Heat flow project management in Simu-Therm 8.0

Hilger & Daniel Software GmbH
www.simu-therm.de

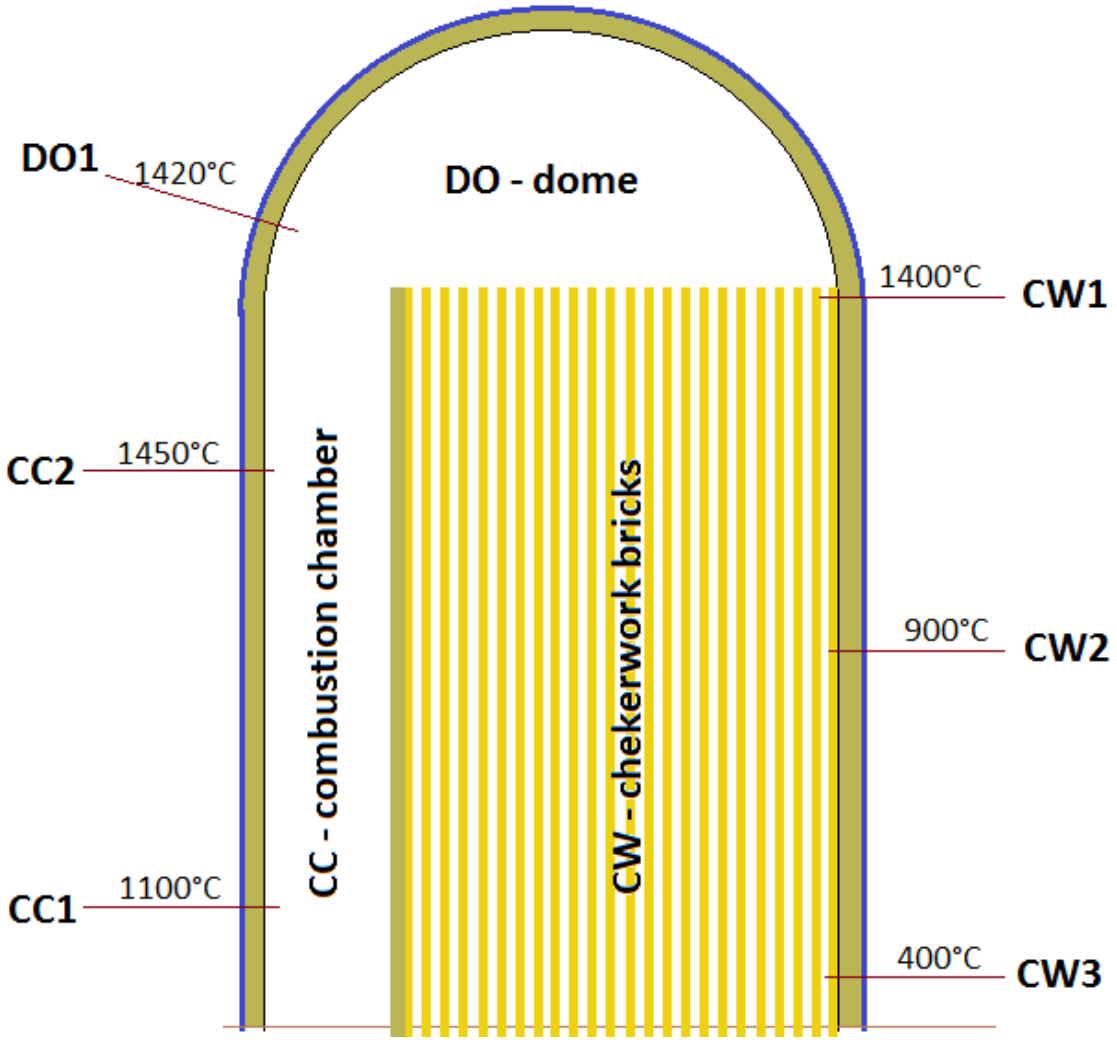
Contents

Structure of this tutorial

This tutorial shows how you can simplify your work on the heat flow calculations with the project management of Simu-Therm 8.0. You learn step by step how to collect your calculations in a project.
You can define temperature cases such as summer/winter conditions in order to print all calculations with different ambient temperatures, and select the language of the printouts.
When it comes to changes in a technical project, the simultaneous modification of calculations is a powerful tool to simplify your work. You can all of the calculations or subsets of them.
If you need to process calculation results further, you can export selected results to a CSV-file readable in Excel.

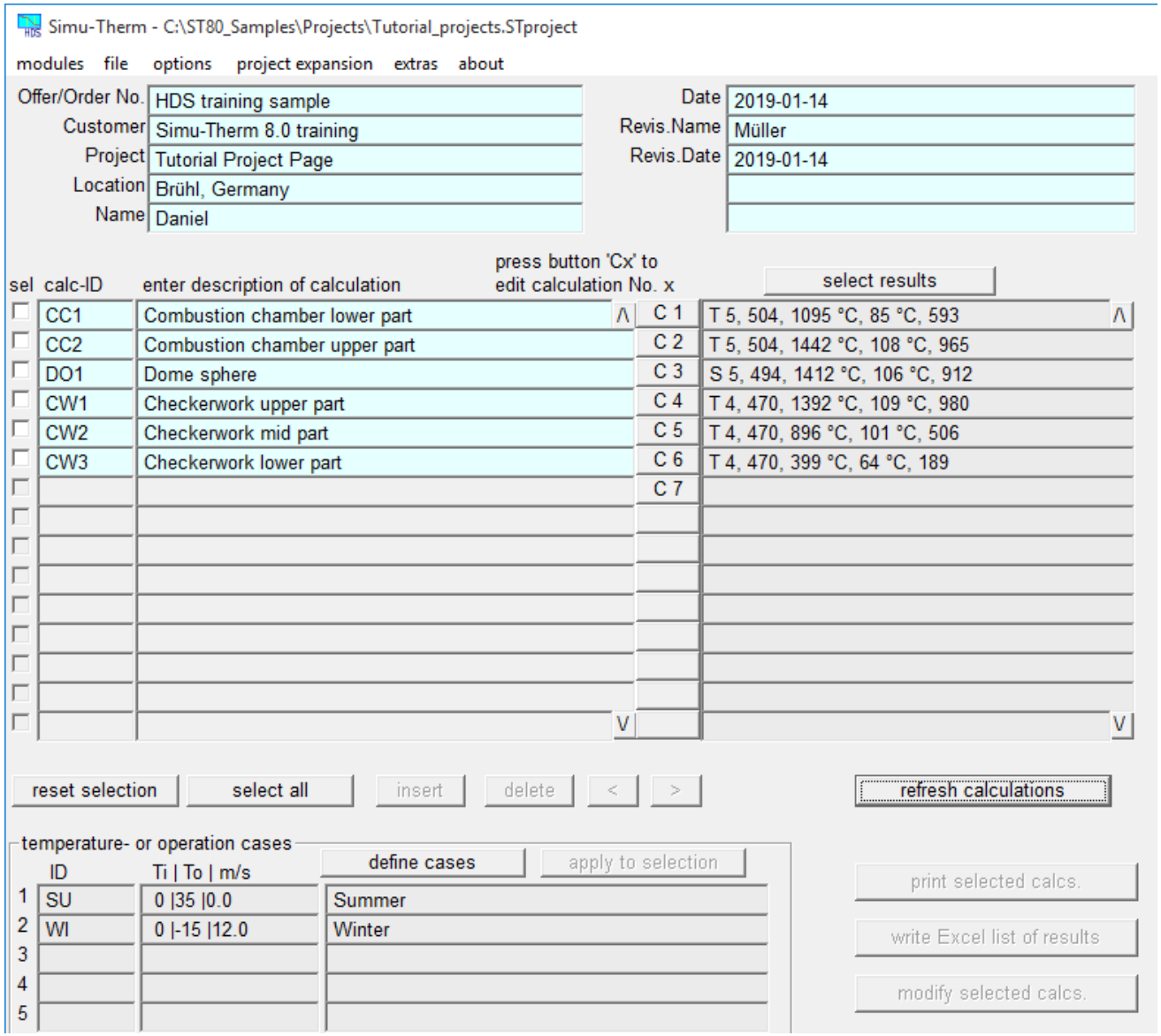
The sample project: Cowper

In our sample project we collect the heat loss calculations for the lining of a cowper.
Combustion chamber and the checkerwork region require tube wall calculations, whereas the dome is a sperical wall.



Overview Steady State calculation page

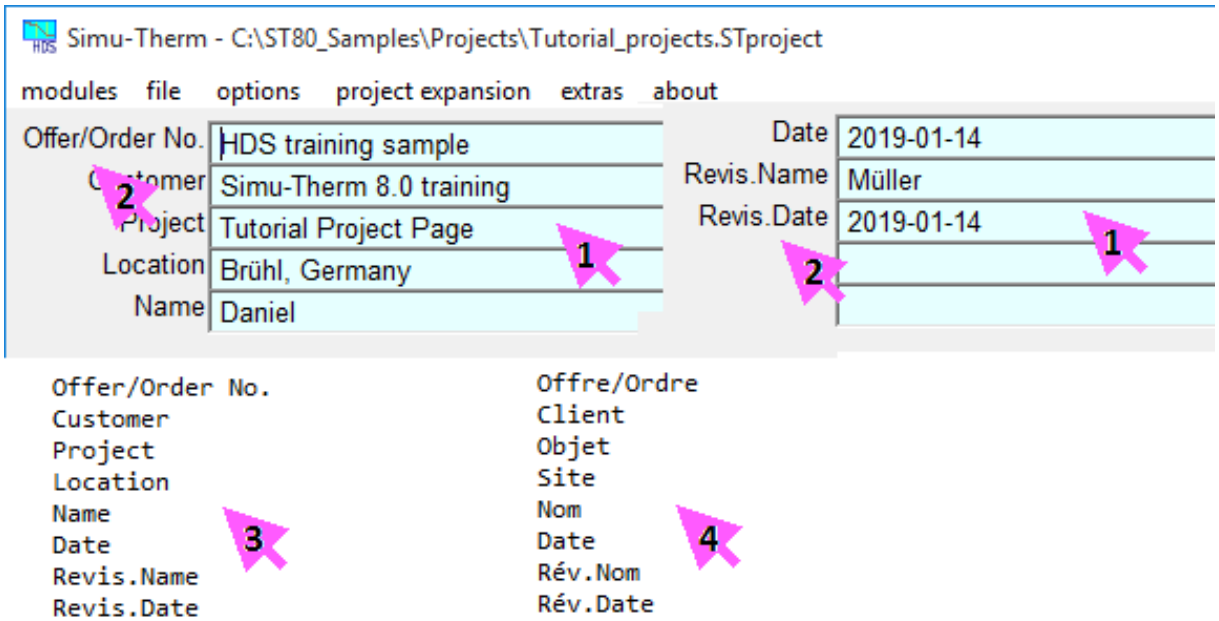
1. descriptions
2. ambient conditions
3. anchor + atmosphere
4. result block
5. geometric properties
6. enter layers
7. layer management
8. navigation in the project



Enter print text of the project

In Simu-Therm up to 10 texts can be entered which are printed in the headers of the print pages (e.g. in steady state print, transient print, expansions print). The descripions of the text items are printed too. They are kept in a text file 'ST_itemsXX.txt' for every language XX to be used printouts.

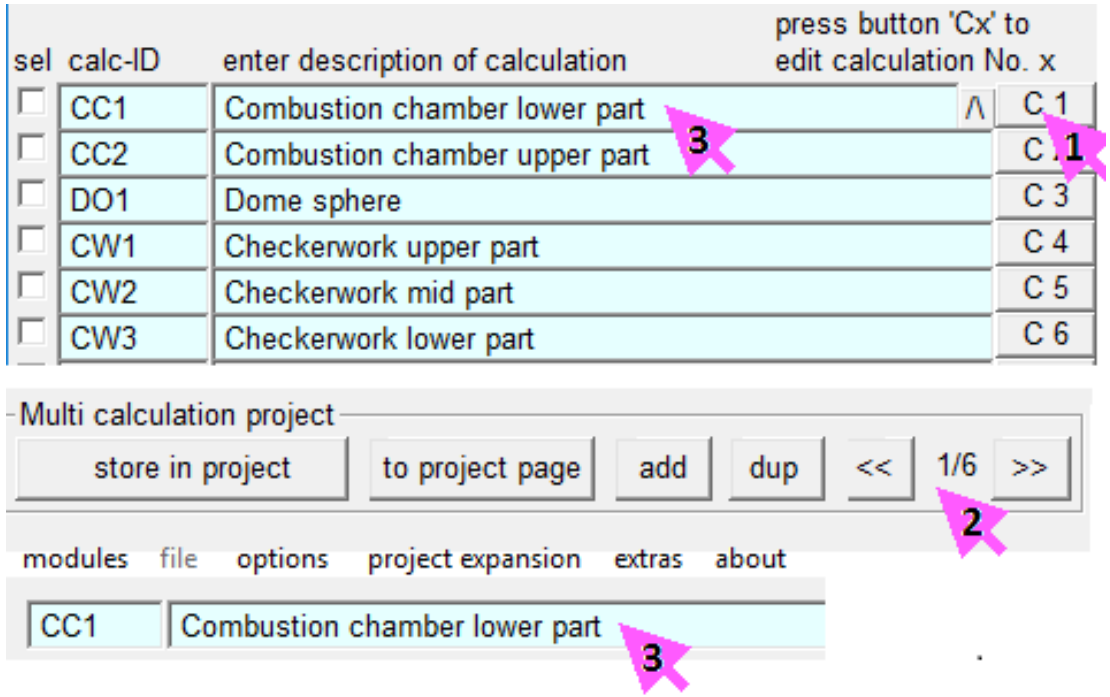
1. text fields
2. descriptions of the text fields
3. content of 'ST_itemsEnglish.txt'
4. content of 'ST_itemsFrench.txt'



Enter the calculations of the cowper

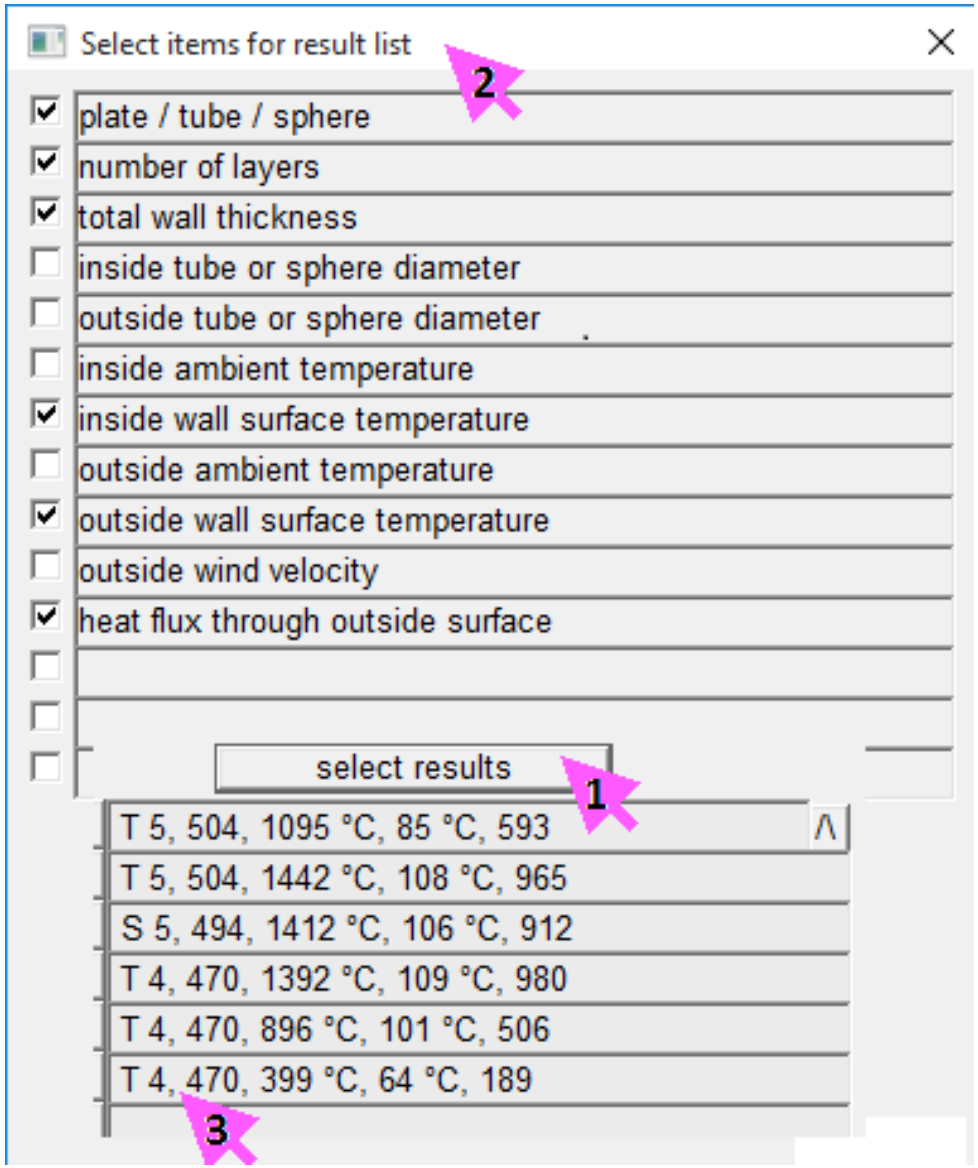
Enter the six cowper calculations. If you are not familiar with the steady state page, please read first the *'Tutorial_SteadyState.pdf'*

1. click on **'C1'** to switch to the steady state page
2. on the steady state page:
Use the navigation line to store, add or duplicate calculations and to switch between calculation and project
3. every calculation has 3 text fields. The first 2 fields can be entered also on the project page



Select overview results

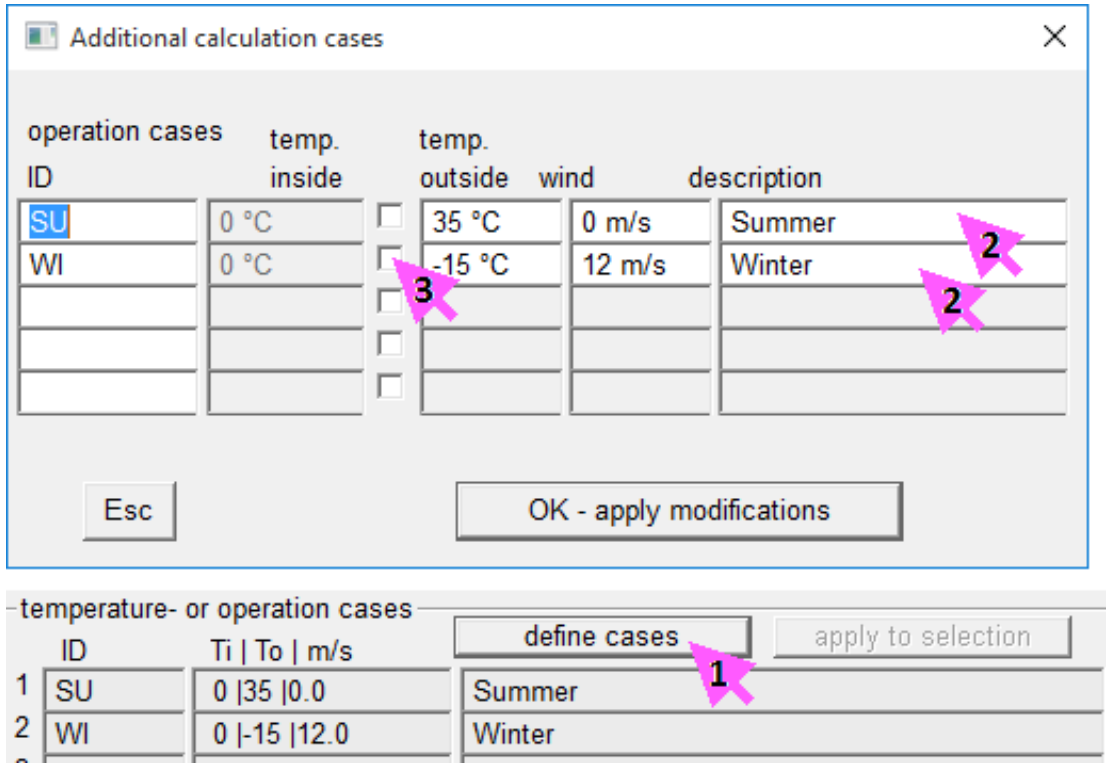
1. click on **'select results'** to open the result selection
2. select the calculated or entered figures you want to see on the project page
3. first three columns in the table: shape(Plate, Tube, Sphere), number of layers, total thickness



Define temperature cases for printing

In order to print the calculations with different outside conditions (typically: summer and winter), you need not make modified copies of the calculations. Instead, you can define up to 5 additional temperatures. They affect printouts only and **do not change the calculations**.

1. click on *'define cases'*
2. for every temperature case: enter ID, outside temperature, wind speed and description
3. if you want a different inside temperature too, activate the check box and enter the temperature



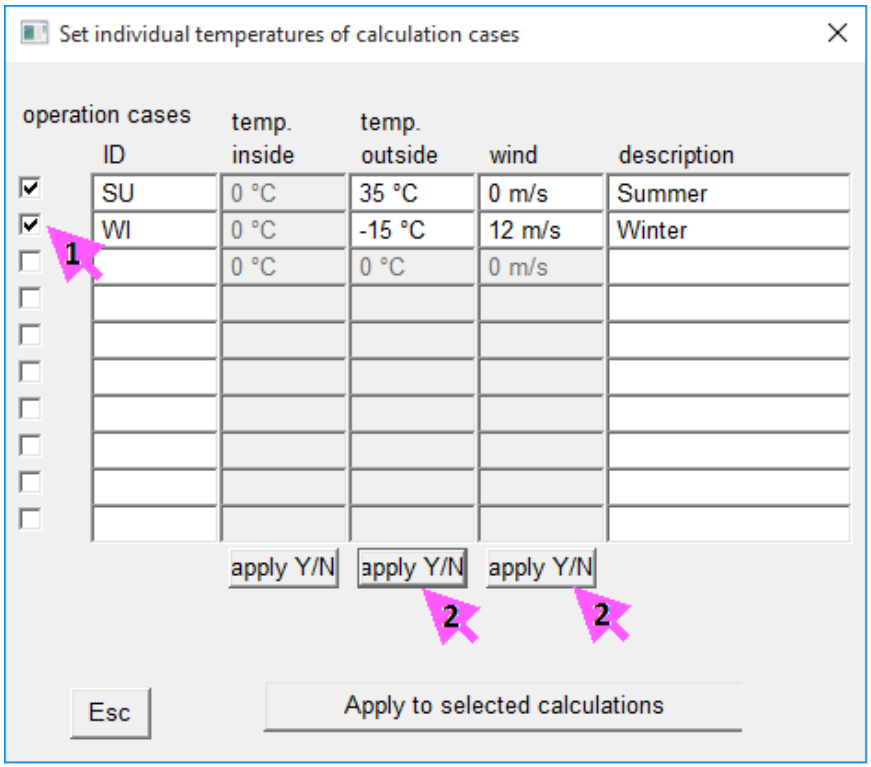
Apply temperature cases to calculations

The temperature cases defined above are not yet connected to calculations. You can apply a subset of the calculations to a subset of the temperature cases

On the project page:

Select at least one calculation (in our example use *'select all'*), then click on *'apply to selection'*

1. select at least one of the temperature cases with the checkboxes
2. select the items of the temperature cases which will be applied to the selected calculations. In our example we apply both temperature cases to all calculations



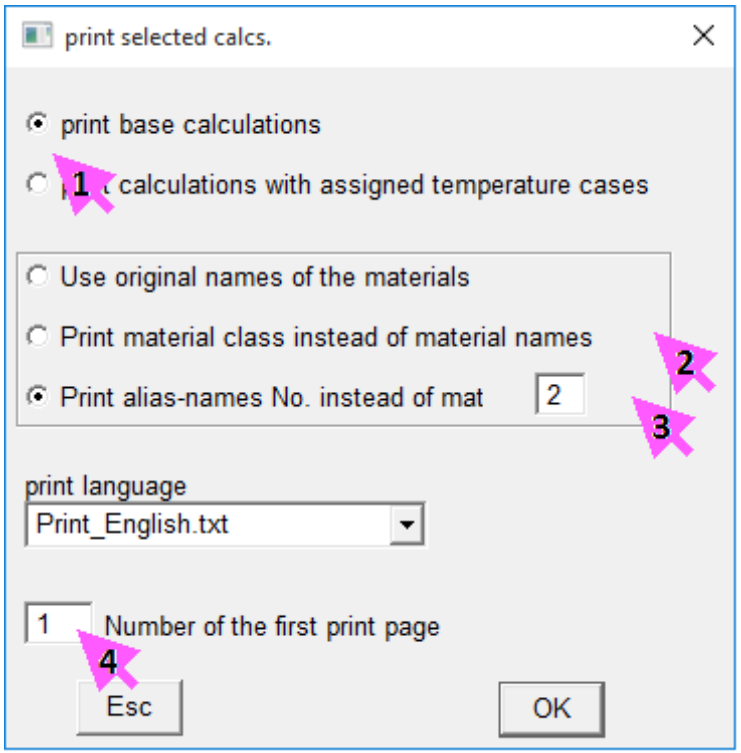
Print calculations

On the project page: **Select at least one calculation**, then click on *'print selected calculations'* to open the print dialog

1. choose wether to print the calculations with original temperatures or with the temperature cases defined as above

You can hide material names:

2. print material group in place of the material name (see **Enter_mat_Tutorial.pdf**)
3. print an alias name in place of the material name (e.g. alias name No 2)
4. if you print page numbers, you can start with a number higher than 1. This may be useful if you incorporate the printouts in a documentation



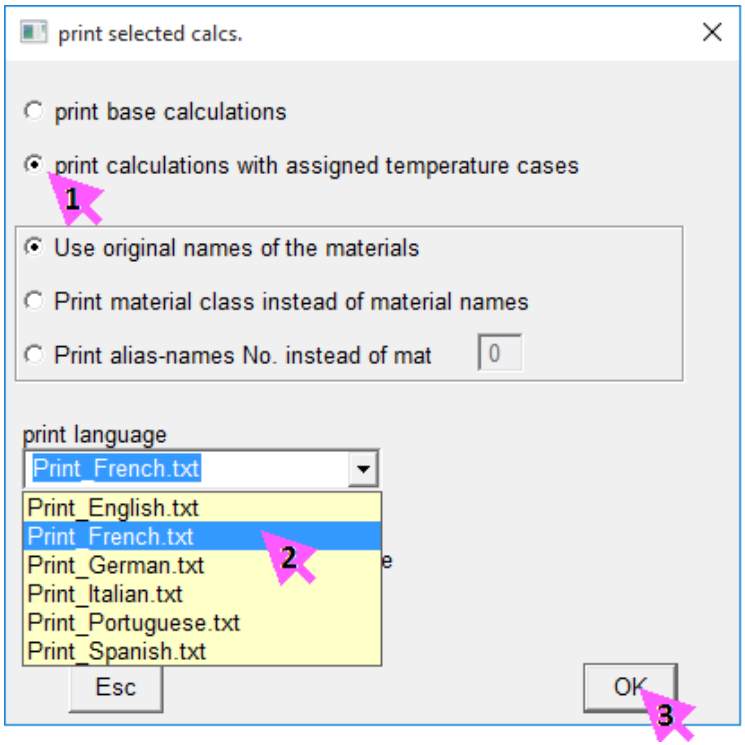
Change print language

In the print dialog you can select among the available print languages for the printout. Note that print languages are **independent of the GUI languages and accessible to the user**.

Print the second calculation with temperature cases and in French language

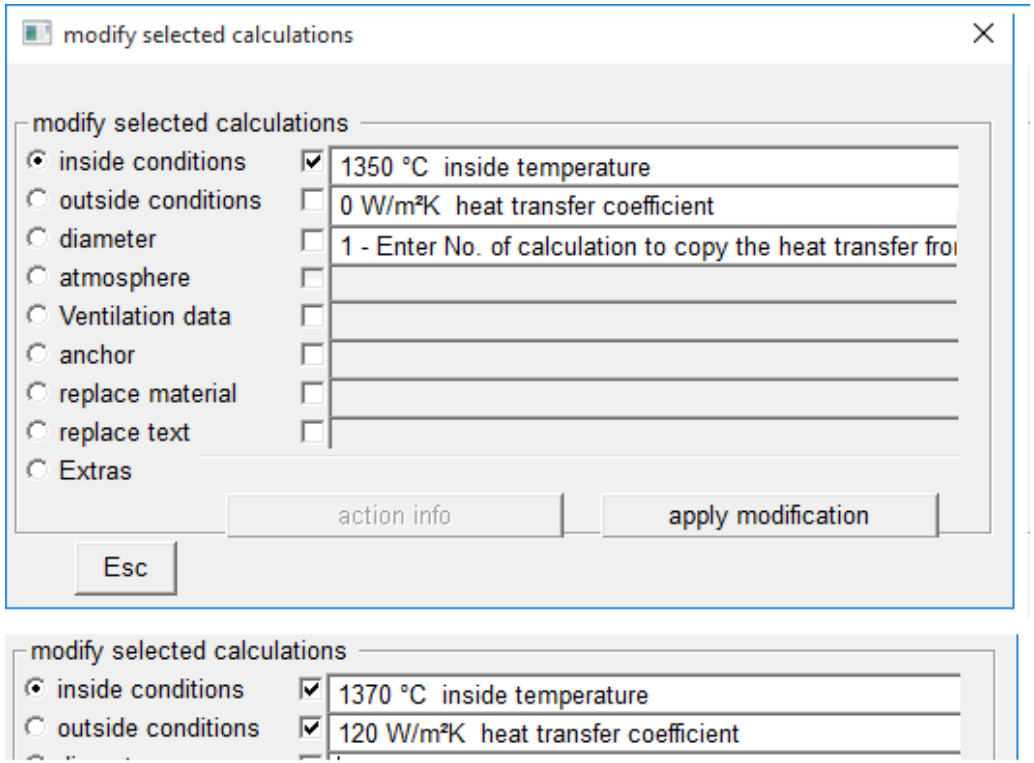
1. click on to *'print calculation with assigned temperature cases'*
2. select language **'French'**
3. start prining

To add another language, use option '' as described in **Tutorial_Options.pdf**



Modify inside ambient temperature

1. select radiobutton *'inside conditions'*
Set inside temperature 1350°C:
2. activate checkbox *'inside temperature'* and enter **1350°C**
Commit with *'apply modifications'* Note that **the heat transfer coefficient is not changed**
Set inside temperature 1370°C and heat transfer coefficient $120 \frac{W}{m^2 K}$:
3. activate checkboxes, enter **1370°C and** $120 \frac{W}{m^2 K}$

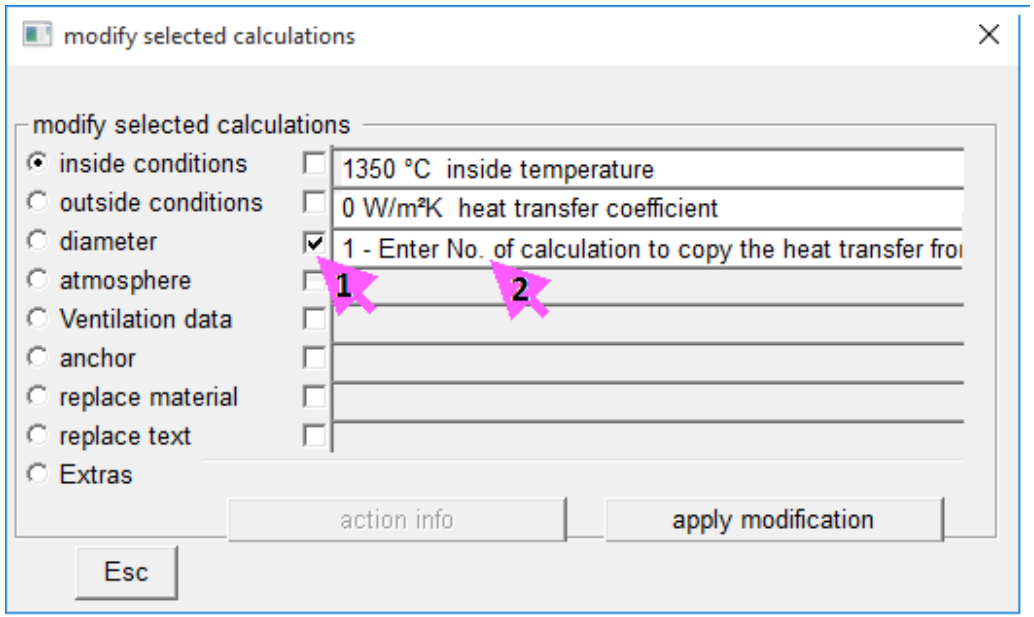


Modify inside heat transfer

To modify the complete inside heat transfer, copy it from a specified calculation

1. activate checkbox *'Enter No. of calculation ..'*
2. enter a valid number >= 1

The complete heat transfer with all settings and parameters is copied, **except the inside temperature**



Modify outside ambient heat transfer

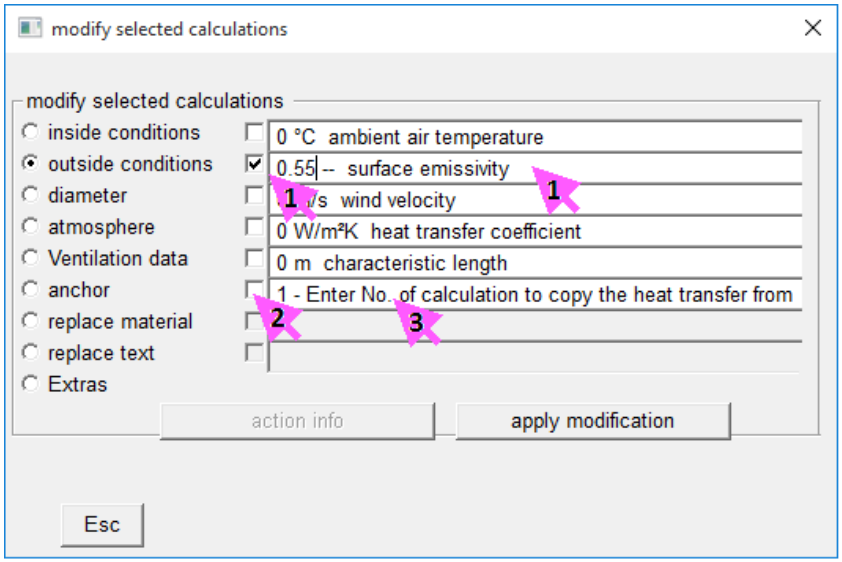
Outside 5 parameters can be modified independently (ambient air temperature to characteristic length)

1. activate a checkbox (e.g. *'surface emissivity'*) and enter the corresponding number (e.g. **0.55**). Commit with *'apply modifications'*

Modify the **complete heat transfer**:

2. activate checkbox *'Enter No. of calculation ..'* and deactivate all other checkboxes
3. enter a valid number $>= 1$

The complete heat transfer with all settings and parameters is copied, **except the inside temperature**

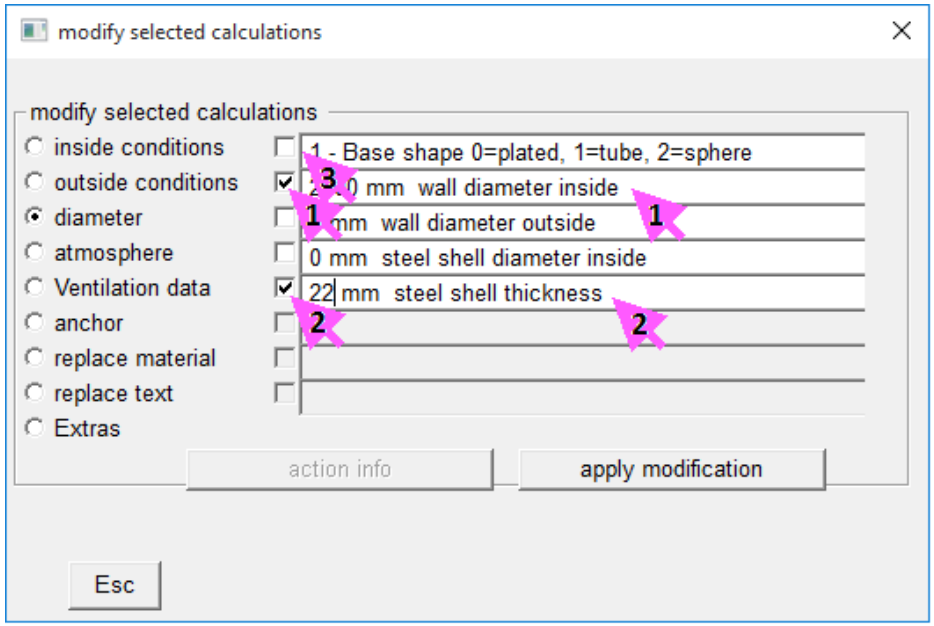


Modify shape and diameter

Select the shape, enter the diameter and the tickness of the steel shell.
Example: Inside diameter 2500 mm, steel tickness 22 mm

1. activate a checkbox *'diameter inside'* and enter **2500 mm**.
2. activate a checkbox *'steel shell thickness'* and enter **22 mm**.
3. Note that the shape setting is not active, so the shape will not be affected. If the shape is a plate, the diameter is ignored.

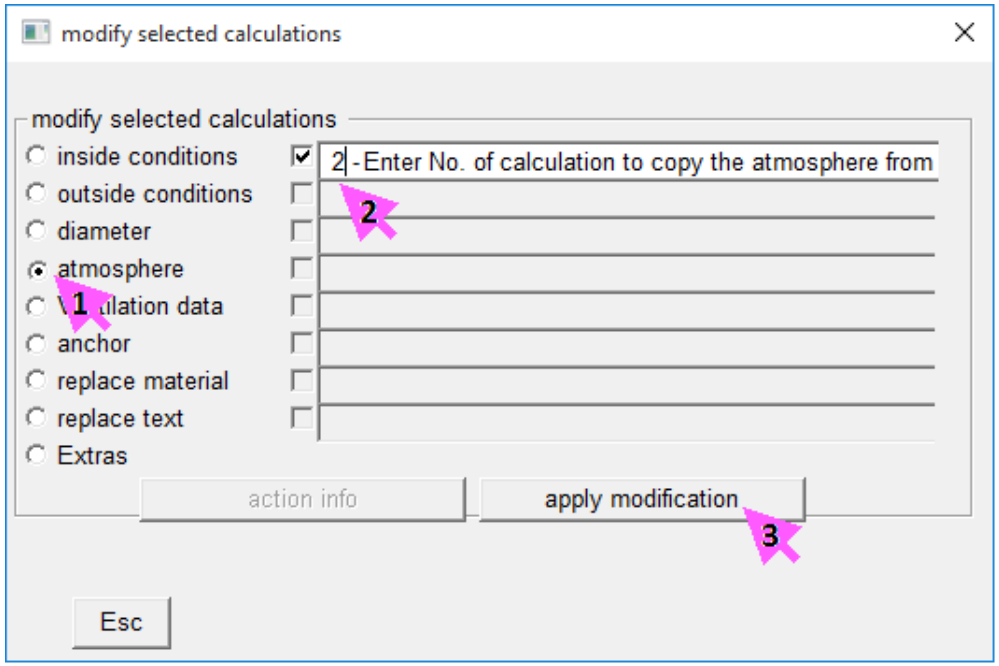
The diameter definitions are explained in the tutorial **Tutorial_SteadyState.pdf**



Modify atmosphere data

If atmosphere data must be changed in many calculations, you can do the change in just one, e.g. calculation 2, and copy the atmoshere to the other calculations.

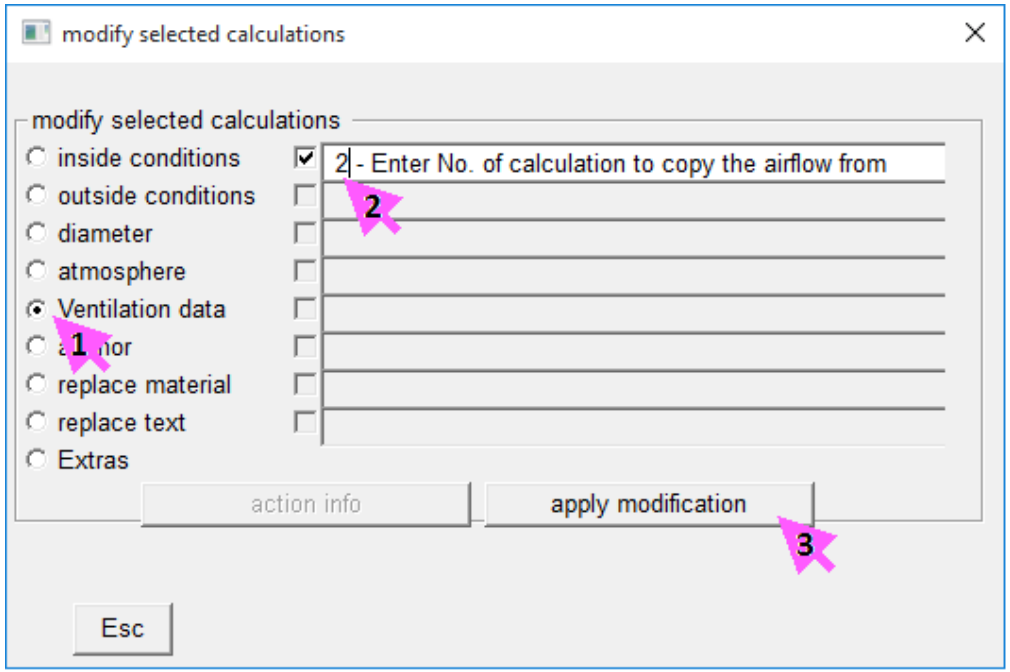
1. select radiobutton *'atmosphere'*
2. activate checkbox *'Enter No of calculation...'* and enter **2**.
3. Commit with *'apply modifications'*



Modify ventilated air gapsa

If airflow data must be changed in many calculations, you can do the change in just one, e.g. calculation 2, and copy the airflow to the other calculations.

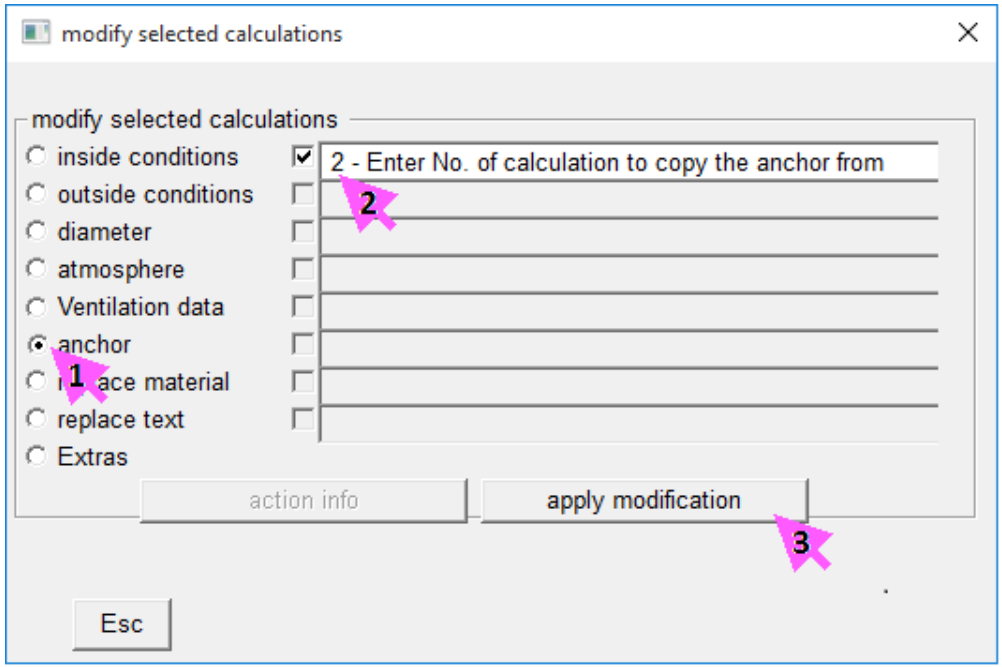
1. select radiobutton *'ventilation data'*
2. activate checkbox *'Enter No of calculation...'* and enter **2**.
3. Commit with *'apply modifications'*



Modify anchor data

If anchor data must be changed in many calculations, you can do the change in just one, e.g. calculation 2, and copy the anchor to the other calculations.

1. select radiobutton *'anchor'*
2. activate checkbox *'Enter No of calculation...'* and enter **2**.
3. Commit with *'apply modifications'*



Replace materials

Example: Replace material *'_9528 INSULATING_BRICK(500)'* with *'_9529 INSULATING_BRICK(600)'* in all selected calculations. Both of the materials must be in the project material list.

1. select radiobutton *'replace material'*
2. fetch the material to be replaced from the project material list.
3. fetch the material to replace it with (from the project material list).
4. Commit with *'apply modifications'*