

**Overview****▪ 3-D Linear Static Analysis****▪ Model**

- Unit : N, cm
- Isotropic Elastic Material
- Solid Element

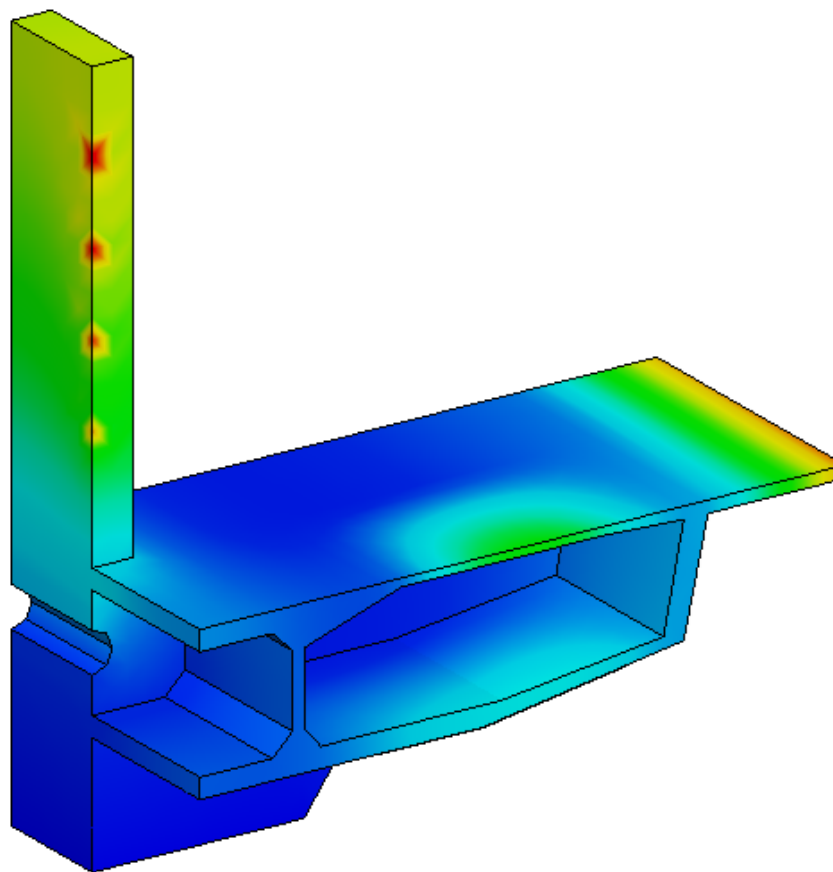
**▪ Load & Boundary Condition**

- Body Force
- Force
- Element Temperature
- Constraint

**▪ Result Evaluation**

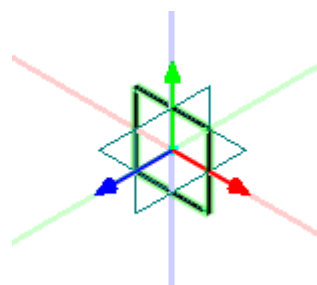
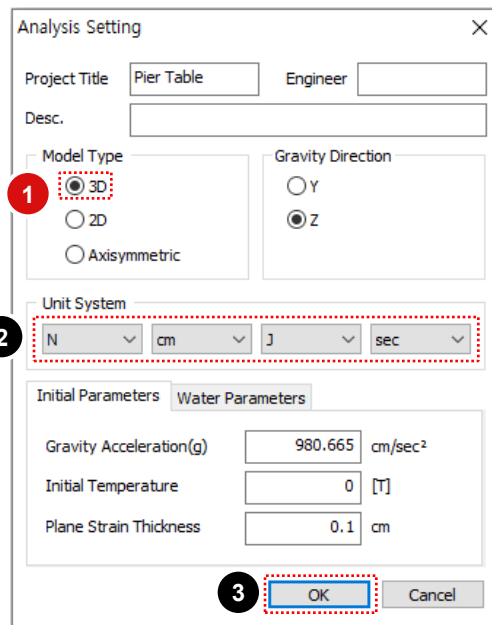
- Refer to Tutorial LS-3

# Pier table

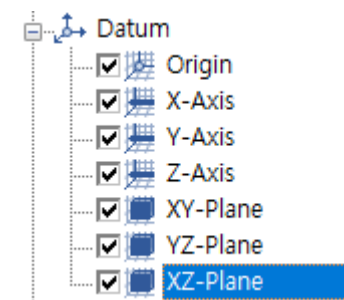
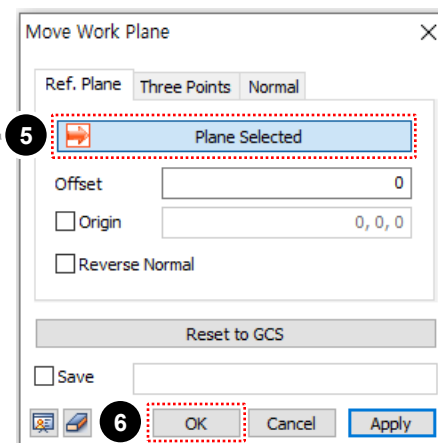


## Procedure


- 1 Model Type : [3D]
- 2 Unit System : [N , cm]
- 3 Click [OK] Button
- 4 Click [Move Work Plane]
- 5 Select [XZ-Plane]
- 6 Click [OK] Button
- 7 Click [Normal View]

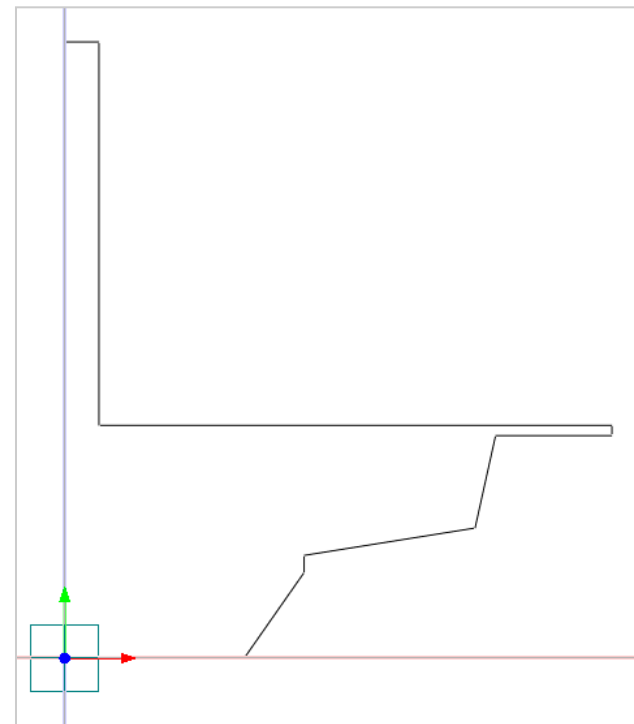
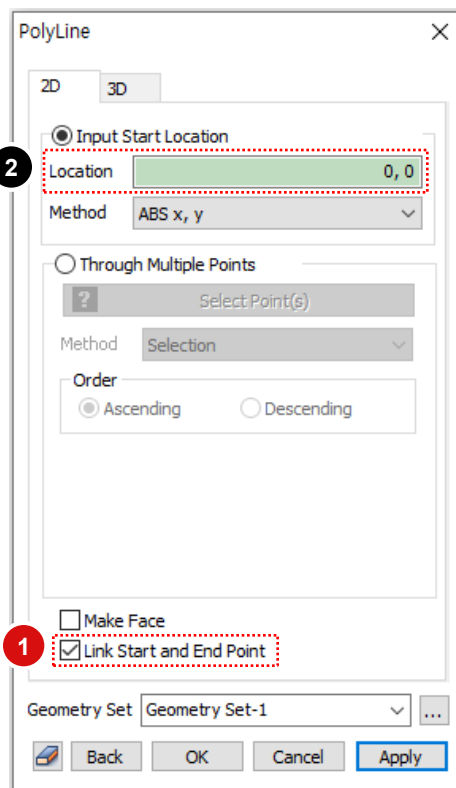



Select "XZ-Plane" in Work Window or Model



**Procedure**

- 1 Check on **[Link Start and End Point]**
- 2 Location : (0) , <525> , <175, 250> ,  
<0, 50> , <500, 80> , <60, 270> ,  
<340> , <0, 30> , <-1500> , <0, 1120> ,  
<-100> 
- 3 Click Right Mouse Button in Work Window (to Stop Polyline Drawing)
- 4 Click **[Zoom All]**

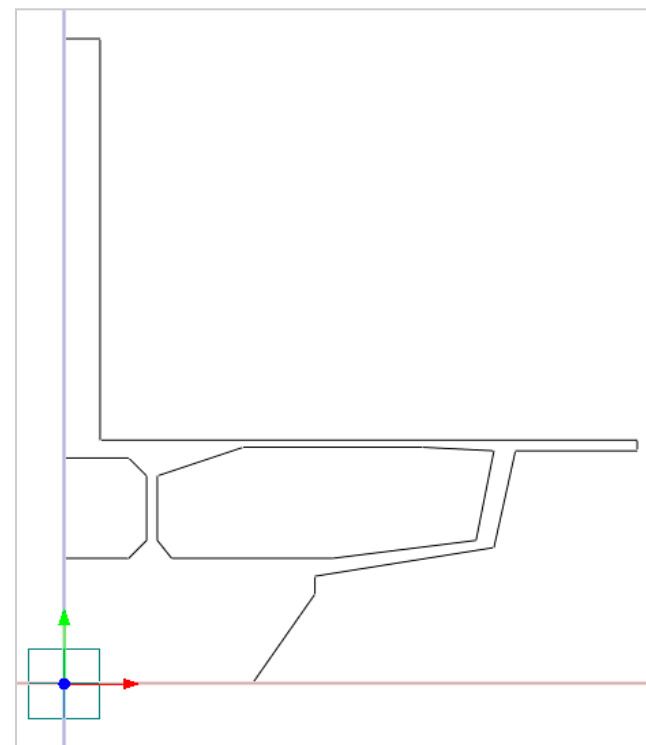
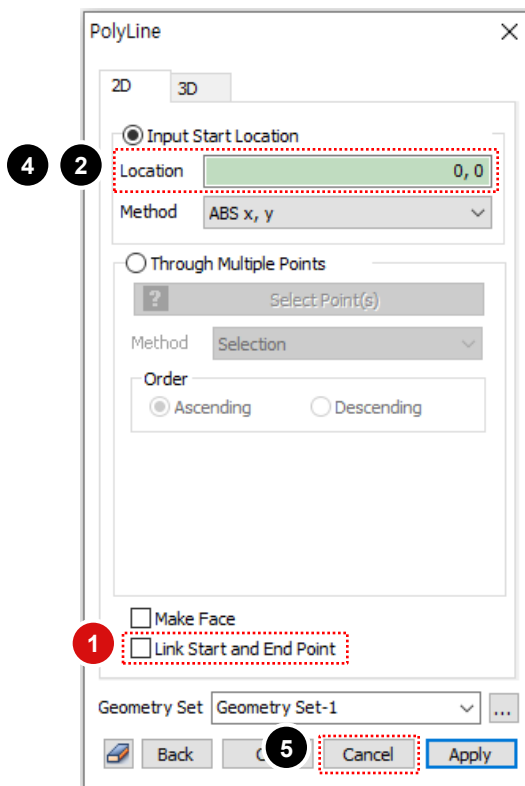


 "( )": ABS x, y", "< >": "REL dx, dy"  
<525> same as <525, 0>



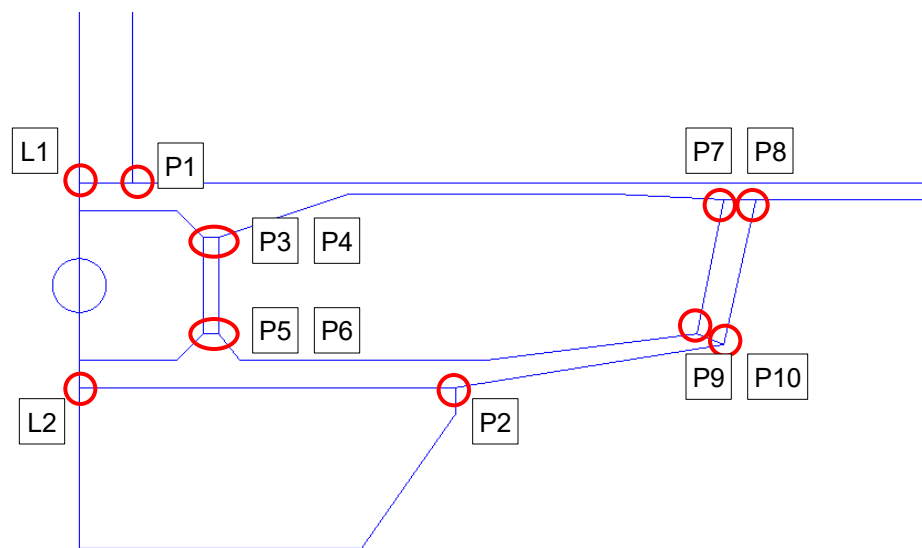
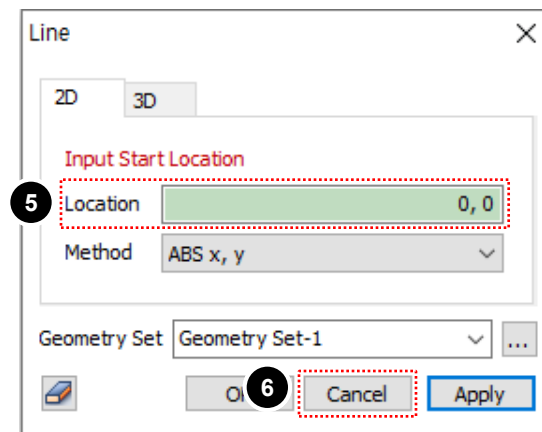
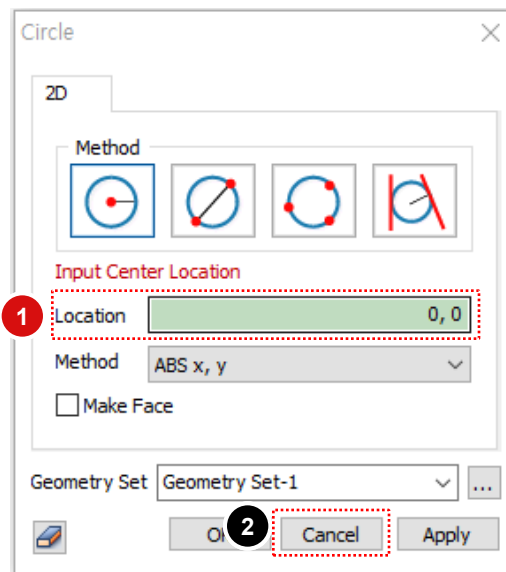
**Procedure**

- 1 Check off **[Link Start and End Point]**
- 2 Location : “(0, 350), <180>, <50,50>, <0, 180>, <-50, 50>, <-180>”
- 3 Click Right Mouse Button in Work Window (to Stop Polyline Drawing)
- 4 Location : “(300, 350) , <450> , <400, 50> ,<50, 250> , <-200, 10> , <-500> ,<-240, -80> , <0, -180> , <40, -50>”
- 5 Click **[Cancel]** Button

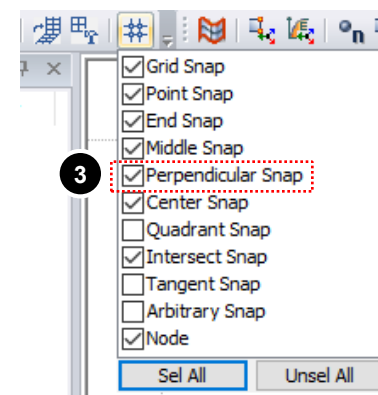


**Procedure**




- 1 Center : “(0, 490)” , Radius : “50”
- 2 Click **[Cancel]** Button
- 3 Toggle on **[Perpendicular Snap]**
- 4 Geometry > Point & Curve > **Line**
- 5 Select [(P1, L1) , (P2, L2) , (P3, P4) , (P5, P6) , (P7, P8) , (P9, P10)]
- 6 Click **[Cancel]** Button




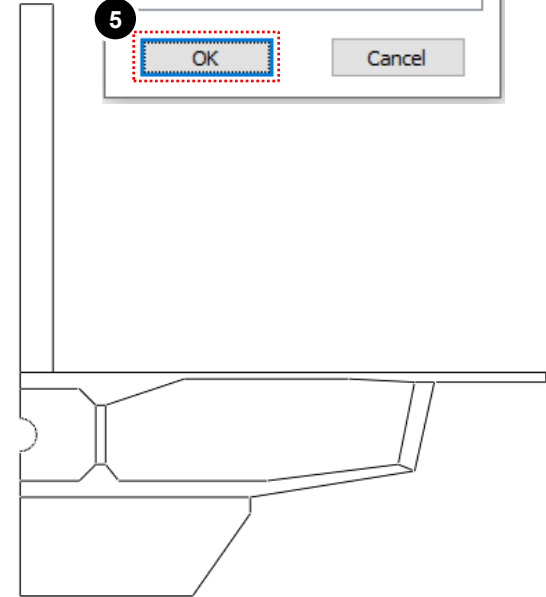
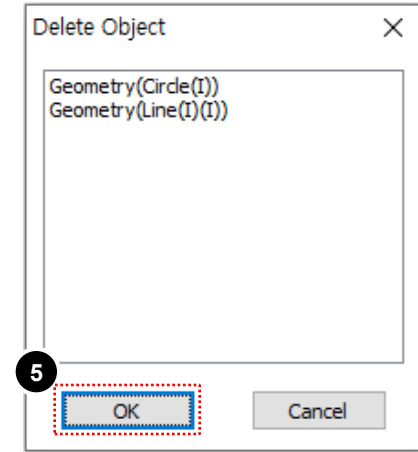
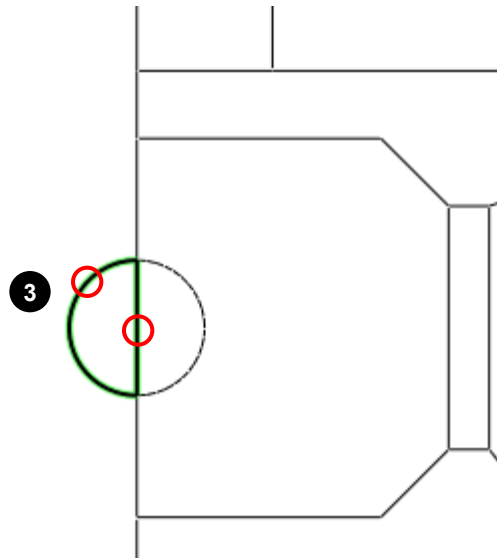
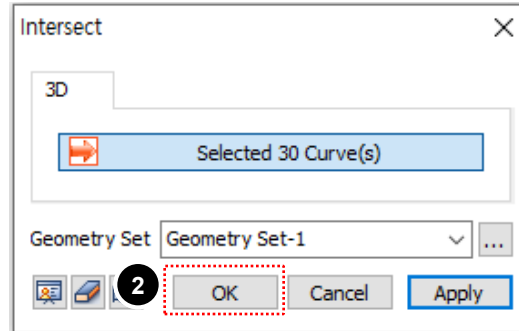
“( )”: ABS x, y”, < >: “REL dx, dy”  
 <525> same as <525, 0>




**Procedure**

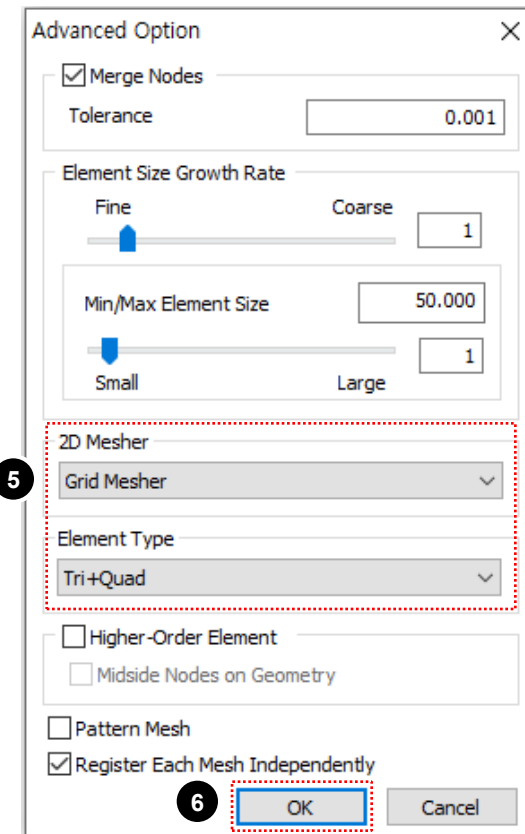
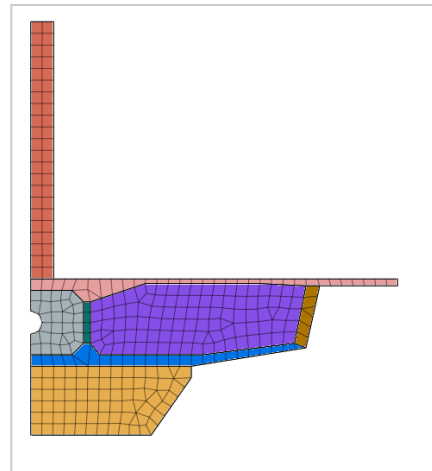
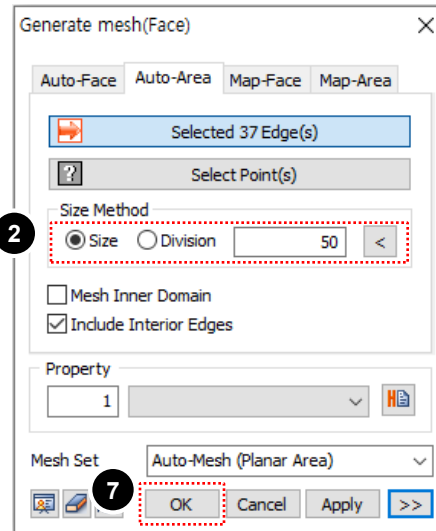
- 1 Select [  ] Select All 
- 2 Click [OK] Button
- 3 Select 2 Edges marked by [  ]  
(See Figure)
- 4 Press [Delete] Key
- 5 Click [OK] Button

 "Ctrl+A" as shortcut for "Select Displayed".




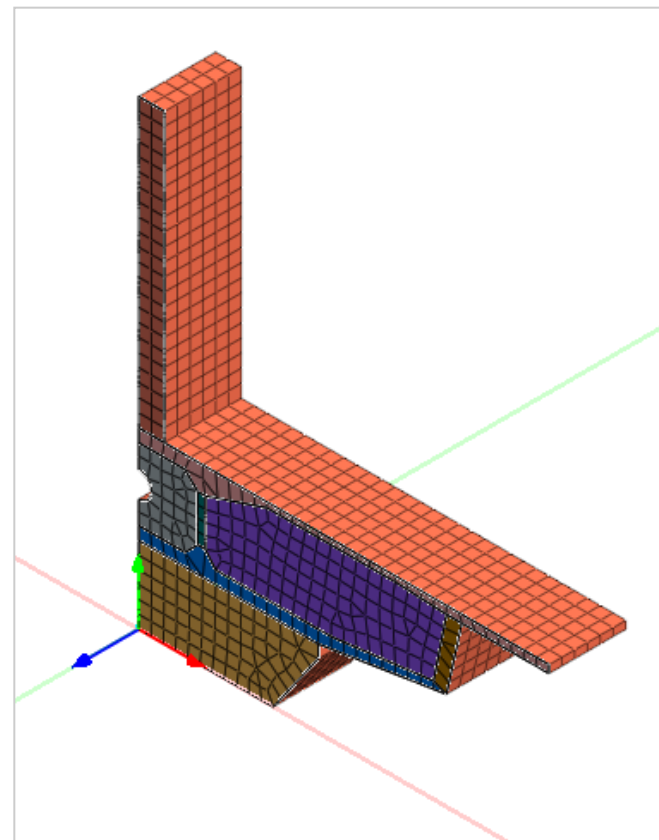
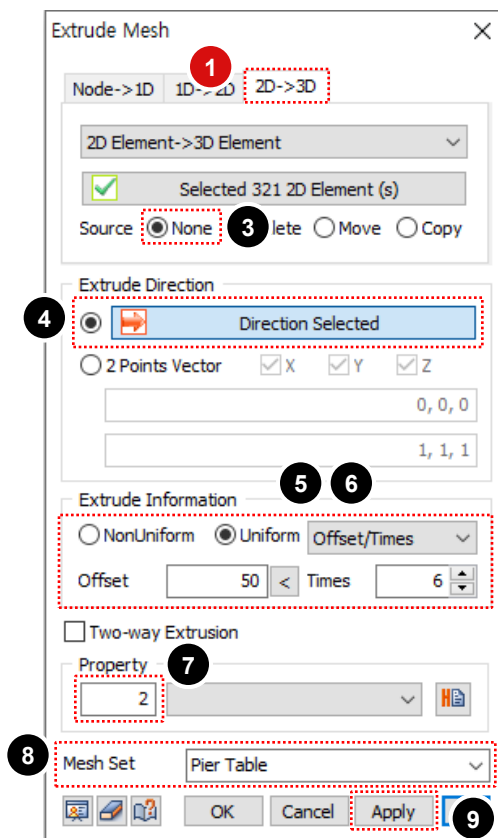
**Procedure**

- 1 Select [  ] Select All
- 2 Size Method - Size : “50”
- 3 Click “>>” button
- 4 2D Mesher : [Grid Mesher]
- 5 Element Type : [Tri + Quad]
- 6 Click [OK] Button
- 7 Click [OK] Button



**Procedure**

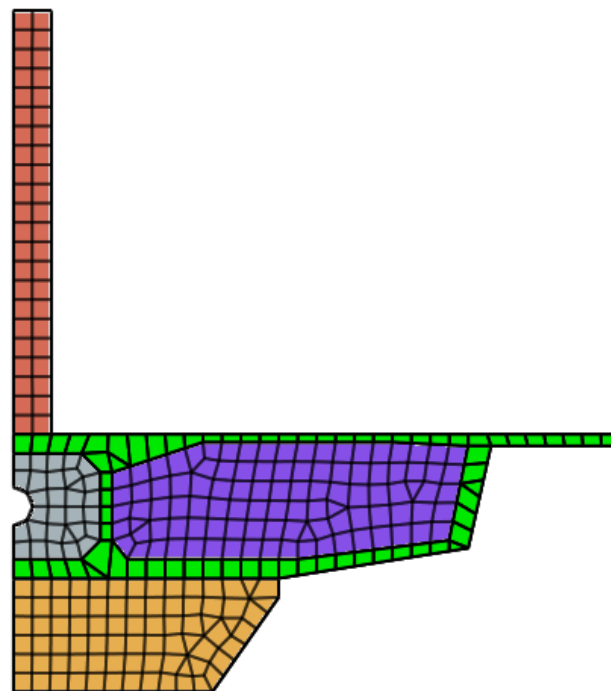
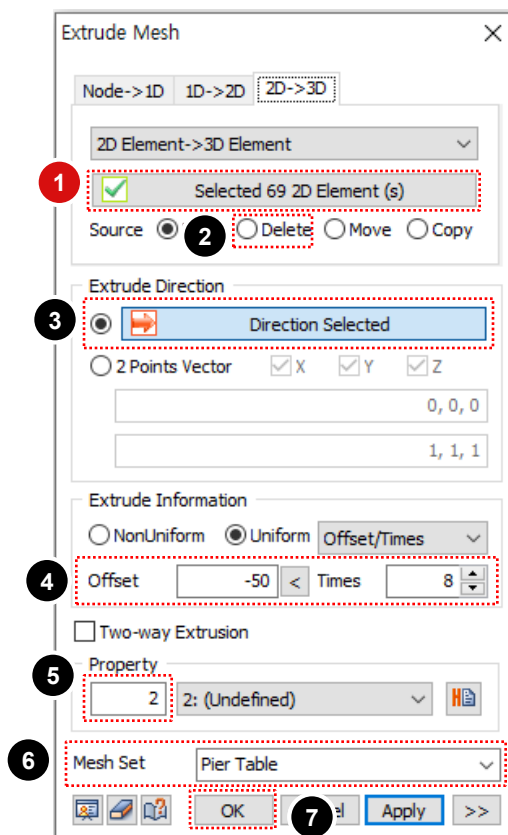
- 1 Select **[2D→3D]** tab
- 2 Select [  ] Select All
- 3 Source Mesh : **[None]**
- 4 Extrude Direction : **[Y-Axis]**
- 5 Select **[Offset/Times]**
- 6 Offset : **"50"** , Times : **"6"**
- 7 Property : **"2"**
- 8 Mesh Set : **[Pier table]**
- 9 Click **[Apply]** Button





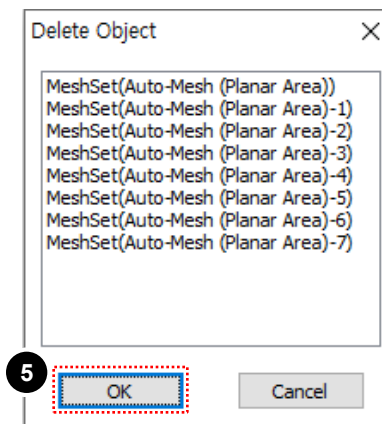
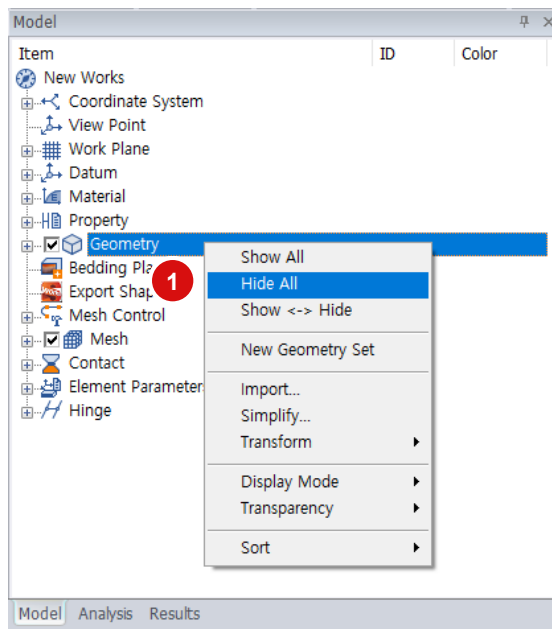
**Procedure**

- 1 Select **[69 Elements]** (Red in Figure)
- 2 Source Mesh : **[Delete]**
- 3 Extrude Direction : **[Y-Axis]**
- 4 Offset : **"-50"** , Times : **"8"**
- 5 Property : **"2"**
- 6 Mesh Set : **[Pier table]**
- 7 Click **[OK]** Button

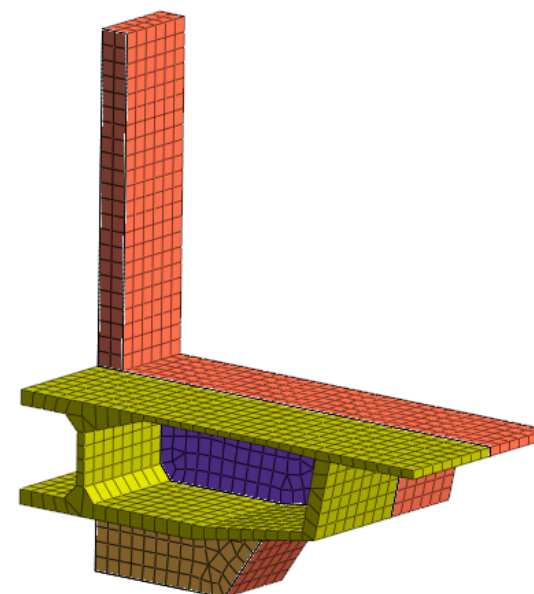
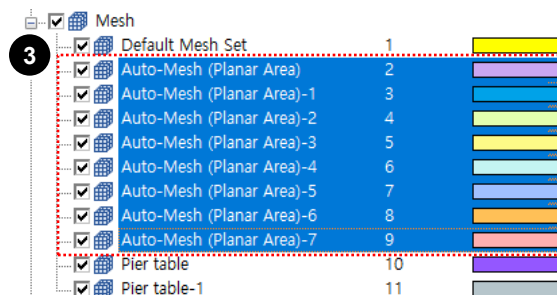


**Procedure**


- 1 Click Right Mouse Button and Select **[Hide All]**
- 2 Model Tree : **[Mesh]**
- 3 Select All Mesh Sets except **[Default Mesh Set]** & **[Pier table]** & **[Pier Table-1]**
- 4 Press **[Delete]** Key
- 5 Click **[OK]** Button

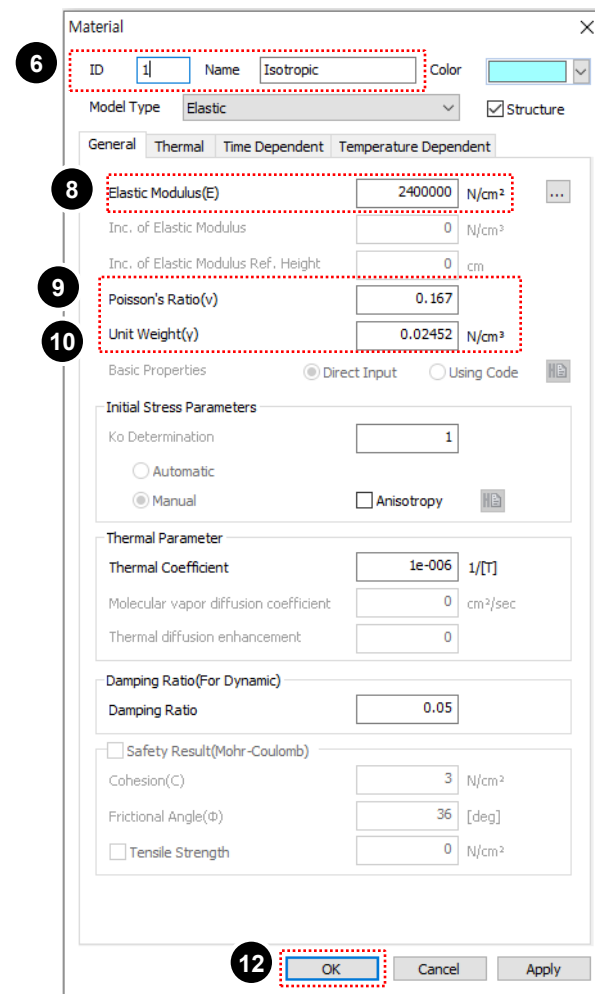
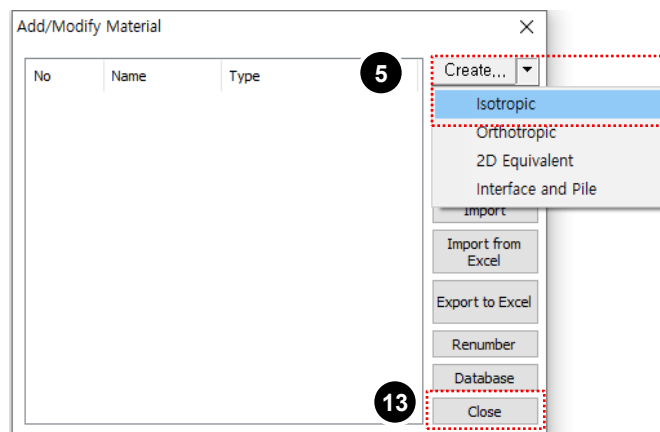
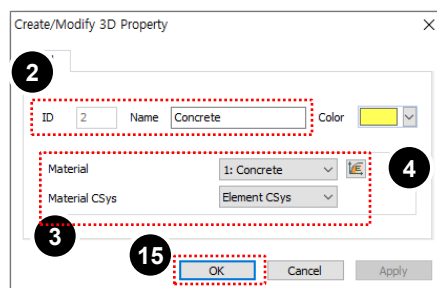
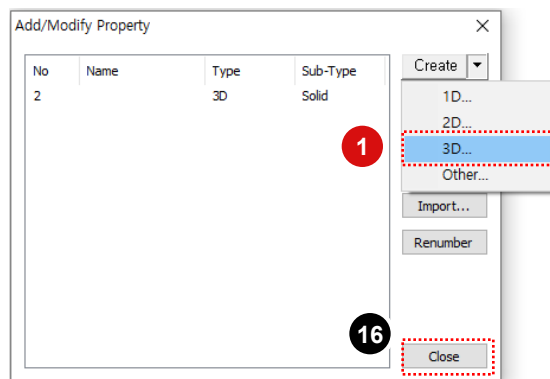


 Multiple Selection: "Shift" / "Ctrl" + Click



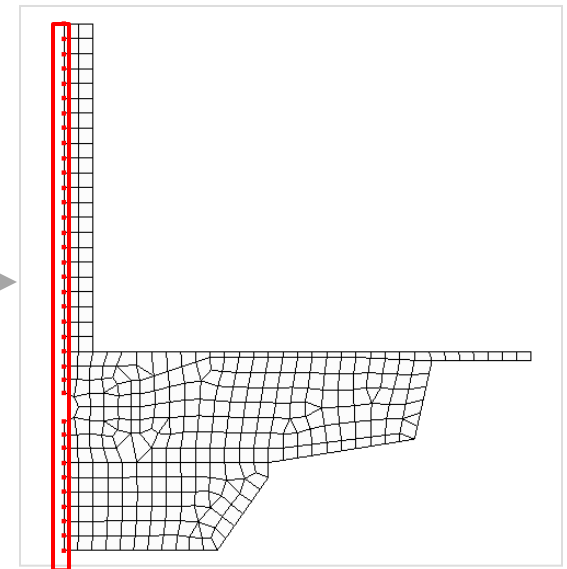
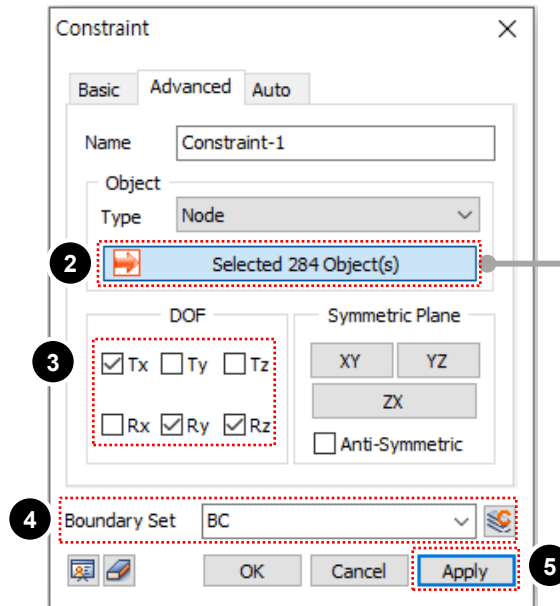
**Procedure**

- 1 Create [3D]
- 2 ID : "2" , Name : "Concrete"
- 3 Material CSys : "Element CSys"
- 4 Click  Button (Material)
- 5 Click [Create Isotropic]
- 6 ID : "1" , Name : "Concrete"
- 7 Model Type : [Elastic]
- 8 Elastic Modulus : "2.4e6" N/cm<sup>2</sup>
- 9 Poisson's Ratio : "0.167"
- 10 Unit Weight : "2.452e-2" N/cm<sup>3</sup>
- 11 Thermal Coefficient. : "1e-6"
- 12 Click [OK] Button
- 13 Click [Close] Button
- 14 Select [1: Concrete] for Material
- 15 Click [OK] Button
- 16 Click [Close] Button



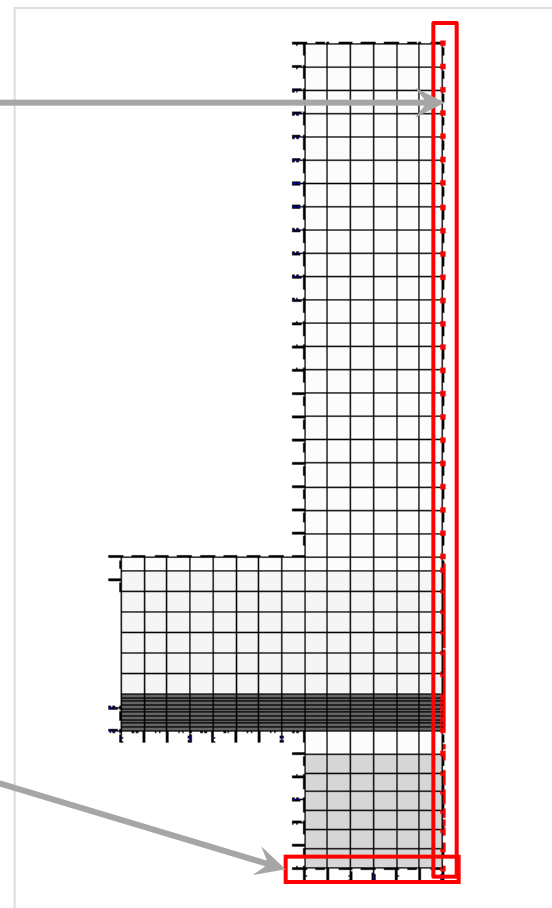
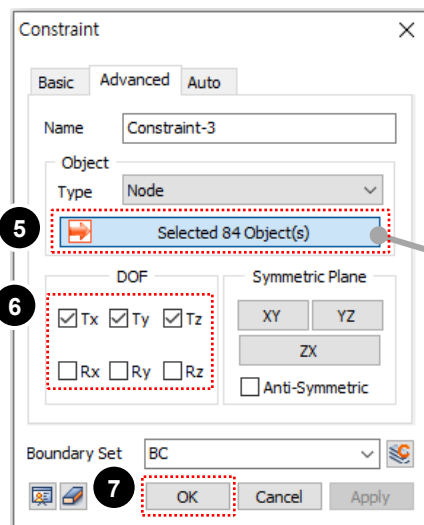
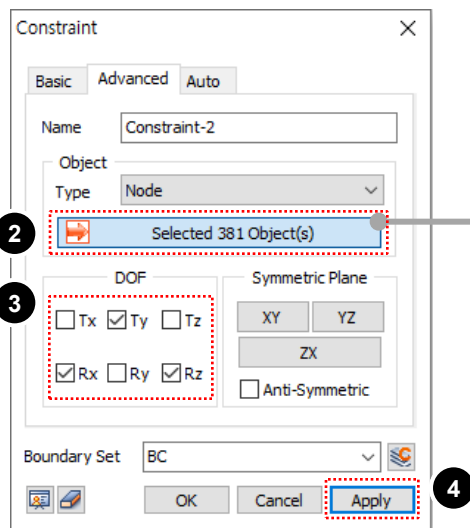
**Procedure**

- 1 Click **[Front]** View
- 2 Select **[Left Nodes]** (See Figure)
- 3 Click **[Tx, Ry, Rz]**
- 4 BC Set : **[BC]**
- 5 Click **[Apply]** Button




**Procedure**

- 1 Click **[Right View]**
- 2 Select **[Right Nodes]** (See Figure)
- 3 Click **[Ty, Rx, Rz]**
- 4 Click **[Apply]** Button
- 5 Select **[Bottom Nodes]** (See Figure)
- 6 Click **[Tx, Ty, Tz]**
- 7 Click **[OK]** Button



**Procedure**

- 1 Click [  ] Button
- 2 Name : “Self Weight”
- 3 Click [Add] Button
- 4 Name : “Temp”
- 5 Click [Add] Button
- 6 Name : “Force”
- 7 Click [Add] Button
- 8 Click [Close] Button
- 9 Gz : “-1”
- 10 Load Set : [Self Weight]
- 11 Click [OK] Button

Gravity

Gravity

Name Gravity-1

Reference Object

Type Coordinate

Ref. CSys Global Rectangular

Components

Gx 0

Gy 0

Gz -1

Spatial Distribution

Base Function None

Load Set Self Weight

OK Cancel Apply

Load Set

Name



Desc.

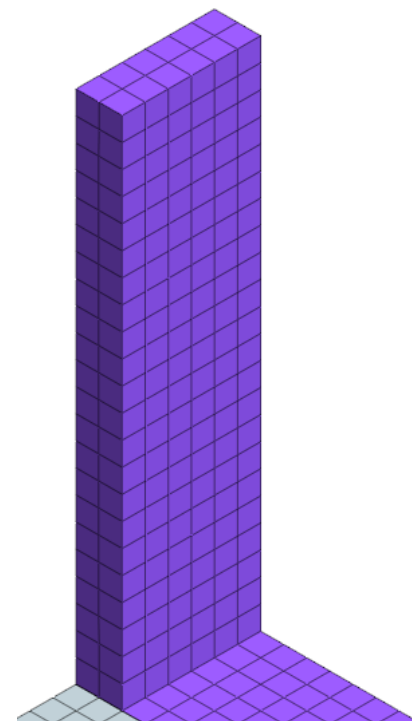
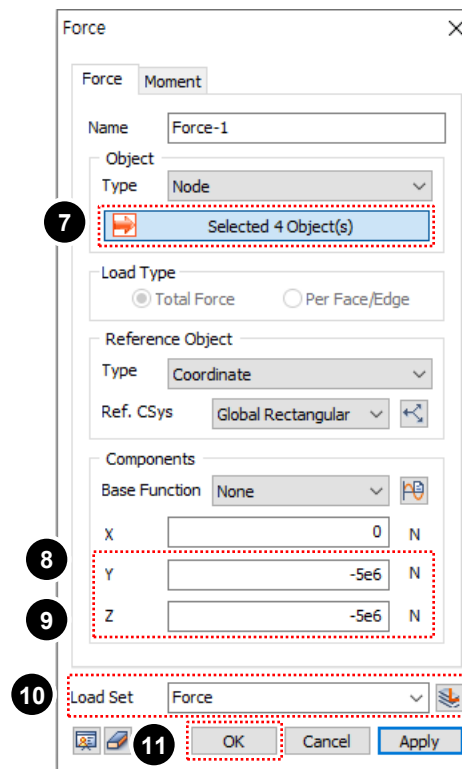
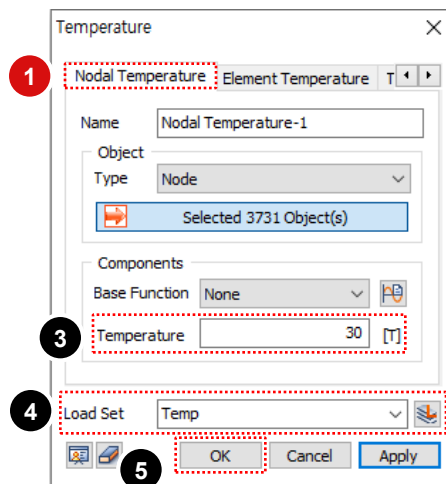
Add Modify Delete

No	Name	Description
1	Self Weight	
2	Temp	
3	Force	

Close

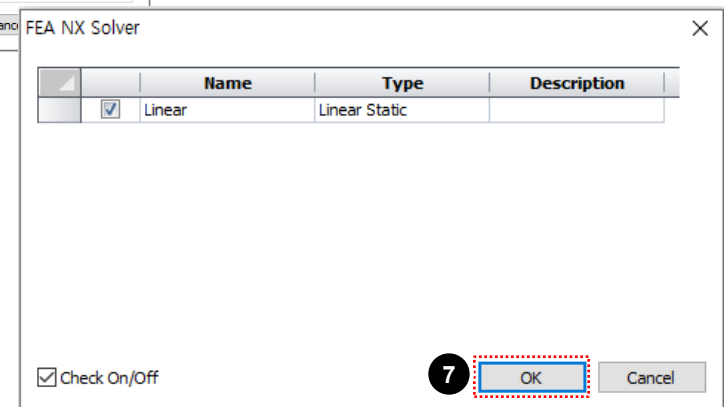
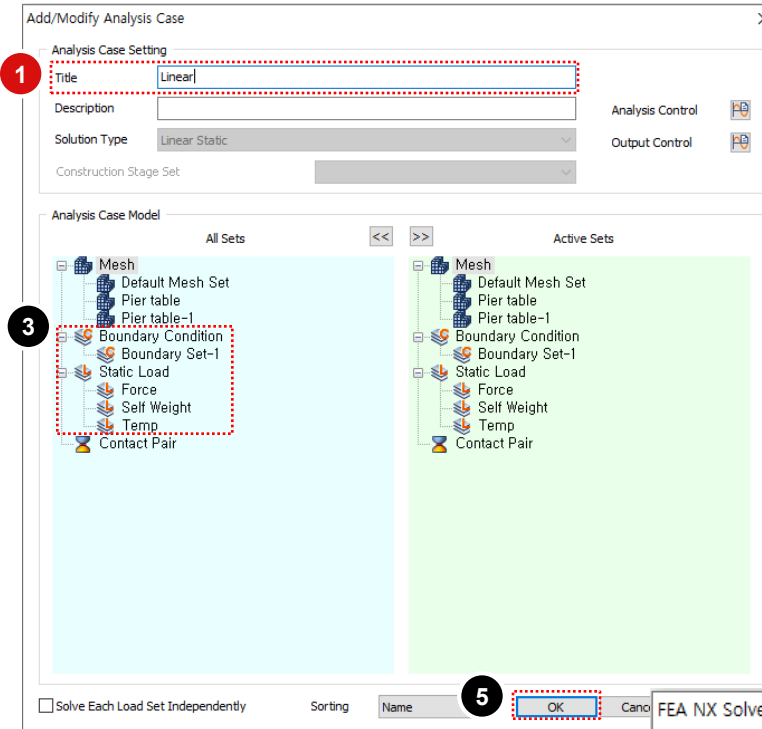
**Procedure**

- 1 Select **[Nodal Temperature]**
- 2 Select [  ] Select All
- 3 Temperature : “30”
- 4 Load Set : **[Temp]**
- 5 Click [OK] Button
- 6 Static Analysis > Static Load > **Force**
- 7 Select 4 Nodes marked by [  ]
- (See Figure)
- 8 F2 : “-5e6” N
- 9 F3 : “-5e6” N
- 10 Load Set : **[Force]**
- 11 Click [OK] Button



**Procedure**

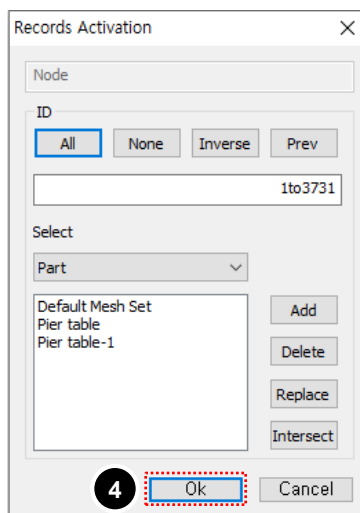
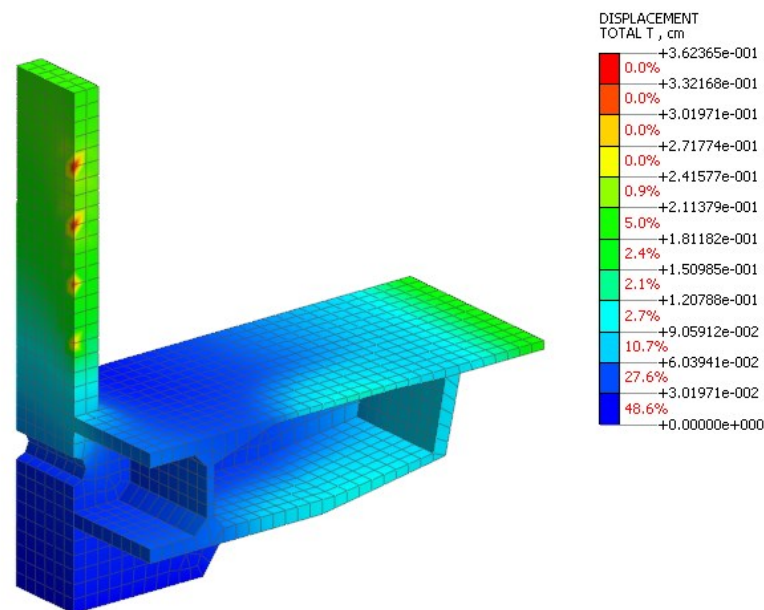
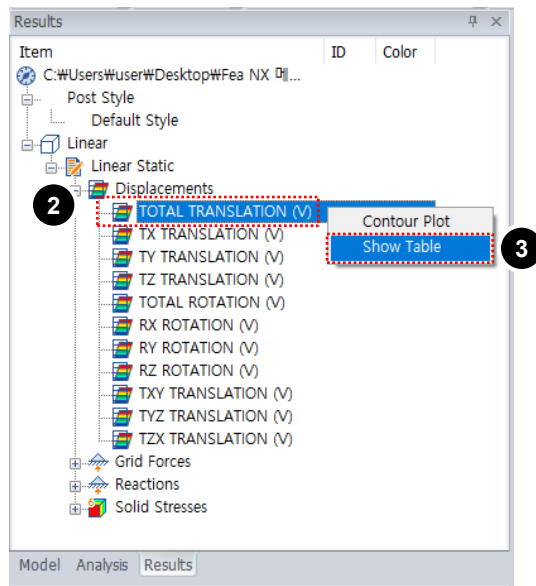
- 1 Title : **"Linear"**
- 2 Solution Type : **[Linear Static]**
- 3 Drag & Drop **[Static Load]** and **[Boundary Condition]** to **[Active Sets]**
- 4 **Sets**
- 5 Click **[OK]** Button
- 6 Analysis > **[Perform]**
- 7 Click **[OK]** Button





## Procedure

- 1 Results : Linear  
Linear Static > Displacements
- 2 Double Click **[TOTAL TRANSLATION (V)]**
- 3 Right Click **[TOTAL TRANSLATION (V)]** and Select **[Show Table]**
- 4 Click **[OK]** Button

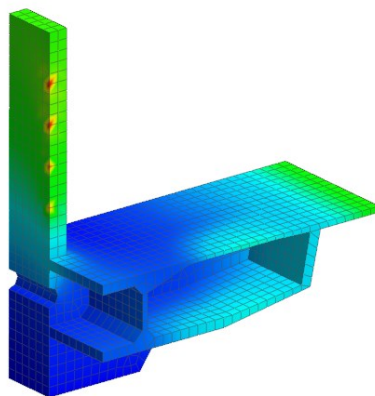
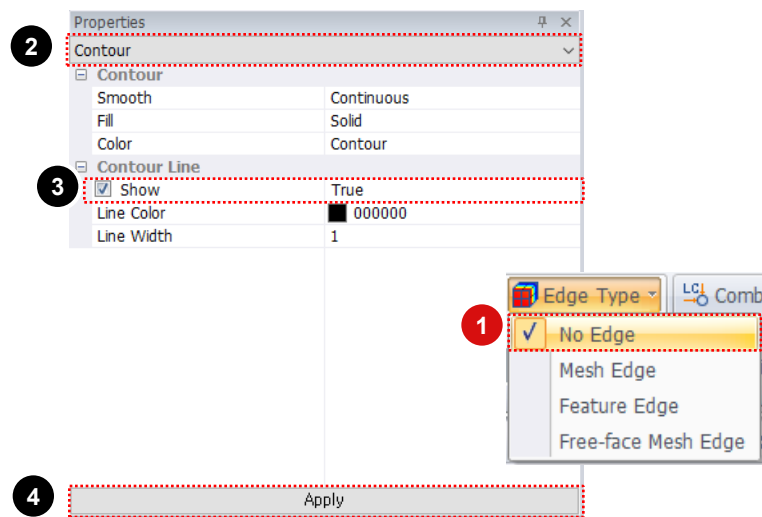


Node	TOTAL TRANSLATION (...)	TX TRANSLATION (...)	TY TRANSLATION (...)	TZ TRANSLATION (...)
1	0.000e+000	0.000e+000	0.000e+000	0.000e+000
2	1.490e-002	6.356e-003	-6.185e-003	-1.198e-002
3	1.975e-002	1.114e-002	-7.717e-003	-1.436e-002
4	2.316e-002	1.504e-002	-8.631e-003	-1.536e-002
5	2.538e-002	1.795e-002	-9.053e-003	-1.550e-002
6	2.677e-002	2.001e-002	-9.266e-003	-1.518e-002
7	2.780e-002	2.150e-002	-9.401e-003	-1.490e-002
8	2.694e-002	2.083e-002	-8.852e-003	-1.460e-002
9	2.564e-002	2.032e-002	-9.231e-003	-1.263e-002

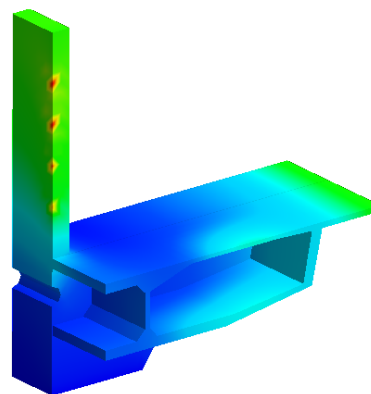
# Contour Plot Type

## Procedure

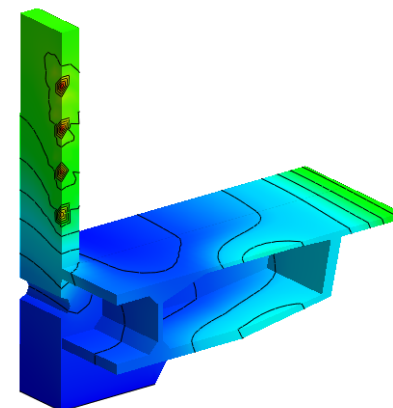
- 1 Select **[No Edge]** for Edge Type
- 2 Property Window : **[Contour]**
- 3 Select **[Show]** for Contour Line On/Off
- 4 Click **[Apply]** Button



Contour  
with Mesh



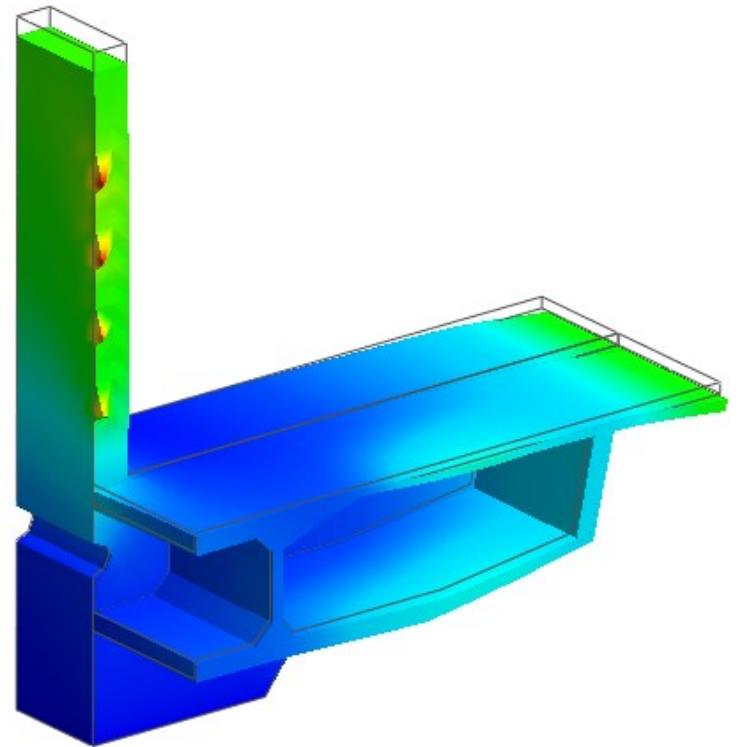
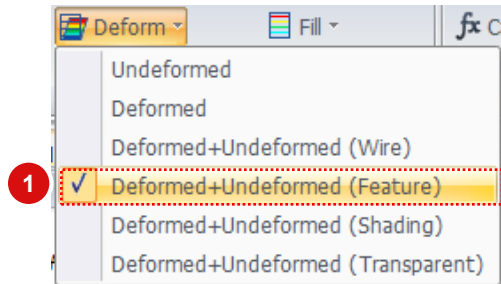
Contour  
with No Edge



Contour  
with Iso-Line

**Procedure**

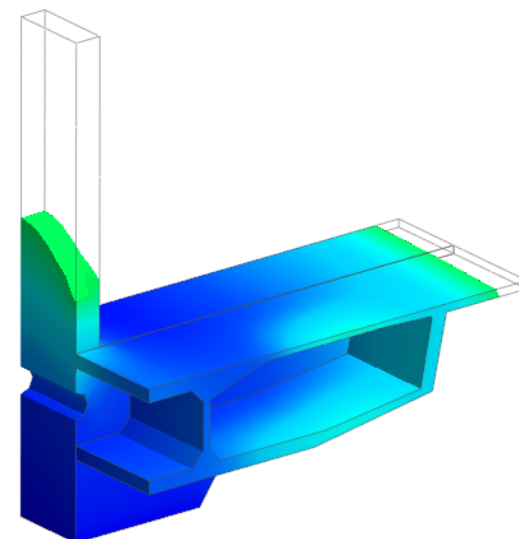
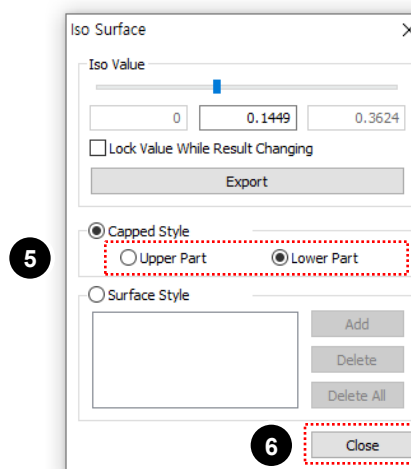
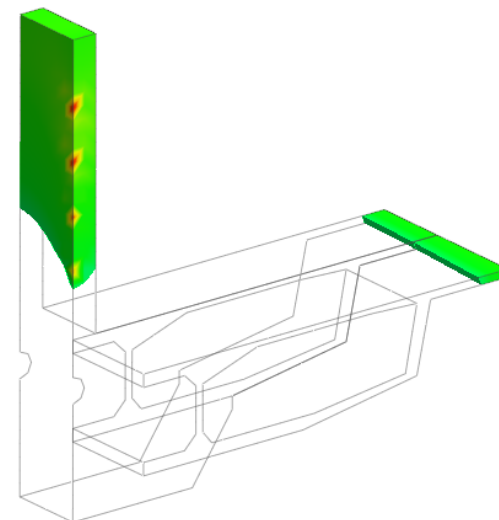
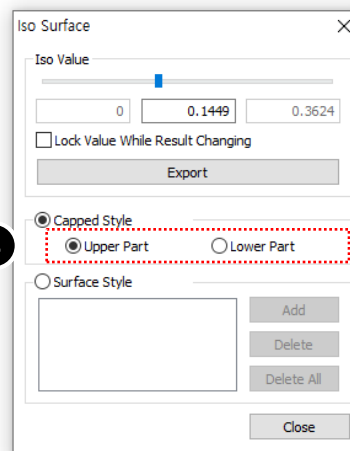
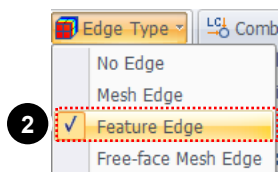
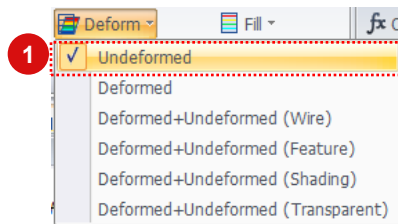
- 1 Select **[Deformed+Undeformed(Feature)]** for Mesh Shape



# 19 Iso-Surface Plot

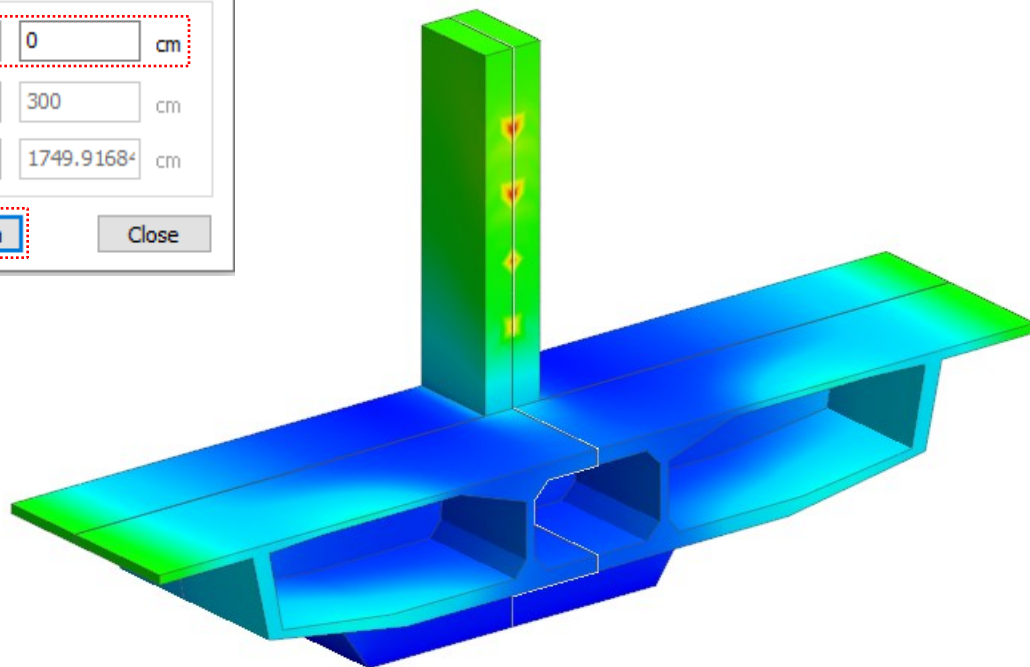
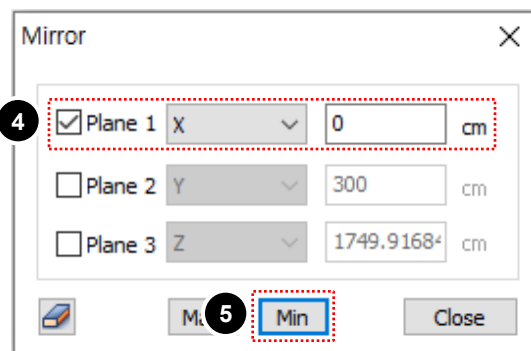
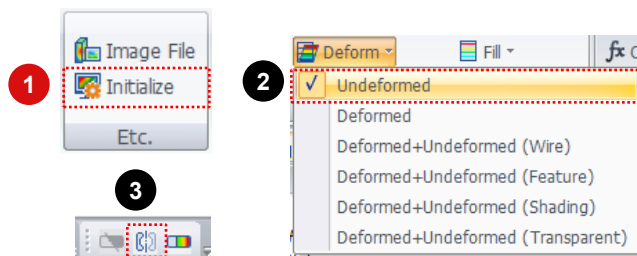
## Procedure

- 1 Select **[Undeformed]** for Mesh Shape
- 2 Select **[Feature Edge]** for Edge Type
- 3 Select **[Iso Value Surface]**
- 4 Select **[Upper Part]** for Capped Style
- 5 Select **[Lower Part]** for Capped Style
- 6 Click **[Close]** Button



**Procedure**

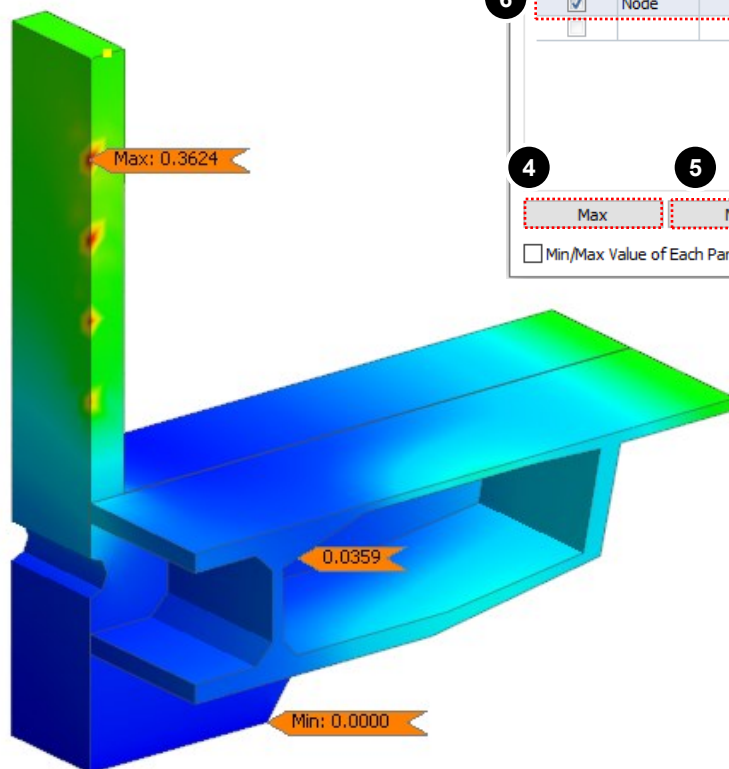
- 1 Click Result > Etc. > **[Initialize]**
- 2 Select **[Undeformed]** for Mesh Shape
- 3 Select **[Mirror Plane]**
- 4 Select **[X]** for **[Mirror Plane1]**
- 5 Click **[Min]** Button



# Probe & Result Tag

## Procedure

- 1 Select **[Mirror Mode]** again  
(to Disable Mirror Mode)
- 2 Click **[Close]** Button
- 3 Result > Advanced > **[Probe]**
- 4 Click **[Max]** Button
- 5 Click **[Min]** Button
- 6 Enter **[Node ID(3664)]**
- 7 Click **[Enter]** Button



Probe Results

Entity Type: ☒ Node ☐ Element

Color: Tag Color    Text Color   

Value: ☐ Exponential ☐ Decimal Point 4

Tag Type: ←

Show	Type	ID	Value
<input checked="" type="checkbox"/>	Node	328	Max: 0.3624
<input checked="" type="checkbox"/>	Node	1	Min: 0.0000
<input checked="" type="checkbox"/>	Node	3664	0.0359
<input type="checkbox"/>			

4 Max 5 Min Abs Max Clear All

☐ Min/Max Value of Each Part Close



1