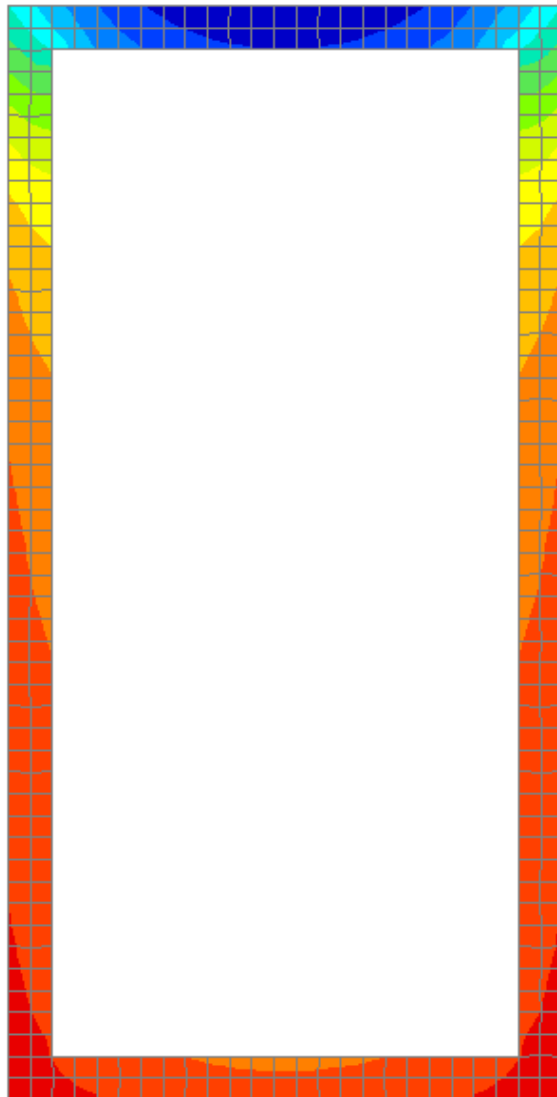


Example for GiD-SAFIR TSH Thermal Analysis

Exercise n°1 - Section 2D

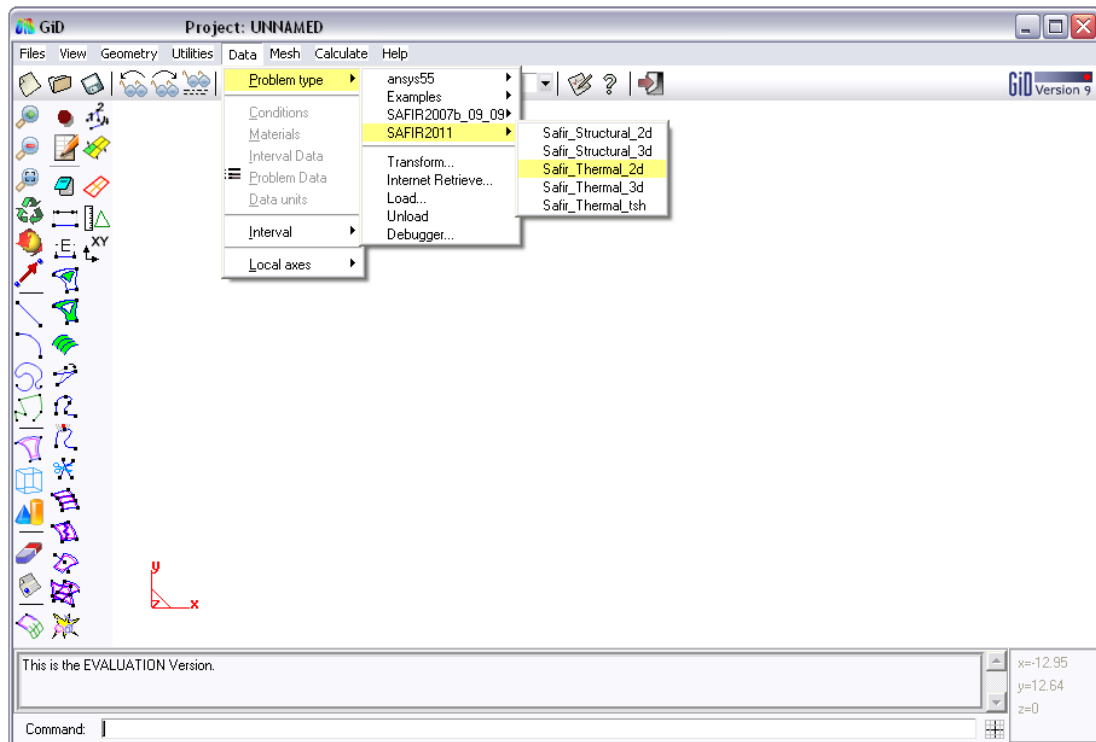


This example creates a slab section 0.5 x 0.25 m with a 0.02 m wall thickness

1. Create a project in 2D for Thermal Analysis


From the pull down menu select:


 **Data->Problem type->SAFIR2011->Safir_Thermal_2D**



To save the project select (or use icons on the left):

 **Files->Save**

or  or [Ctrl + s]

 **If Caps lock is active on your keyboard, shortcut don't work**

Enter a file name, eg.: Section2D

GiD creates a directory with the name Section2D.gid

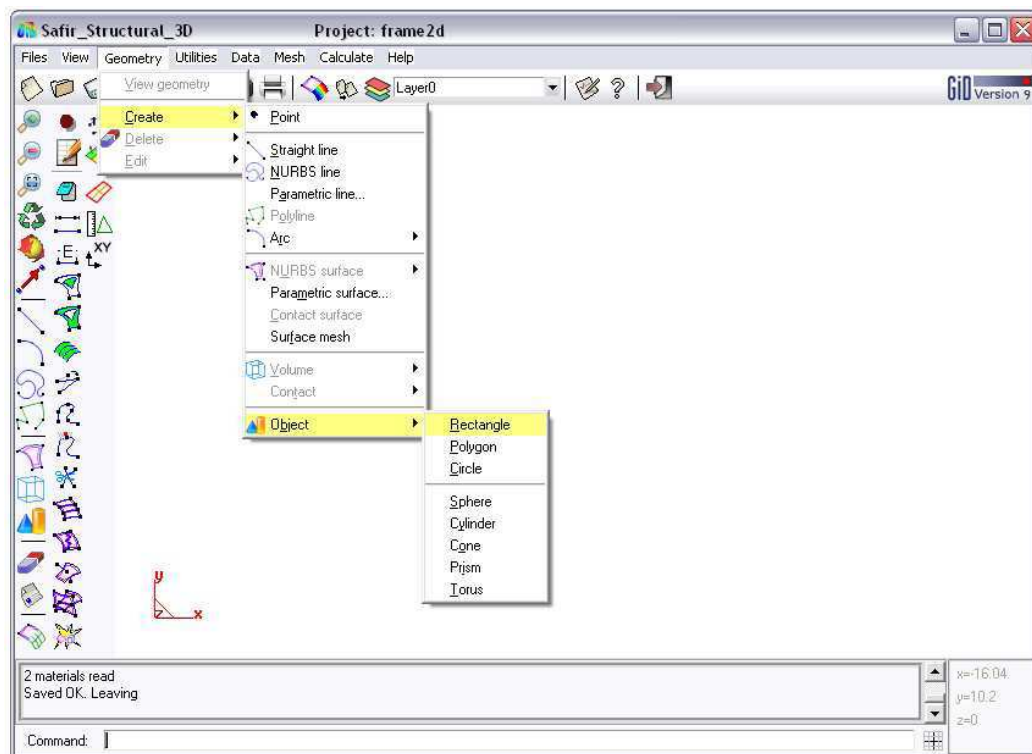
GiD creates a number of system files in this directory.

When you start the SAFIR calculation the Safir . IN, .OUT and .TEM files will be created in this directory.

2. Create the geometry in the xy-plane

From the pull down menu select:

 **Geometry->Create->Object->Rectangle** or  and 




In the command line (bottom of the widows) enter the coordinates of the 1 rectangle corner points:

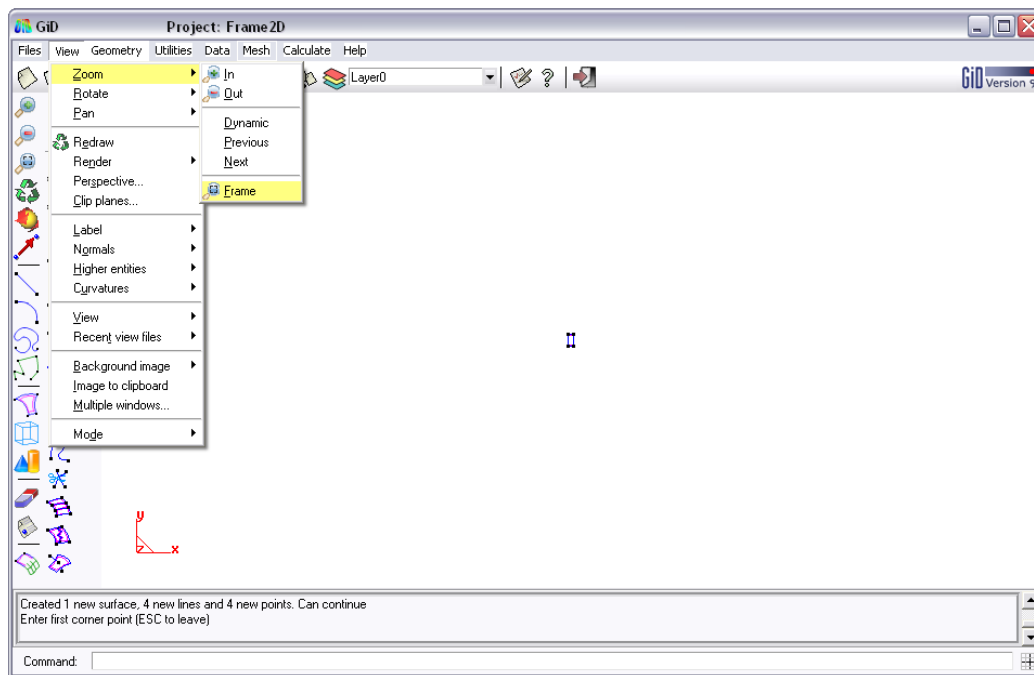
-0.125,-0.25

Press **[Enter]** to confirm

Do the same operation for the second corner point ***0.125,0.25***

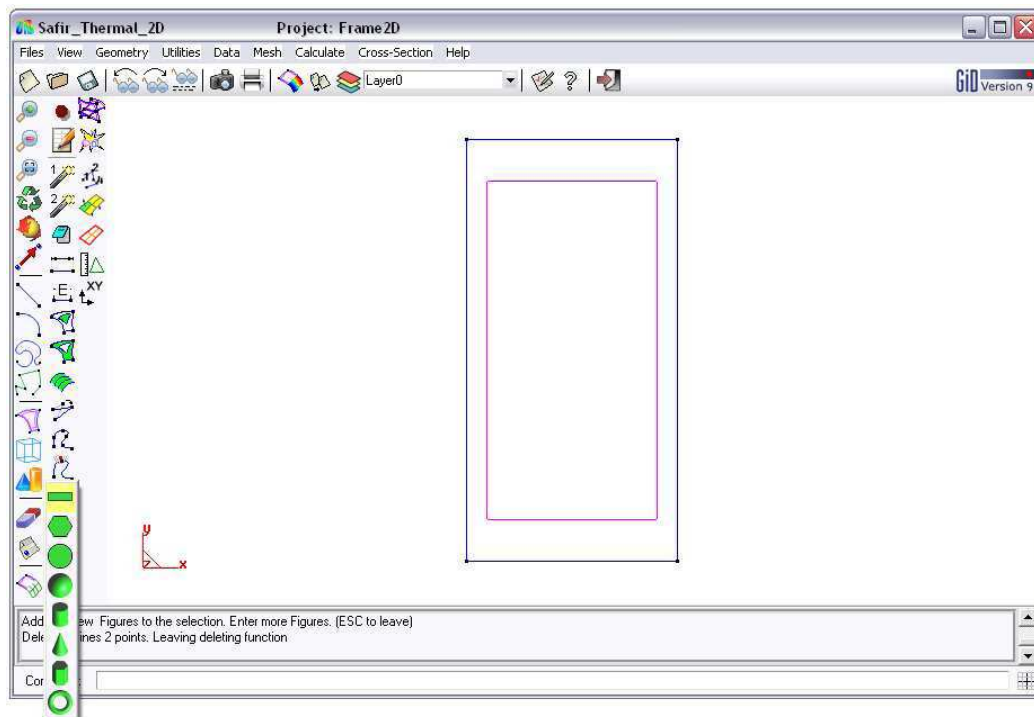
 ***Contour lines are represented in blue and contour surface in pink***

Press **[ESC]** to leave rectangle mode



To change the view, select from the pull down menu:

View->Zoom->Frame or **[F11]** or 



Create a second rectangle with corner points **-0.105,-0.23** and **0.105,0.23**

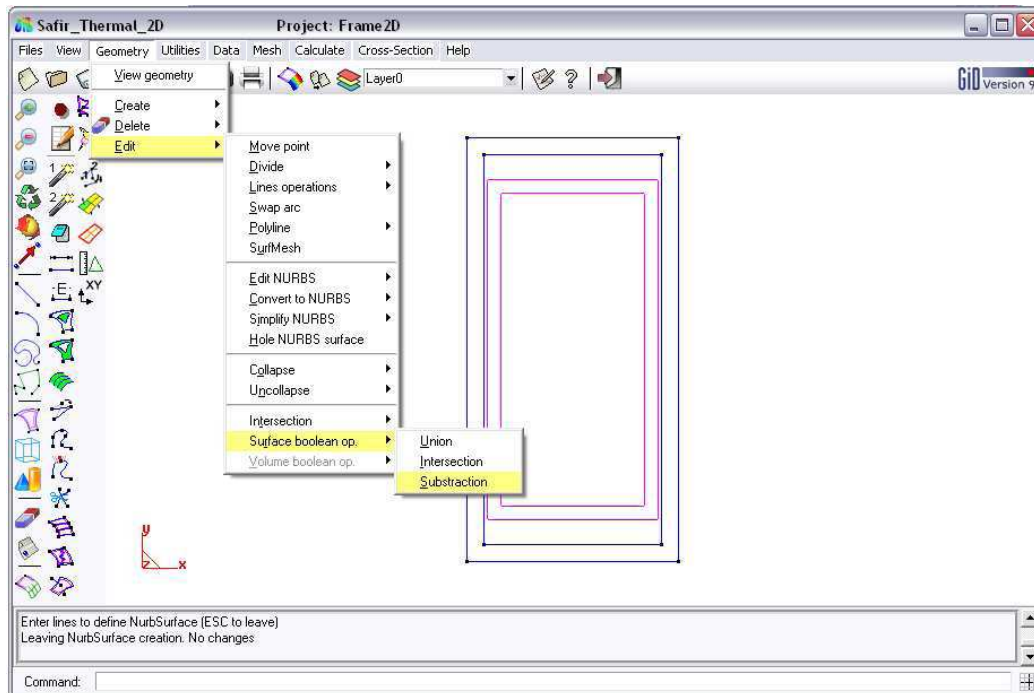
3. Use the boolean operation subtract

From the pull down menu select:

 **Geometry->Edit->Surface boolean op.->Subtraction**

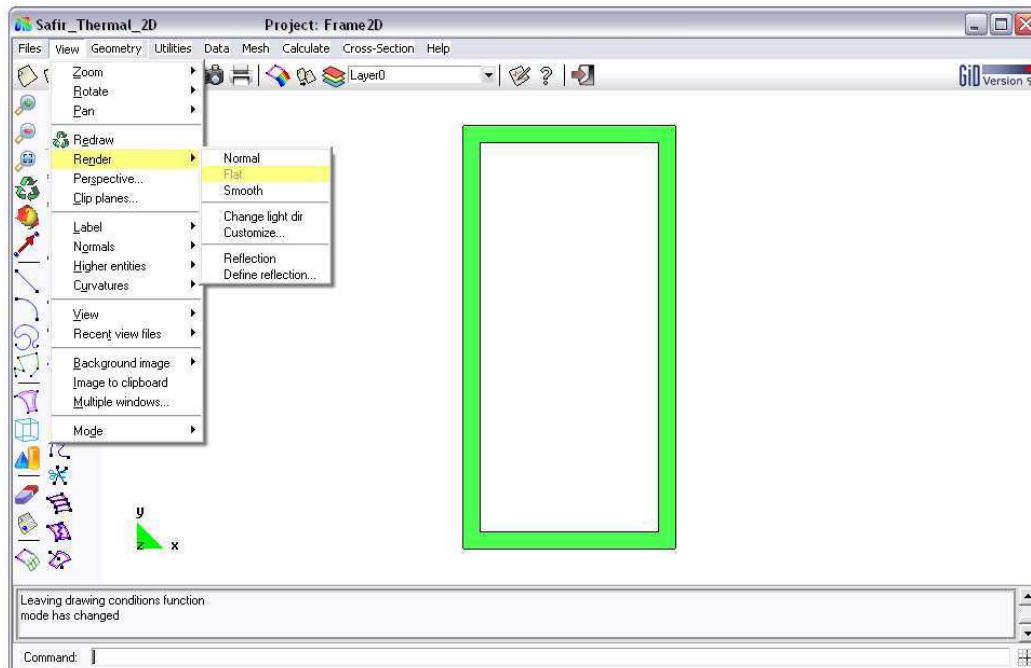
Select first the outer surface, then the inner surface

Press **[Esc]** to leave this mode



To check if the operation was successful change the view mode to filled mode:

 **View->Render->Flat**



To quit this view mode use:

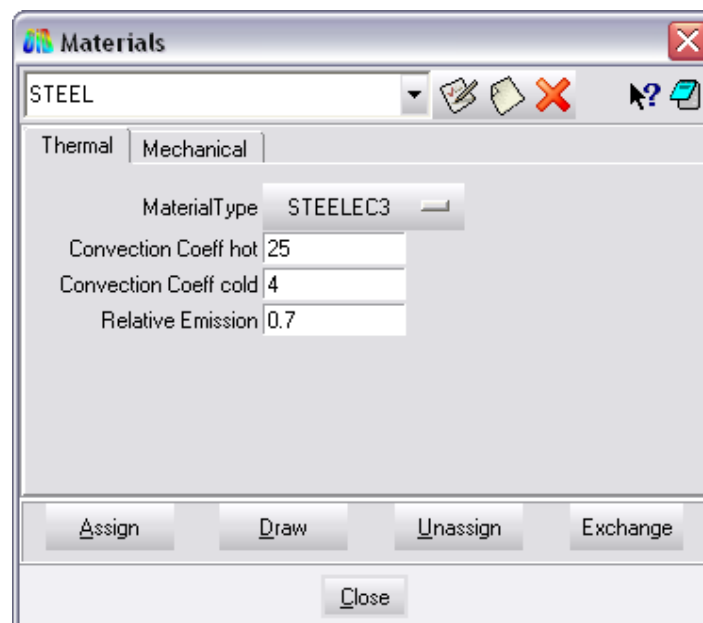
 **View->Render->Normal**

4. Assign Material

From the pull down menu select:

 **Data->Materials**

Select **STEEL** from the dialog box pull down list




Then select:

STEELEC3 as Material Type

A Convection Coeff hot of **25**

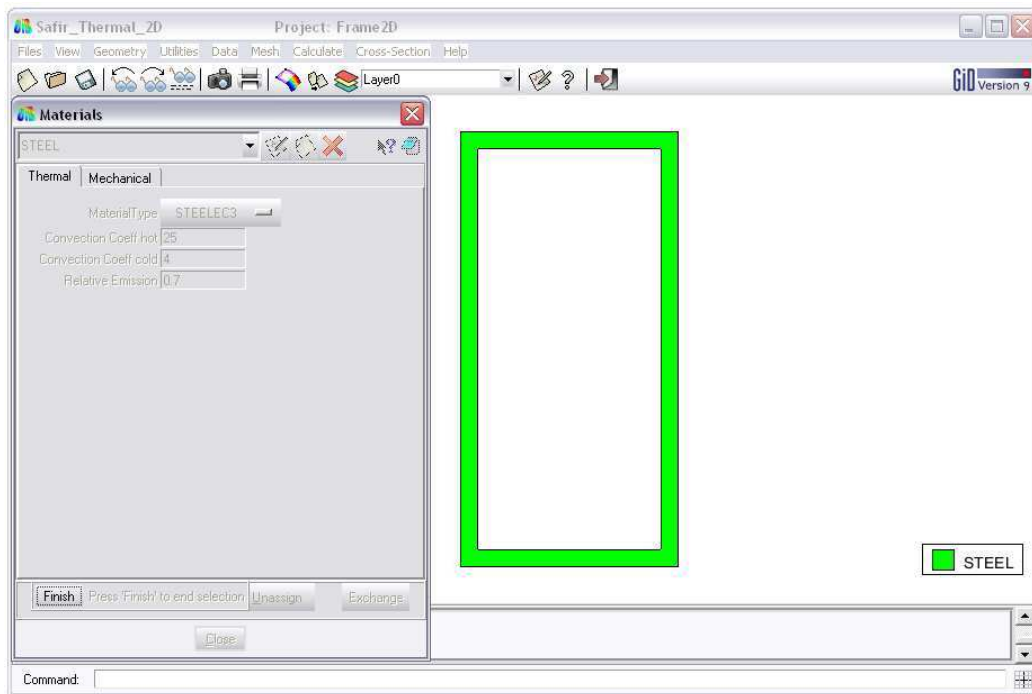
A Convection Coeff cold of **4**

A Relative Emission of **0.7**

 *You don't have to change data in the Mechanical tab. They are needed for Torsion calculation only*

Click on **Assign-> Surfaces** assign it to the 2D-Section surface

Select **DRAW->all materials** in the Material dialog box to display Materials

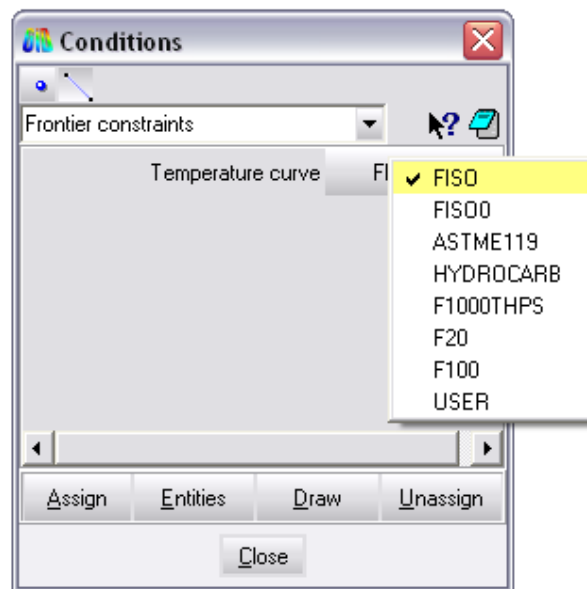


Press **[Esc]** or **Finish** to leave this mode

5. Assign a temperature curve

From the pull down menu select:

► *Data->Conditions*



Select:

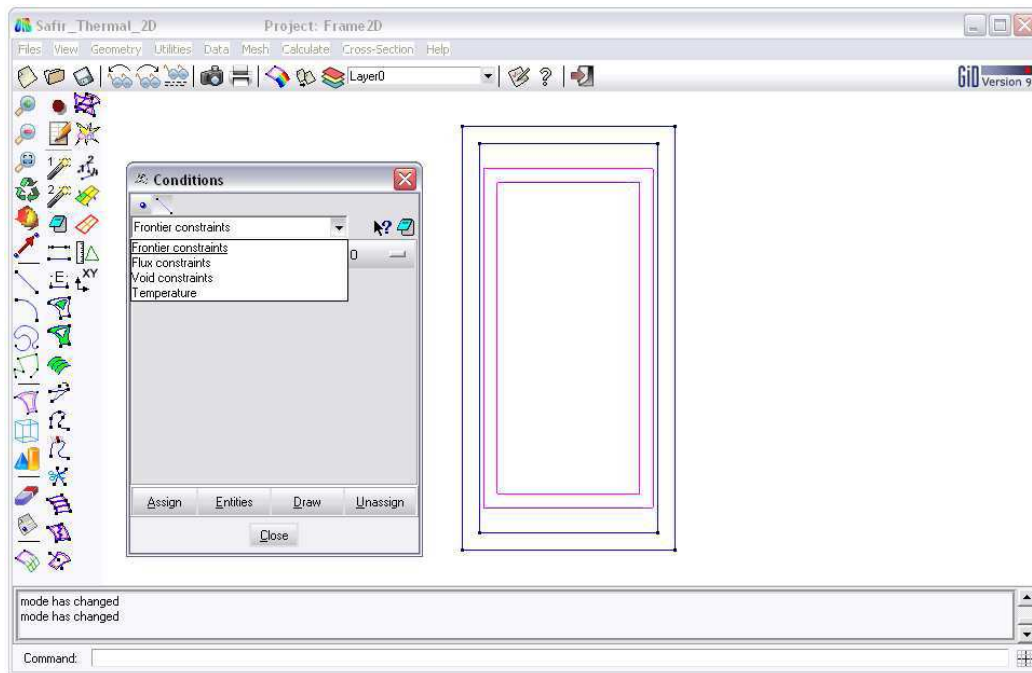
The button

On the first pull down list: *Frontier constraints*

On the Temperature curve pull down list *FISO*

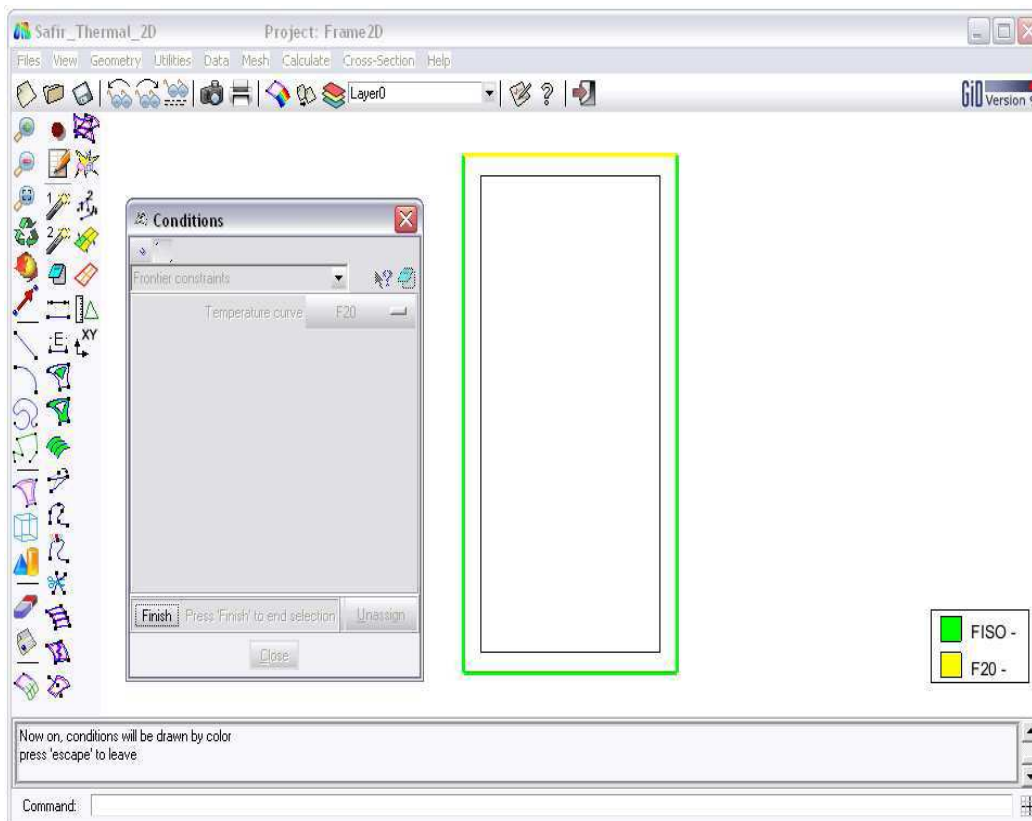
Click the **Assign** button and assign it to the left, bottom and right side of the outer rectangle.

Press **[Esc]** or click on *Finish* to leave

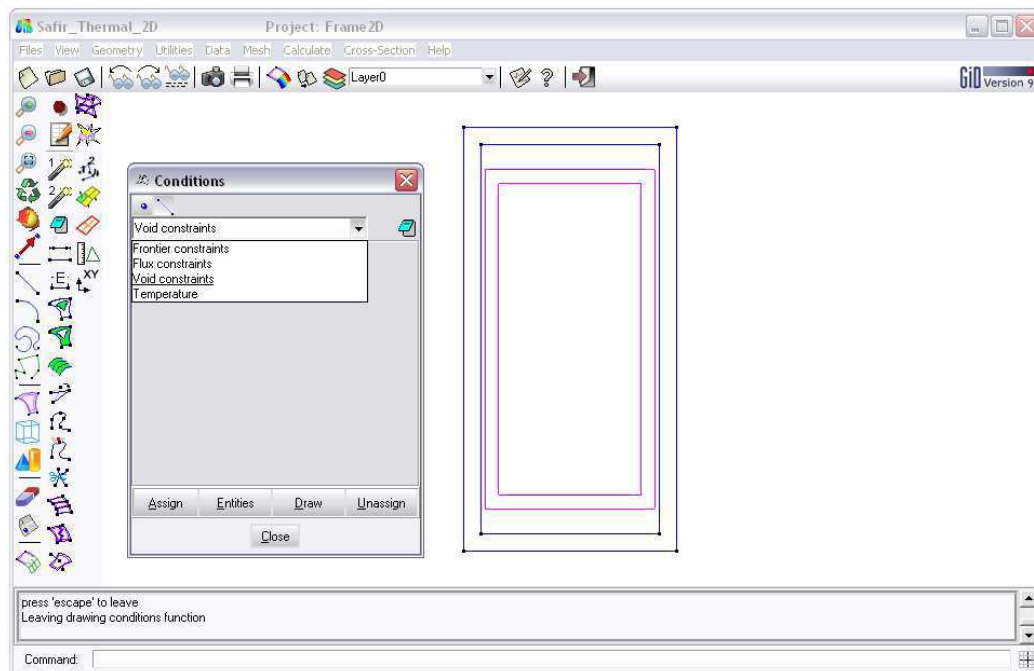


Do the same operation to assign the Temperature curve **F20** to the top side of the rectangle.

Select **DRAW->Colors** in the Conditions dialog box to display the frontier constraints:

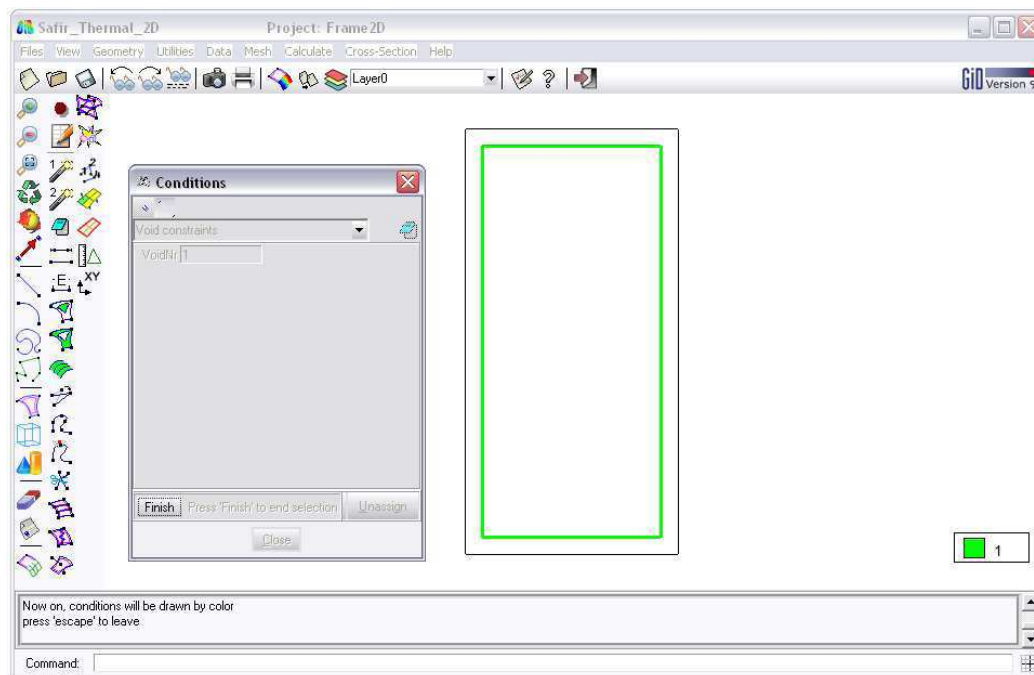


To assign void constraints, select on the **Conditions** windows the pull down menu and change **Frontier constraints** to **Void constraints**



Select void constraints from the pull down list of the dialog box and assign it to all contour lines of the inside rectangle.

Select **Draw>Color**



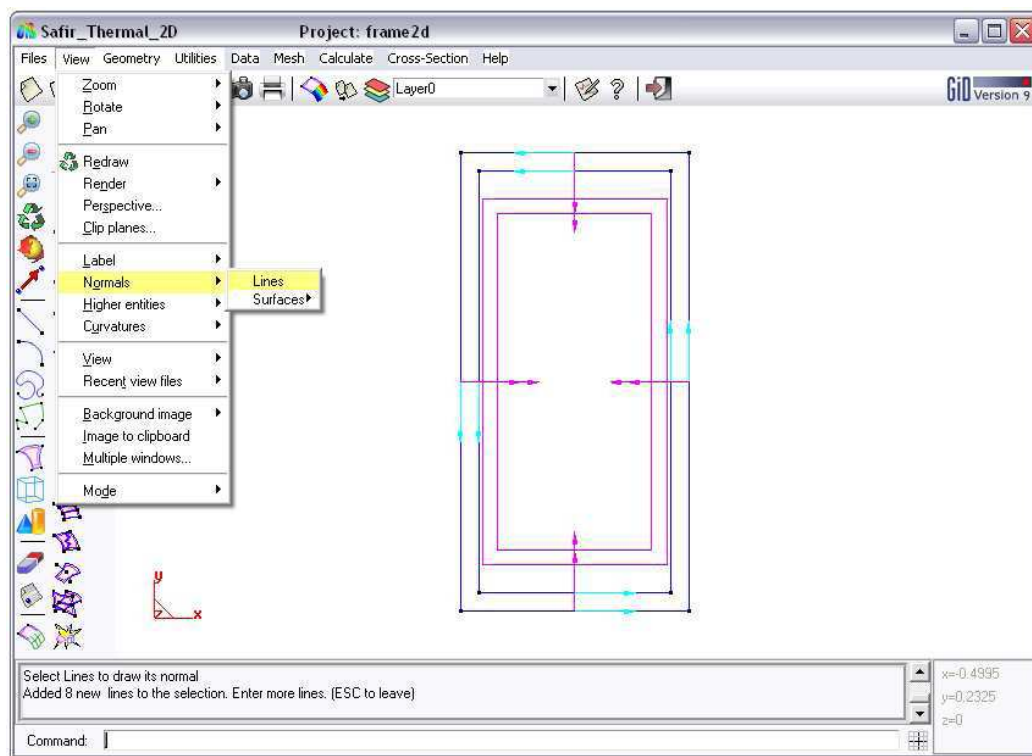
Press **[Esc]** or **Finish** to leave this view mode

⚠ *Voids entities must have counter clockwise direction*

To display normals and directions of lines select:

➤ **View-> Normals-> Lines**

Select all lines



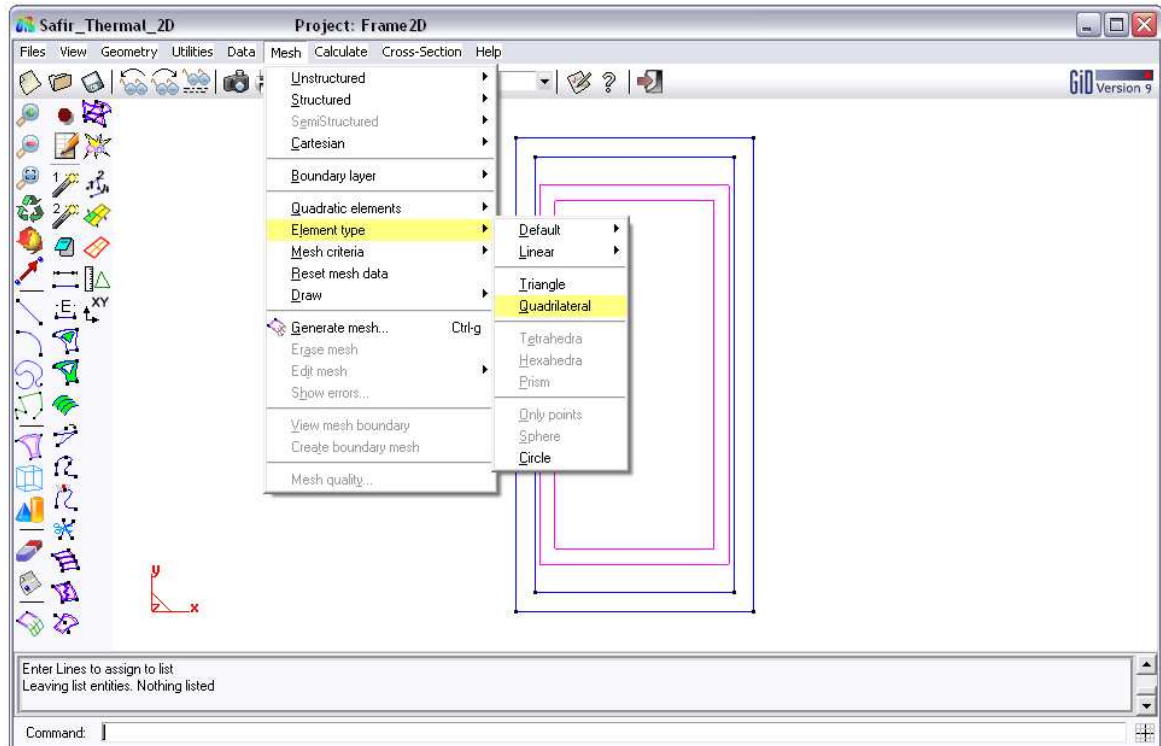
Press **[Esc]** to leave this view mode.

⚠ *if needed you can change the direction of a normal by using: Utilities->Swap Normals-> Lines*

6. Create the mesh

The default element type is the triangle. To change the element type select from the pull down menu:

➤ *Mesh->Element type->Quadrilateral*



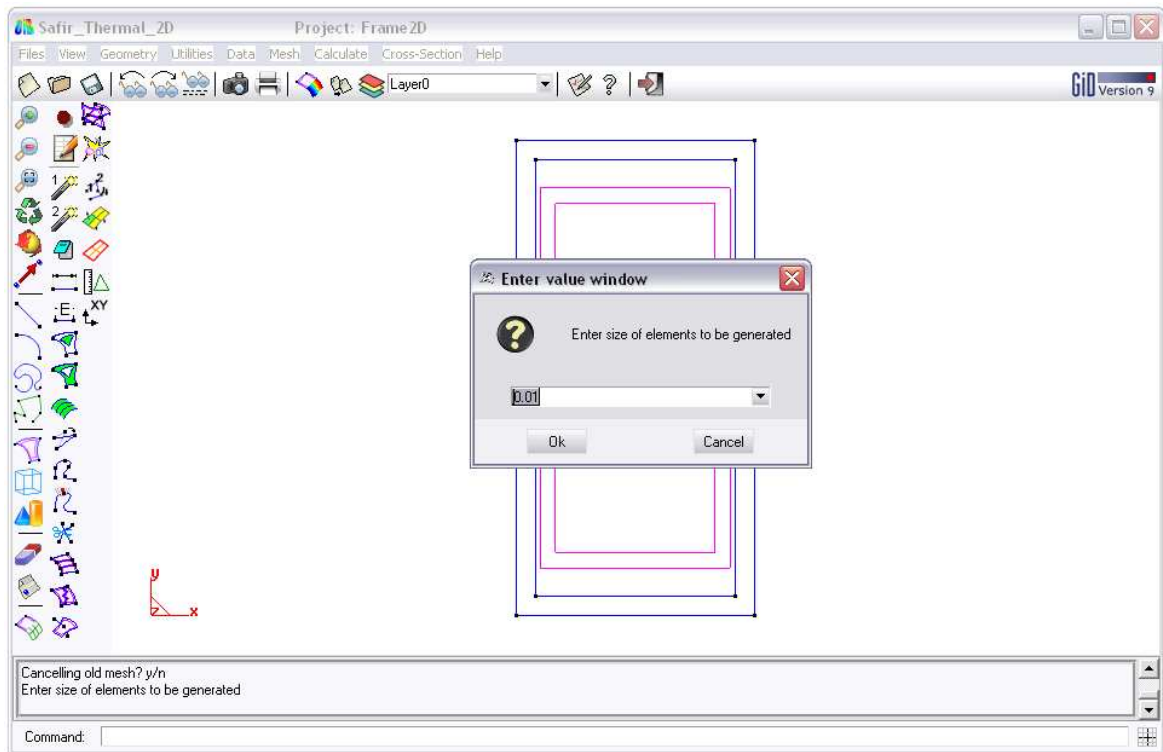
Select the surface

Press **[Esc]** to leave this mode

To create meshes select from the pull down menu:

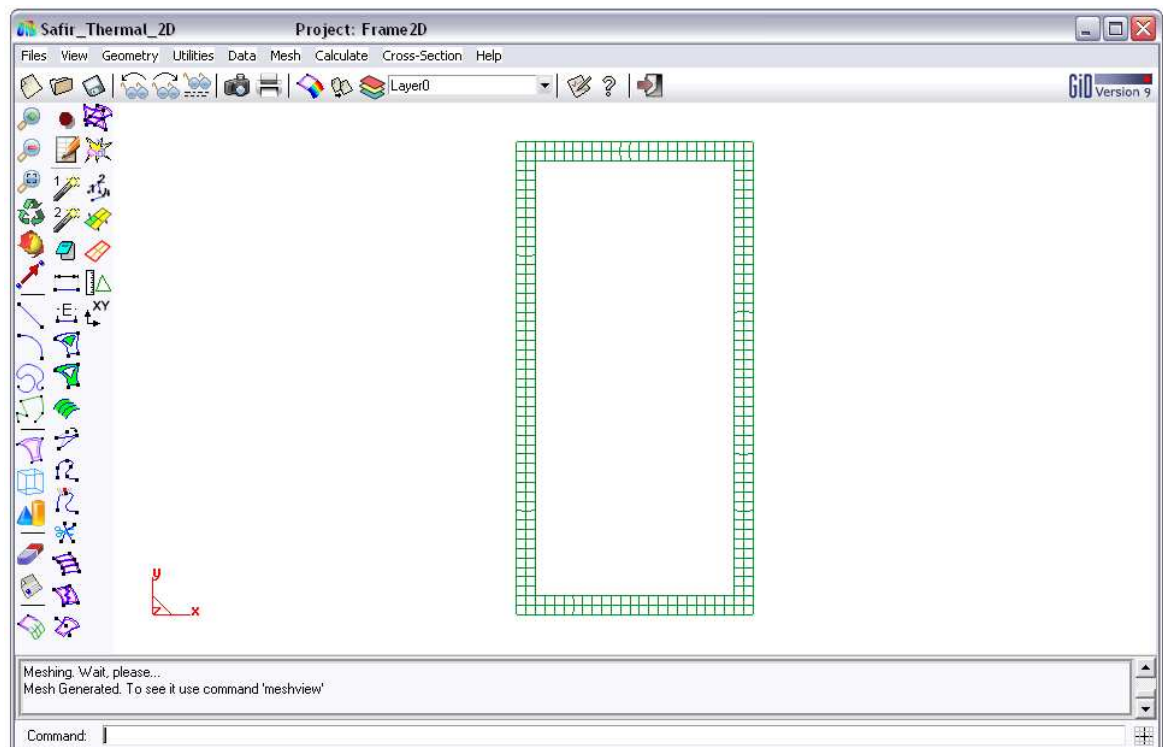
➤ *Mesh->Generate mesh*

or use [Ctrl + g]



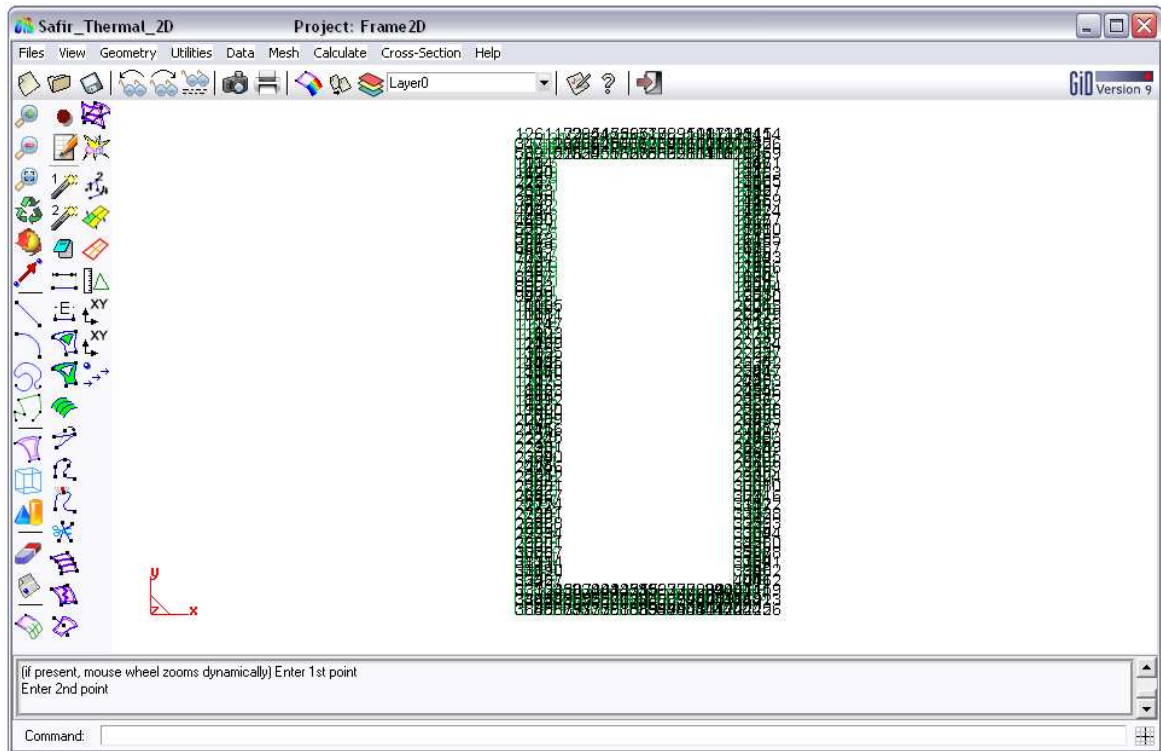
Enter 0.01 as size of elements to be generated

⚠ A message with the number of nodes and the number of elements will appear. If you are using an evaluation version of GiD, the maximum allowed is 1010 nodes



To display elements and nodes numbers select:

➤ **View->Label->All**



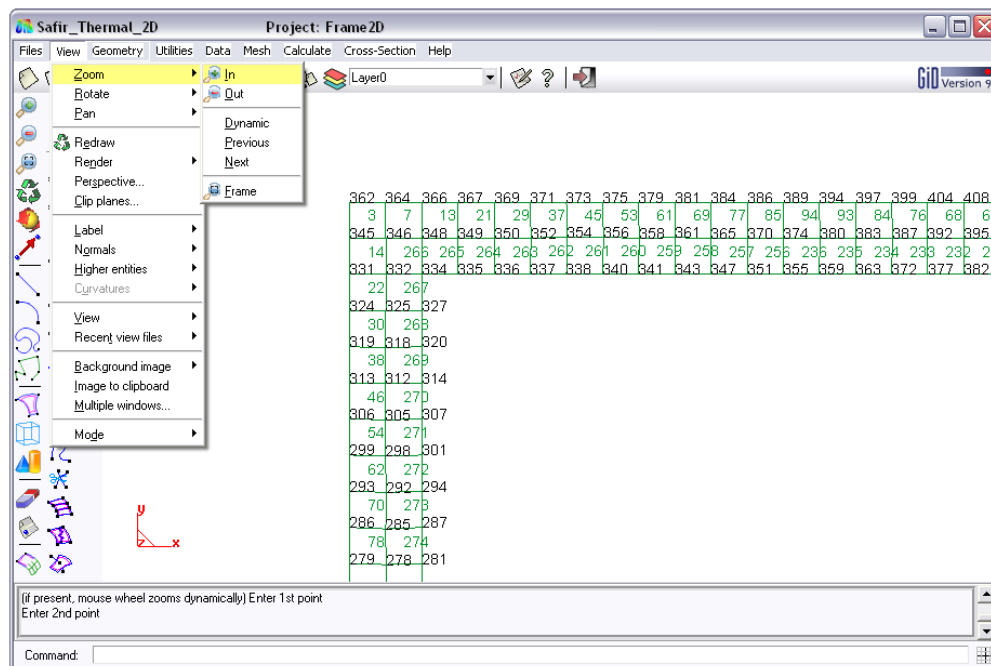
If you want to zoom select:

➤ **View->Zoom->In**

or



Select the area you want to check



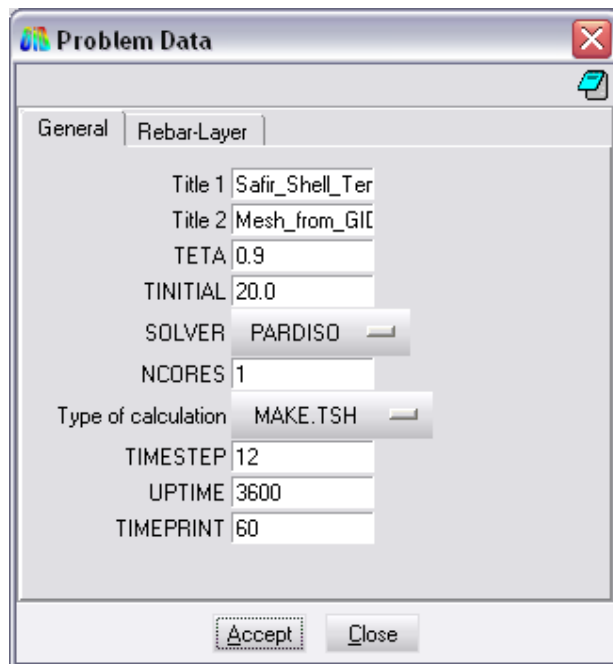
➤ **View->Label->Off** to quit the label mode

6. Assign General Data

From the pull down menu select:

 **Data->Problem Data**

Fill as below:



The screenshot shows the 'Problem Data' dialog box with the 'General' tab selected. The 'Rebar-Layer' tab is also visible. The dialog contains several input fields and buttons. The values entered in the fields are: Title 1: Safir_Shell_Ter, Title 2: Mesh_from_GID, TETA: 0.9, TINITIAL: 20.0, SOLVER: PARDISO, NCORES: 1, Type of calculation: MAKE.TSH, TIMESTEP: 12, UPTIME: 3600, and TIMEPRINT: 60. At the bottom, there are 'Accept' and 'Close' buttons.


Variable	Value
Title 1	Safir_Shell_Ter
Title 2	Mesh_from_GID
TETA	0.9
TINITIAL	20.0
SOLVER	PARDISO
NCORES	1
Type of calculation	MAKE.TSH
TIMESTEP	12
UPTIME	3600
TIMEPRINT	60

In the Problem Data dialog mask enter:

Tem-File name NVOID = 1 (Number of voids)

TIMESTEP, UPTIME, TIMEPRINT as needed

Click the Accept data button

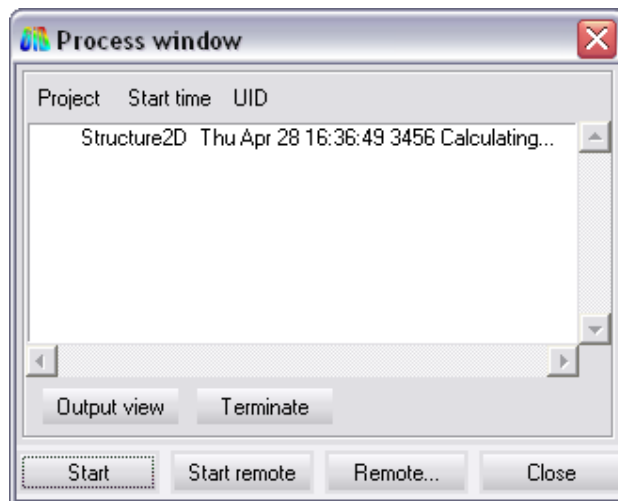
 When you click with the right button on one of the variables, GiD will display an online help message. The variables are also described in more detail in the SAFIR reference manual.

7. Start the calculation

From the pull down menu select:

► *Calculate->Calculate window*

Click the *Start* button



Click the *Output View* button

GiD creates a .IN file in the project directory and starts the calculation.

In the output window you can see the calculation progress from SAFIR and the GiD interface program which generates GiD postprocessor files from the .OUT file.

⚠ *If SAFIR found some errors in the .IN file you will see the error message in this window. Change the value and restart the calculation. Also if the number of NVOID (Data -> Problem data) is wrong an error will found.*