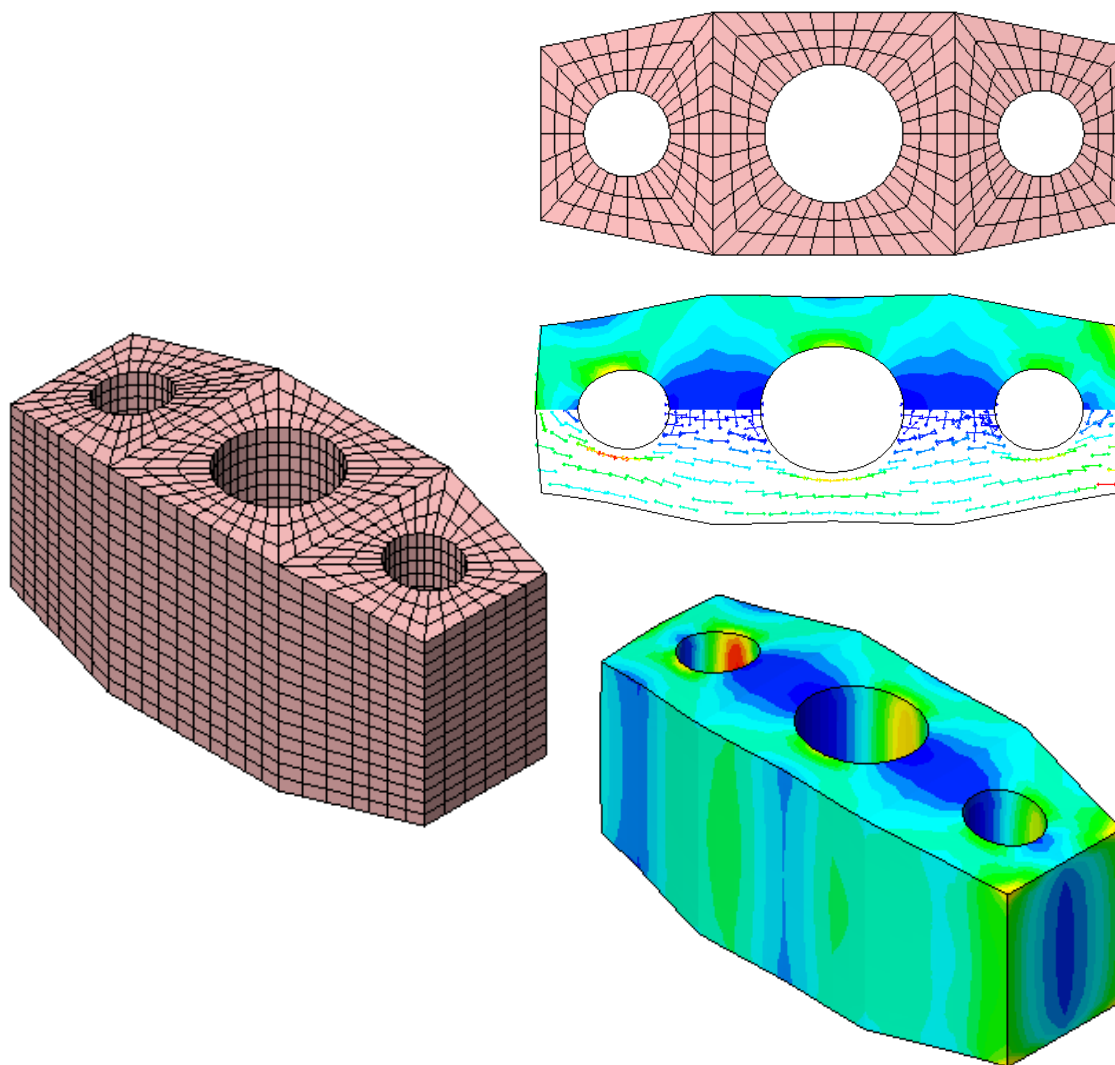
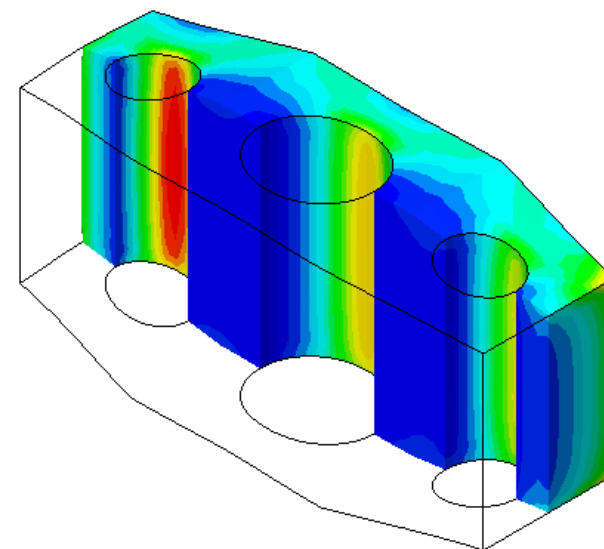


LS-5. Solid Block

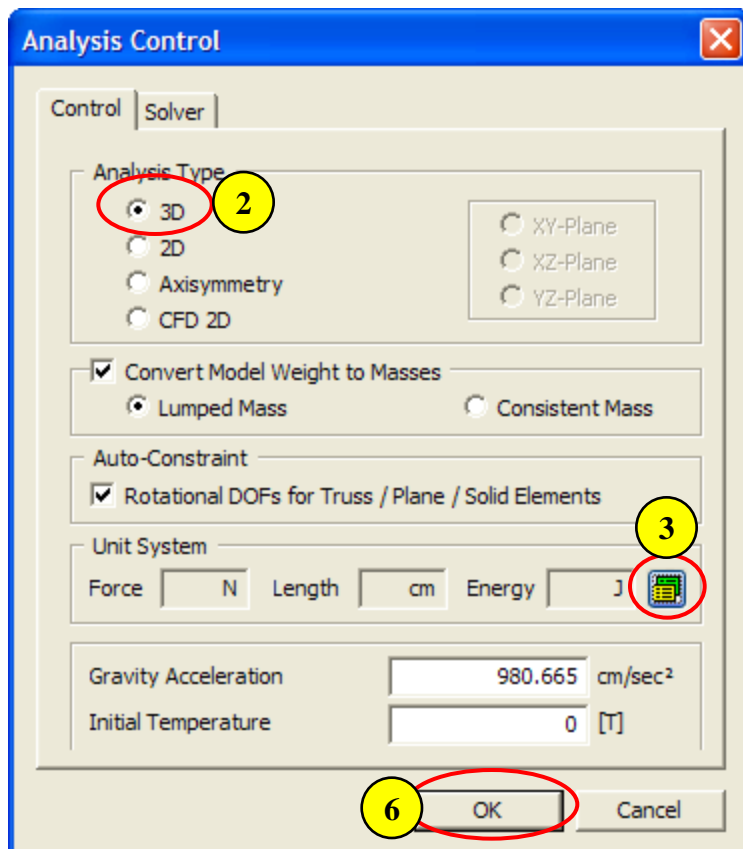


Overview

- 3-D Linear Static Analysis
- Model
 - Unit : N, cm
 - Isotropic Elastic Material
 - Solid Elements
- Load & Boundary Condition
 - Face Pressure
 - Constraint
- Result Evaluation
 - Deformation
 - Principal Stress



Step 1.



1. Analysis > Analysis Control – “Control” tab

2. Analysis Type : 3D

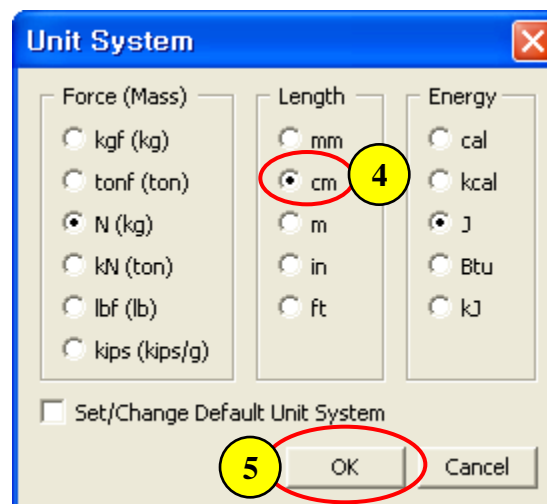
3. Click  Button (Unit System)

4. Length : cm

5. Click [OK] Button

6. Click [OK] Button

7. Click Right Mouse Button in Work Window and Select “Hide Datum & WP”



Previous Command...

Toggle Grid
Grid Setting...

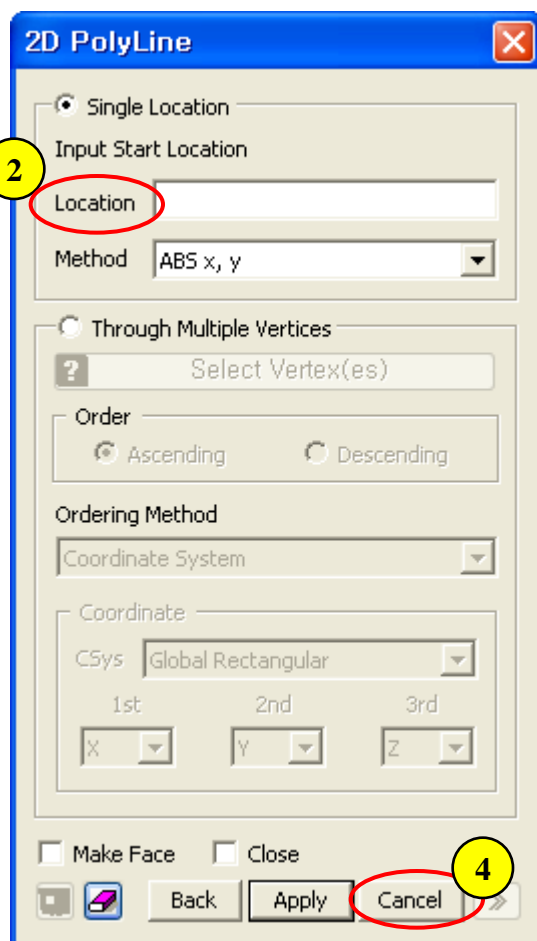
Move Work Plane...

Toggle GCS Triad
Toggle WCS Triad

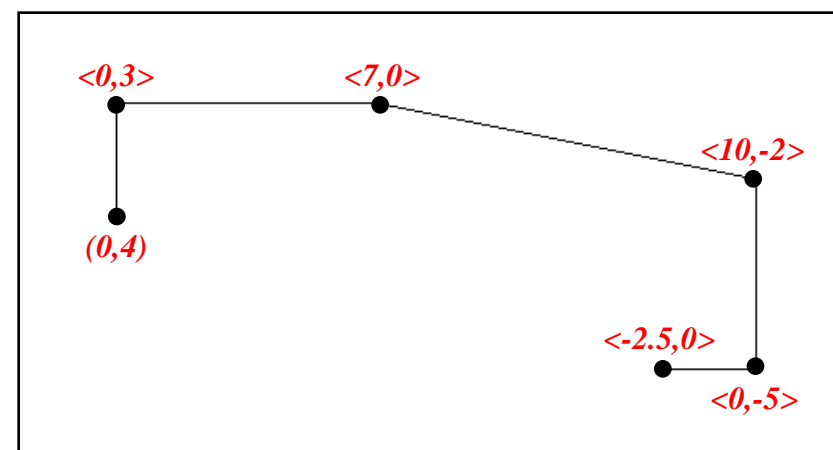
Turn on All Triads
Turn off All Triads

Hide Datum & WP
Hide All Labels

Step 2.

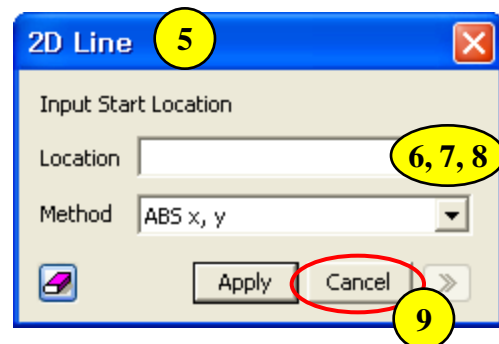
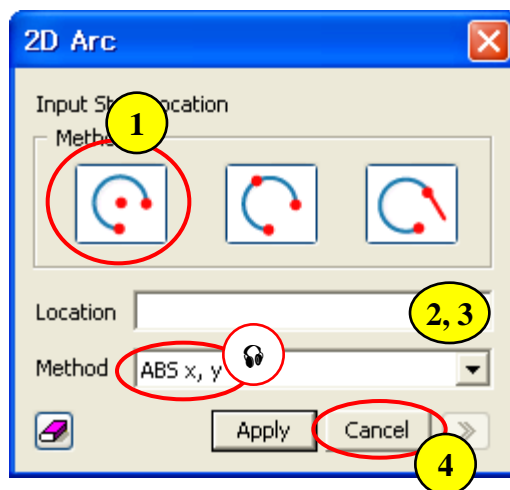


1. Geometry > Curve > Create on WP > Polyline (Wire)...
2. Location : (0, 4) , <0, 3> , <7> , <10, -2> , <0, -5> , <-2.5> ☞
3. Click Right Mouse Button in Work Window
(to Stop Polyline Drawing)
4. Click [Cancel] Button ☞
5. Click "Zoom All"



- ☞ 0: "ABS x, y", <>: "REL dx, dy"
<7> same as <7, 0>
- ☞ [Esc] as shortcut for [Cancel].

Step 3.

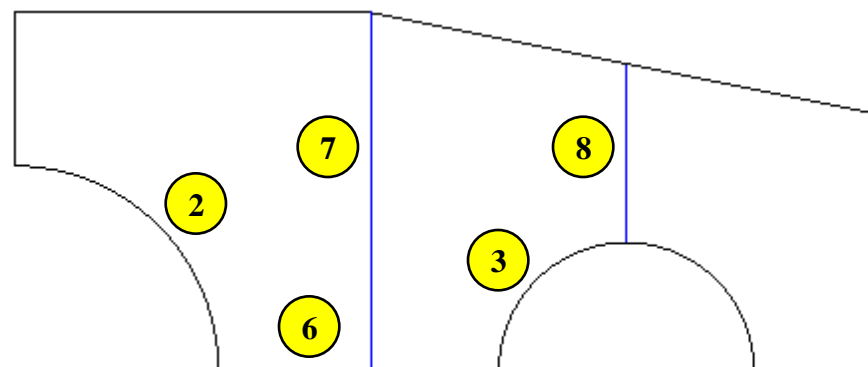


⦿ (): “ABS x, y”

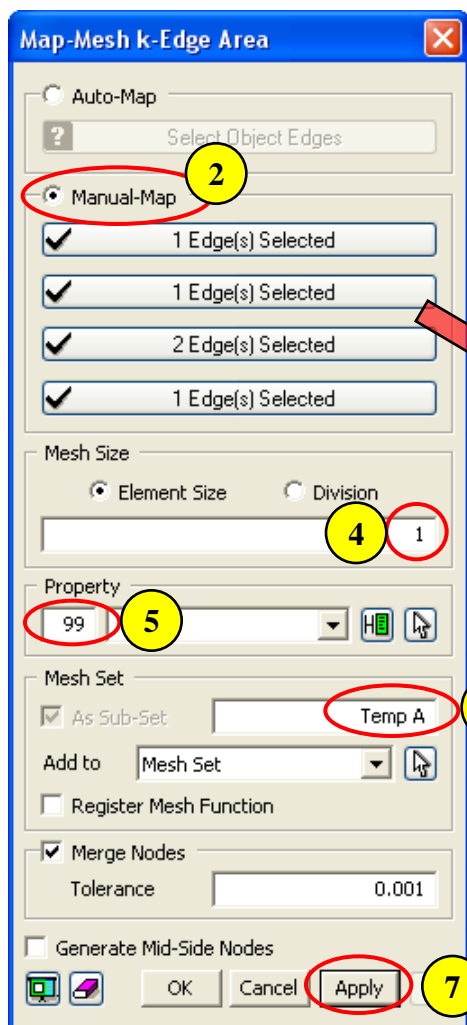
(0) same as (0, 0), (4) same as (4, 0), etc.

⦿ “Ctrl+A” as shortcut for “Select Displayed”.

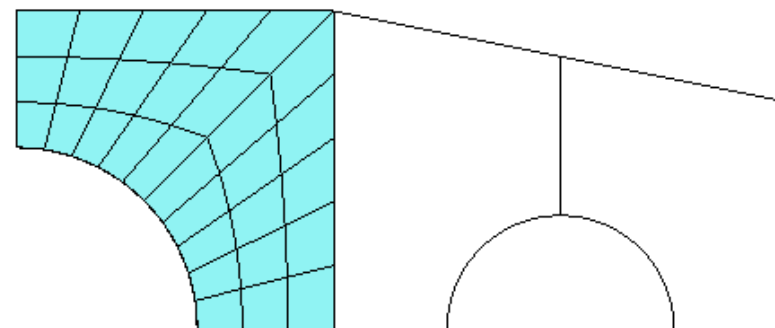
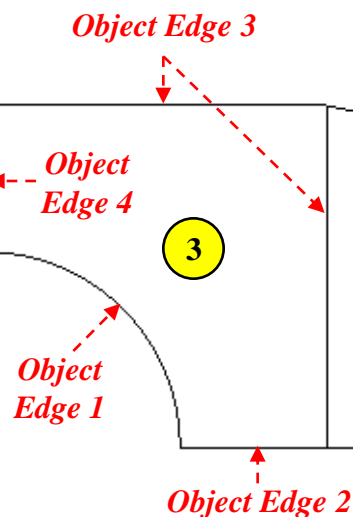
1. Geometry > Curve > Create on WP > Arc...
2. Center (0) , Start (4) , End (0, 4) ⦿
3. Center (12), Start (14.5), End (9.5)
4. Click [Cancel] Button
5. Geometry > Curve > Create on WP > Line...
6. SL(4) , EL<5.5>
7. SL(7, 7) , EL<0, -7>
8. SL(12, 2.5) , EL<0, 3.5>
9. Click [Cancel] Button
10. Geometry > Curve > Intersect...
11. Select ⦿ “Displayed” ⦿
12. Click [Apply] Button
13. Click [Cancel] Button



Step 4.

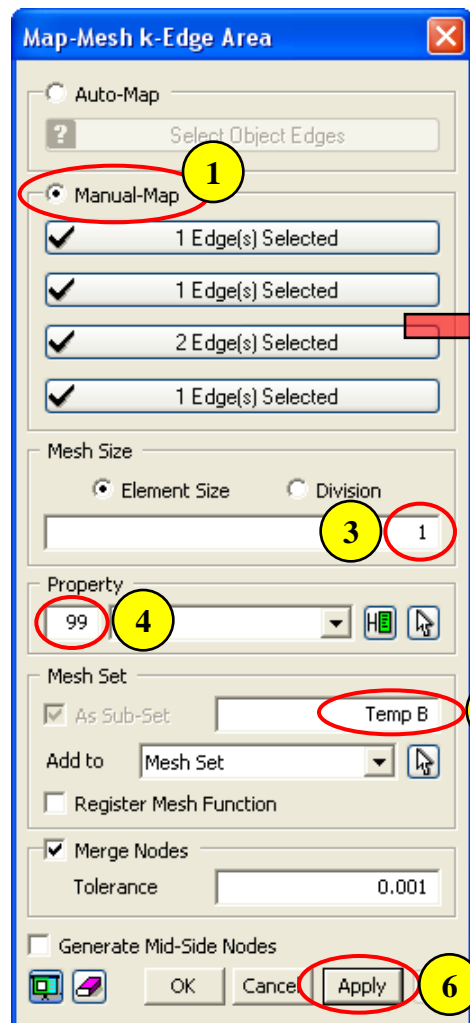


1. Mesh > Map Mesh > k-Edge Area...
2. Select "Manual-Map"
3. Select Edge Groups 1~4 (See Figure) ^⑥
4. Mesh Size - Element Size : 1
5. Property : 99
6. Mesh Set : Temp A
7. Click [Apply] Button

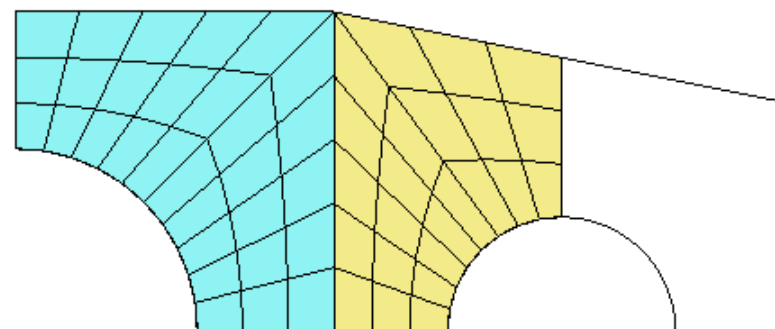
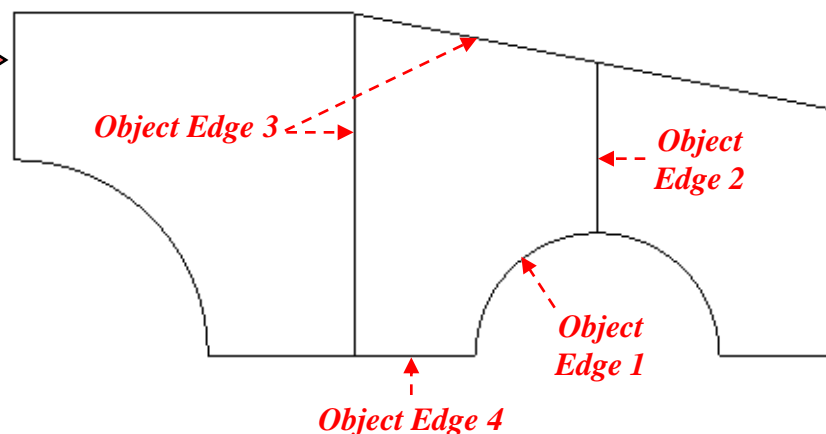


⑥ "Spacebar" will move selection mode to next button.

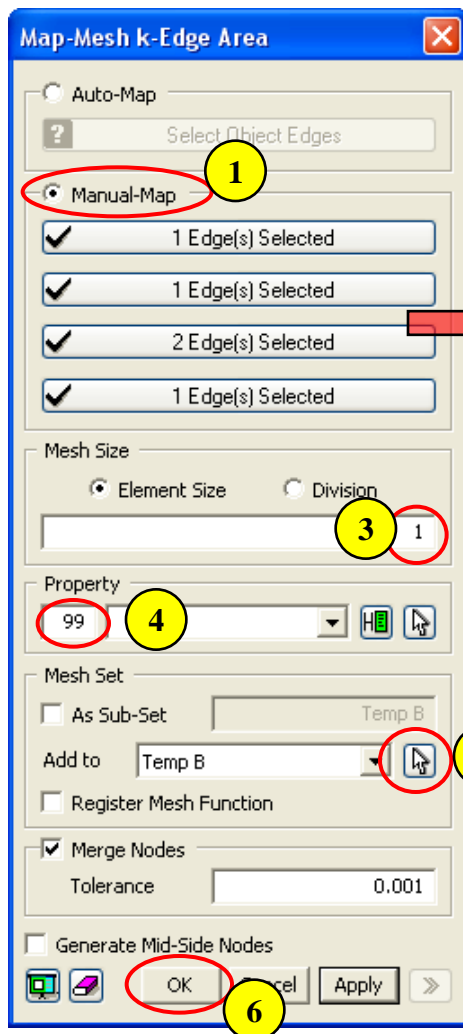
Step 5.




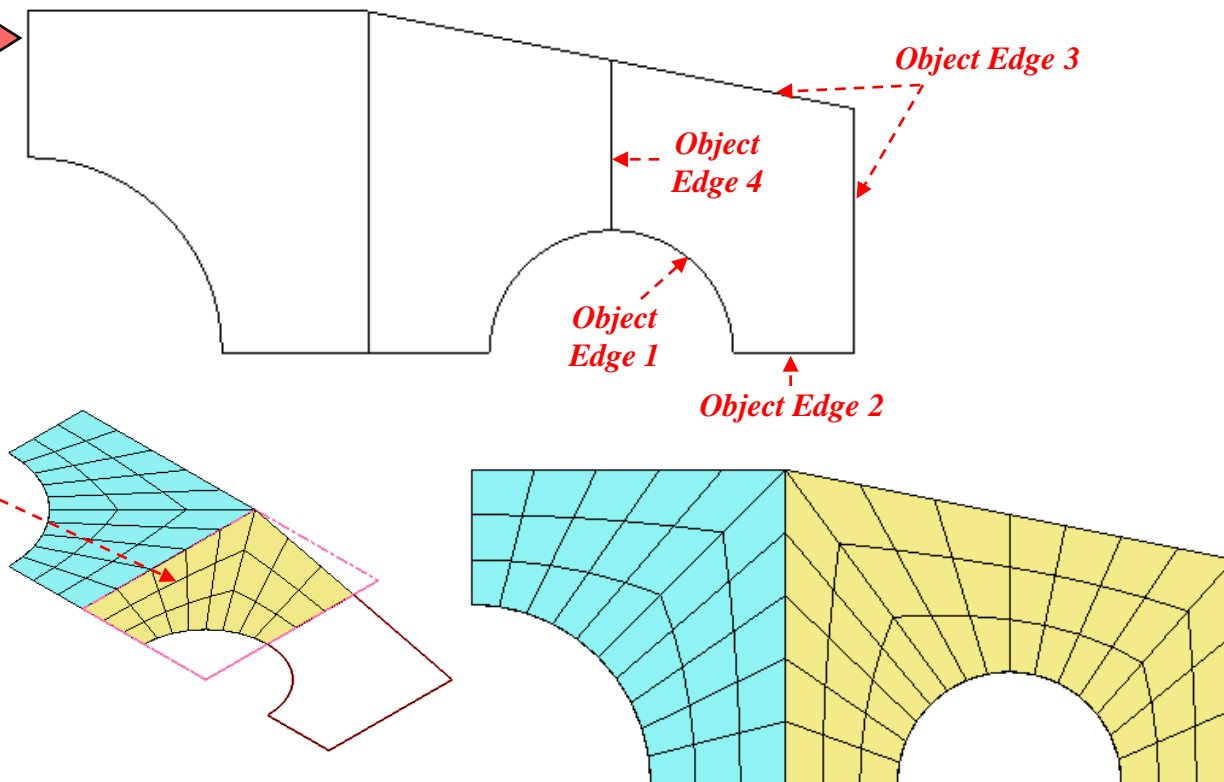
1. Select "Manual-Map"
2. Select Edge Groups 1~4 (See Figure)
3. Mesh Size - Element Size : 1
4. Property : 99
5. Mesh Set : Temp B
6. Click [Apply] Button



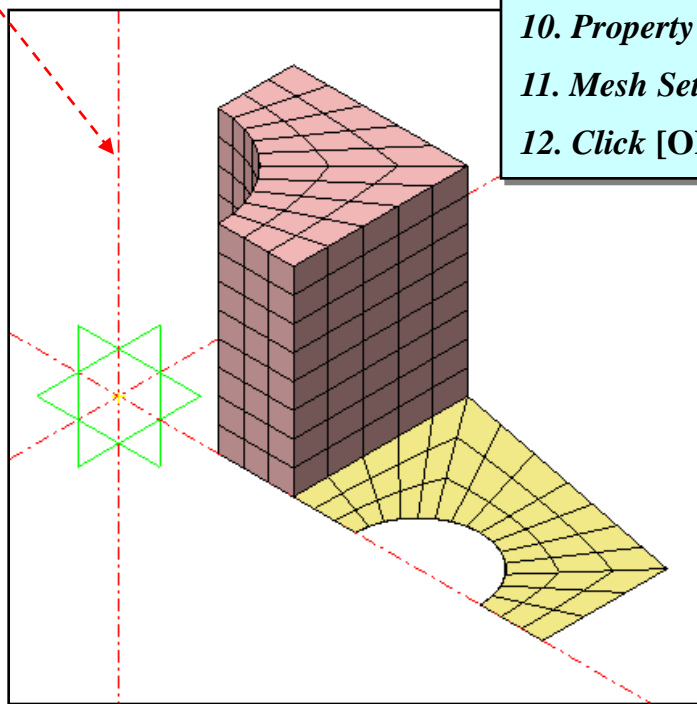
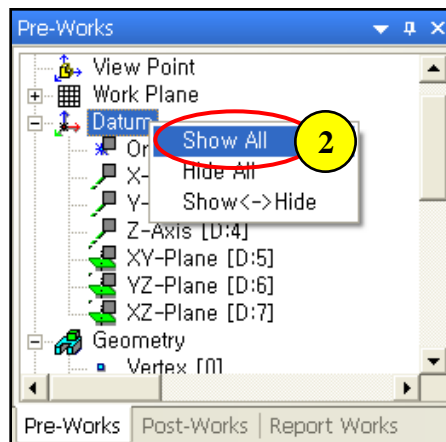
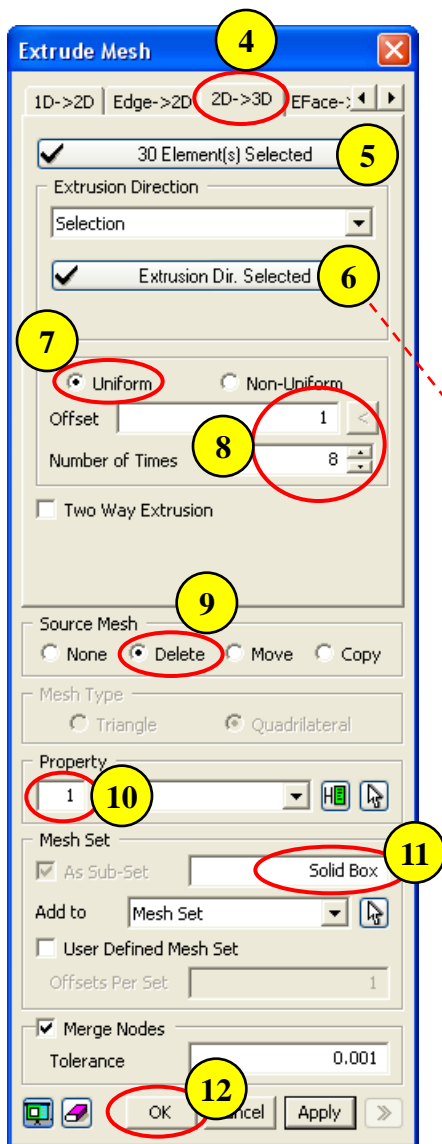
Step 6.



1. Select "Manual-Map"
2. Select Edge Groups 1~4 (See Figure)
3. Mesh Size - Element Size : 1
4. Property : 99
5. Click  "Mesh Set Selection" Button and Select "Temp B" Set in Work Window
6. Click [OK] Button

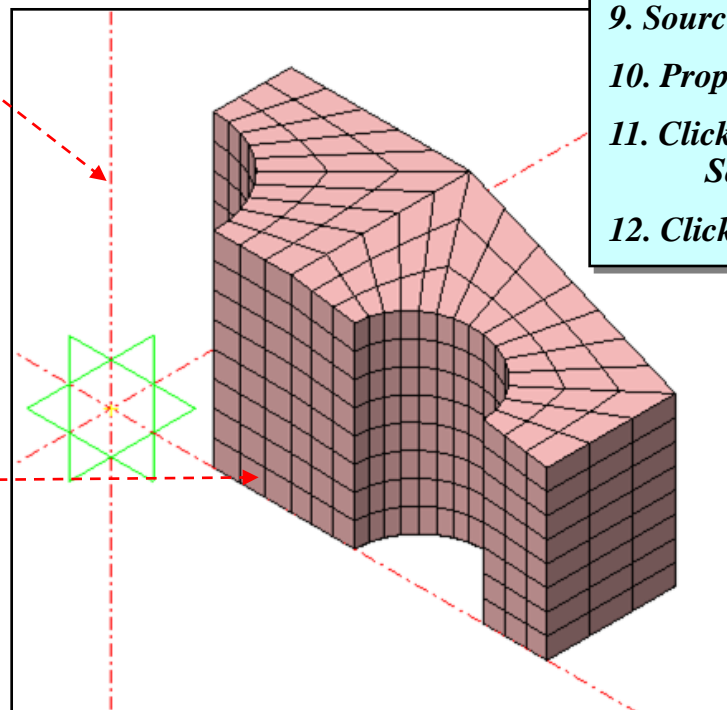
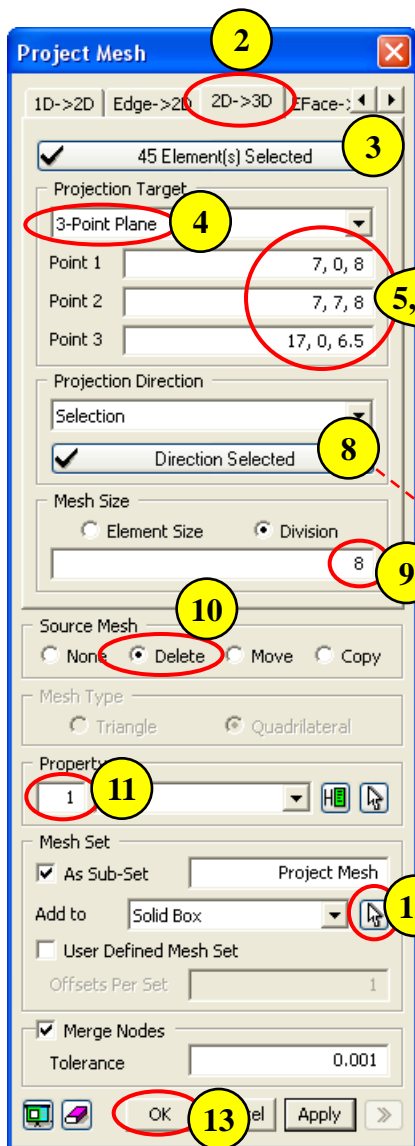


Step 7.



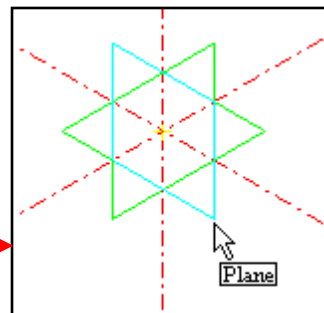
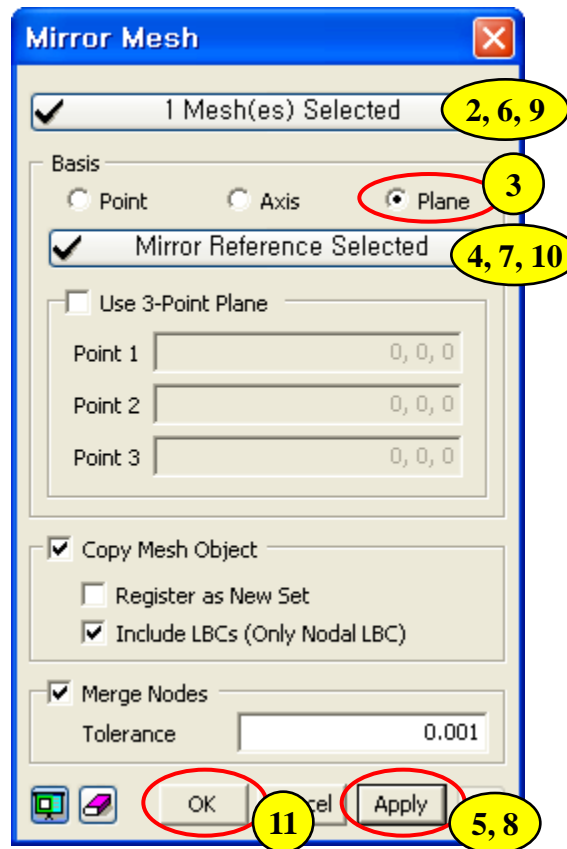
1. Pre-Works Tree : Datum...
2. Click Right Mouse Button and Select "Show All"
3. Mesh > Protrude Mesh > Extrude...
4. Select "2D->3D" tab
5. Select "Temp A" Mesh Set
6. Extrusion Direction : Z-Axis
7. Select "Uniform" Option
8. Offset : 1 , Number of Times : 8
9. Source Mesh : Delete
10. Property : 1
11. Mesh Set : Solid Block
12. Click [OK] Button

Step 8.



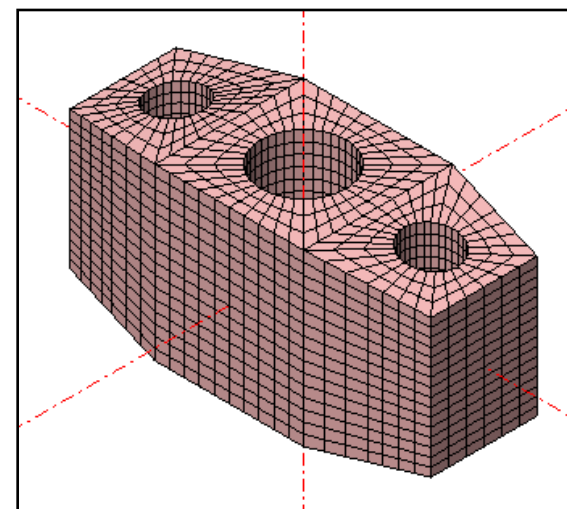
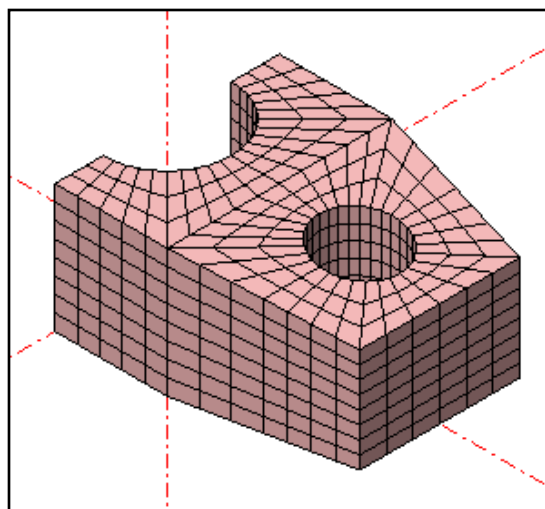
1. Mesh > Protrude Mesh > Project...
2. Select "2D->3D" tab
2. Select "Temp B" Mesh Set
3. Project Target : 3-Point Plane
4. Point 1 : (7, 0, 8)
5. Point 2 : (7, 7, 8)
6. Point 3 : (17, 0, 6.5)
7. Projection Direction : Z-Axis
8. Mesh Size – Division : 8
9. Source Mesh : Delete
10. Property : 1
11. Click "Mesh Set Selection" Button and Select "Solid Block" Set in Work Window
12. Click [OK] Button

Step 9.

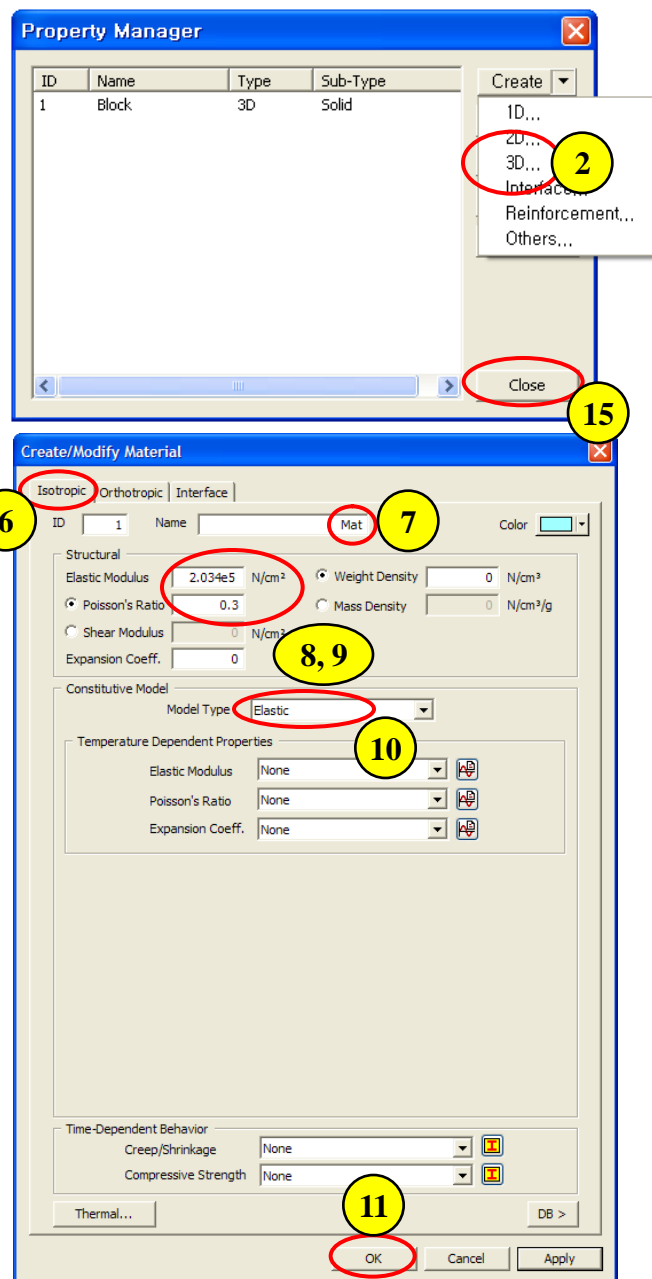
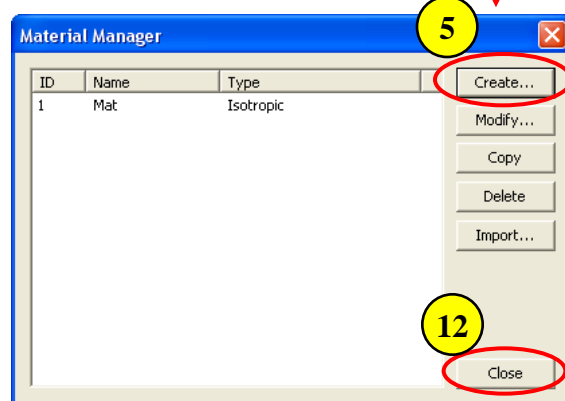
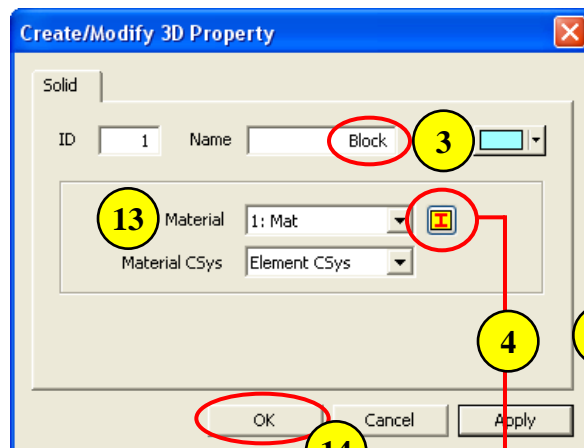


Select "XY/YZ/XZ-Plane" in Work Window or Pre-Works Tree

1. Mesh > Transform > Mirror...
2. Select "Solid Block" Mesh Set
3. Basis : Plane
4. Select "XZ-Plane"
5. Click [Apply] Button
6. Select "Solid Block" Mesh Set
7. Select "YZ-Plane"
8. Click [Apply] Button
9. Select "Solid Block" Mesh Set
10. Select "XY-Plane"
11. Click [OK] Button

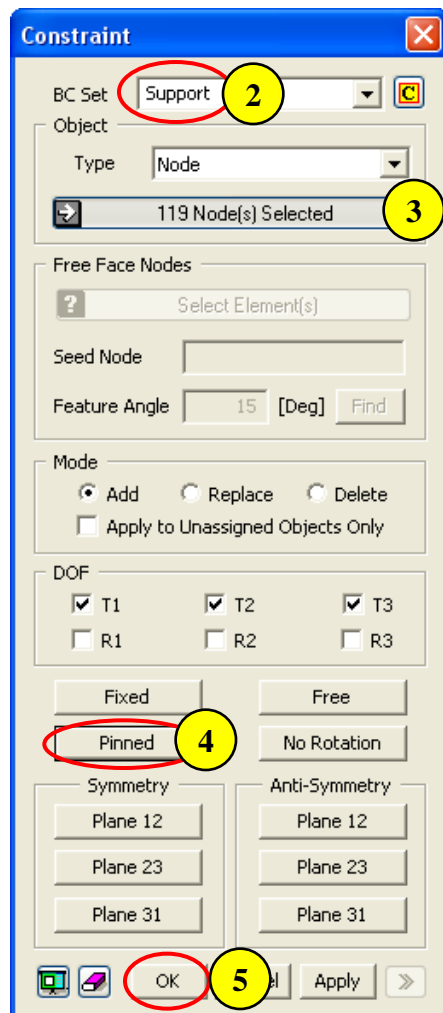


Step 10.

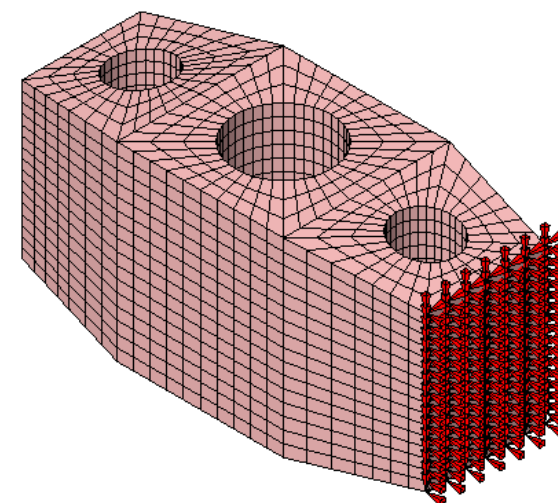
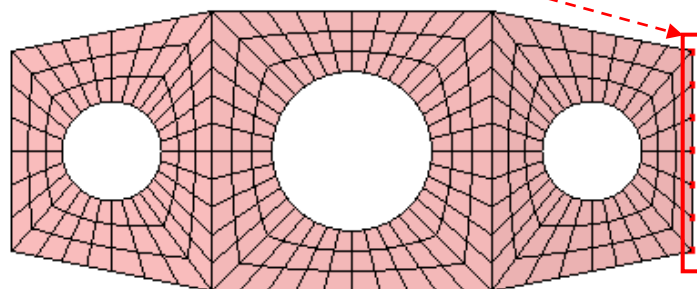


1. Analysis > Property ...
2. Create 3D ...
3. ID : 1 , Name : Block
4. Click  Button (Material)
5. Click [Create...] Button
6. Select "Isotropic" tab
7. ID : 1 , Name : Mat
8. Elastic Modulus : $2.034e5 \text{ N/cm}^2$
9. Poisson's Ratio : 0.3
10. Model Type : Elastic
11. Click [OK] Button
12. Click [Close] Button
13. Select "1: Mat" for Material
14. Click [OK] Button
15. Click [Close] Button

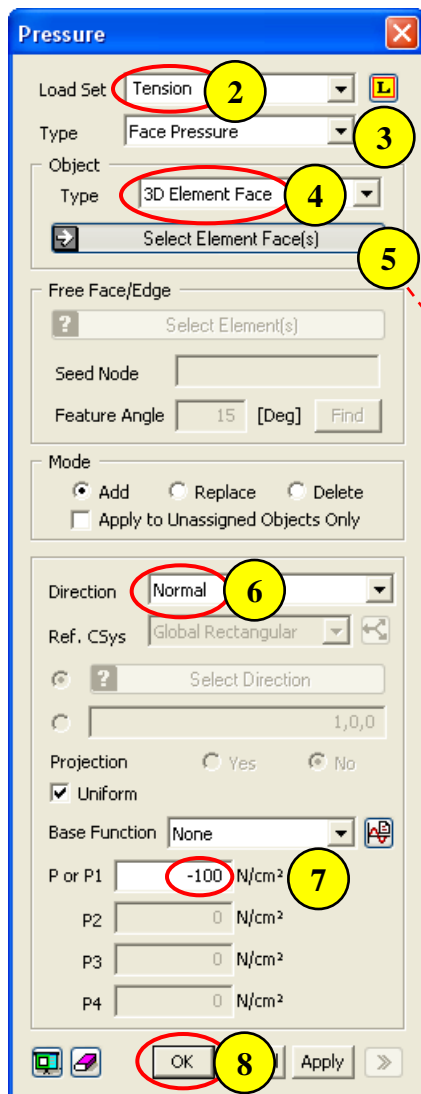
Step 11.



1. Analysis > BC > Constraint...
2. BC Set : Enter "Support"
3. Select 119 Nodes (Right Side, See Figure)
4. Click [Pinned] Button
5. Click [OK] Button



Step 12.



1. Analysis > Load > Pressure...

2. Load Set : Tension

3. Type : Face Pressure

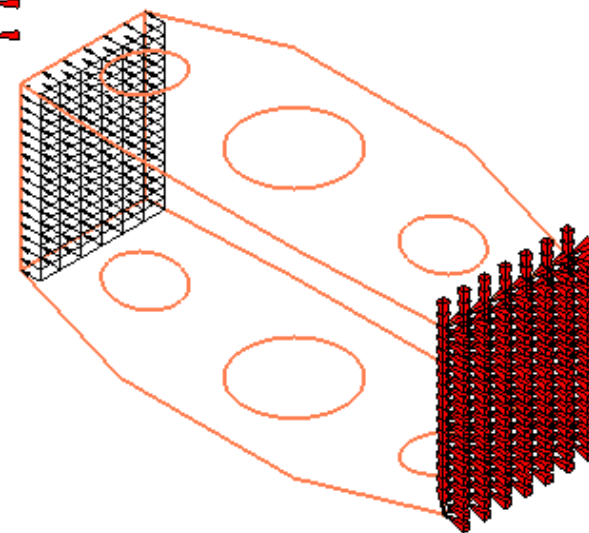
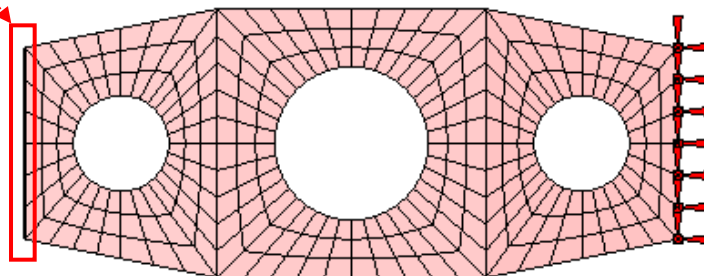
4. Object Type : 3D Element Face

5. Select 96 Element Faces (Left Side, See Figure)

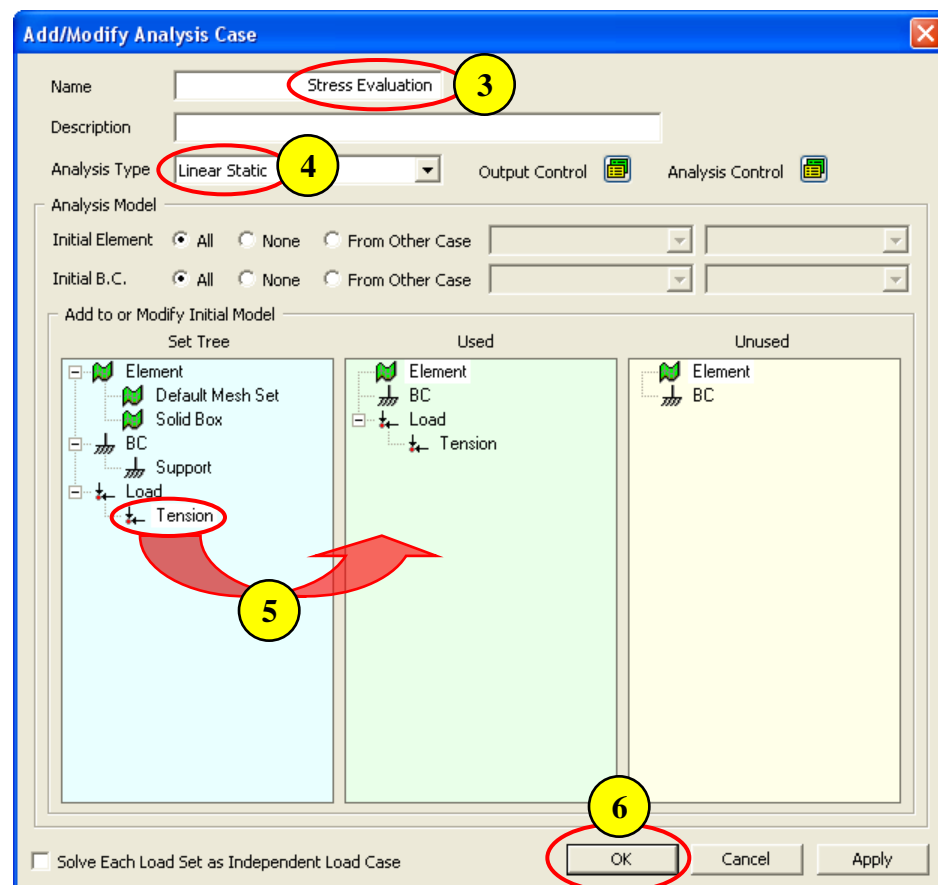
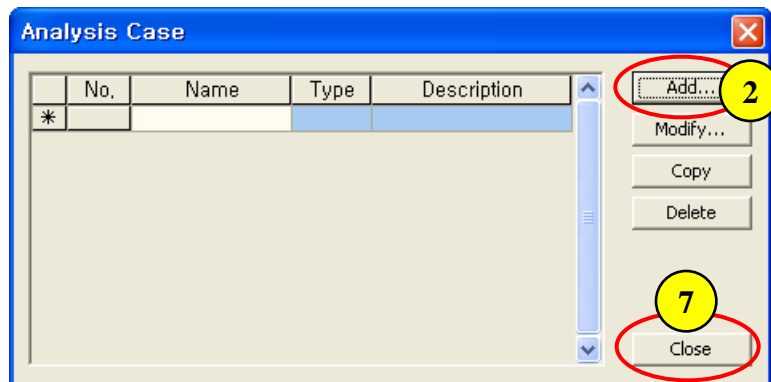
6. Direction : Normal

7. P or P1 : -100

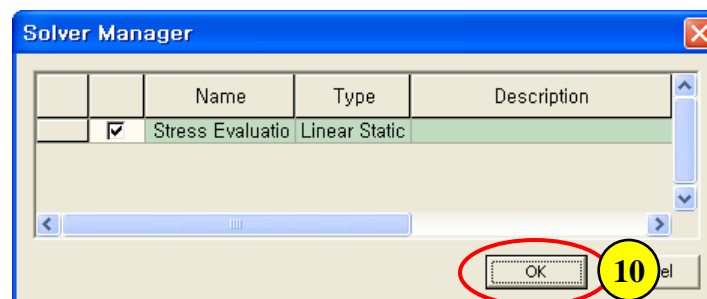
8. Click [OK] Button



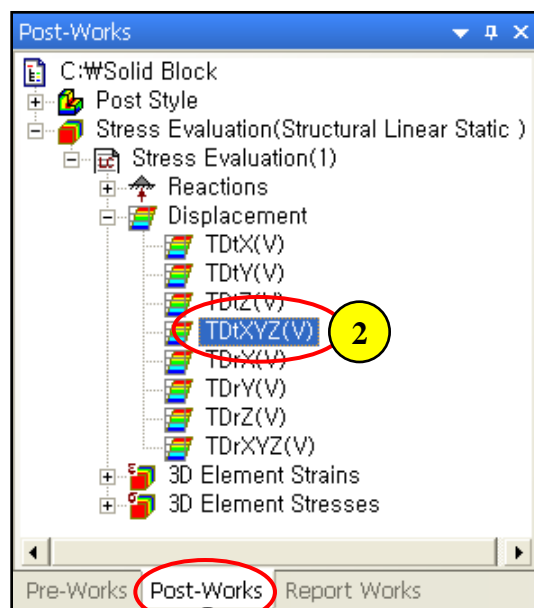
Step 13.



1. Analysis > Analysis Case ...
2. Click [Add] Button
3. Name : Stress Evaluation
4. Analysis Type : Linear Static
5. Drag & Drop "Load" to "Used" Window
6. Click [OK] Button
7. Click [Close] Button
8. File > Save ... (Solid Block.feb)
9. Analysis > Solve ...
10. Click [OK] Button



Step 14.



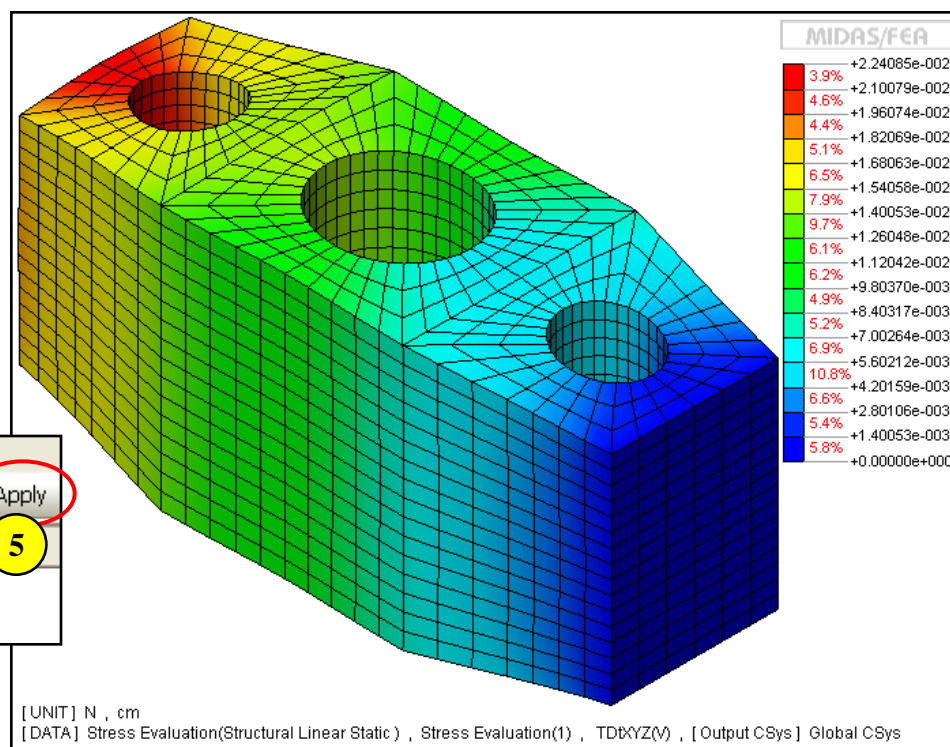
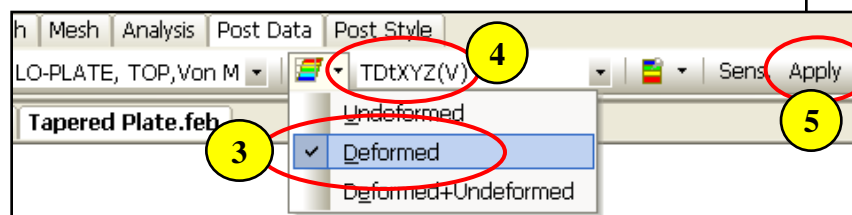
1. Post-Works Tree : Stress Evaluation(Structural Linear Static)
> Stress Evaluation (1) > Displacement

2. Double Click “TDtXYZ(V)”

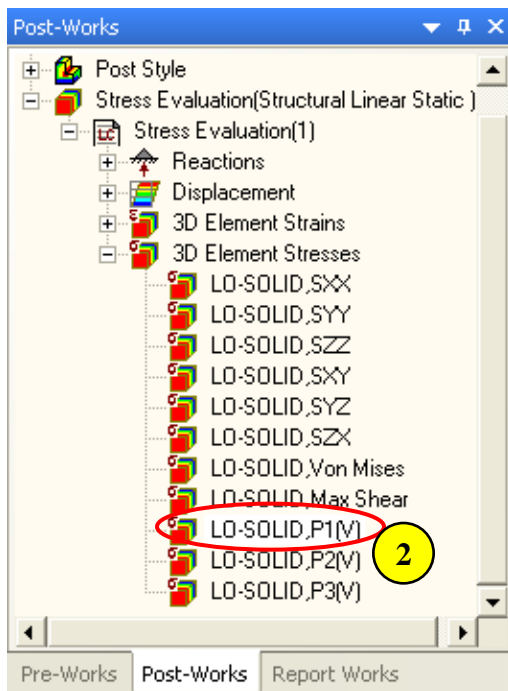
3. Select “Deformed” for Mesh Shape at “Post Data” Toolbar

4. Select “TDtXYZ(V)” for Deformation Data

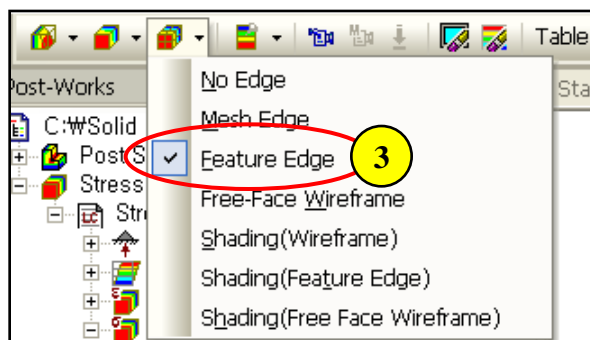
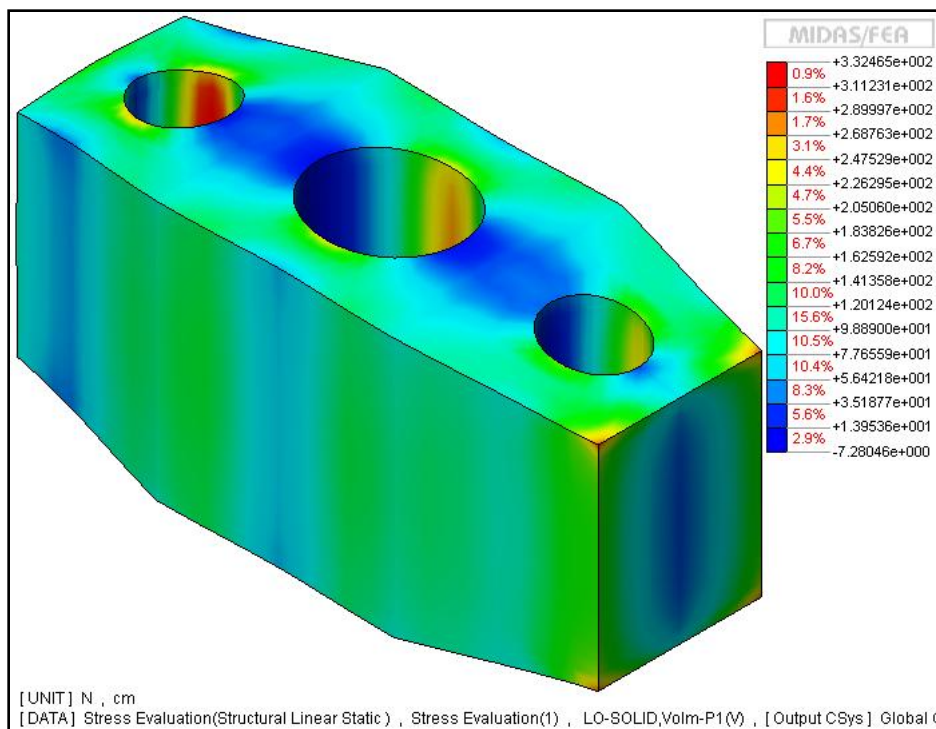
5. Click “Apply” Button



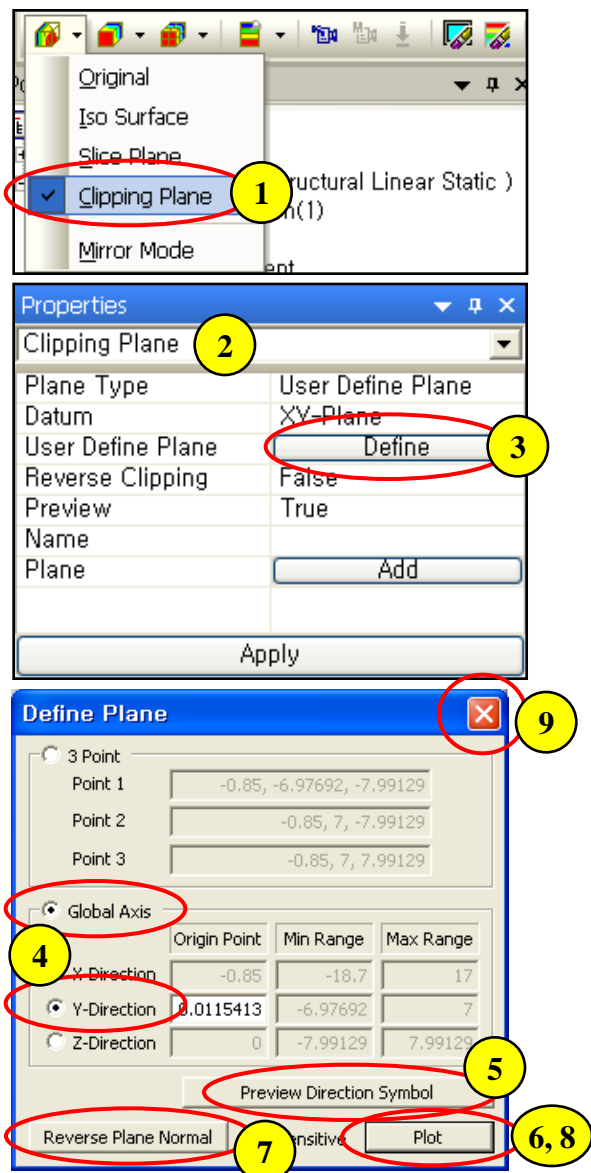
Step 15.



1. Post-Works Tree : Stress Evaluation(Structural Linear Static) > Stress Evaluation (1) > 3D Element Stresses
2. Double Click “LO-SOLID,P1(V)”
3. Select “Feature Edge” for Edge Type at “Post Style” Toolbar (See Figure)



Step 16.



1. Select “Clipping Plane” for Plot Type at “Post Style” Toolbar (See Figure)

2. Property Window : Clipping Plane

3. User Define Plane : Click [Define] Button

4. Select “Global Axis - Y-Direction”

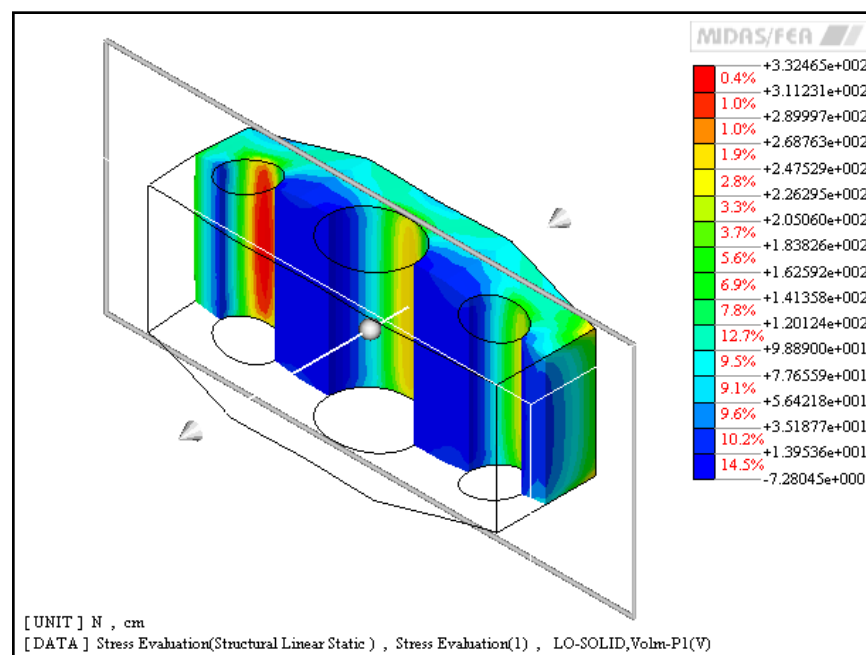
5. Click [Preview Direction Symbol] Button

6. Click [Plot] Button

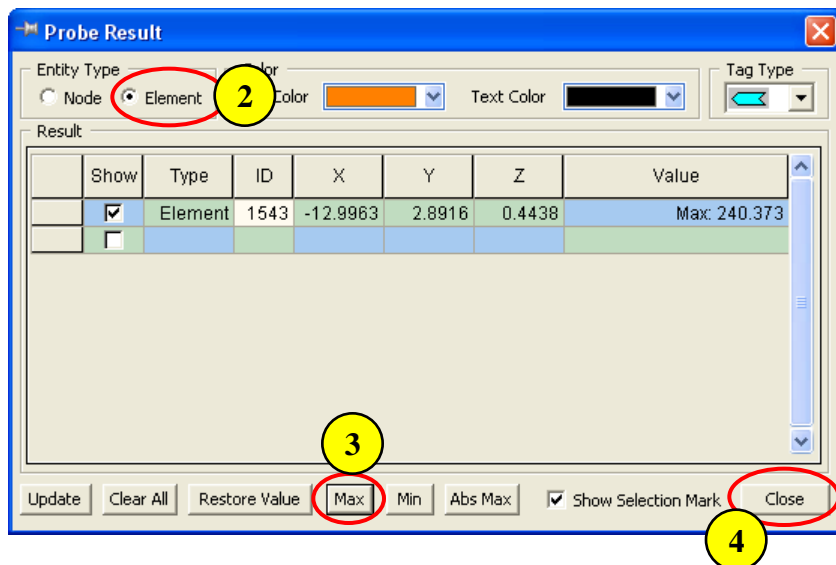
7. Click [Reverse Plane Normal] Button

8. Click [Plot] Button

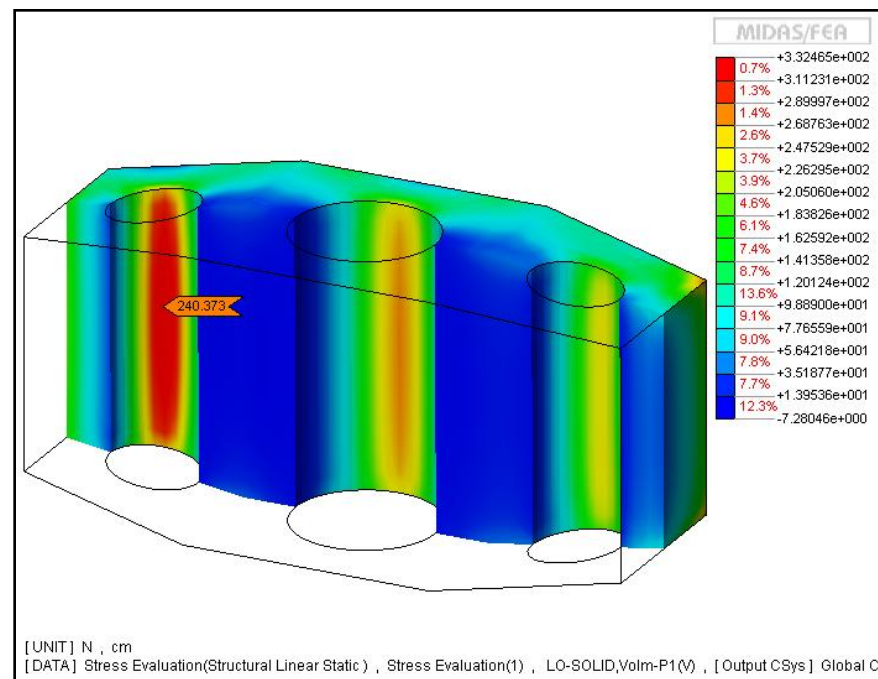
9. Click [X] Button



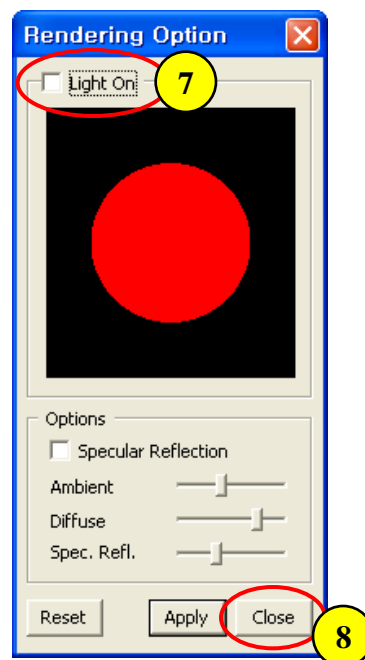
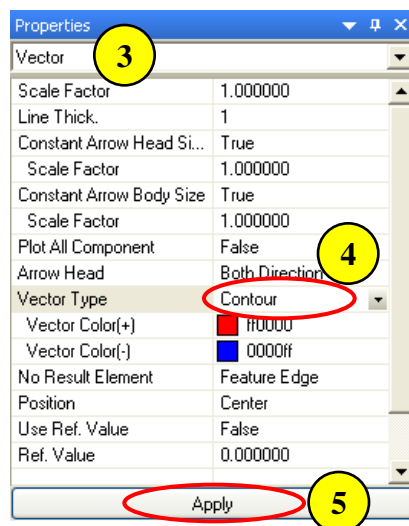
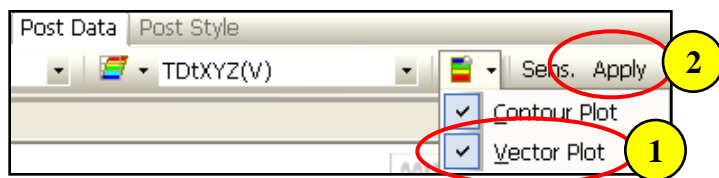
Step 17.



1. Post > Probe Result...
2. Entity Type : Element
3. Click [Max] Button
4. Click [Close] Button



Step 18.



1. Check on "Vector Plot" at "Post Style" Toolbar
2. Click "Apply" Button
3. Property Window : Vector
4. Vector Type : Contour
5. Click [Apply] Button
6. View > Rendering Option...
7. Check off "Light On"
8. Click [Close] Button

