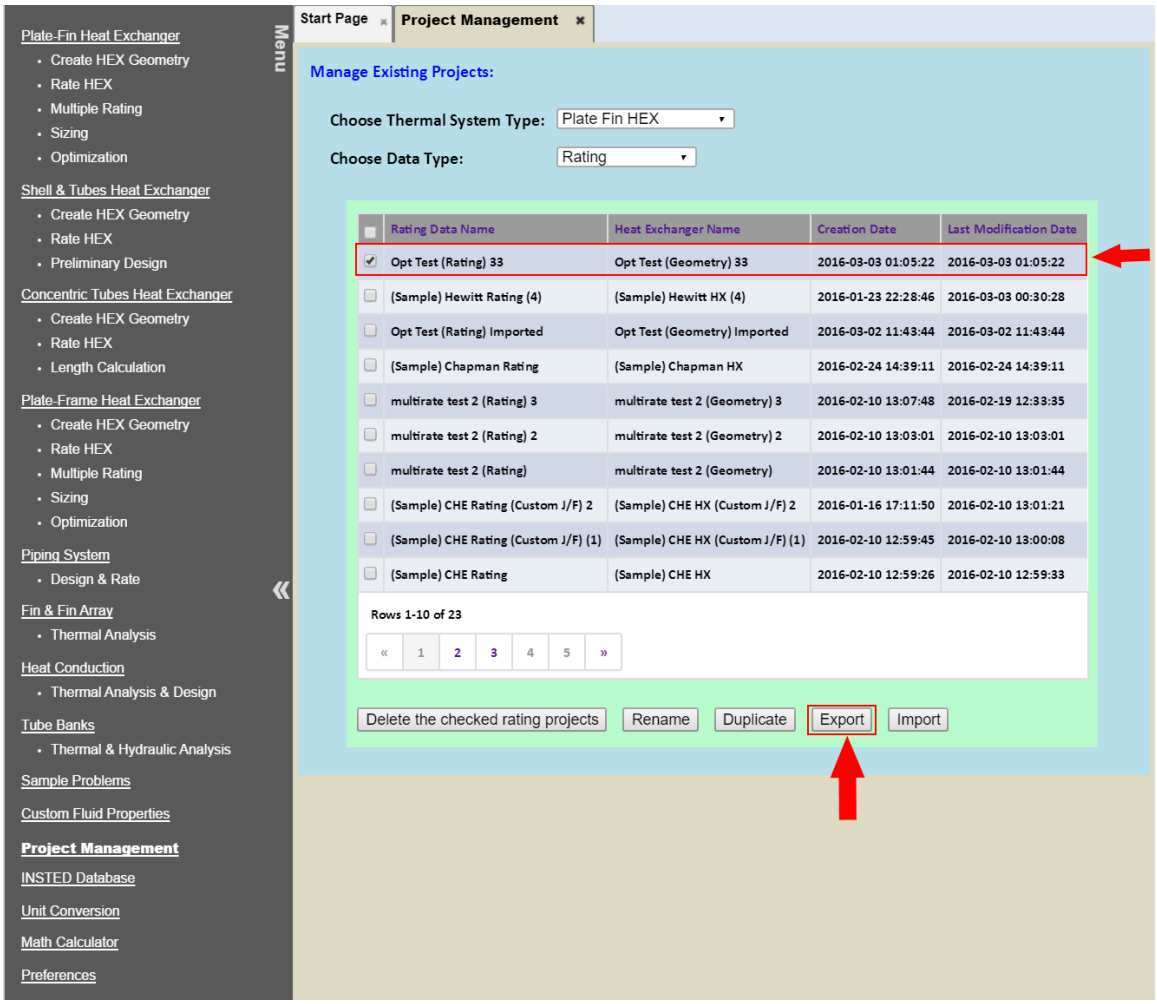


#5. Export an Existing Project into an XML File

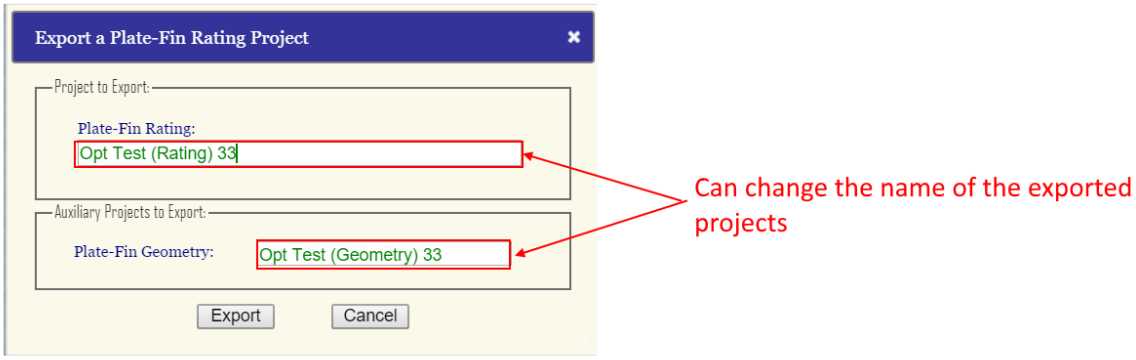
Under "Projects Management," choose the task for the project.



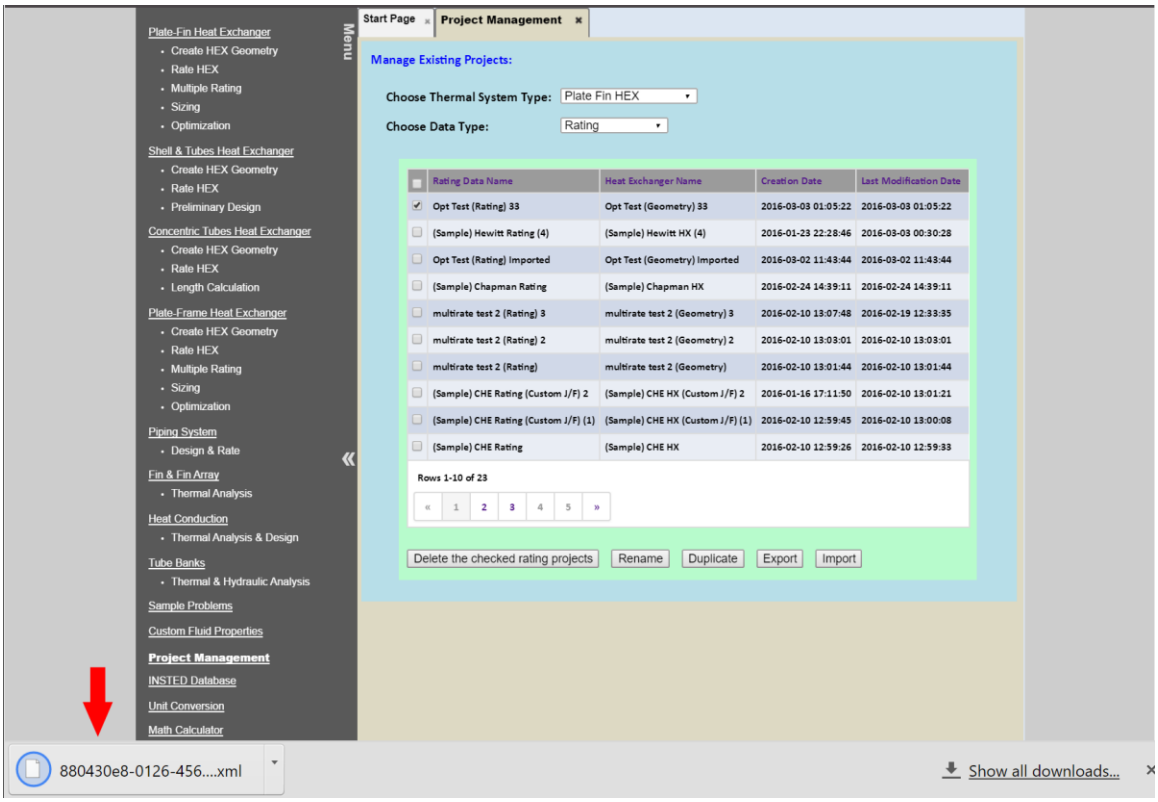
Check the "checkbox" for the project (file) you want to export and click the "Export" button.



A dialog box will be displayed to show the names of the rating project to be exported and its associated "geometry." To give the project and/or its geometry a different name, simply write over the name of the project and/or its geometry, as shown below.

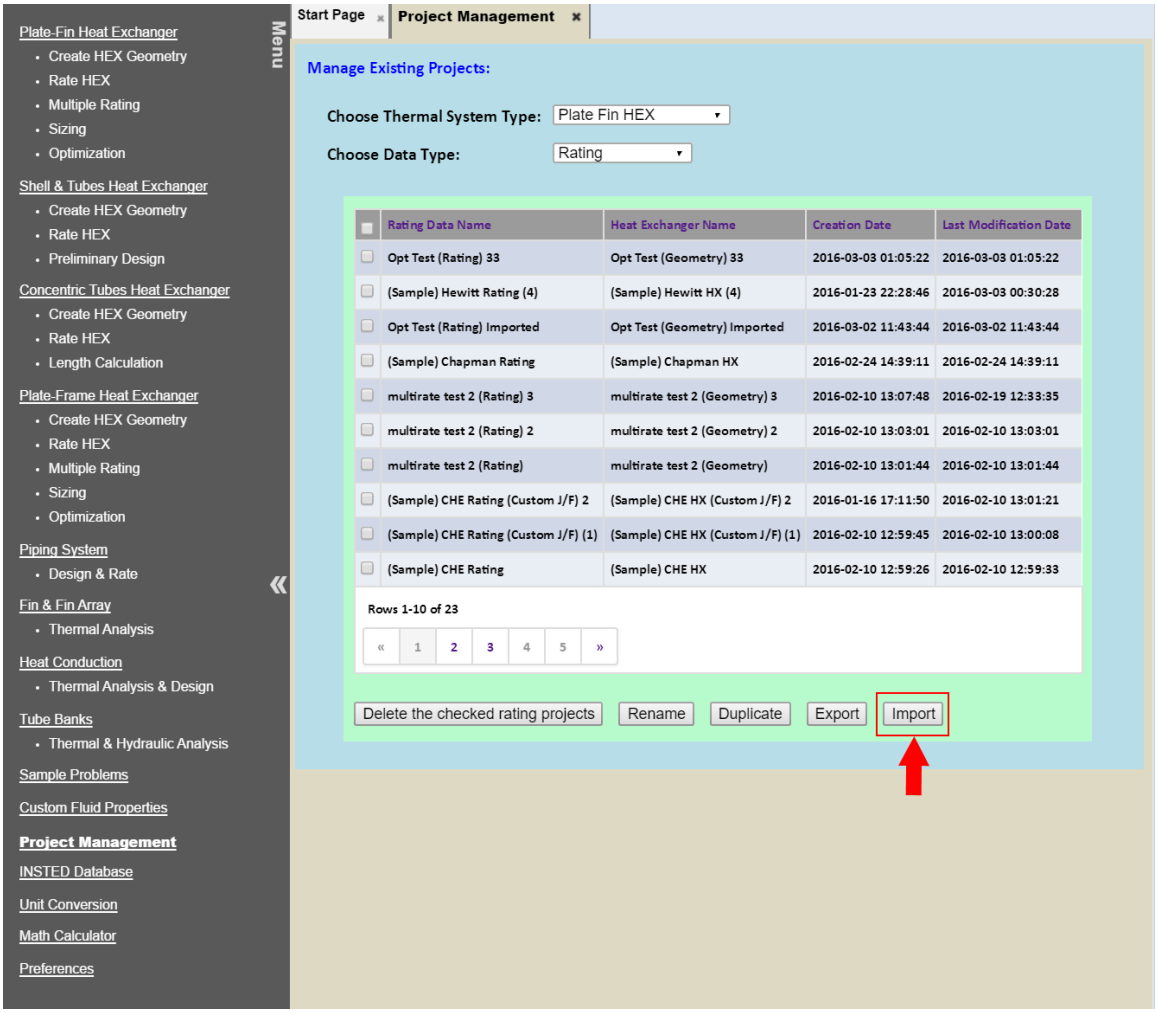


Click the "Export" button and a project file will be generated and downloaded in your browser.

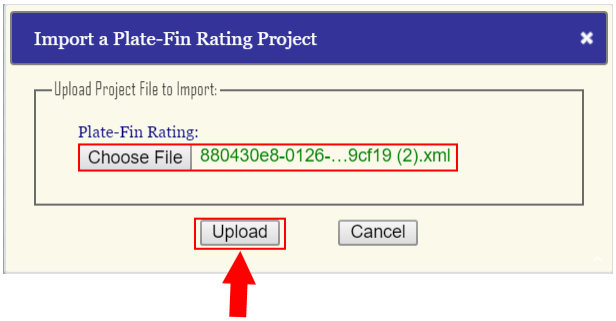


#6. Import (an exported XML project file) back into INSTED

Under “Projects Management,” choose the type of task for which you want to import a project and click the “Import” button.



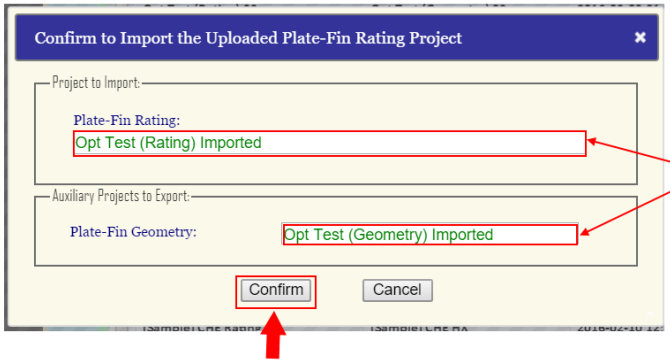
A dialog box will be displayed.



Choose the file you want to upload and click the “Upload” button.

A dialog box containing the details of the imported project will be displayed. You also have the option of changing the name (descriptions) of the imported projects.

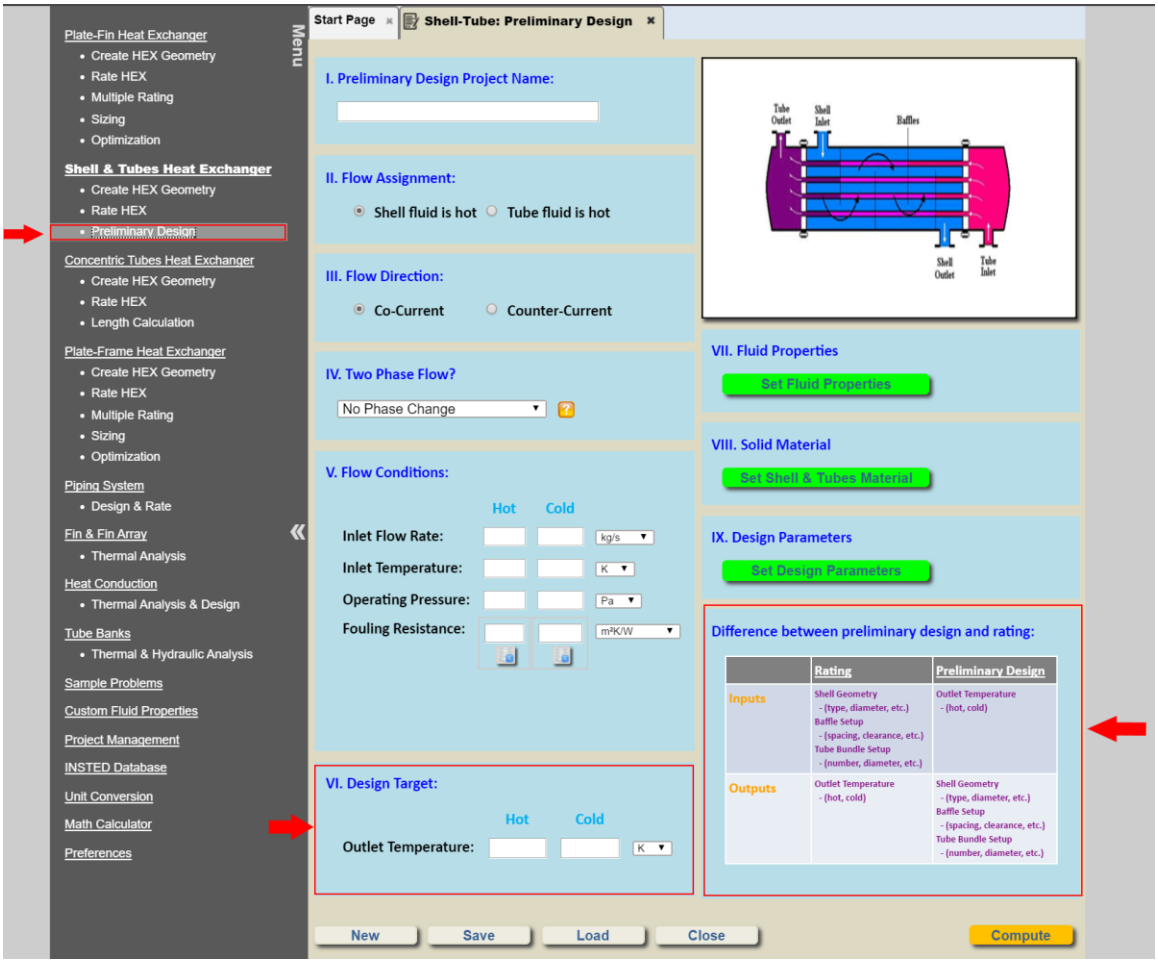
Important Information: Please note that your project files are downloaded into your browser default download folder. This is where to look when you want to export the file to other INSTED users.



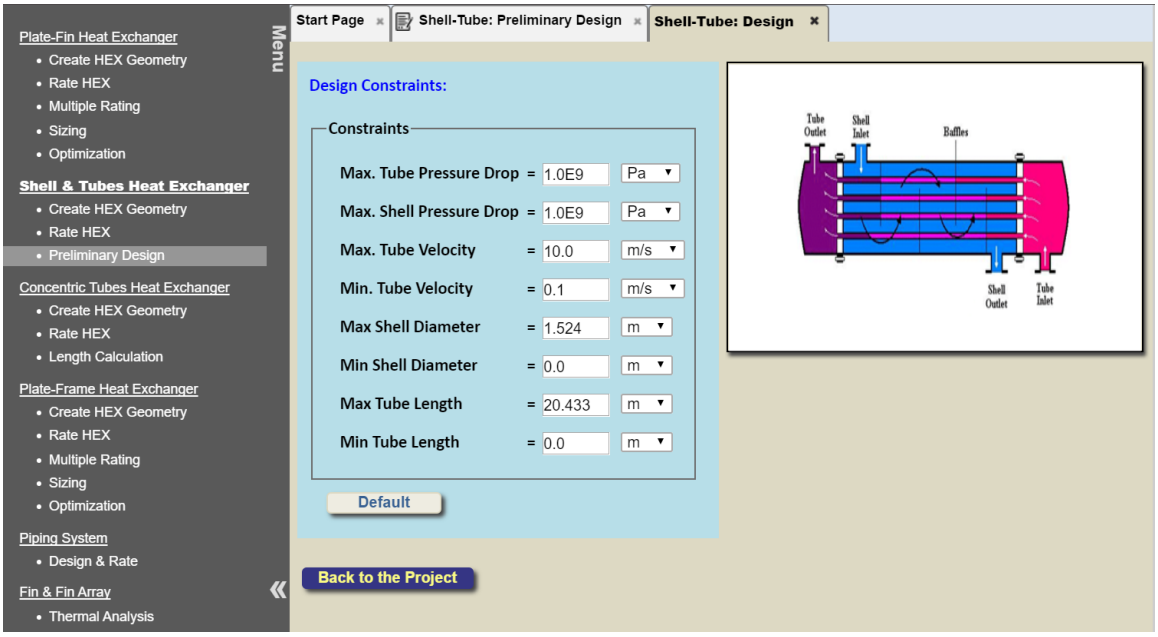
Click the "Confirm" button to import the project.

#7. "Preliminary Design" Module is added to "Shell & Tubes HEX"

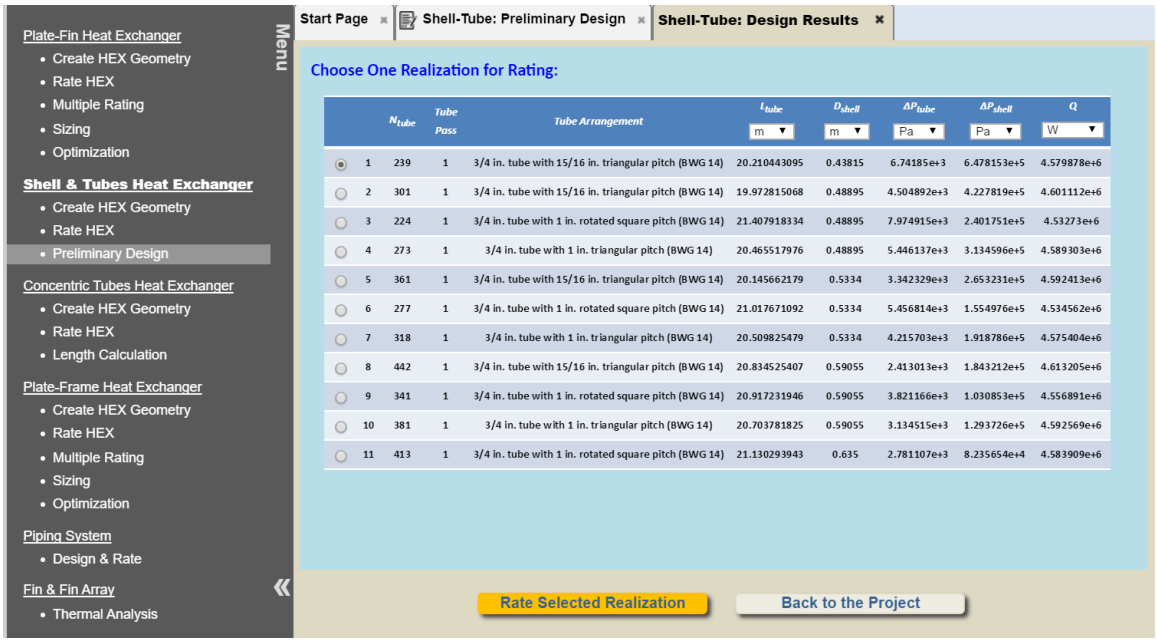
In "Preliminary Design", the geometry information of the shell & tubes heat exchanger is unknown, such as the shell geometry (shell type, inner diameter, etc.), baffle setup (spacing, clearance, etc.) and tube bundle setup (bundle arrangement, number of tubes, tube diameter, etc.). User only need to provide the "Design Target", which is the outlet temperature of the hot and cold streams, and with the additional data of the flow conditions and solid material, INSTED can try to find a geometry design for the Shell & Tube HEX to achieve the design target.



Note that a search scheme is used in the INSTED solver, so that user need to provide a reasonable "Design Parameters"

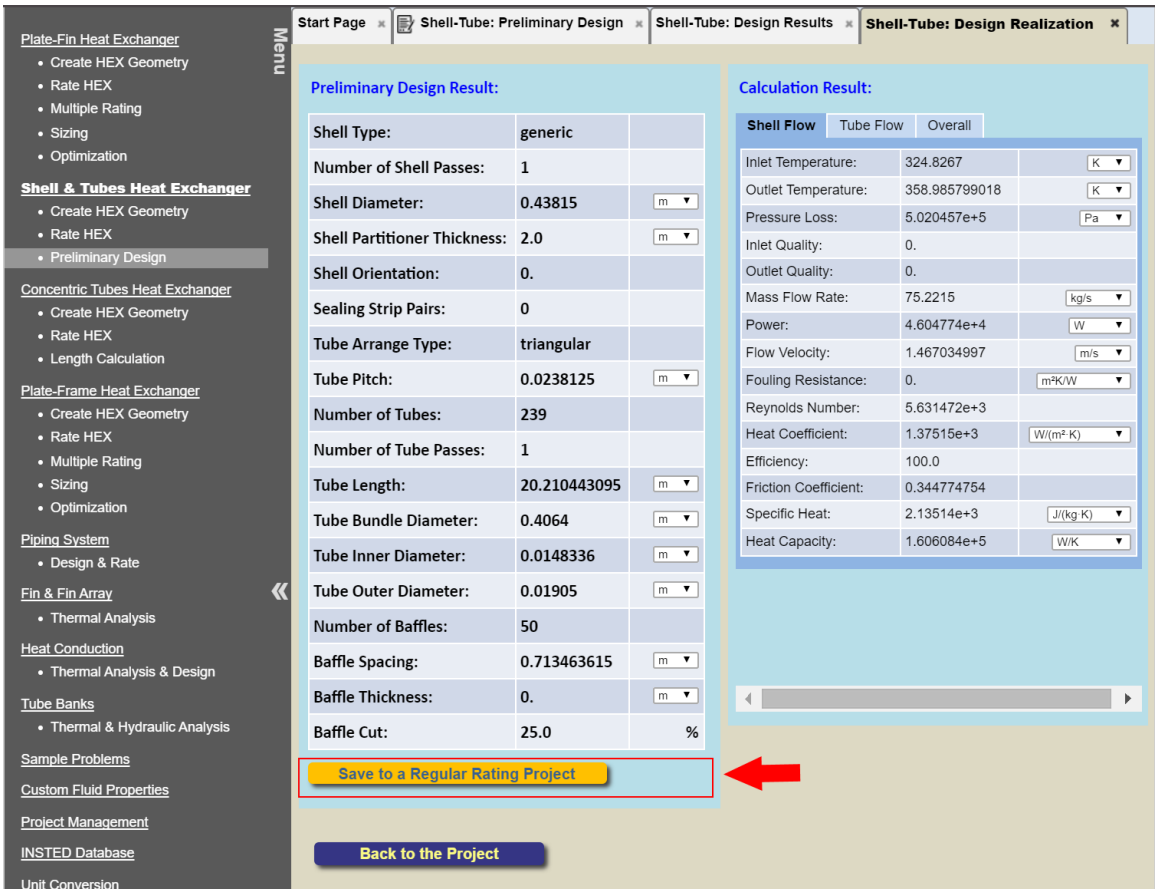


By clicking “Compute” button, a series of possible realizations will be listed



		N_{tube}	Tube Pass	Tube Arrangement	l_{tube} (m)	D_{shell} (m)	ΔP_{tube} (Pa)	ΔP_{shell} (Pa)	Q (W)
◉	1	239	1	3/4 in. tube with 15/16 in. triangular pitch (BWG 14)	20.210443095	0.43815	6.74185e+3	6.478153e+5	4.579878e+6
○	2	301	1	3/4 in. tube with 15/16 in. triangular pitch (BWG 14)	19.972815068	0.48895	4.504892e+3	4.227819e+5	4.601112e+6
○	3	224	1	3/4 in. tube with 1 in. rotated square pitch (BWG 14)	21.407918334	0.48895	7.974915e+3	2.401751e+5	4.53273e+6
○	4	273	1	3/4 in. tube with 1 in. triangular pitch (BWG 14)	20.465517976	0.48895	5.446137e+3	3.134596e+5	4.589303e+6
○	5	361	1	3/4 in. tube with 15/16 in. triangular pitch (BWG 14)	20.145662179	0.5334	3.342329e+3	2.653231e+5	4.592413e+6
○	6	277	1	3/4 in. tube with 1 in. rotated square pitch (BWG 14)	21.017671092	0.5334	5.456814e+3	1.554976e+5	4.534562e+6
○	7	318	1	3/4 in. tube with 1 in. triangular pitch (BWG 14)	20.509825479	0.5334	4.215703e+3	1.918786e+5	4.575404e+6
○	8	442	1	3/4 in. tube with 15/16 in. triangular pitch (BWG 14)	20.834525407	0.59055	2.413013e+3	1.843212e+5	4.613205e+6
○	9	341	1	3/4 in. tube with 1 in. rotated square pitch (BWG 14)	20.917231946	0.59055	3.821166e+3	1.030853e+5	4.556891e+6
○	10	381	1	3/4 in. tube with 1 in. triangular pitch (BWG 14)	20.703781825	0.59055	3.134515e+3	1.293726e+5	4.592569e+6
○	11	413	1	3/4 in. tube with 1 in. rotated square pitch (BWG 14)	21.130293943	0.635	2.781107e+3	8.235654e+4	4.583909e+6

Check the radio button of one realization and click “Rate Selected Realization” button will view the details of the realization.



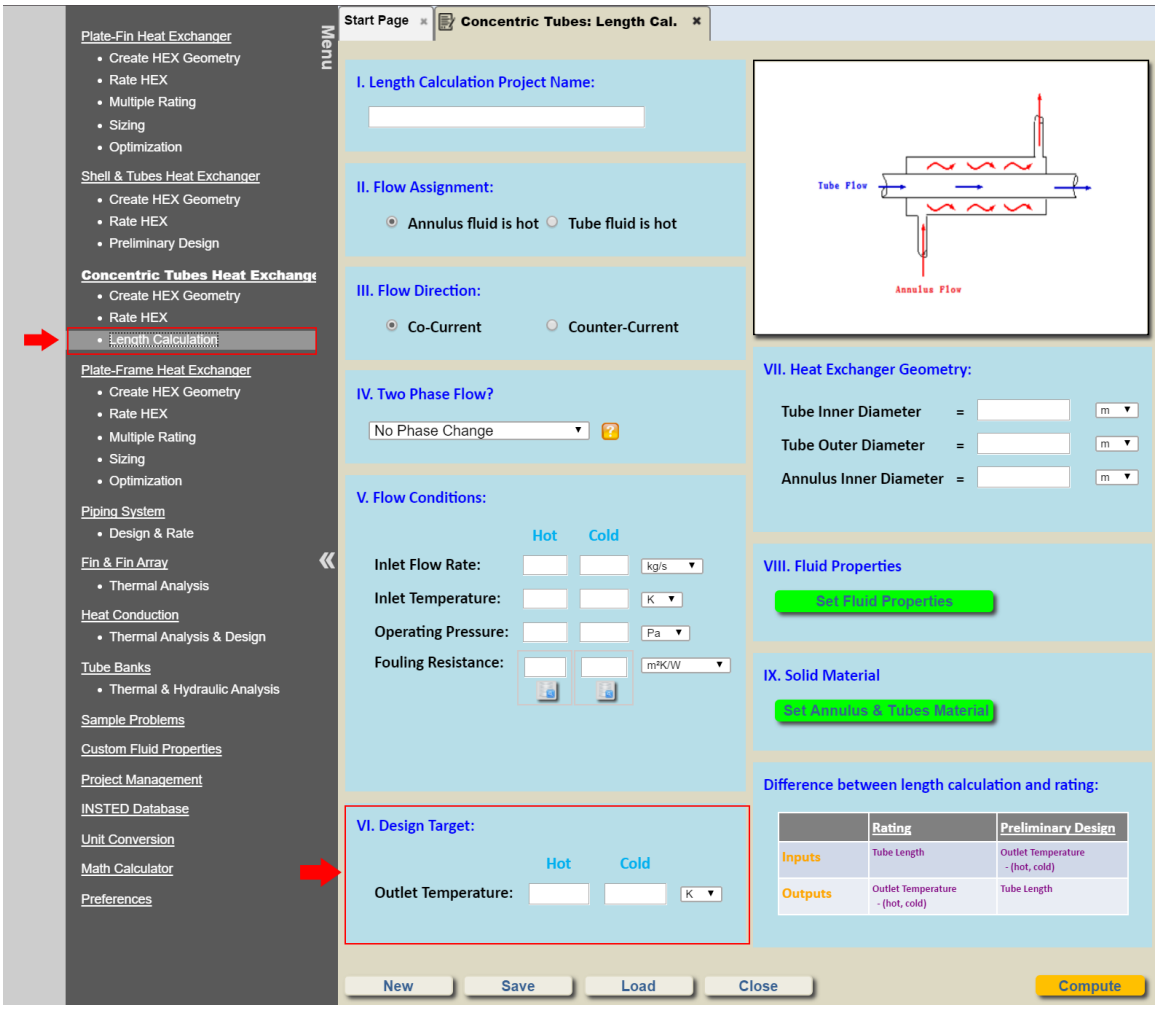
The design results are shown and user can also save this realization result into a separate, regular, rating project.

Note that:

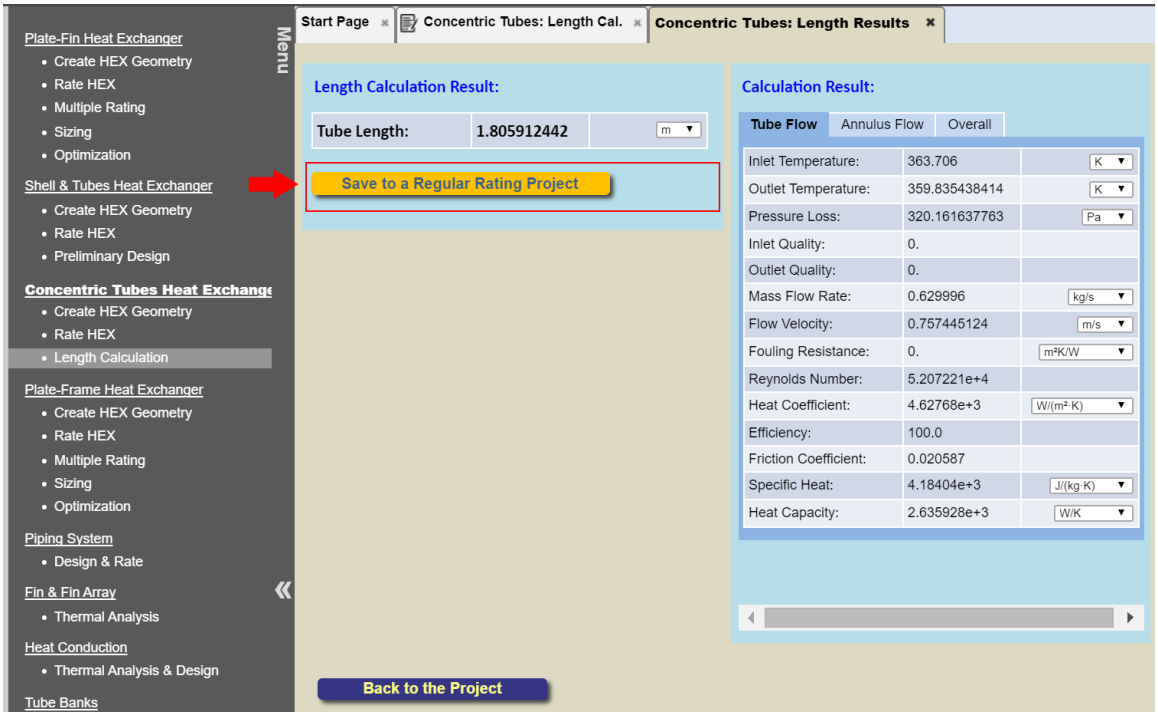
- Two-phase calculation is currently not supported for the preliminary design calculation in Shell & Tubes module.

#8. "Length Calculation" Module is added to "Concentric Tubes HEX"

In "Length Calculation", the length of the concentric tubes heat exchanger is unknown. User only need to provide the "Design Target", which is the outlet temperature of the hot and cold streams, INSTED can try to calculate the length of the concentric tubes to achieve the design target.



By clicking “Compute” button, the calculation result will be shown. User can also save the calculation result into a separate, regular, rating project.



Note that:

- Two-phase calculation is currently not supported for the length calculation in Concentric Tubes module.