How to get started in HTRI

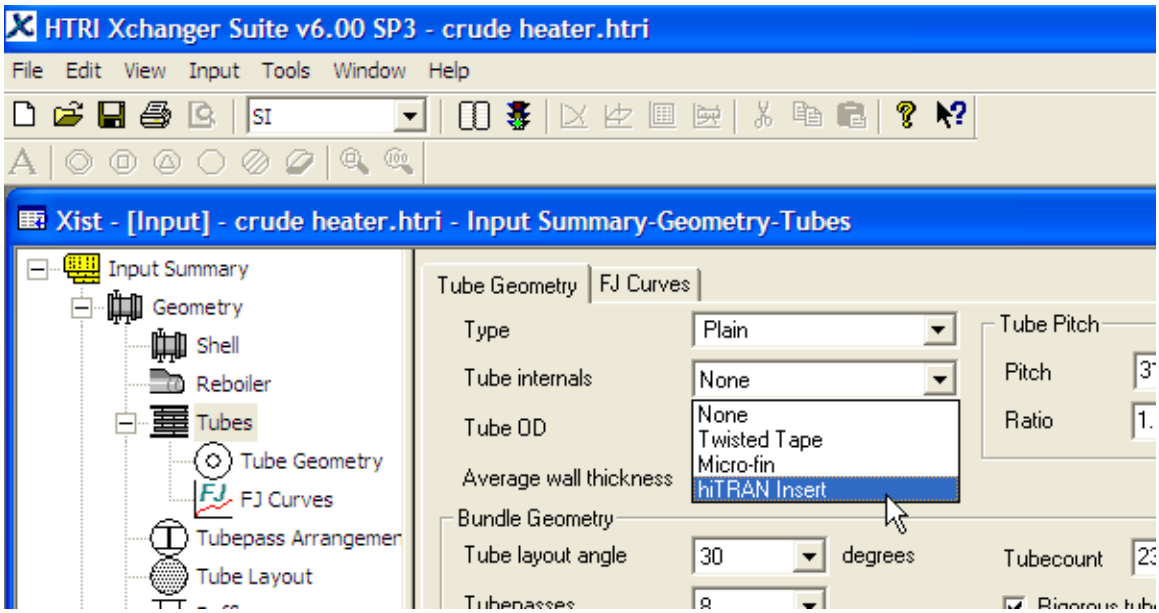
Dll needs to be installed on the user's machine

HTRI V6 SP3 has to be installed!

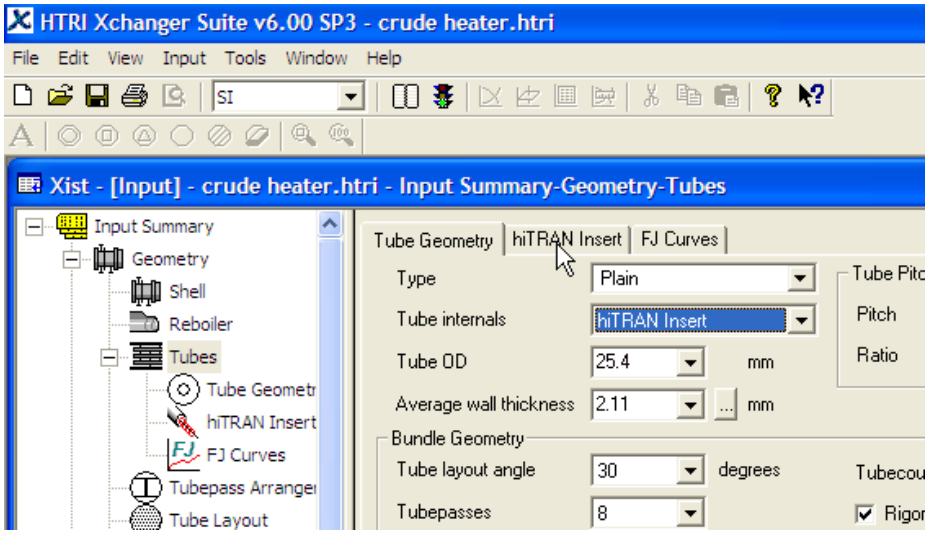
Limitations: Single Phase Flow only

Xist

The hiTRAN option can be found as shown in the screenshot:



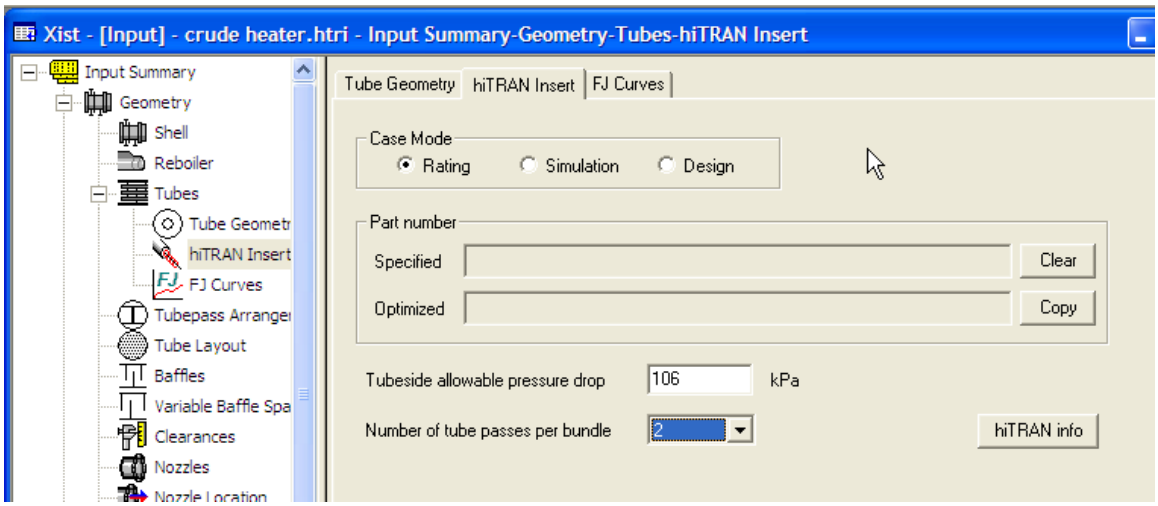
Once the option is clicked a new Tab **hiTRAN Insert** is added. Also on the left in the tree view the hiTRAN Insert Tab is added



Once selected the tube side heat transfer and pressure drop calculations are based on Cal Gavin data.

Depending on the selected Calculation Mode in HTRI (Rating; Simulation)
The plug in behavior differs as explained below:

The user needs to click the [hiTRAN Insert] tab in order to access the hiTRAN Input Panel:



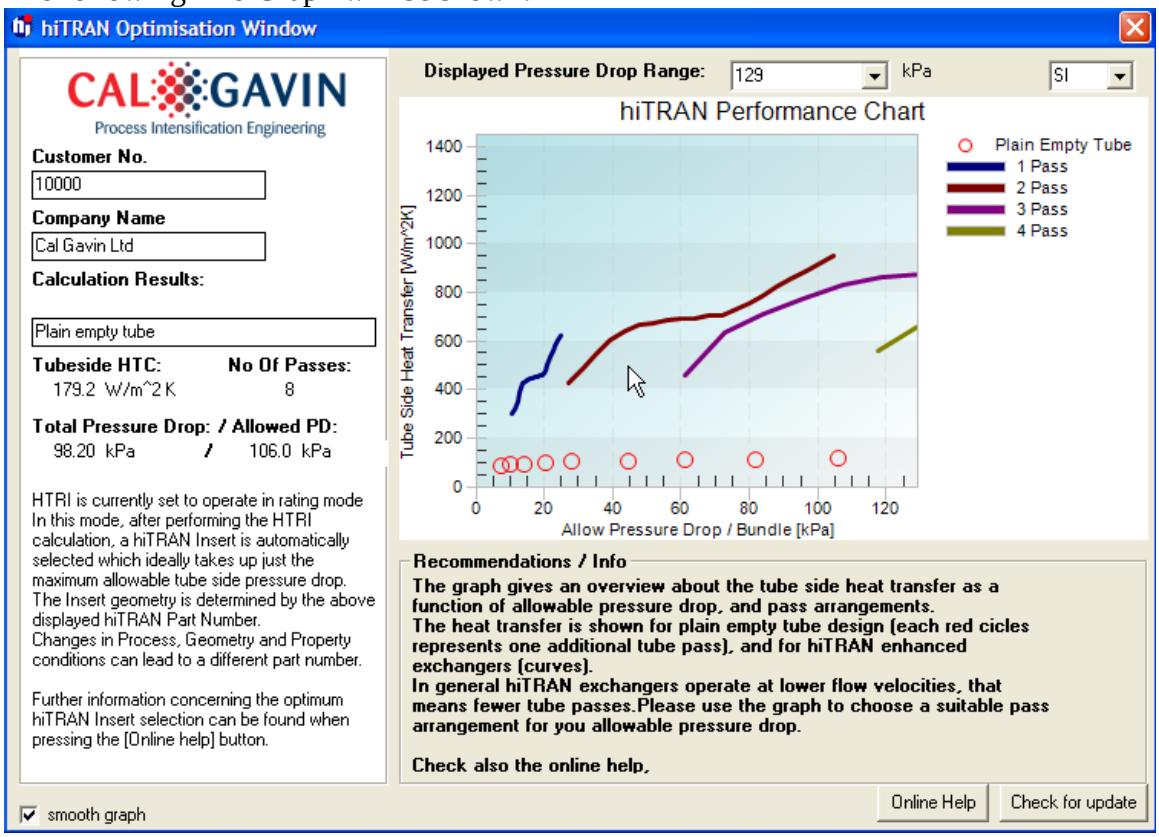
Rating Case / Optimizing Insert Geometry

In case rating is selected the hiTRAN plug in will try to find a Insert geometry (Loopdensity) which just takes up all the allowable pressure drop in order to give the highest tube side heat transfer. Main parameters to influence the result are:

- Allowable tube side pressure drop
- Number of tube passes per bundle

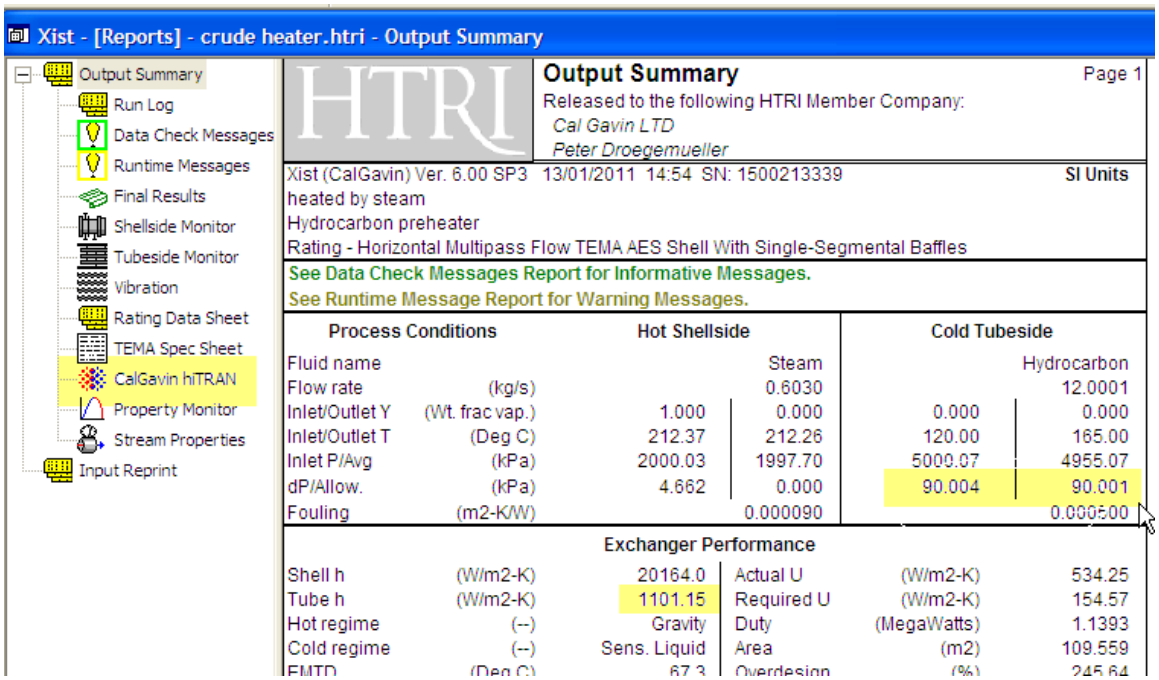
In order to see what kind of combination is useful the hiTRAN Info button can be clicked. ! Prior of doing this, the case to be run once in HTRI!

The following Info Graph will be shown:

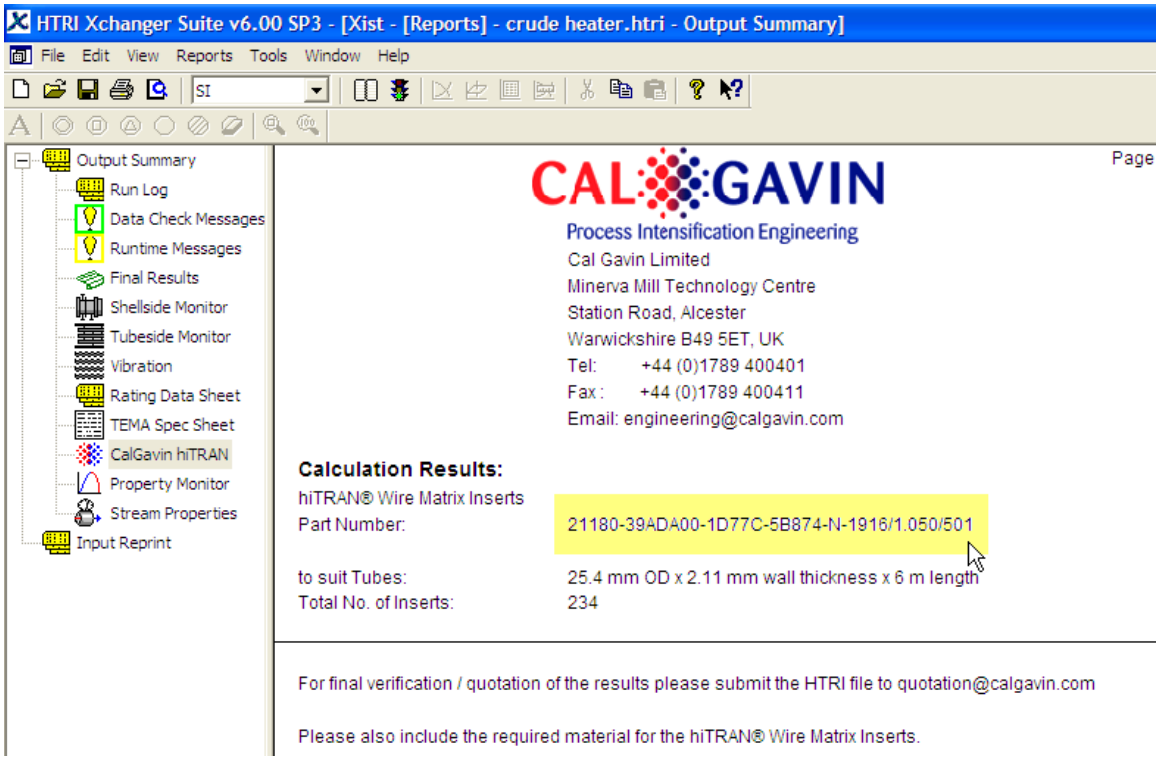


This graph gives additional Information how to choose the pass arrangement with hiTRAN in order to stay within the allowable pressure drop. In an optimised design the allowable pressure drop should equal the calculated pressure drop

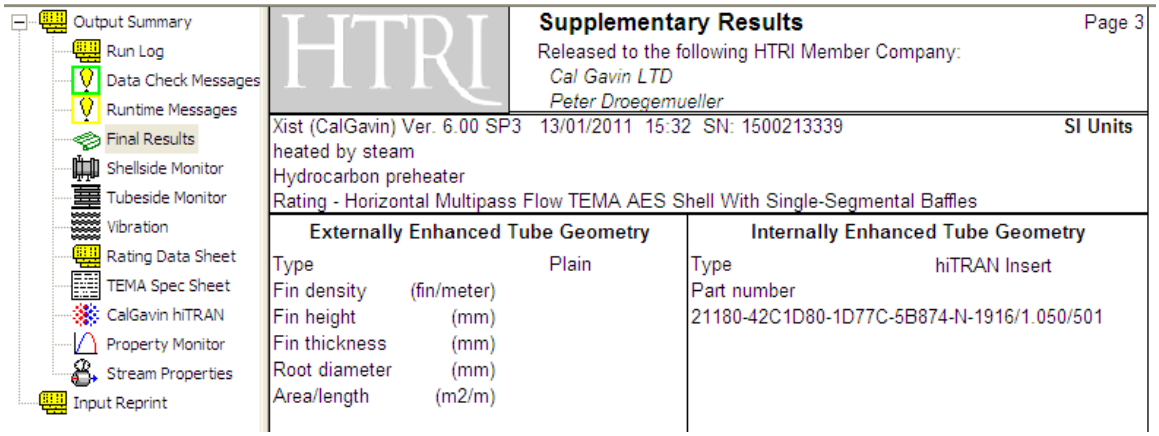
The case can be run and in the Output summary the hiTRAN pressure drop and heat transfer can be seen.



There is also an additional Cal Gavin Report tab in the output tree.
Here the so called part number which determines the Geometry is displayed:



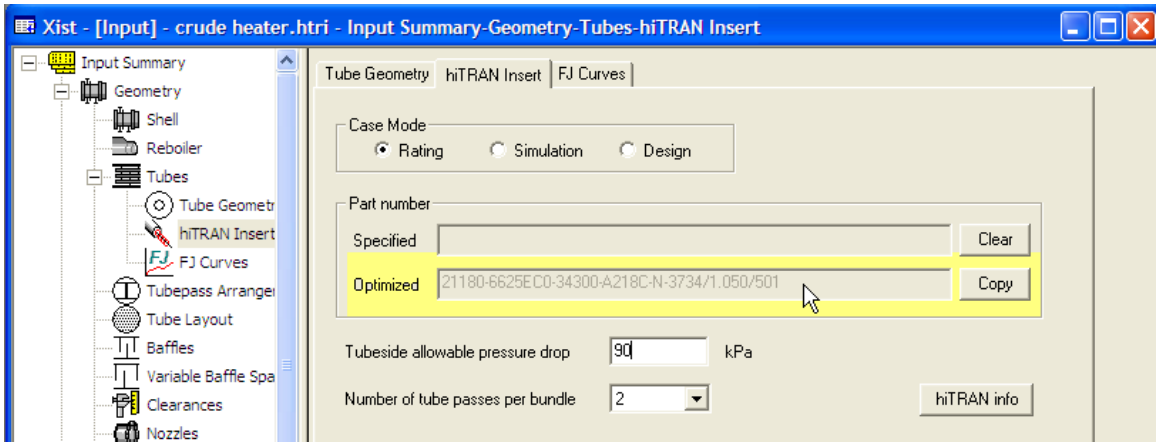
The Part number is also displayed in the supplementary Result sheet and under Remarks in the TEMA sheet



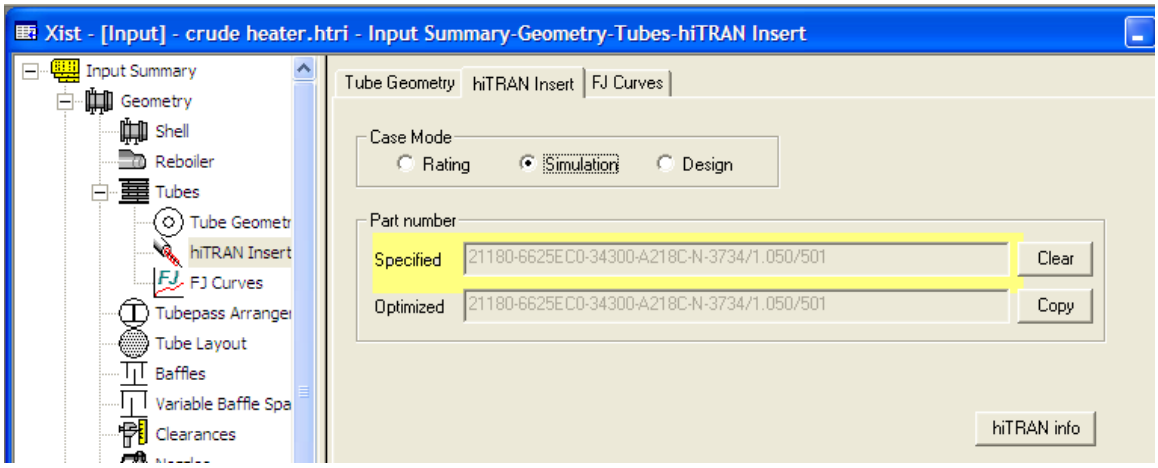
Simulation Case / Runs case with fixed Insert Geometry

In Simulation Mode the Insert is fixed. This means different process conditions can be simulated with a fixed Insert Geometry. To do this the following steps needs to be undertaken:

1.
Prior to simulation the case has to be run in Rating checking mode in order to find an optimized Insert.



In this mode a part number is calculated and displayed under ***Optimized***.
To keep this Part Number fixed in a next step this part number has to be copied to the Specified field. This is done by pressing the ***Copy*** button.



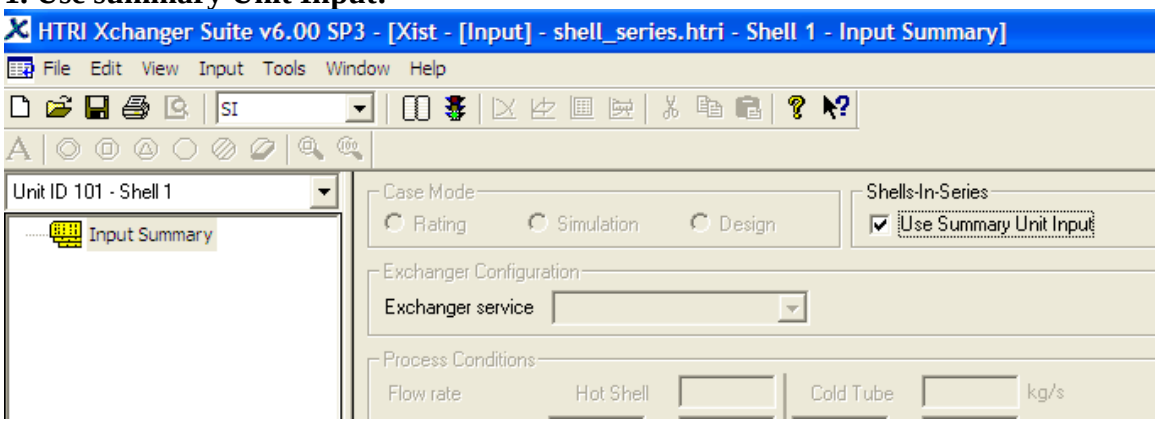
This Part number stays fixed when running in simulation Mode.

In General now the calculated pressure drop will differ from allowable pressure drop.

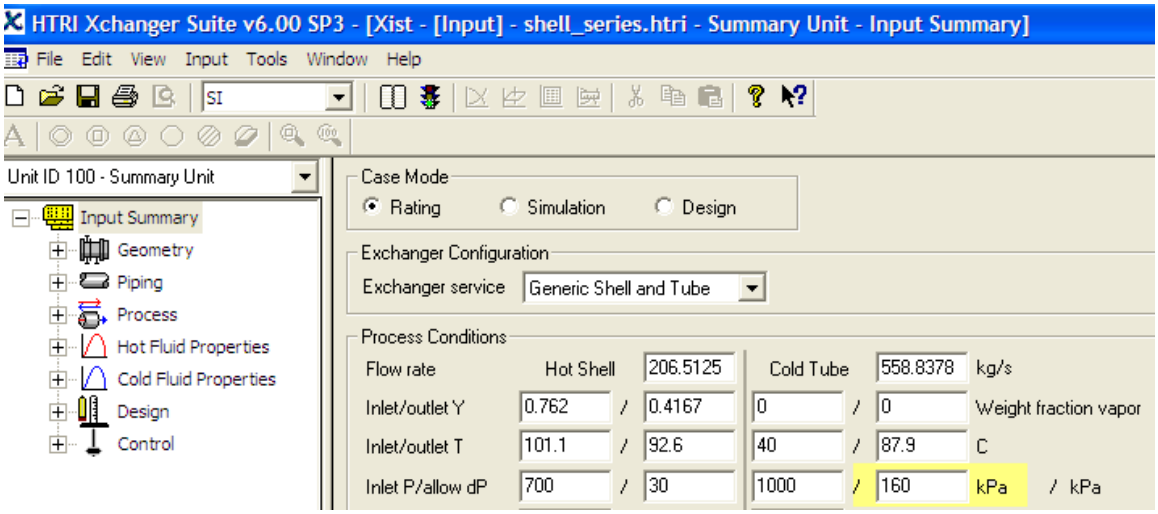
Shells in Series:

When designing a heat exchanger for shells in series the hiTRAN option can also be used. There are two different possibilities

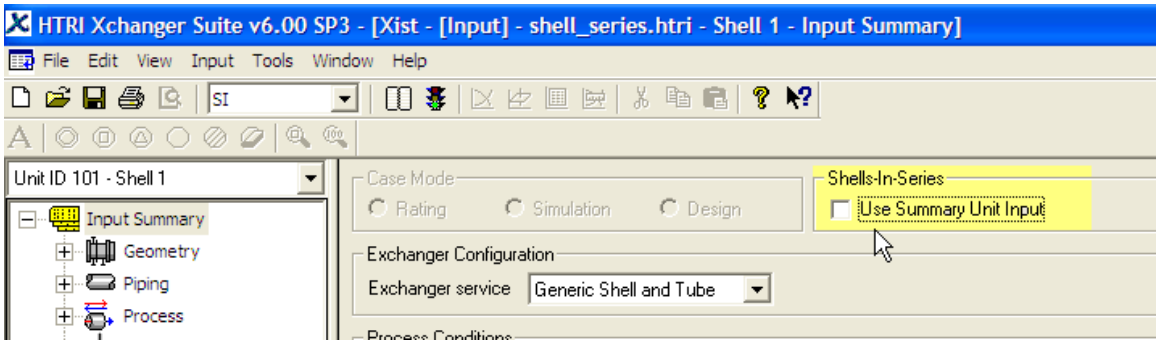
1. Use summary Unit Input:



If this is chosen the allowable pressure drop entered will be used for each shell as allowable pressure drop. This means this value will determine the hiTRAN Geometry. In the example below with two shells in series the end result for the total pressure drop would be 320kPa because for each shell a Insert Geometry will be selected which takes up just the 160kPa.



1. No Summary Input is used:



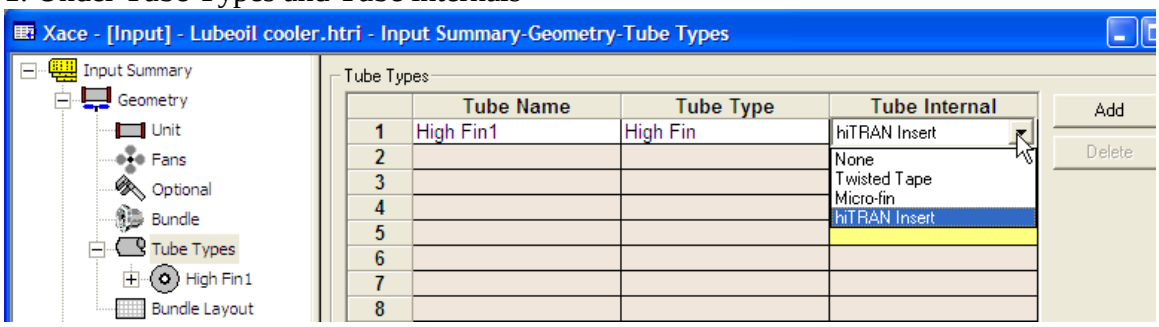
In this case for each bundle an ***"individual"*** allowable pressure drop can be used.
The total allowable pressure drop will be the added allowable pressure drop of all the shells in series.

Tip: Part Number can be copied when exporting the Cal Gavin Result sheet. It can also be copied when using the hiTRAN Info Button

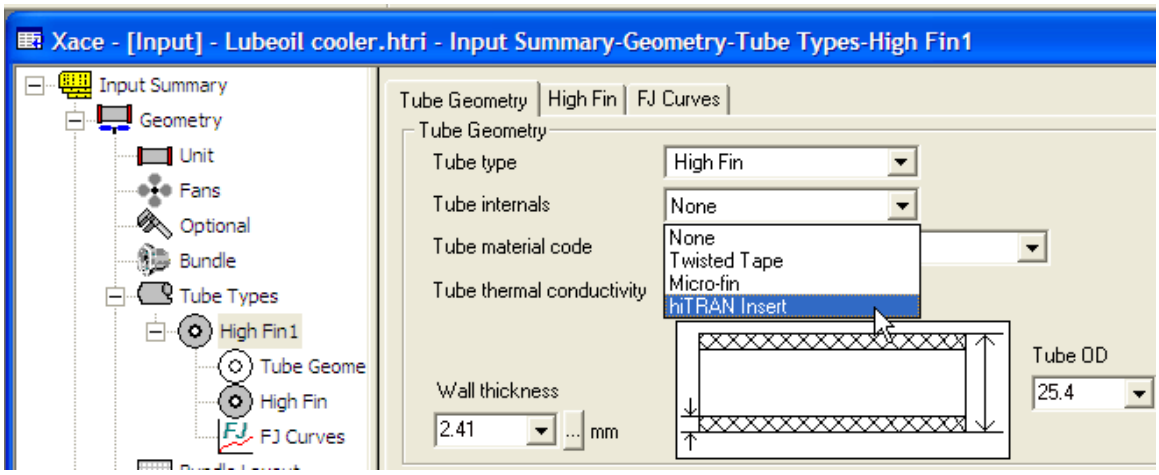
Xace

Once the hiTRAN plug in is installed, the hiTRAN option can be found as shown in the screenshot:

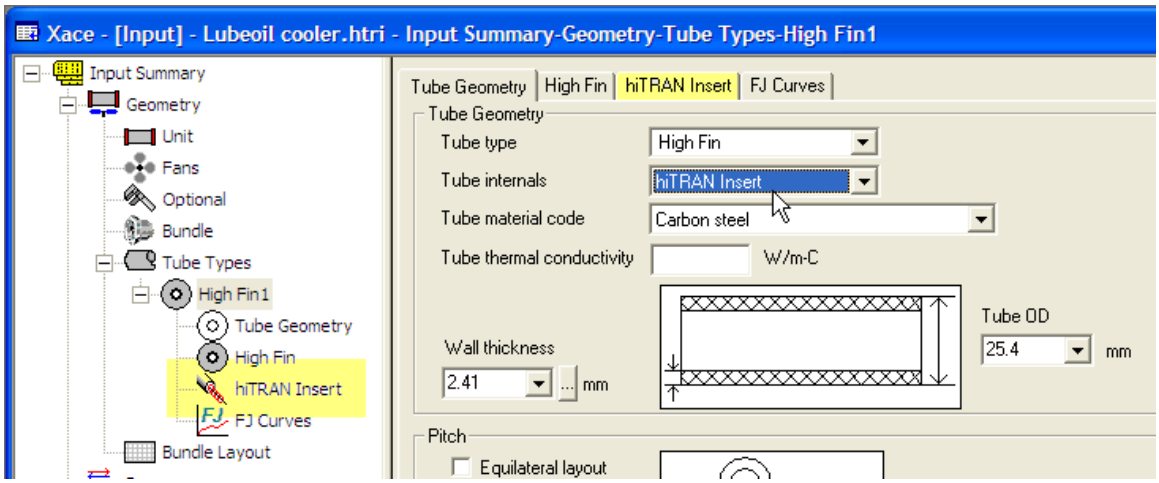
1. Under Tube Types and Tube internals



2. In addition for each tube type the tube internal can be set as shown in the picture below



Once selected the tube side heat transfer and pressure drop calculations are based on Cal Gavin data.



The hiTRAN Insert tab is generated similar to the Xist programme.

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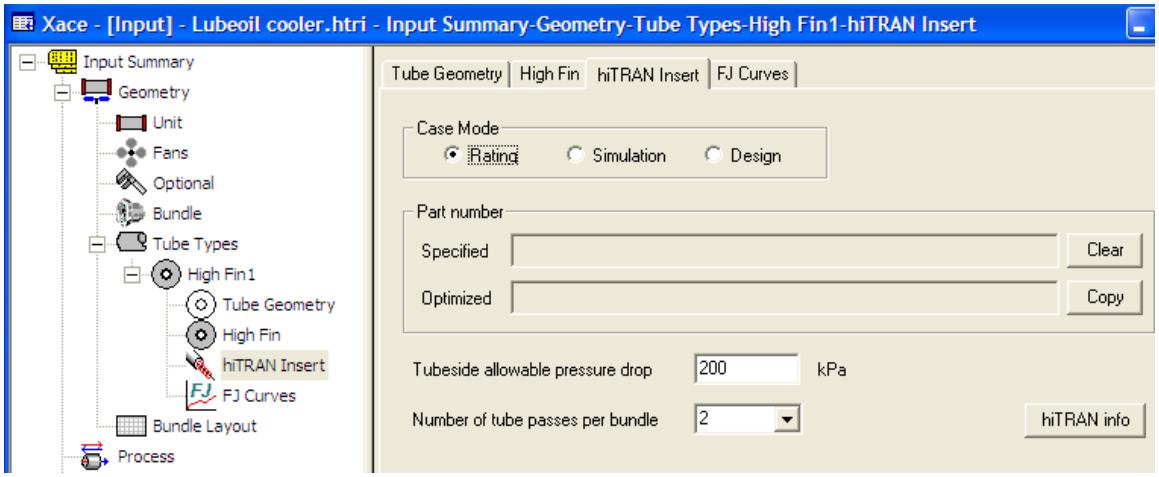

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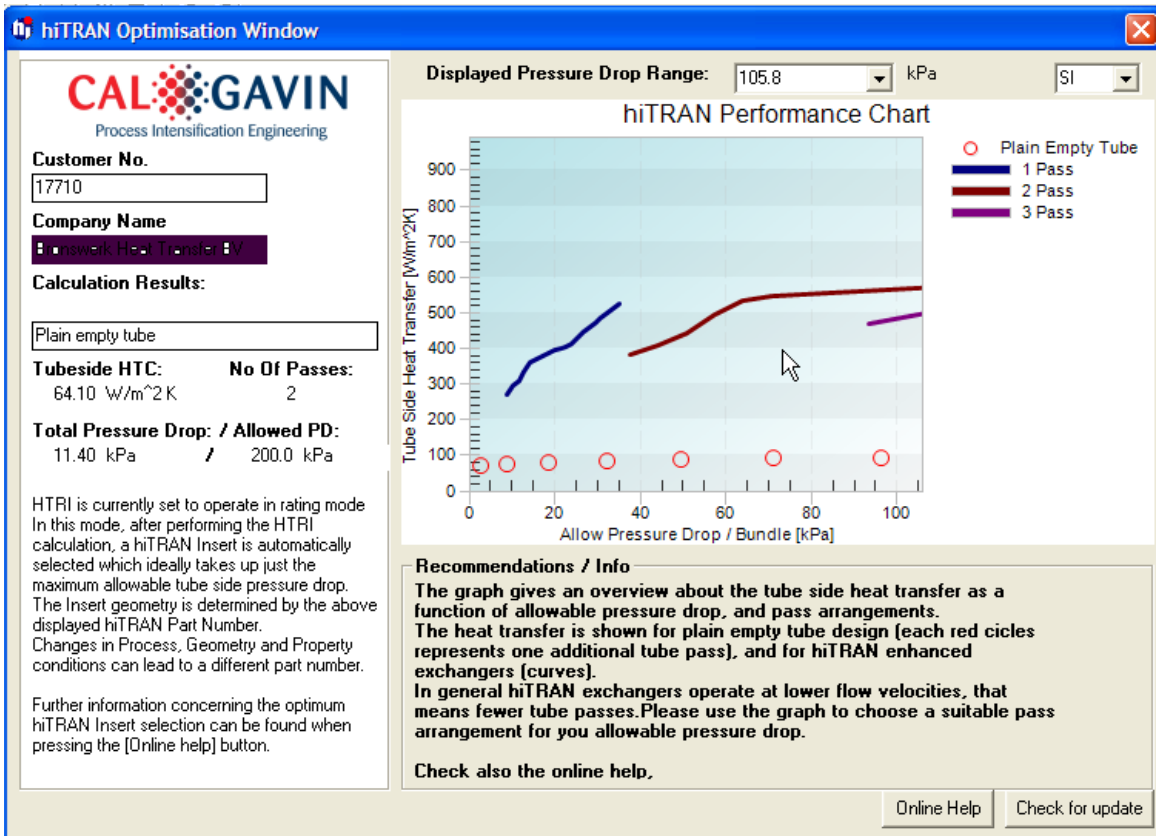

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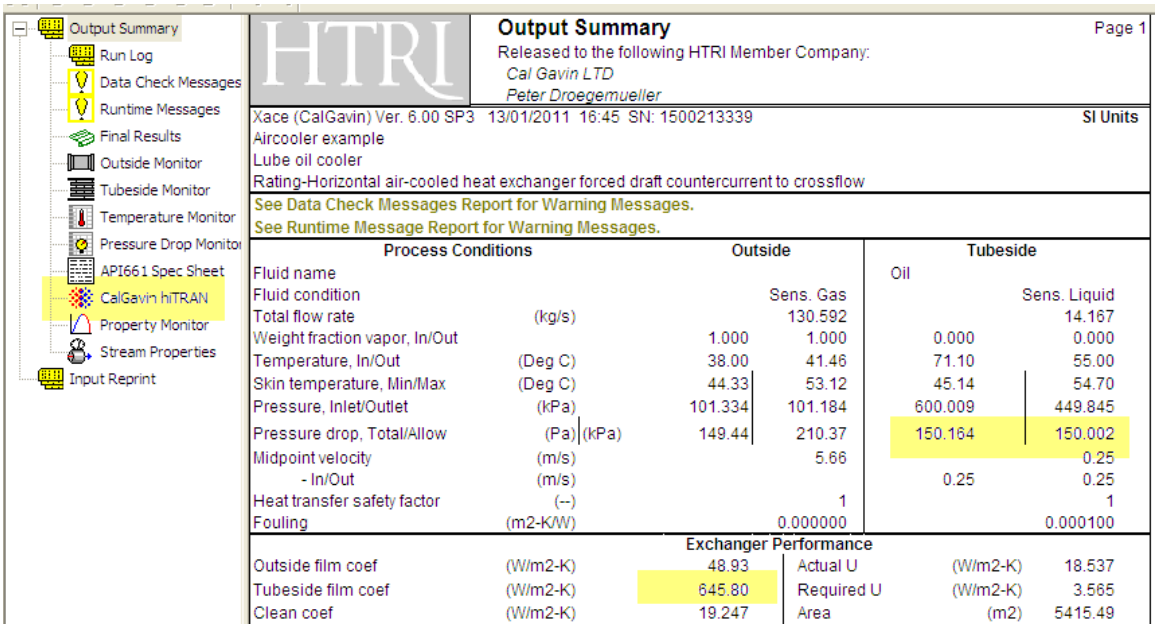

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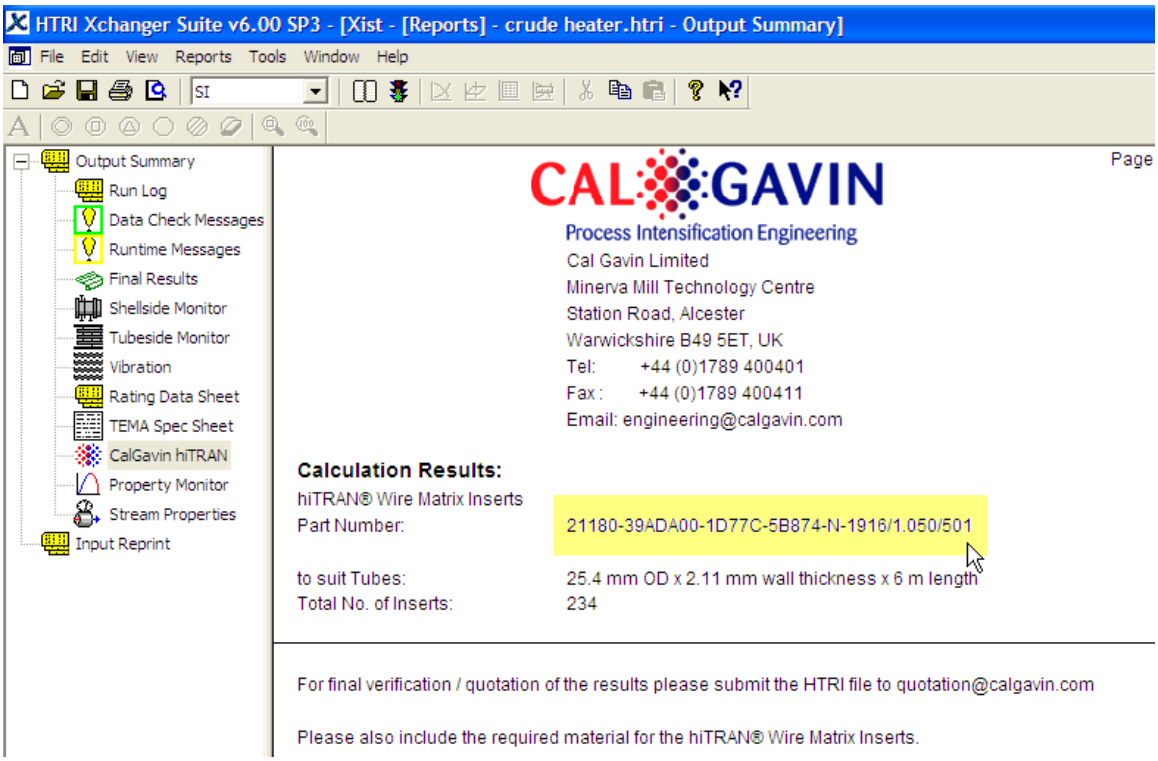

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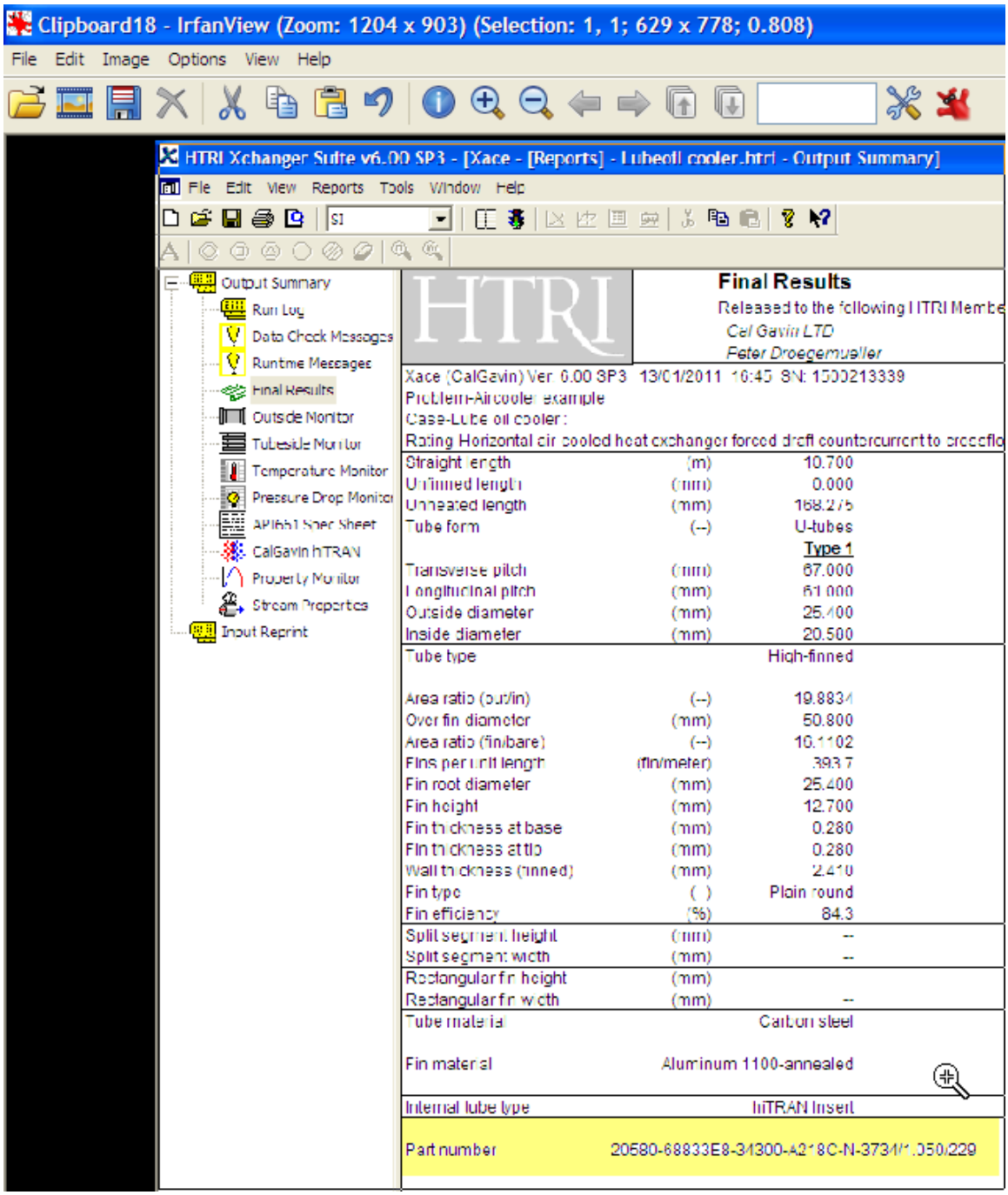

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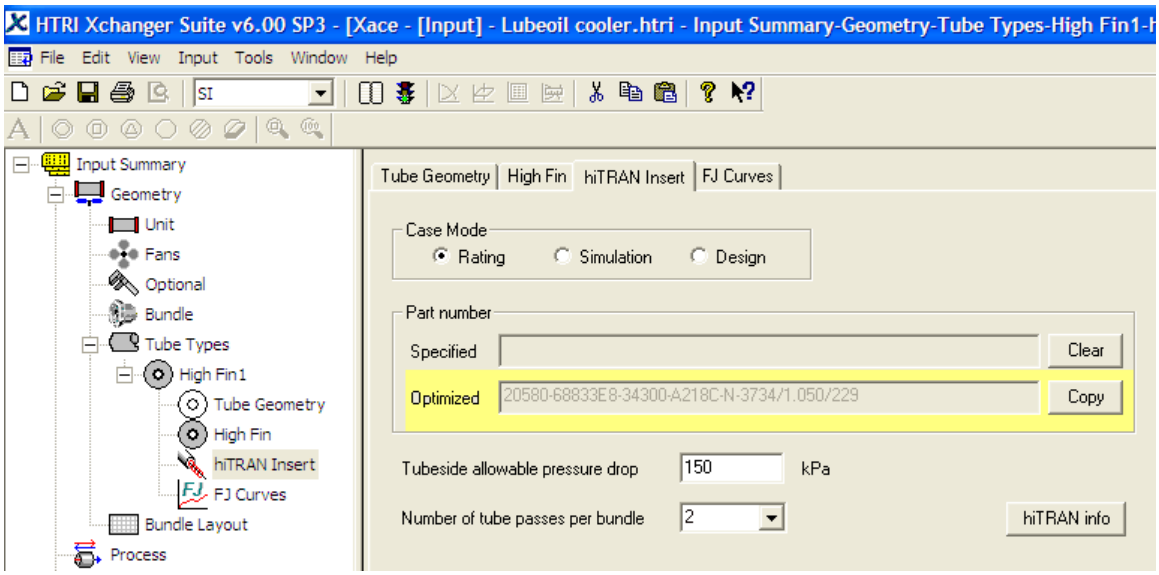

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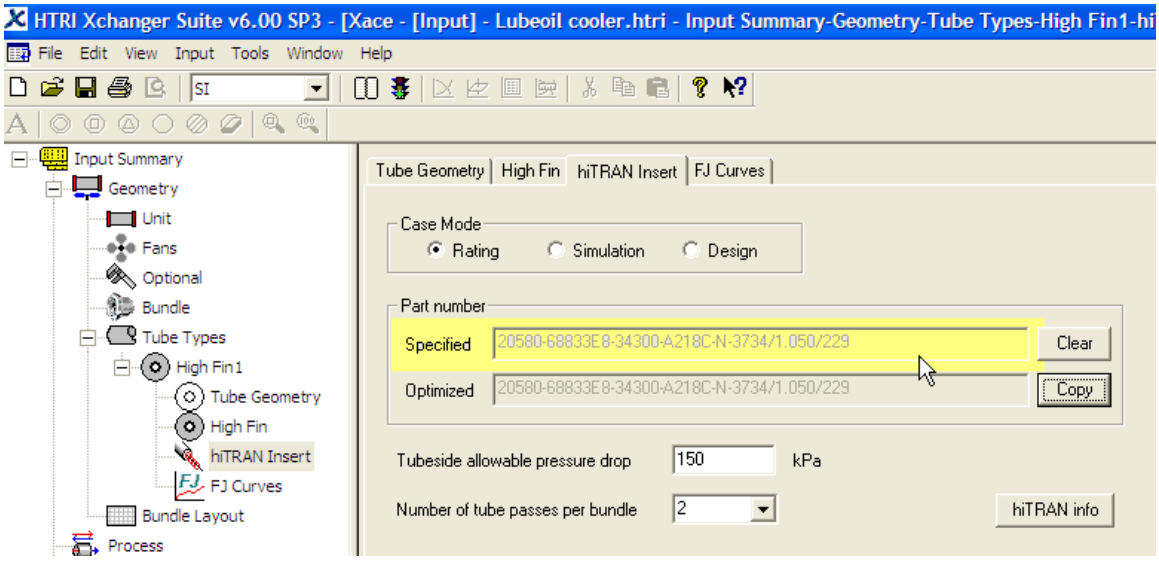

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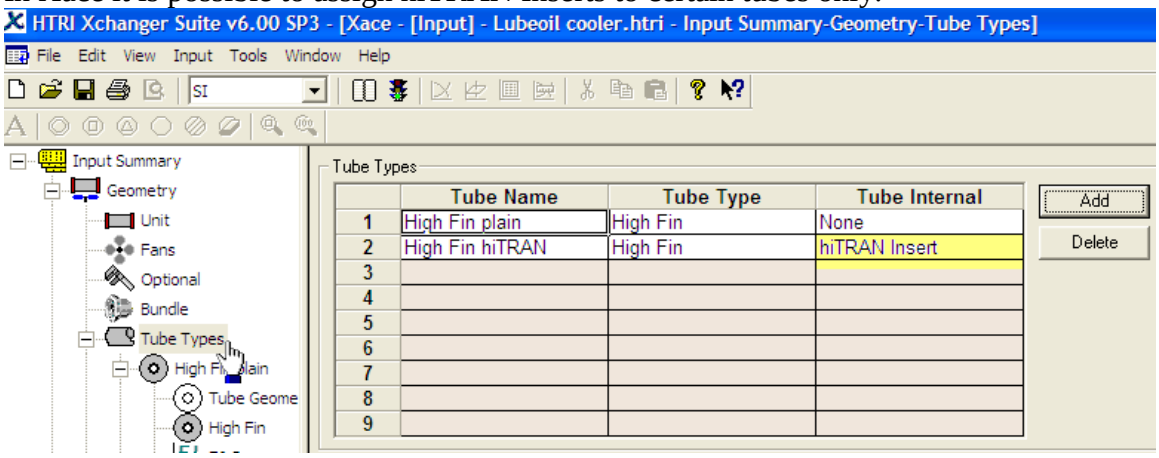
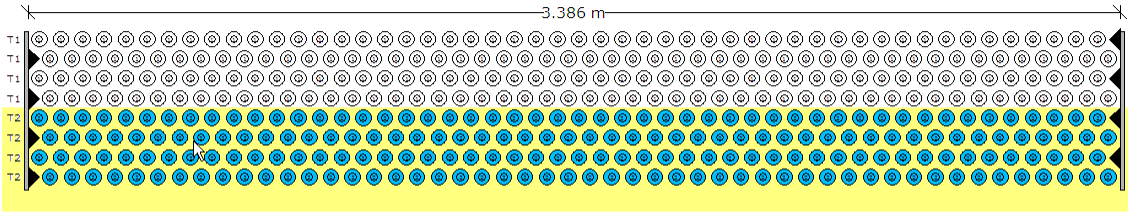
Assigning Inserts only for certain tube passes in Xace

In Xace it is possible to assign hiTRAN Inserts to certain tubes only.



Under tube types a tube type with hiTRAN Internals can be added. This tube type then has to be assigned in the **Bundle Layout** to different tubes within the exchanger.
In reality it should be only assigned to tubes of an entire tube pass.



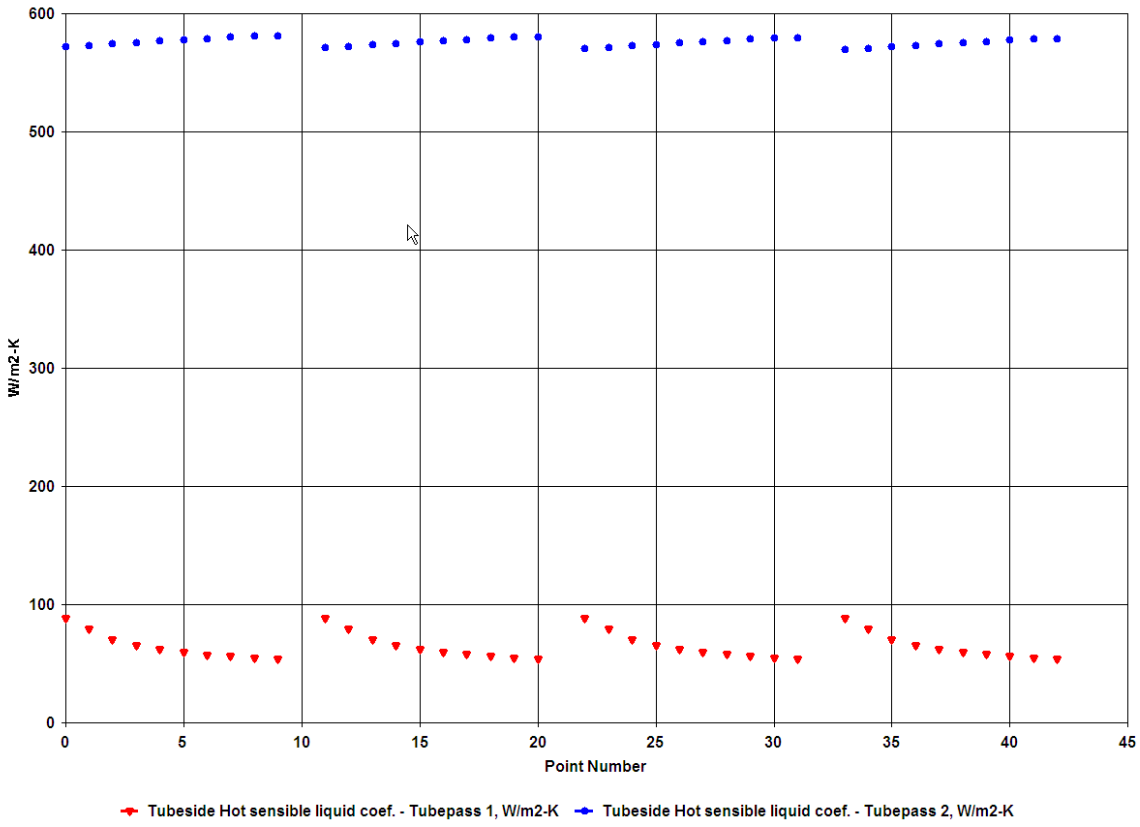
	Name	Type	Outer Diameter (mm)	Wall Thickness (mm)	Transverse Pitch (mm)	Longitudinal Pitch (mm)	Fin Height (mm)
1	High Fin plain	High-finned	25.4000	2.4100	67.0000	61.0000	12.7000
2	High Fin hiTRAN	High-finned	25.4000	2.4100	67.0000	61.0000	12.7000

Bundle Information

Bundle width	3.386	m
Number of tube rows	8	
Number of tubes	400	
Minimum wall clearance		
Left	9.5250	mm

In this example hiTRAN has been assigned to tubes in the second tube pass. The first tube pass is set to plain empty

When running the calculation the plug in will try to find an Insert Geometry which will take up the allowable pressure drop for the whole bundle. This takes into account the plain empty tube pressure drop. When showing the graph for tube side heat transfer the difference can be noted:


600
500
400
300
200
100
0
W/m2-K
0
5
10
15
20
25
30
35
40
45
Point Number
Tubeside Hot sensible liquid coef. - Tubepass 1, W/m2-K
Tubeside Hot sensible liquid coef. - Tubepass 2, W/m2-K