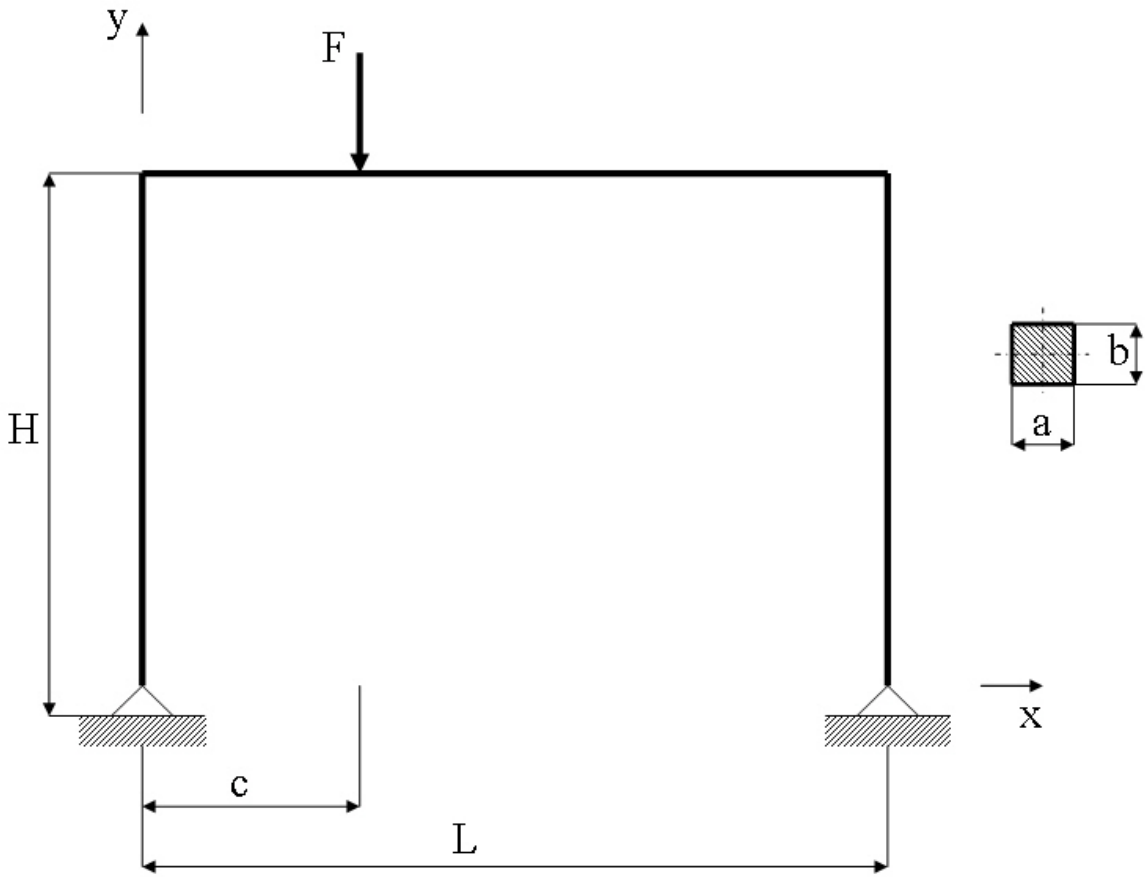
Course in ANSYS

Example0154

Example – Frame 2D



$E = 210000 N/mm^2$

$\nu = 0.3$

L= 1000mm

H = 1000mm

a = 20mm

b = 50mm

c = 400mm

F = 10000N

$I = 208333 N/mm^4$

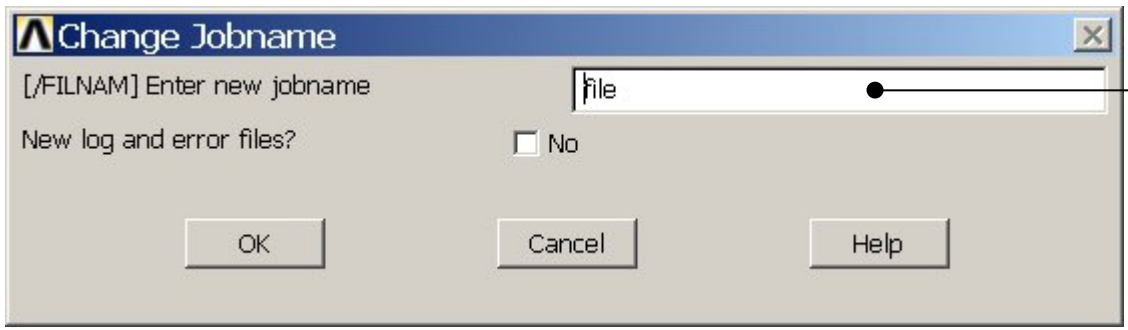
Example – Frame 2D

Objective:
Compute the maximum deflection and the member forces
Tasks:
Display the deflection figure? Display member forces?
Topics:
Start of analysis, Element type, Real constants, Material, modeling, element size for beam models, saving/restoring

Example - title

Utility Menu > File > Change Jobname — GUI

/jobname, Example0154 — Command line entry

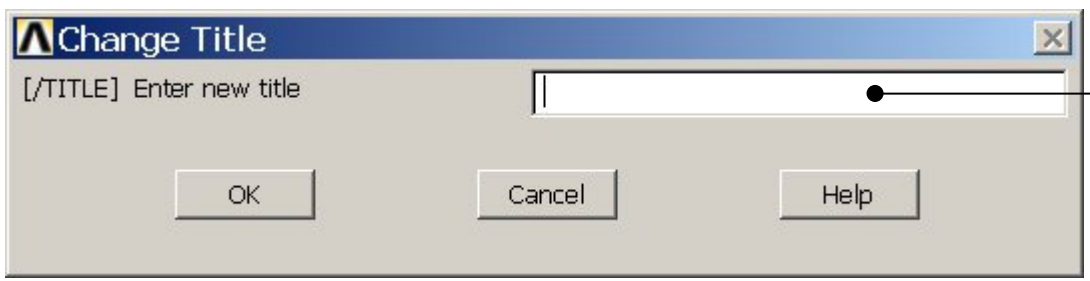


Enter: Example0154

Utility Menu > File > Change Title

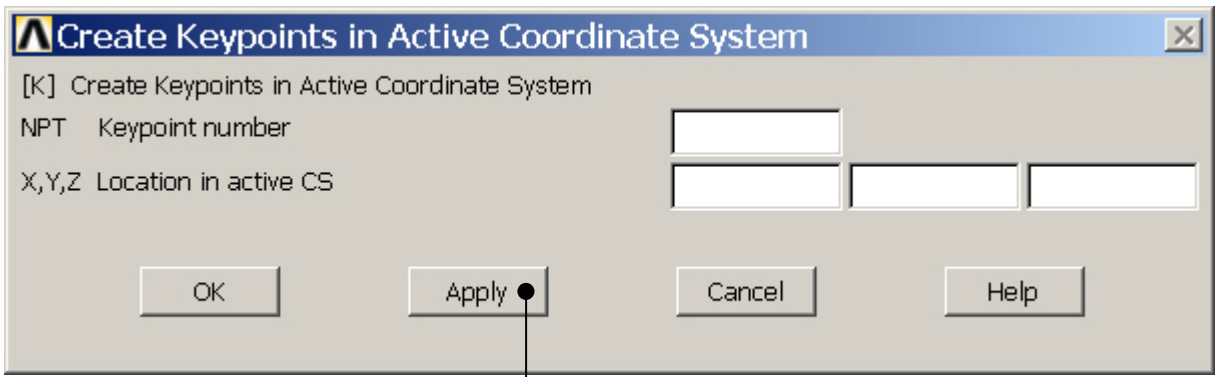
/title, Frame 2D

Enter: Frame 2D



Example - Keypoints

Preprocessor > Modeling > Create > Keypoints > In Active CS

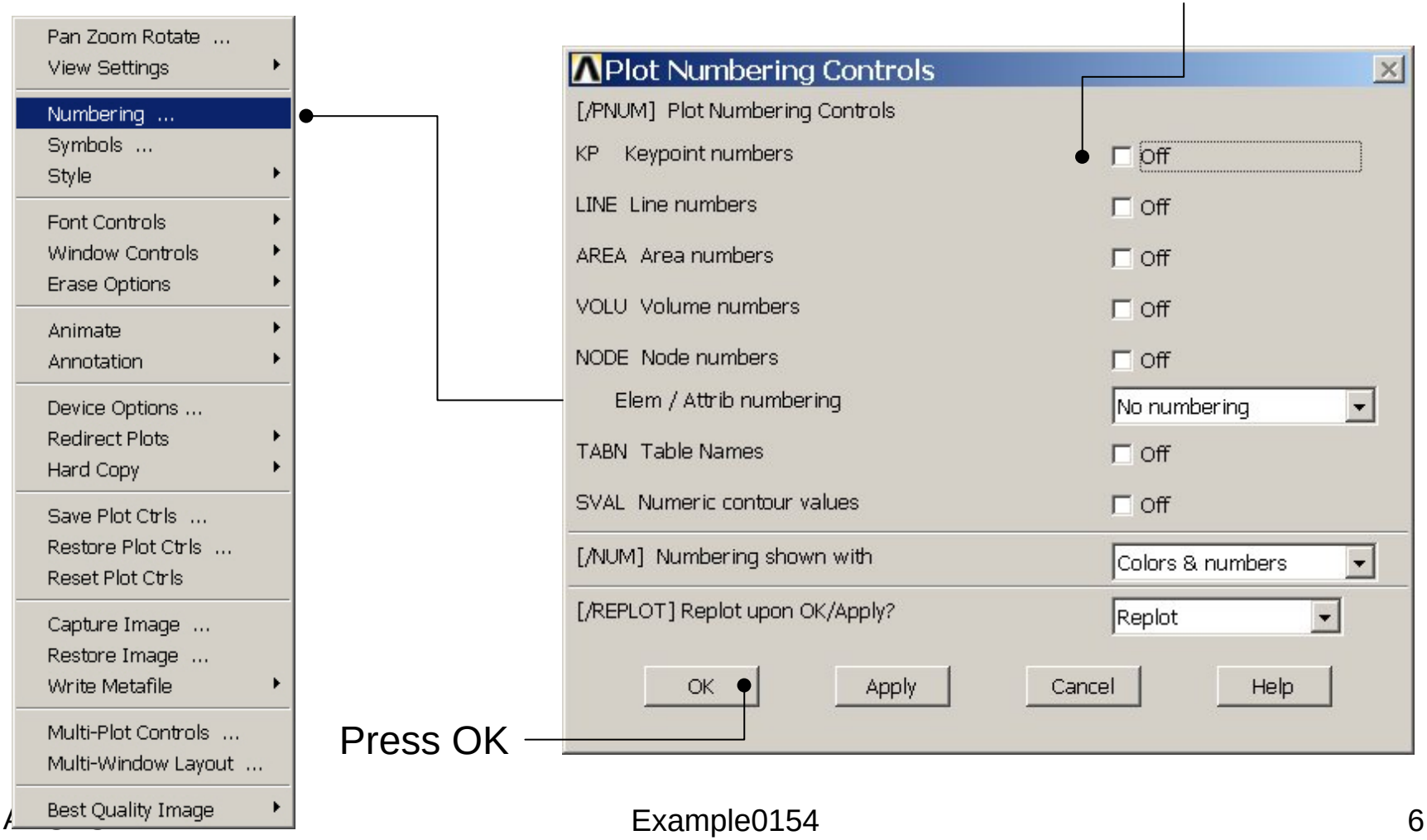


Enter 0,0,0
Enter 0,1000,0
Enter 300,1000,0
Enter 1000,1000,0
Enter 1000,0,0

Example - Numbering

Utility Menu > PlotCtrls > Numbering

Switch on Keypoint numbers



Press OK

Example - Lines

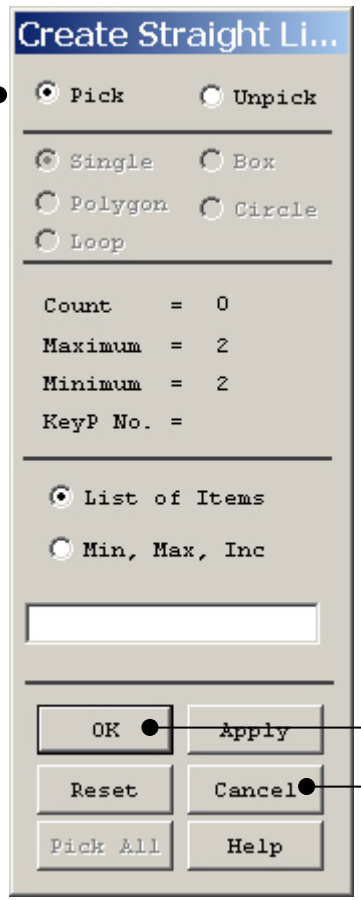
Preprocessor > Modeling > Create > Lines > Lines > Straight Line

Select KP1 and KP2

Select KP2 and KP3

Select KP3 and KP4

Select KP4 and KP5



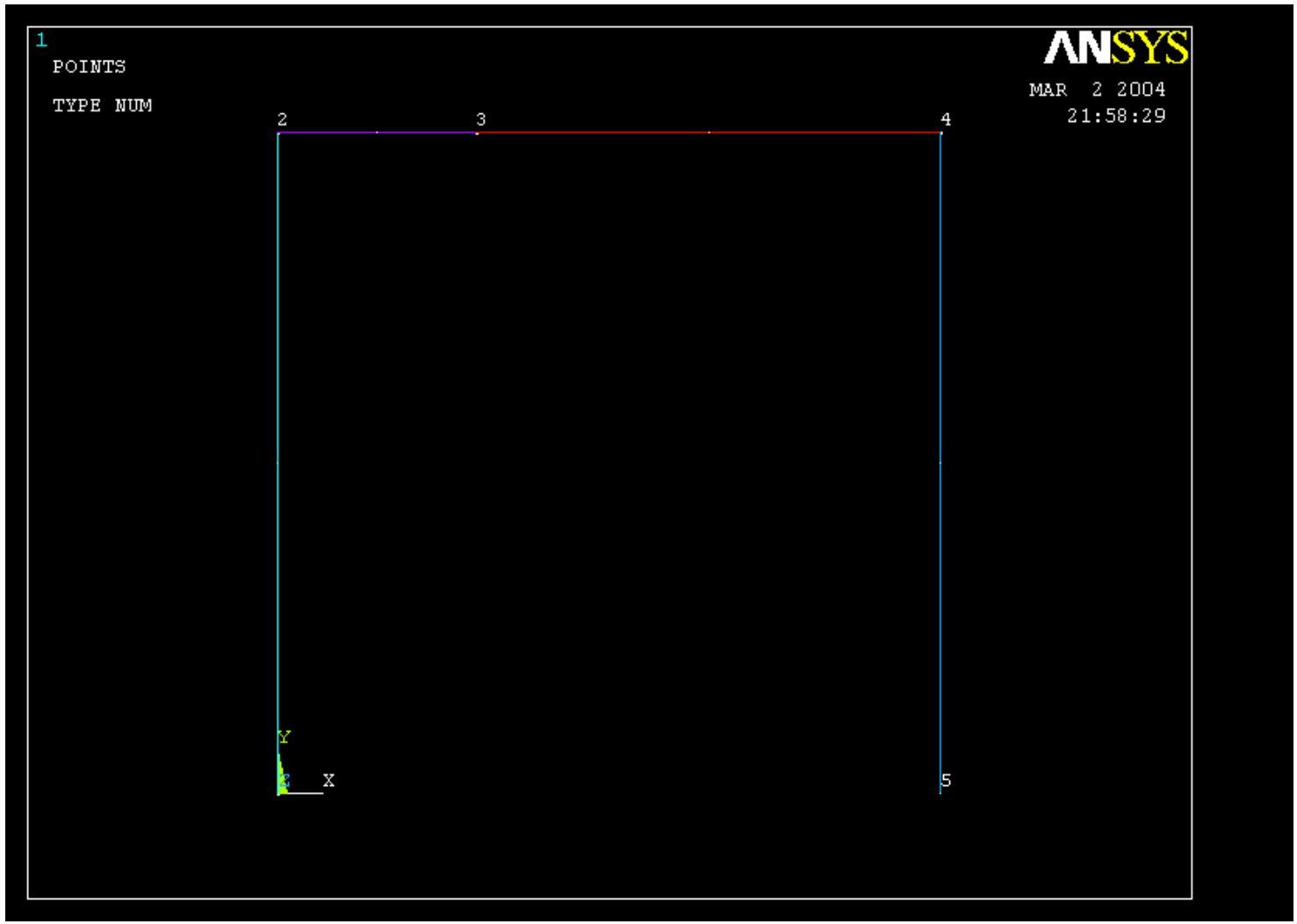
HINT: By clicking with the right-hand mouse button you shift between the Pick/Unpick function. This is indicated by the direction of the cursor arrow:

Pick: upward arrow

Unpick: downward arrow

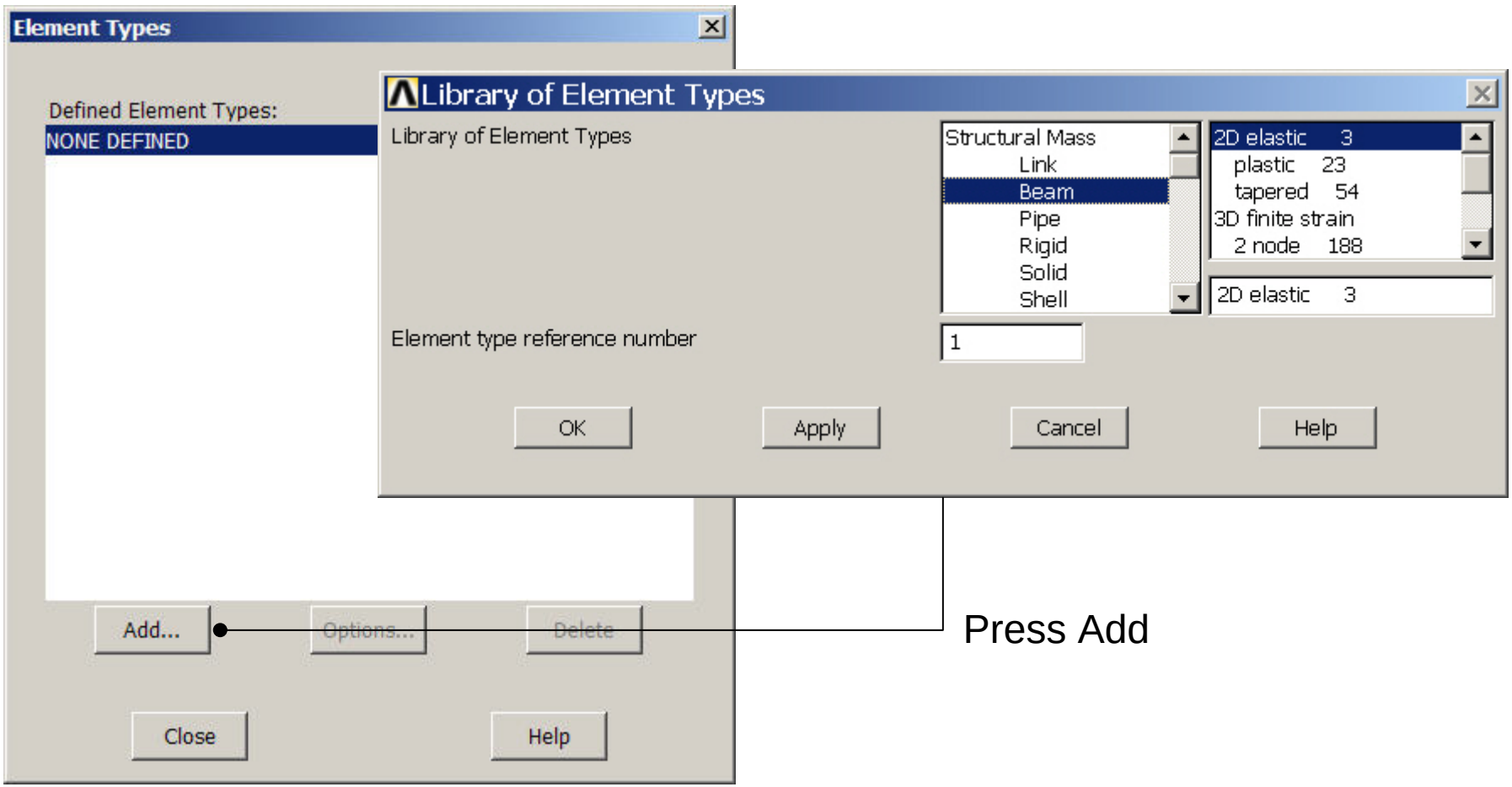
Press OK or Cancel to finish selection

Example – Modeling



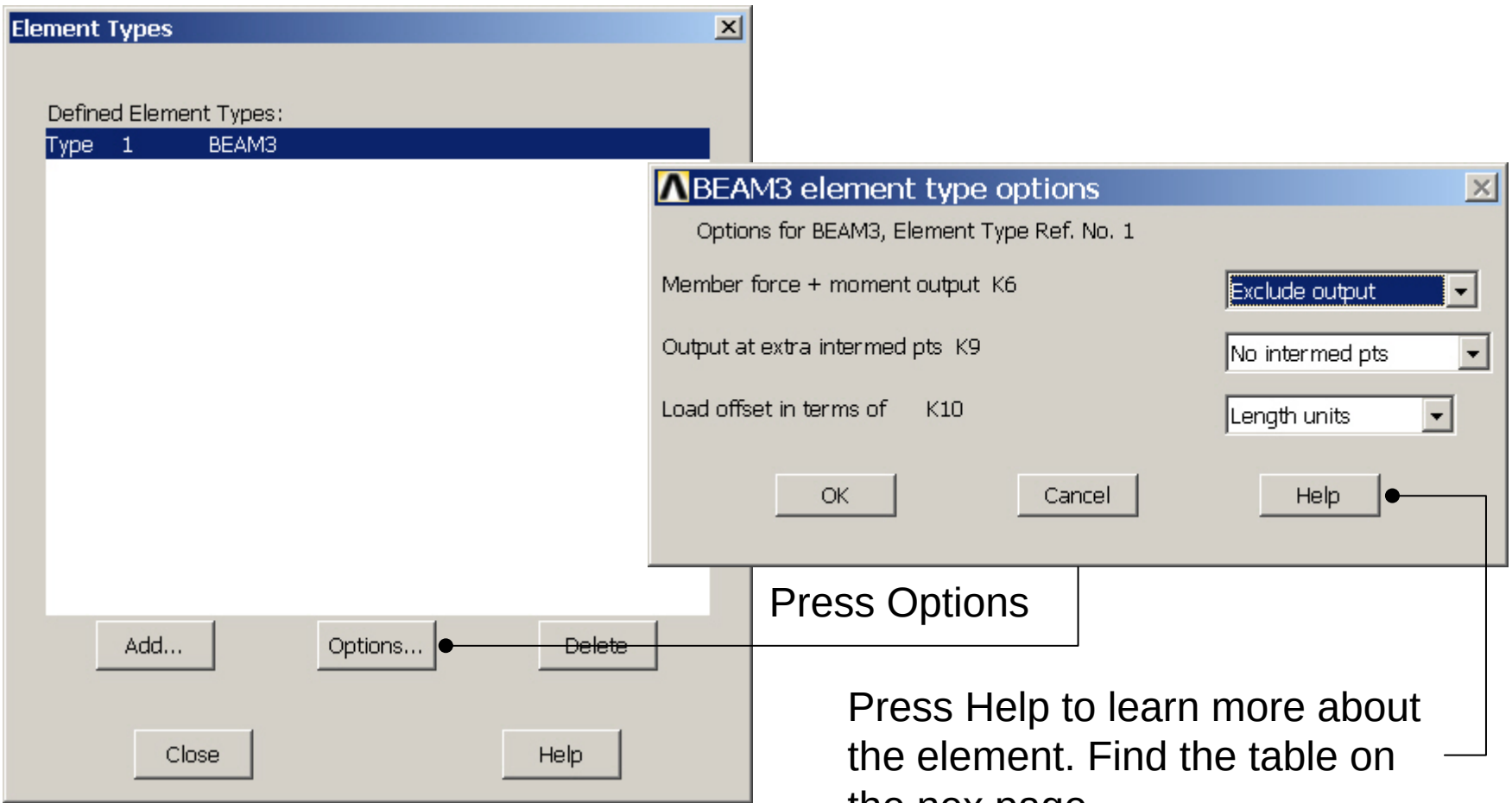
Example – Element Type

Preprocessor > Element Type > Add/Edit/Delete



Example - Element Type

Preprocessor > Element Type > Add/Edit/Delete



Press Options

Press Help to learn more about the element. Find the table on the nex page

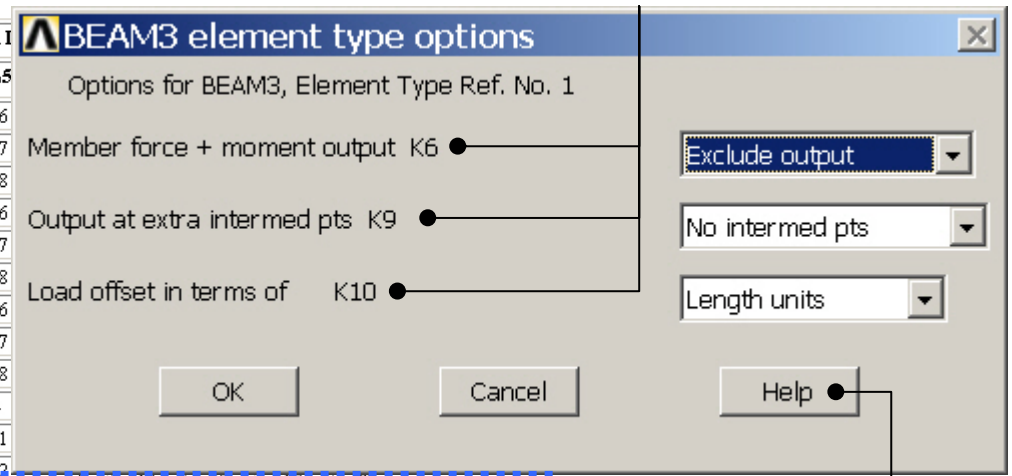
Example - Element Type

Notice the key option number for later use

Table 3.7. BEAM3 Item and Sequence Numbers (KEYOPT(9) = 9)

Output Quantity Name	ETABLE and ESOL Command I												
	Item	E	I	IL1	IL2	IL3	IL4	IL5					
SDIR	LS	-	1	4	7	10	13	16					
SBYT	LS	-	2	5	8	11	14	17					
SBYB	LS	-	3	6	9	12	15	18					
EPELDIR	LEPEL	-	1	4	7	10	13	16					
EPELBYT	LEPEL	-	2	5	8	11	14	17					
EPELBYB	LEPEL	-	3	6	9	12	15	18					
EPTHDIR	LEPTH	-	1	4	7	10	13	16					
EPTHBYT	LEPTH	-	2	5	8	11	14	17					
EPTHBYB	LEPTH	-	3	6	9	12	15	18					
EPINAXL	LEPTH	34	-	-	-	-	-	-					
SMAX	NMISC	-	1	3	5	7	9	11					
SMIN	NMISC	-	2	4	6	8	10	12					
MFORX	SMISC	-	1	7	13	19	25	31	37	43	49	55	61
MFORY	SMISC	-	2	8	14	20	26	32	38	44	50	56	62
MMOMZ	SMISC	-	6	12	18	24	30	36	42	48	54	60	66
P1	SMISC	-	67	-	-	-	-	-	-	-	-	-	68
OFFST1	SMISC	-	69	-	-	-							
P2	SMISC	-	71	-	-	-							
OFFST2	SMISC	-	73	-	-	-							
P3	SMISC	-	75	-	-	-	-	-	-	-	-	-	-
P4	SMISC	-	-	-	-	-	-	-	-	-	-	-	76

		Pseudo Node			
		1	2	3	4
TEMP	LBFE	1	2	3	4

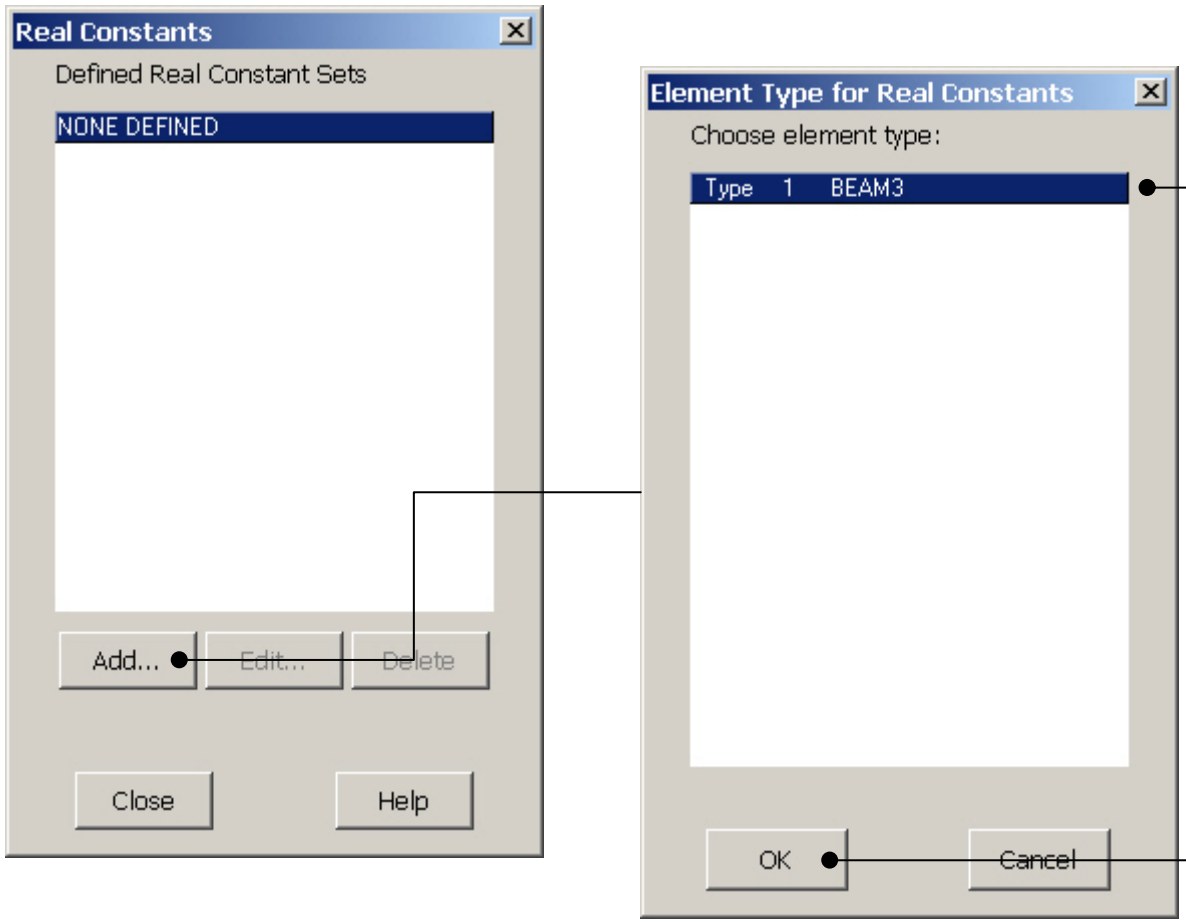


Remember MFORX, SMISC,1,7

Press Help to launch the documentation for this element type.

Example – Real Constants

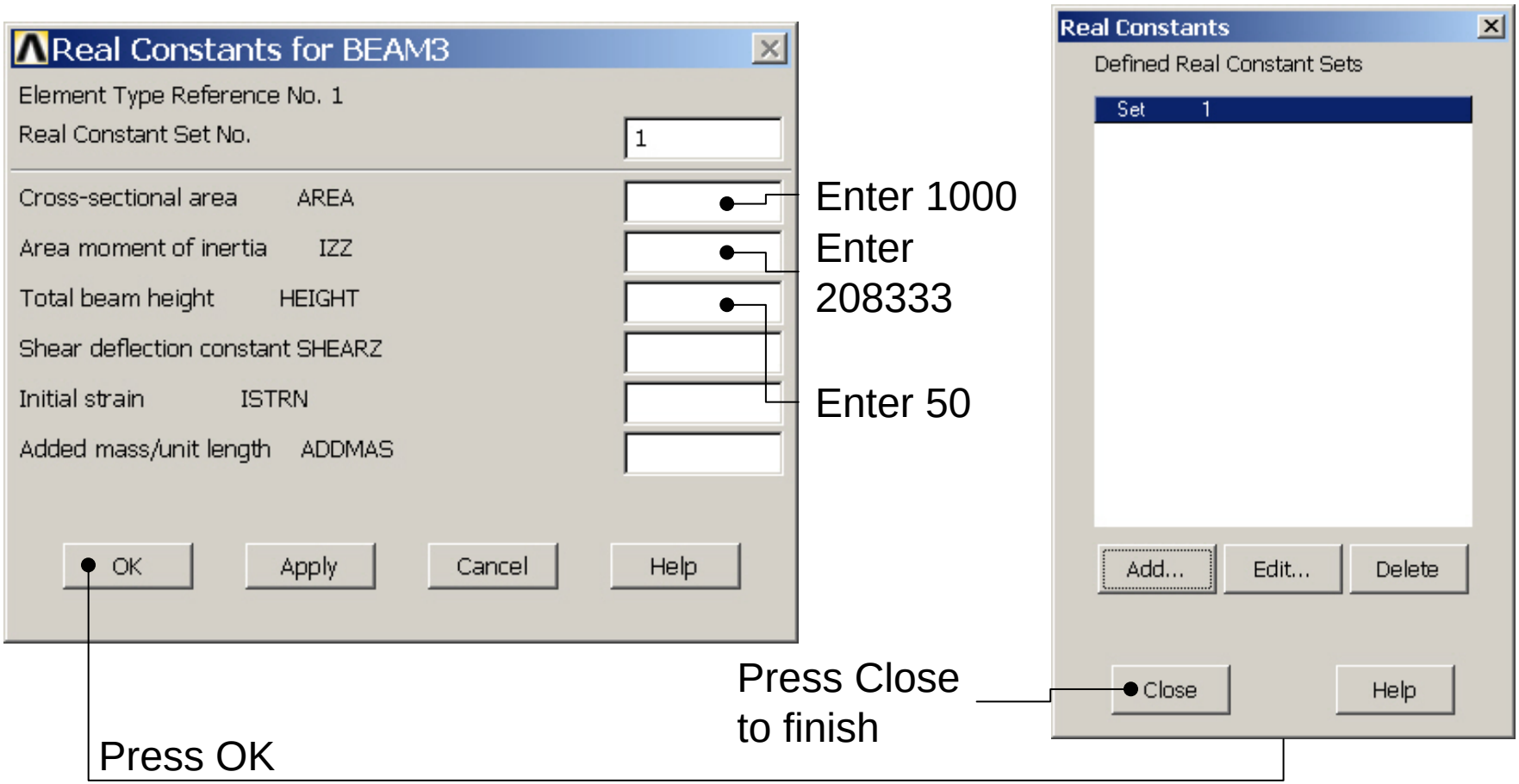
Preprocessor > Real Constants > Add



Place the cursor on the relevant element and press OK

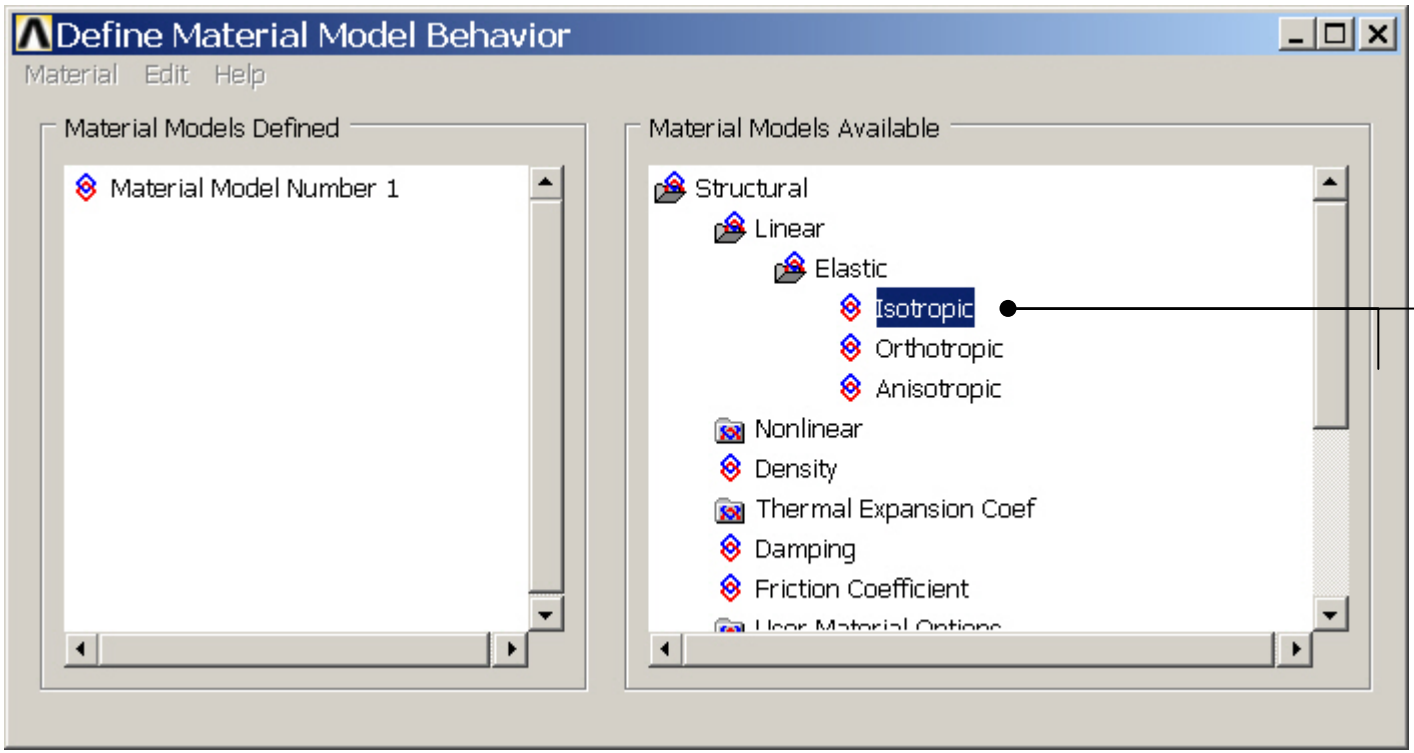
Example - Real Constants

Preprocessor > Real Constants > Add



Example - Material Properties

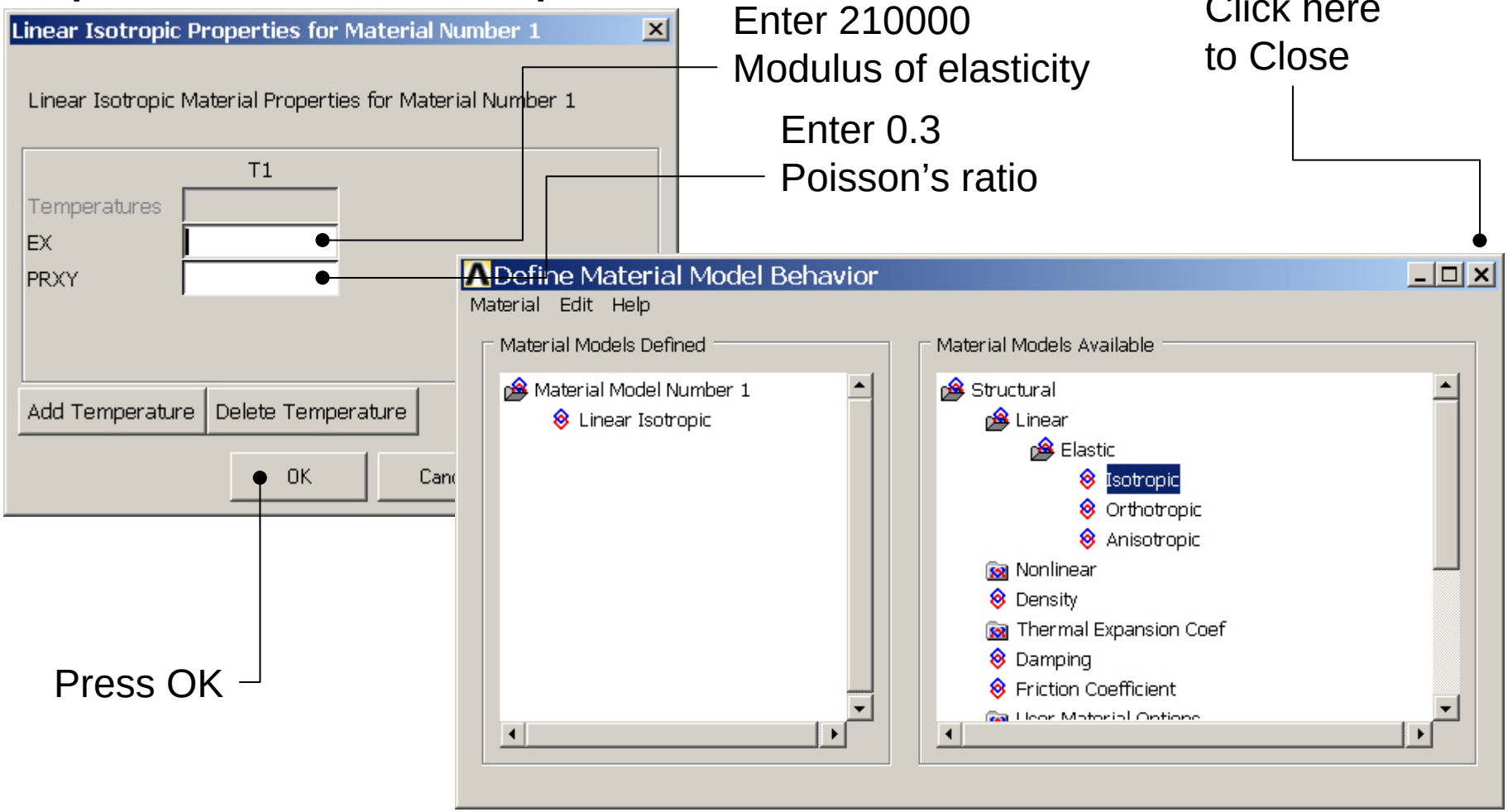
Preprocessor > Material Props > Material Models



Double Click to step in the material tree

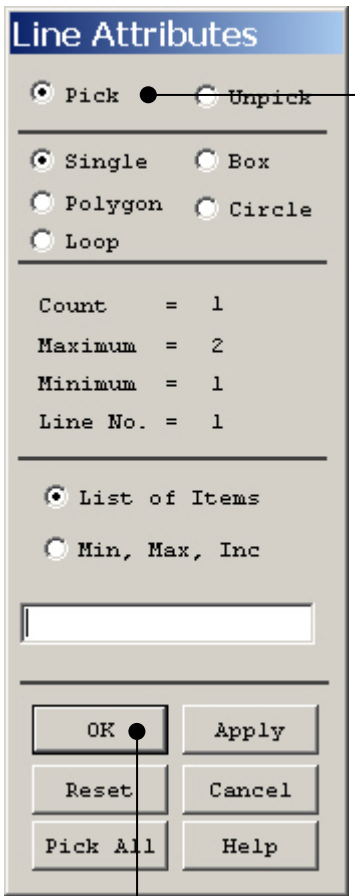
Example - Material Properties

Preprocessor > Material Props > Material Models

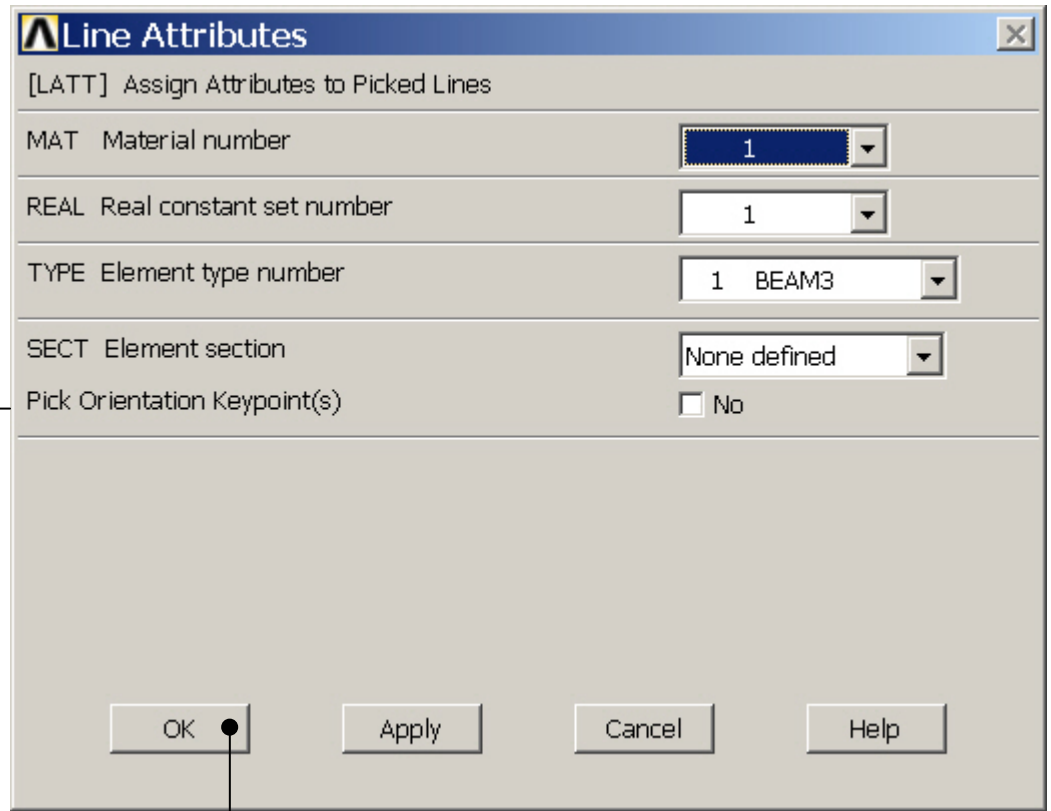


Example – Mesh Attributes

Preprocessor > Meshing > Mesh Attributes > Picked Lines



Select All Lines

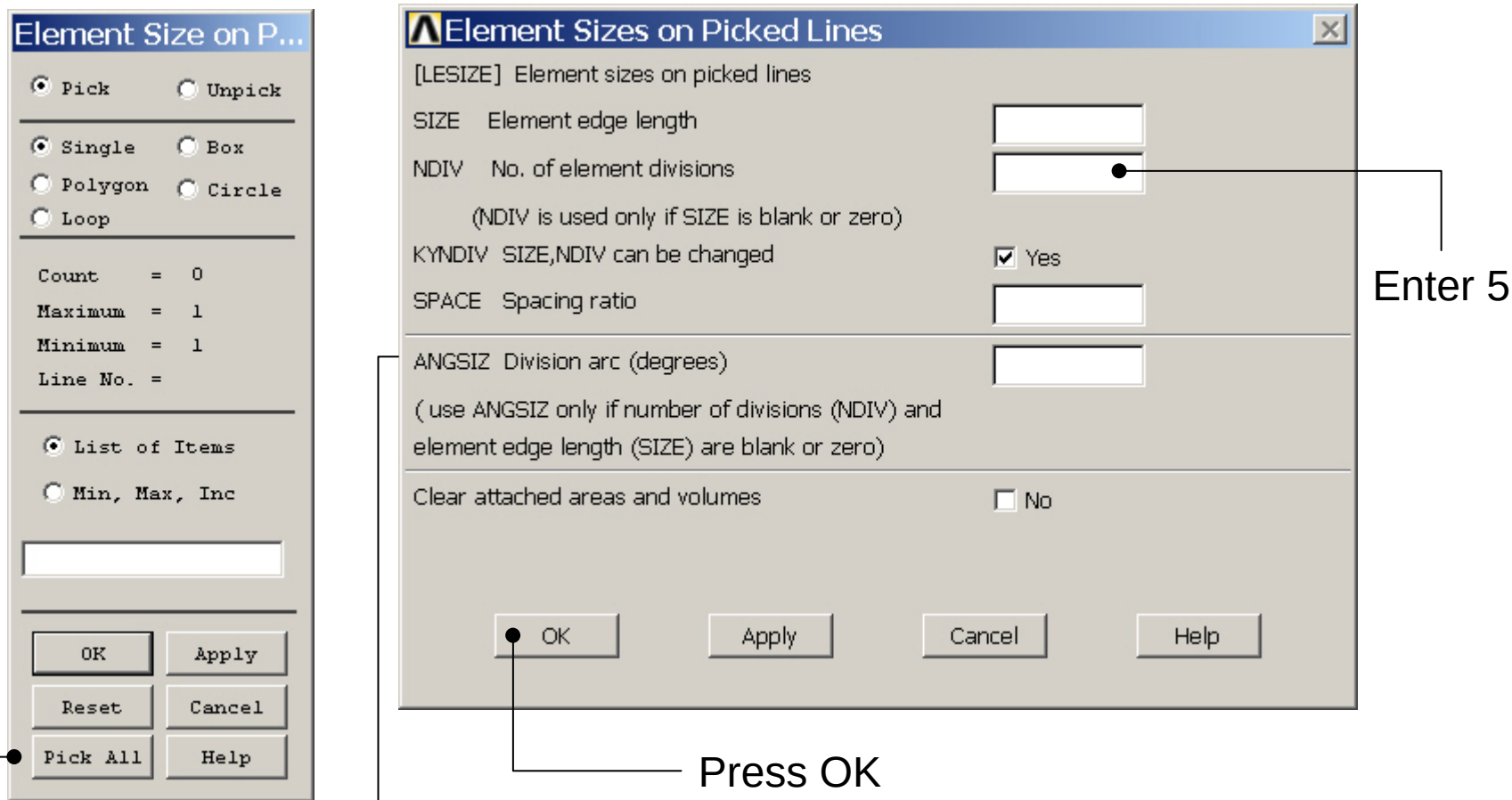


Press OK

Press OK

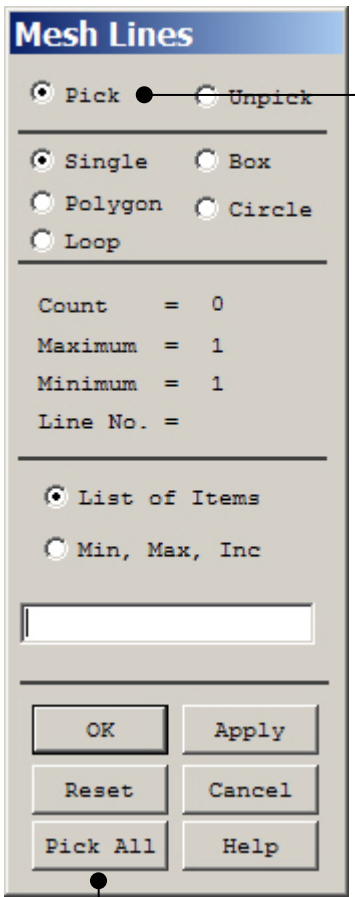
Example – Mesh size

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



Example - Meshing

Preprocessor > Meshing > Mesh > Lines



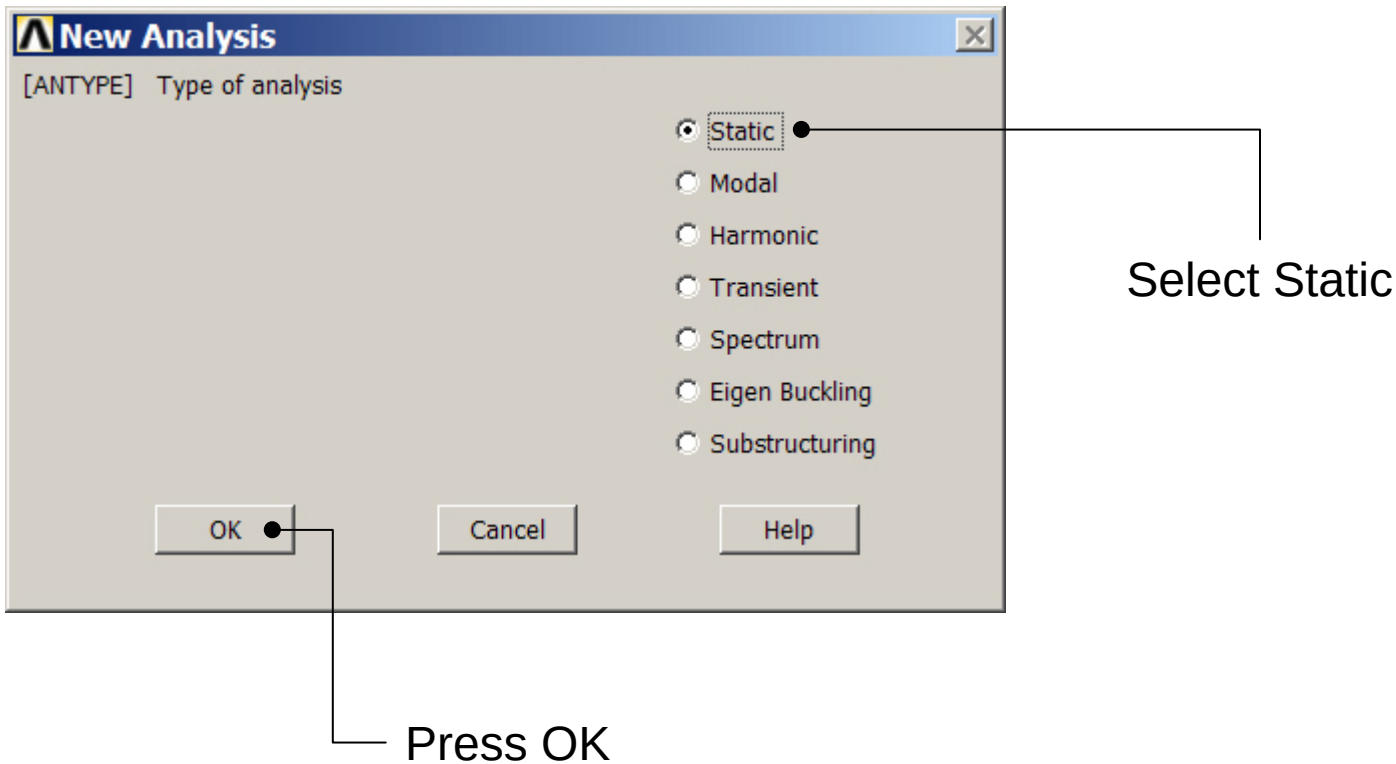
Select individual lines to be meshed by Picking

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

Select all lines defined to be meshed

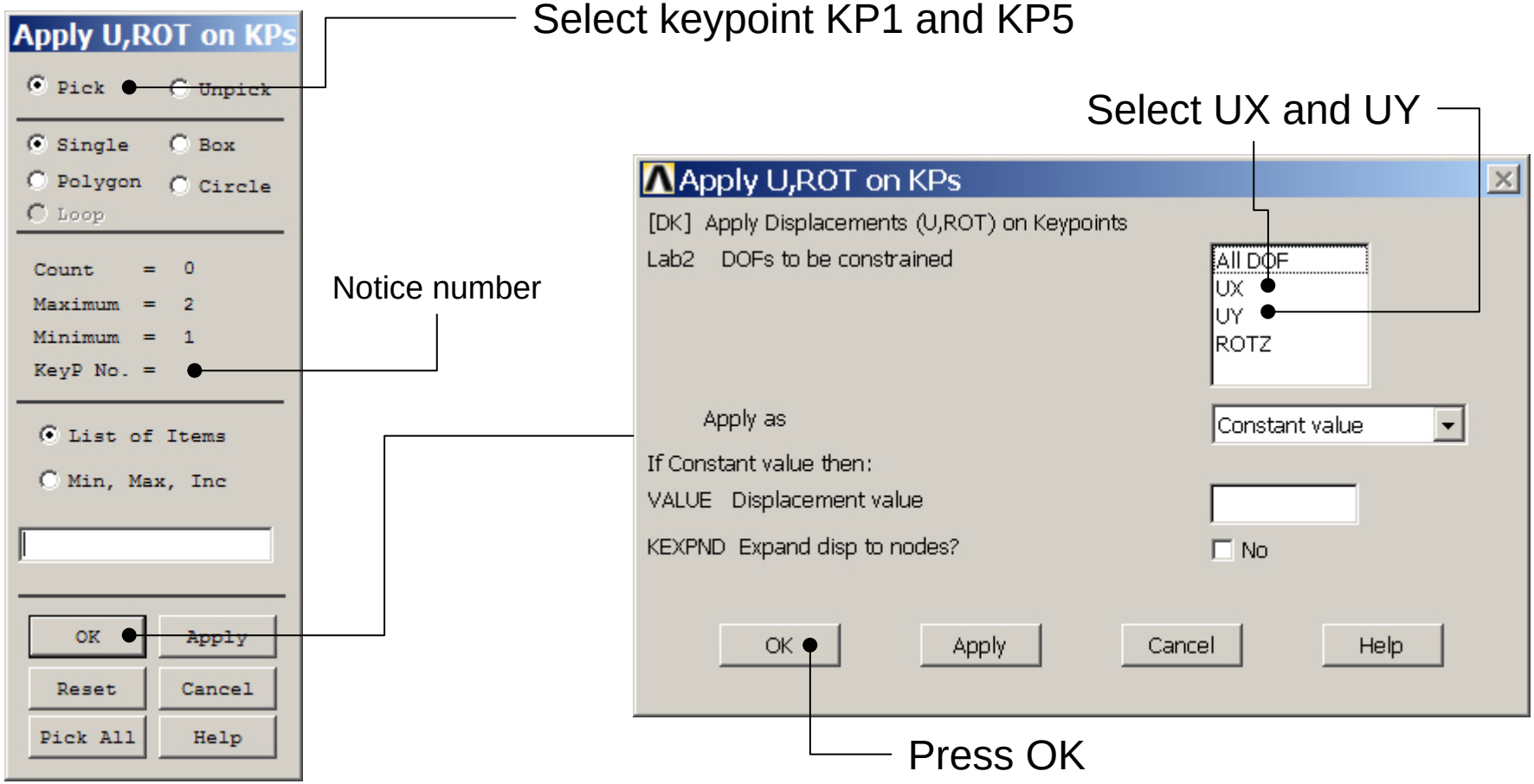
Example – Analysis Type

Solution > Analysis Type > New Analysis



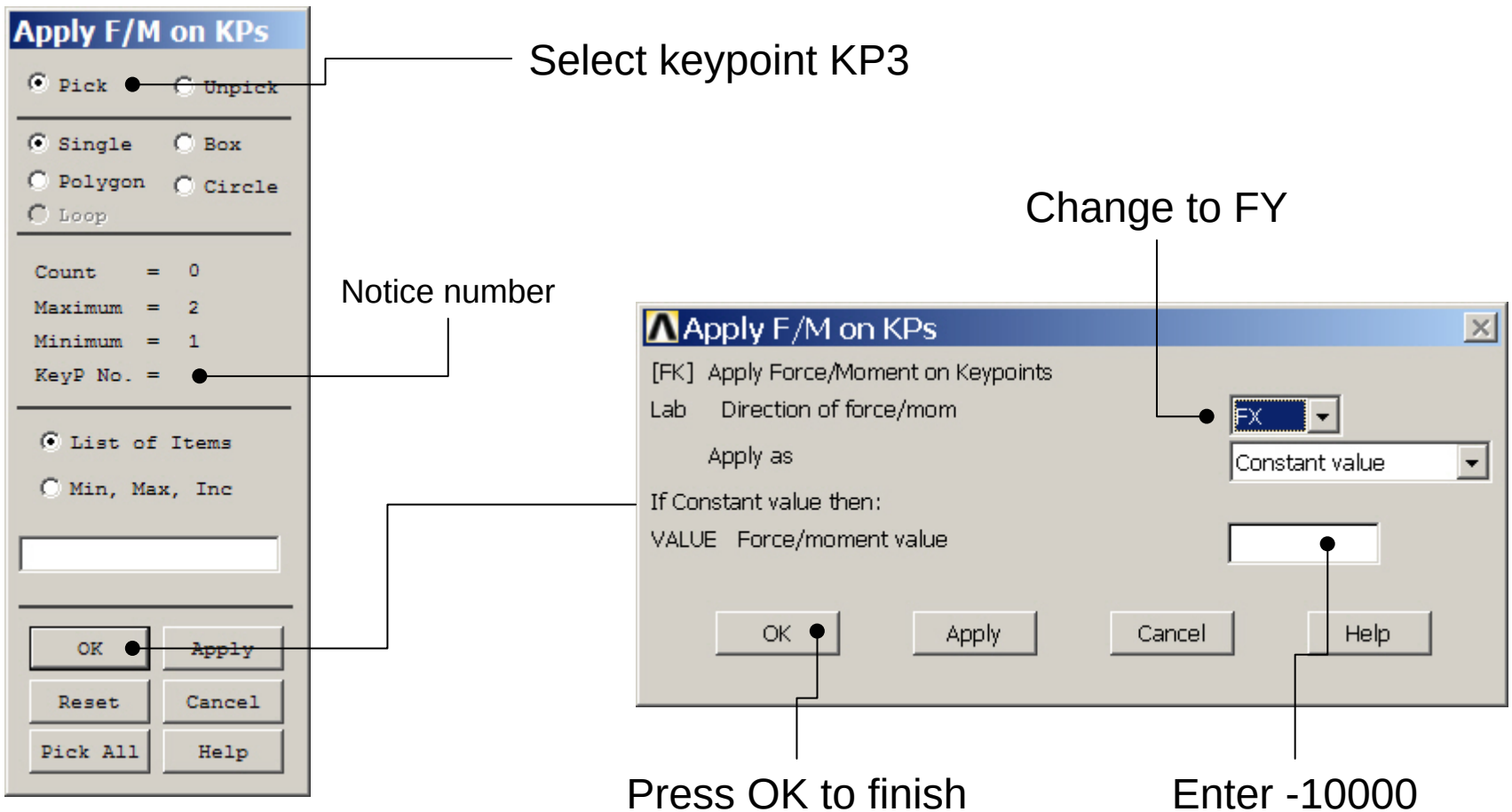
Example – Define Loads

Solution > Define Loads > Apply > Structural > Displacement > On Keypoints

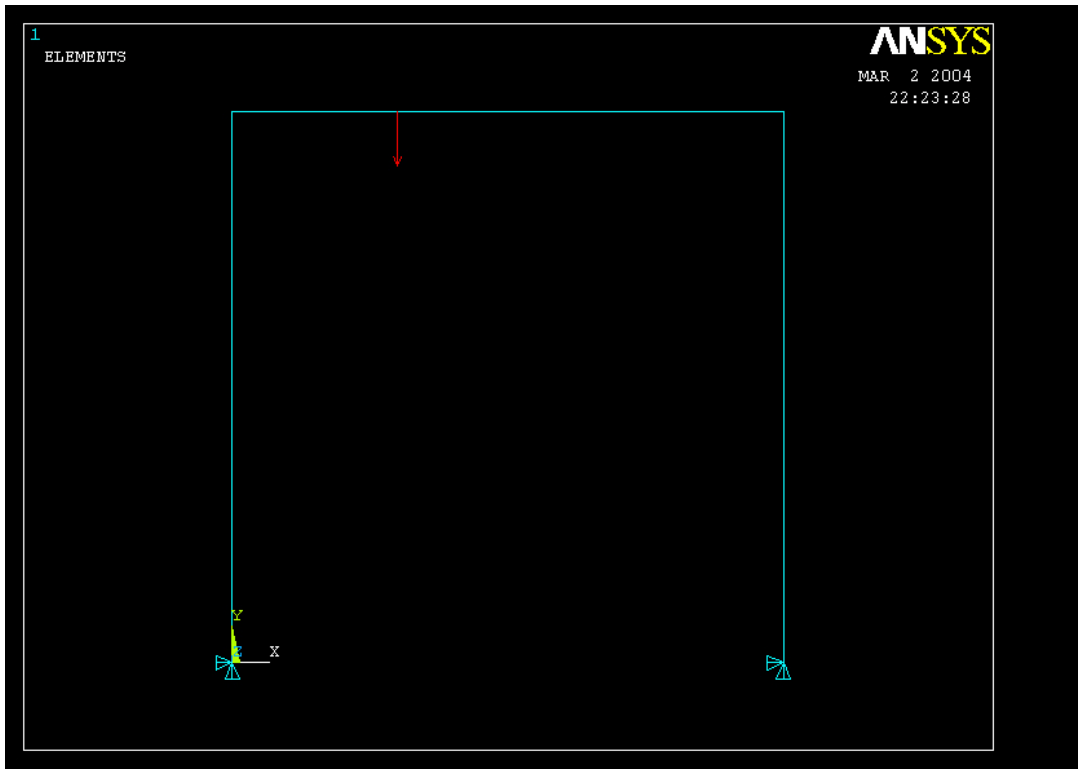


Example – Define Loads

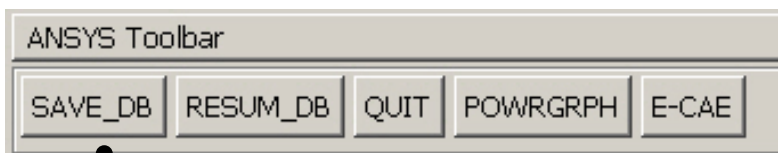
Solution > Define Loads > Apply > Structural > Force/Moment > On Keypoints



Example - Save



Display of Analysis model

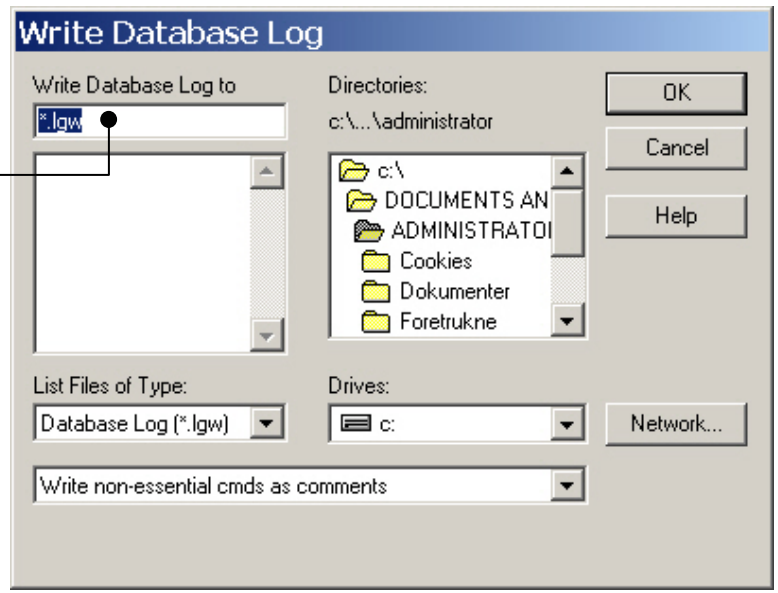


Save the model

Example – Write DB log file

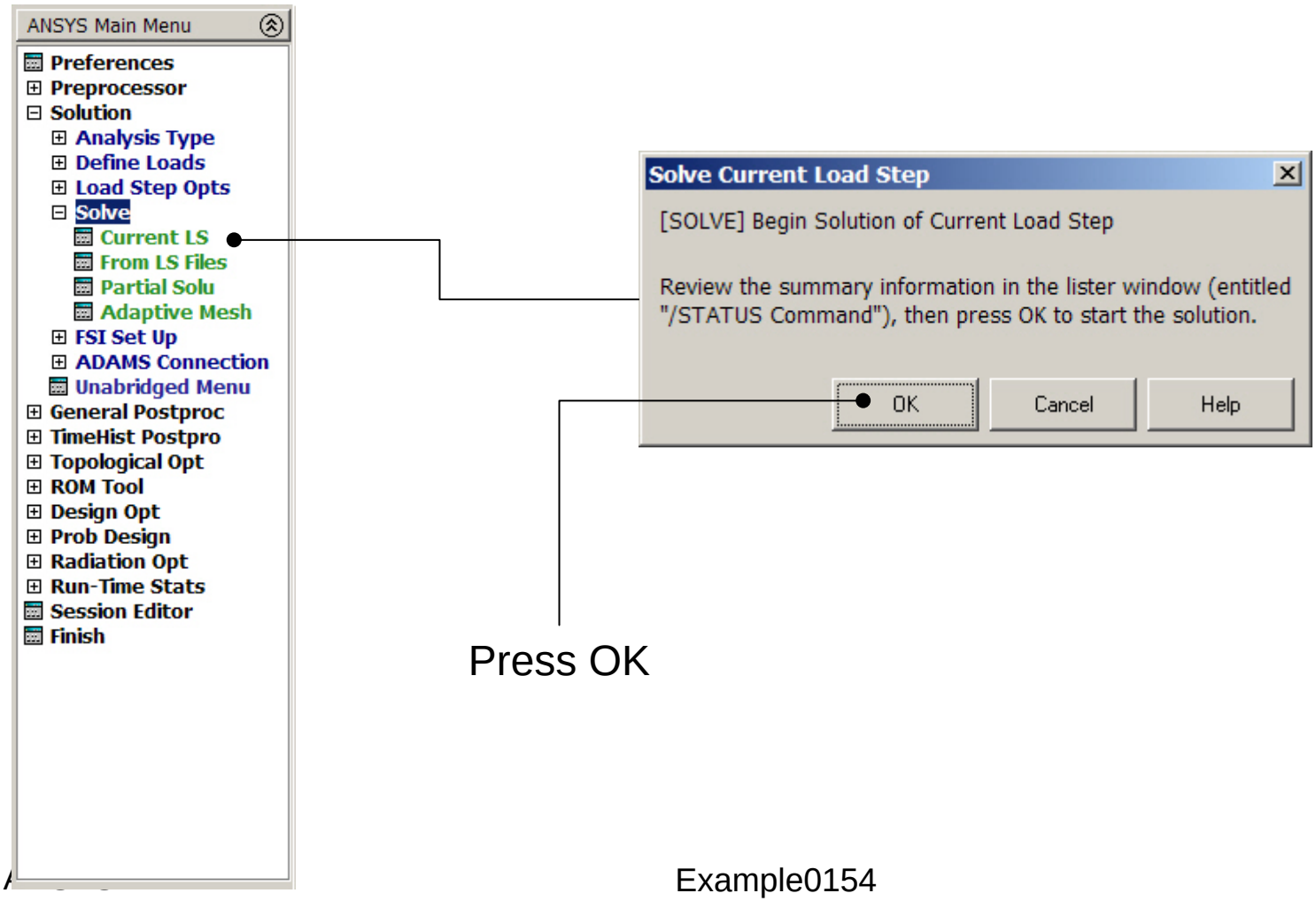
File > Write DB log file

Enter “example0154.lgw”

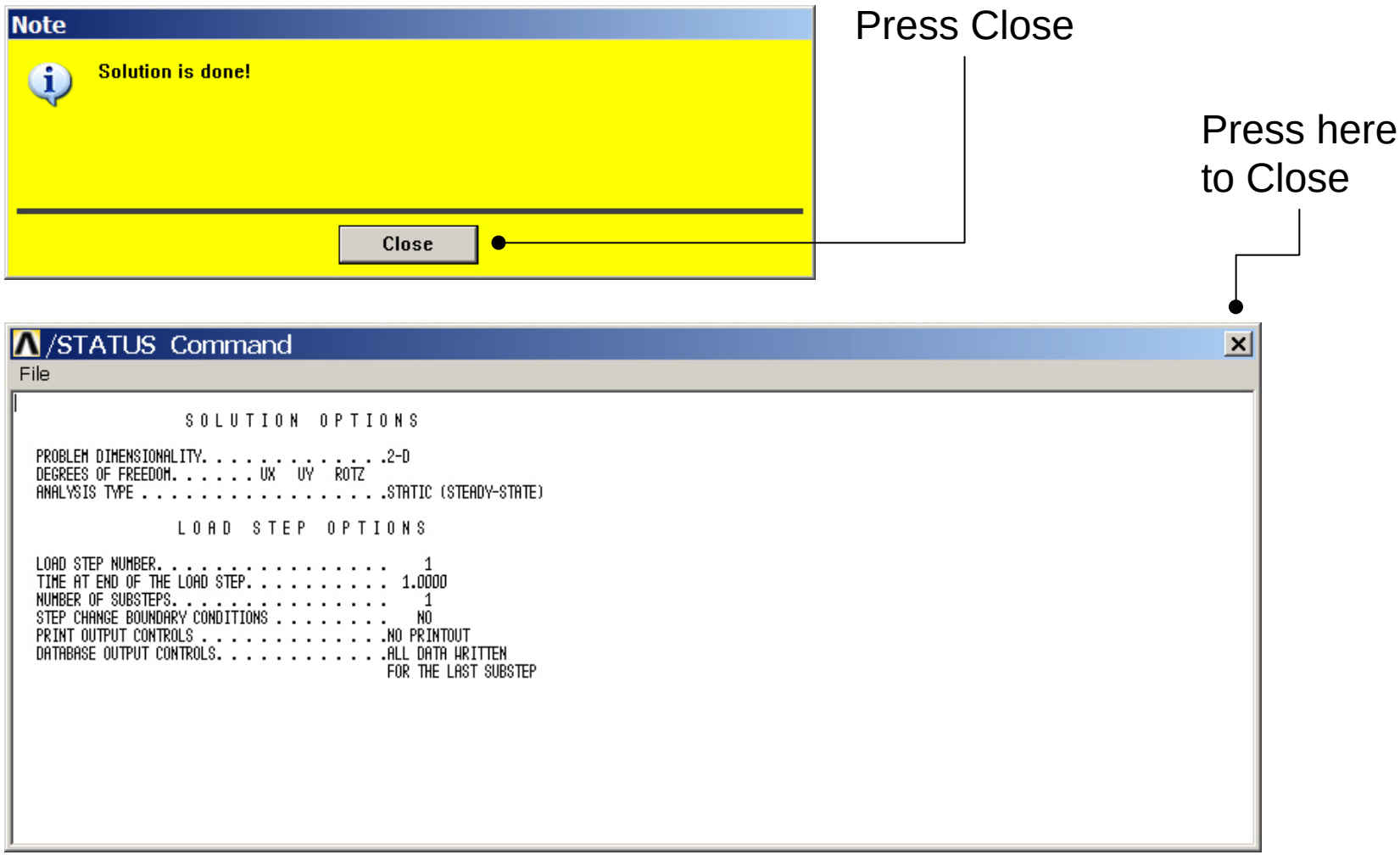


Example – Solve LS

Solution > Solve > Current LS

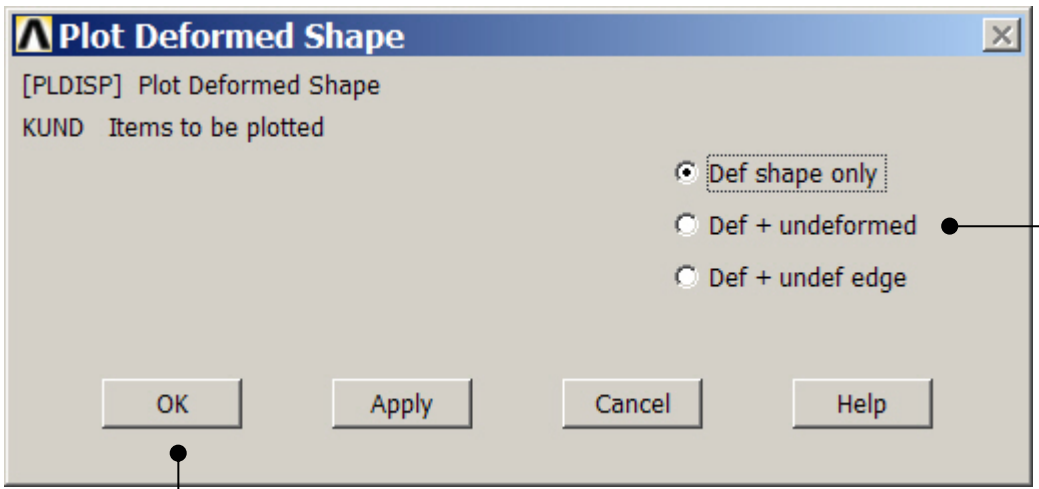


Example - Solution Status



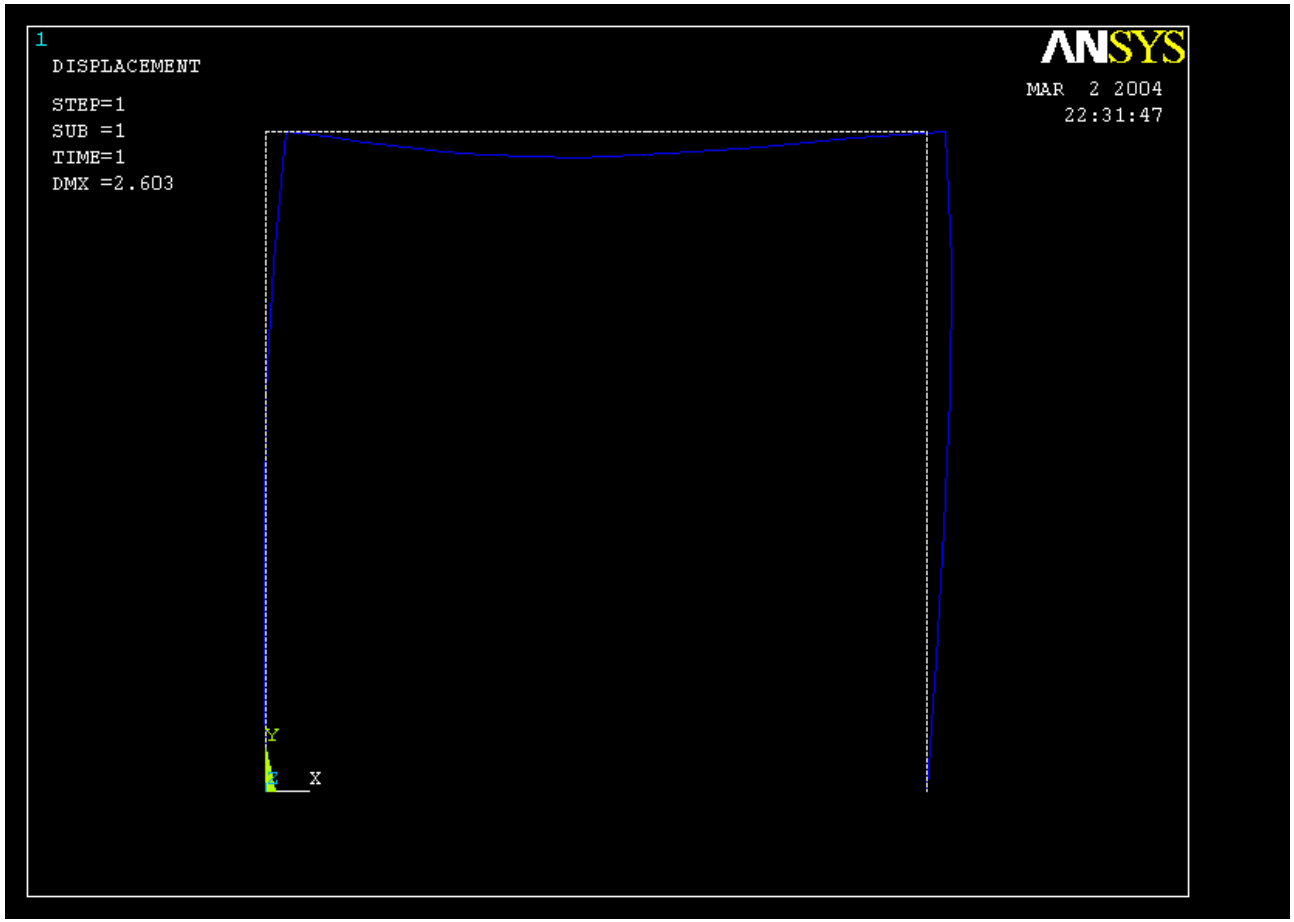
Example - PostProcessing

General Postproc > Plot Results > Deformed Shape



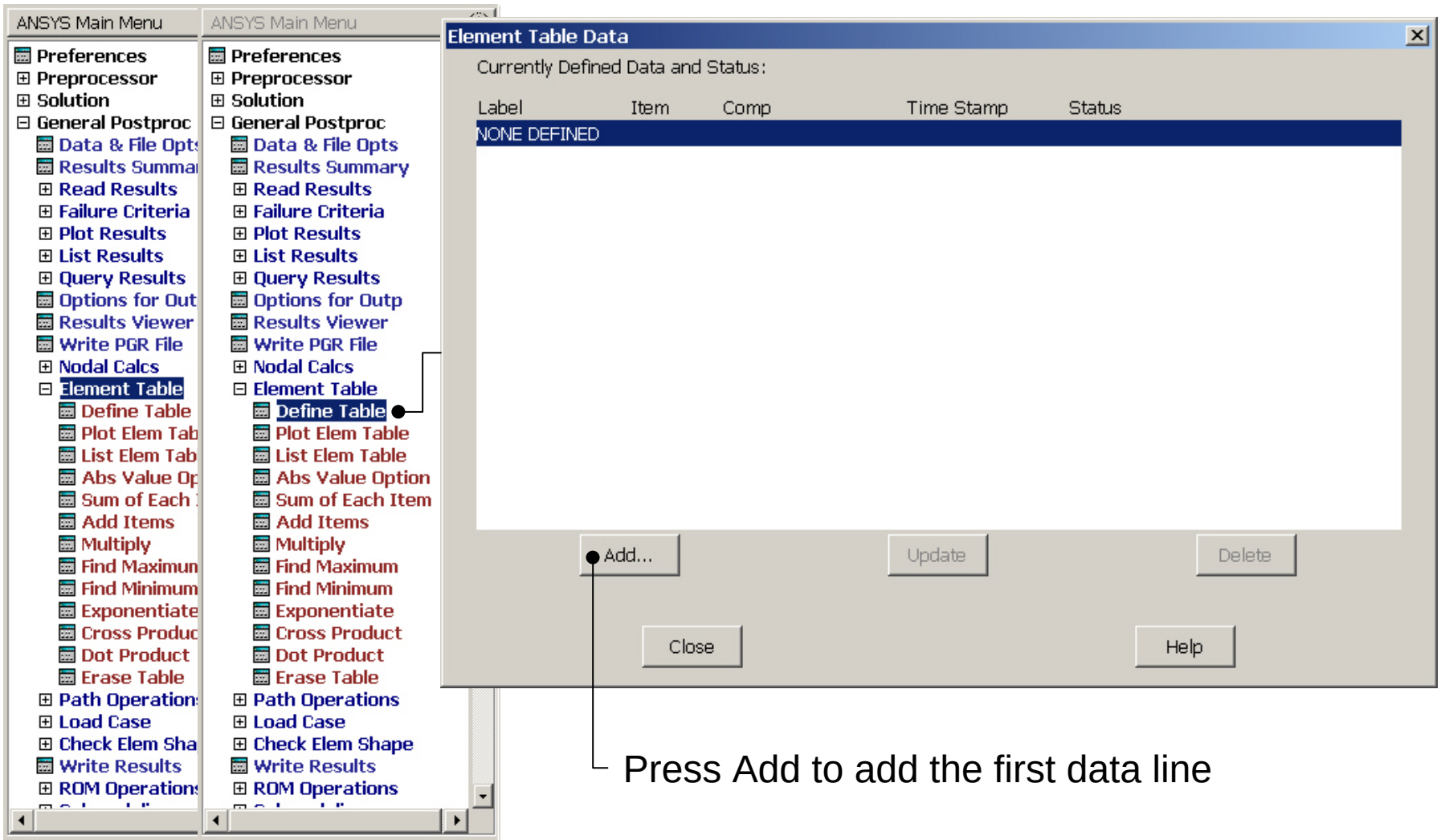
Select “Def+undeformed” and Press OK

Example - PostProcessing



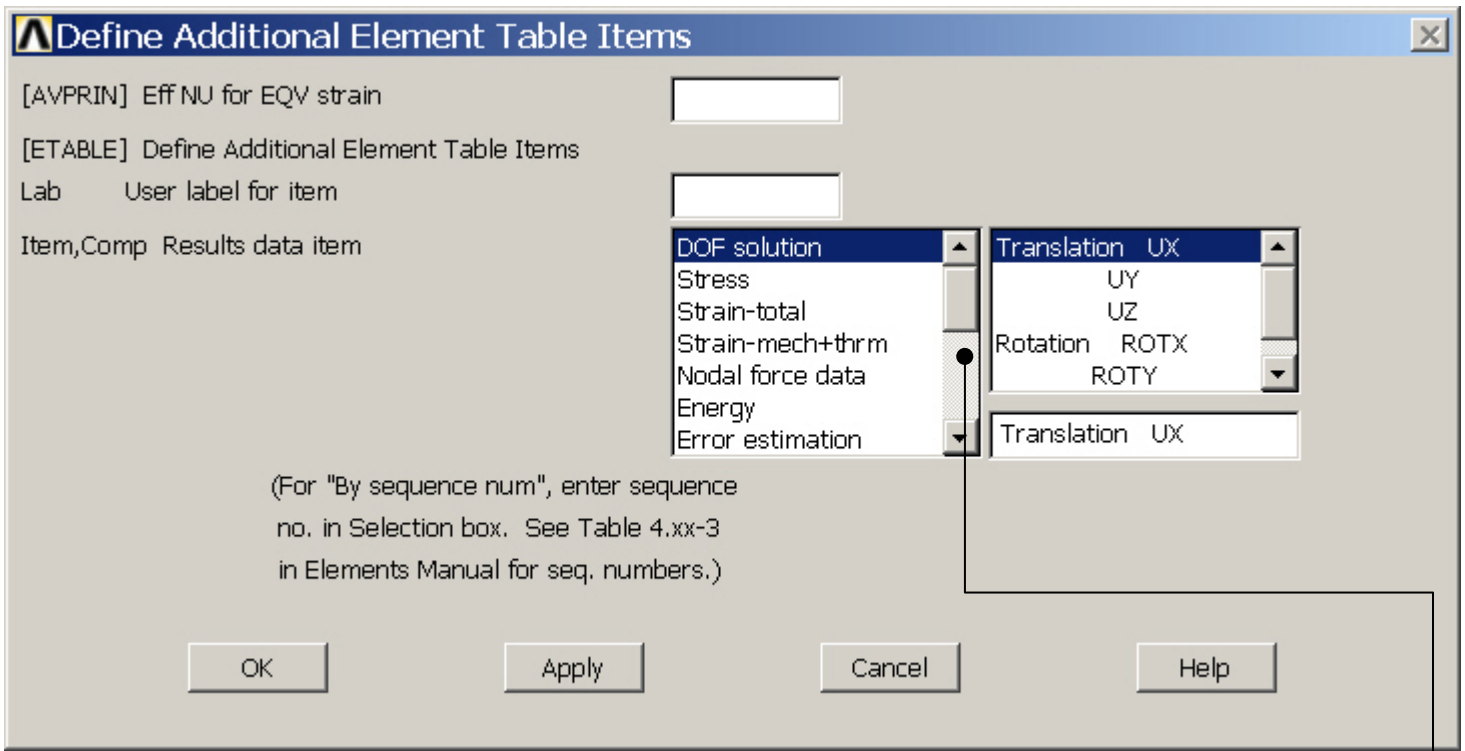
Read Maximum displacement: DMX

Example – Element Table



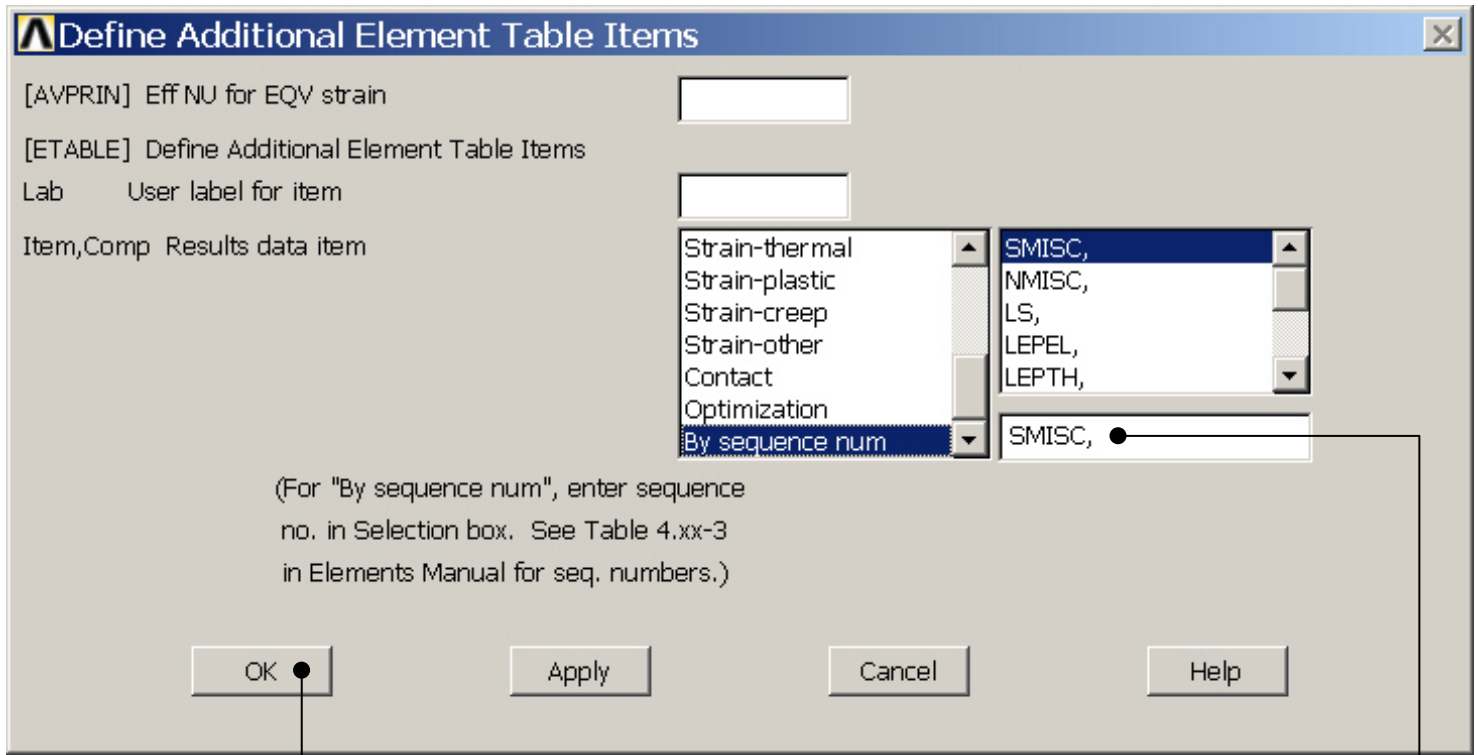
Press Add to add the first data line

Example – Element Table



Scroll down in this menu to find the line “By sequence number”

Example – Element Table

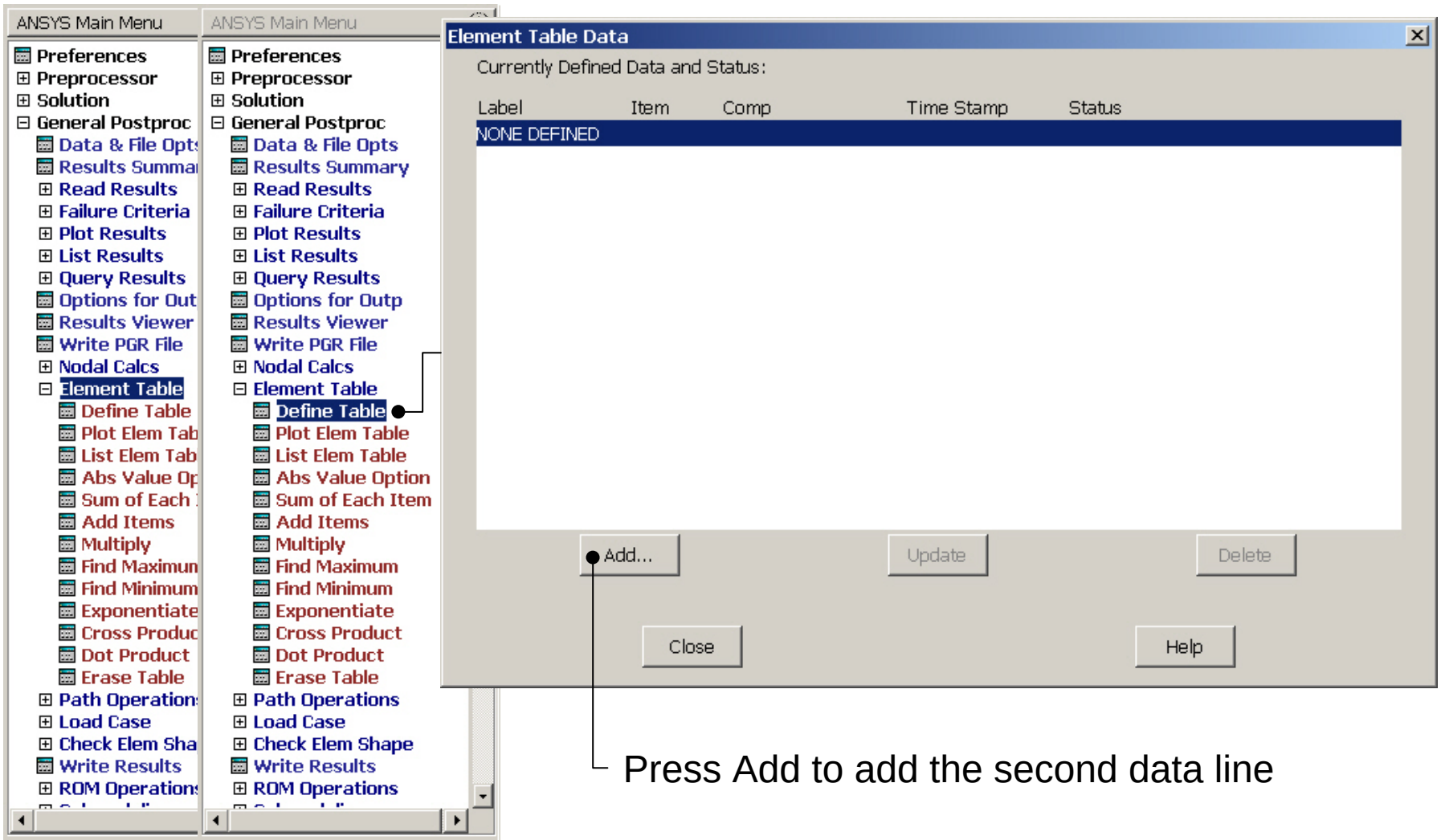


Press OK

Enter 1 as found in table 3.2

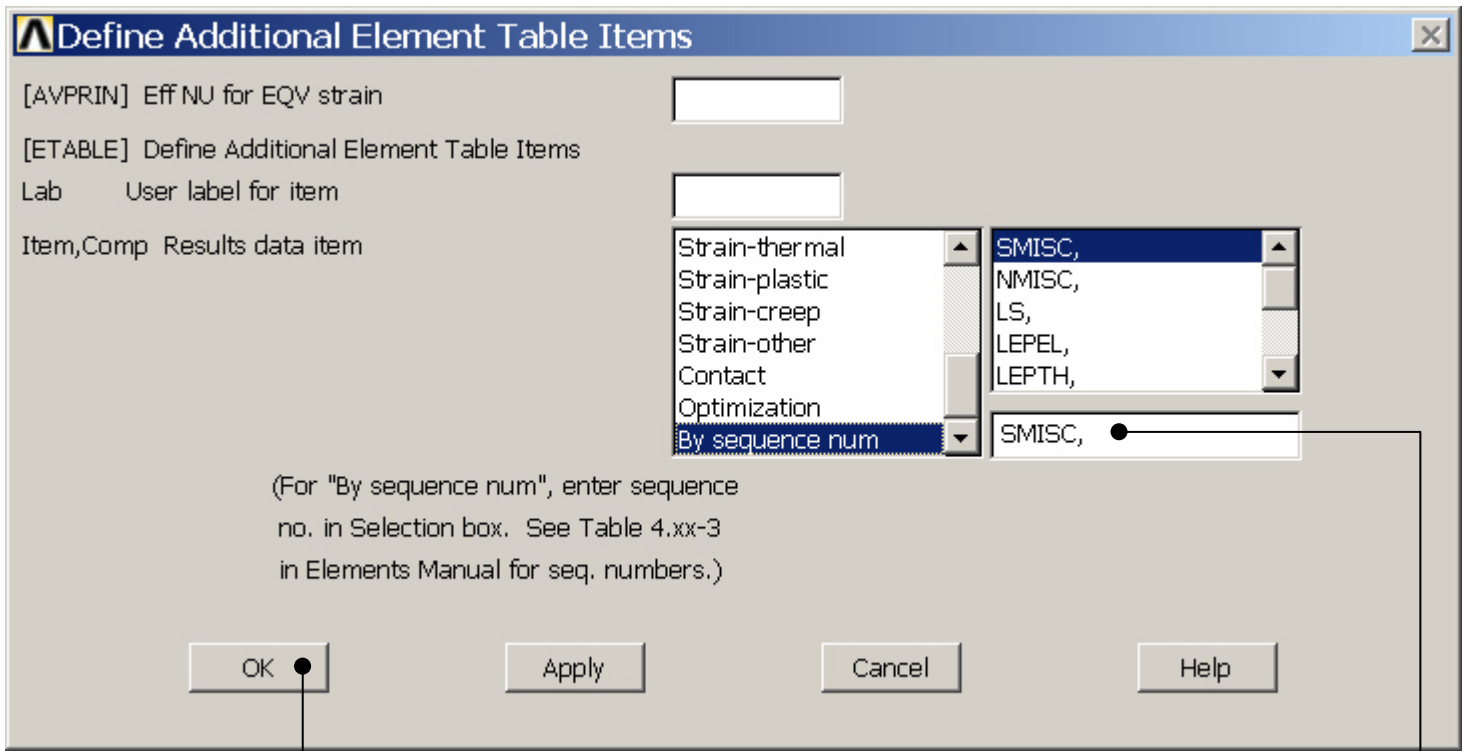
From table 3.2 MFORX, SMISC,1,7

Example – Element Table



Press Add to add the second data line

Example – Element Table

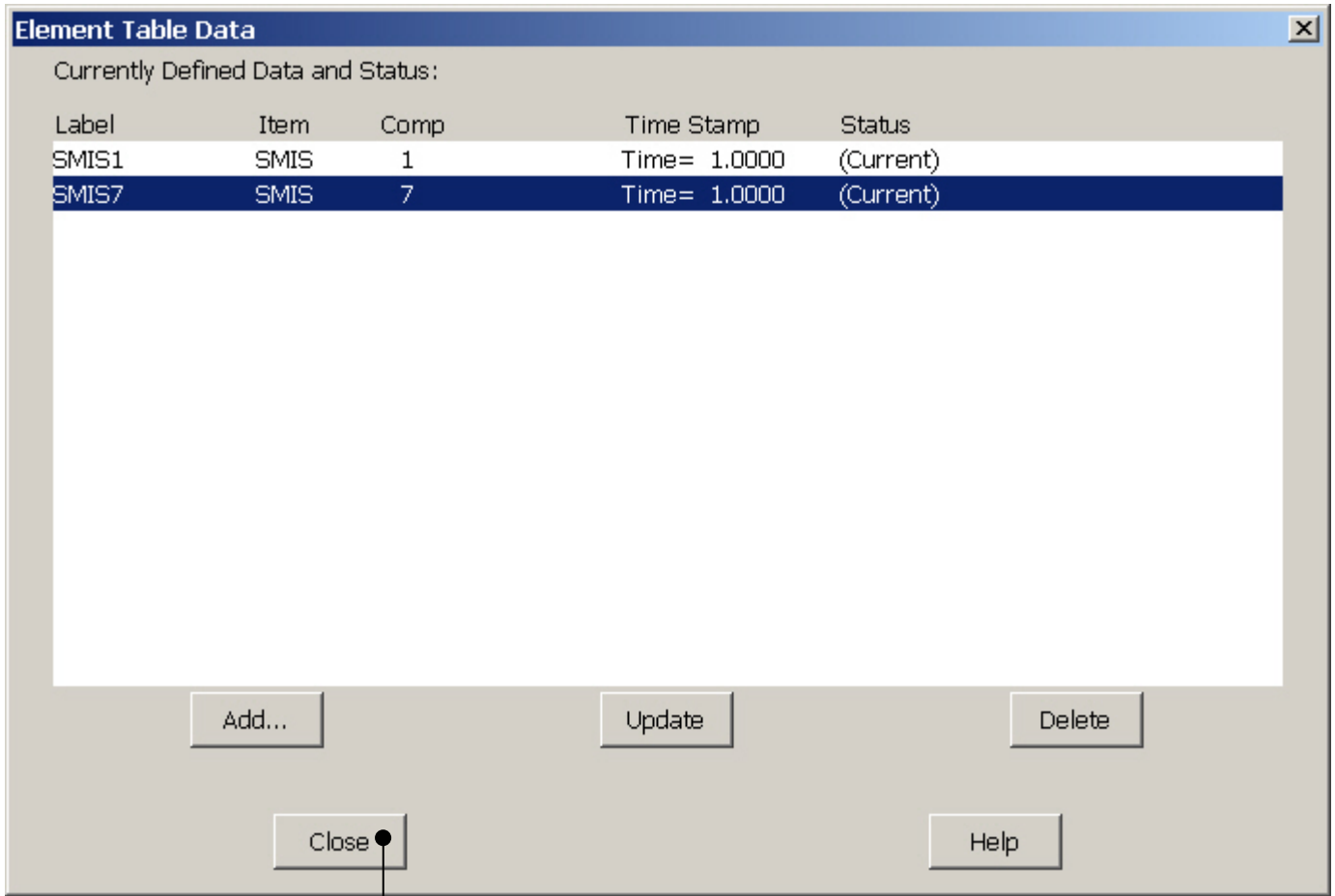


Press OK

Enter 7 as found in table 3.2

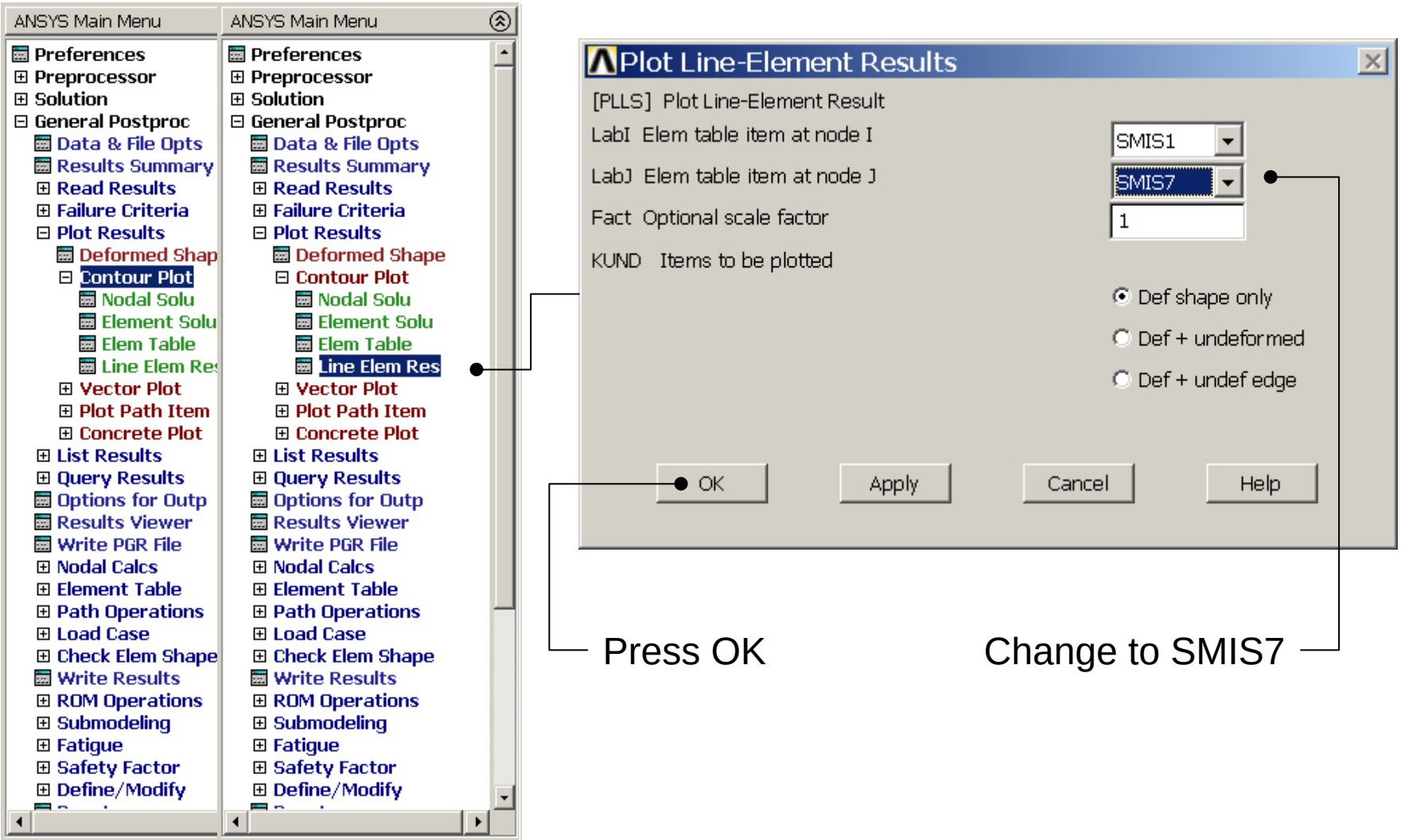
From table 3.2 MFORX, SMISC,1,7

Example – Element Table

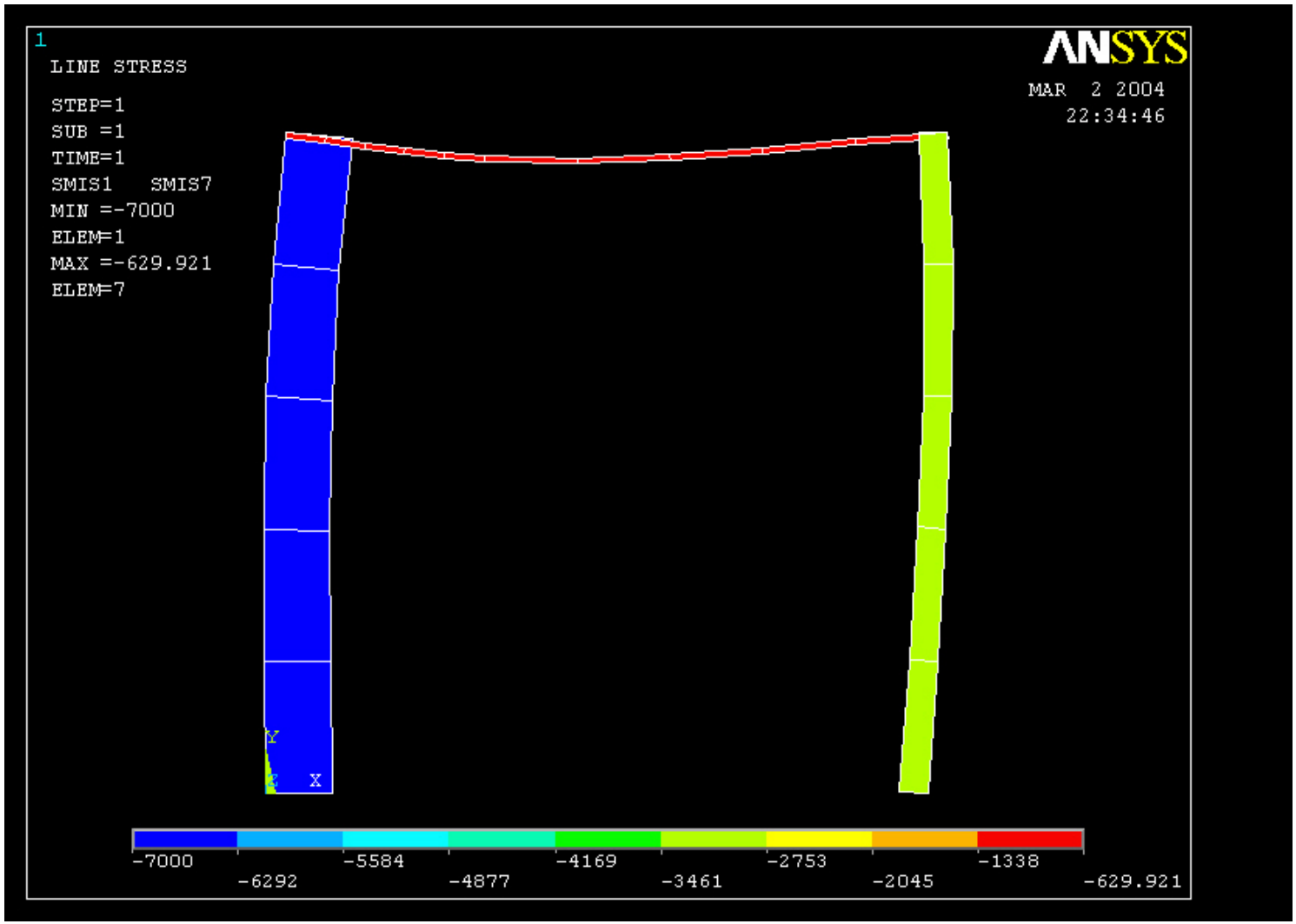


Press Close

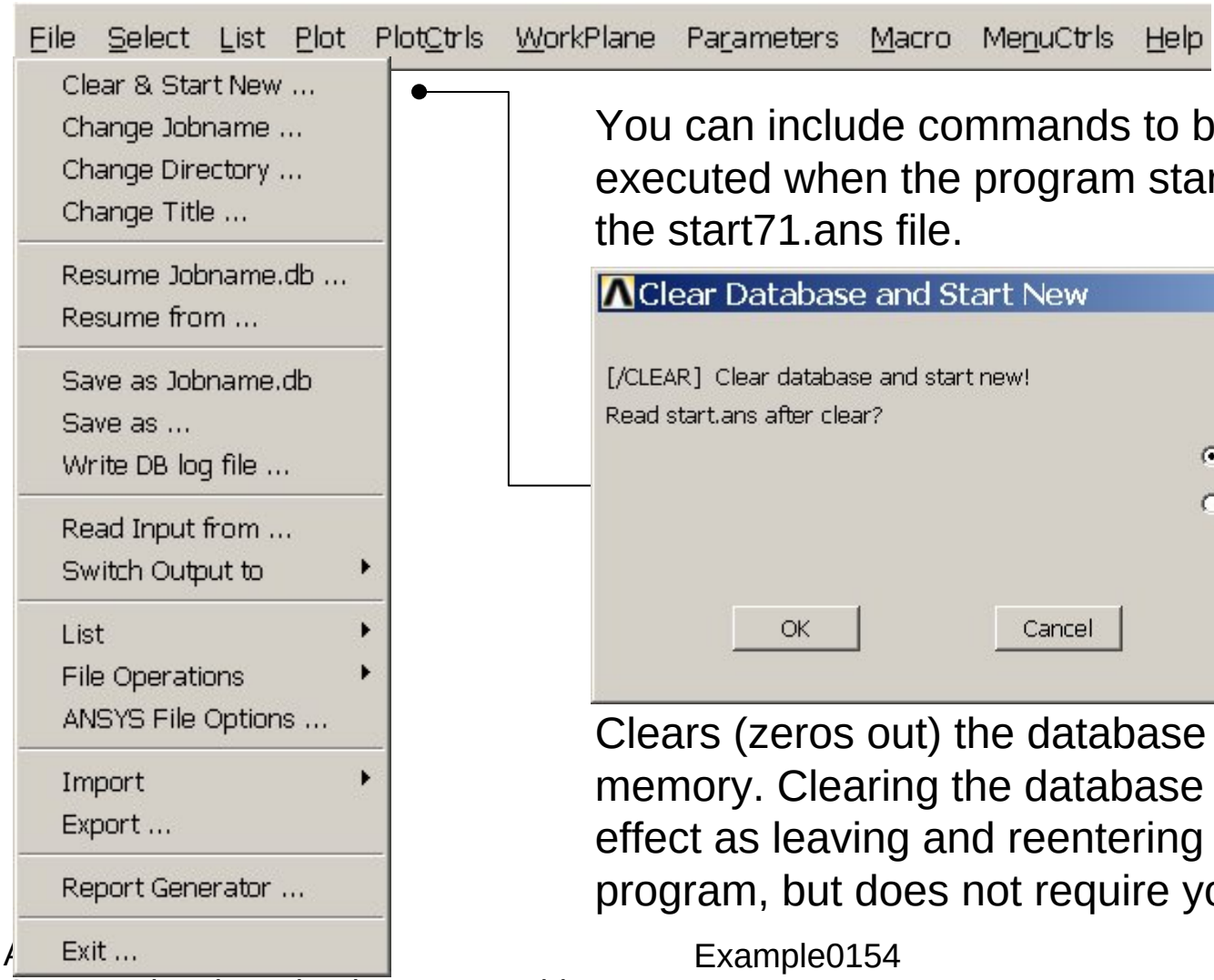
Example – Plot Line-Element



Example – Plot Line-Element



Example – Clear & Start New



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.

Example – Comments/Questions

- The “example0154.lgw” can be edited in “Notepad”
- Change the position of force?
- Display the moment curves?
- Will the number of elements affect the solution?