Release Note

Release Date : Feb. 2025

Product Ver. : CIVIL NX 2025 (v1.1)

DESIGN OF CIVIL STRUCTURES

Integrated Solution System for Bridge and Civil Engineering

Enhancements

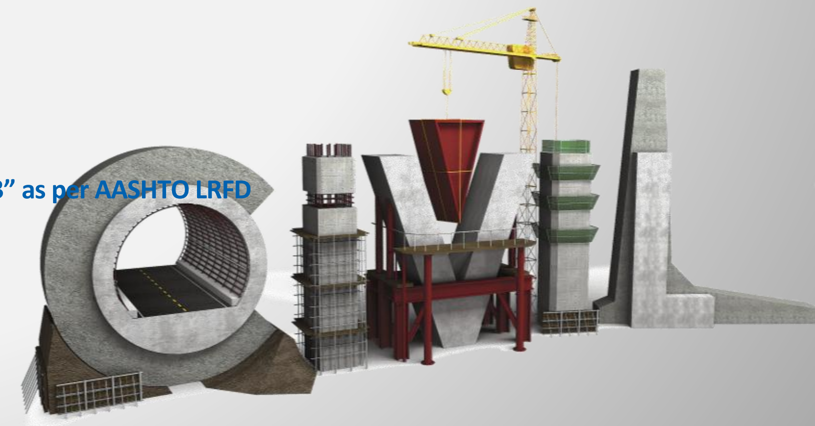
Enhancements in CIVIL NX 2025 (v1.1)

- Pre & Post processing

1. CQC 3 Directional Combination for Response Spectrum
2. Considering Elastic/General Link Forces in Moving Load Tracer
3. B-double rating vehicle as per AS 5100.7
4. Considering two trucks for substructure members or Elastic/General Link as per AASHTO LRFD Vehicle Loads
5. Moving patch load analysis as per AASHTO LRFD traffic loads
6. IRC Fatigue Vehicle
7. Time Dependent Materials as per SP/M/022 v 3.4, AS5100.5:2017(Amd 2:2024) and AS3600:2018(Amd 2)
8. Addition of Response Spectrum Function as per DPT.1301/1302-61:2018 and Eurocode Malaysia NA
9. Addition of H and Channel shape section database as per EN 10365
10. Addition of new Design Spectrum Database in Artificial Earthquake Data Generator
11. Addition of Element Stiffness Scale Factor

- Design

12. RC Design for 1D Beam & Column, Plate Beam & Column as per BS 5400
13. RC & Steel Design as per CSA S6:19
14. Response Modification Factor by members and components as per AASHTO LRFD
15. Addition of an option “Long-term Section Property of Cracked Composite Section: Rebar Area/3” as per AASHTO LRFD



Enhancements

Enhancements in CIVIL NX 2025 (v1.1)

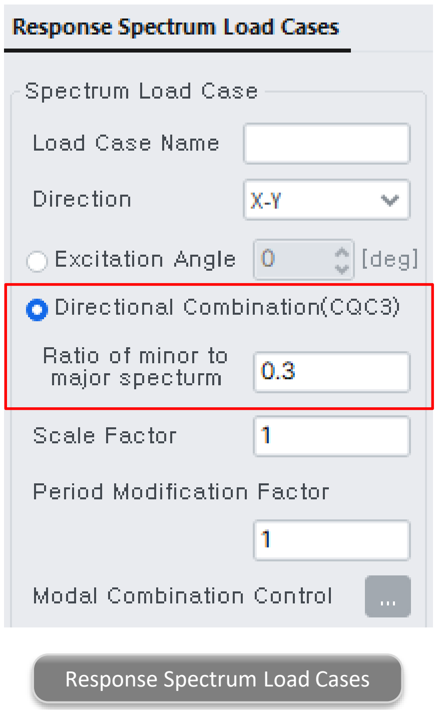
-Including all updates written in the previous pages, and

16. Enhancements in midas GSD
    - -Prestressed general section check
    - -Multiple materials for composite section or section rehabilitation
17. Eurocode 22 National Annexes for RC and PSC Design
18. Enhancements in Output Table Performance and Visual Design
19. Updates to Default Settings of the Custom Toolbar
20. Grasshopper Plug-in
21. Excel Add-in with MCT
22. Import and export function in Load Combinations
23. Improvements to Element Color Display for Structural Groups

1. CQC 3 Directional Combination for Response Spectrum

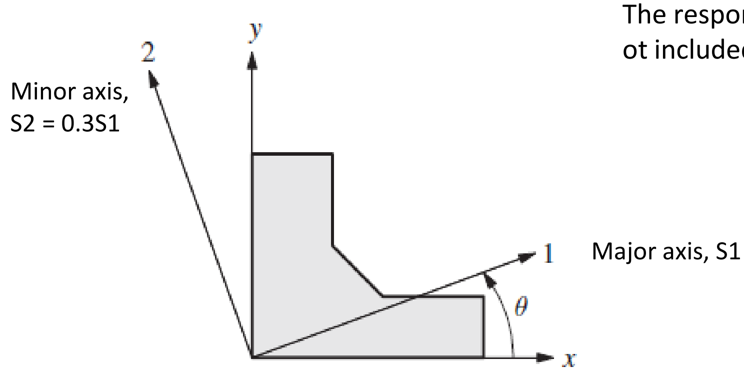
- The CQC3 rule has been developed to estimate the peak value of the combined response due to simultaneous application of the principal components of ground motion.
- The user defines the ratio (ɣ) of minor to major spectrum, and the program finds the critical angle and provides the maximum response for each component.

▪ ***Load > Dynamic Loads > RS Load Cases***



$$\theta_{cr} = \frac{1}{2}\tan^{-1}\left(\frac{2r_{xy}}{r_x^2 - r_y^2}\right)$$

$$r_{cr} \equiv r_{max} \simeq \left[(1+\gamma^2)\left(\frac{r_x^2 + r_y^2}{2}\right) + (1-\gamma^2)\sqrt{\left(\frac{r_x^2 - r_y^2}{2}\right)^2 + r_{xy}^2 + r_z^2}\,\right]^{1/2}$$



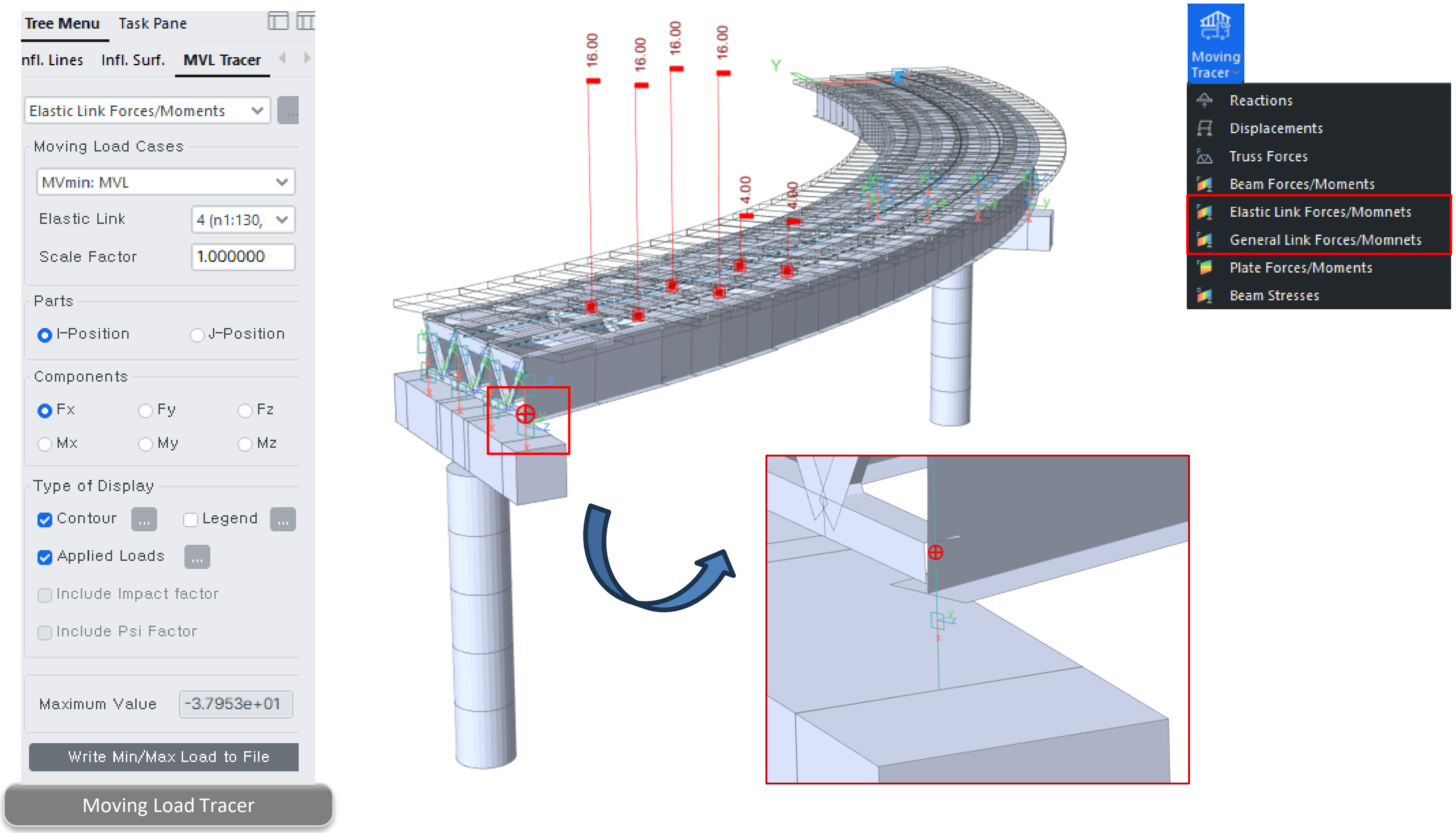
1 and 2: principal axes of ground motion

The responses due to vertical ground motion, r_z are not included in the CQC3 results.

2. Considering Elastic/General Link Forces in Moving Load Tracer

- Bridge bearings are often simulated with Elastic Links or General Links to represent the stiffness of the bearings.
- Now, Moving Load Tracer supports Elastic Links and General Links to find the critical position of the vehicle loads and to convert it into equivalent static loads.

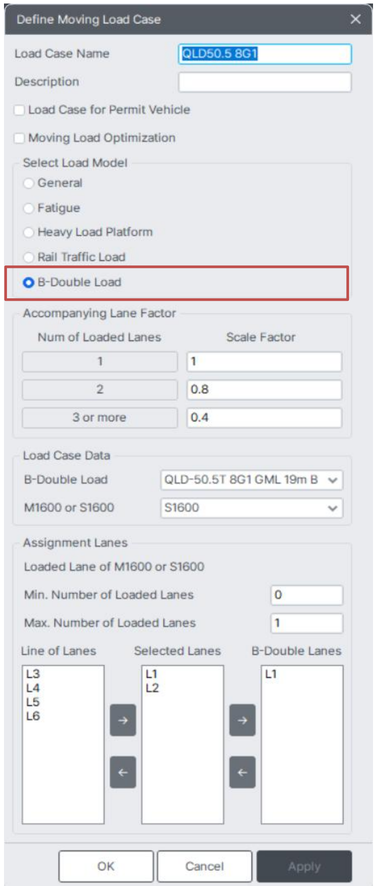
- ***Results > Analysis Result > Moving Tracer > Elastic Link Forces/Moments***
- ***Results > Analysis Result > Moving Tracer > General Link Forces/Moments***



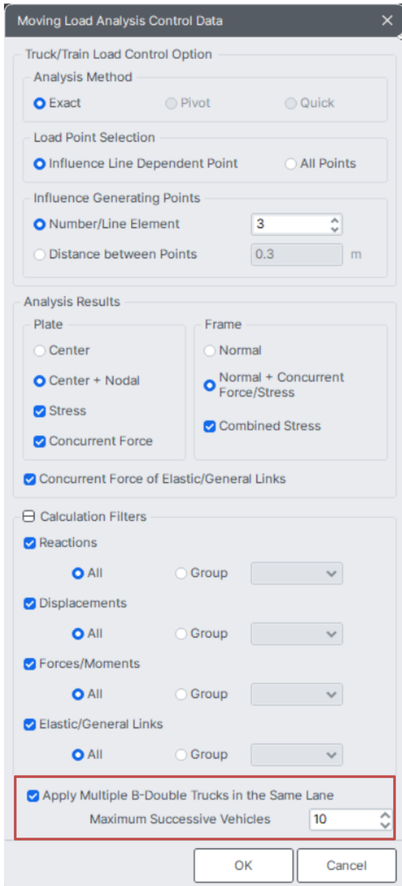
3. B-double rating vehicle as per AS 5100.7

- A B-double is defined in the Heavy Vehicle National Law (HVNL) as a combination consisting of a prime mover towing two semitrailers.
- New B-double assessment vehicle DB for Queensland(QLD) and Victoria(VIC) is now available. More than 2 B-double vehicles can be loaded by checking on the option in Moving Load Analysis control.

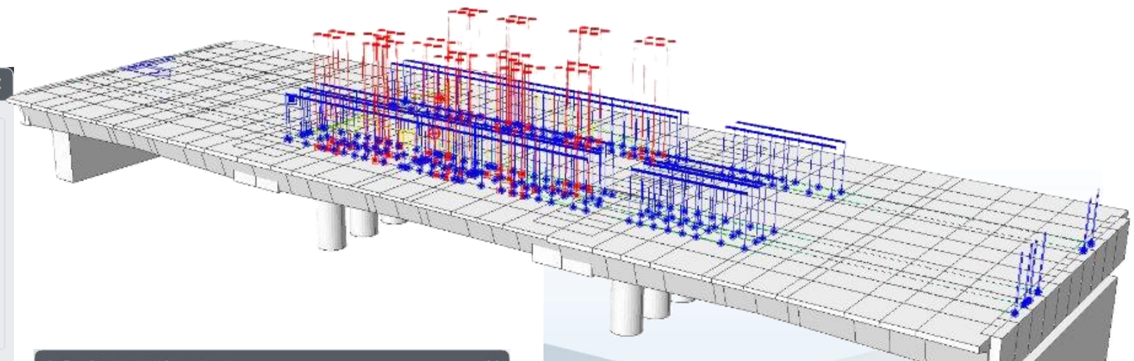
▪ ***Load > Moving Load > Moving Load Code : Australia***

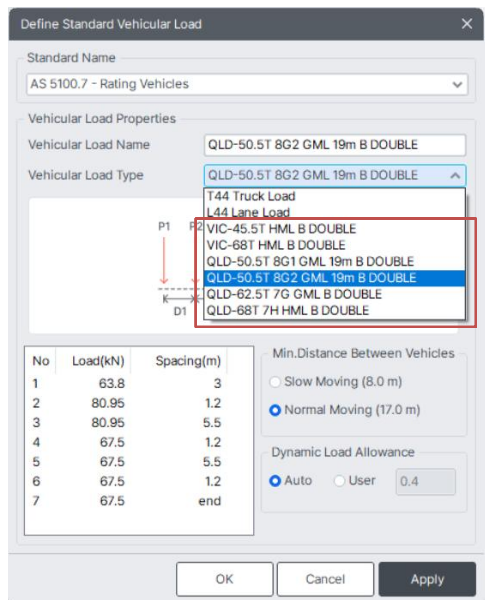


Moving Load Cases

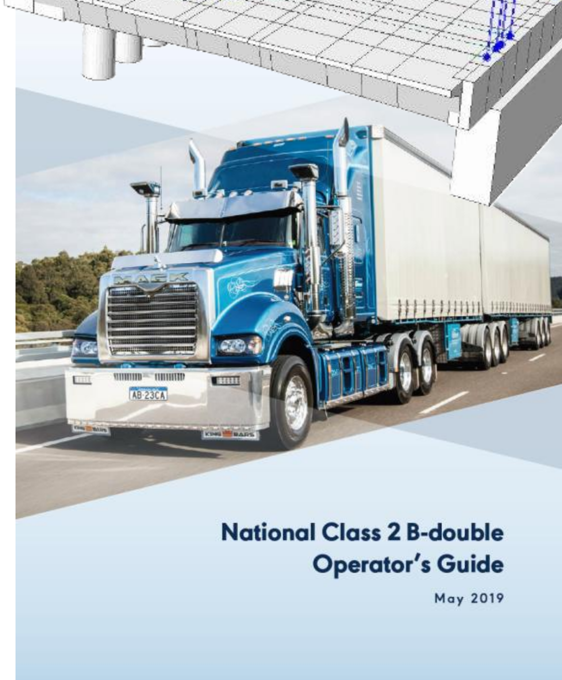


Moving Load Analysis Control





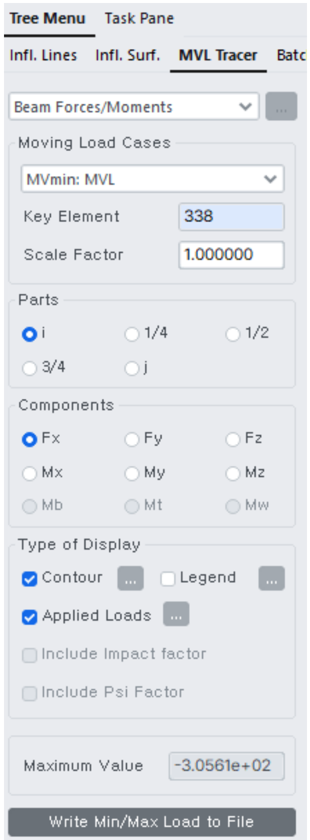
MB-double Vehicles



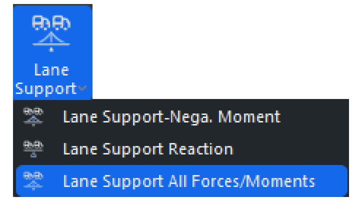
4. Considering two trucks for substructure members or Elastic/General Links as per ASHTO LRFD vehicle loads

- Although AASHTO LRFD says, "For negative moment between points of contraflexure under a uniform load on all spans, 90 percent of the effect of two design trucks combined with 90 percent of the effect of the design lane load, force components other than negative moment need to be determined based on the two-truck rule in some projects.
- Now, it is possible to select elements or links to apply the two-truck rule to obtain maximum results for all force components in moving load analysis.

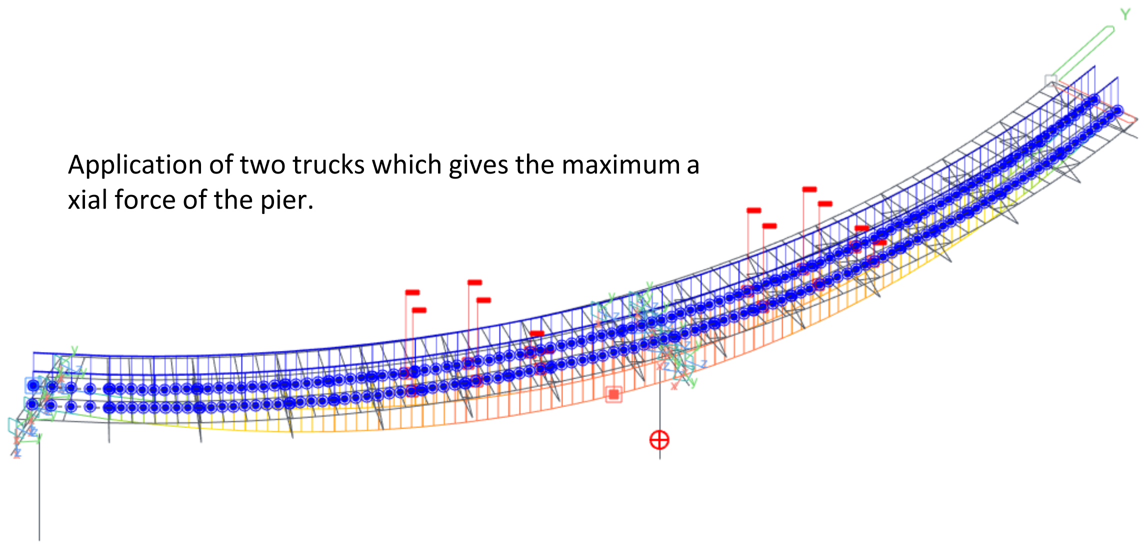
- ***Load > Moving Load > Lane Support > Lane Support All Forces/Moments***

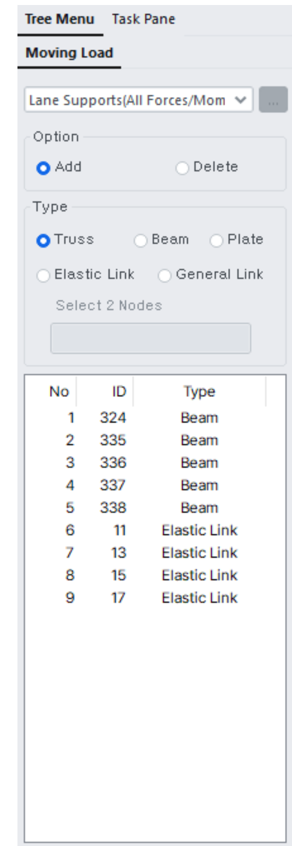


Moving Load Tracer



Application of two trucks which gives the maximum a xial force of the pier.



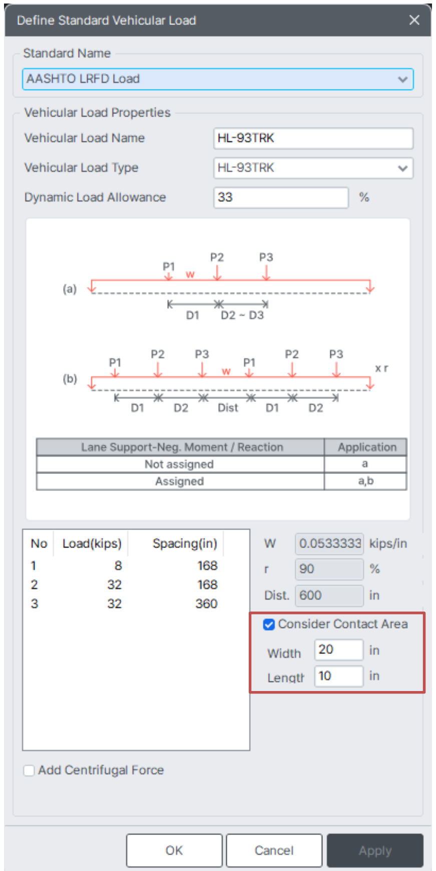


Lane Support All Forces/Moments

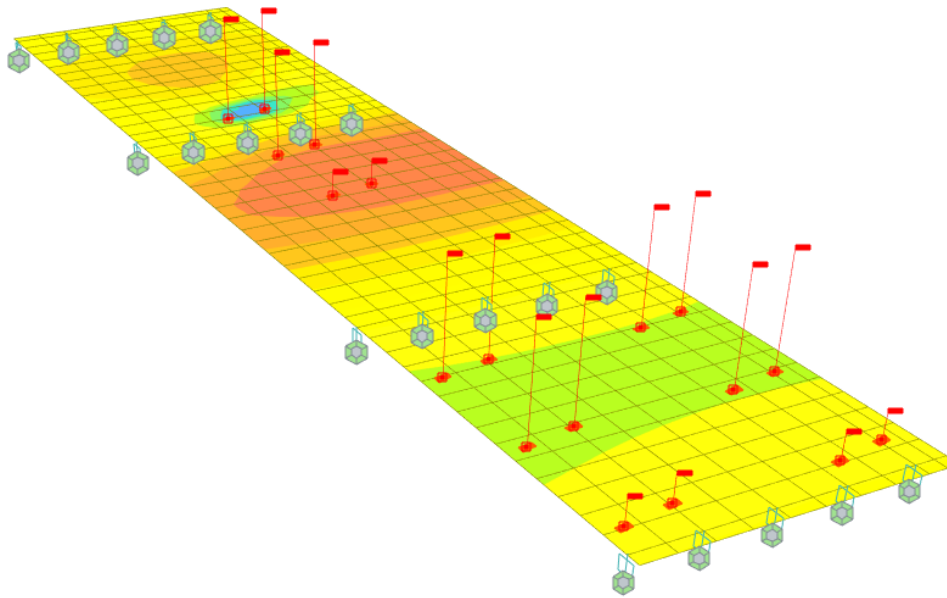
5. Moving patch load analysis as per AASHTO LRFD traffic loads

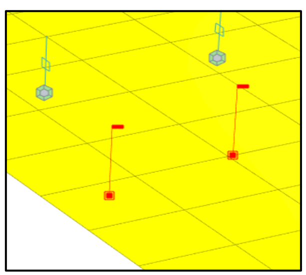
- The tire contact area of a wheel can be applied during moving load analysis. In this version, HL-93TRK, HL-93TDM, and HS20-FTG vehicles of AASHTO LRFD are only supported.
- The design forces of plate elements can be noticeably reduced with the patch/area loads compared to concentrated wheel loads.

▪ ***Load > Moving Load (AASHTO LRFD) > Vehicles***

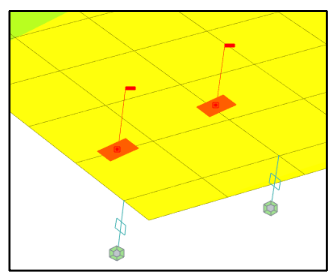


Standard Vehicle

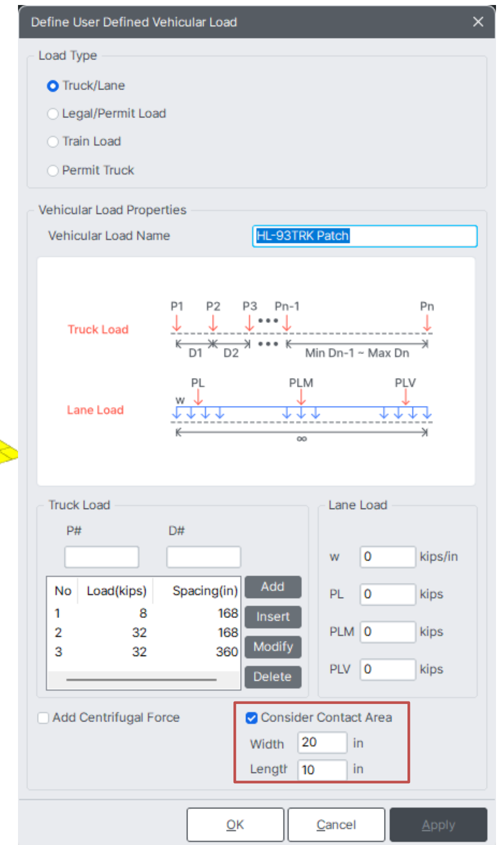




Concentrated wheel loads



Patch/area wheel loads

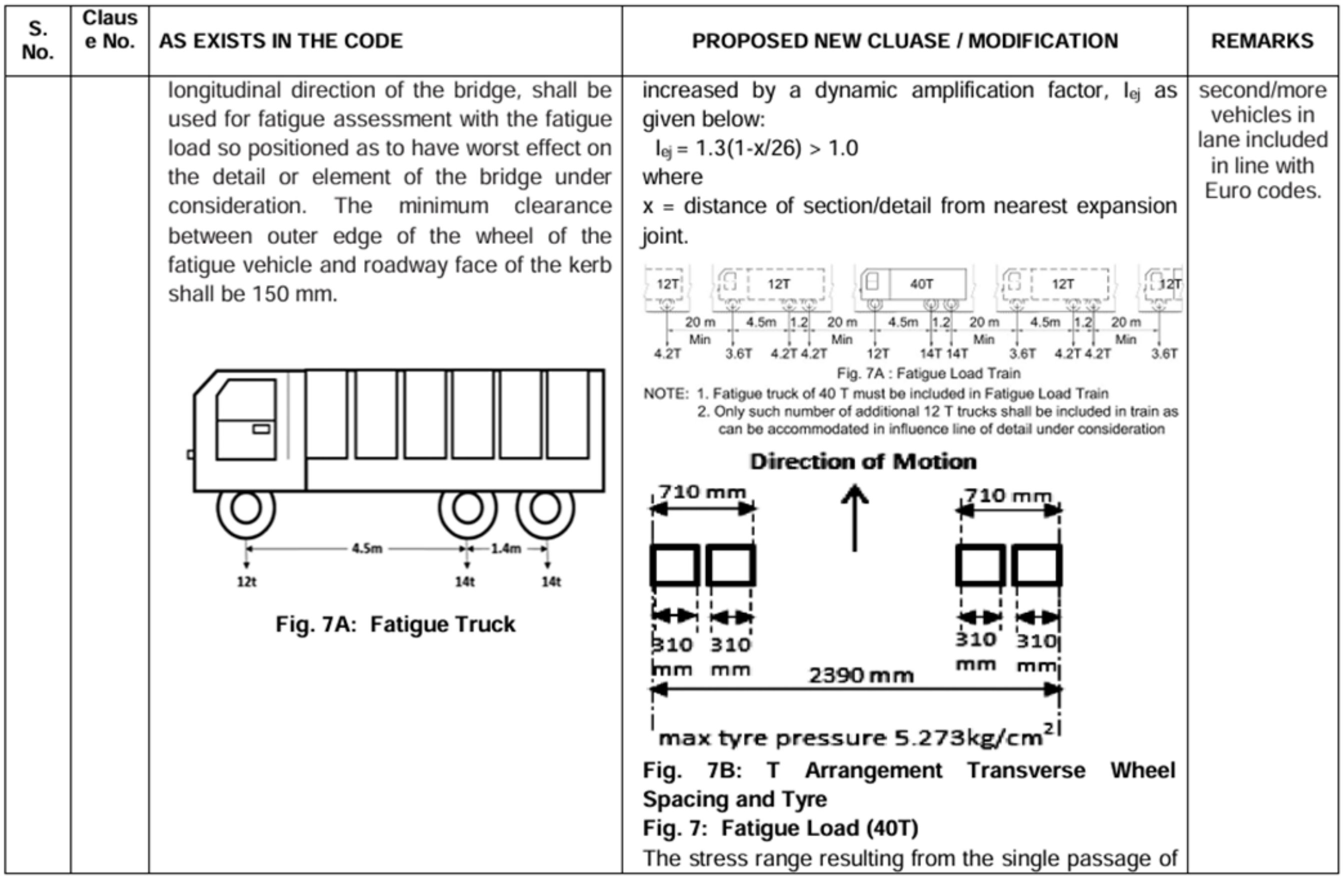


User-Defined Vehicle

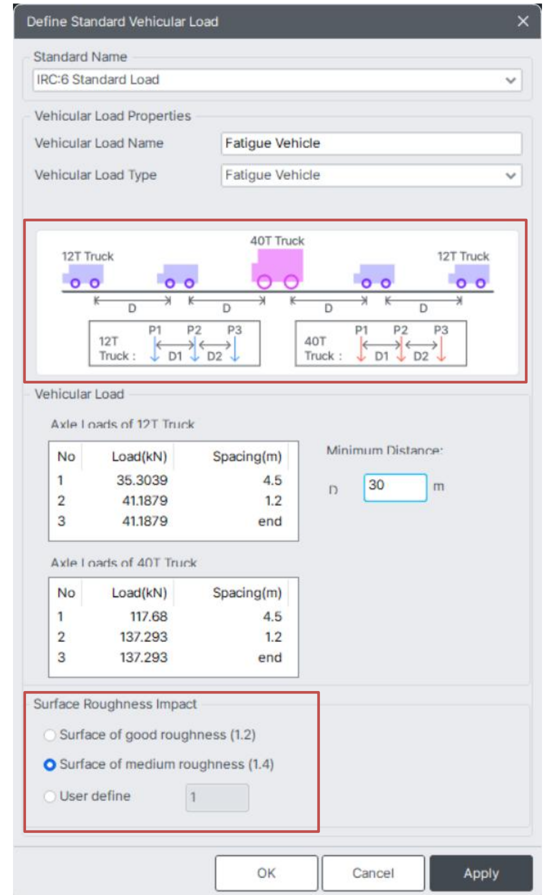
6. Fatigue Vehicle to IRC 6 : Standard Load

- Fatigue Vehicle has been added to existing vehicle library of IRC 6 : Standard Load as per latest amendment to IRC : 6 Fatigue Load Clause 204.6.
- For assessment, impact factor has been replaced with surface roughness impact depending upon type of surface.

▪ ***Load > Load Type > Moving Load > Moving Load Code > India***



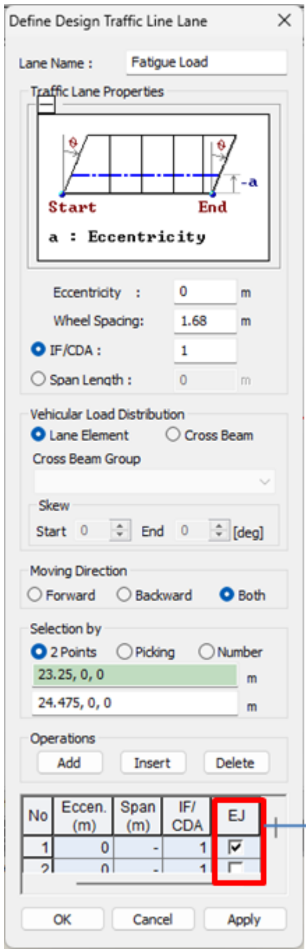
S. No.	Claus e No.	AS EXISTS IN THE CODE	PROPOSED NEW CLUASE / MODIFICATION	REMARKS
		longitudinal direction of the bridge, shall be used for fatigue assessment with the fatigue load so positioned as to have worst effect on the detail or element of the bridge under consideration. The minimum clearance between outer edge of the wheel of the fatigue vehicle and roadway face of the kerb shall be 150 mm. 4.5m 1.4m 12t 14t 14t Fig. 7A: Fatigue Truck	increased by a dynamic amplification factor, I_{ej} as given below: $I_{ej} = 1.3(1-x/26) > 1.0$ where x = distance of section/detail from nearest expansion joint. 12T 12T 40T 12T 12T 20 m Min 4.5m 1.2 20 m Min 4.5m 1.2 20 m Min 4.5m 1.2 20 m Min 4.2T 3.6T 4.2T 4.2T 12T 14T 14T 3.6T 4.2T 4.2T 3.6T Fig. 7A : Fatigue Load Train NOTE: 1. Fatigue truck of 40 T must be included in Fatigue Load Train 2. Only such number of additional 12 T trucks shall be included in train as can be accommodated in influence line of detail under consideration Direction of Motion 710 mm 710 mm 310 mm 310 mm 310 mm 310 mm 2390 mm max tyre pressure 5.273kg/cm² **Fig. 7B: T Arrangement Transverse Wheel Spacing and Tyre** **Fig. 7: Fatigue Load (40T)** The stress range resulting from the single passage of	second/more vehicles in lane included in line with Euro codes.

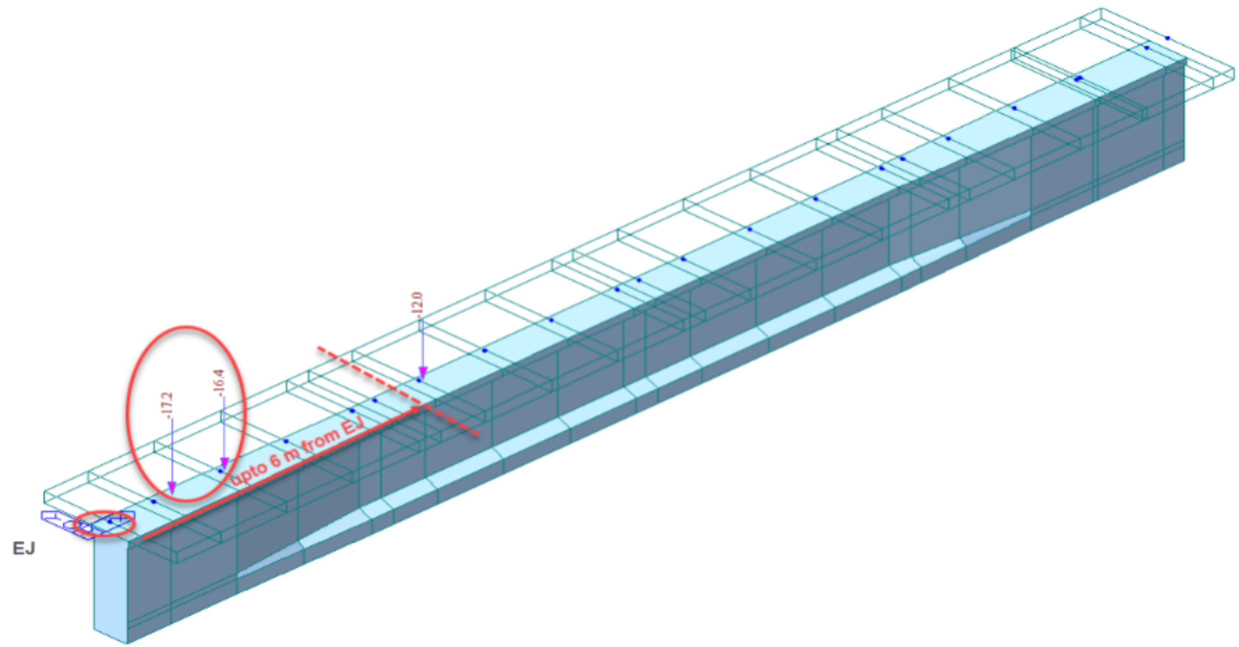


6. Fatigue Vehicle to IRC 6 : Standard Load

- The Traffic Lane Definitions now include an "EJ" checkbox for specifying expansion joint locations.
- For sections/ details within 6.0 m of the expansion joint, the fatigue load arrived as above shall further be increased by a dynamic amplification factor, I_{ej}.

- ***Load > Load Type > Moving Load > Moving Load Code > India***





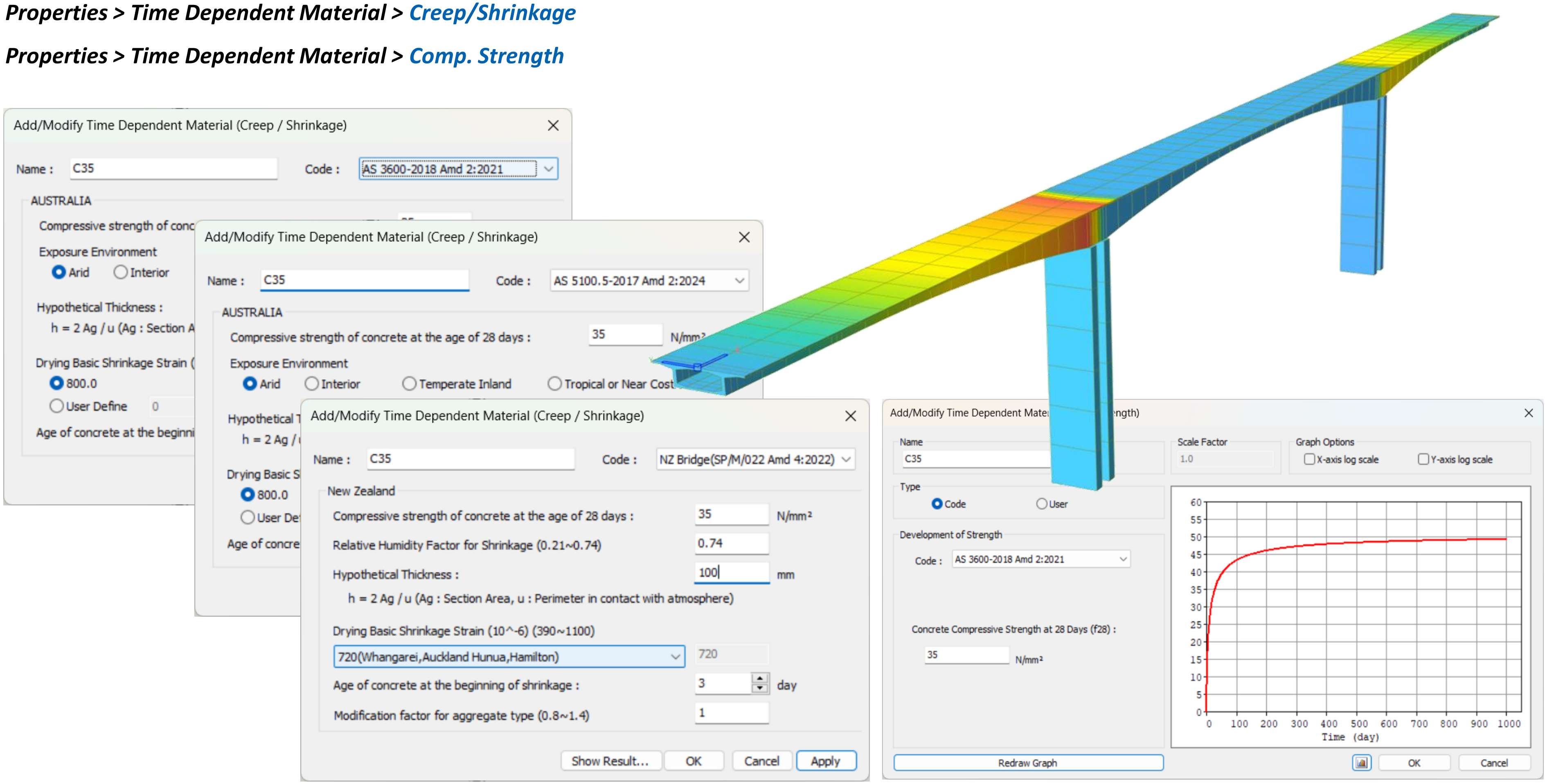
$$I_{ej} = 1.3\left(1-\left(\frac{x}{26}\right)\right) \geq 1$$

x = distance of section/detail from nearest expansion joint

7. Time Dependent Materials as per the latest Australian and New Zealand Standards

- Time Dependent Materials (Creep, Shrinkage and Compressive Strength) as per the following Australian and New Zealand Standards are updated: SP/M/022 v 3.4, AS5100.5:2017(Amd 2:2024) and AS3600:2018(Amd 2).

- ***Properties > Time Dependent Material > Creep/Shrinkage***
- ***Properties > Time Dependent Material > Comp. Strength***



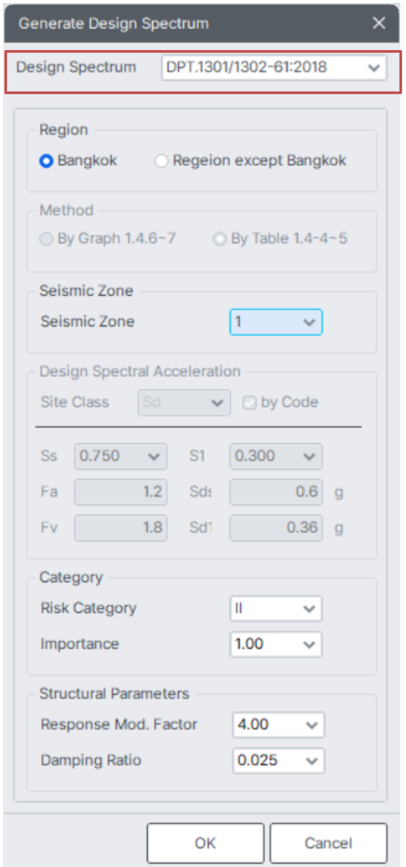
Creep & Shrinkage

Compressive Strength

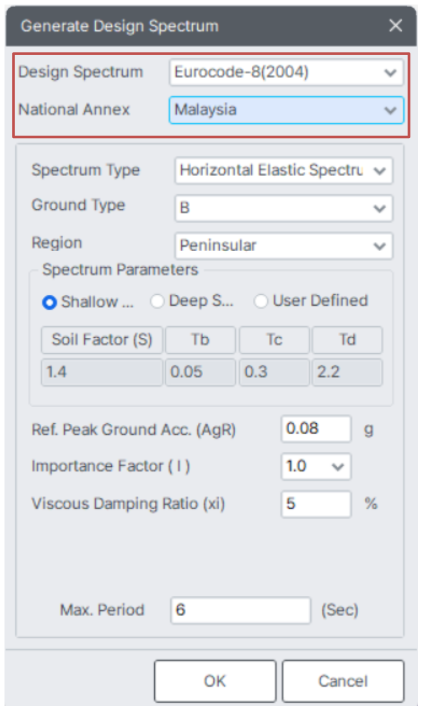
8. Addition of Response Spectrum Function as per DPT.1301/1302-61:2018 and Eurocode Malaysia NA

- Design Spectrums for Thailand specifications(DPT.1301/1302-61:2018) and Eurocode Malaysian National Annex are added.

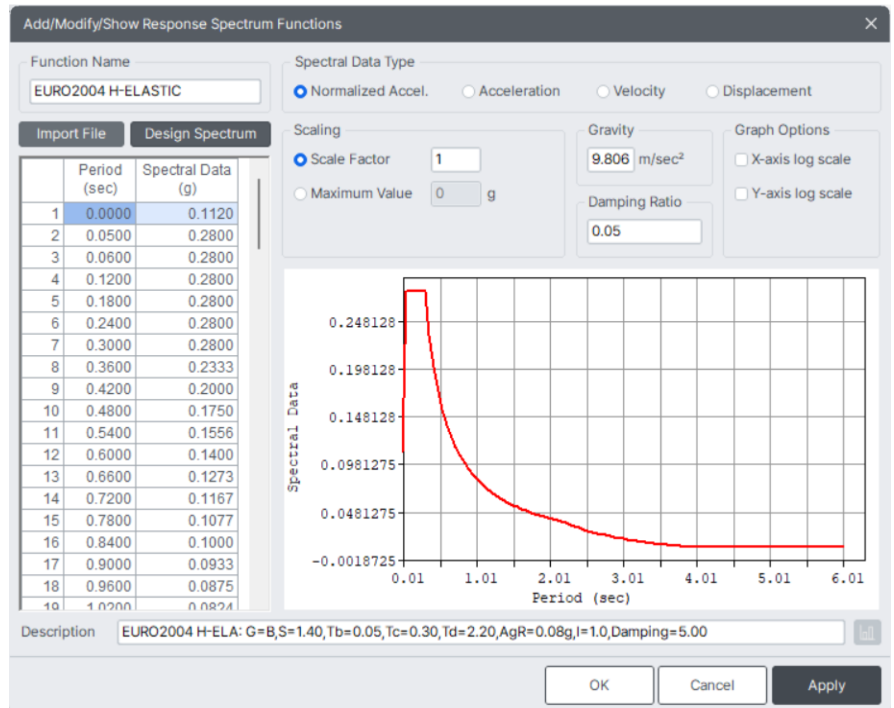
- ***Load > Dynamic Loads > RS Functions***



DPT1301/1302-61 Design Spectrum



MY EN 1998 Design Spectrum

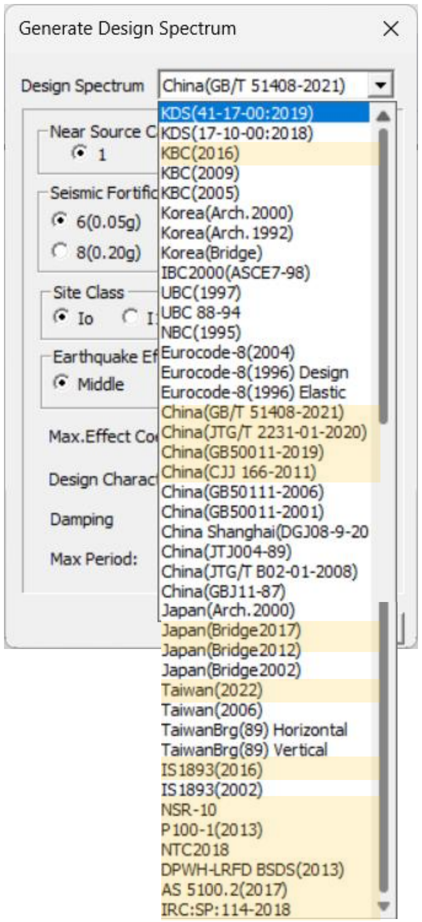


Response Spectrum Function

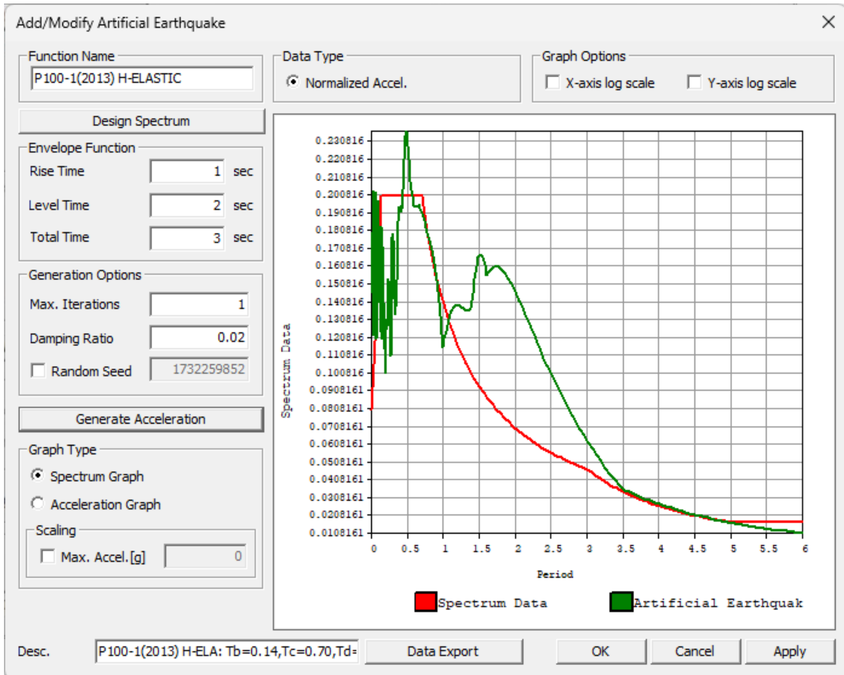
9. Addition of new Design Spectrum Database in Artificial Earthquake Data Generator

- AGS (Artificial Data Generation System for windows) extracts artificial earthquake and design response spectrum using the design spectrum of each standard. Following design spectra are now added: Taiwan (2022), IS1938(2016), NSR-10, P100-1(2013), NTC 2018, DBWH-LRFD BSDS(2013), AS 5100.2(2017), IRC:SP:114-2018, KBC(2016), China (GB/T 51408-2021), China(JTG/T 2231-01-2020), China (GB50011-2019), China (CJJ 166-2011), Japan(Bridge2017), Japan(Bridge 2012)

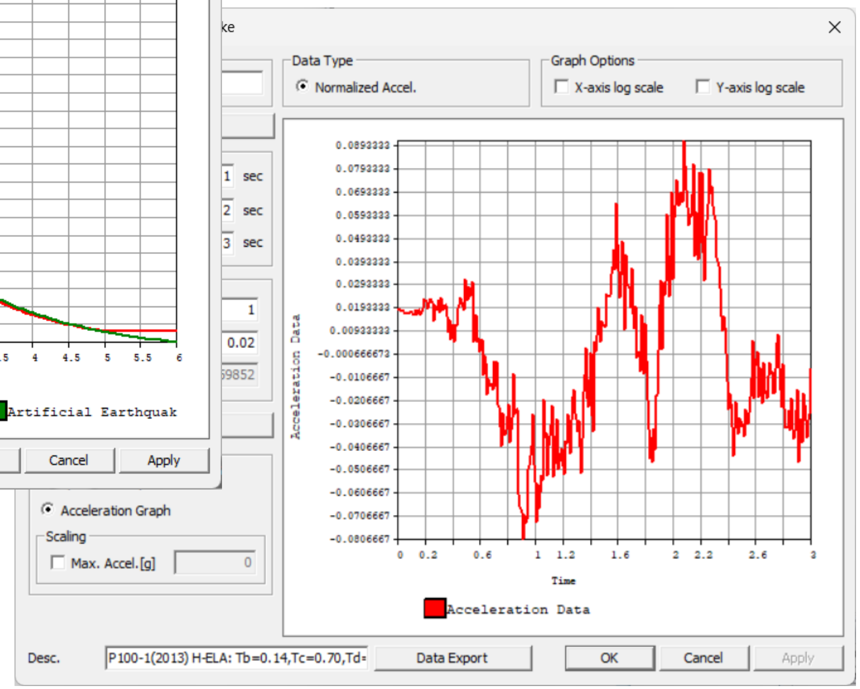
- ***Tools > Data Generator > Artificial Earthquake***



Design Spectrum DB



Artificial Earthquake (RS Spectrum Conversion)

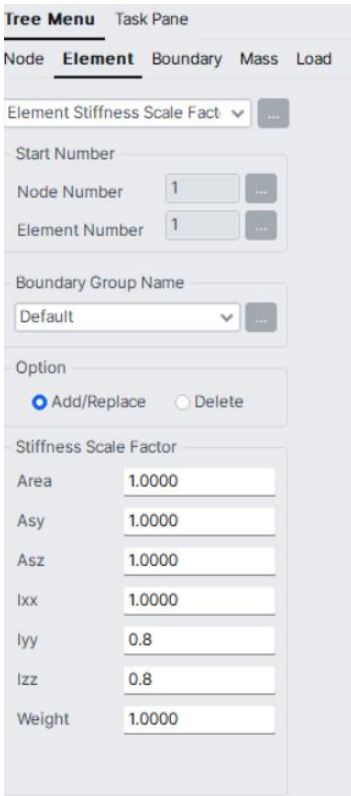


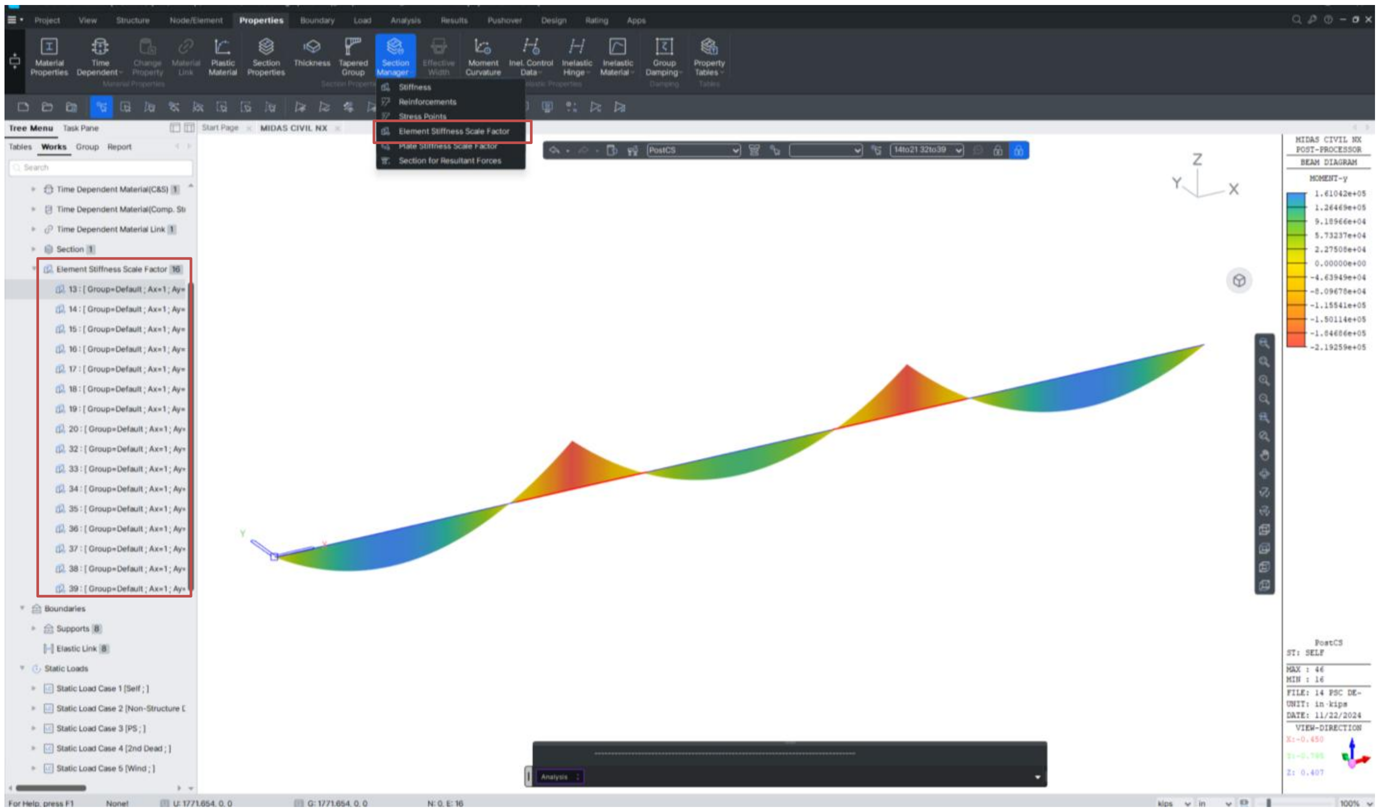
Artificial Earthquake (Time History Acceleration Conversion)

10. Addition of Element Stiffness Scale Factor

- Apply scale factors to the cross-sectional linear elements (Truss, Tension-only, Compression-only, Cable, Gap, Hook & Beam Elements). Specific stiffness may be reduced such as the case where the flexural stiffness of girders in the negative moment region may require reduction to reflect cracked sections of concrete.

- ***Properties > Section Manager > Element Stiffness Scale Factor***



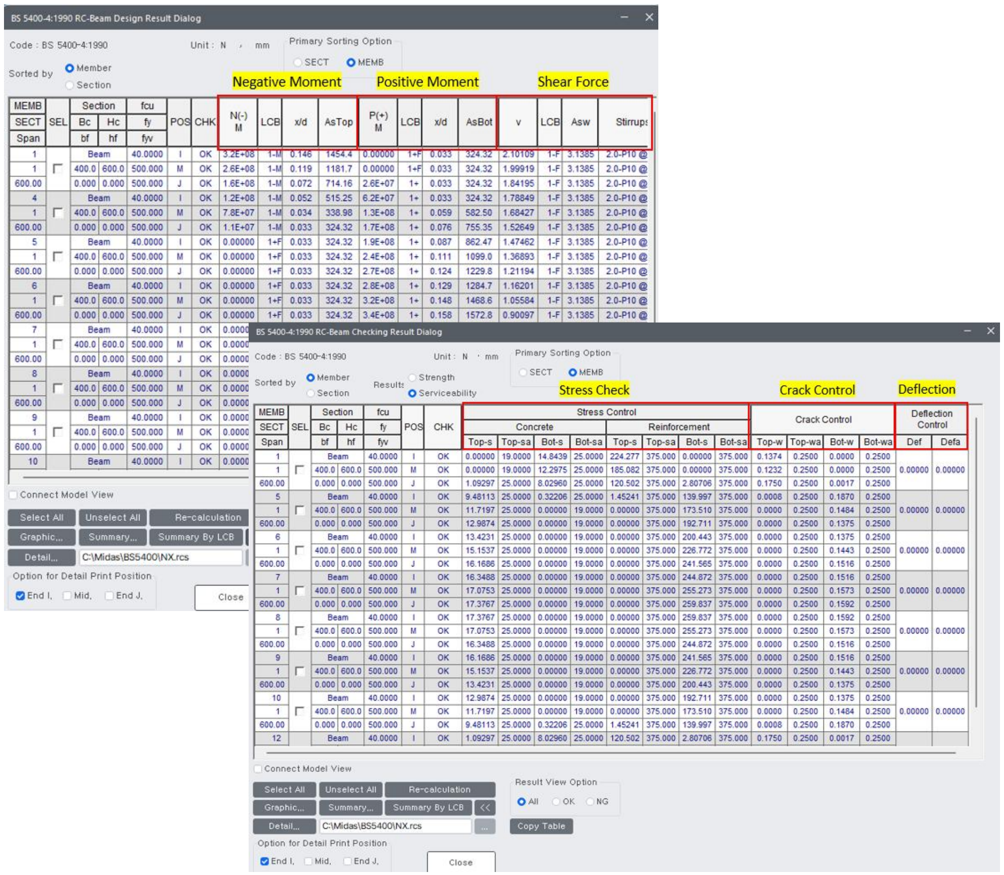


Element Stiffness Scale Factor

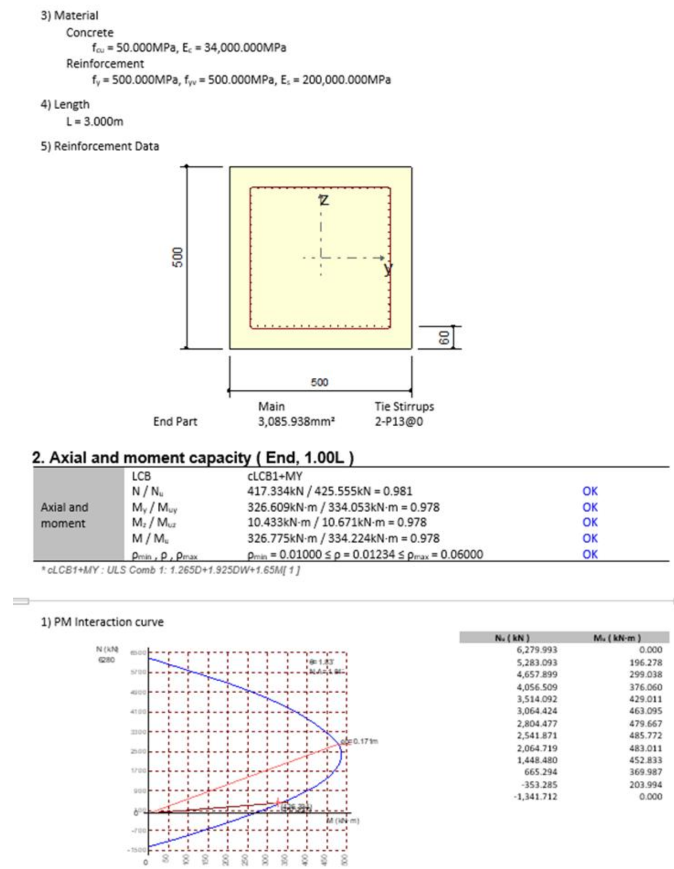
11. RC Design for 1D Beam & Column, Plate Beam & Column as per BS 5400

- Design and checking of RC frame elements to BS 5400 are newly introduced in midas.
- This feature can be applied to piers or RC beams.

- ***Design > RC Design > RC Code Design > Beam/Column Design***



Design Result Table



Detailed Calculation Report

12. RC Design for 1D Beam & Column, Plate Beam & Column as per BS 5400

- Design and checking of RC plate elements to BS 5400 are newly introduced in midas.
- This feature can be applied to culvert, pier walls or slabs where the stresses are distributed in one way.

▪ ***Design > RC Design > RC Code Design > Plate Beam/Column Design***

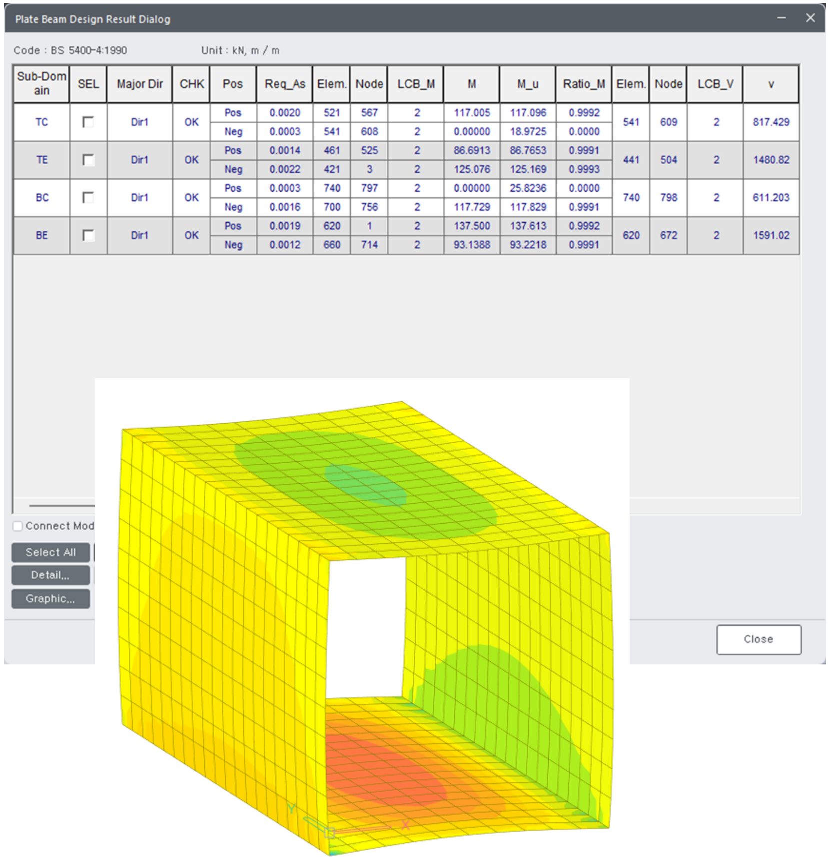


Plate Beam/Column Design Result Table

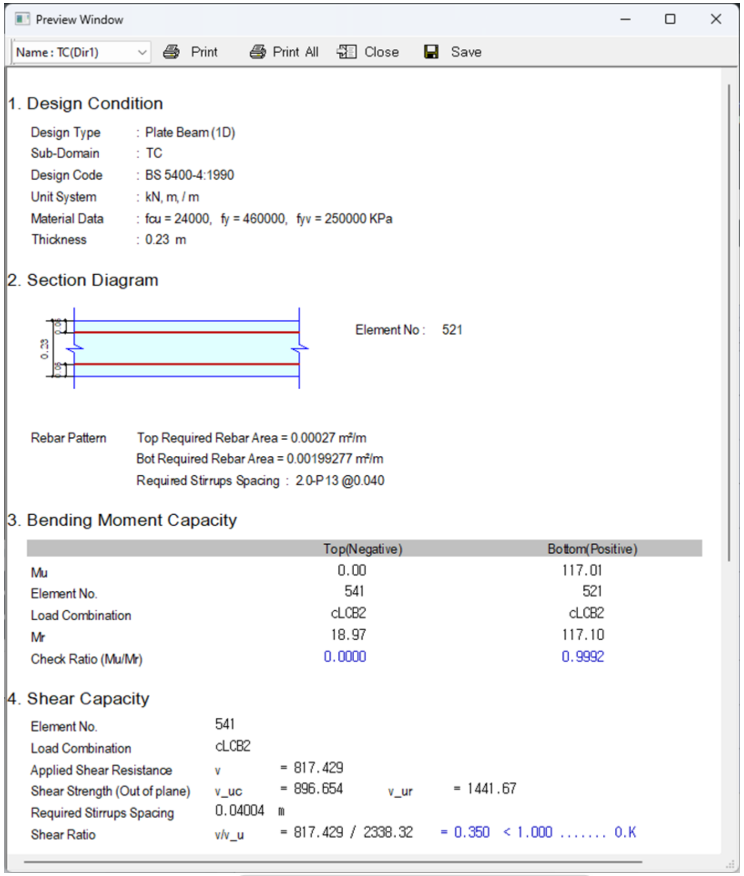
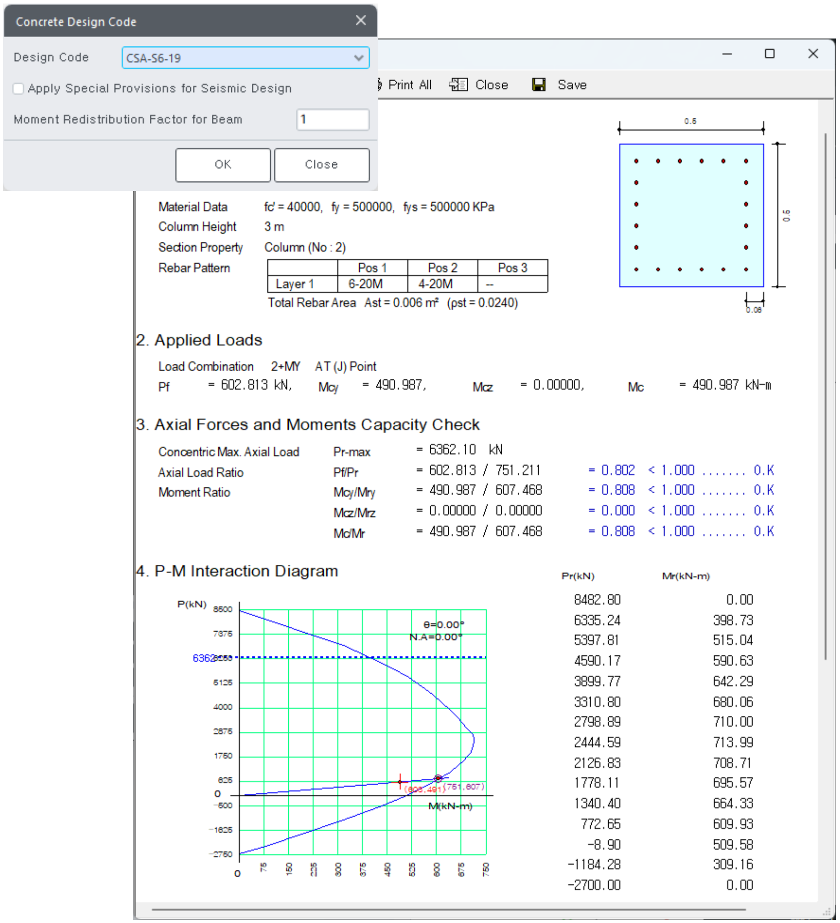


Plate Beam Design Summary

13. RC & Steel Design as per CSA S6:19

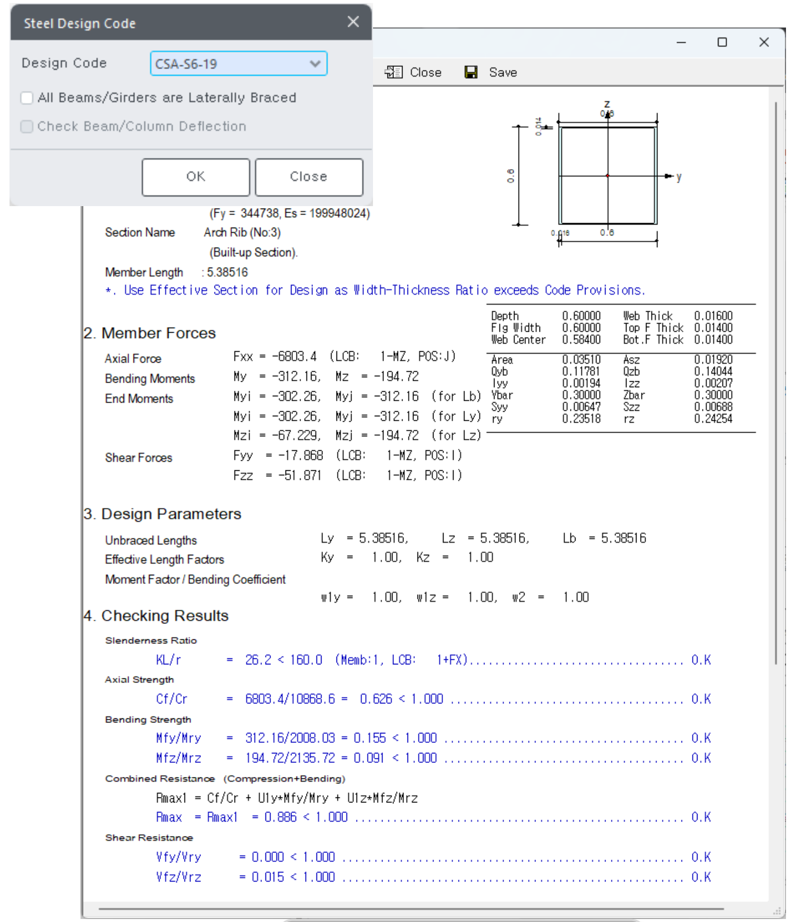
- RC member design and steel member design have been updated as per CSA S6: 19.

- ***Design > RC Design > Design Code Option***



RC Design Summary Report

- ***Design > Steel Design > Design Code Option***

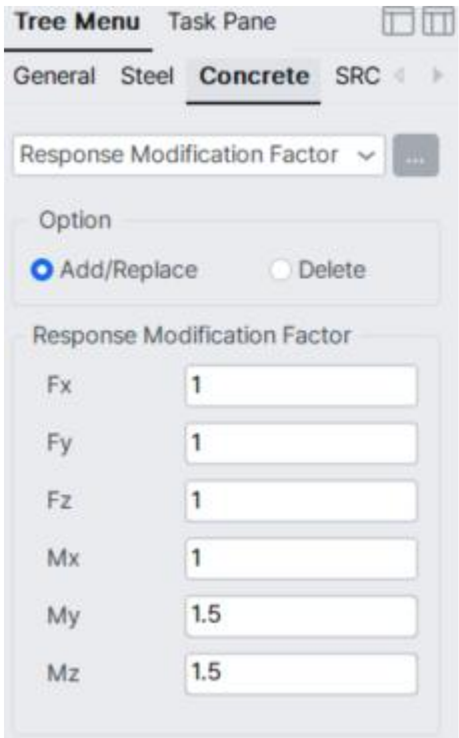


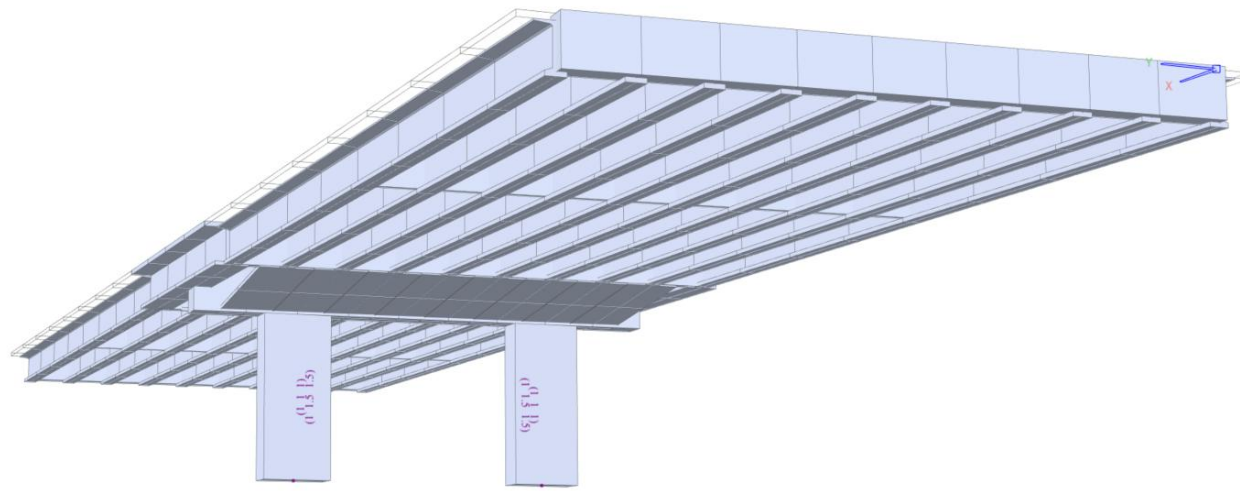
Steel Design Summary Report

14. Response Modification Factor by members and components as per AASHTO LRFD

- Seismic design force effects for substructures shall be determined by dividing the force effects resulting from elastic analysis by the appropriate response modification factor, R.
- In the previous version, only a single response modification factor could be applied. However, the current version allows for the application of response modification factors based on substructure types and load components.
- Applicable Code: AASHTO-LRFD

▪ ***Design > RC Design > Design Parameters >*** ***Response Modification Factor (R)***





Start Page | MIDAS CIVIL NX | Response Modification Factor (R)

	Elem	R factor for Fx	R factor for Fy	R factor for Fz	R factor for Mx	R factor for My	R factor for Mz
	390	1.00	1.00	1.00	1.00	1.50	1.50
	391	1.00	1.00	1.00	1.00	1.50	1.50
*							

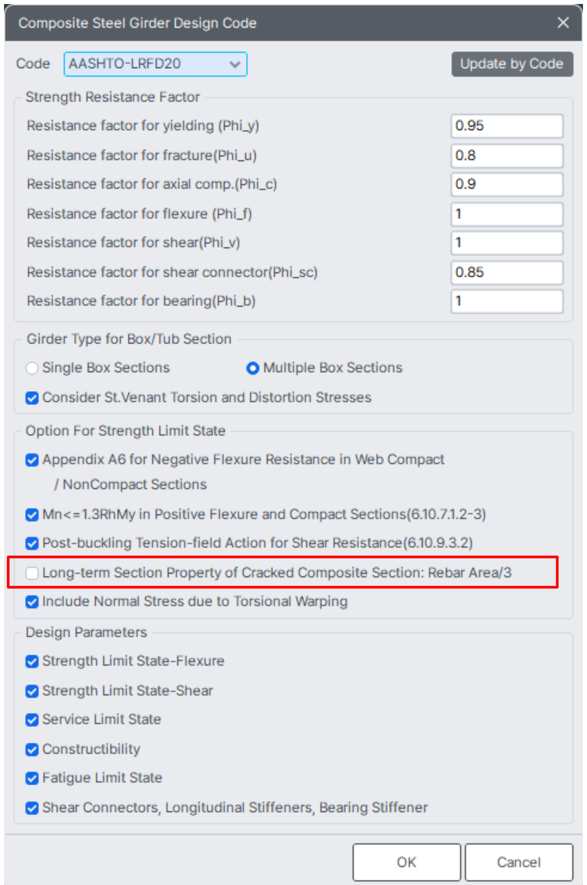
Response Spectrum Modification Factor Dialog

Response Spectrum Modification Factor Table

15. Addition of an option "Long-term Section Property of Cracked Composite Section: Rebar Area/3" as per AASHTO LRFD

- In previous versions, the long-term section properties of the composite girder subjected to negative moment were calculated as "Steel Section + Long. Reinforcement/3".
- Now, an option is added to determine the section properties as "Steel Section + Long. Reinforcement".

▪ ***Design > Composite Design > Design Code Option***



Composite Steel Girder Design Code Option

3) Long-term Composite Section
(Es/Ec = 3n)

$A_{(n)}$(mm²)	114055.580	$I_{y(n)}$(mm⁴)	84815877315.974	$I_{z(n)}$(mm⁴)	20571628095.453
$d_{Top(n)}$(mm)	693.811	$d_{Bot(n)}$(mm)	1185.789		
$S_{Top(n)}$(mm³)	122246331.502	$S_{Bot(n)}$(mm³)	71526969.459		
$S_{L(n)}$(mm³)	80990661.793	$S_{R(n)}$(mm³)	80990661.793		
$W_{1(n)}$(mm²)	-10138.241	$W_{2(n)}$(mm²)	10138.290	$I_{w(n)}$ (mn	2.751341E+15
$W_{3(n)}$(mm²)	488492.120	$W_{4(n)}$(mm²)	-488491.491		

4) Short-term Composite Section(Long. Reinforcement)

$A_{(R)}$(mm²)	100601.412	$I_{y(R)}$(mm⁴)	73165083170.475	$I_{z(R)}$(mm⁴)	10775758973.804
$d_{Top(R)}$(mm)	810.378	$d_{Bot(R)}$(mm)	1069.222		
$S_{Top(R)}$(mm³)	90285105.810	$S_{Bot(R)}$(mm³)	68428350.798		
$S_{L(R)}$(mm³)	42424247.928	$S_{R(R)}$(mm³)	42424247.928		
$W_{1(R)}$(mm²)	0.000	$W_{2(R)}$(mm²)	0.000	$I_{w(R)}$ (mn	0.000000E+00
$W_{3(R)}$(mm²)	0.000	$W_{4(R)}$(mm²)	0.000		

5) Long-term Composite Section(Long. Reinforcement)

$A_{(R3)}$(mm²)	100601.412	$I_{y(R3)}$(mm⁴)	73165083170.475	$I_{z(R3)}$(mm⁴)	10775758973.804
$d_{Top(R3)}$(mm)	810.378	$d_{Bot(R3)}$(mm)	1069.222		
$S_{Top(R3)}$(mm³)	90285105.810	$S_{Bot(R3)}$(mm³)	68428350.798		
$S_{L(R3)}$(mm³)	42424247.928	$S_{R(R3)}$(mm³)	42424247.928		
$W_{1(3R)}$(mm²)	-10138.241	$W_{2(3R)}$(mm²)	10138.290	$I_{w(3R)}$ (mn	2.751341E+15
$W_{3(3R)}$(mm²)	488492.120	$W_{4(3R)}$(mm²)	-488491.491		

Design Report

Updates in CIVIL NX 2025 (v1.1)

Release Date : Jan. 2025

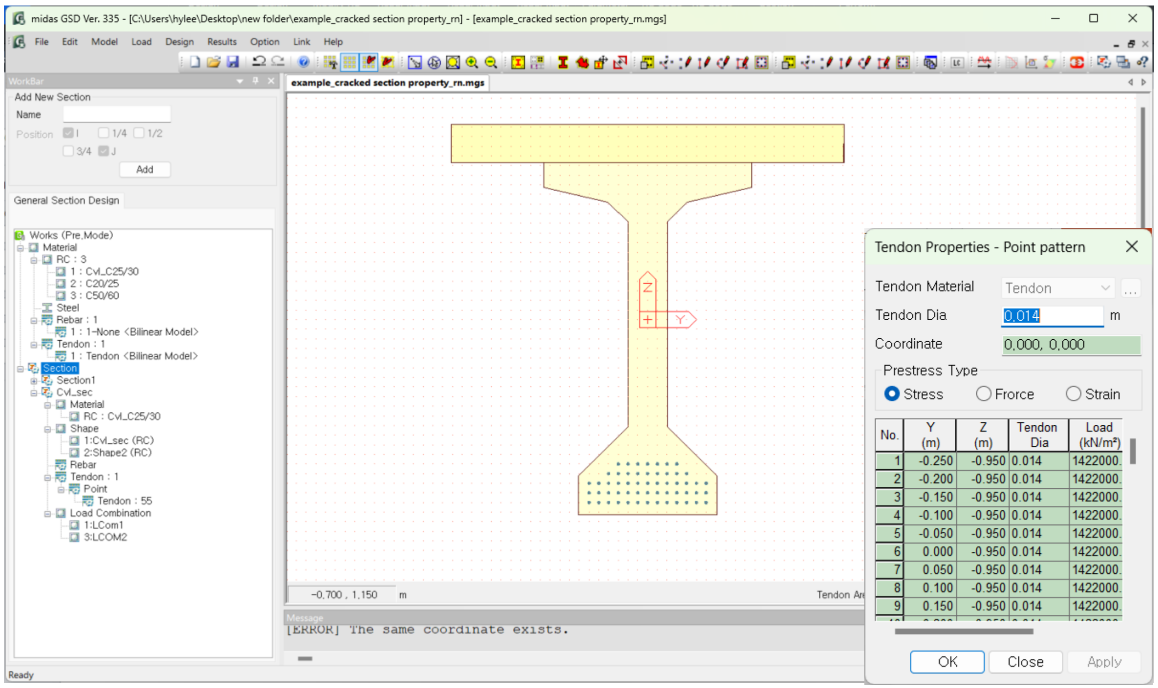
Product Ver. : CIVIL NX 2025 (v1.1)

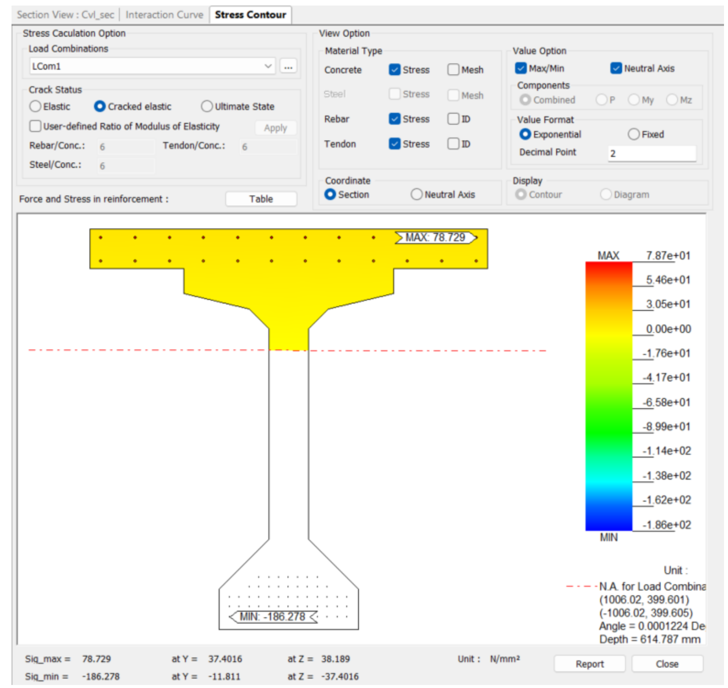
Please note that the following features are exclusively available in MIDAS CIVIL NX. Common updates included in CIVIL 2025 (v1.1) are not detailed in the following document.

16. Enhancements in midas GSD

- midas GSD now supports the verification of prestressed concrete sections through P-M interaction curves, Moment-Curvature curves, and Ultimate Limit State (ULS) verification, ensuring comprehensive design validation.
- midas GSD now allows the definition of multiple materials to support the rehabilitation of cross-sections, providing enhanced flexibility and functionality for structural design and analysis.
- This feature is exclusively available in MIDAS CIVIL NX.

- ***Apps > General Section Designer***



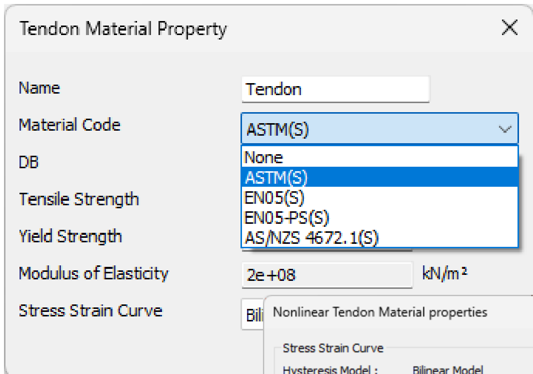


midas GSD

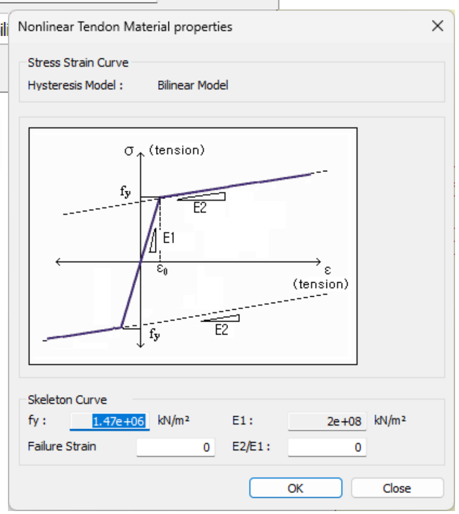
16. Enhancements in midas GSD

- Tendon Material DB: ASTM, Eurocode, AS/N 4672.1
- Nonlinear Material Properties: Elastic, Bilinear, Trilinear, User-defined

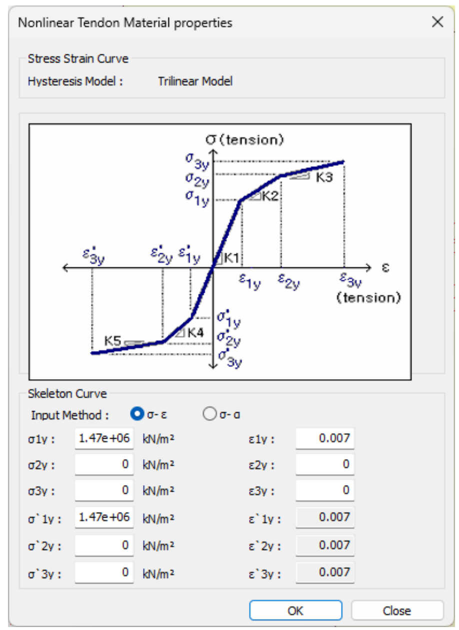
▪ ***Apps > General Section Designer***



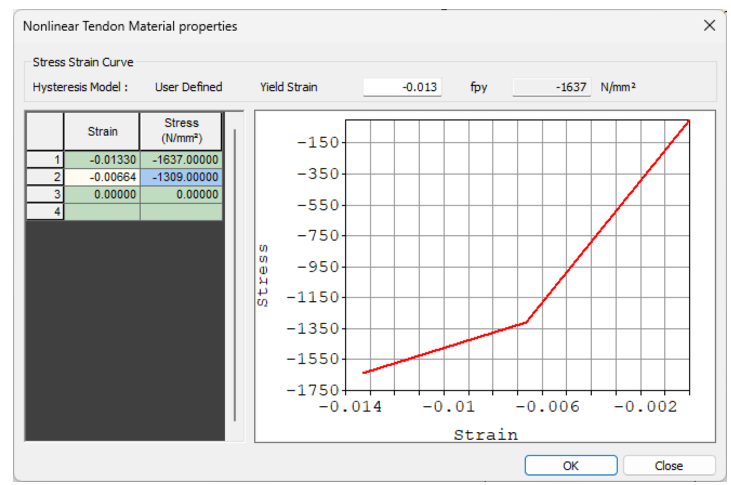
Tendon Material Property



Bilinear Model



Trilinear Model

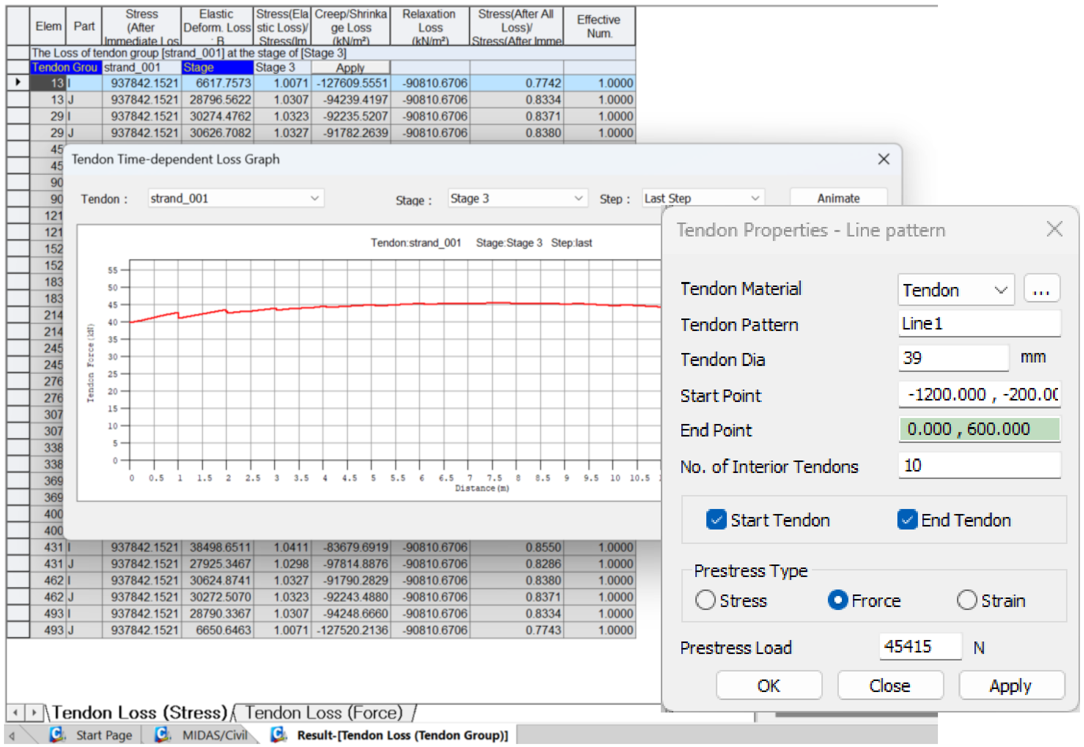


User-defined Model

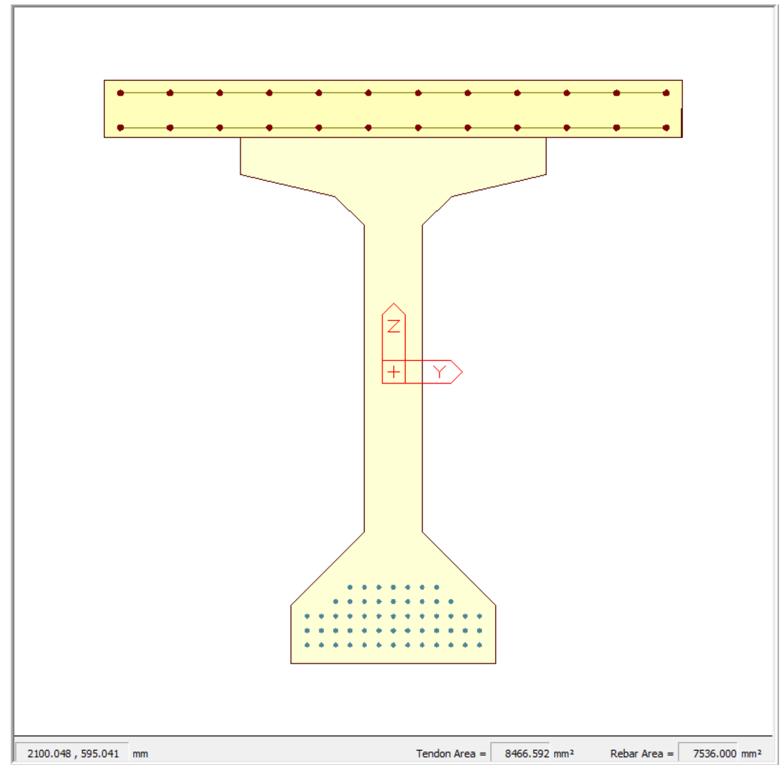
16. Enhancements in midas GSD

- Tendon coordinates import/export from midas CIVIL
- Effective force is imported into midas GSD.

■ ***Apps >*** ***General Section Designer***



Import Tendon from midas Civil



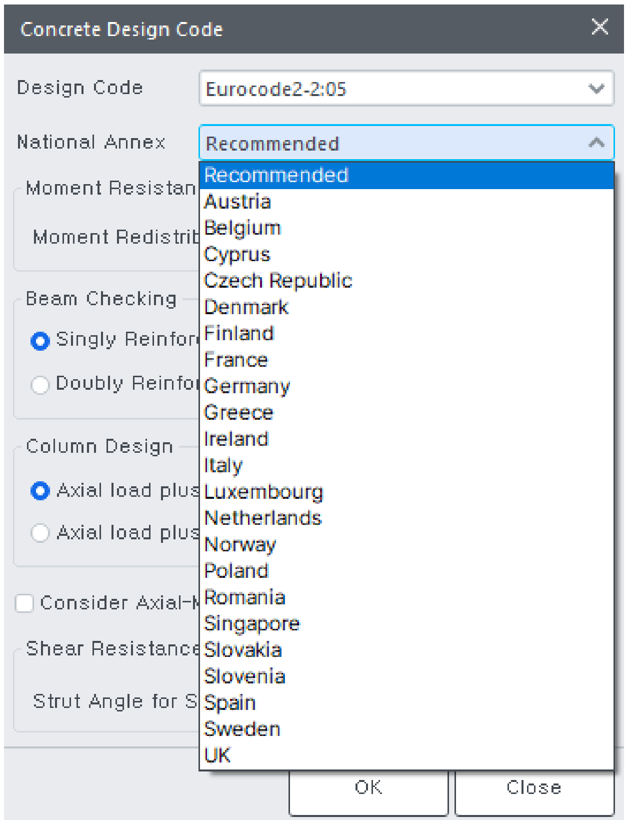
Tendon area

17. Eurocode 22 National Annexes for RC and PSC Design

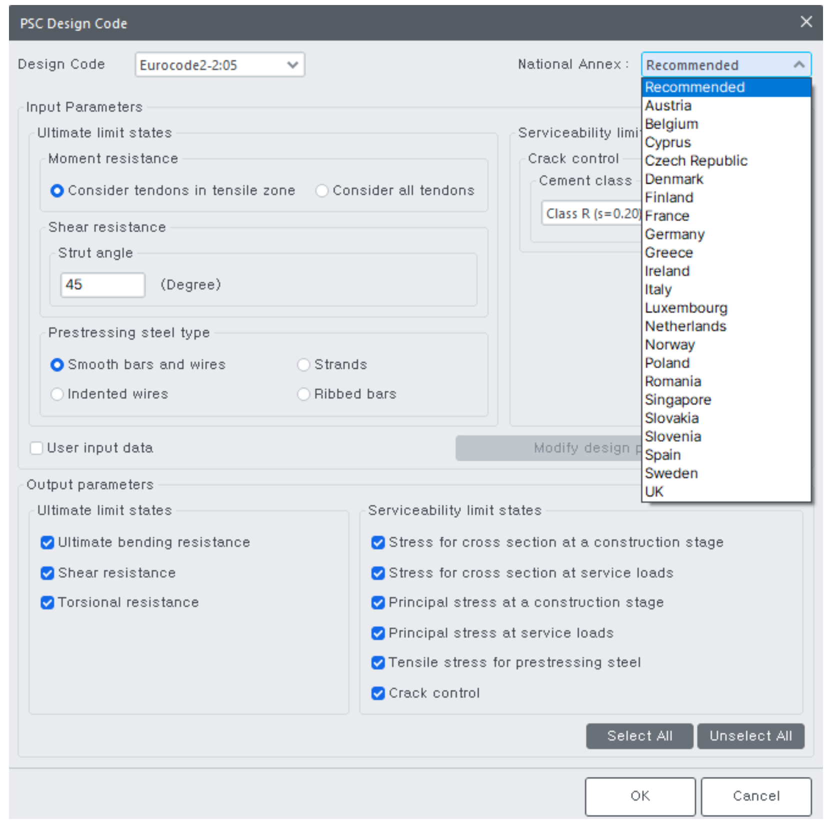
- The program supports national annexes for RC design and PSC design for the following 22 countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Romania, Singapore, Slovakia, Slovenia, Spain, Sweden, UK

- This feature is exclusively available in MIDAS CIVIL NX.

  - ***Design > RC Design > Design Code Option***
  - ***Design > PSC Design > Design Code Option***



Concrete Design Code



PSC Design Code

17. Eurocode 22 National Annexes for RC and PSC Design

	Recomm.	Austria	Belgium	Cyprus	Czech	Denmark	Netherland	Finland	France	German	Greece	Ireland	Italy	Luxemburg	Norway	Poland	Romania	Singapore	Slovakia	Slovenia	Spain	Sweden	UK
fck(min)	30	25	25	30	20	unlimited	30	25	20	20(R) 30(P)	25(R) 30(P)	25	25	unlimited	30	30	16	30	30	30	25	25	25
fck(max)	70	60	90	70	90	50	70	unlimited	90	50	50	unlimited	60	90	60	70	50	50 (shear) 70 (other)	70	70	90	100	50 (shear) 70 (other)
fykmax (MPa)	600	600	500	600	600	600	600	700	500	500	500	500	450 or	600	600	600	500	600	600	600	500	600	600
phimin (mm)	8	12	12	8	12	8	8	8	8	12	8	12	12	8	10	6	12	12	10	12	12	8	12
Alphacc	0.85	0.85	0.85	0.85	0.9	1	1	0.85	1	0.85	0.85	0.85	0.85	0.85(bend.) 1.00(other)	0.85	0.85	0.85(90%↑) 1.0(50%↓)	0.85	0.85	0.85	1	1	0.85(comp) 1.00(other)
Alphact	1	1	1	1	1	1	1	1	1	0.85	1	1	1	1	0.85	1	1	1	1	1	1	1	1
Alphacw	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	fcd -> fcd/αcc	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	1 (RC) 1 + σcp/fctm (PSC)	1	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)	(1 + σcp/fcd) or 1.25 or 2.5 (1 - σcp/fcd)
CRdc	0.18/γc	0.18/γc	1.25·0.18/γc	0.18/γc	0.18/γc	0.18/γc	0.12 (persistent or transient) 0.15 (accidental)	0.18/γc	0.18/γc	0.15/γc	0.18/γc	0.18/γc	0.18/γc	0.18/γc	0.15/ γc (dg < 16) 0.18/γc (dg >= 16)	0.18/γc	0.18/γc	0.18/γc	0.18/γc	0.18/γc	0.18/γc	0.18/γc	0.18/γc
Rhowmin	0.08sqrt(fck)/fyk	0.15fctm/fyd	0.08sqrt(fck)/fywk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.063 sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.256·fctm/fyd (pre) 0.16·fctm/fyd (other)	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	(0.1·√fck)/fyk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk	fctm/(7.5·fyk)	0.08sqrt(fck)/fyk	0.08sqrt(fck)/fyk
Beam Rhomin	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	Rhowmin (9.2.2(5))	아래 그림 참고	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	unlimited	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)	Separate table	min(0.26 fctm/dfy, 0.0013)	min(0.26 fctm/dfy, 0.0013)
Beam Rhomax	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	unlimited	0.04
Beam Slmax	0.75d(1 + cotα)	0.75d(1 + cotα) <= 250mm	0.75d(1 + cotα)	0.75d(1 + cotα)	400	0.75d(1 + cotα)	300	0.75d(1 + cotα)	0.75 d (1 + cot α) (h > 250mm) 0.90d (h ≤ 250mm)	Separate table	0.75d(1 + cotα)	0.75d(1 + cotα)	0.75d(1 + cotα)	0.75d(1 + cotα)	0.60 · h' · (1 + cot α)	0.75d(1 + cotα)	0.75d(1 + cotα)	0.75d(1 + cotα)	400	0.75d(1 + cotα)	Separate table	0.75d(1 + cotα)	0.75d(1 + cotα)
Column Rhomin	max(0.1NEd/fyd/Ag, 0.002)	0.13NEd/fyd/Ag ≥ 0.0026	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.002)	max(0.15 | NEd|/fyd/Ag, 0.003)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.003)	max(0.1NEd/fyd/Ag, 0.002)	0.2 fcd/fyd ≤ 0.5NEd/fyd /Ag ≤ 0.01	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.004)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.002)	max(0.1NEd/fyd/Ag, 0.003)	max(0.1NEd/fyd/Ag, 0.004/fyd)	0.002	max(0.1NEd/fyd/Ag, 0.002)
Column Scltmax	min(20*dia, dim, 400mm)	min(12ϕl, bmin, 250mm)	min(15ϕl, bmin, 300mm)	min(20*dia, dim, 400)	min(15ϕl, bmin, 300mm)	min(20*dia, dim, 400mm)	min(20*dia, dim, 400mm)	min(15ϕl, bmin, 400mm)	min(20*dia, dim, 400mm)	min(12ϕl, bmin, 300mm)	min(20*dia, dim, 400mm)	min(20*dia, dim, 400mm)	min(12*dia, dim, 250mm)	min(15ϕl, bmin, 300mm)	min(15ϕl, bmin, 400mm)	min(20*dia, dim, 400mm)	min(15ϕl, bmin, 300mm)	min(20*dia, dim, 400mm)	min(15ϕl, bmin, 300mm)	min(12ϕl, bmin, 300mm)	min(15ϕl, bmin, 300mm)	min(20*dia, dim, 400mm)	min(20*dia, dim, 400mm)

22 National Annexes

17. Eurocode 22 National Annexes for RC and PSC Design

- ***Crack Width by Exposure Classes***

Recommended

Table 7.1N Recommended values of w_{max} (mm)

Exposure Class	Reinforced members and prestressed members with unbonded tendons	Prestressed members with bonded tendons
	Quasi-permanent load combination	Frequent load combination
X0, XC1	0,4[1]	0,2
XC2, XC3, XC4	0,3	0,2[2]
(AC2) XD1, XD2, XD3, XS1, XS2, XS3 (AC2)		Decompression

Note 1: For X0, XC1 exposure classes, crack width has no influence on durability and (AC1) this limit is set to give generally acceptable appearance. In the absence (AC1) of appearance conditions this limit may be relaxed.

Note 2: For these exposure classes, in addition, decompression should be checked under the quasi-permanent combination of loads.

Austria

7.3.1 (105)

*When choosing the "**Austrian ÖNORM-EN NA method**" the values of maximal calculated crack width are given in the National Annex:*

Maximal crack width table [mm]

Exposure class	RM (Quasi)	RM (Freq)	POST (Freq)	POST (Quasi)	POST (Char)	PRE (Freq)	PRE (Quasi)	PRE (Char)
X0, XC1	0.3	-	0.2	-	-	0.2	-	-
XC2, XC3, XC4, XD1, XS1	0.3	-	0.2	-	-	-	-	0.2
XD2, XS2	0.3	-	-	-	0.2	-	-	0.2

Belgium

Tableau 7.101N-ANB – Valeurs recommandées de w_{max} [mm].

Type d'éléments	Eléments en béton armé ou en béton précontraint sans armatures de précontrainte adhérente	Eléments en béton précontraint à armatures adhérentes
Superstructure de pont route	**0,2**	Aucune décompression
Superstructure de pont-rails	**0,3**	Aucune décompression
Autres superstructures	**0,2**	Aucune décompression
Infrastructures (piles et culées)	**0,3**	0,2
Soutènements de terres	**0,2**	0,2
Ancrages de réactions	**0,3**	Aucune décompression

Czech

Maximal crack width table [mm]

Exposure class	RM (Quasi)	PRE (Freq)	PRE (Char)	POST-PL1 (Freq)	POST-PL2+3 (Freq)
X0, XC1	0.4	0.2	0	0.2	0.3
XC2, XC3, XC4, XD1, XS1	0.3	0.1	0	0.2	0.3
XD2, XD3, XS2, XS3	0.2	-	0.2	0.1	0.2

Denmark

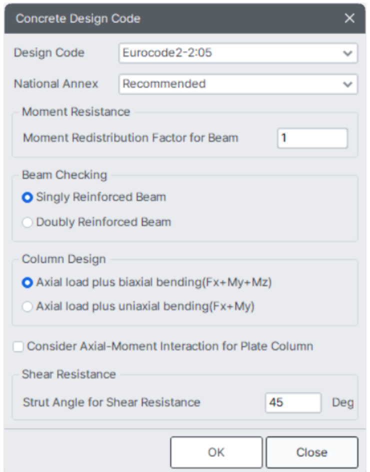
Table 7.1 NA - Recommended maximum values of calculated crack widths w_{max} (mm)

Environmental class	Non-prestressed reinforcement	Prestressing tendons
Extra aggressive	0,2 mm	0,1 mm
Aggressive	0,3 mm	0,2 mm
Moderate	0,4 mm	0,3 mm

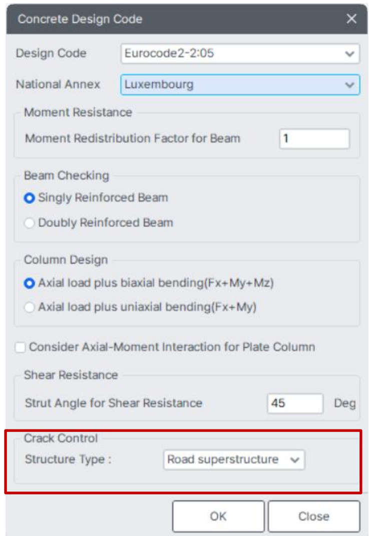
17. Eurocode 22 National Annexes for RC and PSC Design

- ***Design > RC Design > Design Code Option***

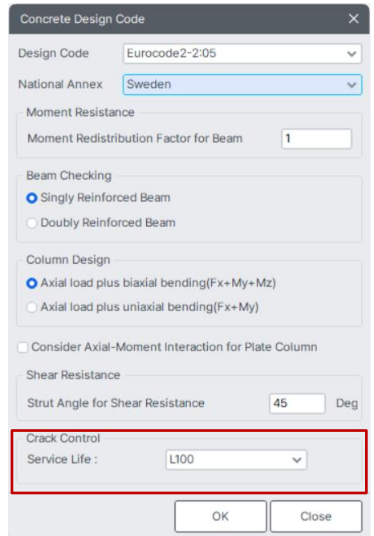
Recommended



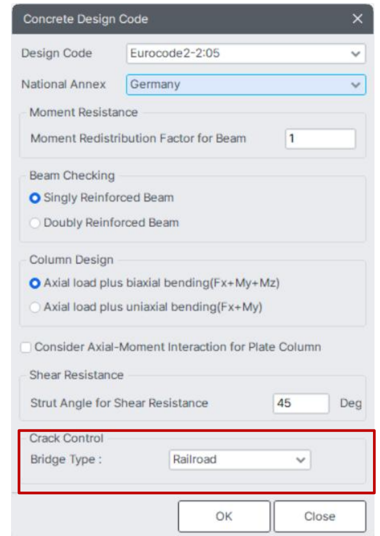
Luxembourg



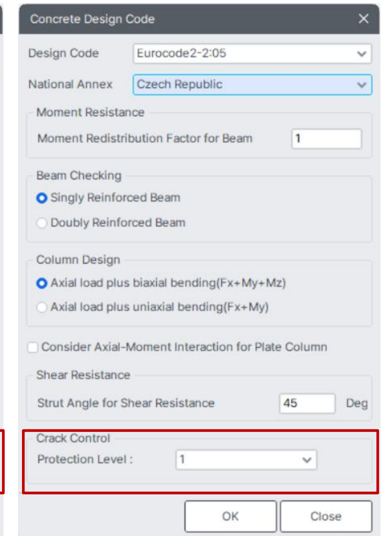
Sweden



Germany

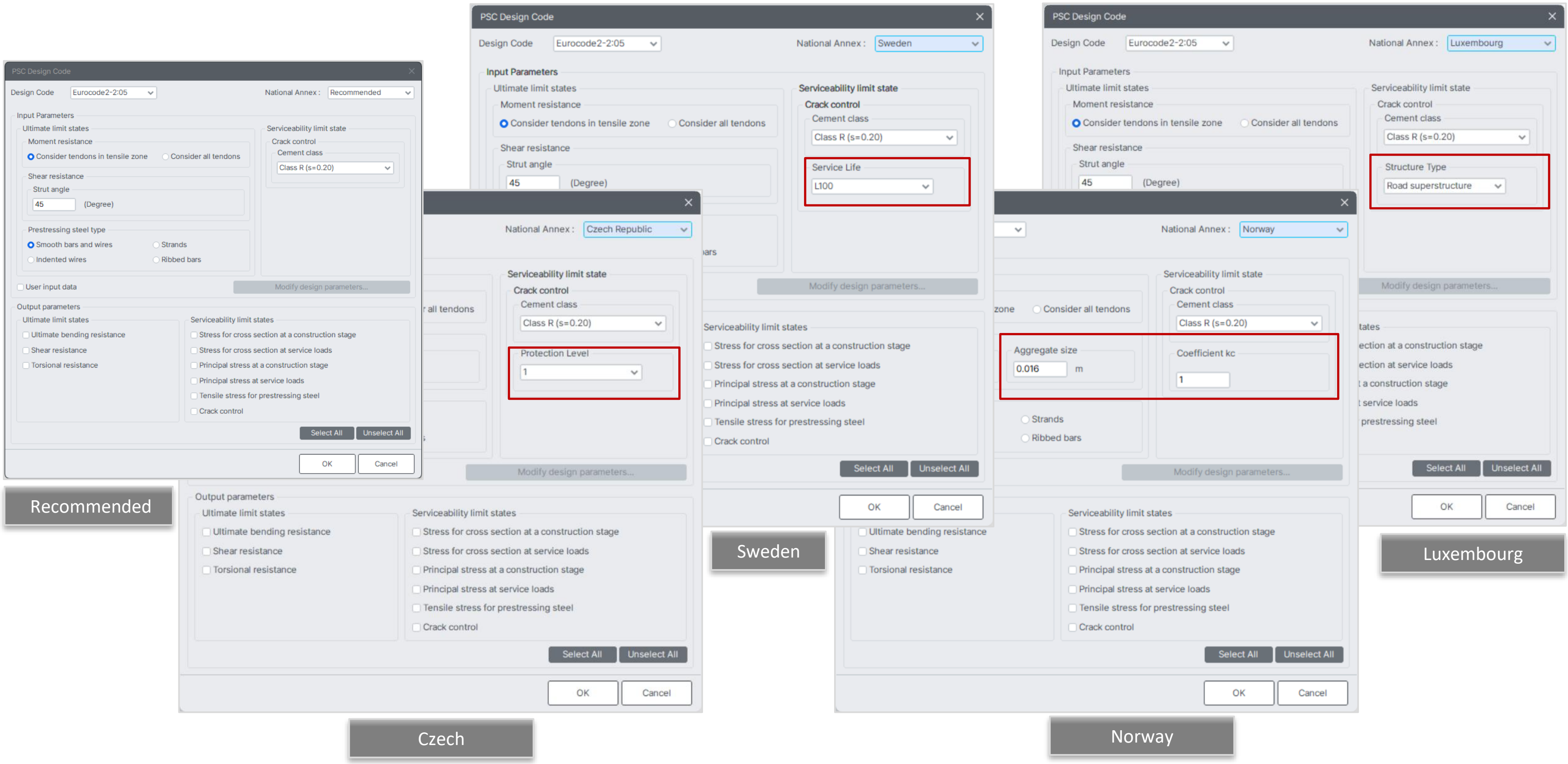


Czech



17. Eurocode 22 National Annexes for RC and PSC Design

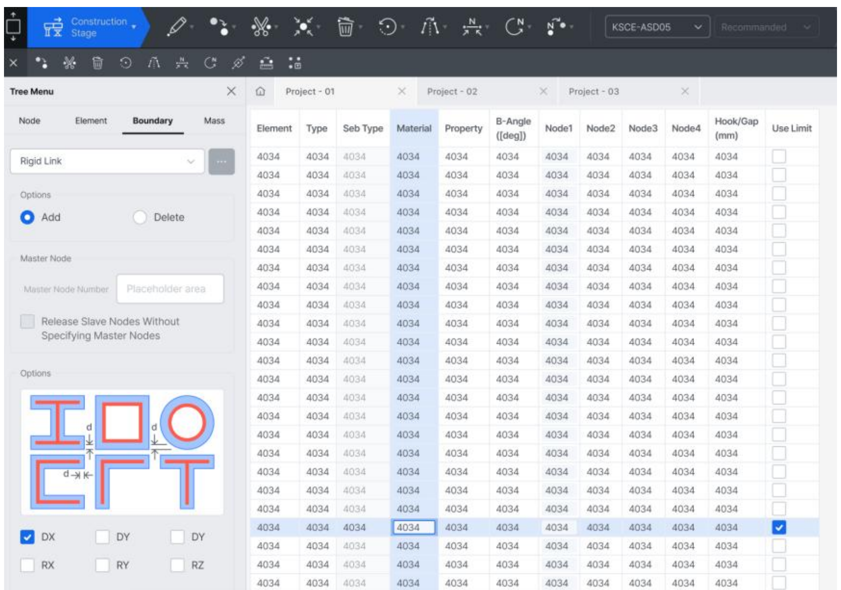
- ***Design > PSC Design > Design Code Option***



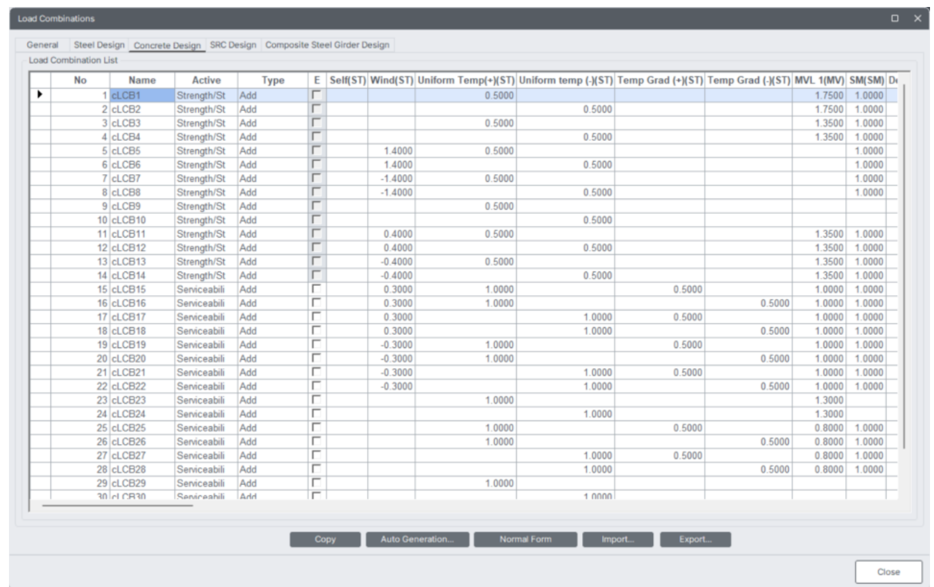
18. Enhancements in Output Table Performance and Visual Design

- In MIDAS Civil NX 2025, the output table processing time has been improved, achieving a reduction of approximately 30% compared to MIDAS Civil 2025.
- Additionally, the table color scheme has been updated to align with the new design framework of Civil NX, enhancing visual consistency and user experience.

Test model	Type of table	midas Civil (sec)	MIDAS CIVIL NX (sec)	Reduced rate(%)
Model 1	Plate forces/moments	198.81	133.95	-0.33
	Plane-Stress/Plate Stresses_Plate Force	19.92	12.93	-0.35
	Plane-Stress/Plate Stresses_Plate Stress	48.04	31.38	-0.35
Model 2	Beam Forces/Moments	12.76	8.31	-0.35
	Beam Forces/Moments_View by Max Value	1258.93	93.15	-0.93



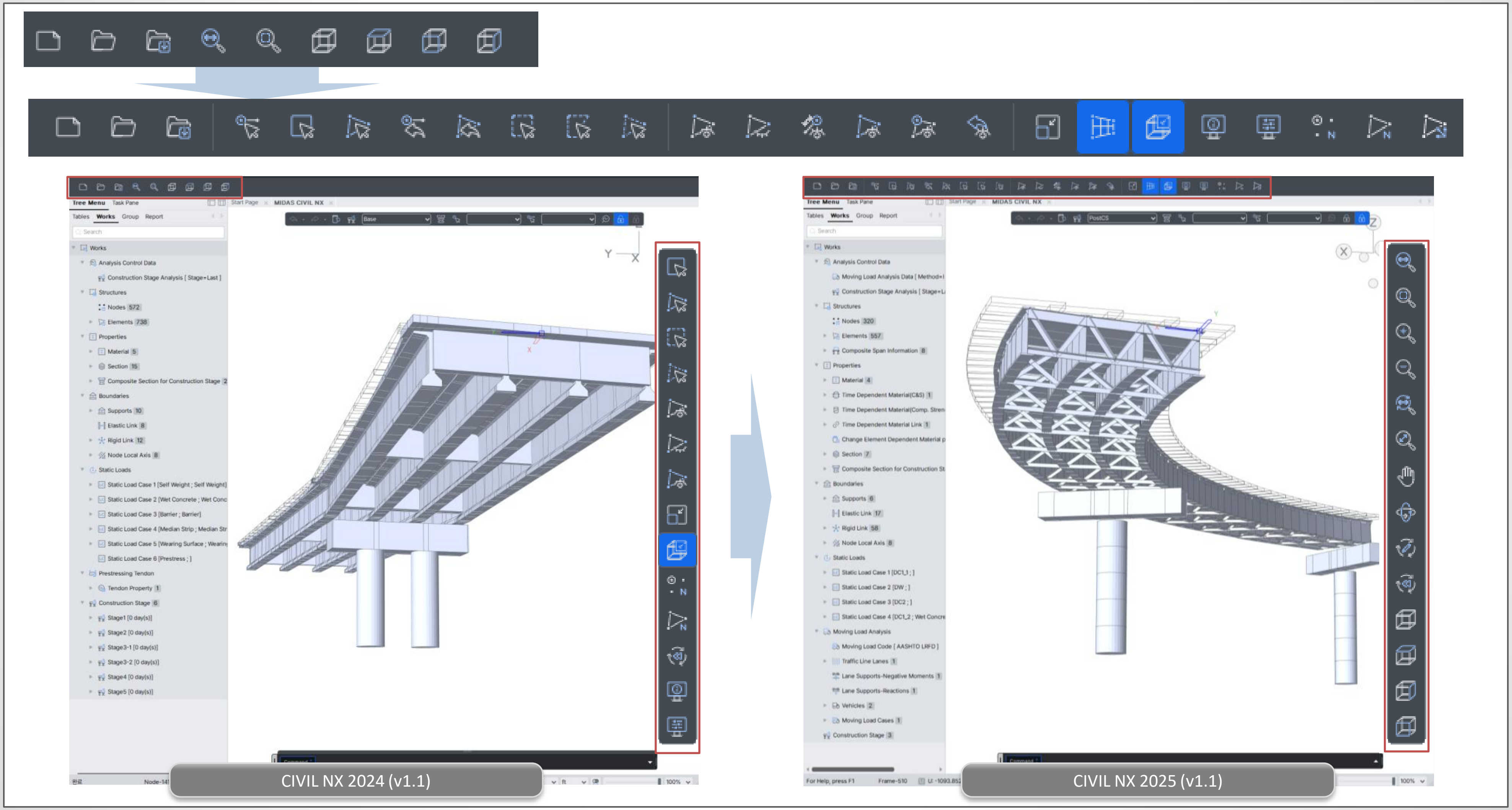
Section Properties Table



Load Combinations Dialog Box

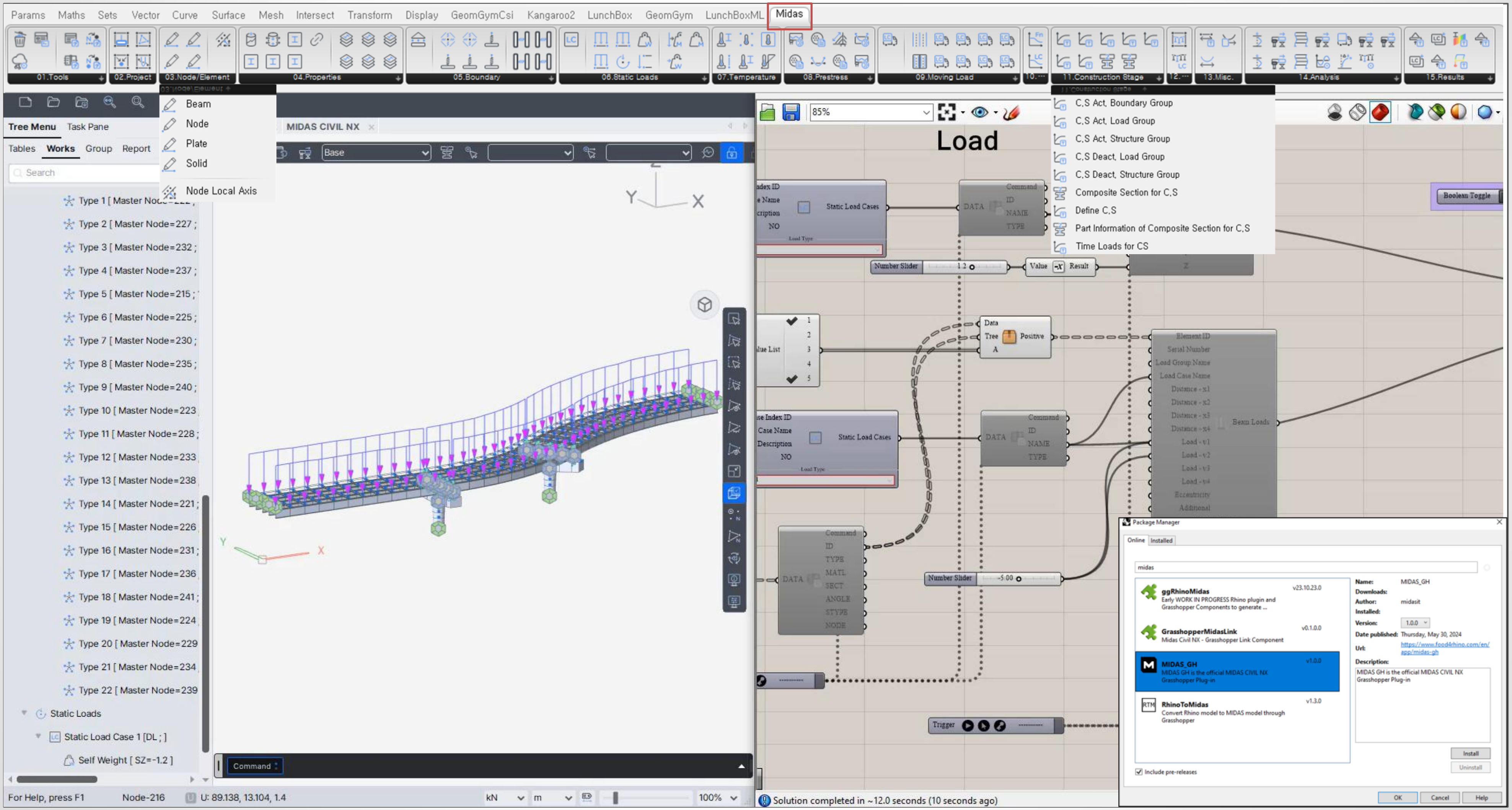
19. Updates to Default Settings of the Custom Toolbar

- The default icons in both the Custom Toolbar and the Vertical Toolbar have been updated to align with those used in the previous version of midas Civil, ensuring a consistent user experience.



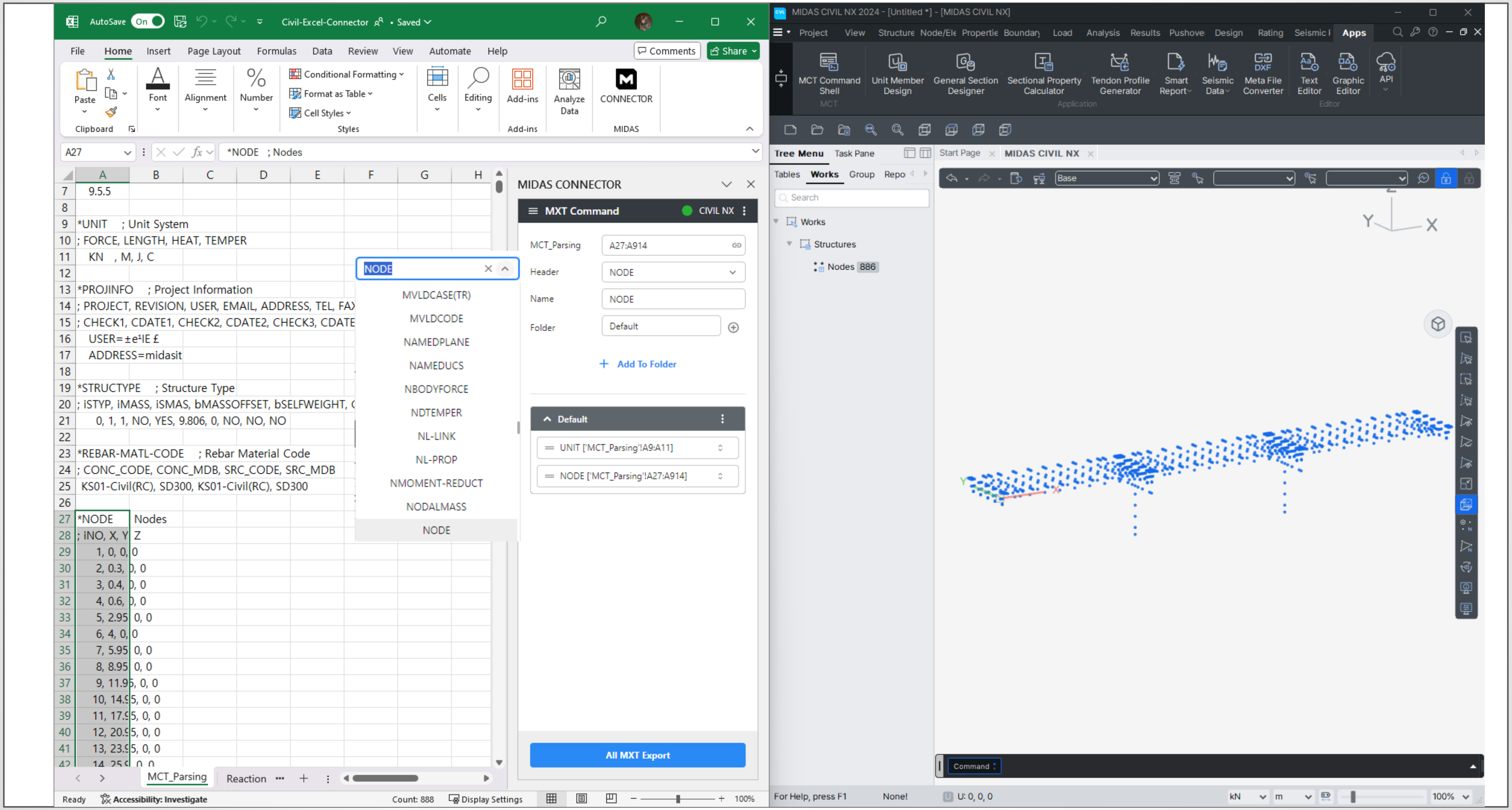
20. Grasshopper Plug-in

- Users can connect their Rhino + Grasshopper structure models with MIDAS CIVIL NX using the complimentary MIDAS GH plug-in via Package Manager.
- The MIDAS GH provide from geometry components to moving load, Construction Stages, CIVIL NX material and section database, and more.



21. Excel Add-in with MCT

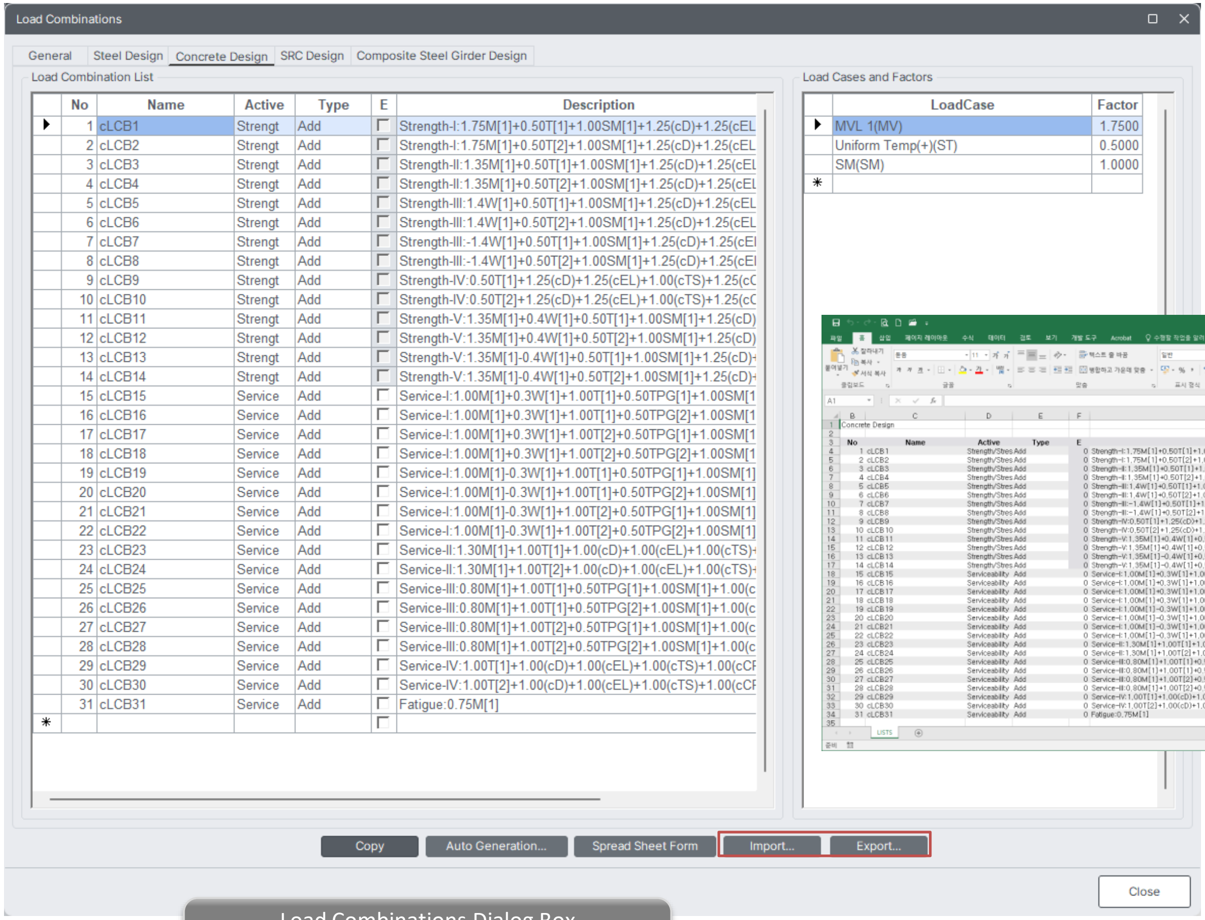
- The users can use their existing calculating sheets using MIDAS CONNECTOR. This Add-in parsing the data using APIs, and it is more flexible to create, modify, and delete components.
- Usage: 1. Select all components and connect to MCT_Parsing 2. Search Command 3. Give a name 4. Select a folder 5. Click add to Folder button, and 6. Press the All MXT Export button.



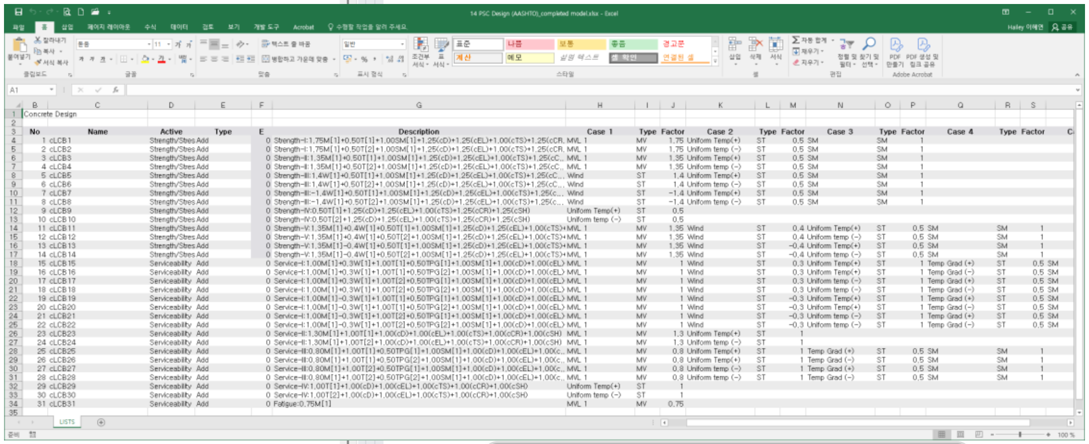
22. Import and export function in Load Combinations

- In previous version, load combination data could be imported in *.lcb format, while it was exported in *.lcp format. The difference in file formats and structures between the import and export features made it challenging to generate load combinations outside of the dialog box.
- In the latest version, users can seamlessly import and export load combinations in a uniform MS Excel format, enhancing usability and workflow efficiency.

- ***Results > Load Combinations***



Load Combinations Dialog Box



Excel Format Load Combinations

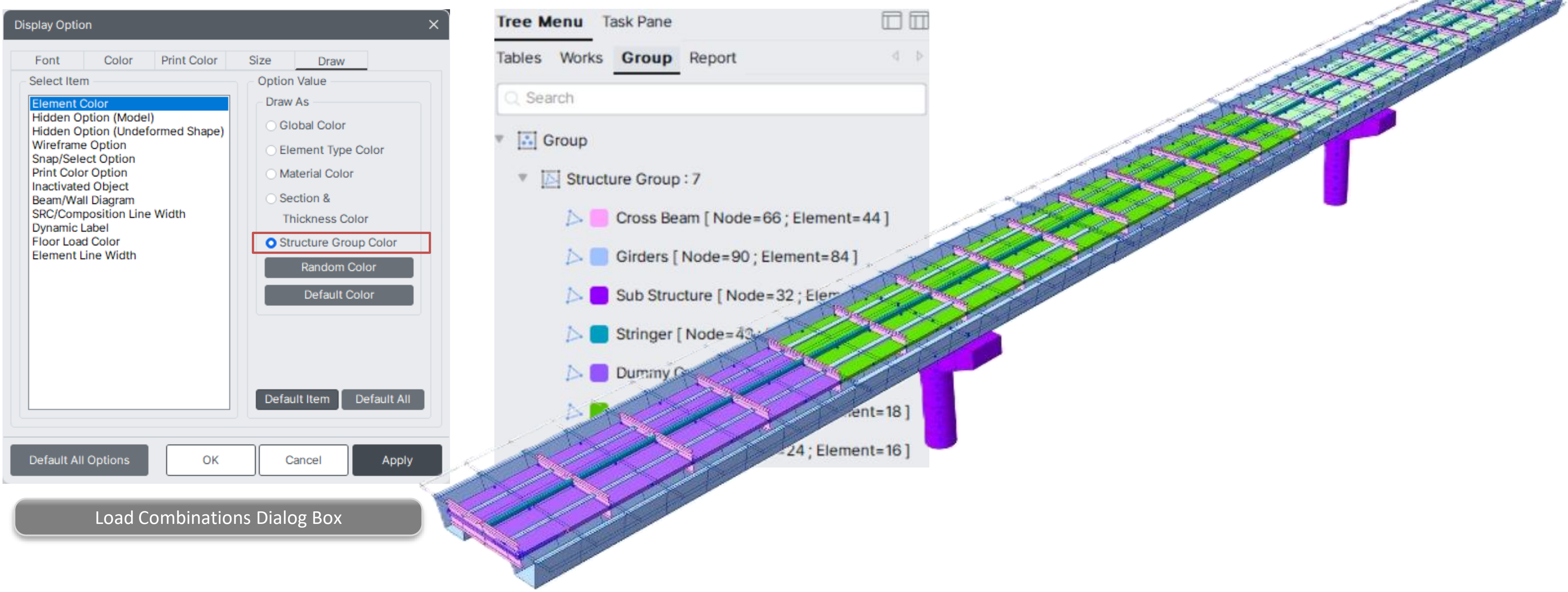
23. Improvements to Element Color Display for Structural Groups

- In the previous version, when the Element Color option was set to display Structural Group Colors, elements belonging to more than two structural groups were displayed with a single color labeled as Duplicated Designation. This often occurred in models containing construction stages or moving load data, where elements were commonly assigned to multiple structural groups.
- In the new version, elements assigned to more than two structural groups will now be displayed based on the following priority:

  Priority 1: The structural group with the smallest number of elements among the assigned structural groups.

  Priority 2: The structural group listed first in the structural group order.
- This enhancement ensures clearer visualization and improved distinction between overlapping structural group assignments.

▪ ***View > Display > Display Option***



Load Combinations Dialog Box