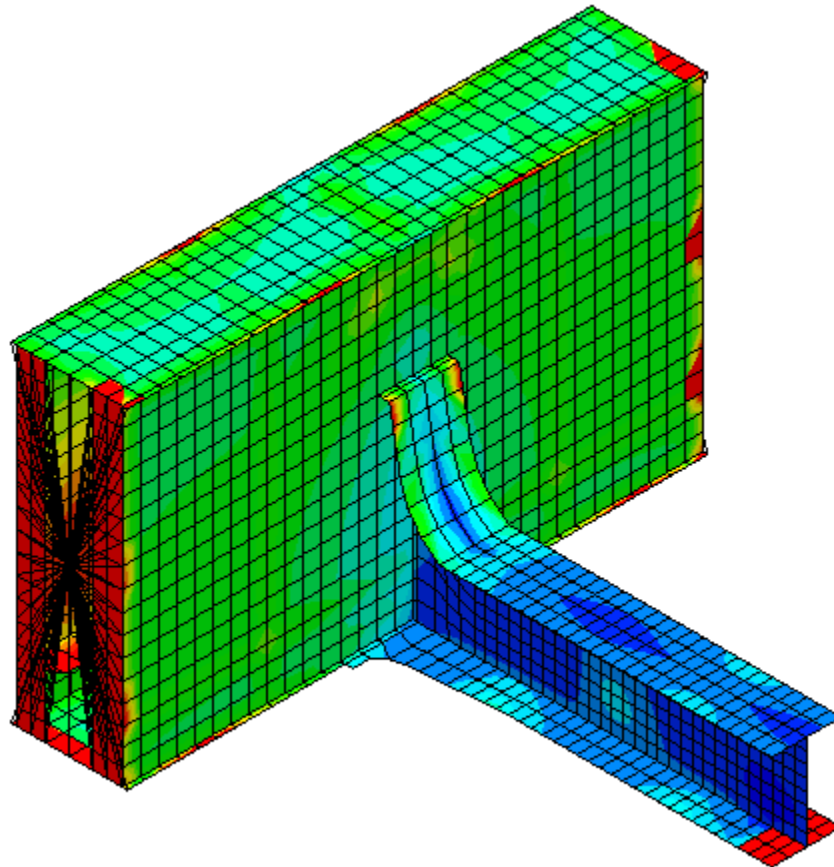


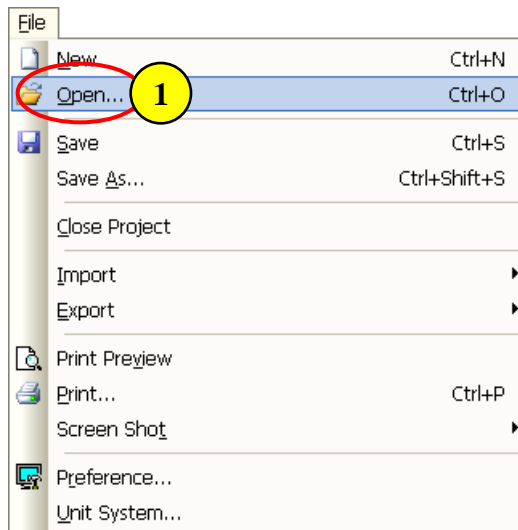
FA-1. Fatigue Analysis of a Box Girder



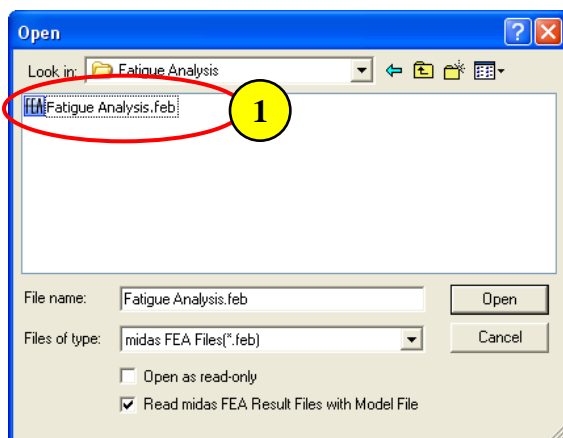
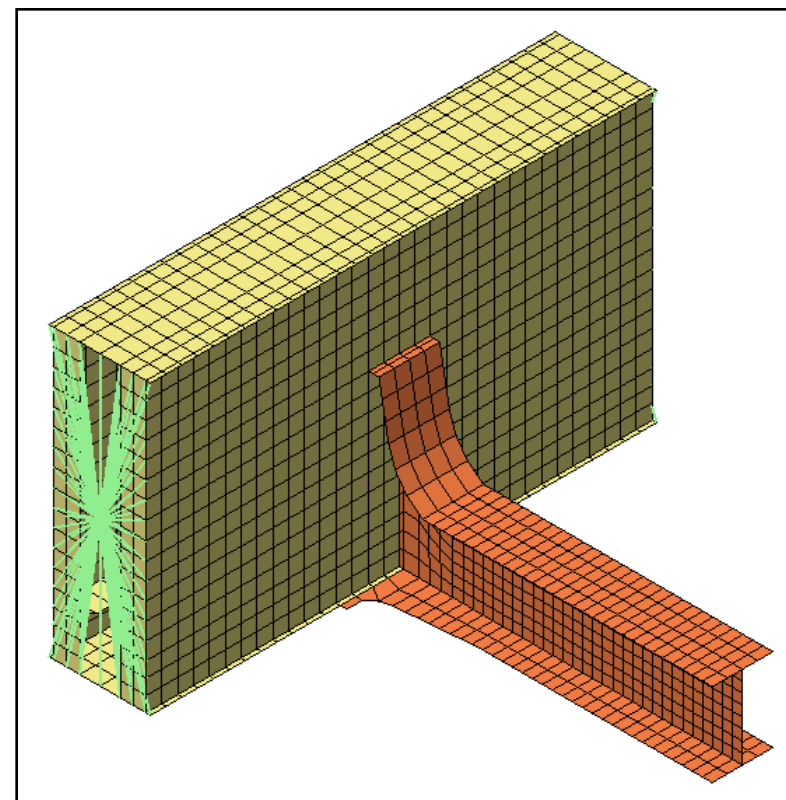
Overview

- 3-D Fatigue Analysis
- Model
 - $\frac{1}{2}$ Symmetric Model
 - Unit : N, m
 - Isotropic Elastic Material
 - Plate Element
 - Rigid Link
- Load & Boundary Conditions
 - Body Force
 - Pressure
 - Constraint
- Result Evaluation
 - Life cycle
 - Damage

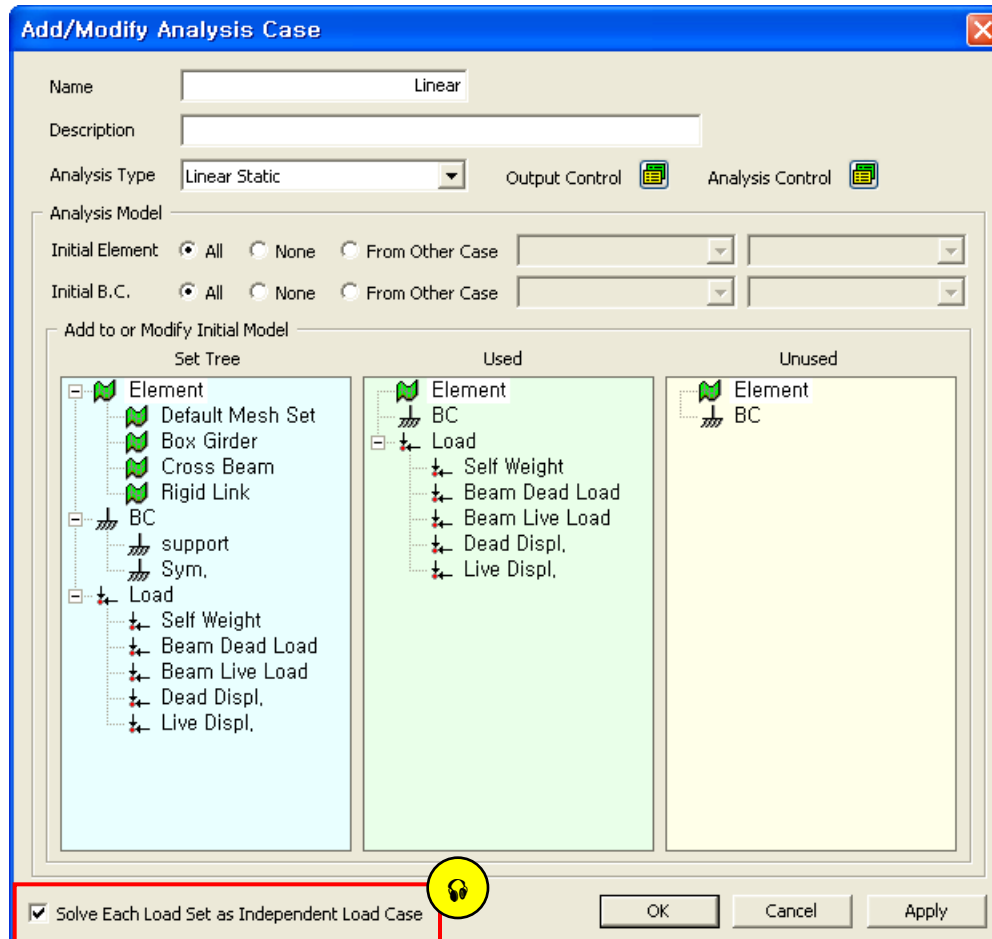
Step 1.



1. File > Open > "Fatigue Analysis.feb"

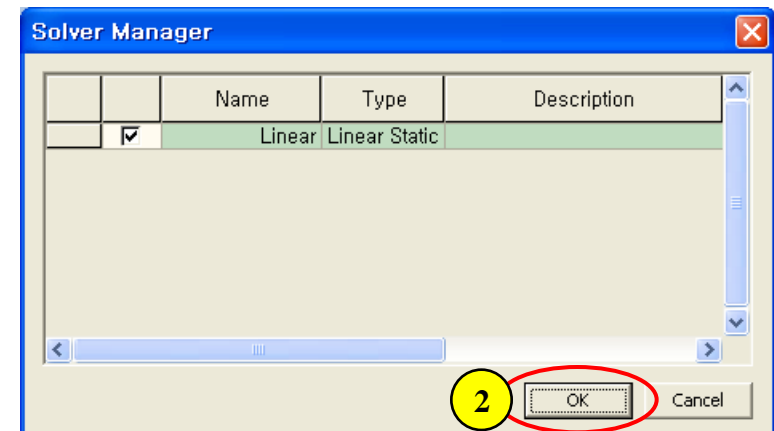


Step 2.



1. Analysis > Solve ...

2. Click [OK] Button



🔊 **“Solve Each Load Set as Independent Load Case” must be checked for Fatigue Analysis.**

Step 3-1.

Fatigue Analysis

Analysis Data

Analysis Set: Linear (2)

Stress Option

Stress Type: Von Mises

☒ Average (3) ☐ Max ☐ Min

Property

Young's modulus: JIS-Civil(S)_SM490

Tensile Strength: 3.6e+009 N/m² (4~9)

Off-Limit Strength of S-N Curve: 3.24e+009 N/m²

Cycles at Off-Limit Strength: 1000

Endurance Limit: 1000 N/m²

Cycles at Endurance: 1000000

Mean Stress Correction

☒ None ☒ Goodman ☒ Gerber (10)

Output

☒ Damage ☒ Fatigue Life Cycle (11)

Target Nodes

☐ Boundary ☒ All (12) ☐ Selected

Fatigue Load

Define Load/Stress History: Table (13)

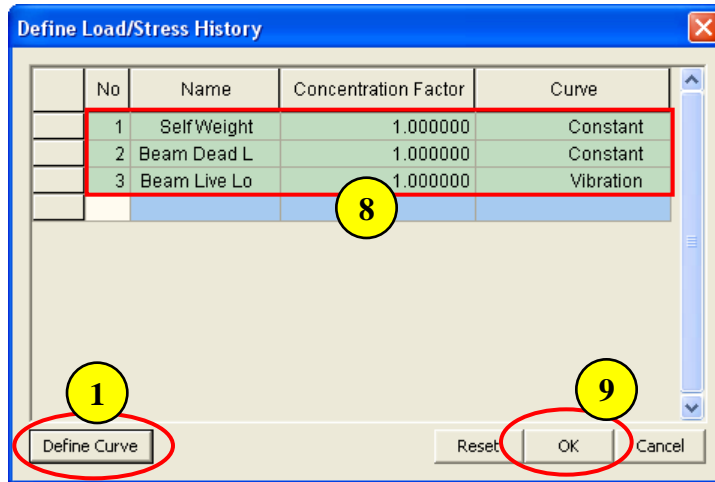
Number of load cycles: 1

Run Save Cancel

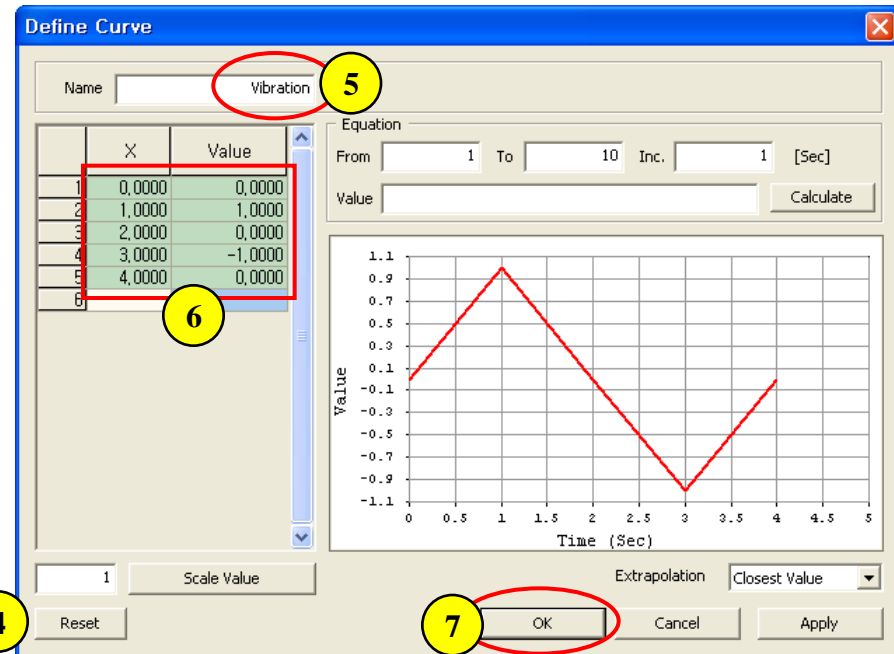
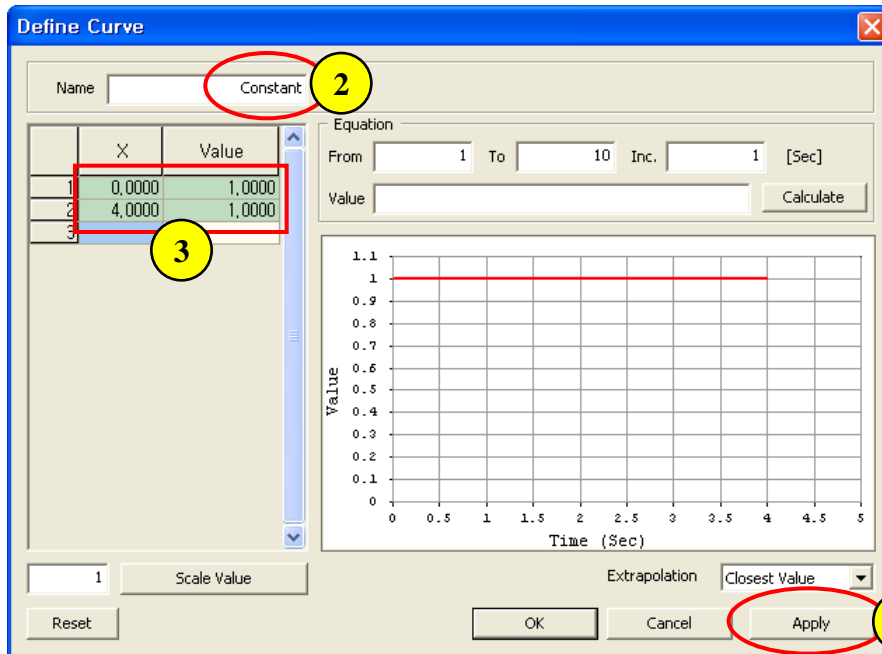
1. Post > Fatigue Analysis ...
2. Analysis Set : Linear
3. Stress Option : Von Misses , Average
4. Young's Modulus : JIS-Civil(S)_SM490
5. Tensile Strength : 3.6e9 N/m²
6. Off-Limit Strength of S-N Curve: 3.24e9 N/m²
7. Cycles at Off-Limit Strength : 1000
8. Endurance Limit : 1000 N/m²
9. Cycles at Endurance : 1e6
10. Check on "None", "Goodman" & "Gerber"
11. Check on "Damage" & "Fatigue Life Cycle"
12. Target Nodes : All
13. Click [Table] Button

- ⚠ You can use only "Isotropic - Elastic" material in Fatigue Analysis.
- ⚠ Tensile Strength must be greater than "2D Element Stresses".

Step 3-2.



1. Click [Define Curve] Button
2. Name : Constant
3. Input data as per dialog box
4. Click [Apply] Button
5. Name : Vibration
6. Input data as per dialog box
7. Click [OK] Button
8. Input data as per dialog box
9. Click [OK] Button



Step 3-3.

Fatigue Analysis

Analysis Data
Analysis Set: Linear

Stress Option
Stress Type: Von Mises
☒ Average ☐ Max ☐ Min

Property
Young's modulus: JIS-Civil(S)_SM490
Tensile Strength: 3.6e+009 N/m²
Off-Limit Strength of S-N Curve: 3.24e+009 N/m²
Cycles at Off-Limit Strength: 1000
Endurance Limit: 1000 N/m²
Cycles at Endurance: 1000000

Mean Stress Correction
☒ None ☒ Goodman ☒ Gerber

Output
☒ Damage ☒ Fatigue Life Cycle

Target Nodes
☐ Boundary ☒ All ☐ Selected

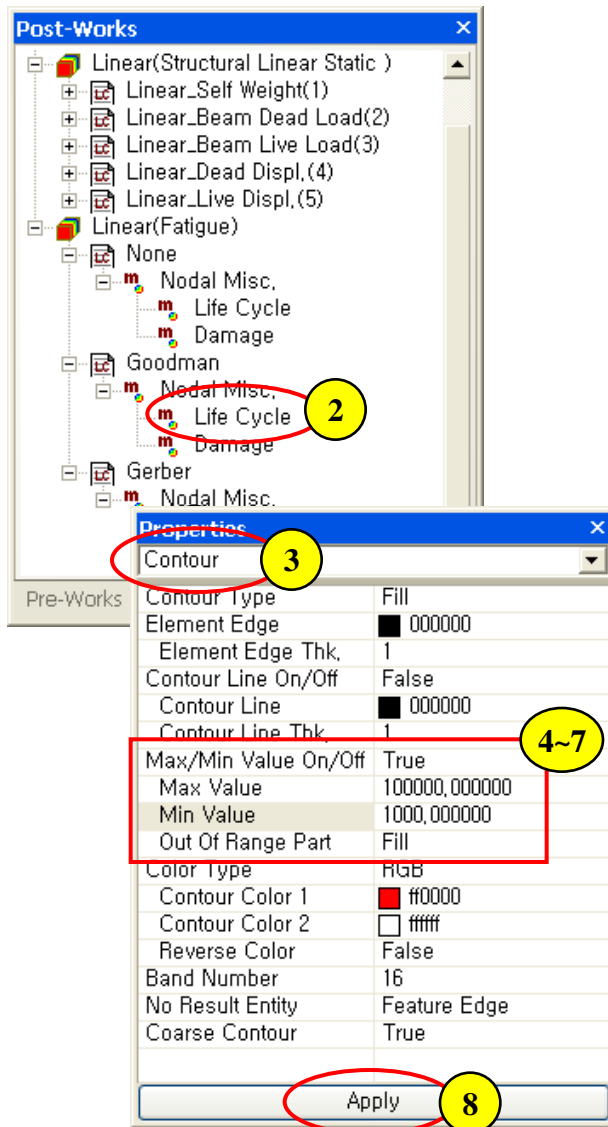
Fatigue Load
Define Load/Stress History: Table
Number of load cycles: 1

Run Save Cancel

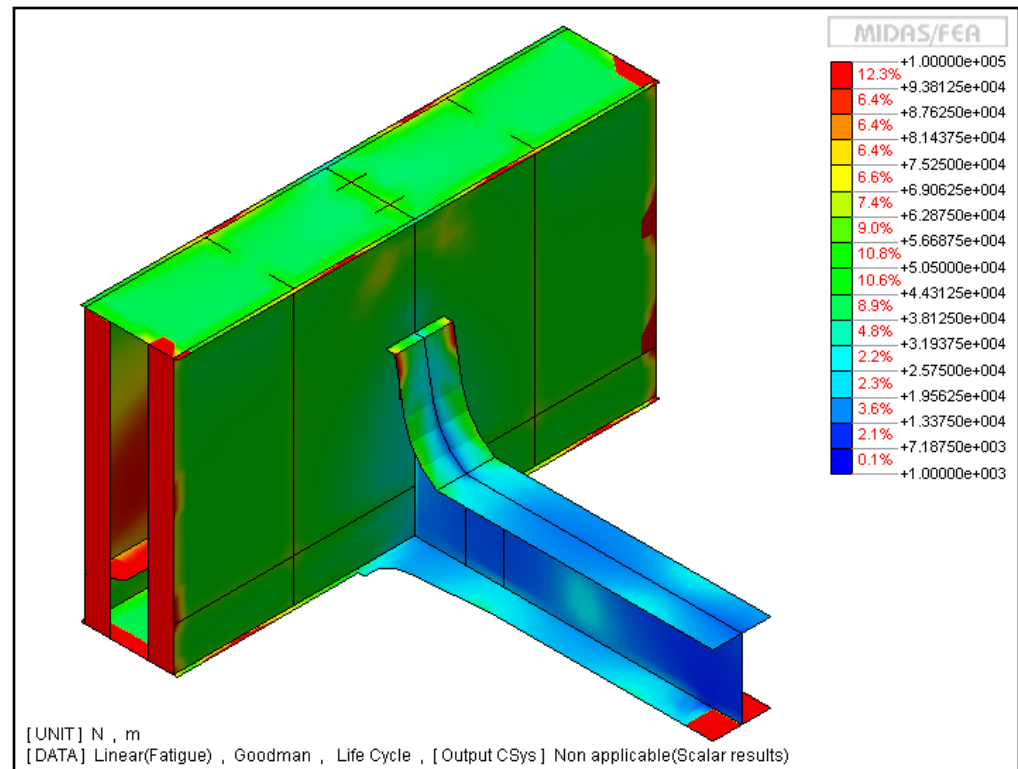
1. Number of load cycles : 1

2. Click [Run] Button

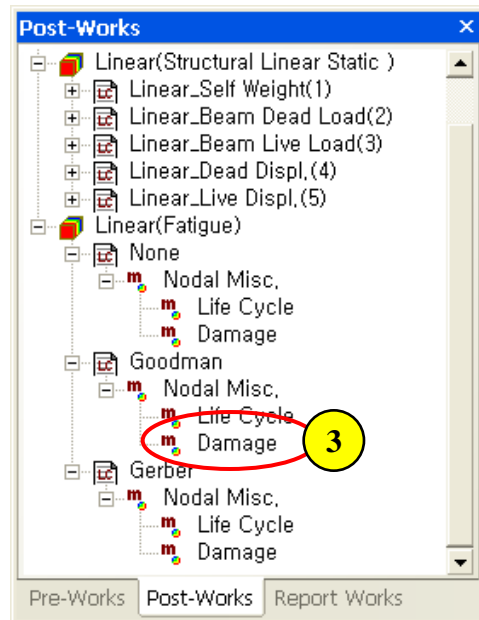
Step 4.



1. Post-Works Tree : Linear(Fatigue) > Goodman > Nodal Misc. ...
2. Double Click "Life Cycle"
3. Property Window > Contour ...
4. Max/Min Value On/Off : True
5. Max Value : 100000
6. Min Value : 1000
7. Out Of Range Part : Fill
8. Click [Apply] Button



Step 5.



1. Click "Initial Post Style" at "Post Style" Toolbar
2. Post-Works Tree : Linear(Fatigue) > Goodman > Nodal Misc. ...
3. Double Click "Damage"

