Release Note

Release Date : Oct. 07, 2021

Product Ver. : Civil 2022 (v1.1)

DESIGN OF CIVIL STRUCTURES

Integrated Solution System for Bridge and Civil Engineering

Enhancements

1. UK CS 454 Bridge Assessment for Steel Composite Girder
2. UK High-Speed Train Loads Database for Train Load Generator
3. Train Load Generator Time Forcing Function Improvement
4. AS 5100.5:17 Update for midas GSD
5. Italy NTC 2018 RS function
6. Auto-generation of Beam Section Temperature Loads (AASHTO, Eurocode, Australia)
7. Load Rating LRFR 2019 Update to AASHTO MBE 3rd edition
8. Traffic Load AK, N11 Update to Russia Standard
9. Longitudinal Stiffener Input Measured from Bottom of Steel Composite Girder

1. UK CS 454 Bridge Assessment for Steel Composite Girder

- Steel composite girder assessment to CS 454 and CS 457 has been added.

- ***Rating> Steel Bridge > CS 454/20***


Design Manual for Roads and Bridges

highways england

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Llywodraeth Cymru
Welsh Government

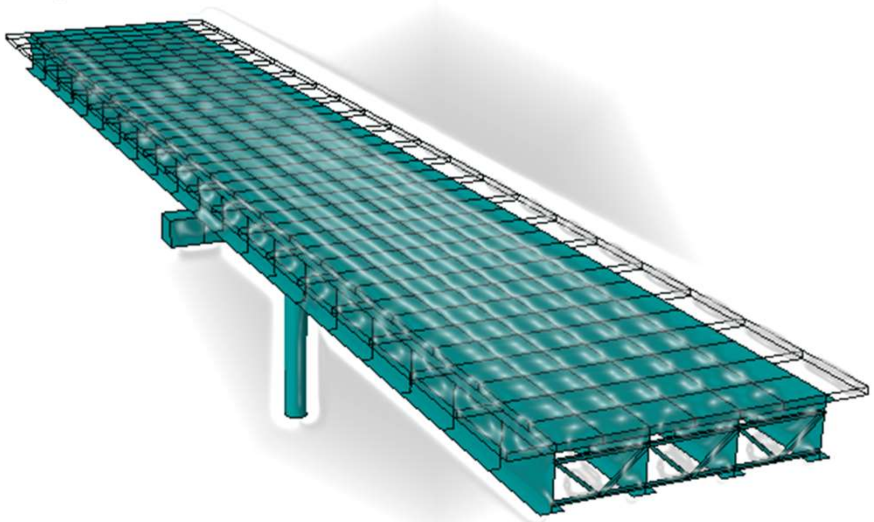
Department for Infrastructure
An Roinn Bonneagair

Highway Structures & Bridges
Inspection & Assessment

CS 457
The assessment of composite highway bridges and structures

(formerly BD 61/10)

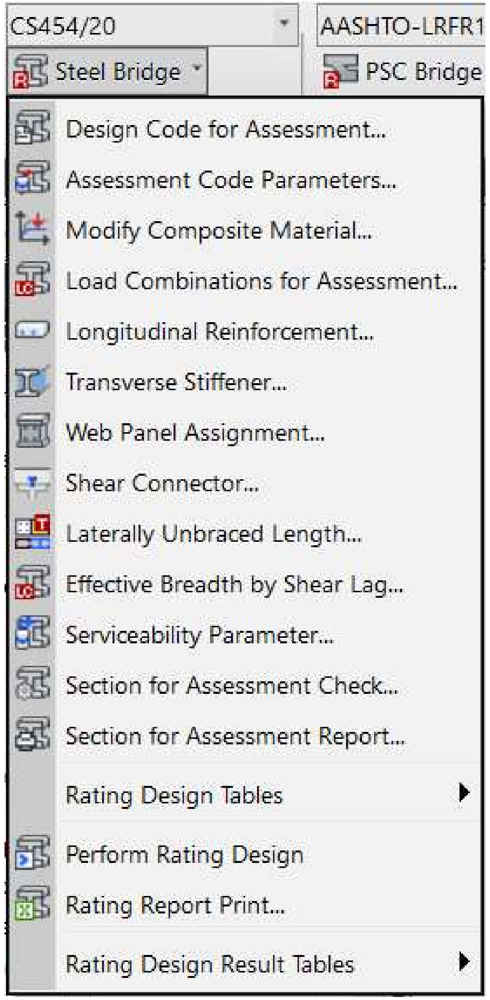
Revision 1



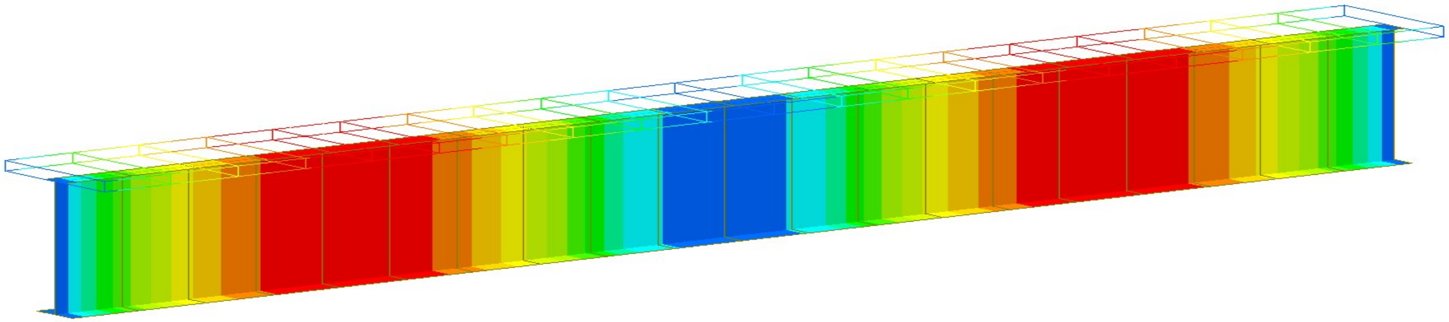
1. UK CS 454 Bridge Assessment for Steel Composite Girder

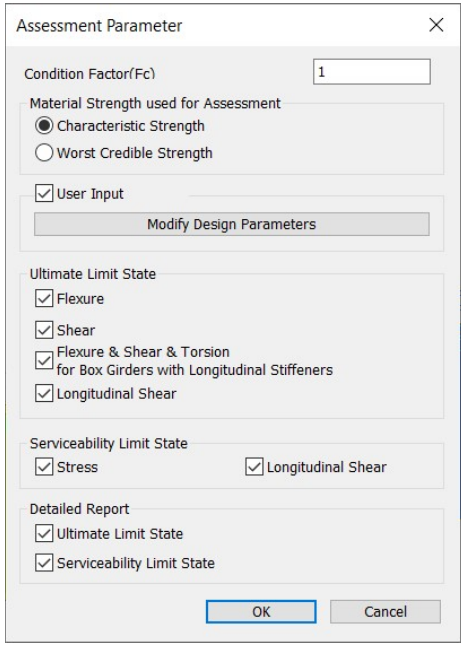
- Level 1 assessment can be performed now for the **steel composite girders** in midas Civil.
- Assessment load combinations can be defined to obtain output for strength & service limit states.

▪ ***Rating> Steel Bridge*** ***> CS 454/20***

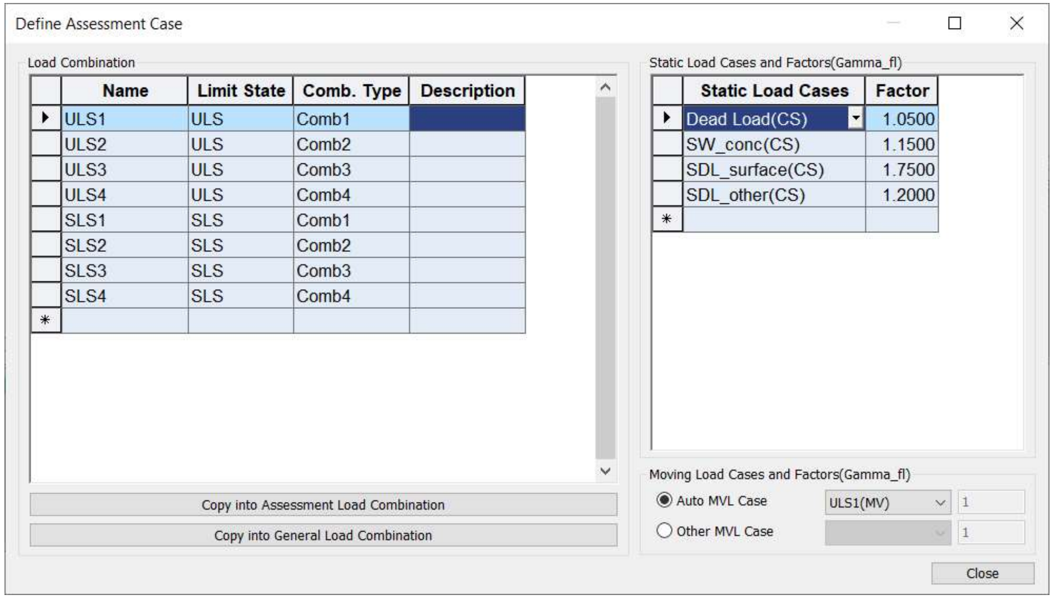


Assessment Input





Assessment Parameters

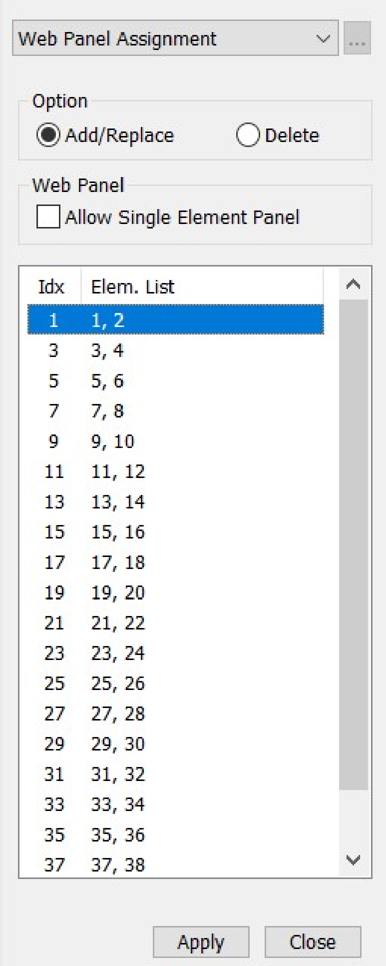


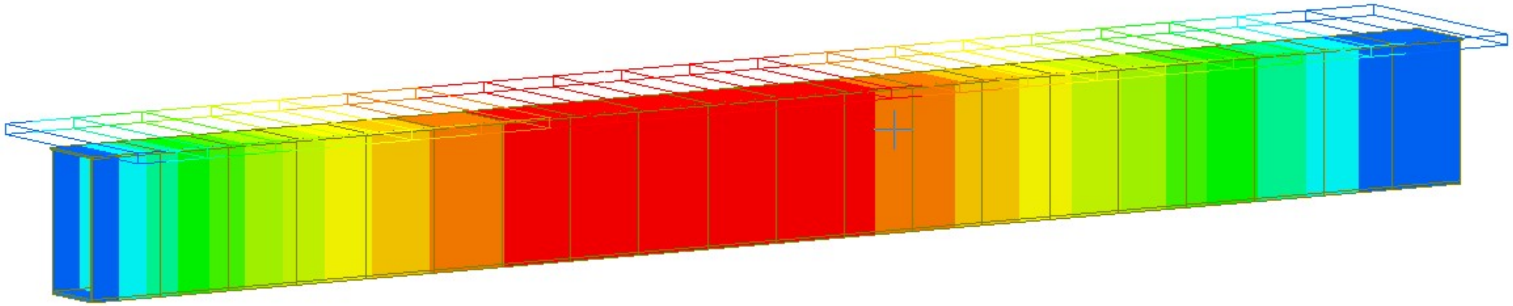
Load Combination for Assessment

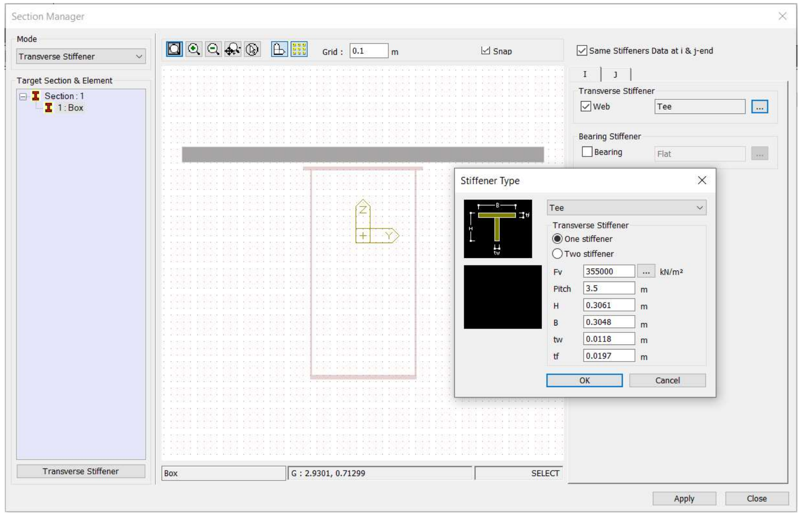
1. UK CS 454 Bridge Assessment for Steel Composite Girder

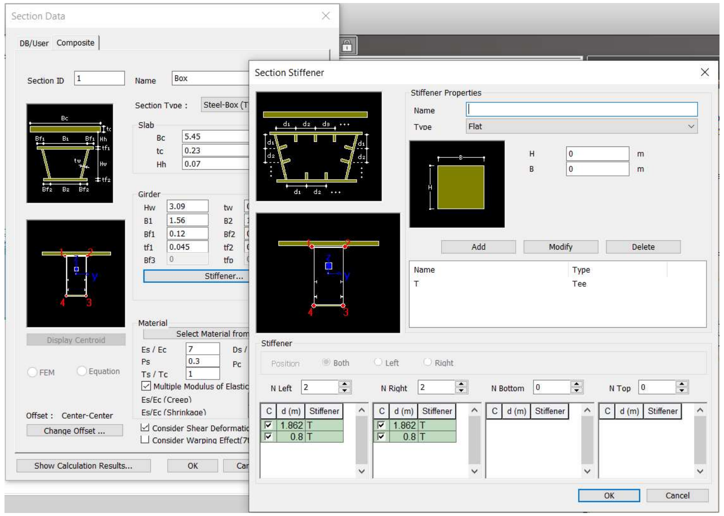
- Assessment can be performed depending on section types such as plate girders and box girders. (Note: Box girder assessment will not be included in this release.)
- Stiffeners in the transverse and longitudinal direction, web panels, shear connectors can be defined.

▪ ***Rating> Steel Bridge > CS 454/20***









Web Panel Assignment

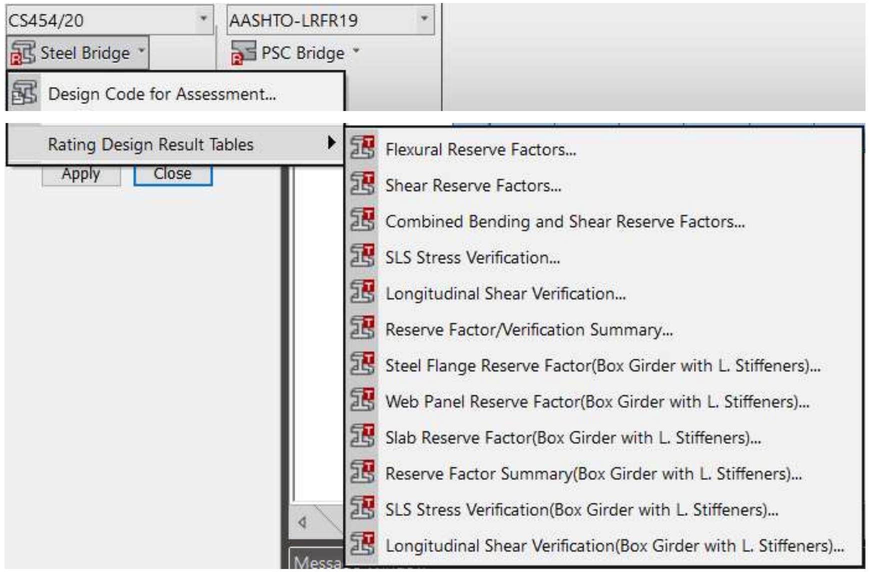
Transverse Stiffeners

Longitudinal Stiffeners

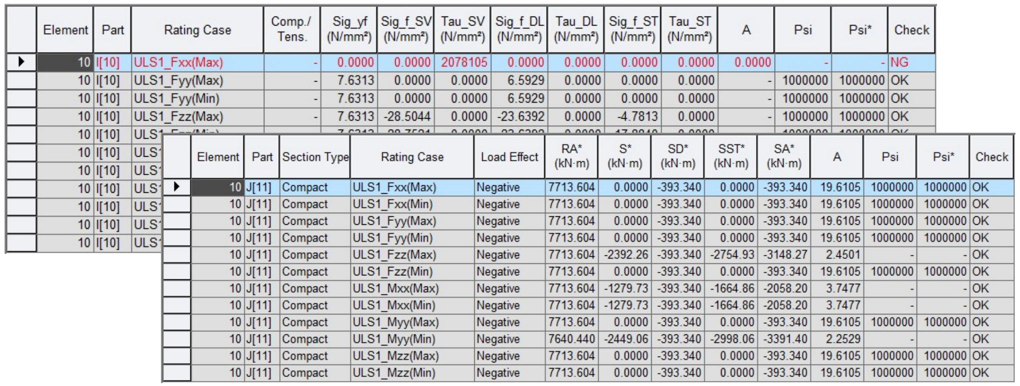
1. UK CS 454 Bridge Assessment for Steel Composite Girder

- Assessment results can be viewed in tabular format in midas Civil itself and these can be exported to excel file as well.
- Both summary ands detailed report are provided for the bending, shear, combined bending and shear, longitudinal shear checks and service limit state.

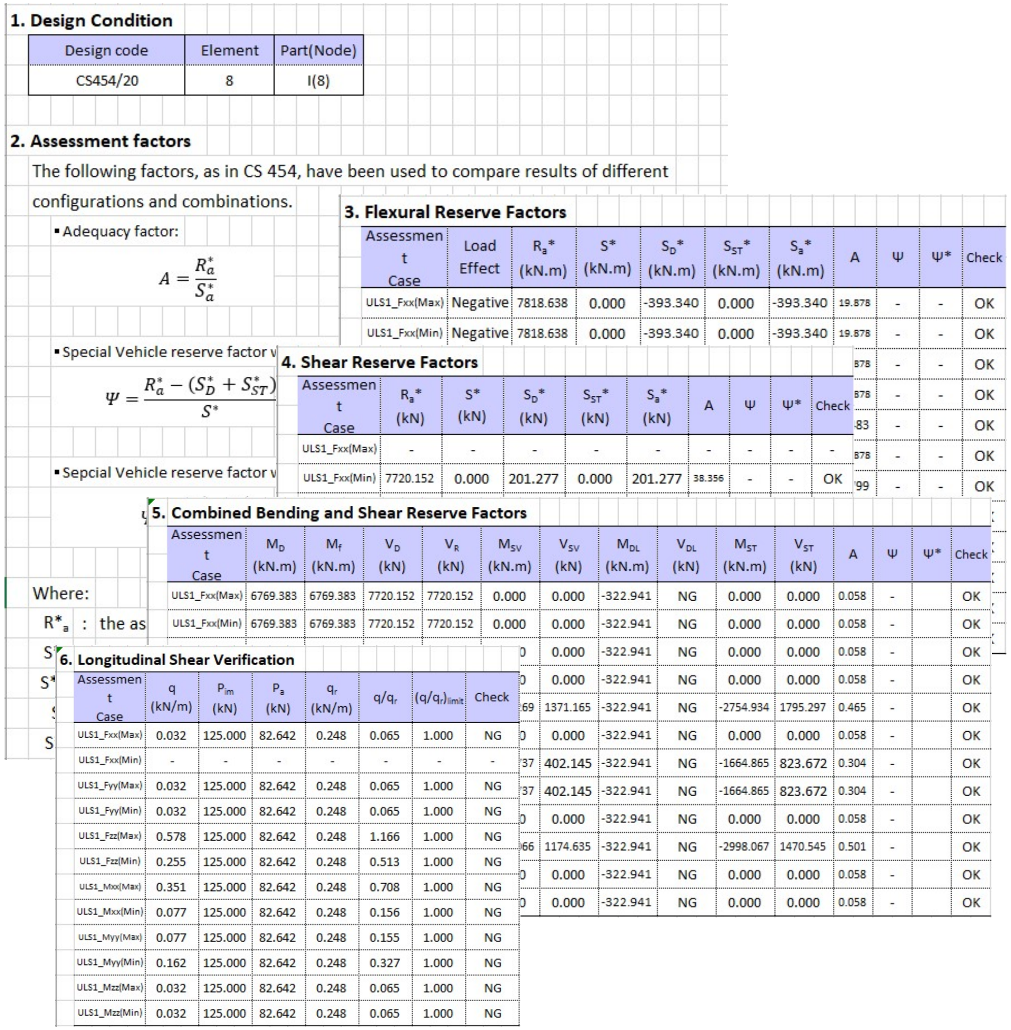
- ***Rating> Steel Bridge > CS 454/20***



Assessment Result Tables



Tabular Output in midas Civil

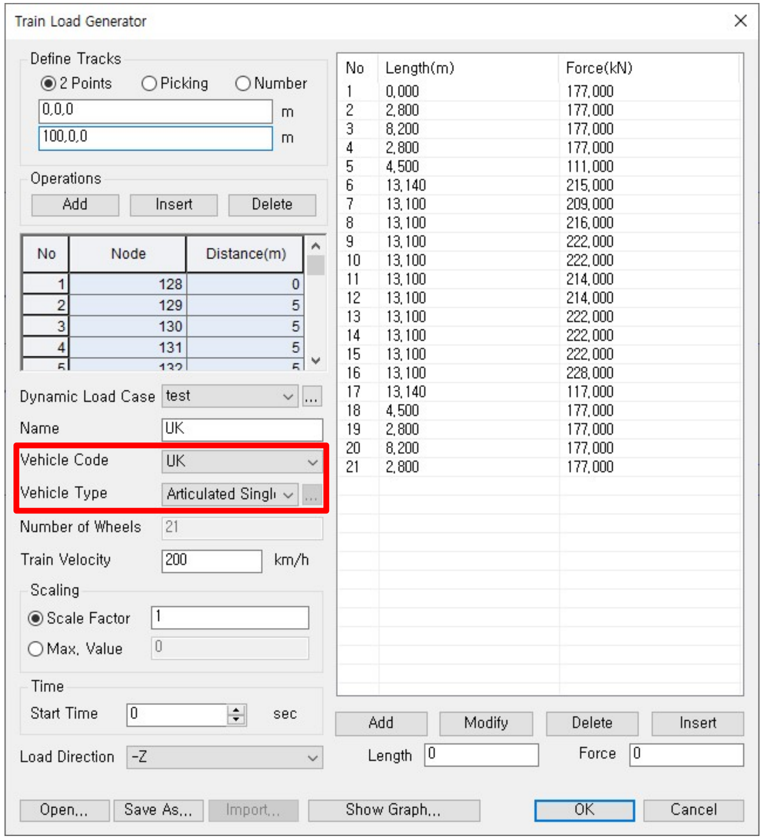


Excel Report Output

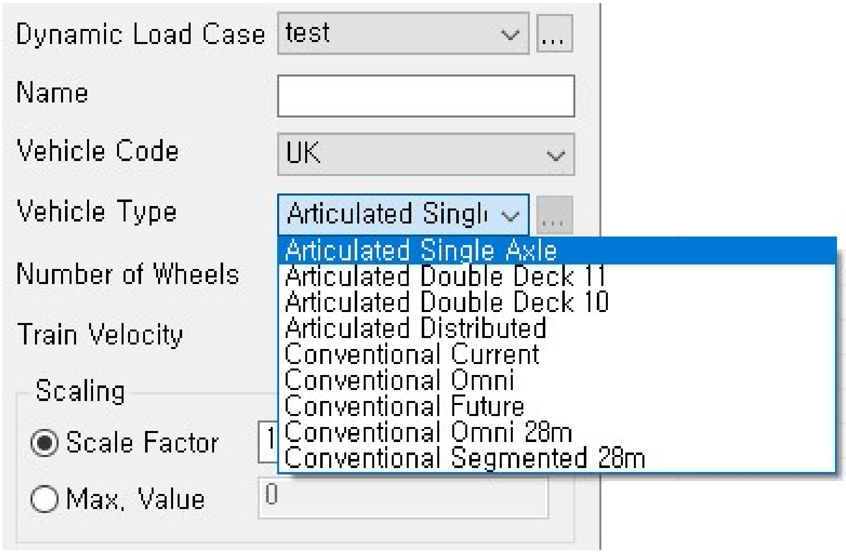
2. UK High-Speed Train Loads Database for Train Load Generator

- UK high-speed train loads database are available in the Train Load Generator.
- UK Vehicle data is provided as per the clause of UK HS2.

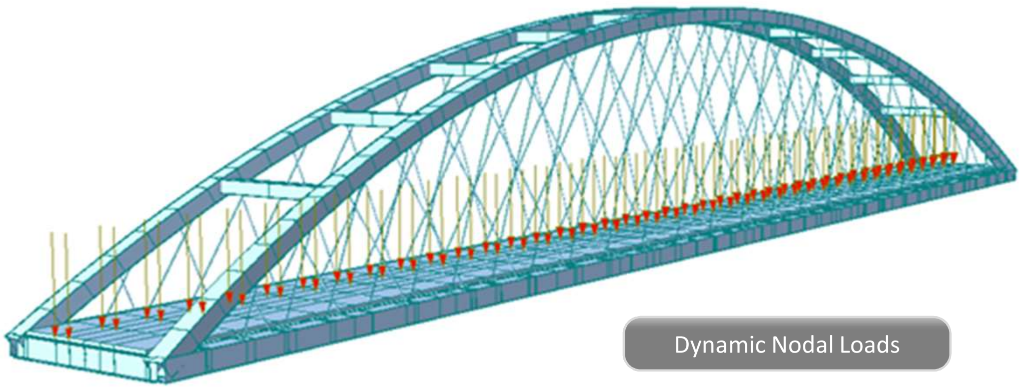
▪ ***Load > Dynamic Loads > Time History Analysis Data > Train Load Generator > Vehicle Code - UK***



Train Load Generator



Vehicle Code & Type

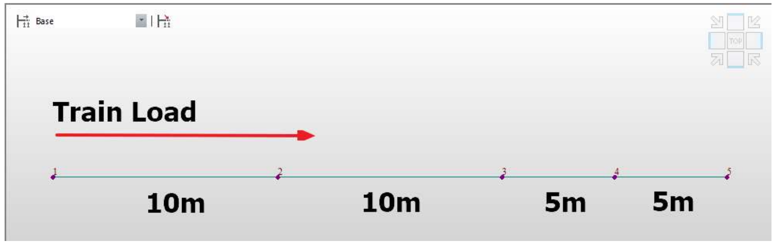


Dynamic Nodal Loads

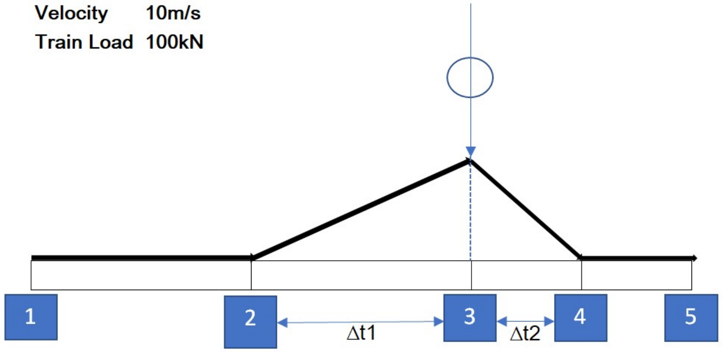
3. Train Load Generator Time Forcing Function Improvement

- Time-history function is improved for the nodes which have different distances between nodes.
- Time-history function is also improved for the first node and the last node of the track.

- ***Load > Dynamic Loads > Train Load Generator***



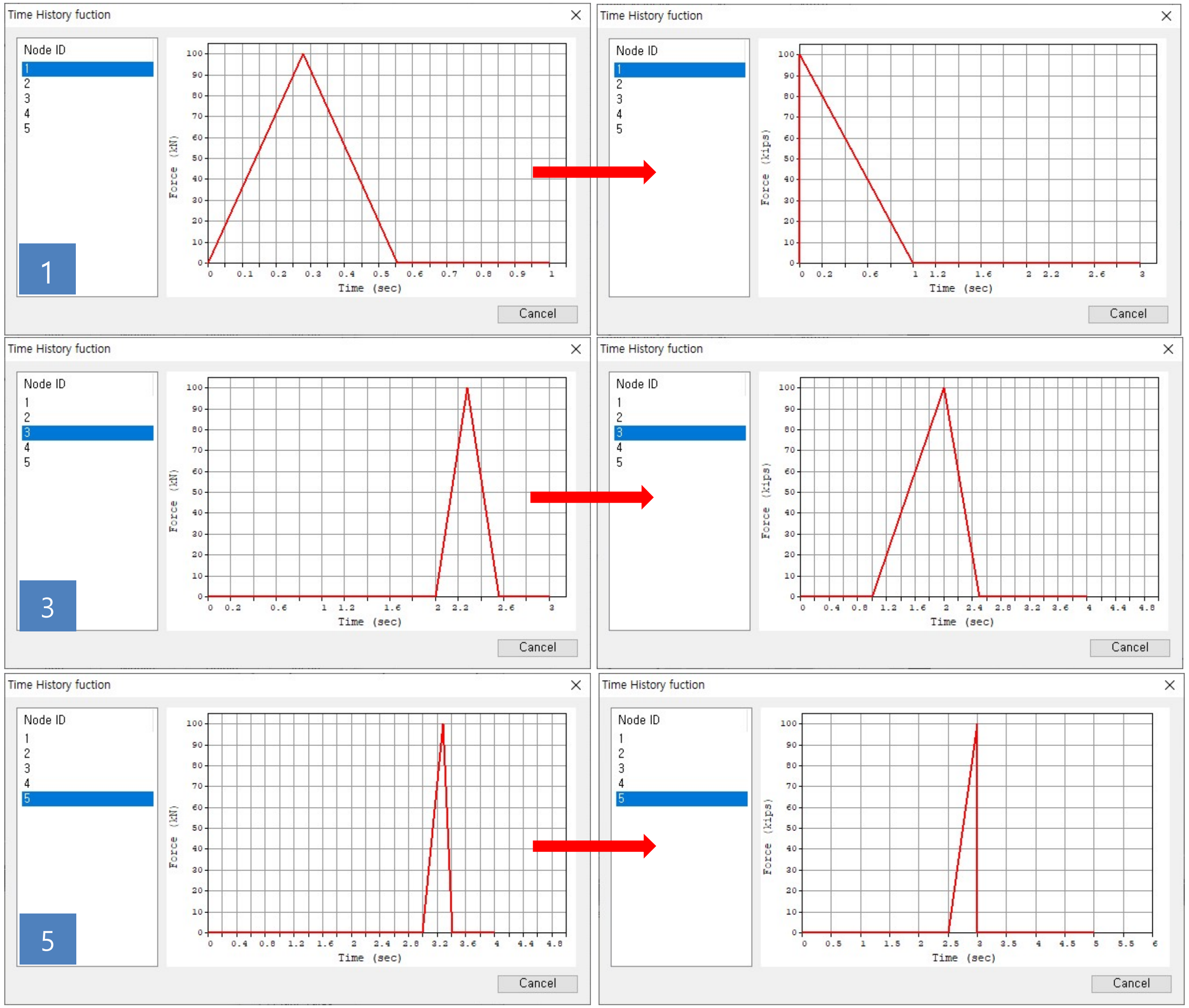
Velocity 10m/s
Train Load 100kN



Δt1 = (distance between node 2 to 3)/ (velocity)

Δt2 = (distance between node 3 to 4)/ (velocity)

Generation of time-history function



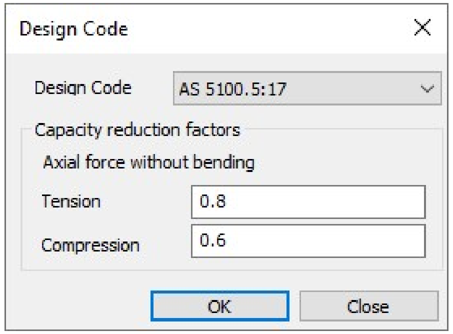
Civil 2021 v1.1

Civil 2022 v1.1

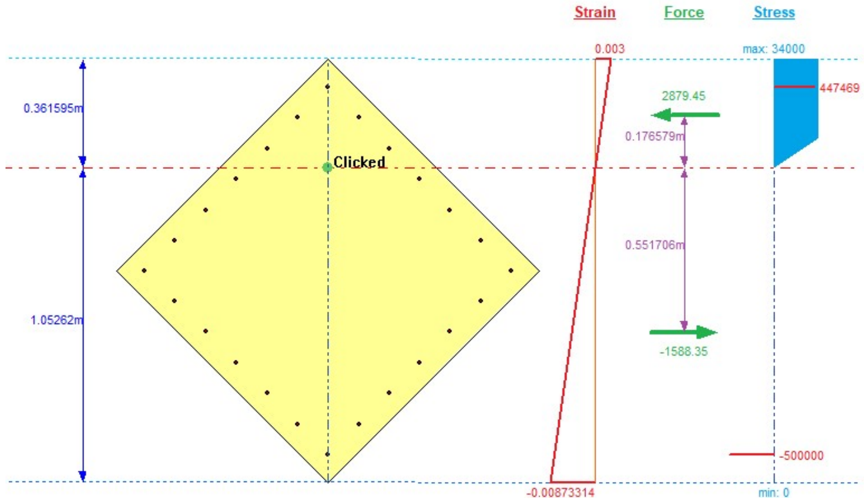
4. AS 5100.5:17 Update for midas GSD

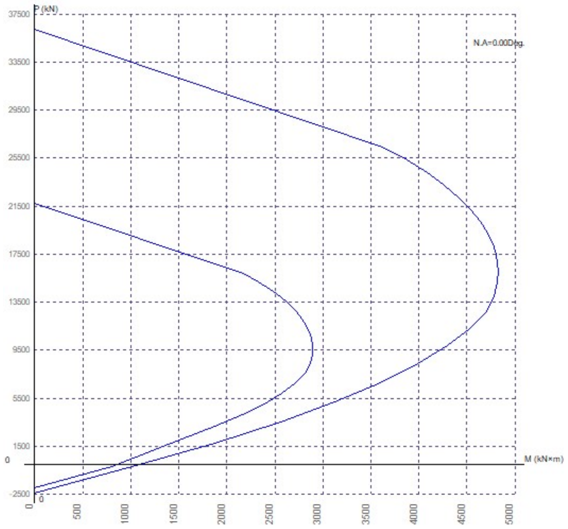
- Factored & unfactored P-M curve, M-M curve and stress contours based on AS 5100.5:17 can now be generated in midas GSD.
- Accurate M-M curve calculations with incremental NA rotation is adopted as it could be used for any section shape. This is preferred over traditional empirical approach in the code.

- ***Load > Temp./Prestress > Tendon Prestress***

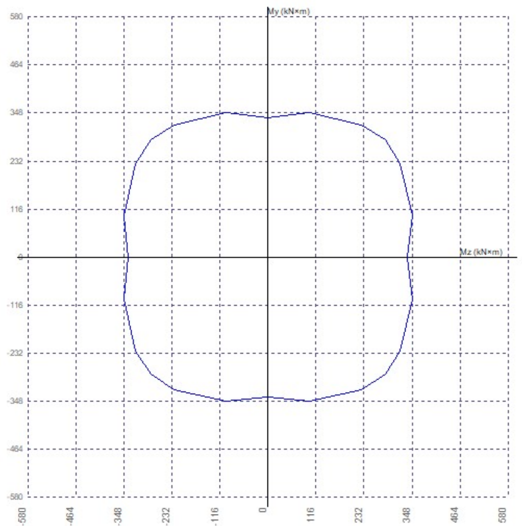


Design Code & Reduction Factors

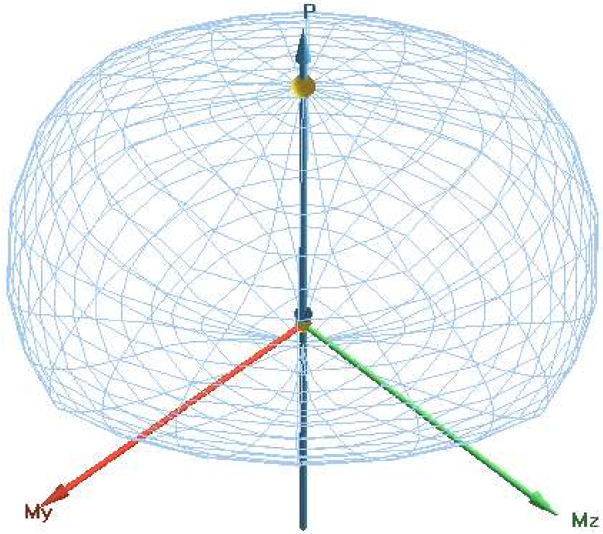




Factored & Unfactored P-M Curve



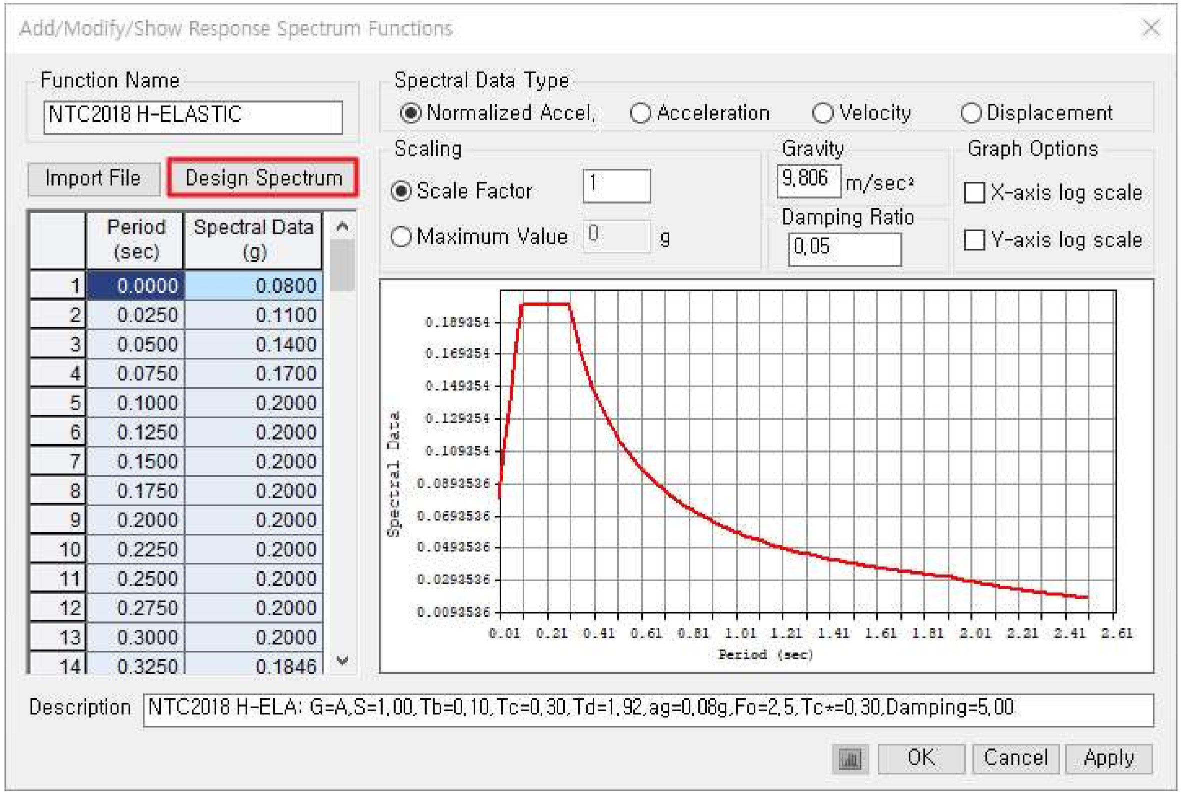
M-M Curve using Incremental NA Rotation



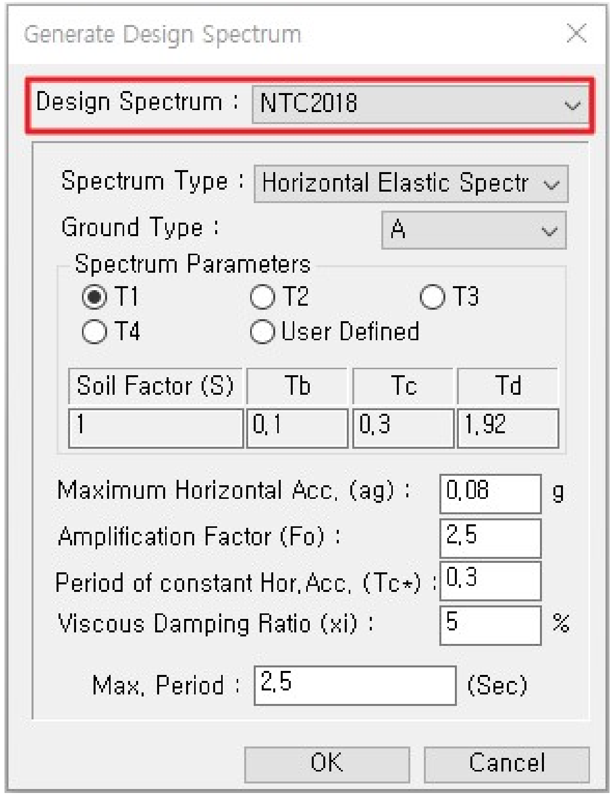
5. Response Spectrum Function: Italy NTC 2018

- Response spectrum function as per Italy NTC 2018 has been added.

▪ ***Load > Dynamic Loads > RS Functions***



Response Spectrum Functions

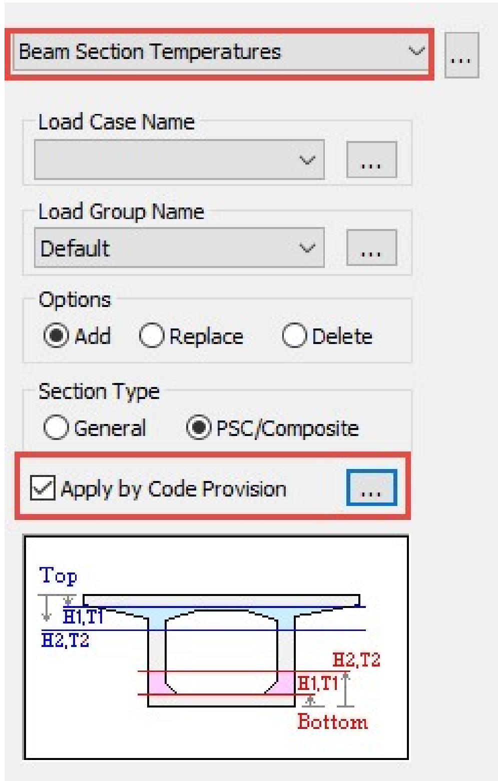


Design Spectrum inputs

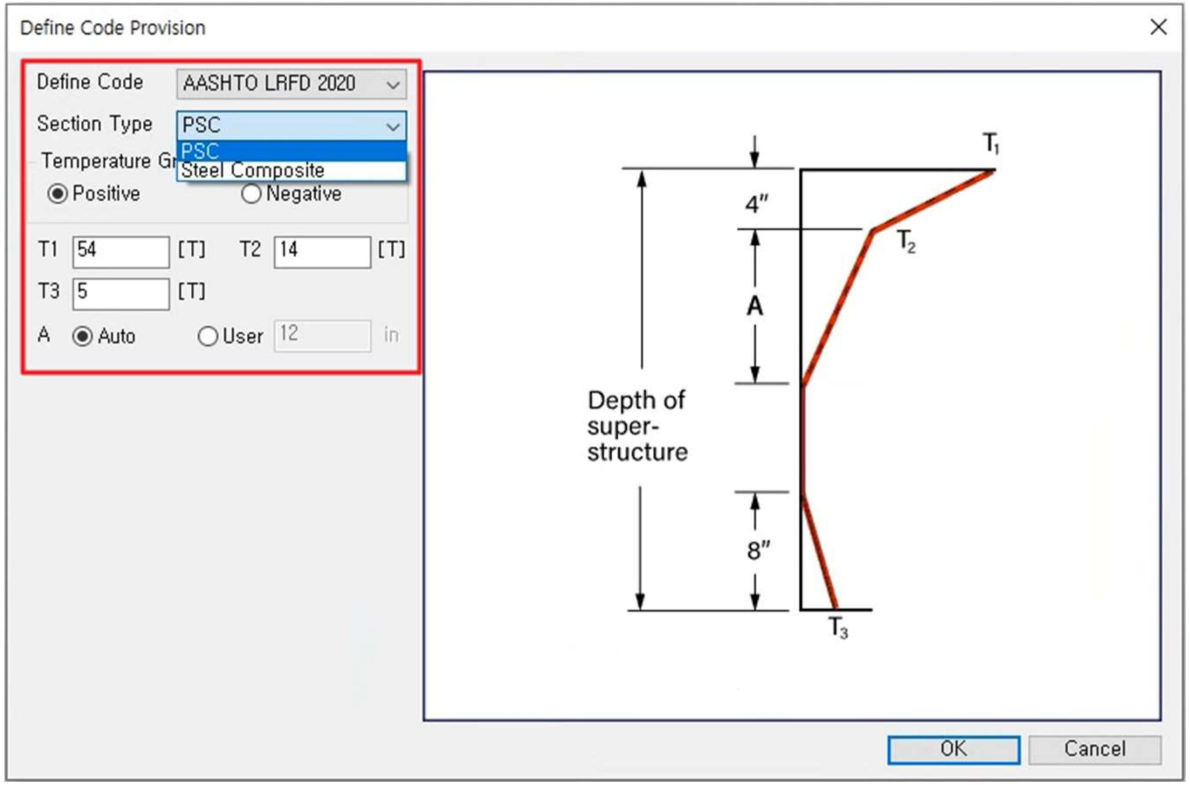
6. Auto-generation of Beam Section Temperature Loads (AASHTO, Eurocode, Australia)

- Auto definition of the temperature gradient for PSC and Steel composite girders as per AASHTO LRFD 2020.
- Applicable for sections defined from PSC, Composite tab (not applicable for SPC and Value type sections).

▪ ***Load > Temp/Prestress> Beam Section Temperature > AASHTO LRFD 2020***



Beam Section Temperature

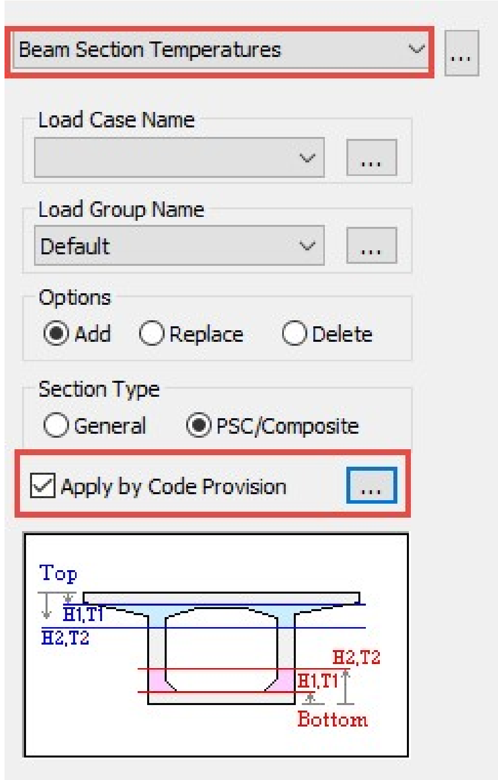


Auto Option as per Code Provision

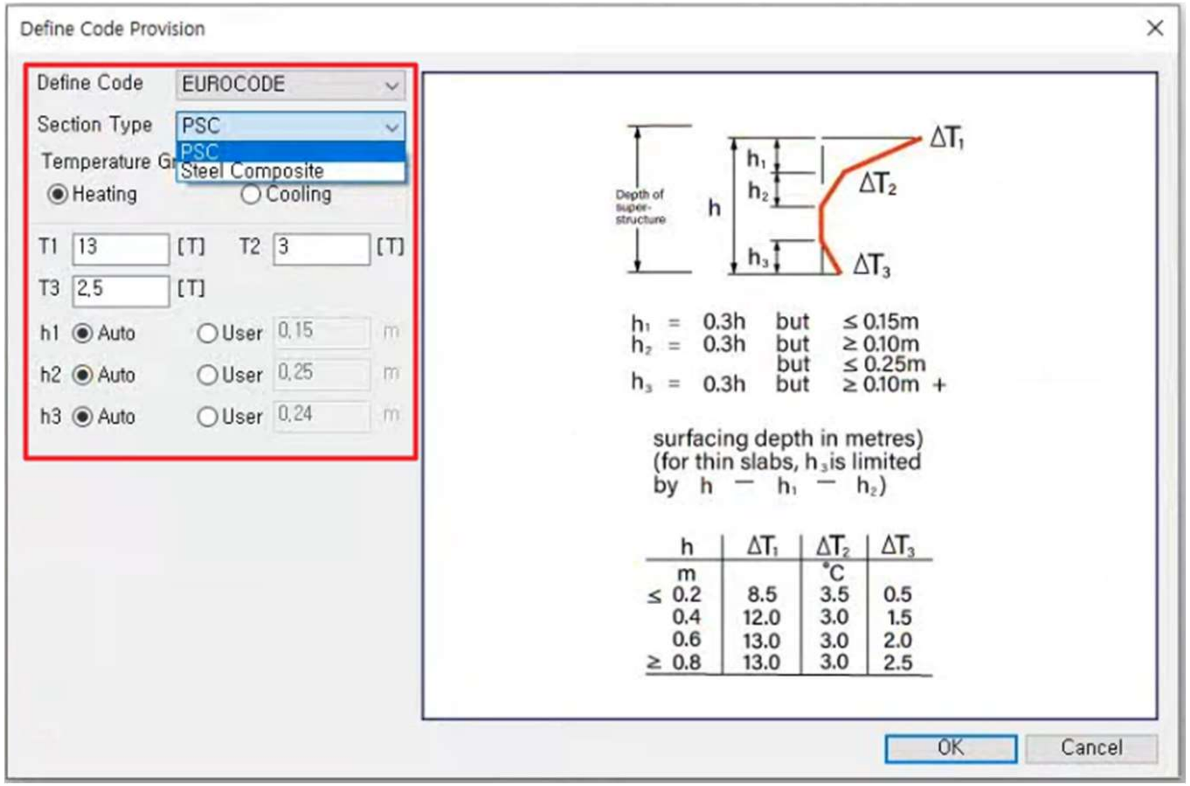
6. Auto-generation of Beam Section Temperature Loads (AASHTO, Eurocode, Australia)

- Auto definition of the temperature gradient for PSC and Steel composite girders as per Eurocode.
- Applicable for section defined from PSC, Composite tab (not applicable for SPC and Value type sections).

- ***Load > Temp/Prestress> Beam Section Temperature > Eurocode***



Beam Section Temperature

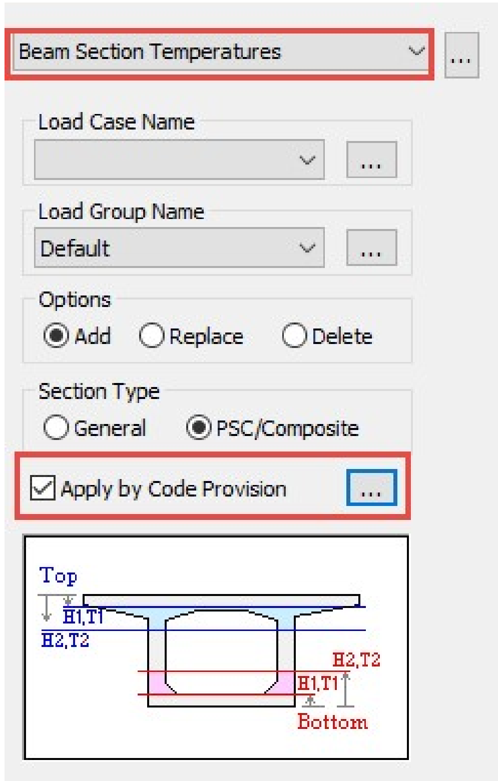


Auto Option as per Code Provision

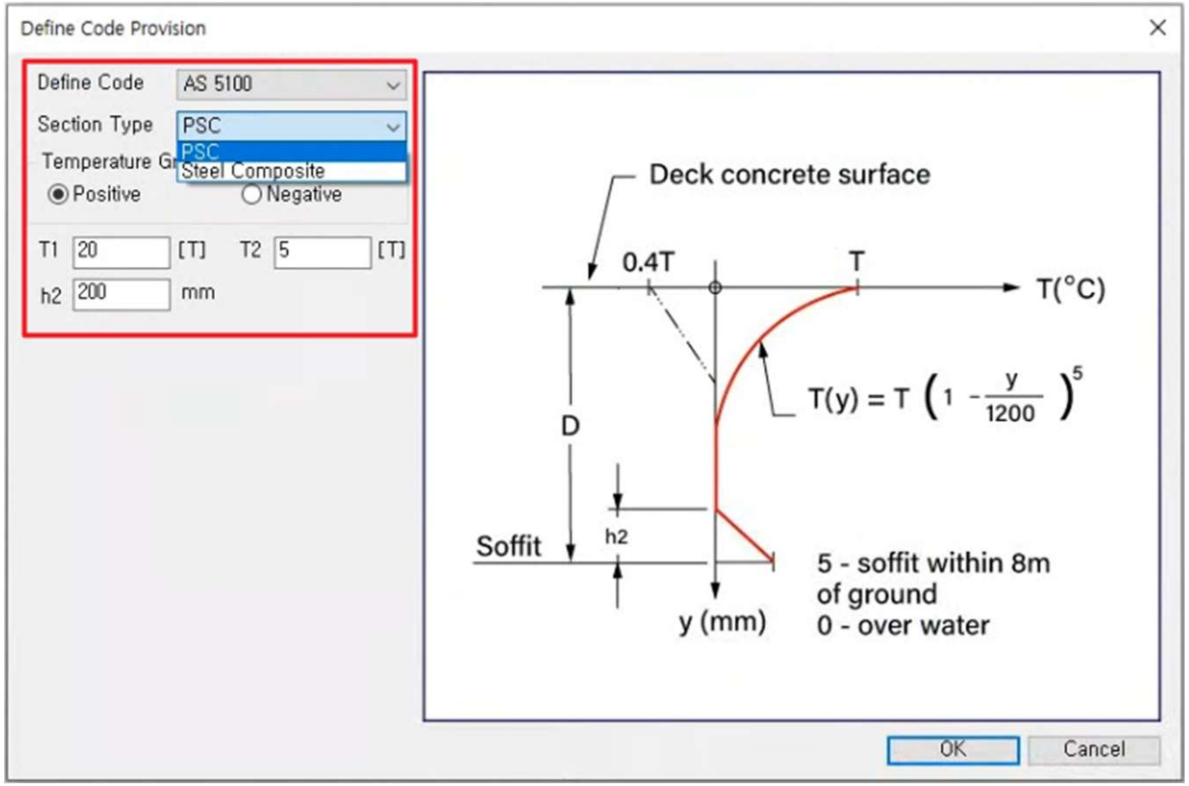
6. Auto-generation of Beam Section Temperature Loads (AASHTO, Eurocode, Australia)

- Auto definition of the temperature gradient for PSC and Steel composite girders as per AS 5100.
- Applicable for section defined from PSC, Composite tab (not applicable for SPC and Value type sections).

▪ ***Load > Temp/Prestress> Beam Section Temperature > AS 5100***



Beam Section Temperature



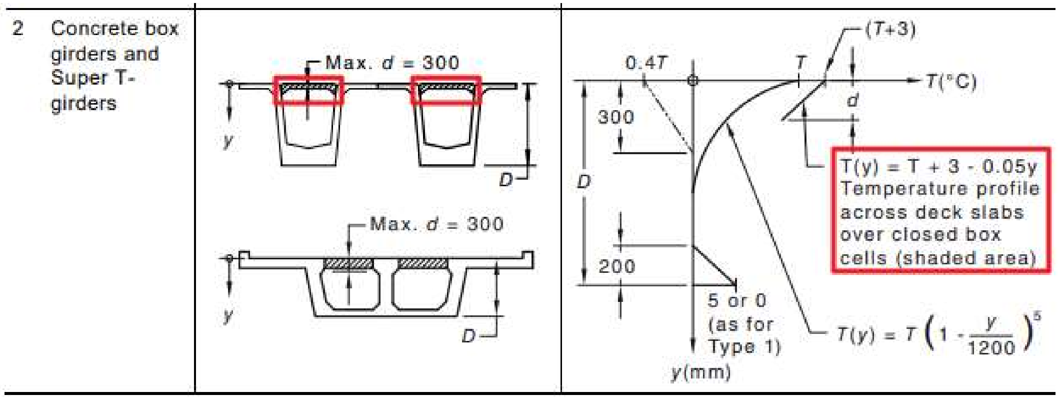
Auto Option as per Code Provision

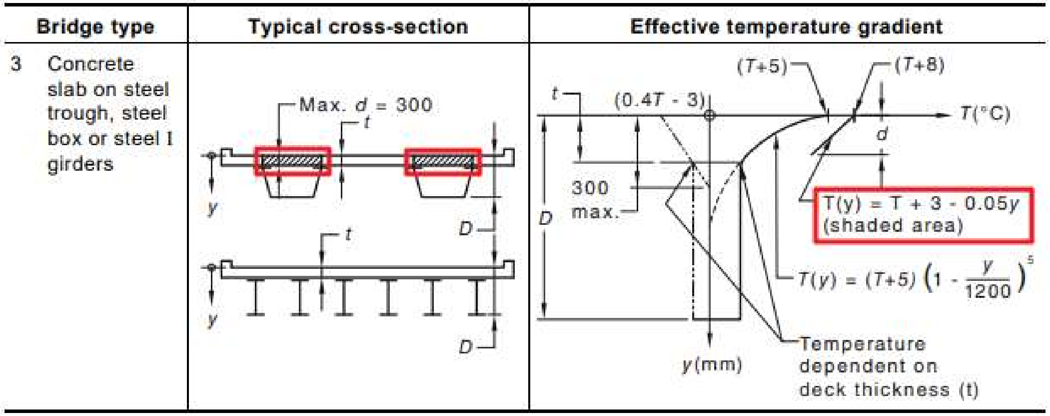
6. Auto-generation of Beam Section Temperature Loads (AASHTO, Eurocode, Australia)

- The AS 5100 standard has different temperature distributions between the shaded area and other area of the top slab of the PSC sections, but in this function, the temperature distribution of other area is applied to the whole area of the top slab.
- It is recommended to use the General Section Type in Beam Section Temperatures to apply the temperature distribution of the shaded area.

▪ ***Load > Temp/Prestress > Beam Section Temperature > General Type***

Beam Section Temperature



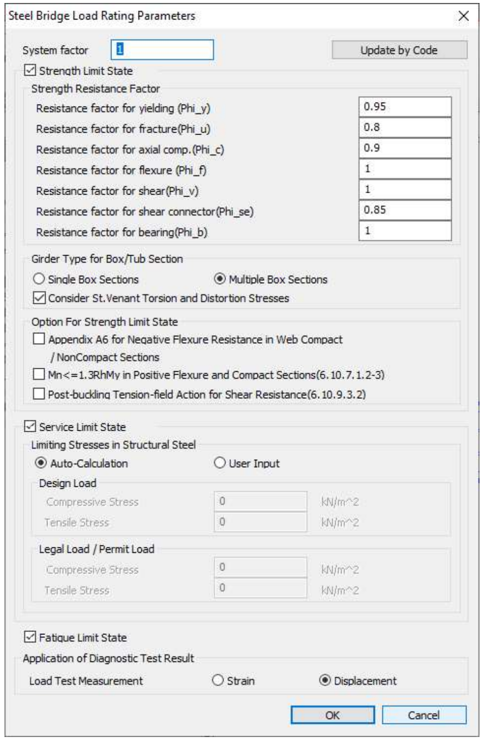


AS 5100 Standard (PSC/Composite, Steel/Composite)

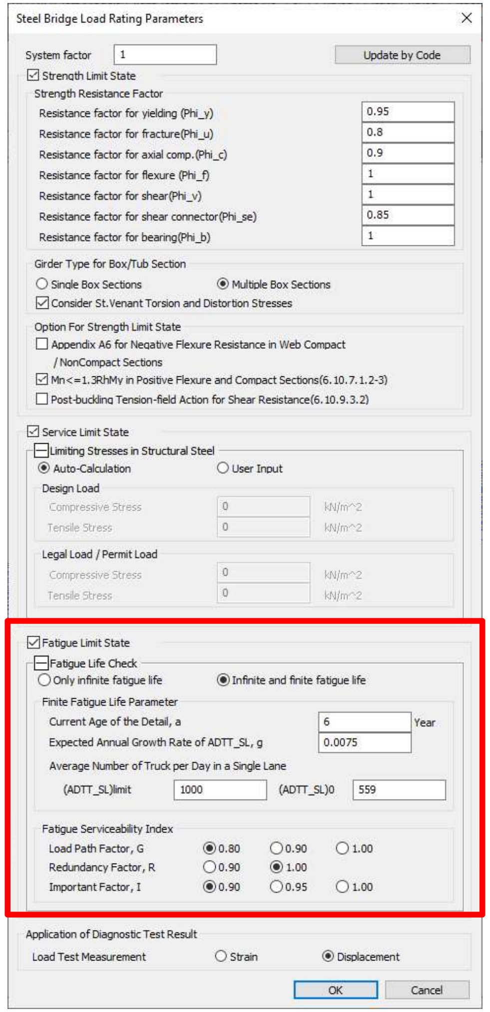
7. Load Rating LRFR 2019 Update to AASHTO MBE 3rd edition - Steel Composite Girder

- Service, Strength & Fatigue rating are available for steel composite girder based on AASHTO-LRFR19.
- Finite/Infinite life as well as serviceability index could be viewed in the software and the excel report could be referred to for detailed calculations.

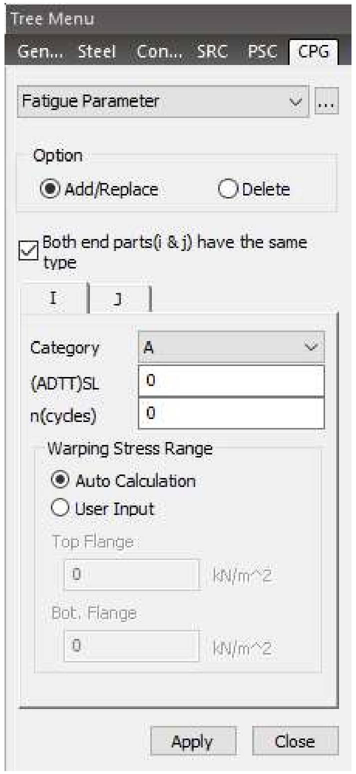
▪ ***Rating > Bridge Rating Design > Steel-Composite Bridge > AASHTO-LRFR19***



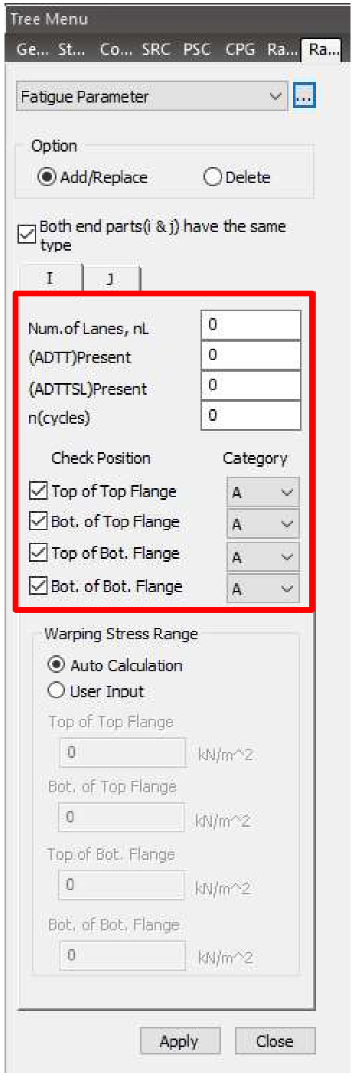
Load Rating Parameters – Previous Versions



Load Rating Parameters – Civil 2022 v1.1



Fatigue Parameters – Previous Versions

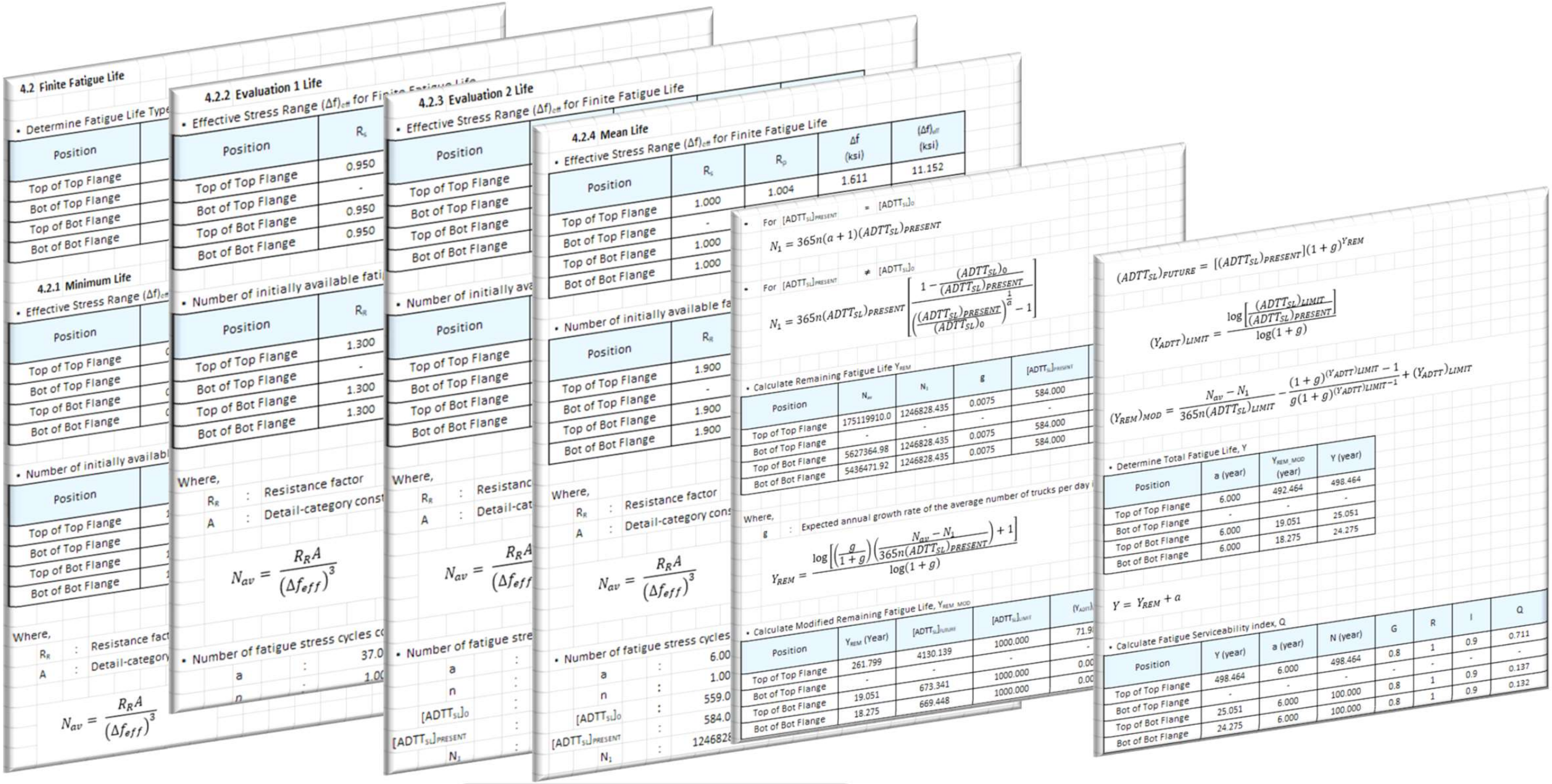


Fatigue Parameters – Civil 2022 v1.1

7. Load Rating LRFR 2019 Update to AASHTO MBE 3rd edition - Steel Composite Girder

- In earlier versions, just the classification whether the detail had infinite fatigue life or finite fatigue life was available.
- In Civil 2022, if the detail has finite fatigue life, then the minimum, evaluation I, evaluation II & mean fatigue life along with serviceability index are provided with detailed calculations.

- ***Rating > Bridge Rating Design > Steel-Composite Bridge > AASHTO-LRFR19***

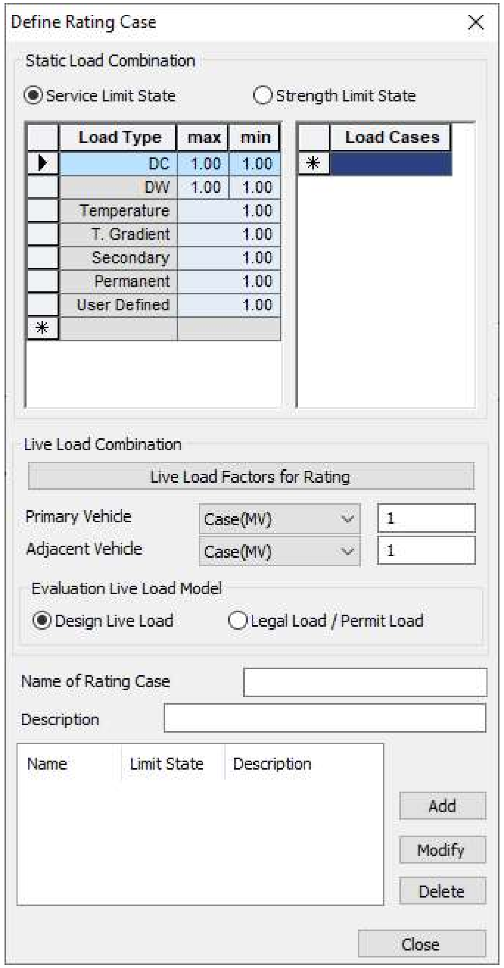


Rating Excel Report

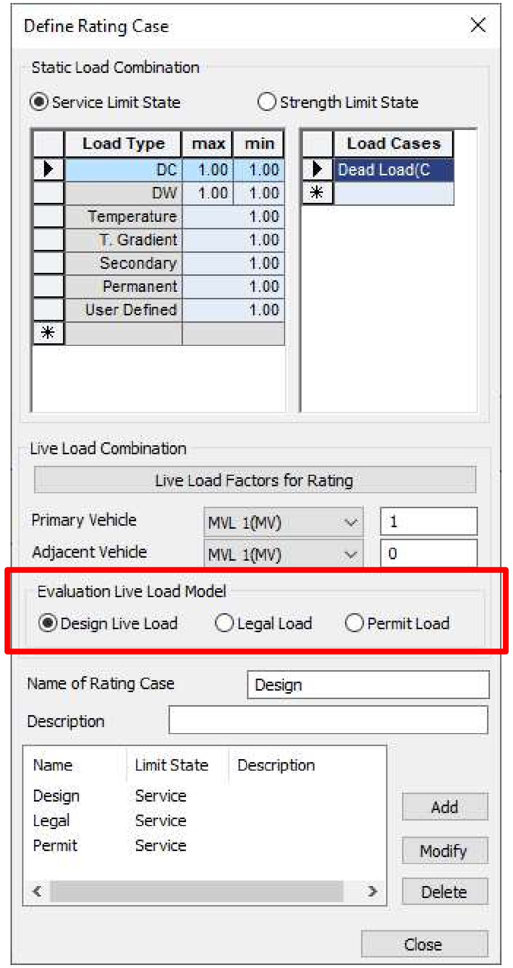
7. Load Rating LRFR 2019 Update to AASHTO MBE 3rd edition - PSC Girder

- PSC/PSC Composite girders could now be rated based on AASHTO-LRFR19.
- In earlier versions, legal & permit load rating were combined. In newer version, these have been separated and stress ratio for reinforcement/tendon is now calculated for permit load rating.
- Tendon Primary load case should not be selected for the load combinations. It is automatically taken into account by the program.

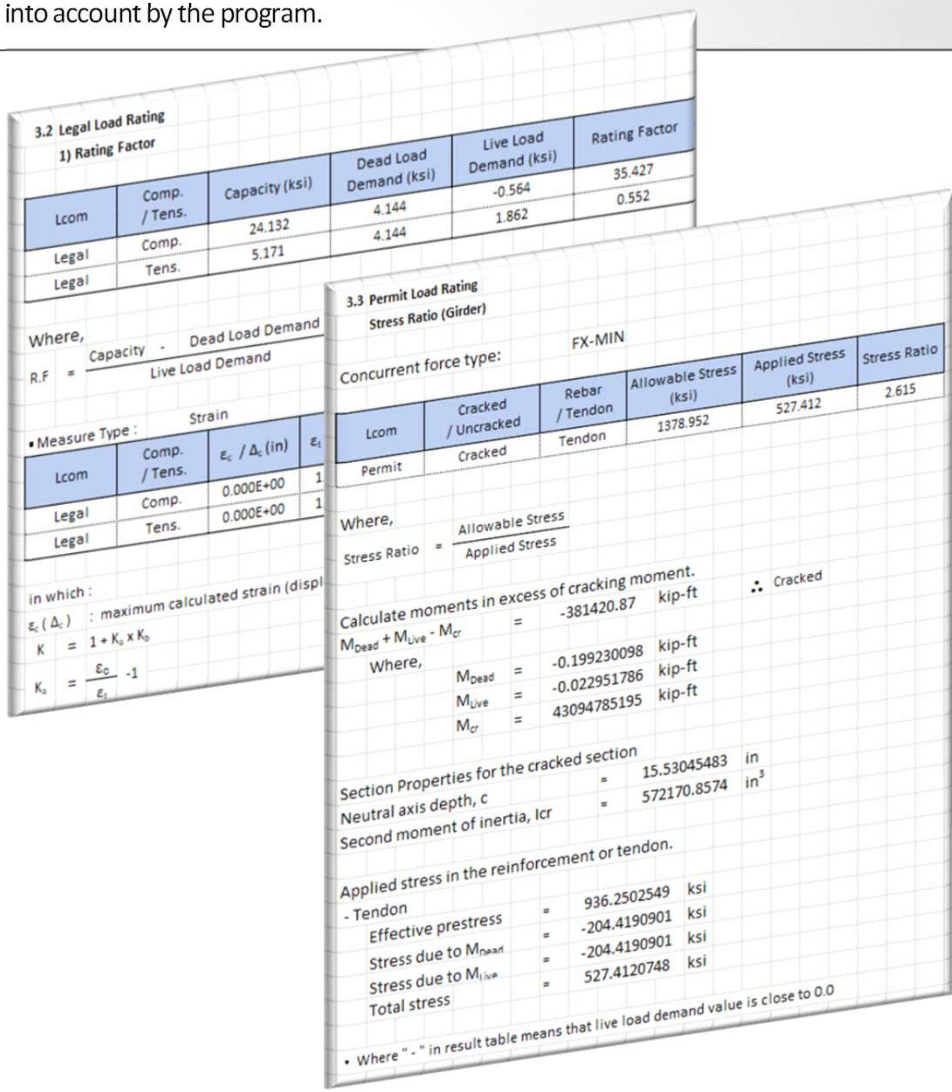
▪ ***Rating > Bridge Rating Design > PSC Bridge > AASHTO-LRFR19***



Load Rating Case –Previous Versions



Load Rating Case – Civil 2022 v1.1

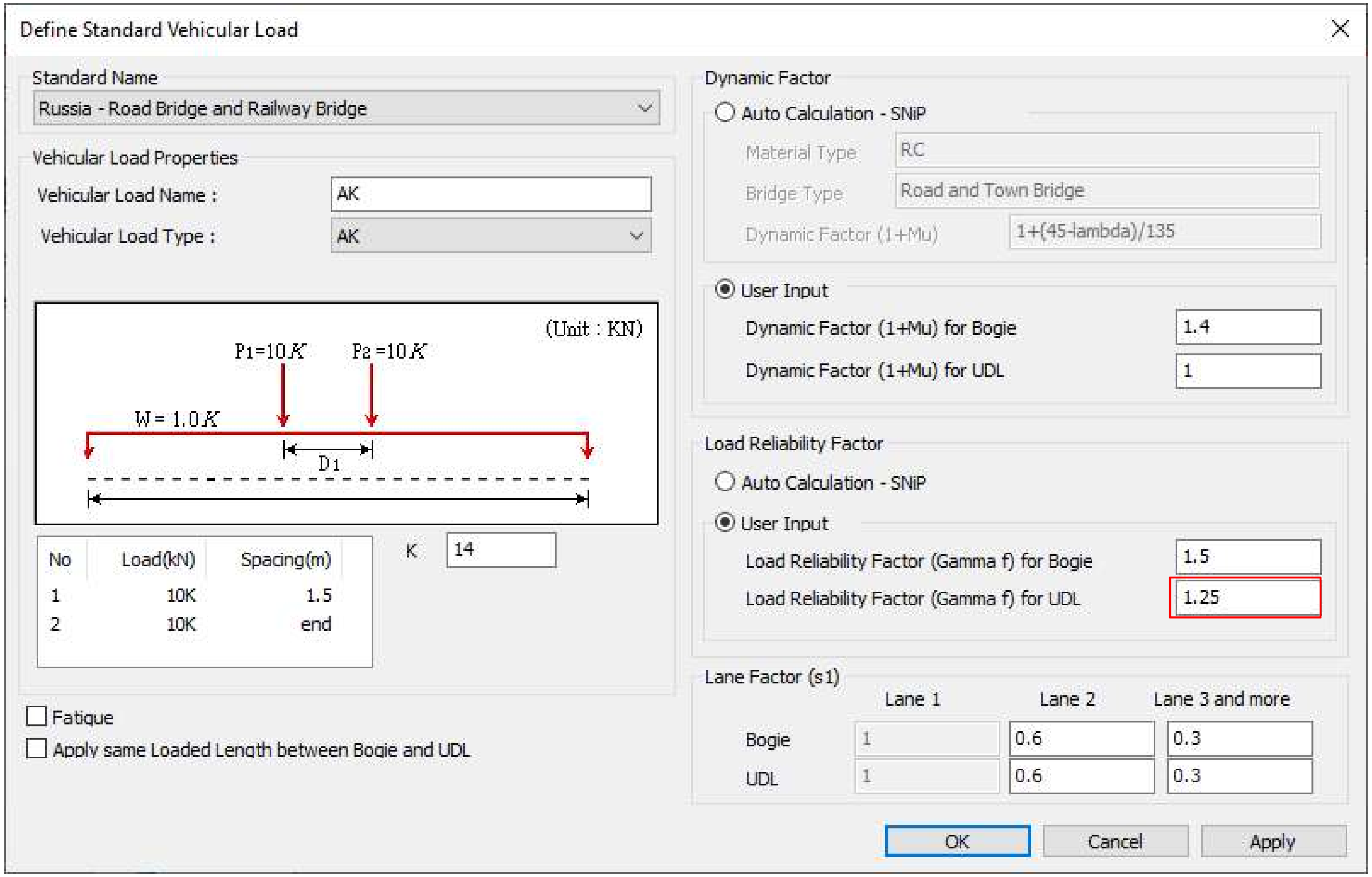


PSC Load Rating Report

8. Traffic Load AK, N11 Update to Russia Standard

- The reliability factor for the UDL of AK vehicle load has changed from 1.15 to 1.25 to the latest amendments to SP 35.13330.2011.

▪ ***Load > Moving Load > Vehicle***

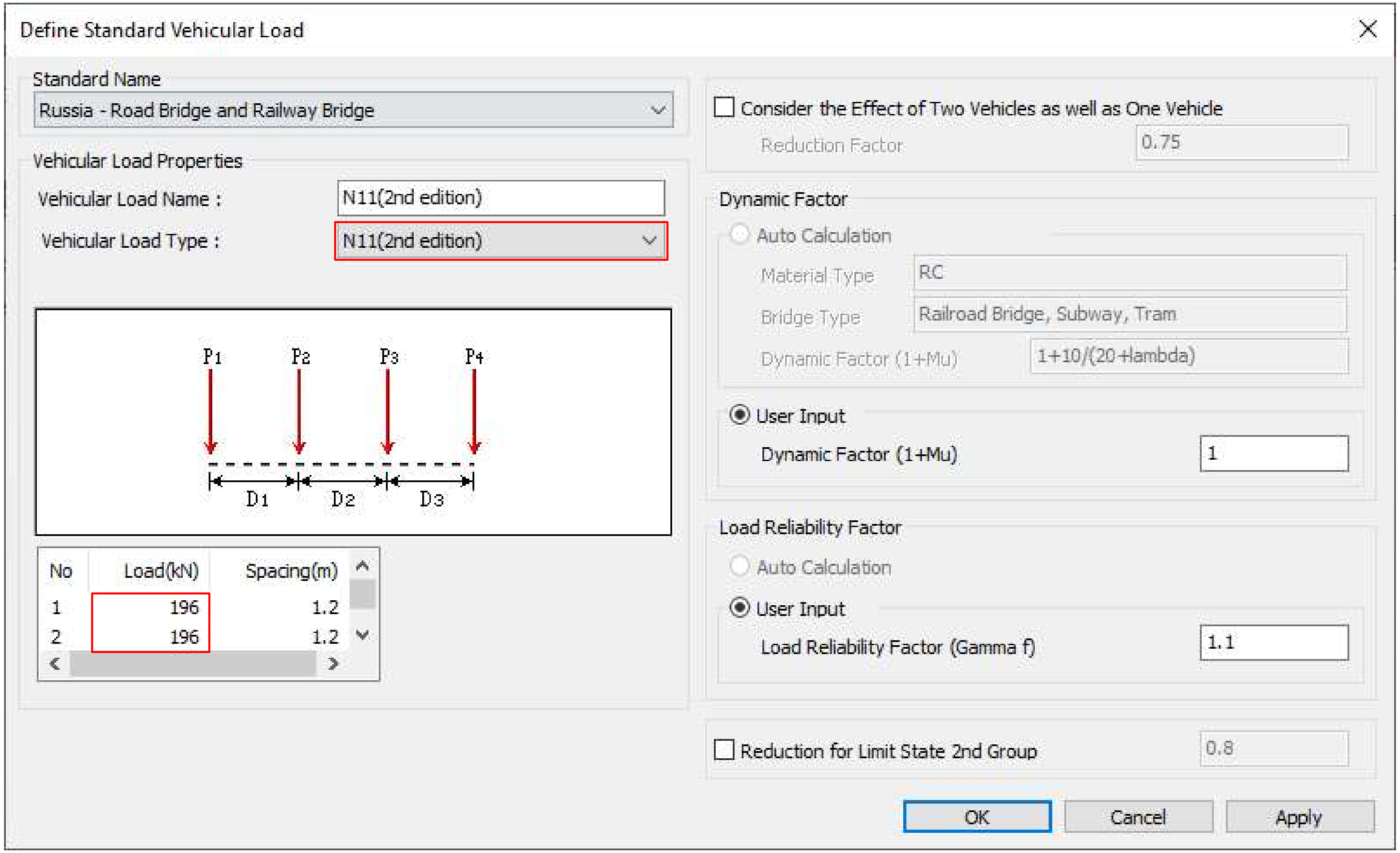


Vehicle Dialog Box

8. Traffic Load AK, N11 Update to Russia Standard

- The axle load of N11 has changed from 14 K (14 x 11 = 154 kN) to 196 kN to the latest amendments to SP 35.13330.2011.
- N11 (2nd Edition) vehicle has been added.

- ***Load > Moving Load > Vehicle***

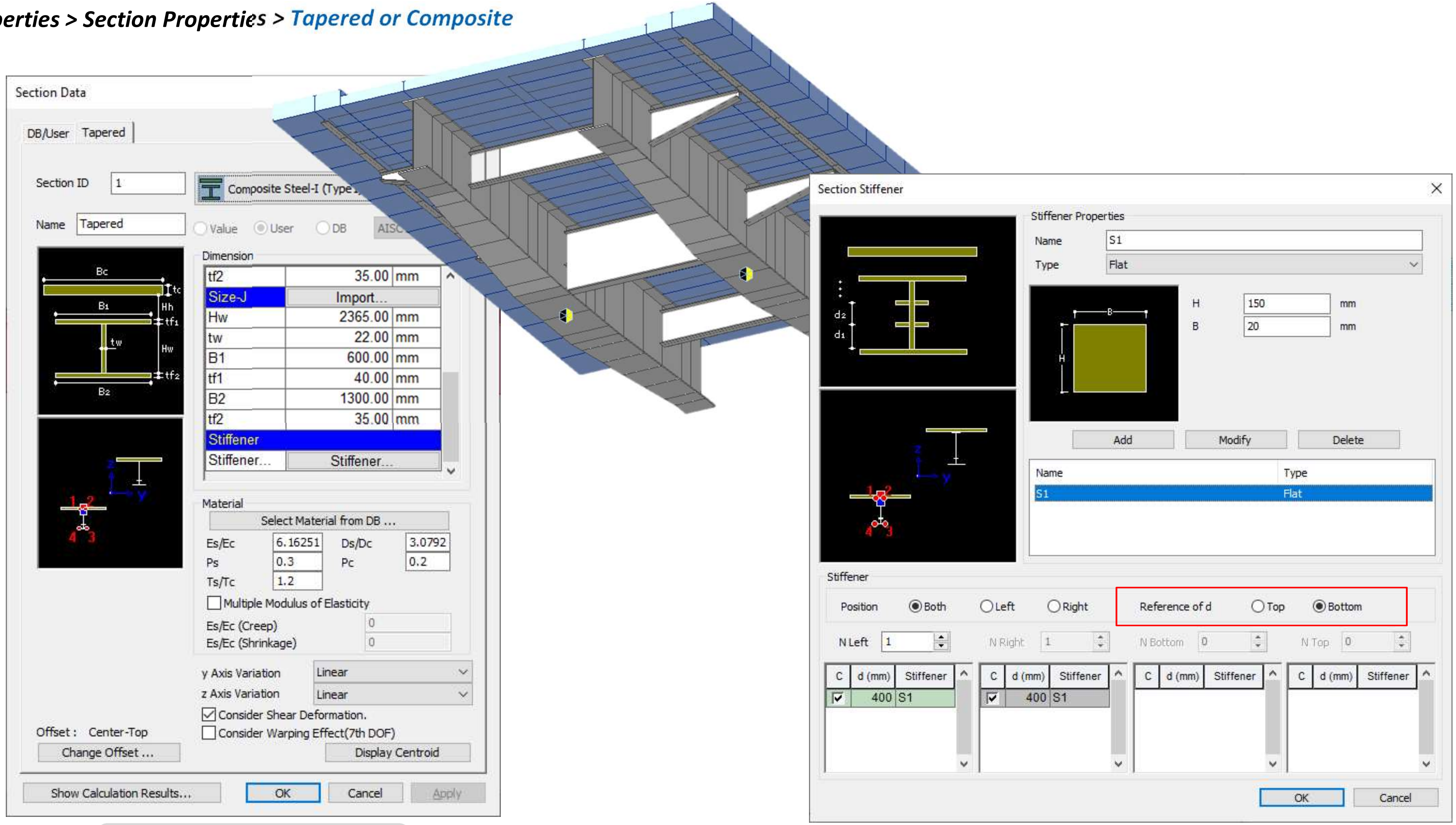


Vehicle Dialog Box

9. Longitudinal Stiffener Input Measured from Bottom of Steel Composite Girder

- Longitudinal stiffeners can be defined with respect to the bottom of the steel beam. Previously, the distance was measured only from the top surface.
- This would be useful when you add longitudinal stiffeners for the tapered girders.

- ***Properties > Section Properties > Tapered or Composite***



Tapered Composite Steel Section

Longitudinal Stiffener