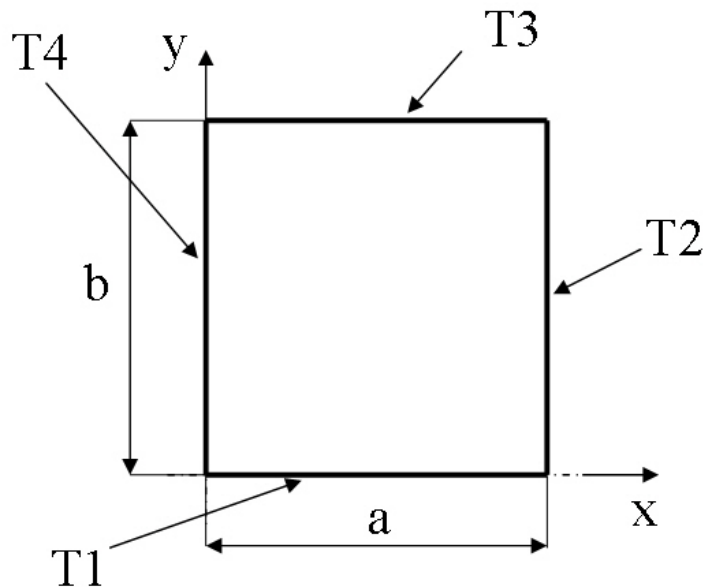


Course in ANSYS

Example0600

Example – Temperature in a plate



Objective:

Solve for the temperature distribution within the rectangular plate, based on the specified temperatures on the plate edges, and the plate dimensions.

Tasks:

How should this be modelled?

Topics:

Element type, thermal analysis, modeling, plot results, output graphics

$$E = 210000 \text{ N/mm}^2$$

$$\nu = 0.3$$

$$\text{Thermal conductivity} = 401 \text{ W/(m-K)}$$

$$a = 10 \text{ m}$$

$$b = 20 \text{ m}$$

$$T1 = 100^\circ\text{C}$$

$$T2 = 100^\circ\text{C}$$

$$T3 = 200^\circ\text{C}$$

$$T4 = 100^\circ\text{C}$$

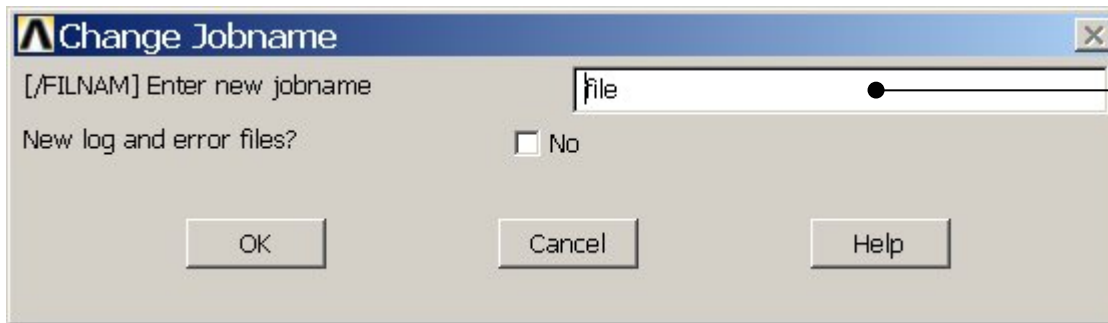
Example - title

Utility Menu > File > Change Jobname

/jobname, Example0600

GUI

Command line entry

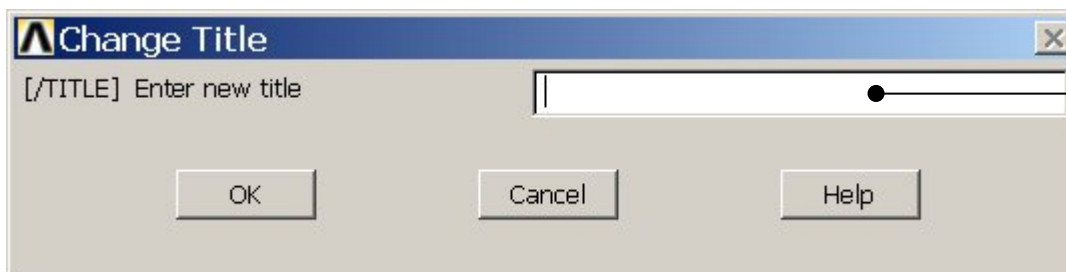


Enter: Example0600

Utility Menu > File > Change Title

/title, Temperature in a plate

Enter: Temperature in a plate



Example – Areas Rectangle

Preprocessor > Modeling > Create > Areas > Rectangle > By Dimensions

The screenshot shows the ANSYS Main Menu on the left and the 'Create Rectangle by Dimensions' dialog box in the center. The dialog box has a title bar with the ANSYS logo and the text 'Create Rectangle by Dimensions'. Below the title bar, it says '[RECTNG] Create Rectangle by Dimensions'. There are two rows of input fields: 'X1,X2 X-coordinates' and 'Y1,Y2 Y-coordinates'. Each row has two empty text boxes. Below the input fields are four buttons: 'OK', 'Apply', 'Cancel', and 'Help'. There are four callout lines with text labels pointing to the dialog box: 'Enter 0 or leave empty' points to the top-right input box, 'Enter 10' points to the top-left input box, 'Enter 0 or leave empty' points to the bottom-right input box, and 'Enter 20' points to the bottom-left input box. A callout line points to the 'OK' button with the label 'Press OK'. Below the dialog box, there is a note: 'Note: Keypoints (4 kp's) and lines (4 lines) are automatically generated (also numbered automatically)'. At the bottom of the slide, there is a footer with the text 'Computational mechanics, AAU, Esbjerg' on the left, 'Example0600' in the center, and '4' on the right.

Enter 0 or leave empty

Enter 10

Enter 0 or leave empty

Enter 20

Press OK

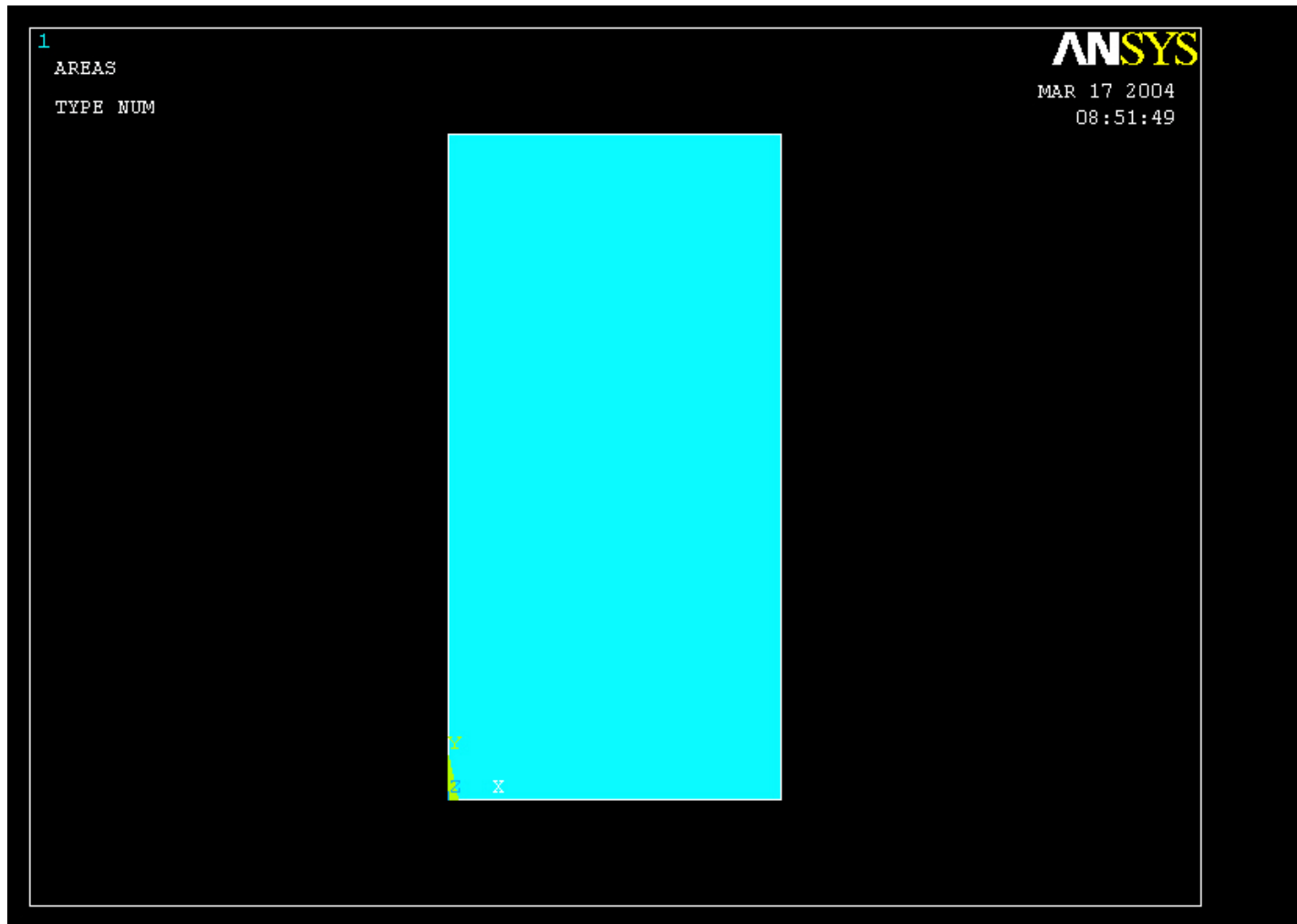
Note: Keypoints (4 kp's) and lines (4 lines) are automatically generated (also numbered automatically)

Example0600

Computational mechanics, AAU, Esbjerg

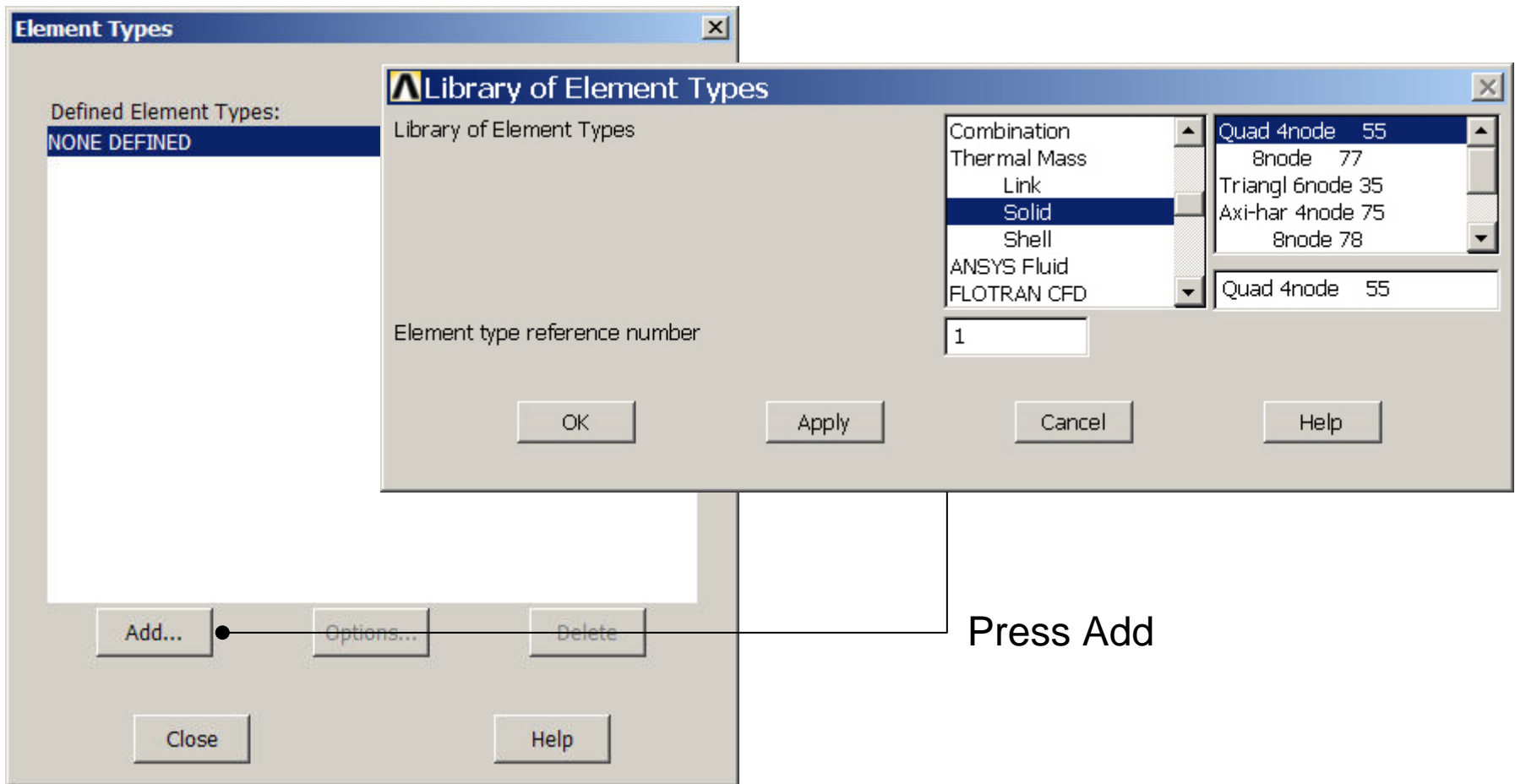
4

Example – Areas Rectangle



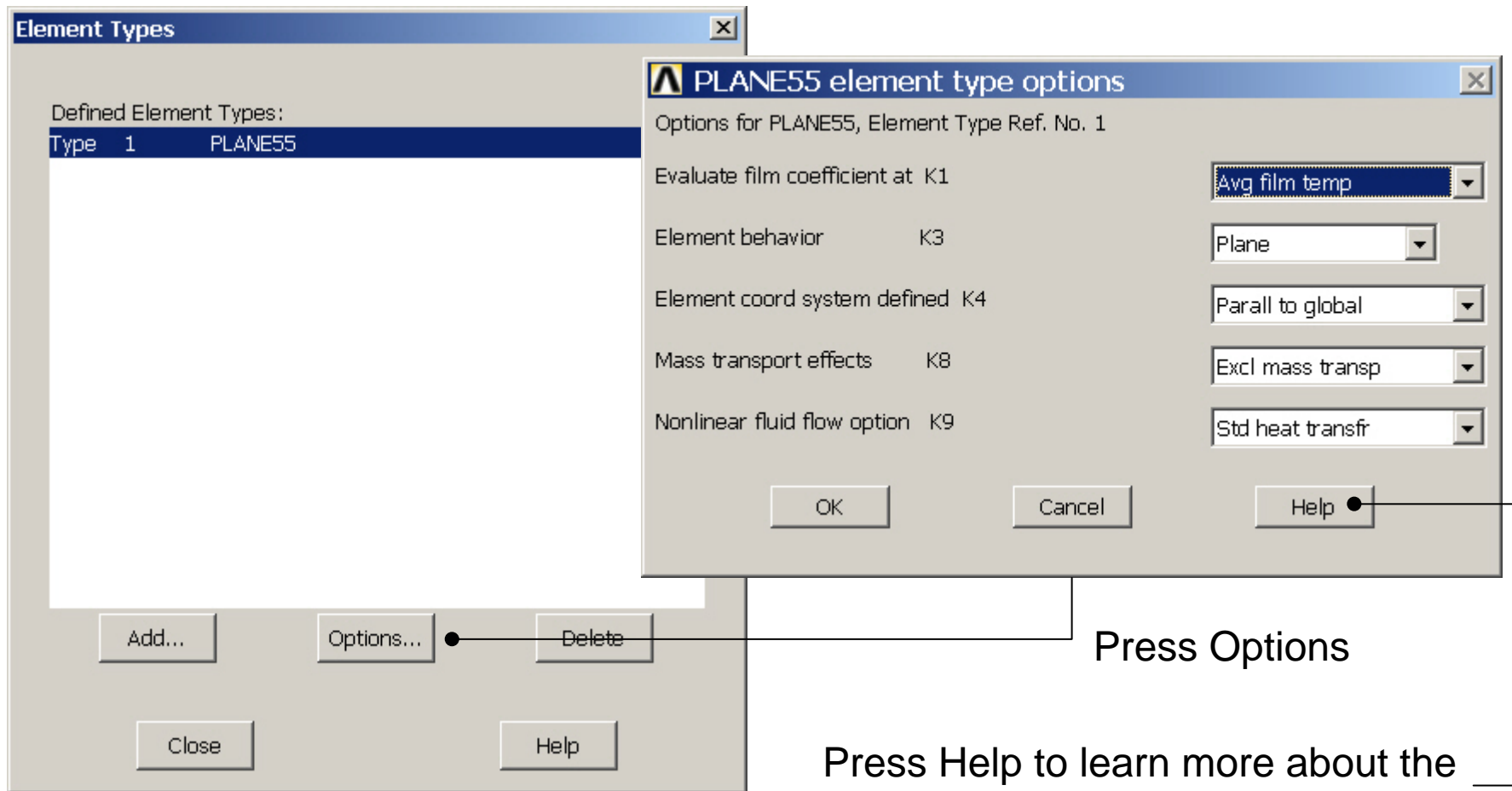
Example – Element Type

Preprocessor > Element Type > Add/Edit/Delete



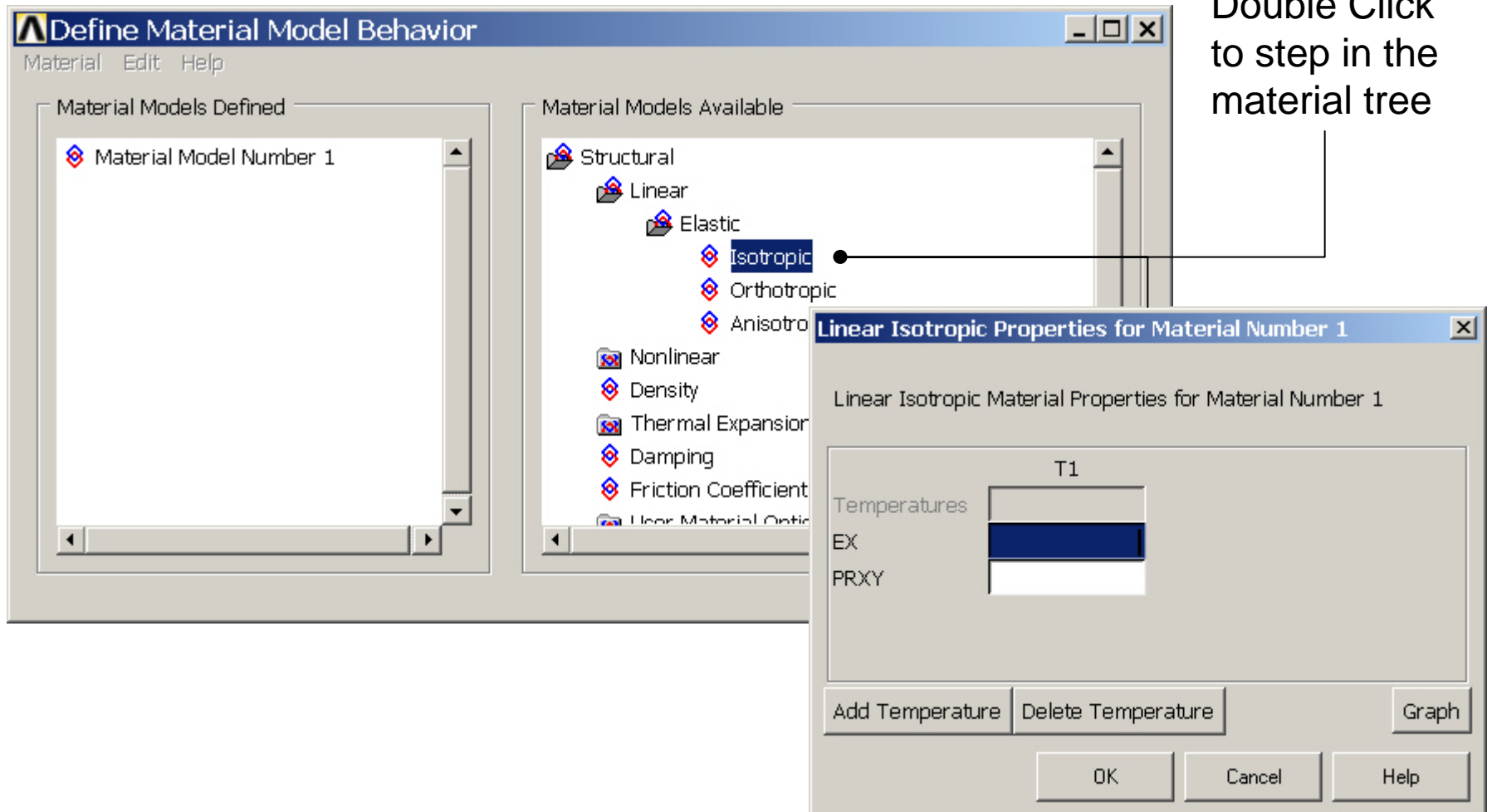
Example - Element Type

Preprocessor > Element Type > Add/Edit/Delete



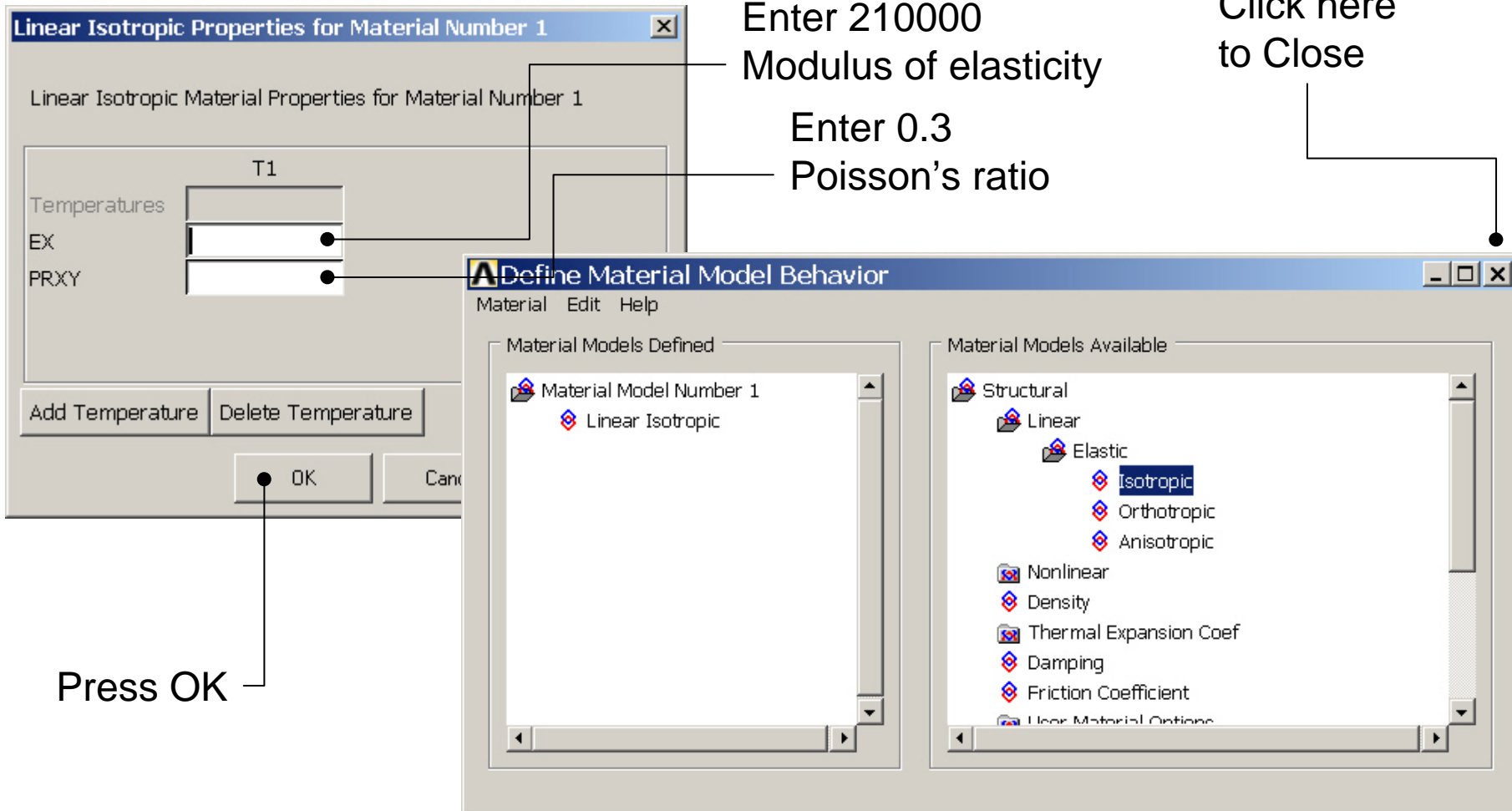
Example - Material Properties

Preprocessor > Material Props > Material Models



Example - Material Properties

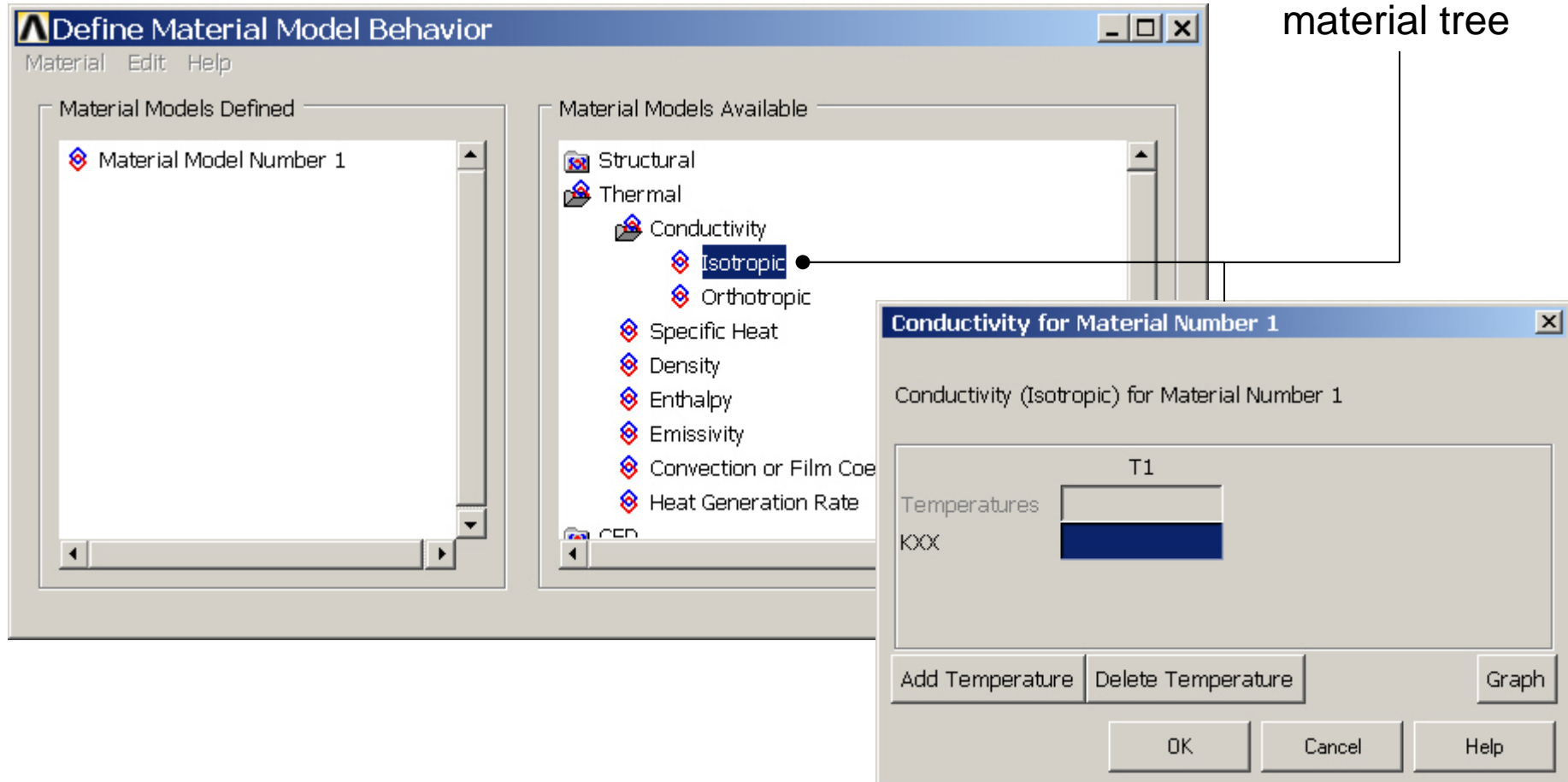
Preprocessor > Material Props > Material Models



Example - Material Properties

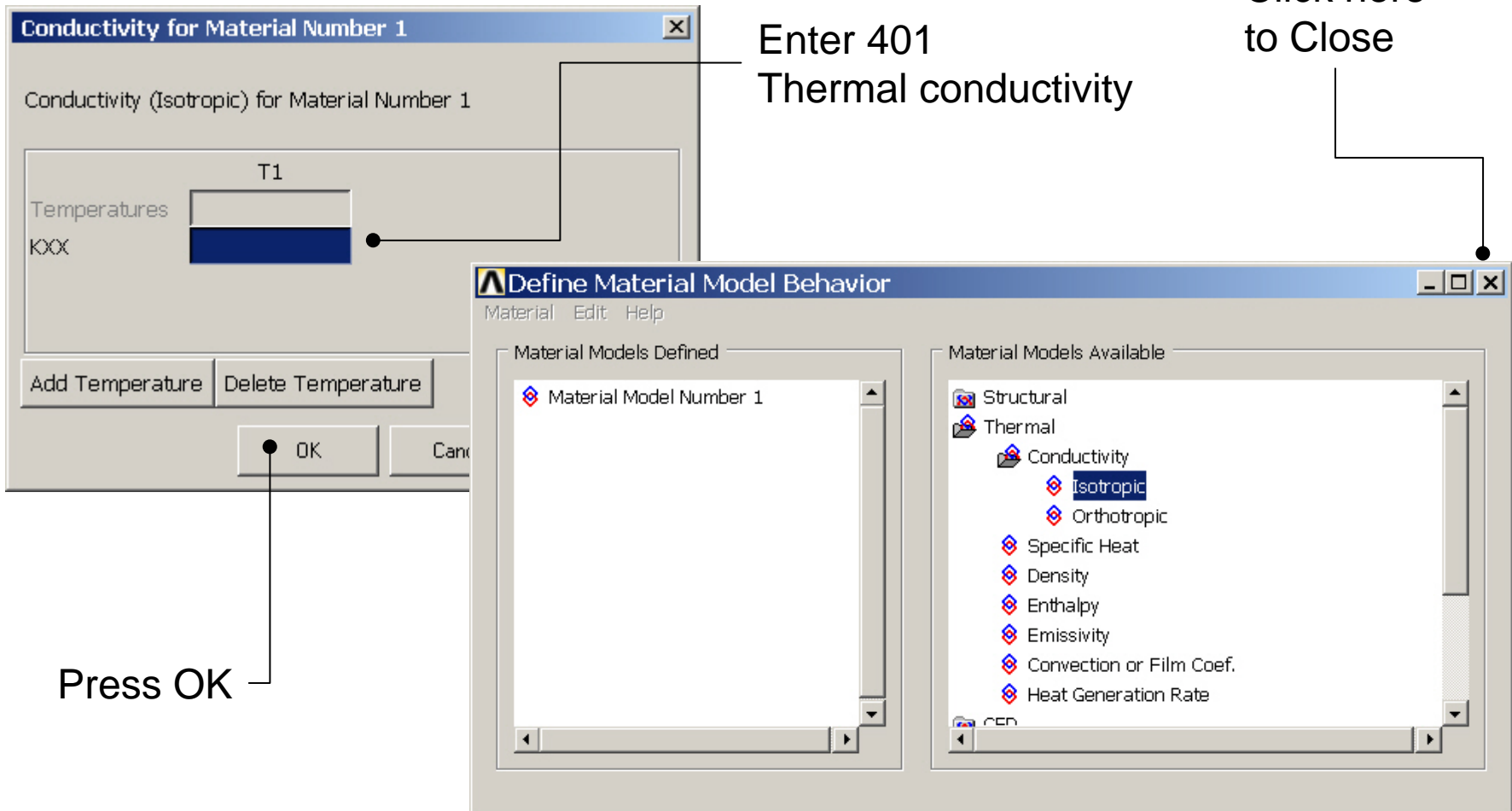
Preprocessor > Material Props > Material Models

Double Click
to step in the
material tree



Example - Material Properties

Preprocessor > Material Props > Material Models



Example - Meshing

Preprocessor > Meshing > Size Cntrls > ManualSize > Lines > Picked Lines

Element Size on P...

☒ Pick ☐ Unpick

☒ Single ☐ Box

☐ Polygon ☐ Circle

☐ Loop

Count = 0

Maximum = 1

Minimum = 1

Line No. =

☒ List of Items ☐ Min, Max, Inc

OK Apply

Reset Cancel

Pick All Help

Select/Pick
Lines to
specify
mesh size
for

Pick the two
longest lines

Element Sizes on Picked Lines

[LESIZE] Element sizes on picked lines

SIZE Element edge length

NDIV No. of element divisions

(NDIV is used only if SIZE is blank or zero)

KYNDIV SIZE,NDIV can be changed

SPACE Spacing ratio

ANGSIZ Division arc (degrees)

(use ANGSIZ only if number of divisions (NDIV) and element edge length (SIZE) are blank or zero)

Clear attached areas and volumes

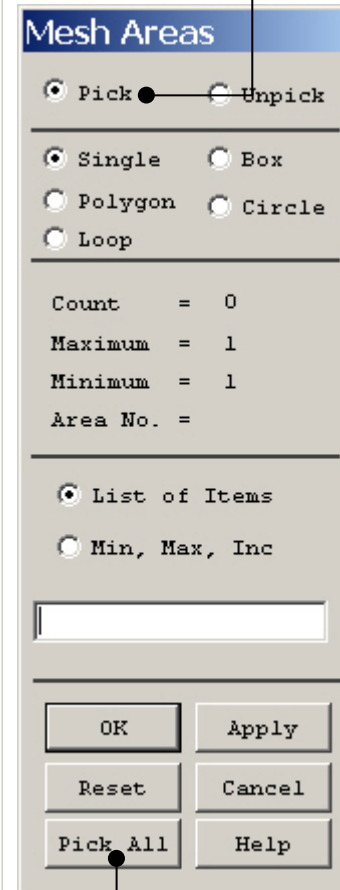
OK Apply Cancel Help

See next page

Press OK when finish with selection

Example - Meshing

Preprocessor > Meshing > Mesh > Areas > Mapped > 3 or 4 sided



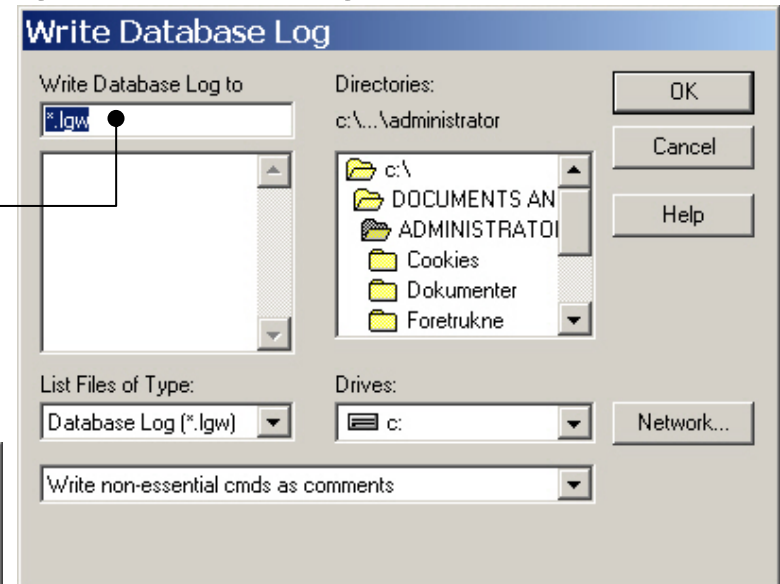
Select individual areas to be meshed

NB: It is often necessary to “Clear” the model for example if Element Type or model geometry is to be changed

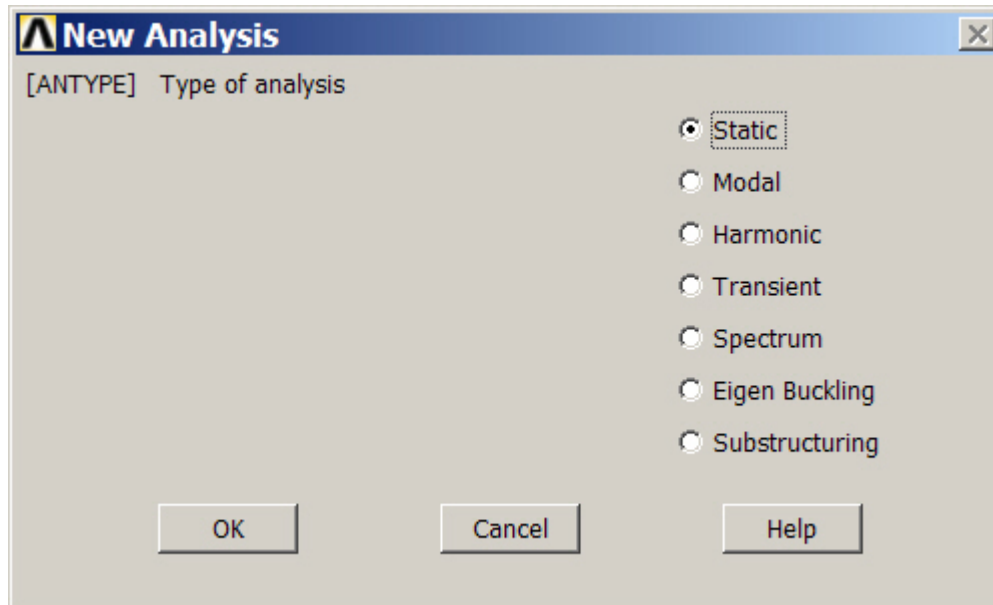
Select all areas defined to be meshed

Example – Analysis Type

File > Write DB log file
Enter “example0600.lgw”

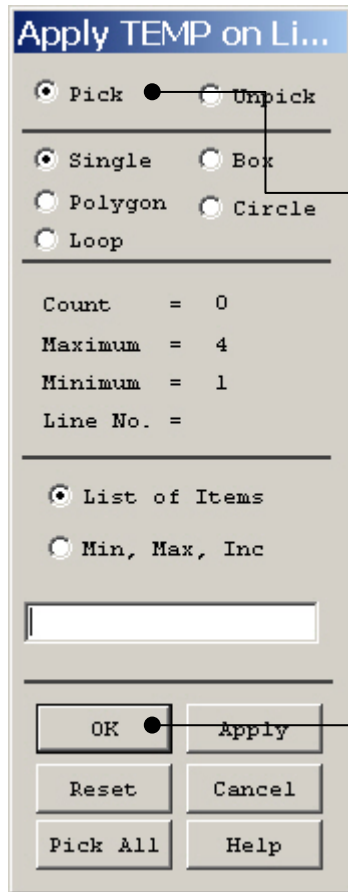


Solution > Analysis Type > New Analysis



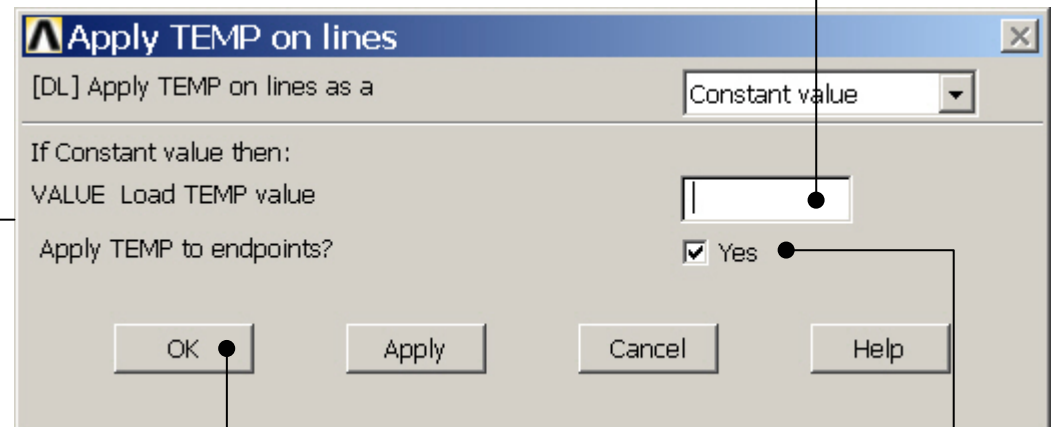
Example – Define Loads

Solution > Define Loads > Apply > Thermal > Temperature > On Lines



Select the two vertical lines

Enter 100

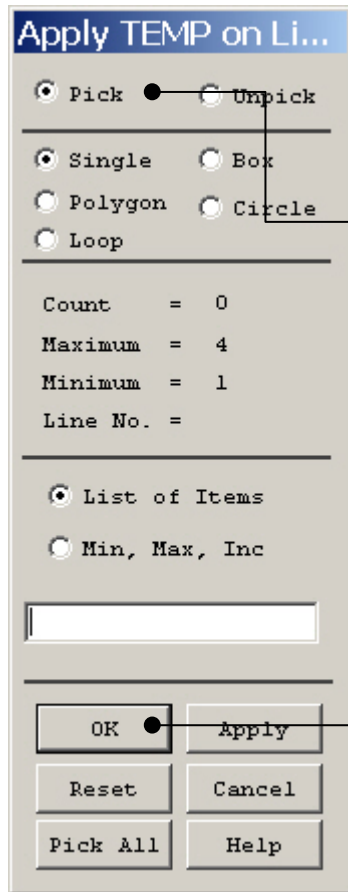


Press OK

Set to No

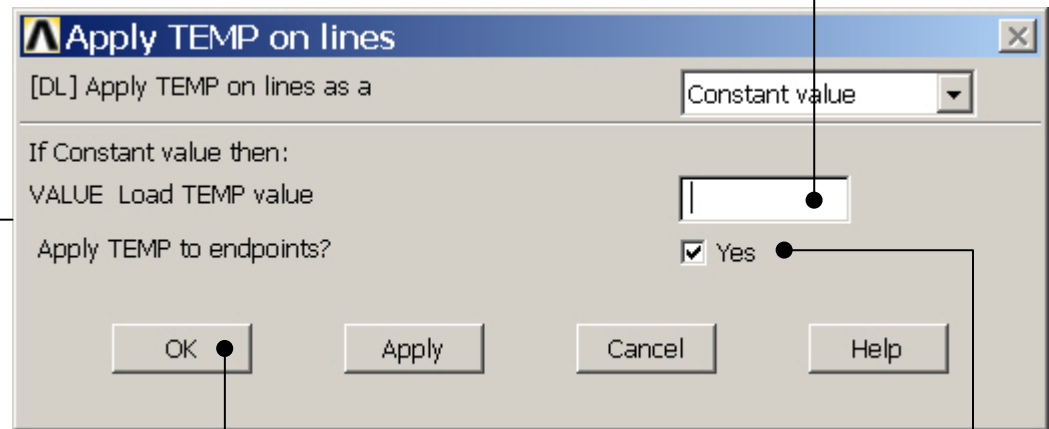
Example – Define Loads

Solution > Define Loads > Apply > Thermal > Temperature > On Lines



Select the
bottom
horizontal line

Enter 100

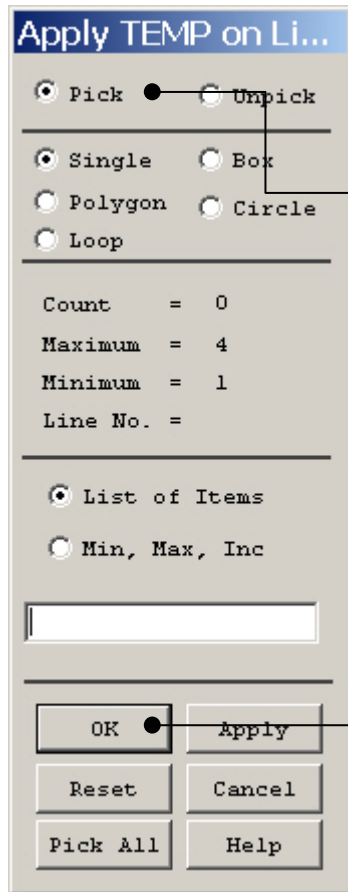


Press OK

Set to Yes

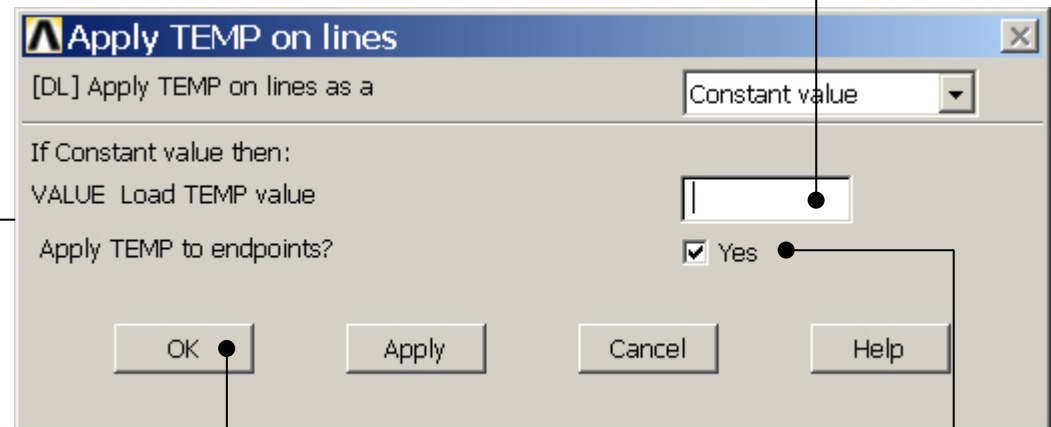
Example – Define Loads

Solution > Define Loads > Apply > Thermal > Temperature > On Lines



Select the top horizontal line

Enter 200

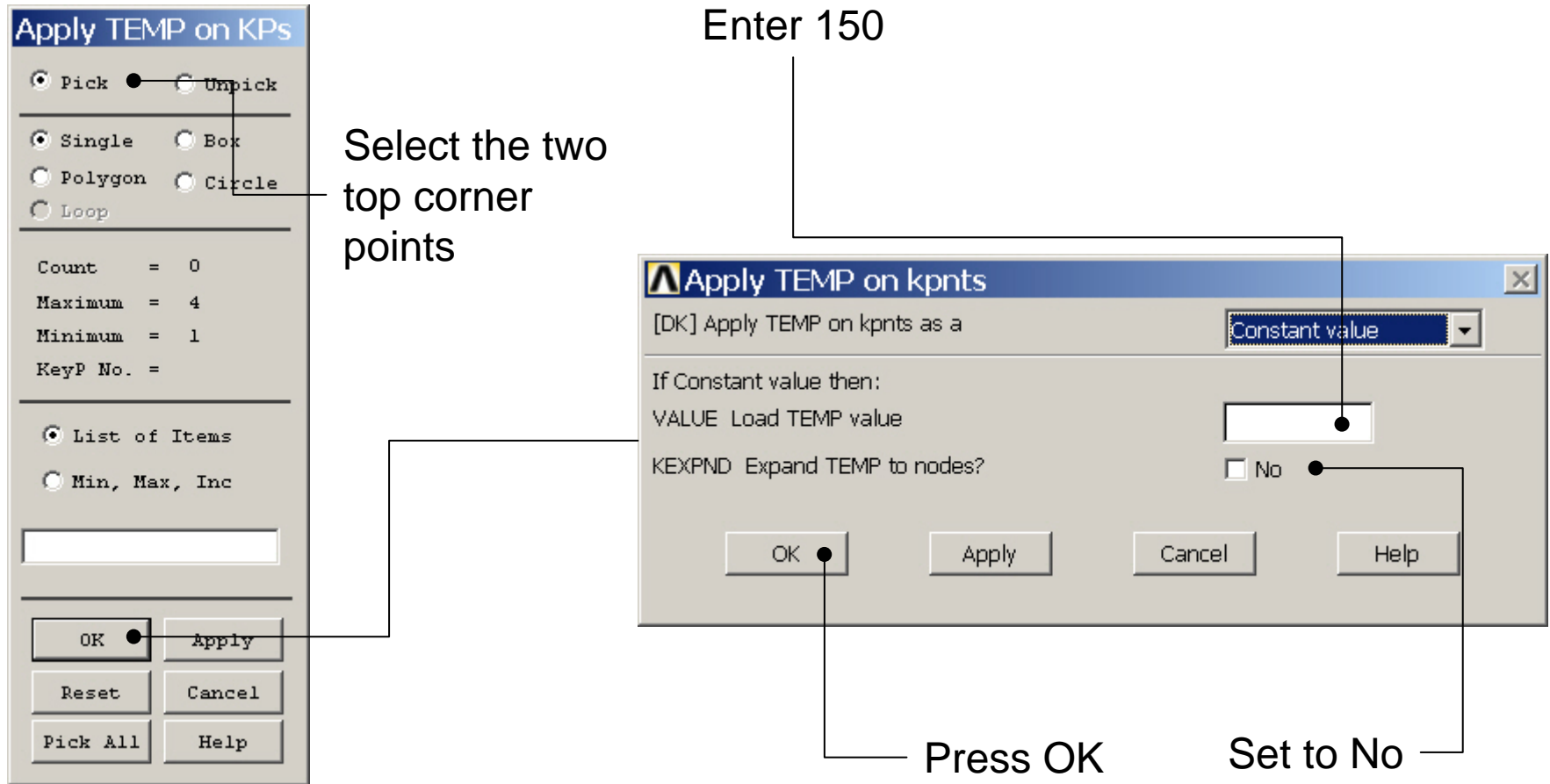


Press OK

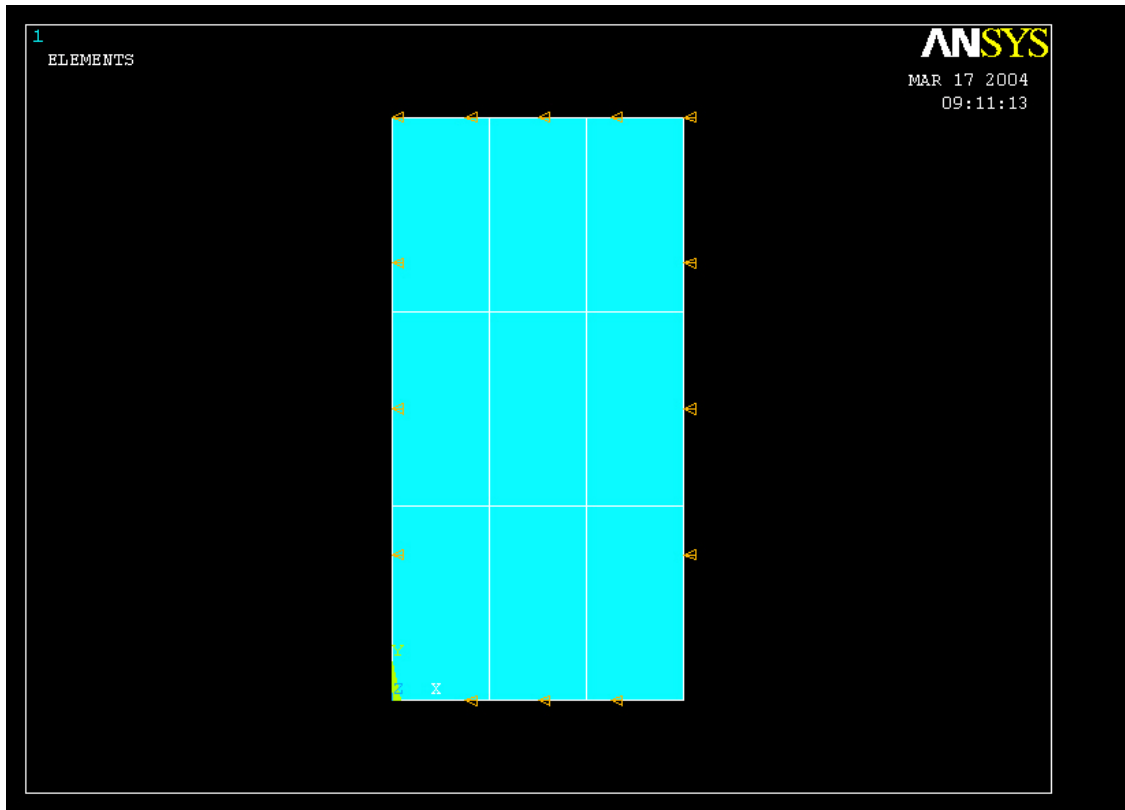
Set to No

Example – Define Loads

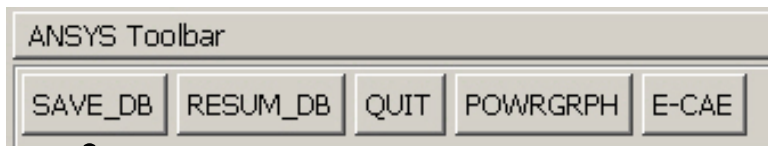
Solution > Define Loads > Apply > Thermal > Temperature > On Lines



Example - Save



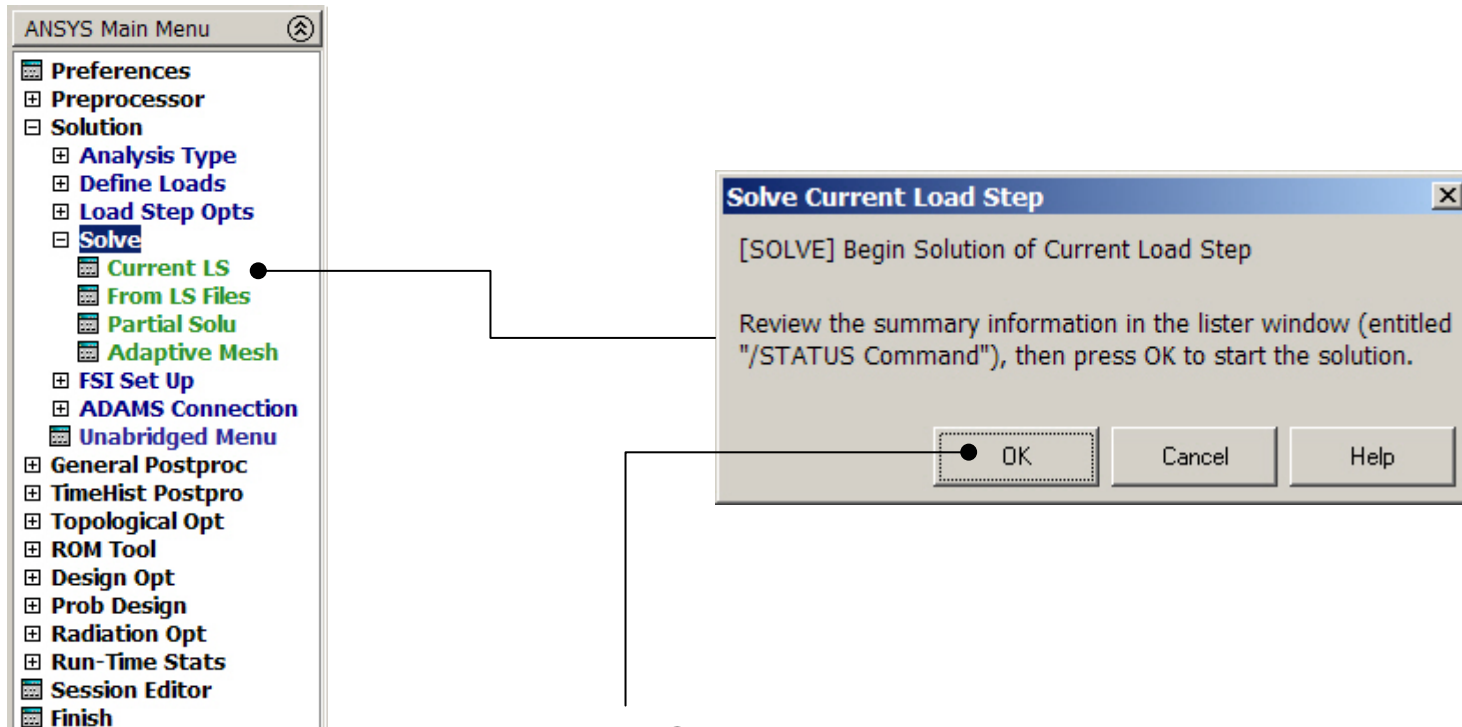
Display of Analysis model



Save the model

Example - Solve

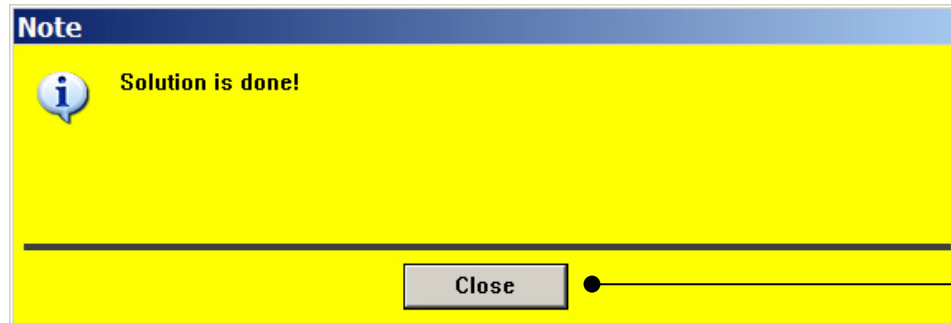
Solution > Solve > Current LS



Press OK

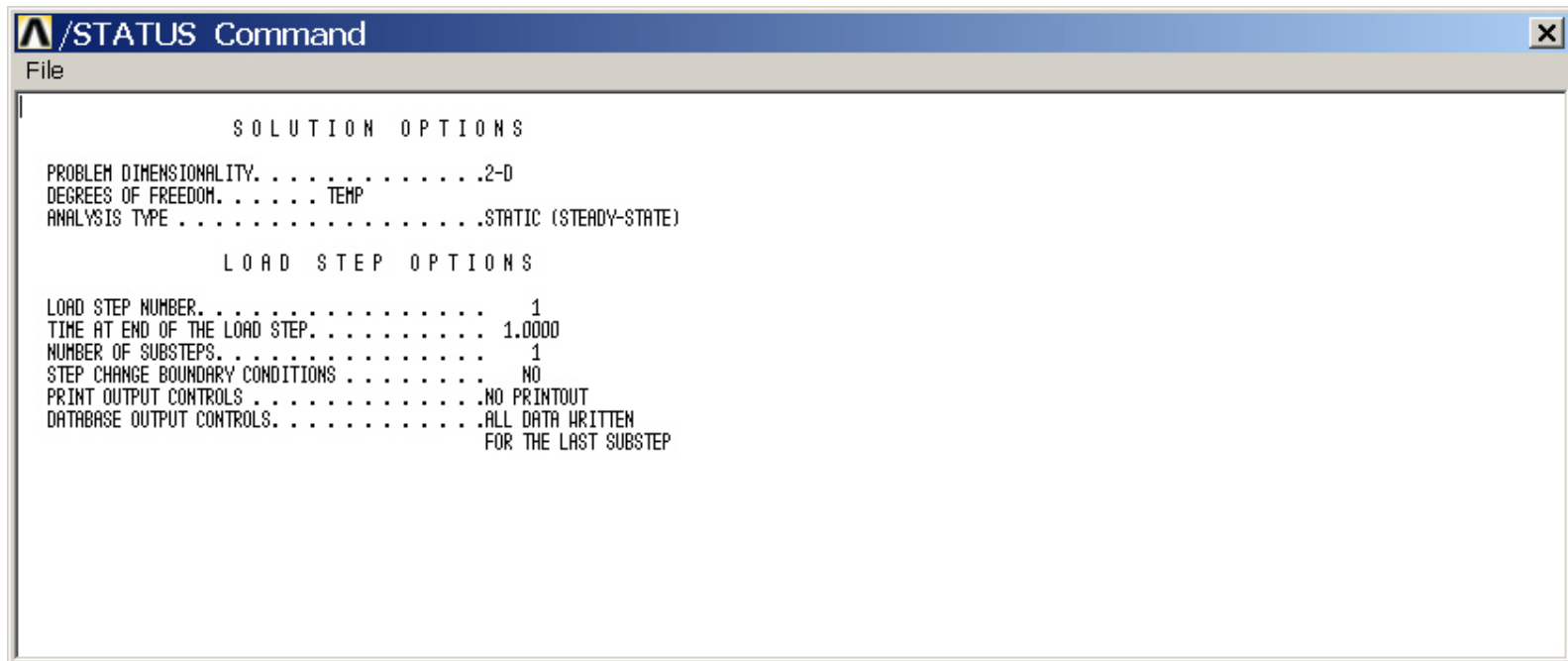
Example0600

Example - Solve



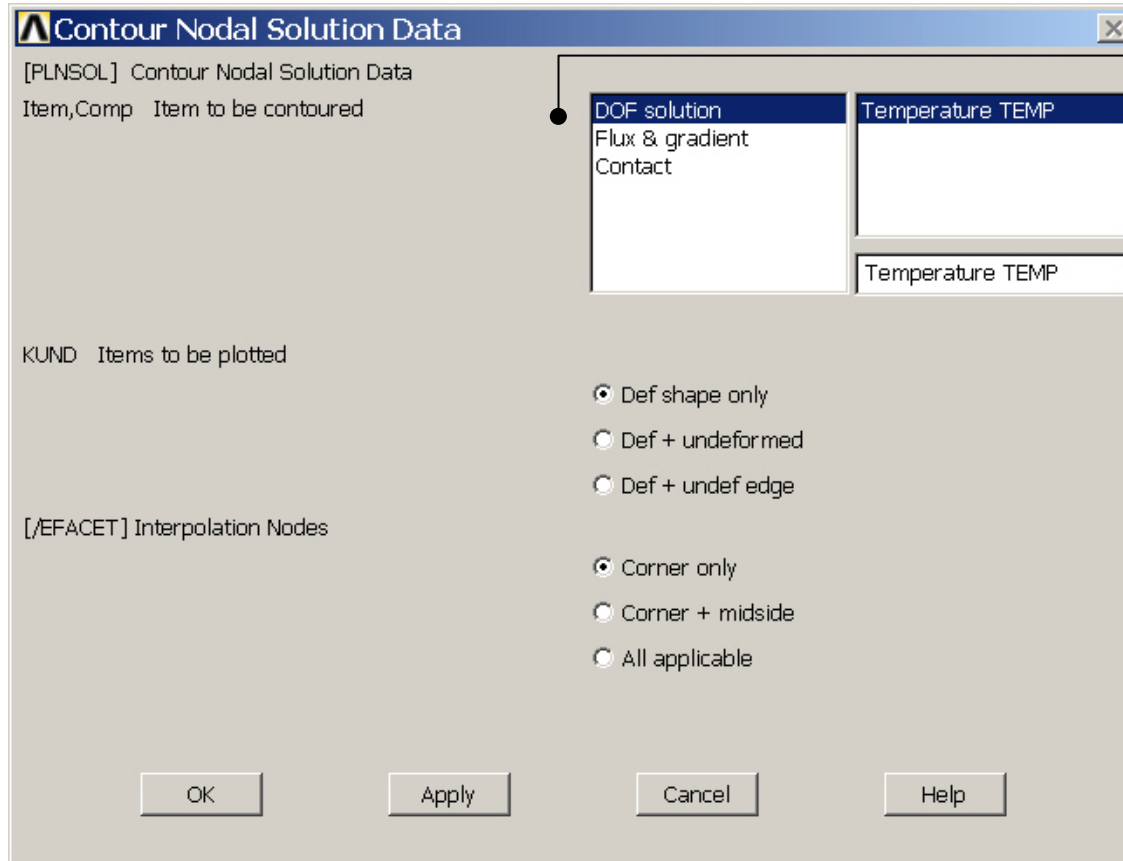
Press Close

Press here
to Close



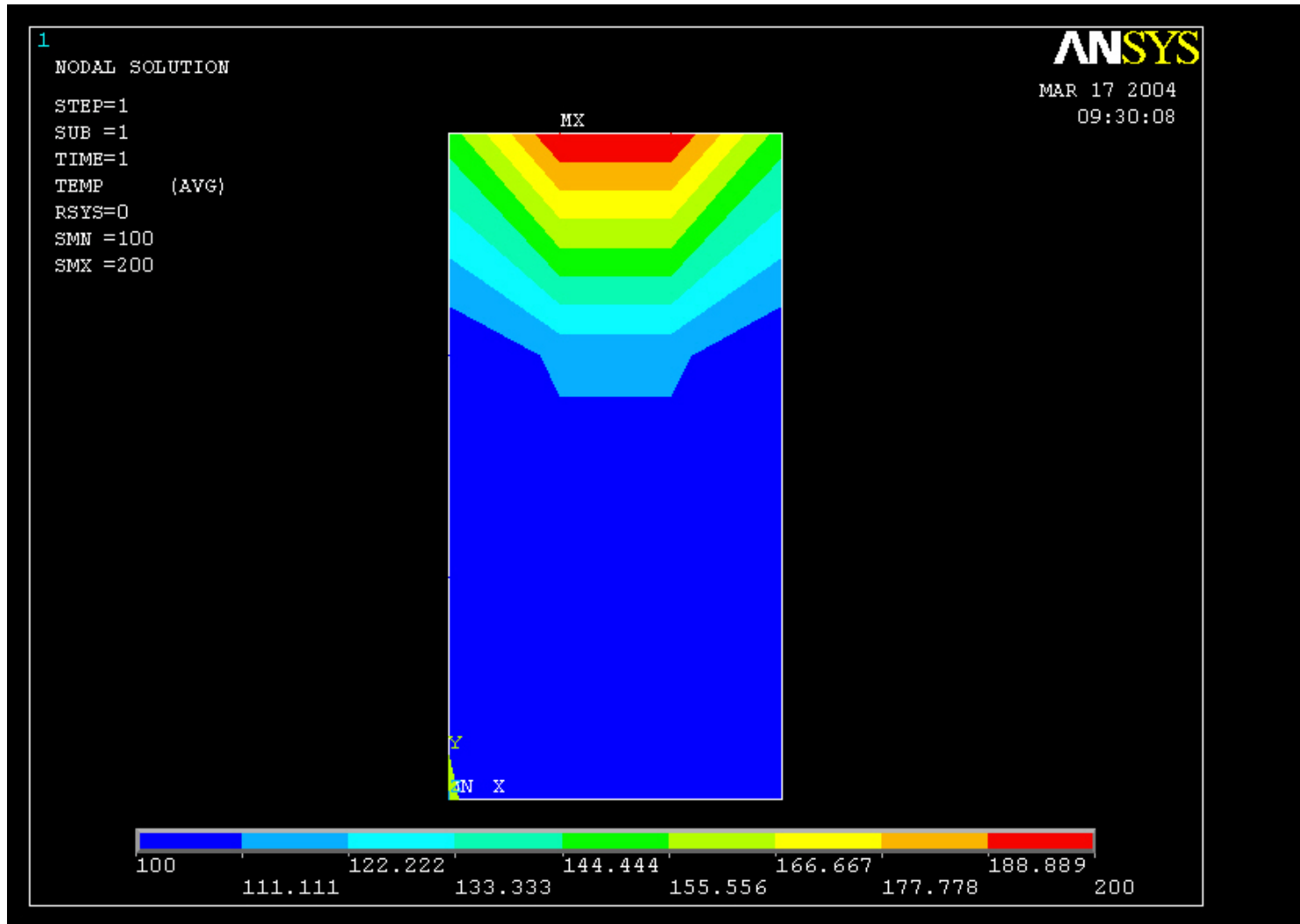
Example – Contour Plot

General Postproc > Plot Results > Contour Plot > Nodal Sol

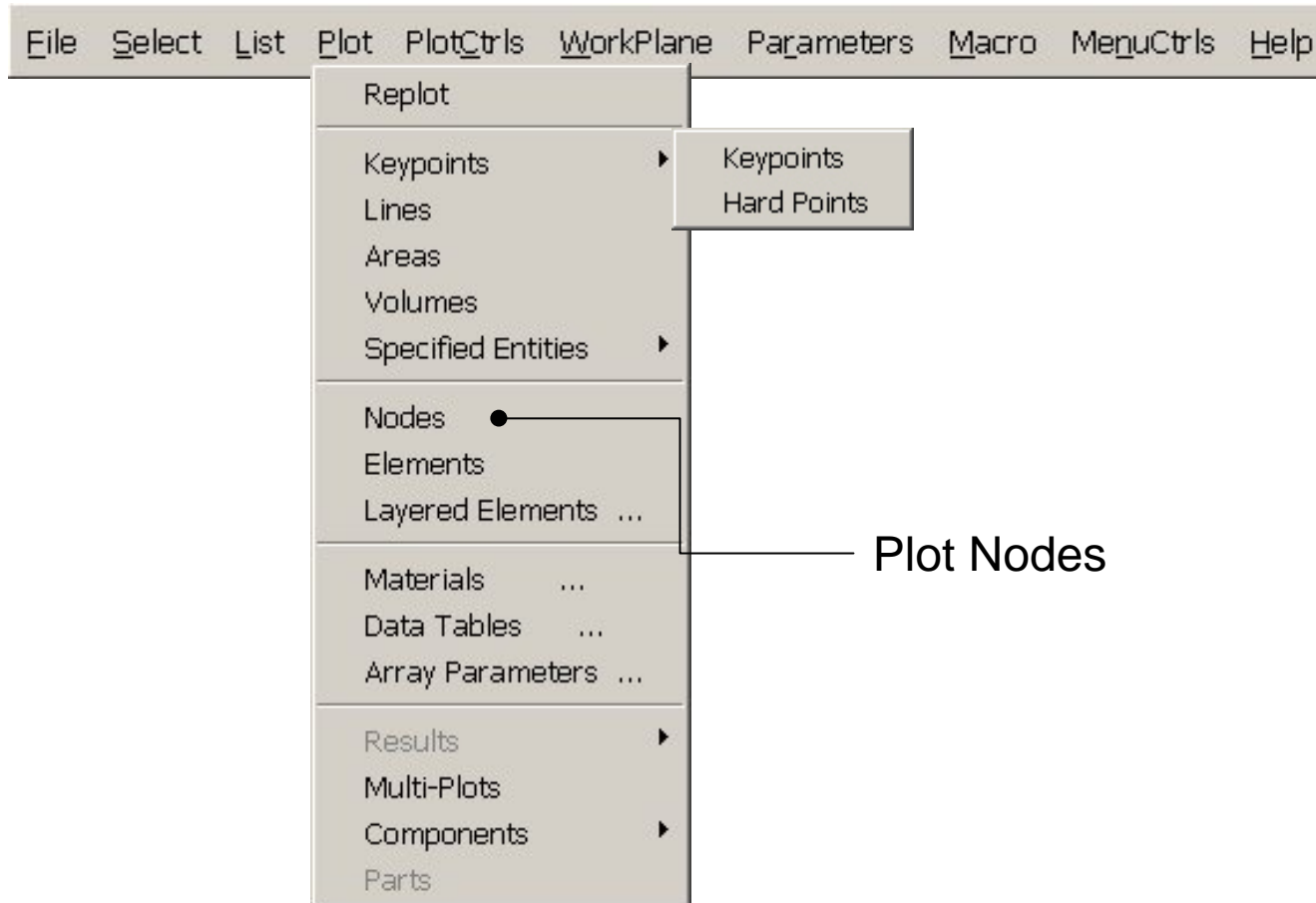


Select DOF solution

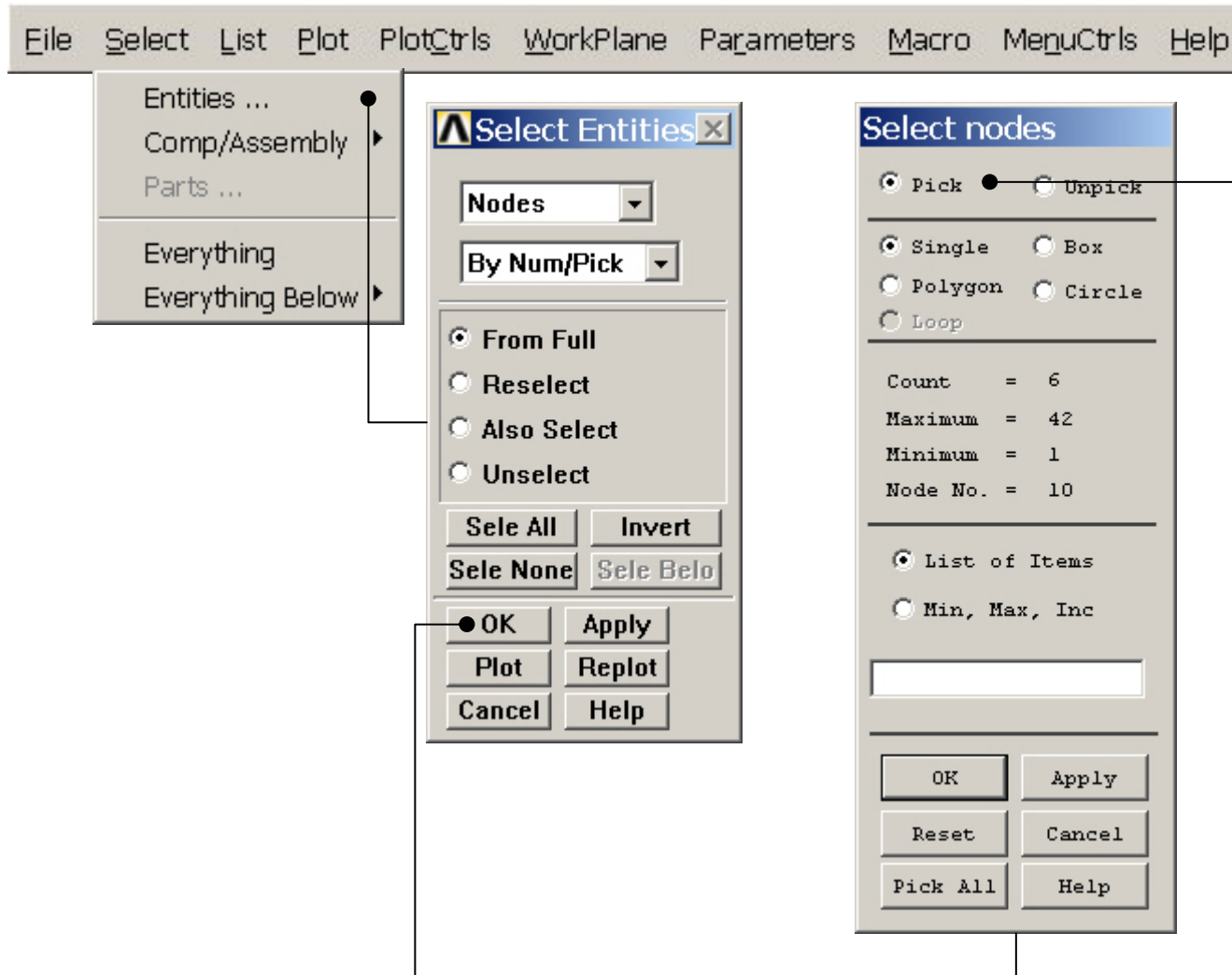
Example – Contour Plot



Example - Plot - Nodes

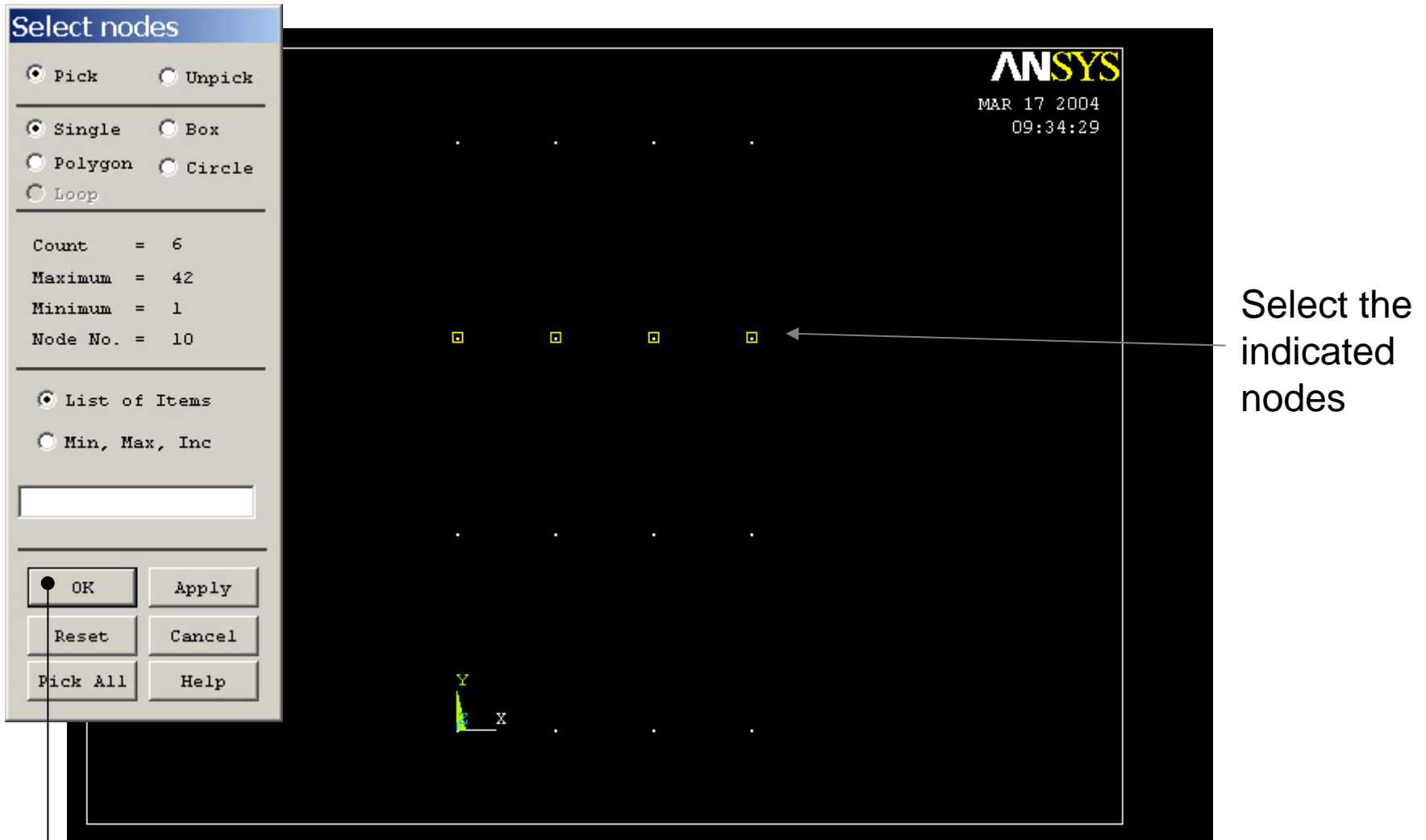


Example – Select - Entities

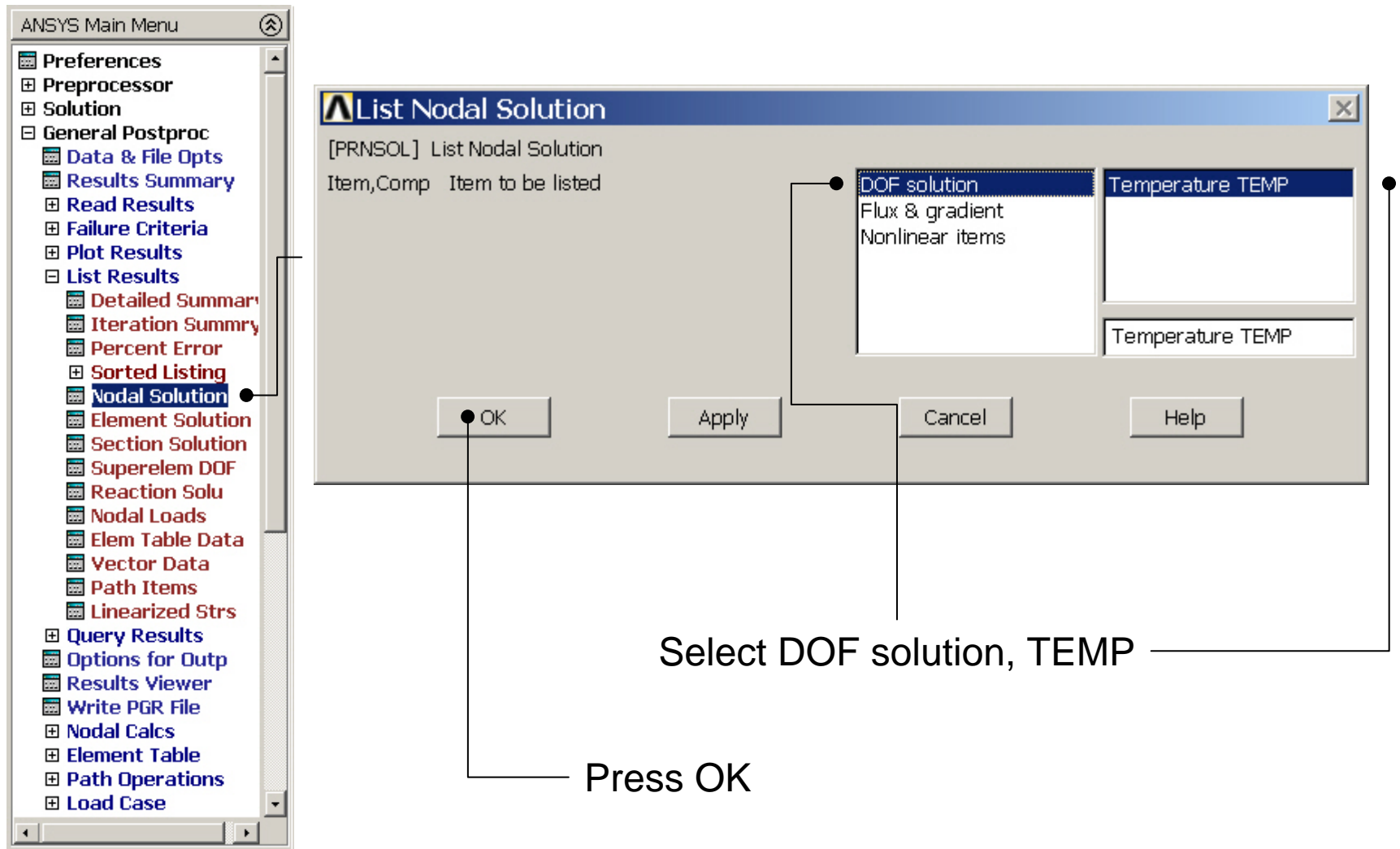


See next page
for selection

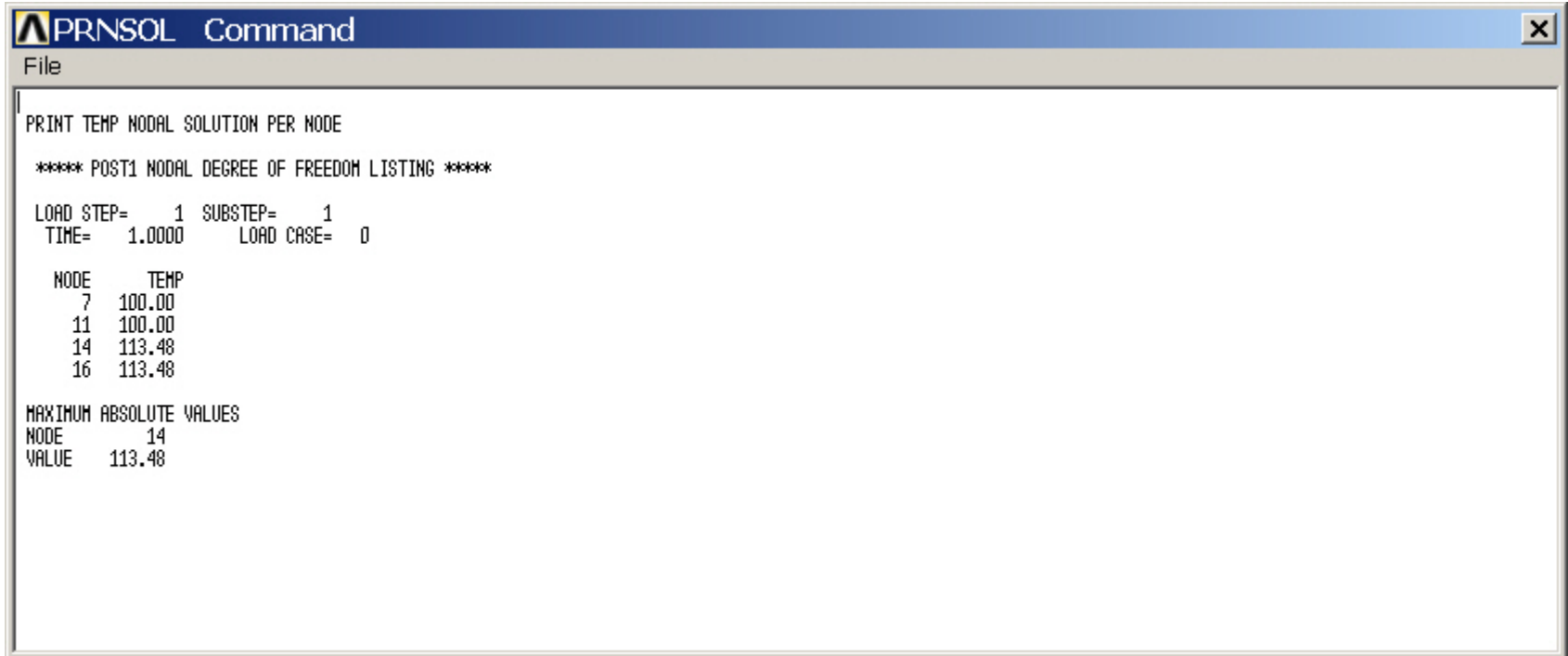
Example – Select Nodes



Example – List Results



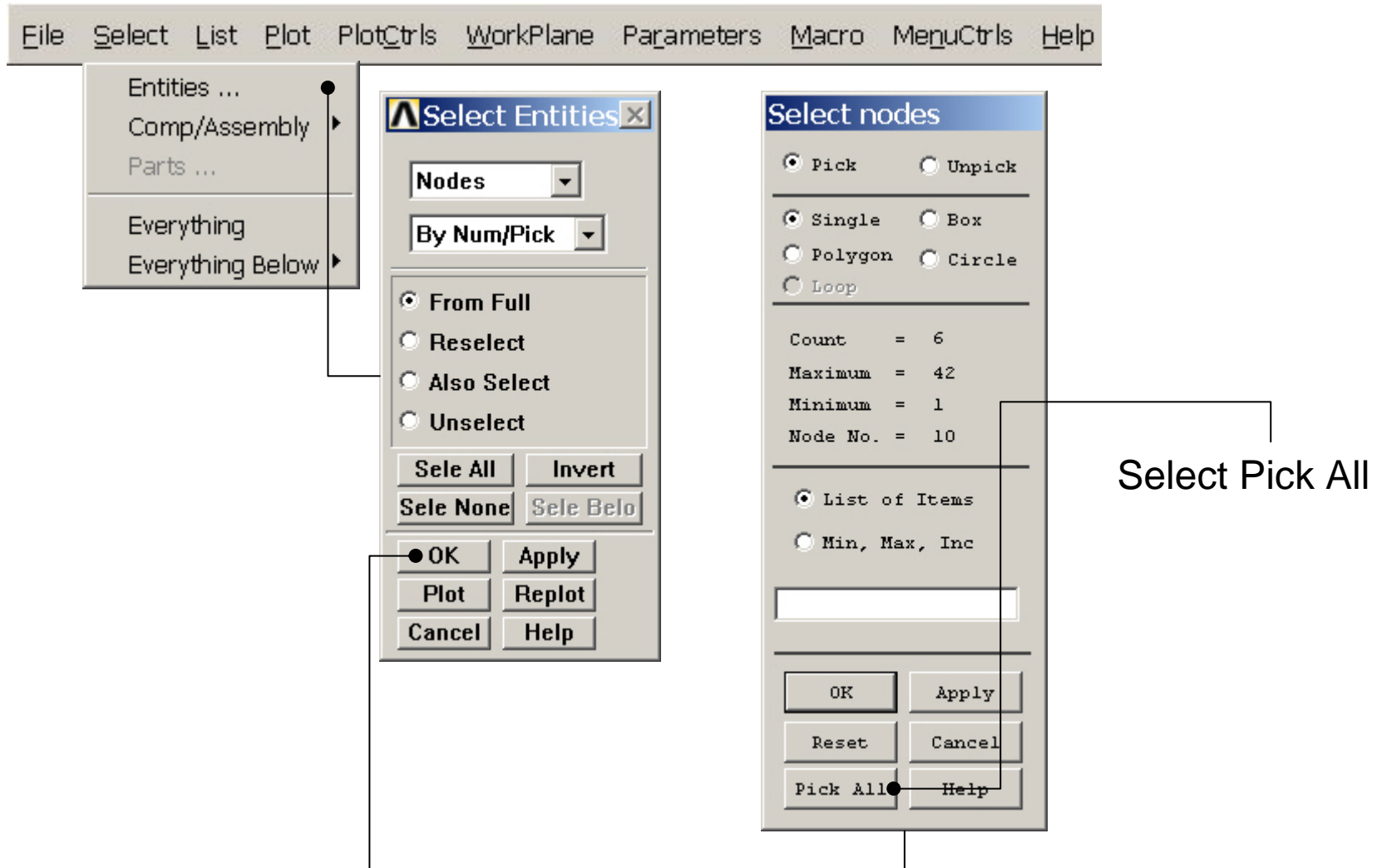
Example – List Results



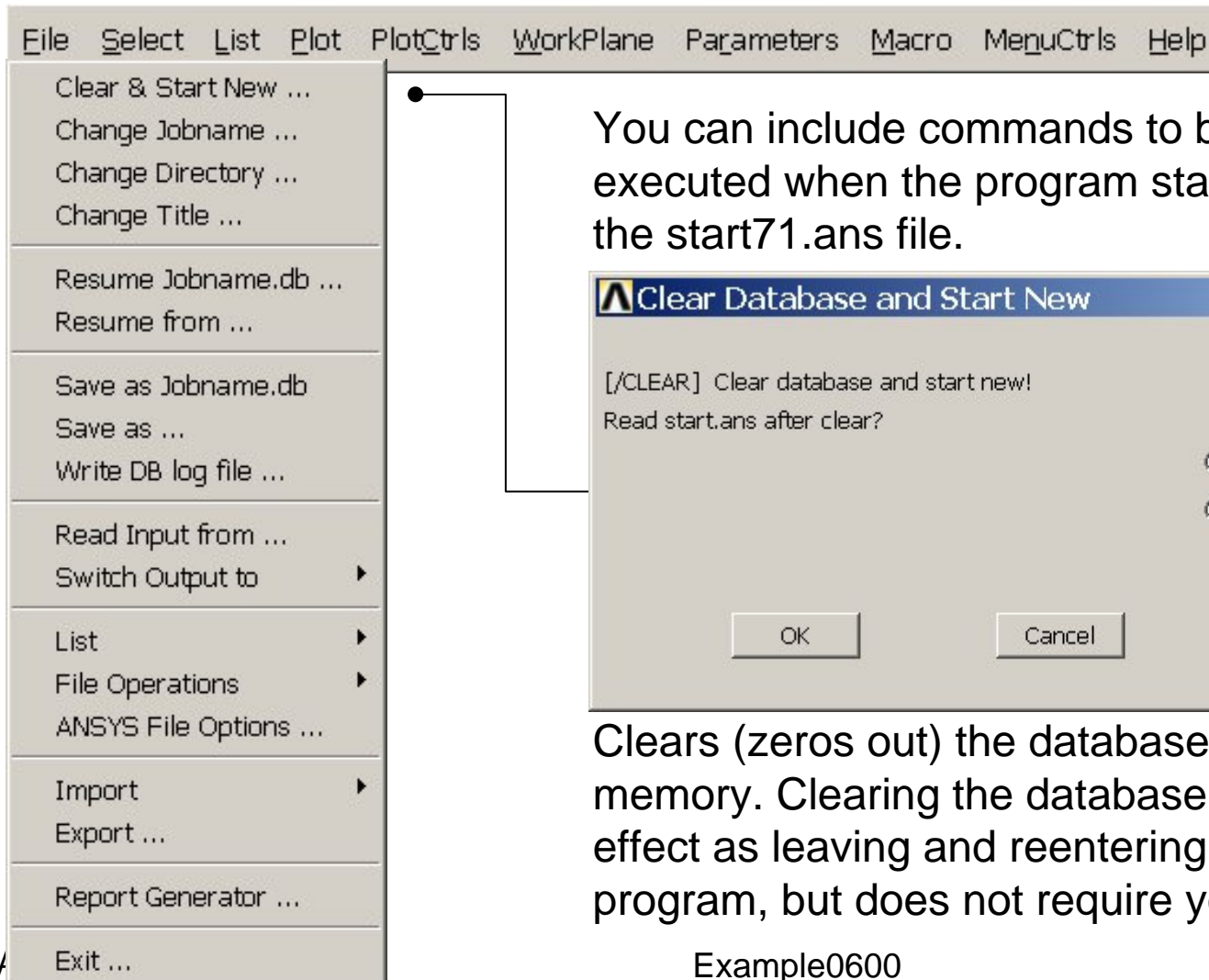
The screenshot shows a window titled "PRNSOL Command" with a menu bar containing "File". The main text area displays the following output:

```
PRINT TEMP NODAL SOLUTION PER NODE  
  
***** POST1 NODAL DEGREE OF FREEDOM LISTING *****  
  
LOAD STEP=    1  SUBSTEP=    1  
TIME=    1.0000  LOAD CASE=    0  
  
  NODE      TEMP  
   7    100.00  
  11    100.00  
  14    113.48  
  16    113.48  
  
MAXIMUM ABSOLUTE VALUES  
NODE      14  
VALUE    113.48
```

Example – Select - Entities



File menu



You can include commands to be executed when the program starts up in the start71.ans file.

Clears (zeros out) the database stored in memory. Clearing the database has the same effect as leaving and reentering the ANSYS program, but does not require you to exit.