

FloTherm Interface Tutorial

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Configuration of Smart | Coupling


Activate menu_sc.xml

- 1. View > Menus > Custom Menu... >***
- 2. Select the file ... \xml\menu_cs.xml***

Activate the smartcoupling.sty

- 1. View > Style > Load New Style... >***
 - 2. Select the file ... \styles\smartcoupling.sty***
-

View Control Toolbar

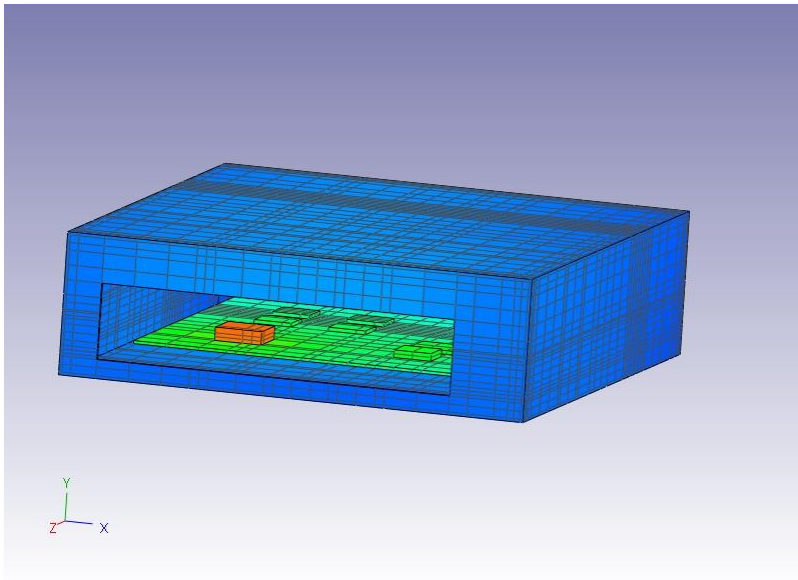
- 
1. *Preset Views (top, side, iso, ...)*
 2. *3D Rotation*
 3. *Pan*
 4. *Dynamic Zoom*
 5. *Window Zoom*
 6. *Fit Zoom Part Extension*
 7. *Keep Vertical Z Axis (On/Off)*
 8. *Feature Edge (On/Off)*
 9. *Element Edges (On/Off)*
 10. *Shading (On/Off)*
 11. *Transparency (On/Off)*
 12. *Switch Contour (On/Off)*
 13. *Show only the selected element set (On/Off)*
 14. *Marker Settings*
 15. *Animate*
 16. *Interactive Selection*

Training objectives

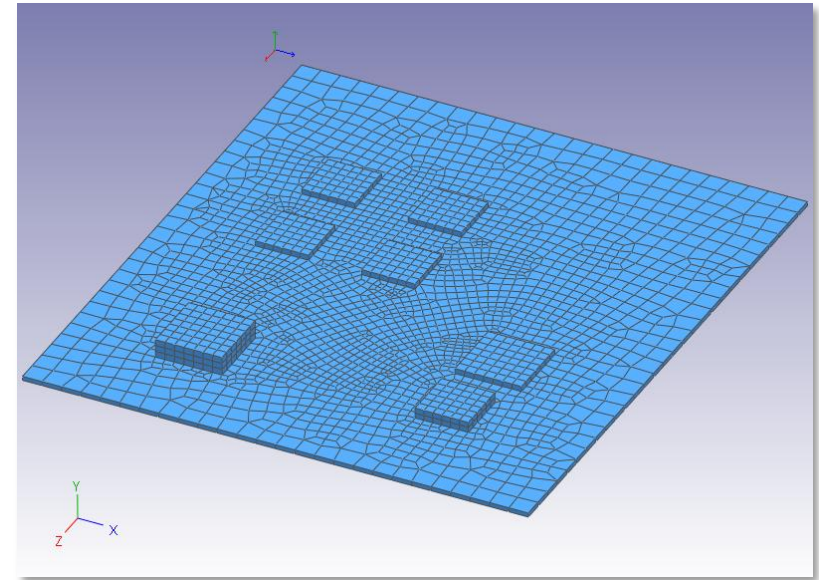
- Understand the general interpolation procedure of SmartCoupling through a basic example
 - Fundamental data import features
 - Manipulation of Thermal and Structural mesh
 - Temperature field 3D interpolation
 - Export interpolated data to FEA modeler

Models overview

FloTherm Model



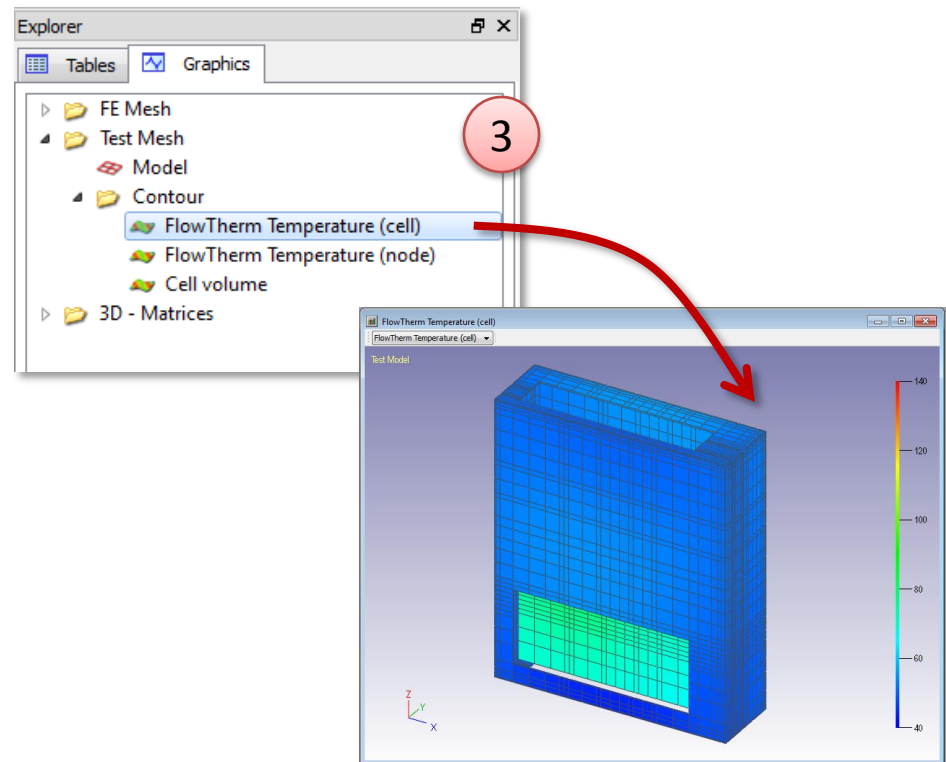
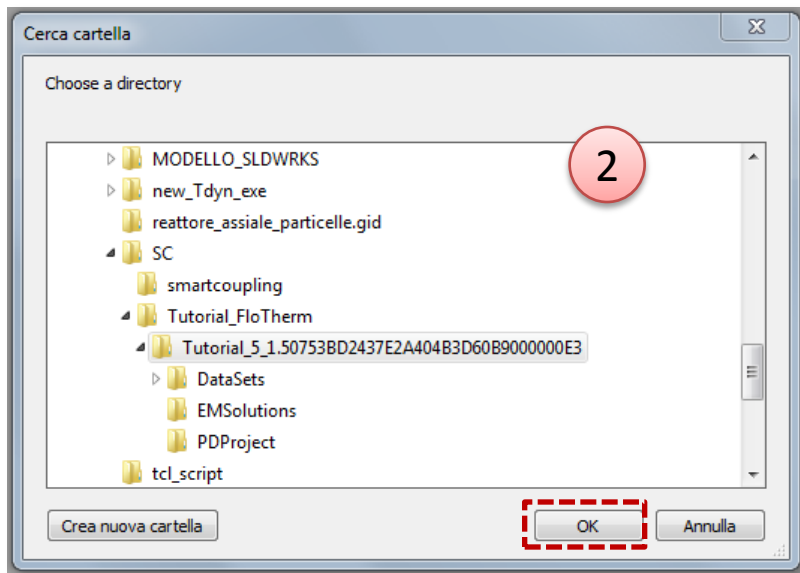
NASTRAN Model



01 Import FloTherm model and results

Procedure

- 1) Menu **Smart | Coupling > Import CFD > Import FloTherm grid and temperature**
- 2) Select the **root directory** of the FloTherm project and click **OK**
- 3) View the imported model by click on the **Graphics > Test Model > Contour > FloTherm Temperature (cell)**



02 Advanced Visualization Controls

Procedure

- 1) Right-Click on the graphic window and choose **Customize...** , or press **F8**
- 2) Select the **Marker** tab and select the part you want to show (e.g. Set 2).
- 3) Select the **Contour** tab and select the result to be shown. Check the **Autoscale** option. Click **OK** when done.
- 4) Use the 3D View controls to improve the visualization (e.g turn **ON** the option **Show only the selected element set**)

The image illustrates the steps to customize the mesh display in a 3D visualization software. It shows the context menu, the 'Customize Mesh Display' dialog boxes, and the resulting 3D view.

Step 1: Right-click on the graphic window and choose **Customize...** (or press **F8**).

Step 2: Select the **Marker** tab and select the part you want to show (e.g. Set 2).

Step 3: Select the **Contour** tab and select the result to be shown. Check the **Autoscale** option. Click **OK** when done.

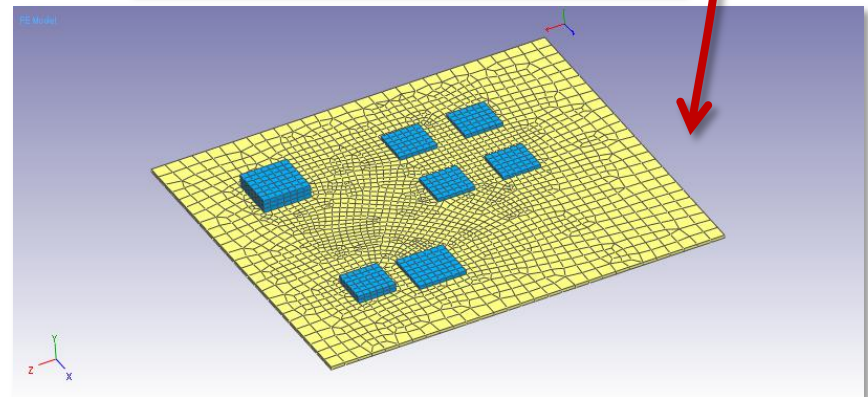
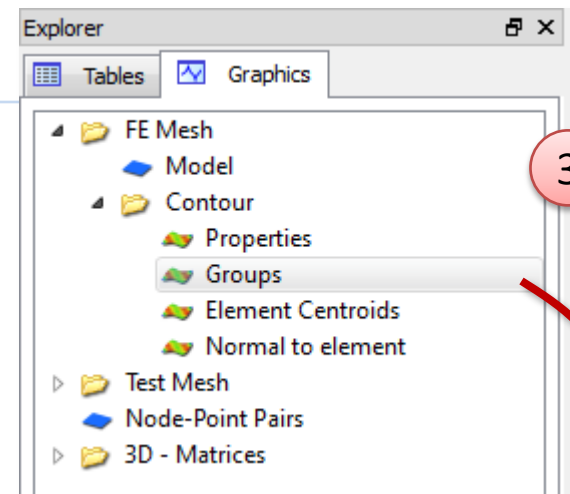
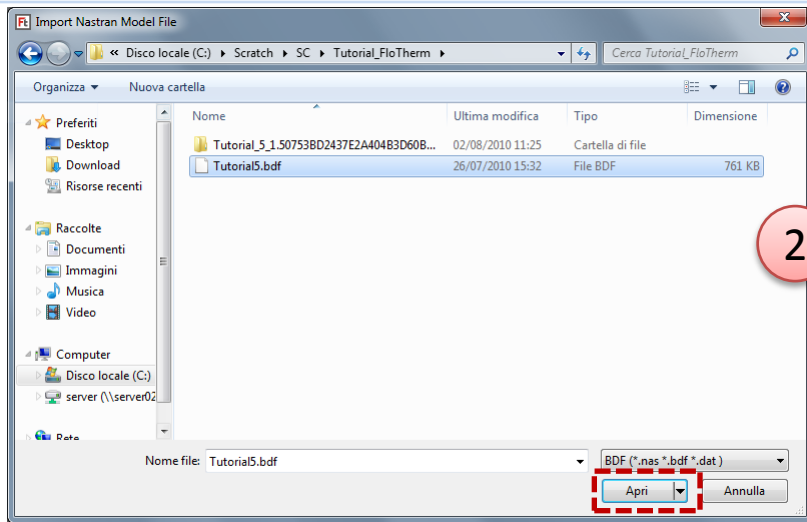
Step 4: Use the 3D View controls to improve the visualization (e.g turn **ON** the option **Show only the selected element set**).

The 3D view shows a mesh with a contour plot. The color scale ranges from 60 to 130. The mesh is colored according to the selected result, with a red region indicating the highest values.

03 Import Nastran Mesh

Procedure

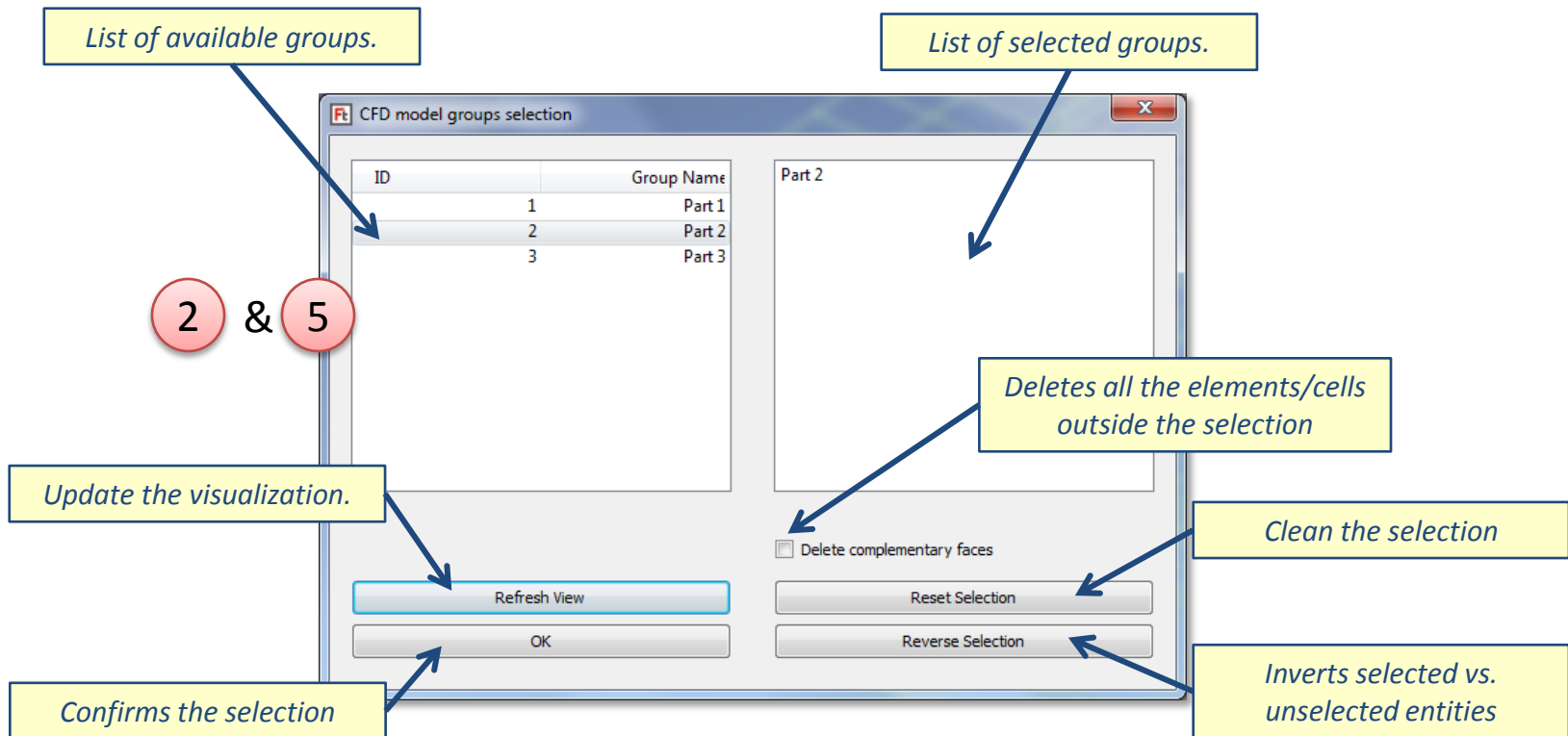
- 1) Menu **Smart | Coupling > Import FEA > Import NASTRAN mesh**
- 2) Select the **Nastran Bulk Data File** to read and click **OK**
- 3) View the imported model by click on the **Graphics > FEA Model > Contour > Groups**



04 Select CFD and FEA parts for interpolation

Procedure

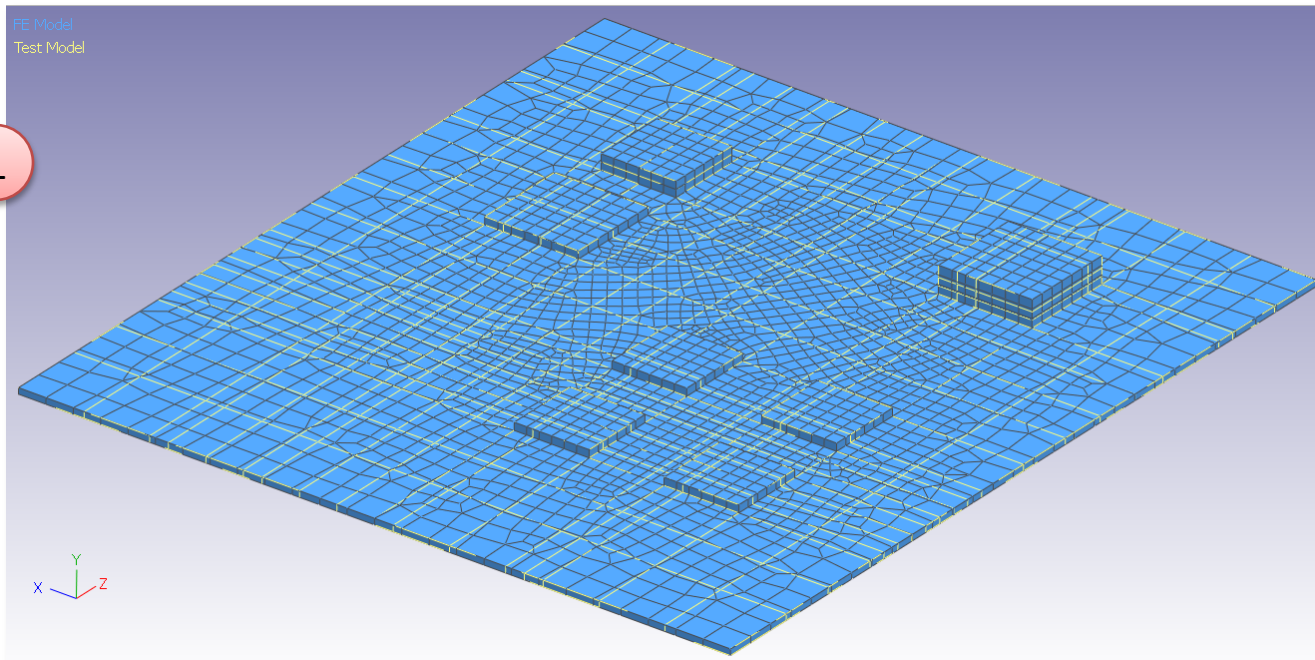
- 1) Menu **Smart|Coupling > Select Parts > Select CFD groups**
- 2) Select the **CFD groups** to be included in the interpolation run (Source mesh). Multiple parts are allowed.
- 3) Select **Part 2 only** and **click OK** when done. The program shows the selected parts.
- 4) Menu **Smart|Coupling > Select Parts > Select FEA groups**
- 5) Select the **FEA groups** to be included in the interpolation run (Destination mesh). Multiple parts are allowed.
- 6) Select **all the FEA parts** and **click OK** when done. The program shows the selected parts.



05 View overlapped models

Procedure

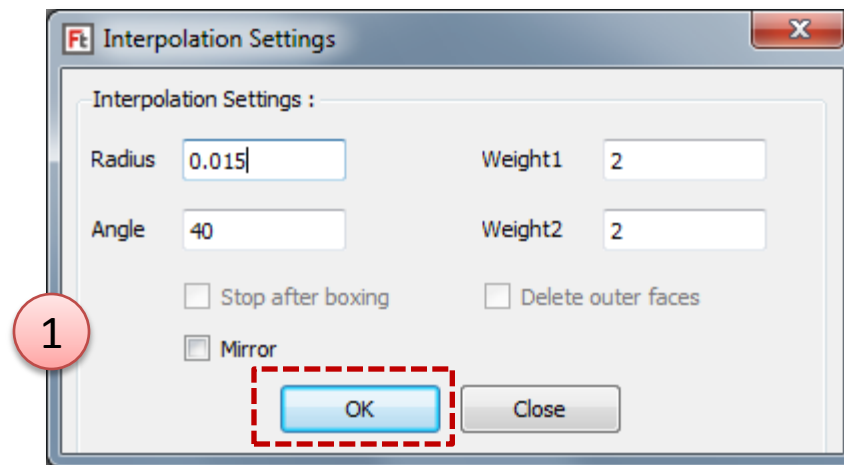
- 1) Menu **Smart|Coupling > Select Parts > Preview** shows the overlap of CFD and FEA selections
- 2) In case the selection is not correct, **repeat Step 04** (previous slide).
- 3) In case of model geometry mismatch:
 - The two parts are not located / oriented in the same way
 - One of the two models is not show = reasonably the two mesh don't use the same length unit.
 - Use **Menu > Transform models** to adapt one of the two mesh to the other (scale, translate, rotate).



06 Run temperature interpolation

Procedure

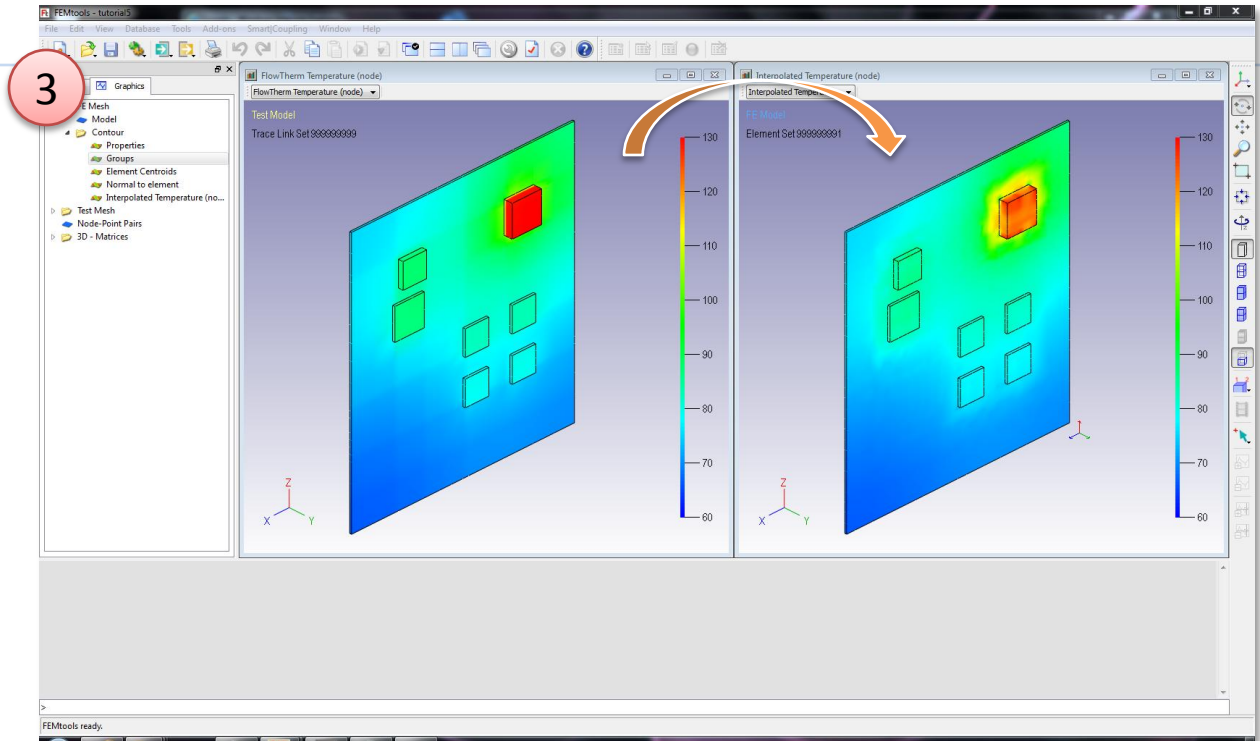
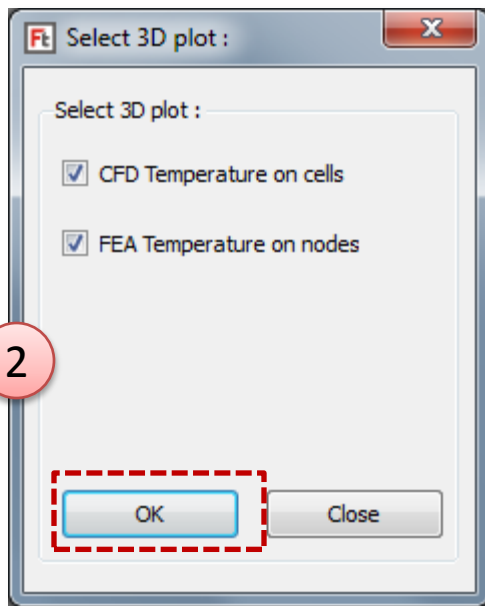
- 1) Menu **Smart|Coupling > Temperature Interpolation Toolbox > Interpolate Temperature**
- 2) Insert the **Radius** tolerance used for interpolation (e.g. **0.015**) and click **OK** when done
 - all the other settings have no effect



07 View interpolation results

Procedure

- 1) Menu **Smart | Coupling > Temperature Interpolation Toolbox > Plot Results**
- 2) **Select** which result show and click **OK**.
- 3) The program shows a paired view of the two models, with temperature map.



08 Export Temperature to NASTRAN

Procedure

- 1) Menu **Smart|Coupling > Temperature Interpolation Toolbox > Export T to NASTRAN**
- 2) **Select the settings to export data and click OK.**
- 3) **Include the temperature data into your Nastran model.**

Temperature offset
(e.g. from Celsius to Kelvin)

Export PLOAD4 cards to C:\Scratch\SC\Tutorial_FloTherm\interpolated...

Nastran Load Case :

Nastran Load Case ID: 1000

Temperature Offset: 0

Filter: 1E-09

Note: \Scratch\SC\Tutorial_FloTherm\interpolated_temperature.bdf

OK Close

Tolerance for zeroing

Custom notes field

3

```

-----
$
$ Smart|Coupling - Interpolated pressure field
$
$ -----
$
$ Created   : 02-Aug-2010
$ Project   : tutorial5
$
$ -----
$
$ Load case : 1000
$ Note      : C:\Scratch\SC\Tutorial_FloTherm\interpolated_temperature.bdf
$
$ -----
$ Interpolation Settings
$
$ Radius = 0.1500E-01      Peso1 = 2.0000E+00
$ Angolo2 = 4.0000E+01     Peso2 = 2.0000E+00
$
$ -----
TEMP 1000 2454 8.622+1
TEMP 1000 2455 8.652+1
TEMP 1000 2456 8.685+1
TEMP 1000 2457 8.738+1
TEMP 1000 2458 8.770+1
TEMP 1000 2459 8.855+1
TEMP 1000 2460 8.822+1
TEMP 1000 2461 8.766+1
TEMP 1000 2462 8.745+1
...

```