Release Note

Release Date : December 2021

Product Ver. : FEA NX 2022 (v1.1)

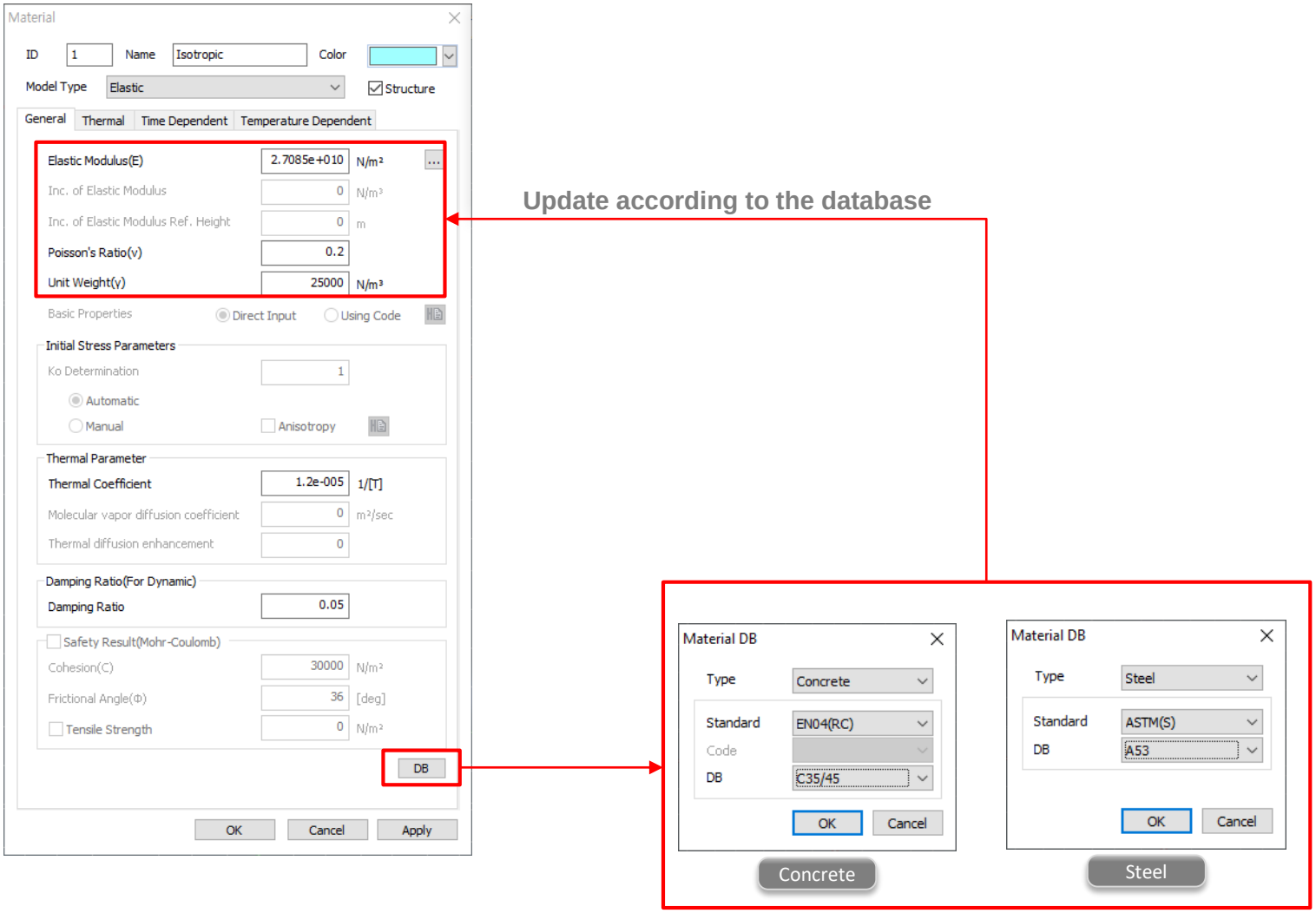
Enhancements

1. Add Material Database for Concrete/Steel
2. Add Arc Length Method for Construction Stage Analysis
3. Improvement of Measure Function
4. Unit Conversion of Eigenvalue Analysis Results
5. Improvement of Results Diagram
6. Improvement of Non-spatial Function for Temperature-Dependent Property
7. Import Nastran Model File
8. Improvement of Surface Spring (Normal/Shear Elastic Link Type)
9. Generate Max/Min/Absolute Max Results of Thermal Stresses
10. Generate Damper Condition at the Bottom of the Ground

1. Add Material Database for Concrete/Steel

- ASTM, EN, UNI, IS, BS, CSA, CNS, AS/NZS, GOST, and more.

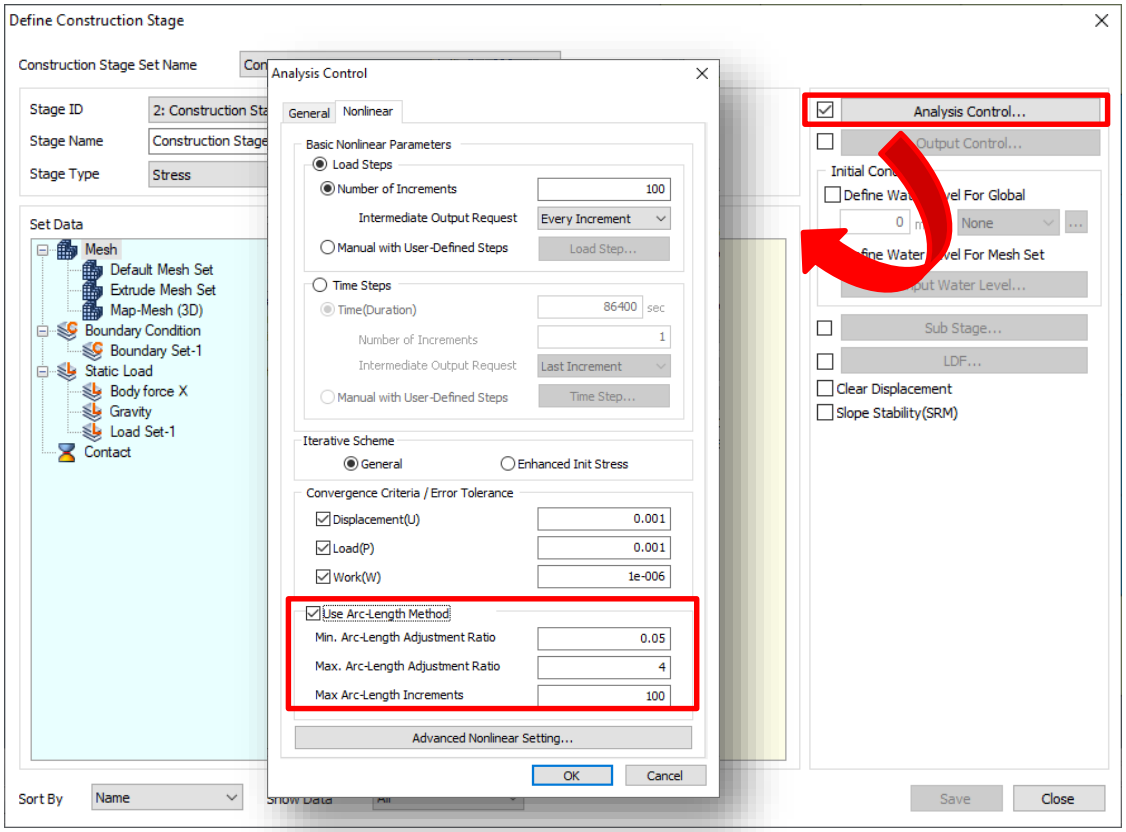
▪ ***Mesh > Prop./CSys./Func. > Material > Isotropic***



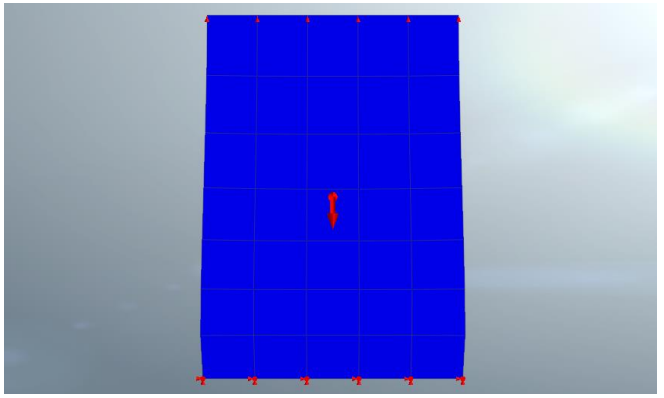
2. Add Arc Length Method for Construction Stage Analysis

- The Arc Length method is introduced for the construction stage analysis to support sequential loadings (i.e., lateral loads after self-weight.).
- The Arc Length method promises to solve highly nonlinear systems of equations efficiently and accurately even when the Newton method fails.

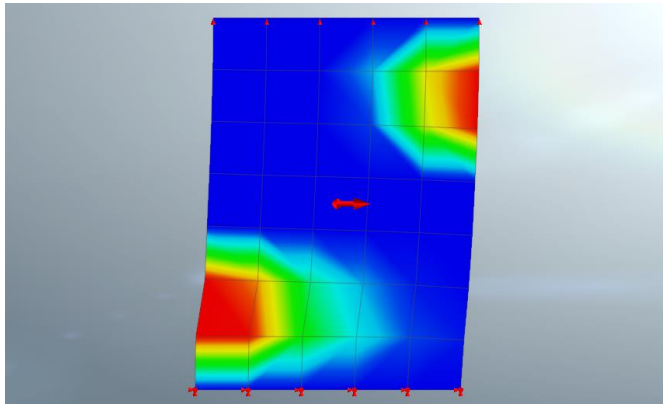
▪ ***Construction Stage > Define Construction Stage > Analysis Control***



Define Construction Stage



Stage 1: Apply gravity loads

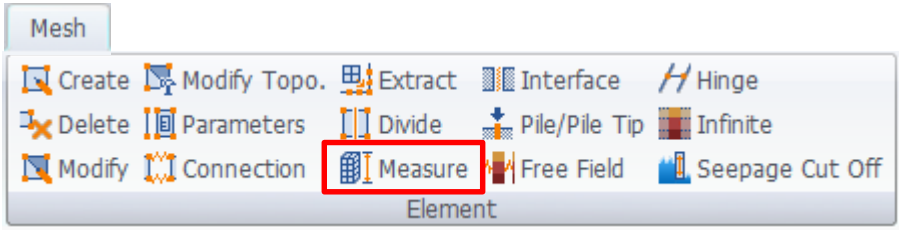


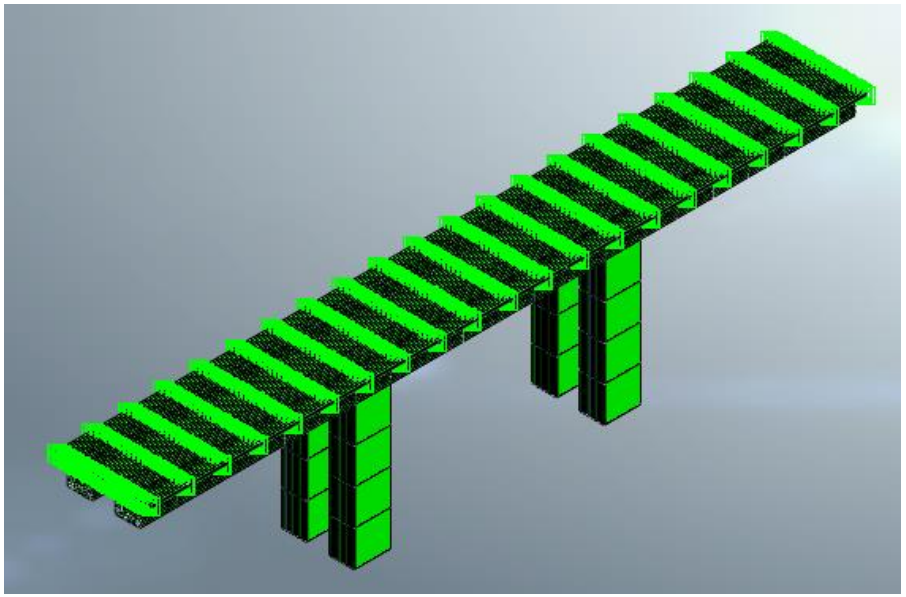
Stage 2: Apply lateral loads

3. Improvement of Measure Function

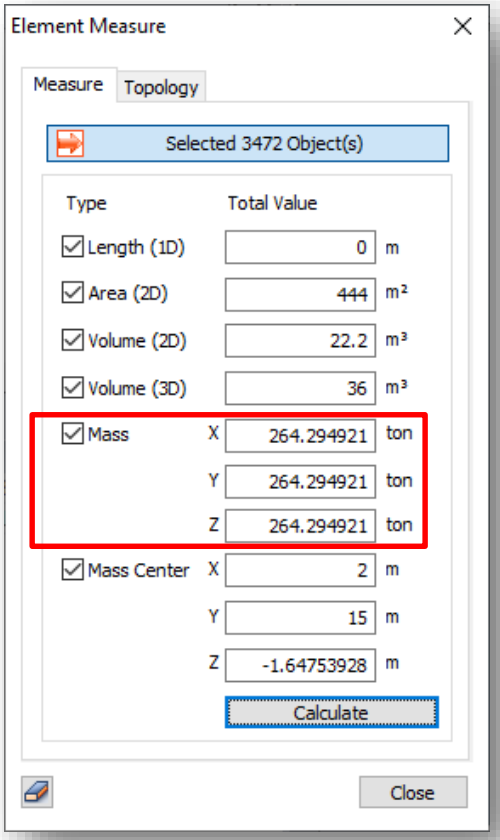
- Mass data can be viewed in the X, Y, and Z axis separately.

▪ ***Mesh > Element > Measure***





Structural Mass and Loads to Mass

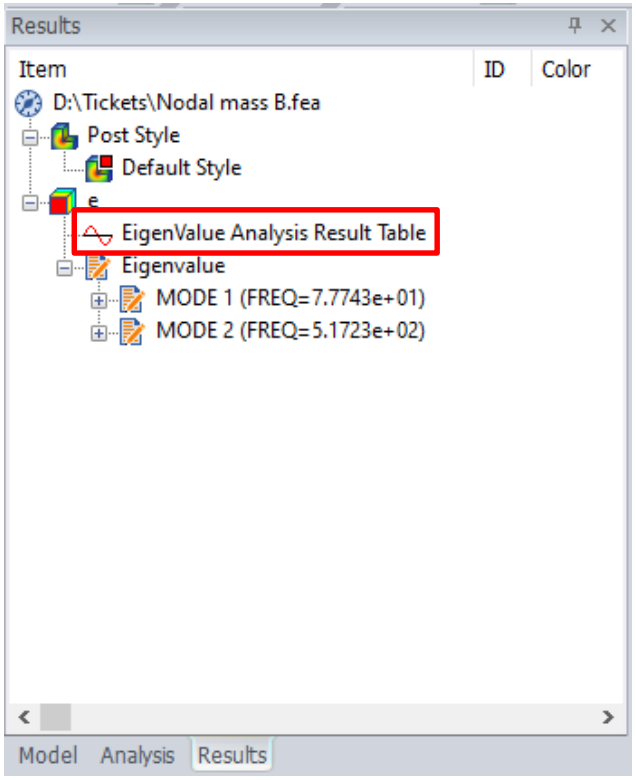


Element Measure

4. Unit Conversion of Eigenvalue Analysis Results

- Modal effective masses and modal participation factors are provided depending on the unit system selected by the user.
- Previously, the values were always calculated with the N, m unit.

▪ ***Post > Results > Eigenvalue Analysis Result Table***



REAL EIGENVALUES

MODE NUMBER	EIGENVALUE	RADIANS	CYCLES	PERIOD	GENERALIZED MASS	GENERALIZED STIFFNESS	ORTHOGONALITY LOSS	ERROR MEASURE
1	2.386048e+005	4.884719e+002	7.774272e+001	1.286294e-002	1.000000e+000	2.386048e+005	0.000000e+000	0.000000e+000
2	1.056140e+007	3.249830e+003	5.172265e+002	1.933389e-003	1.000000e+000	1.056140e+007	0.000000e+000	0.000000e+000

MODAL EFFECTIVE MASS

MODE NUMBER	T1	T2	T3	R1	R2	R3		
1	1.581238e-001	0.000000e+000	0.000000e+000	0.000000e+000	1.002773e+000	0.000000e+000		
2	4.187618e-002	0.000000e+000	0.000000e+000	0.000000e+000	1.285185e-002	0.000000e+000		
TOTAL	2.000000e-001	0.000000e+000	0.000000e+000	0.000000e+000	1.015625e+000	0.000000e+000		
TOTAL IN MODEL	2.000000e-001	0.000000e+000	0.000000e+000	0.000000e+000	1.015625e+000	0.000000e+000		

PERCENTAGE MODAL EFFECTIVE MASS

MODE NUMBER	T1	T2	T3	R1	R2	R3		
1	79.06%	0.00%	0.00%	0.00%	98.73%	0.00%		
2	20.94%	0.00%	0.00%	0.00%	1.27%	0.00%		
TOTAL	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%		

MODAL DIRECTION FACTOR

MODE NUMBER	T1	T2	T3	R1	R2	R3		
1	44.47%	0.00%	0.00%	0.00%	55.53%	0.00%		
2	94.30%	0.00%	0.00%	0.00%	5.70%	0.00%		

MODAL PARTCIPATION FACTOR

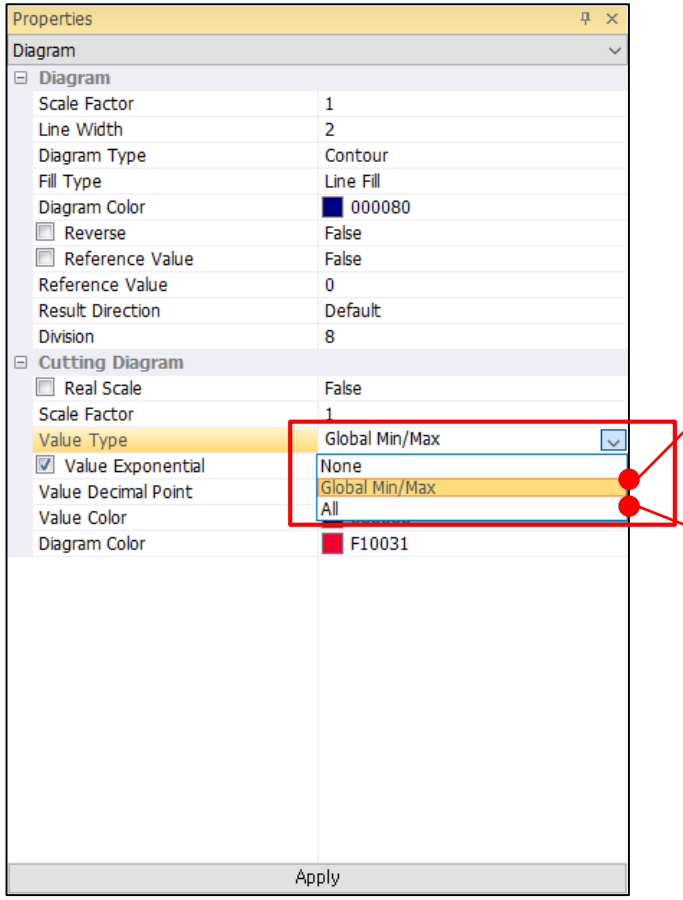
MODE NUMBER	T1	T2	T3	R1	R2	R3		
1	3.976479e-001	0.000000e+000	0.000000e+000	0.000000e+000	1.001386e+000	0.000000e+000		
2	2.046367e-001	0.000000e+000	0.000000e+000	0.000000e+000	-1.133660e-001	0.000000e+000		

Eigenvalue Analysis Result Table

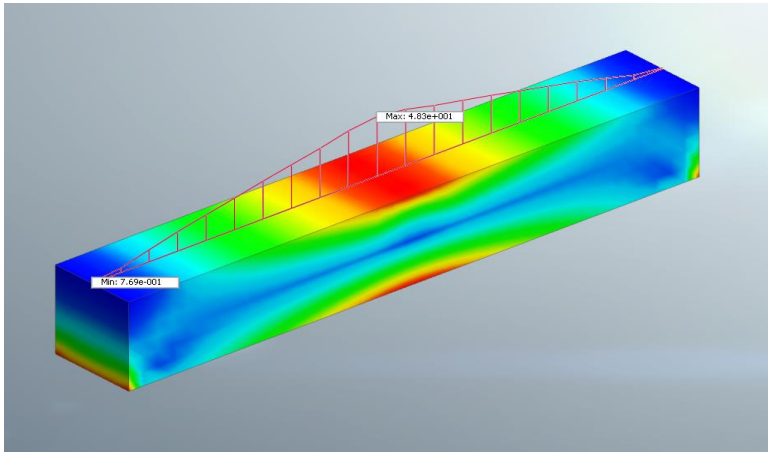
5. Improvement of Results Diagram

- The values can be viewed at all the node positions in the results diagram.
- Previously, the minimum and maximum values could only be displayed.

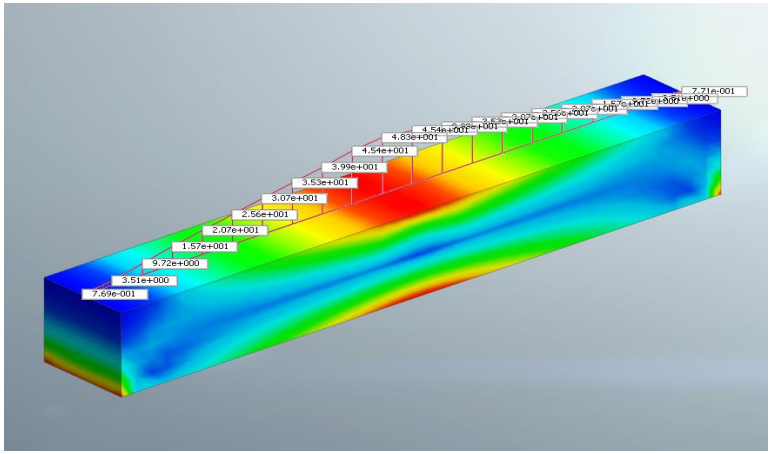
▪ ***Post > Properties > Diagram > Value Type***



Properties> Diagram



FEA NX 2021: Min/Max value only

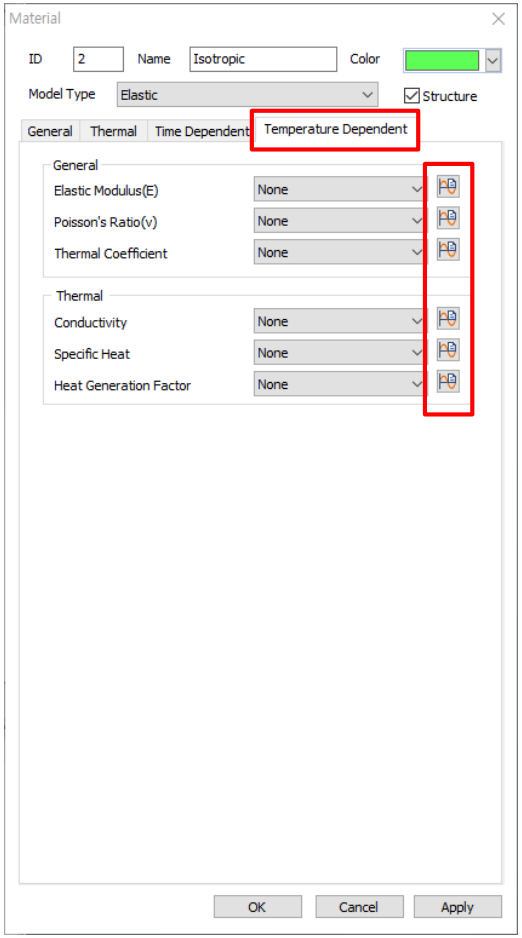


FEA NX 2022: Min/Max or All Values

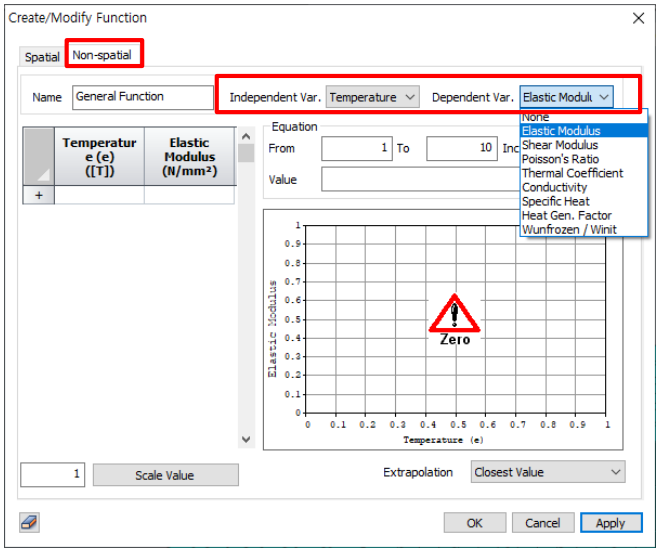
6. Improvement of Non-spatial Function for Temperature-Dependent Property

- Define the function for the temperature-dependent properties based on the current unit system. Enter the values as an absolute value rather than a scale factor.

▪ ***Mesh > Prop./CSys./Func. > Material > Temperature Dependent***



Temperature Dependent Properties



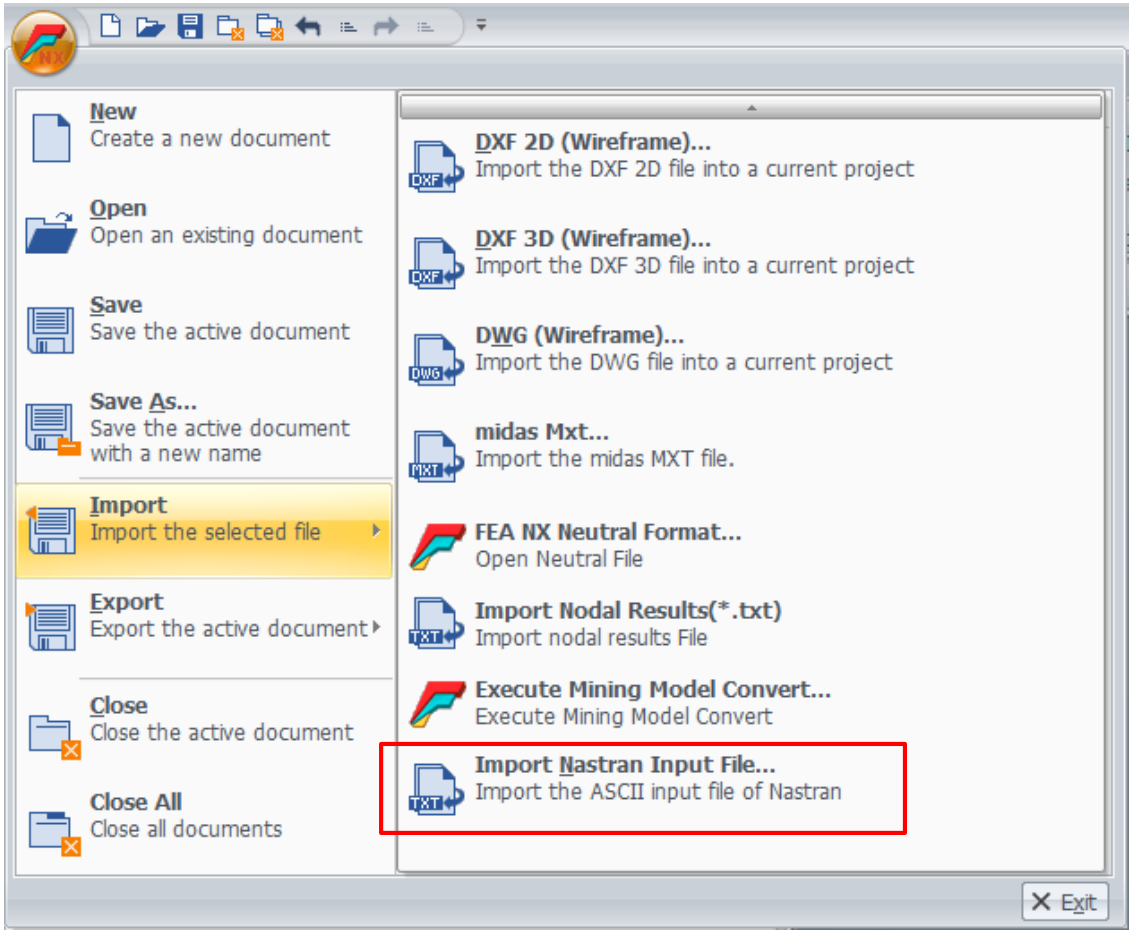
Non-spatial Function

Independent Variable	Dependent Variable	Current Unit
Strain/Stretch	None	-
Temperature	None	-
	Elastic Modulus	N/mm^2
	Shear Modulus	N/mm^2
	Poisson's Ratio	-
	Thermal Coefficient	-
	Conductivity	W/(mm*[T])
	Specific Heat	J/(kg*[T])
	Heat Gen. Factor	-
	Wunfrozen/Winit	-
Displacement	Force/Length	N/mm
	Force/Area	N/m^2
	Force	N
Stress	None	-

7. Import Nastran Model File

- Nastran input file can be imported into FEA NX.

- ***File > Import > Import Nastran Input File...***

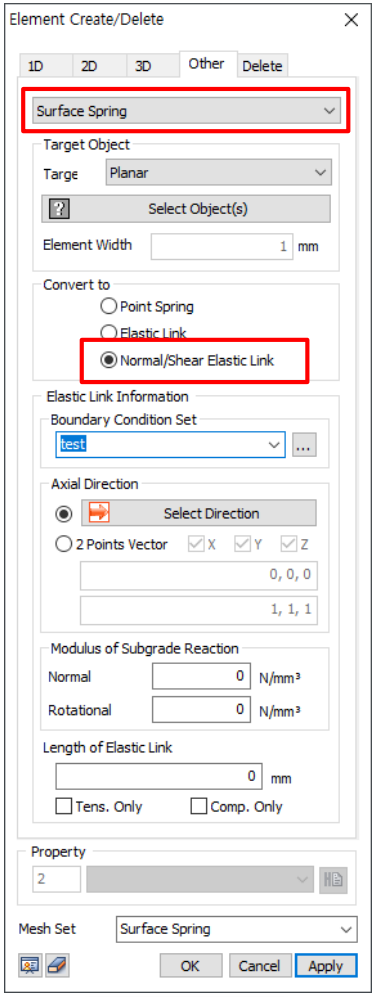


Import Files

8. Improvement of Surface Spring (Normal/Shear Elastic Link Type)

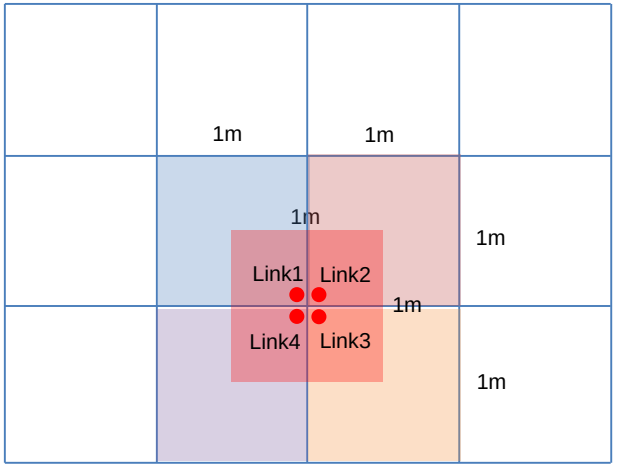
- The stiffness of the link is determined based on the area supported by each links.

▪ ***Mesh > Element > Create > Other > Surface Spring***



Surface Spring

FEA NX 2021

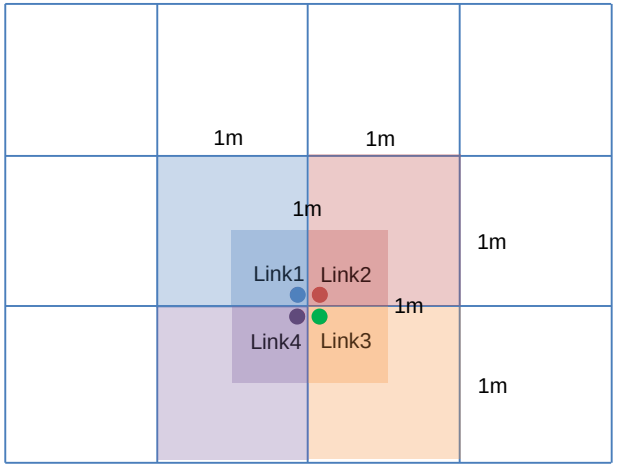


The stiffness corresponding to the red box area was assigned to the Elastic Link 1, 2, 3, and 4 without dividing by four.

Link1: $1N/m^3 * 1m^2 = 1N/m$
Link2: $1N/m^3 * 1m^2 = 1N/m$
Link3: $1N/m^3 * 1m^2 = 1N/m$
Link4: $1N/m^3 * 1m^2 = 1N/m$

The stiffness was four time larger than the actual stiffness.

FEA NX 2022



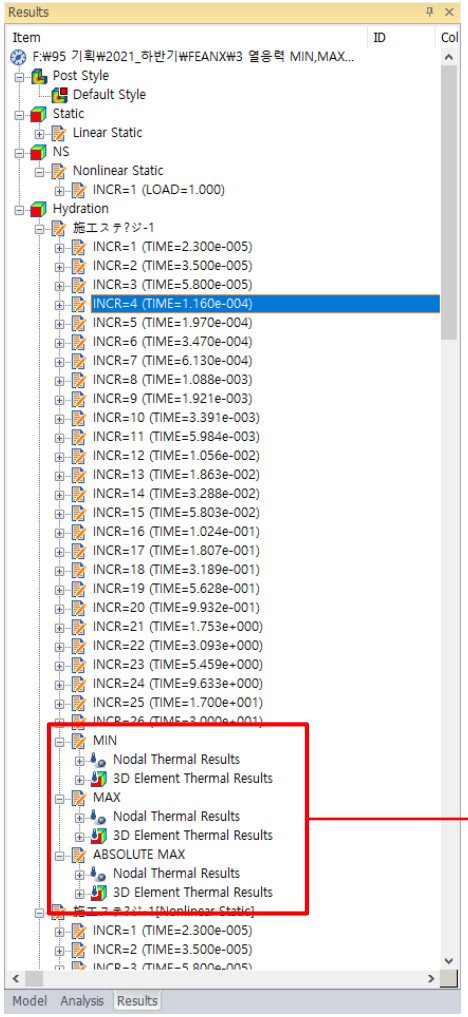
The stiffness corresponding to the area supported by each links is assigned to the Elastic Link 1, 2, 3, and 4.

Link1 : $1N/m^3 * 0.25m^2 = 0.25N/m$
Link2 : $1N/m^3 * 0.25m^2 = 0.25N/m$
Link3 : $1N/m^3 * 0.25m^2 = 0.25N/m$
Link4 : $1N/m^3 * 0.25m^2 = 0.25N/m$

9. Generate Max/Min/Absolute Max Results of Thermal Stresses

- Check the envelope of the thermal stresses among all the stages in the heat of hydration analysis.

▪ ***Post > Results > Hydration***

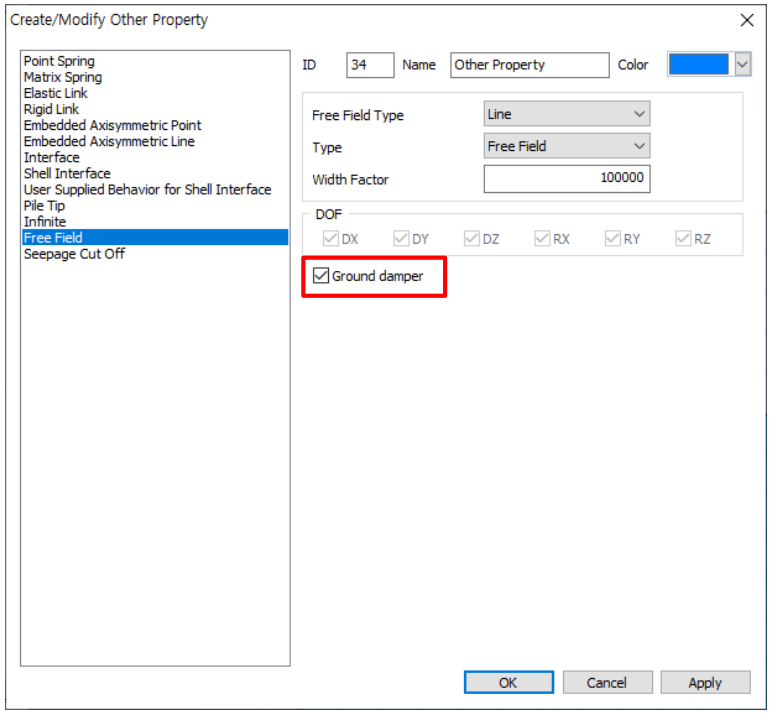


- Generate Max/Min/Absolute Max values of the thermal stresses throughout the stages.

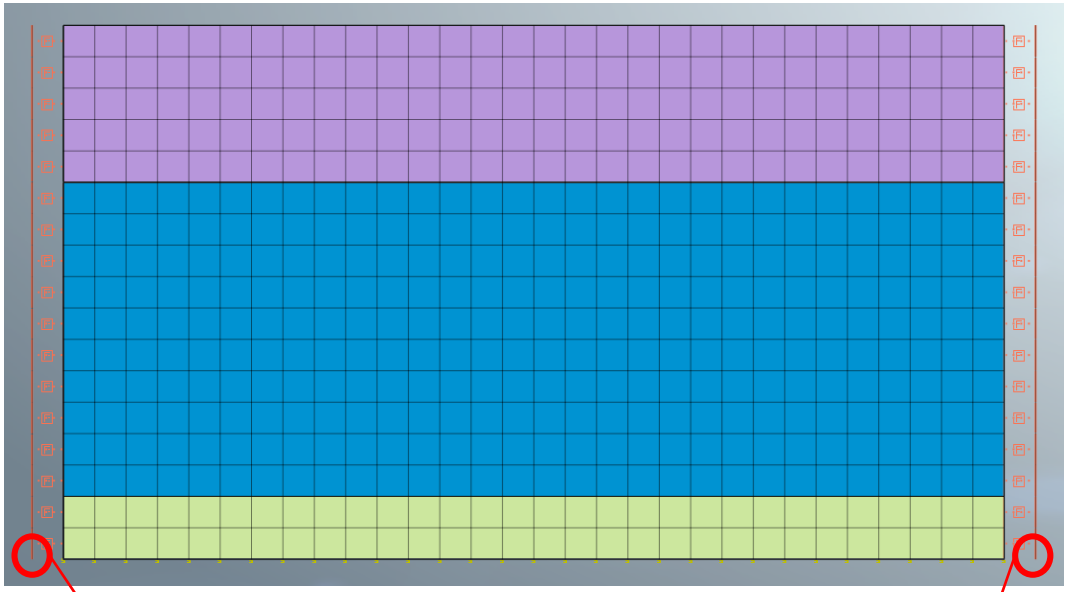
10. Generate Damper Condition at the Bottom of the Ground

- Generate the damper condition at the bottom of the free field.

▪ ***Mesh > Prop./CSys./Func. > Property > Other… > Free Field***



Property> Free Field

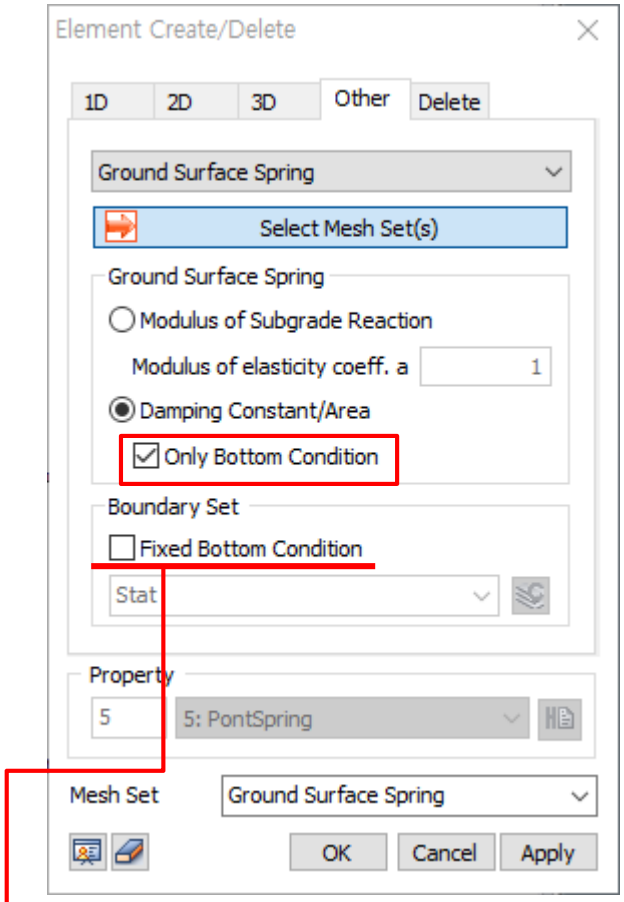


- Generate damper condition at the bottom of Free Field
- Damper can be displayed after analysis.

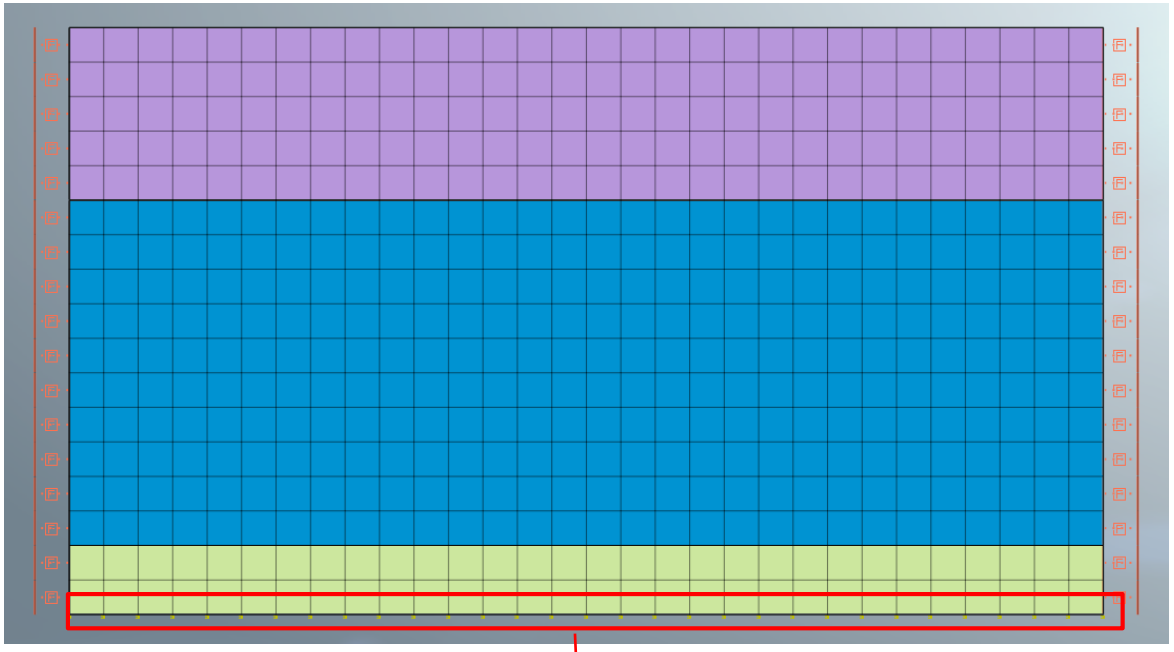
10. Generate Damper Condition at the Bottom of the Ground

- Generate the damper condition along the bottom edge of the selected mesh set.

▪ ***Mesh > Element > Create > Other > Ground Surface Spring***



* Check off 'Fixed Bottom Condition'.



- Generate damper condition at the bottom of the mesh set.