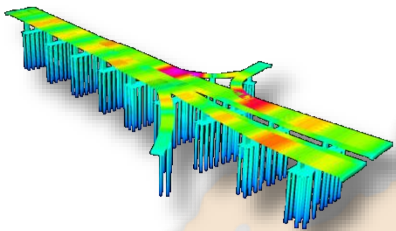
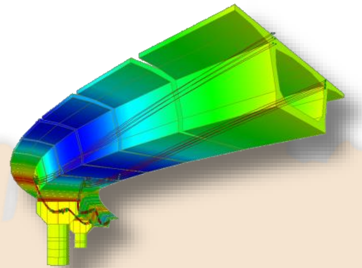
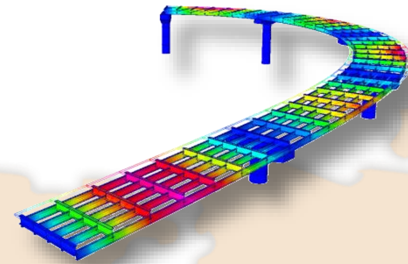
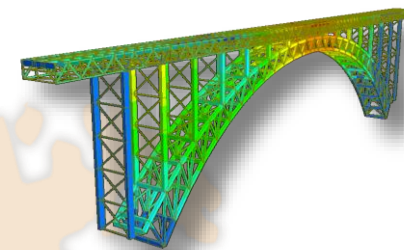
Bridging Your Innovations to Realities

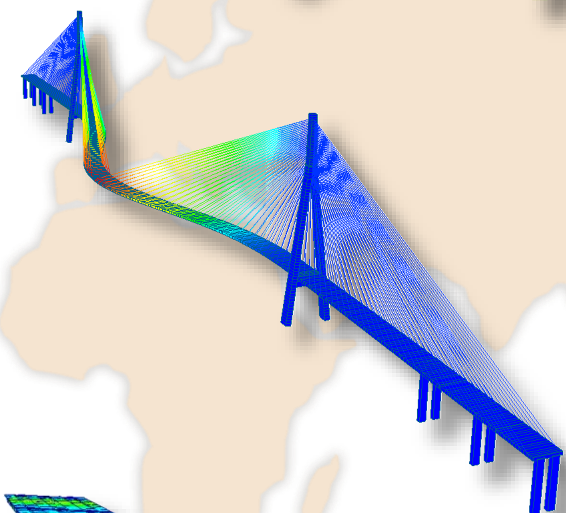
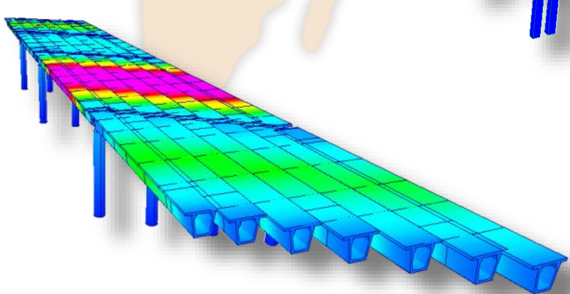
Integrated Solution System for Bridge and Civil Engineering

Contents

midas **Civil**

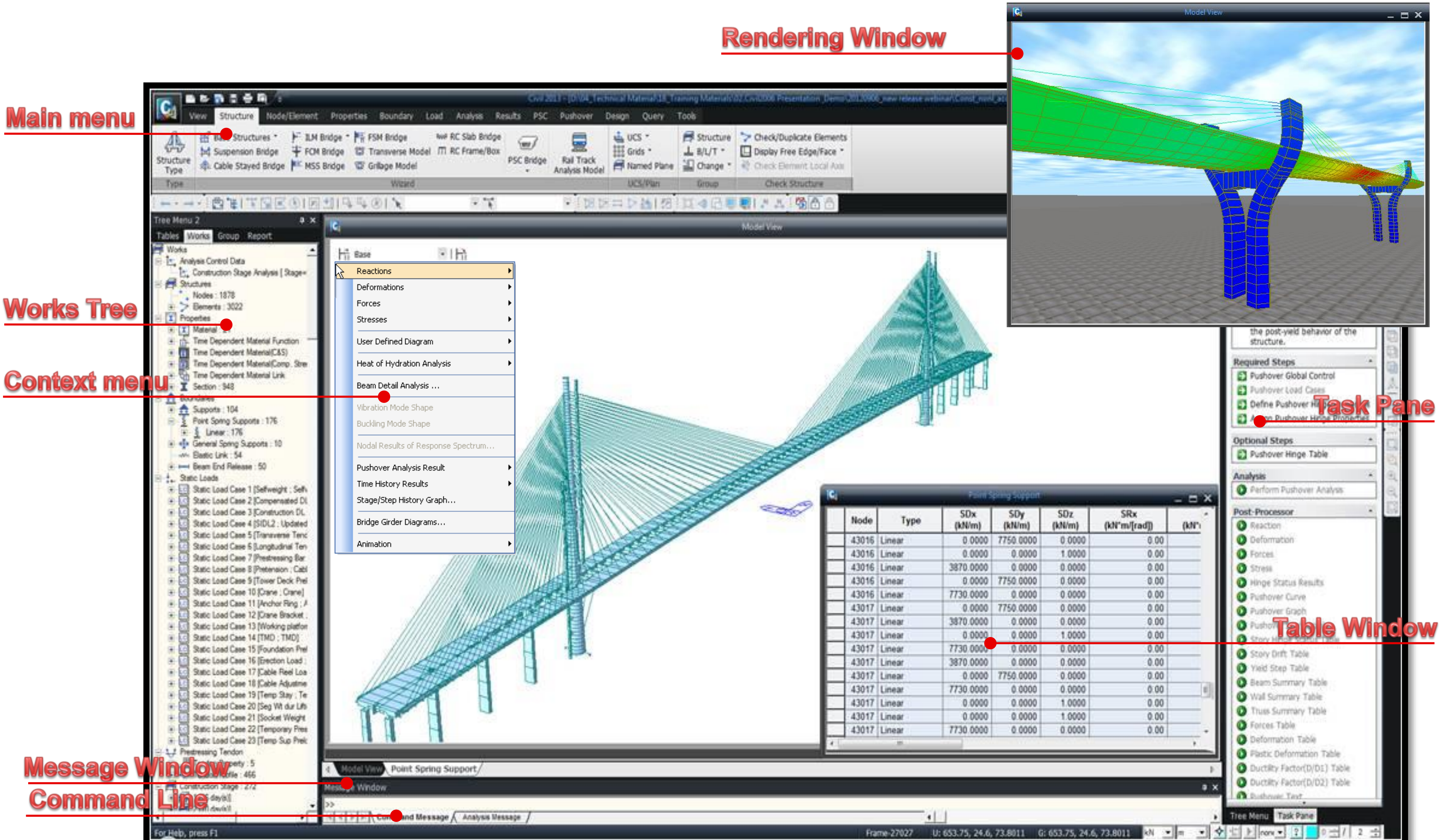
Distributed worldwide & Leader in high profile projects

A partial list of Users

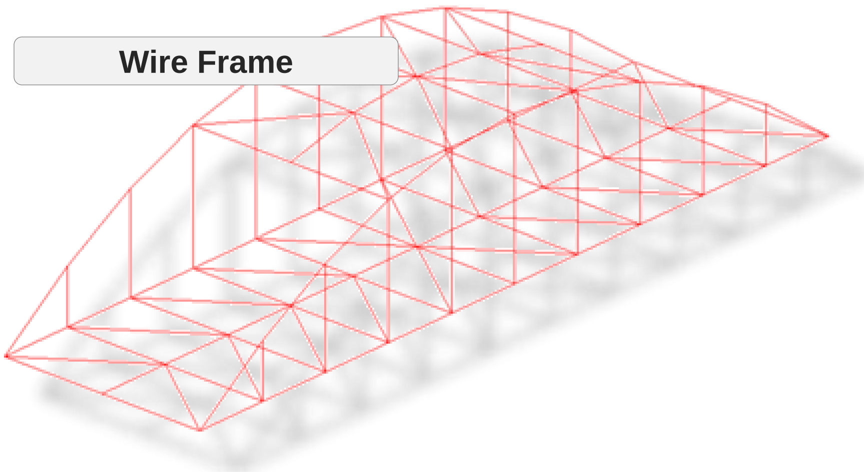
T Y Lin
URS Corp.
Parsons Corp.
Michael Baker Jr.
Hyder
Burgess & Niple
Arup
Figg Bridge Engineers
OTAK
Akins
Maunsell AECOM Group
HNTB Corp.
Halcrow
Parsons & Brinckerhoff
Roughan & O'Donovan
McCormick Rankin Corp.
WSP
COWI
Scott Wilson
Strasky, Husty
Delcan
Ministry of Transportation of Ontario
Royal Haskoning
PennDOT
Florida DOT
California DOT
Oregon DOT

Graphic User Interface

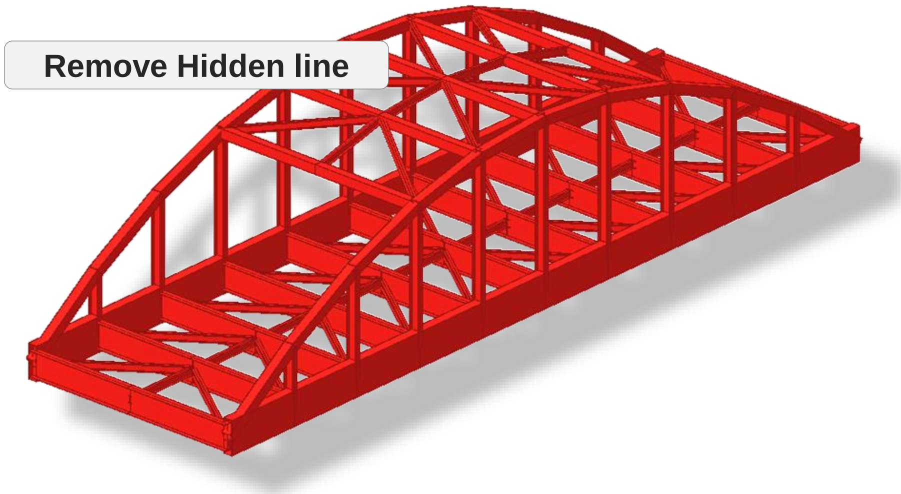


Various model display methods

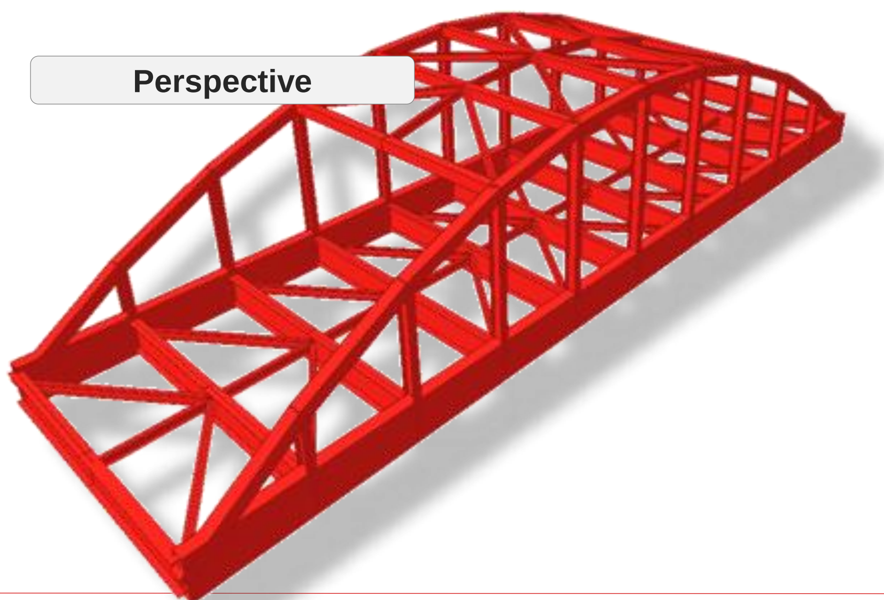
Wire Frame



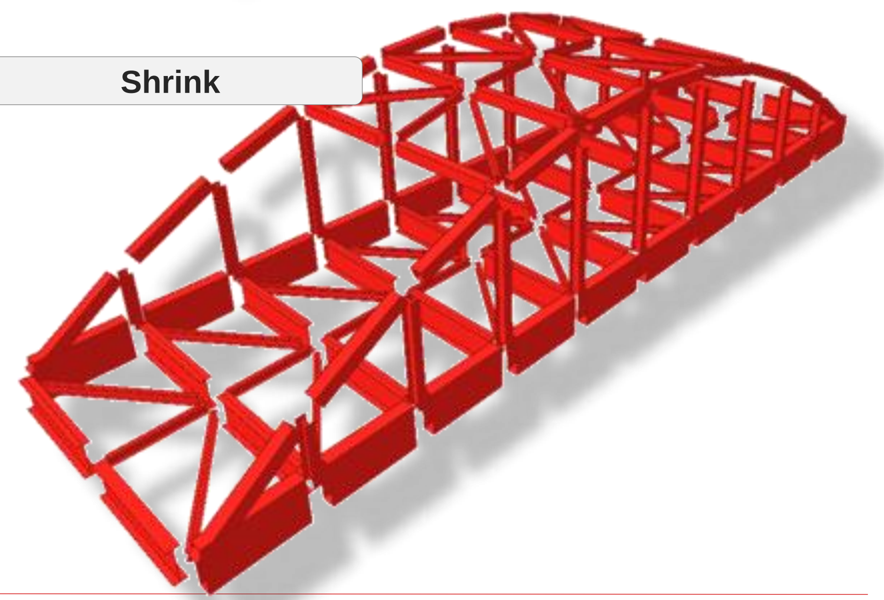
Remove Hidden line



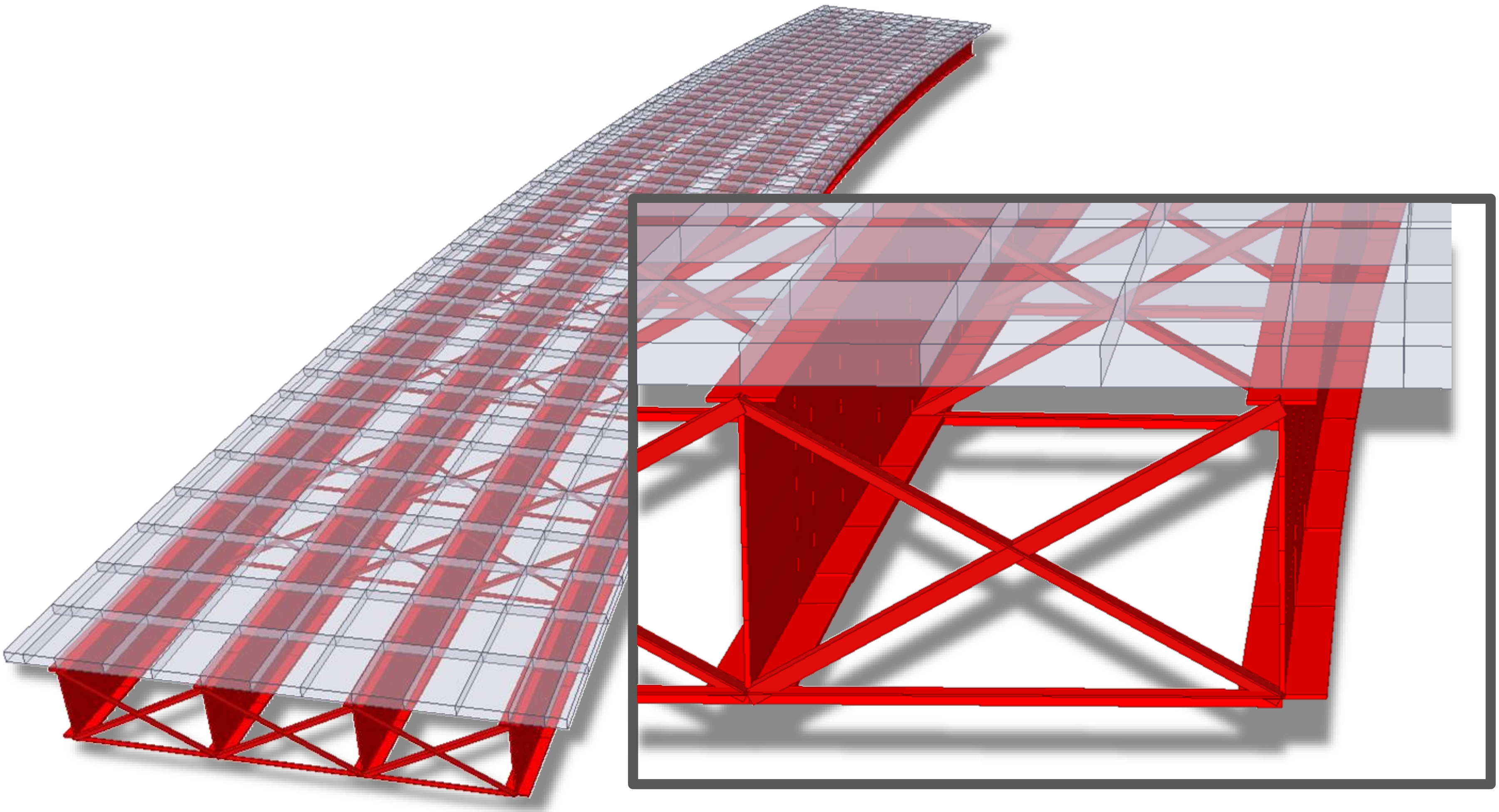
Perspective



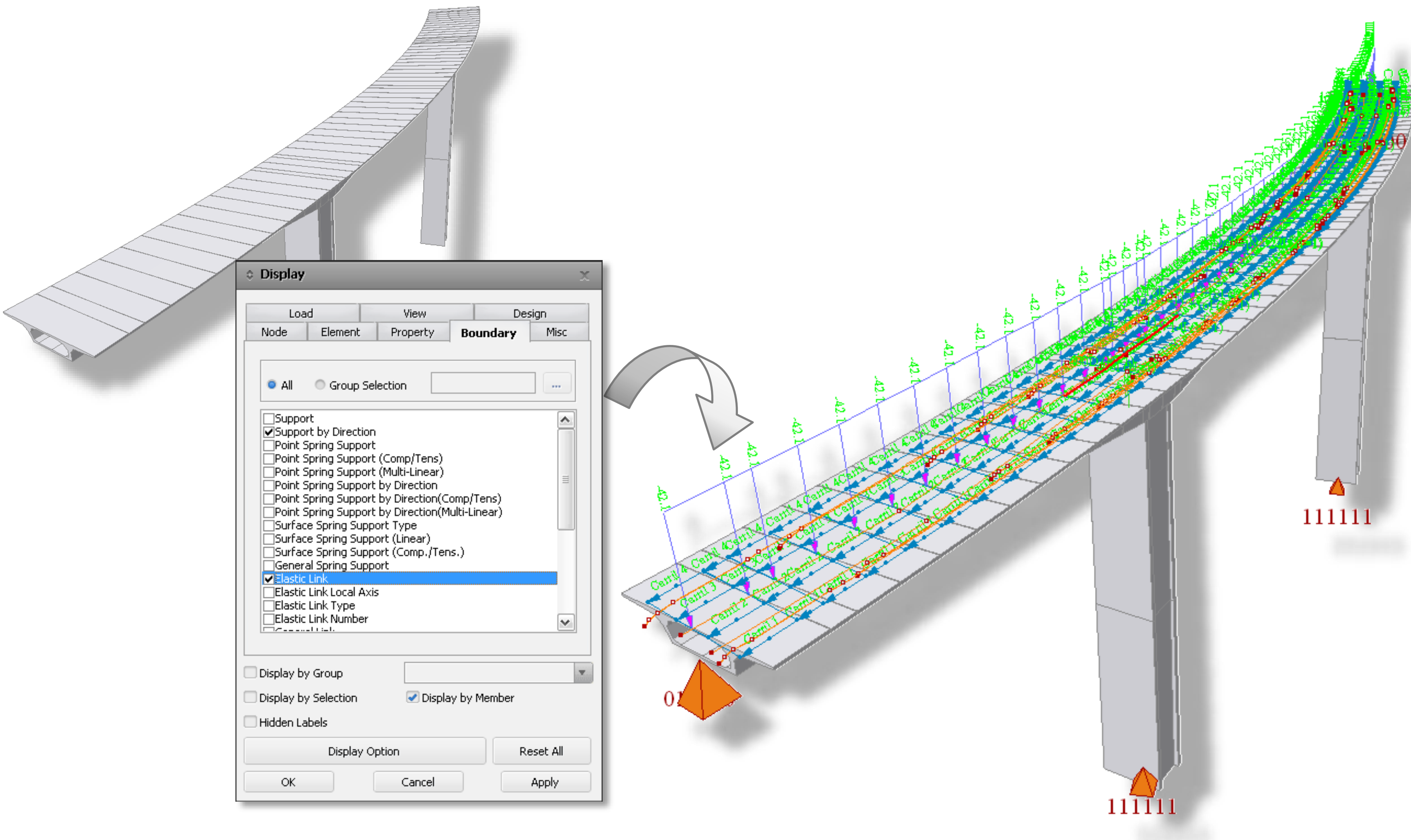
Shrink



See-through Effect of Composite Bridge by Blending (Transparency) effect

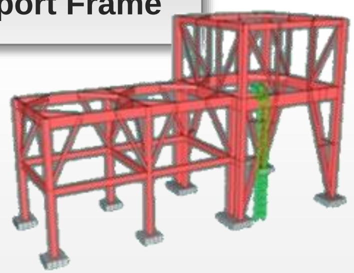


Visualization options for Elements / Load / Boundary Conditions

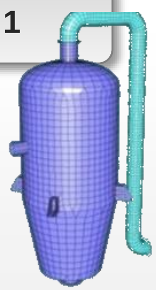


3 separate data files merged into one total model

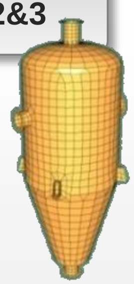
Support Frame

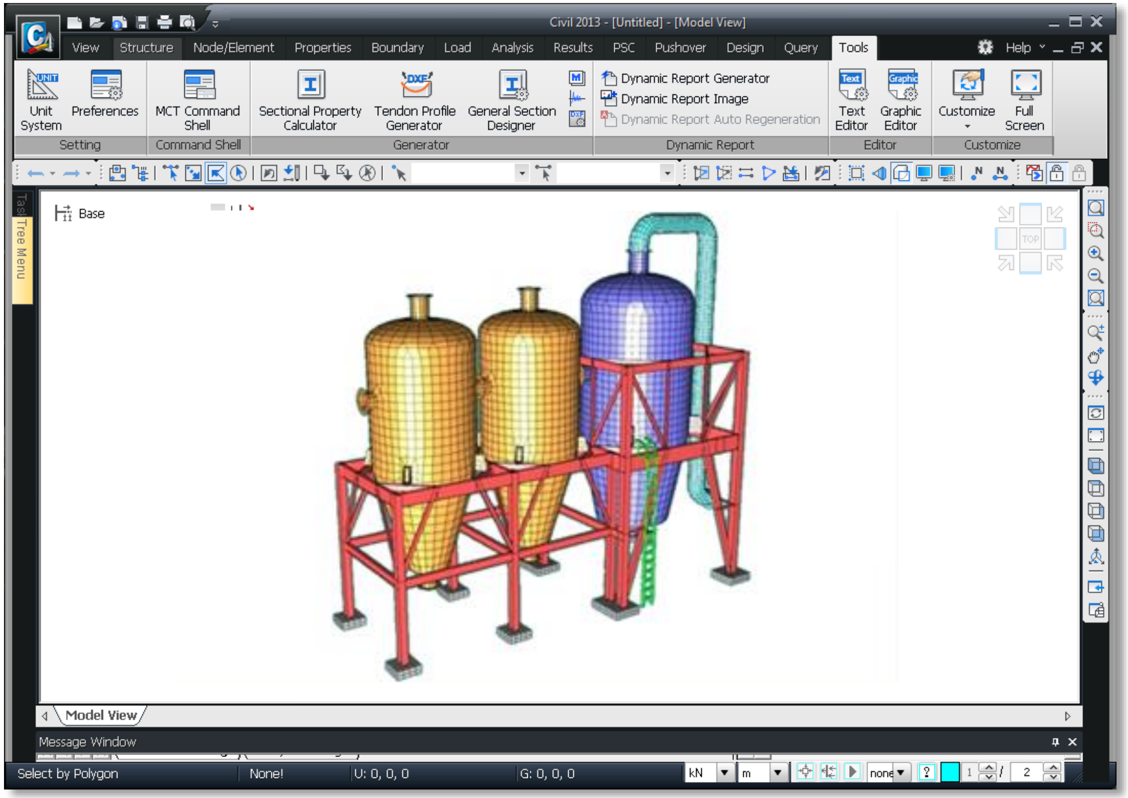


Vessel 1

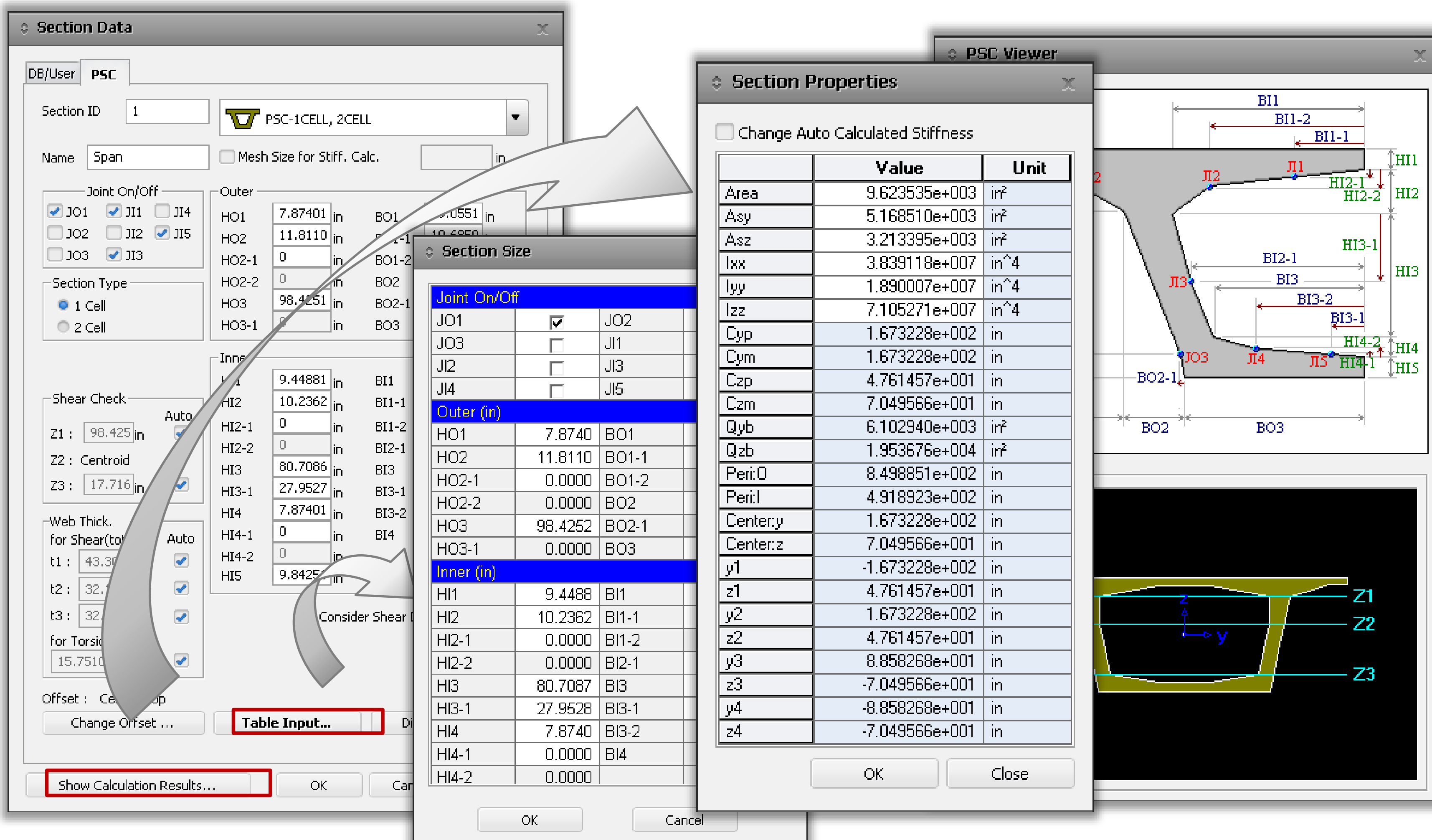


Vessels 2&3

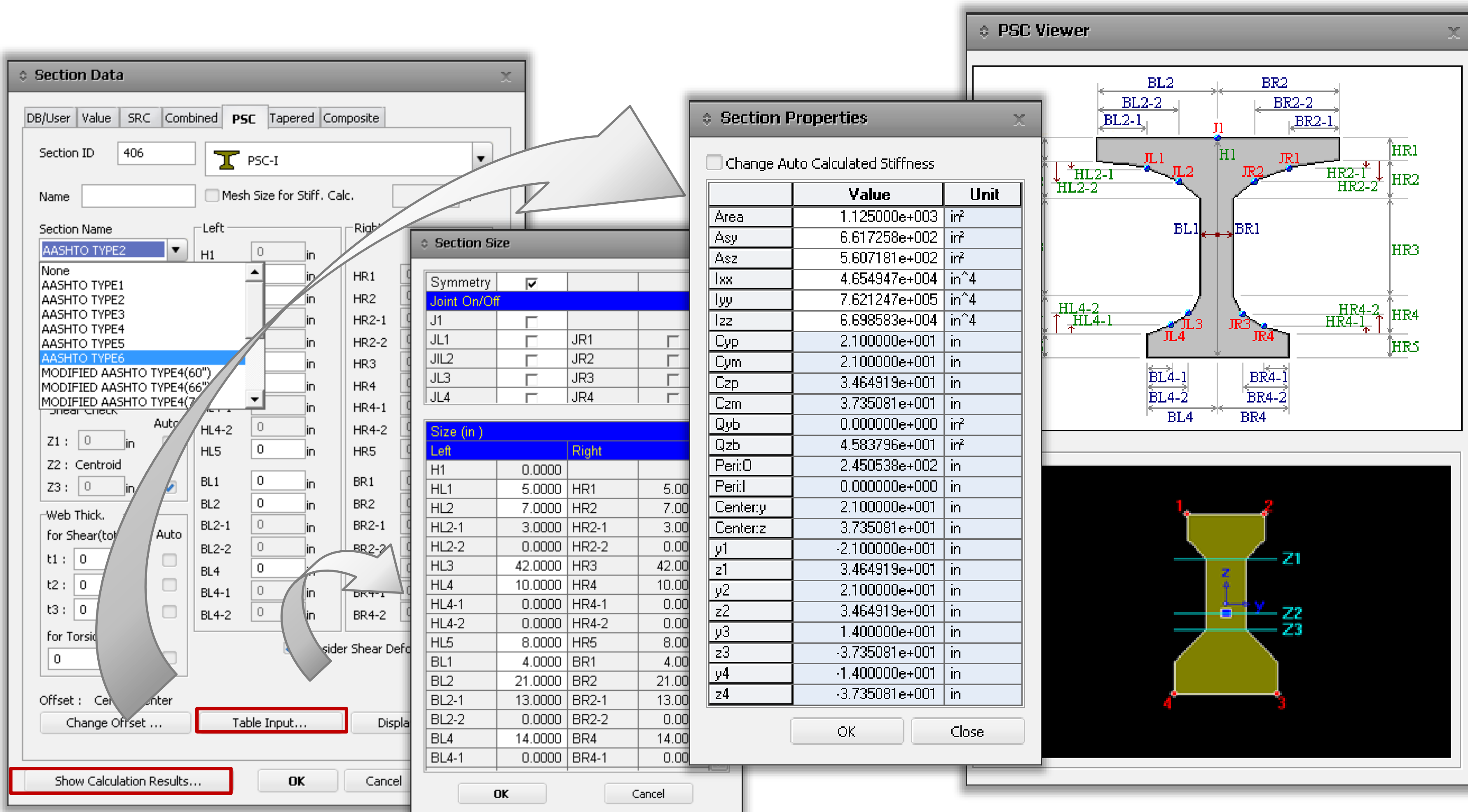




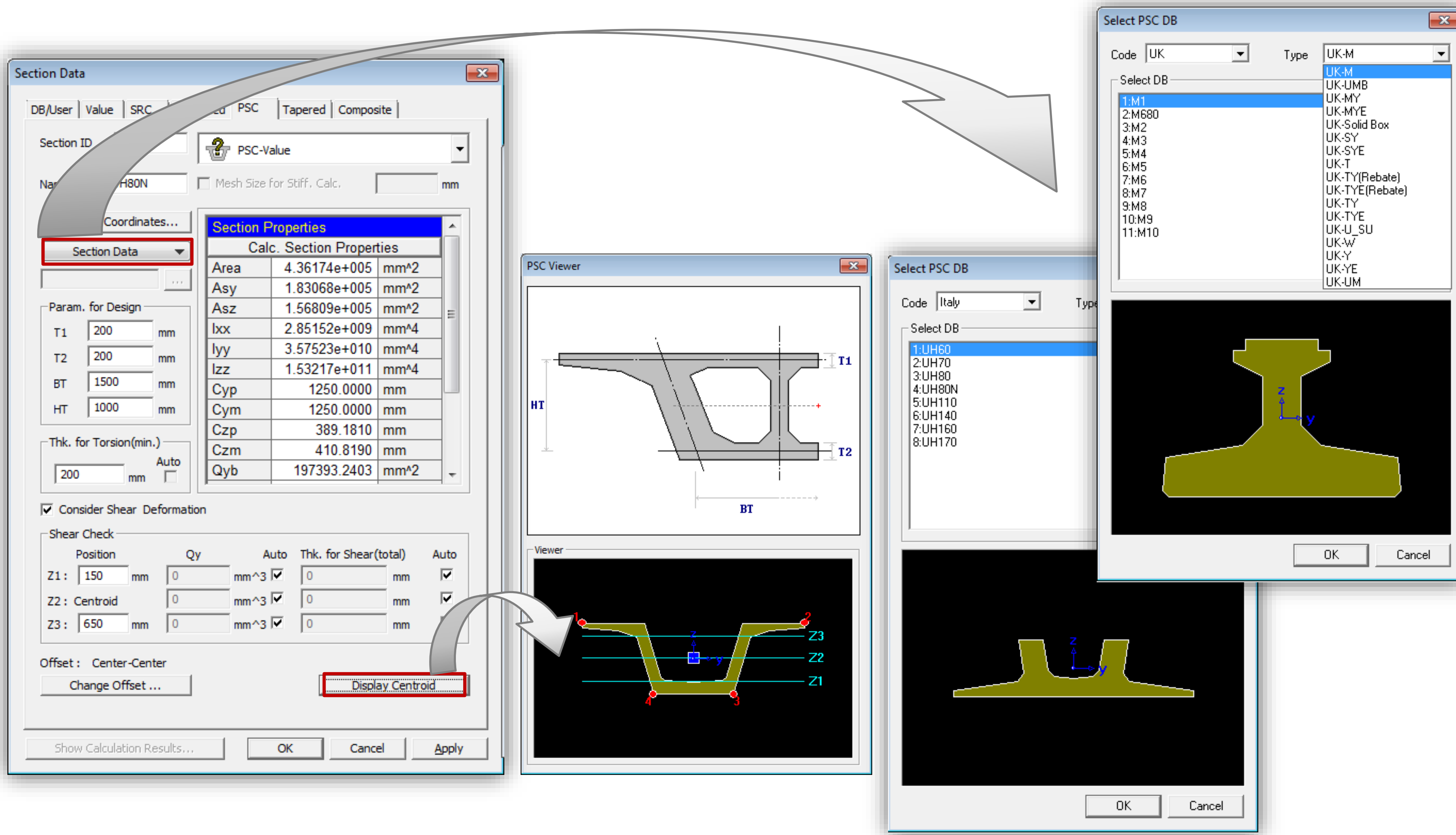
Prestressed & Post-tension Concrete Box Sections



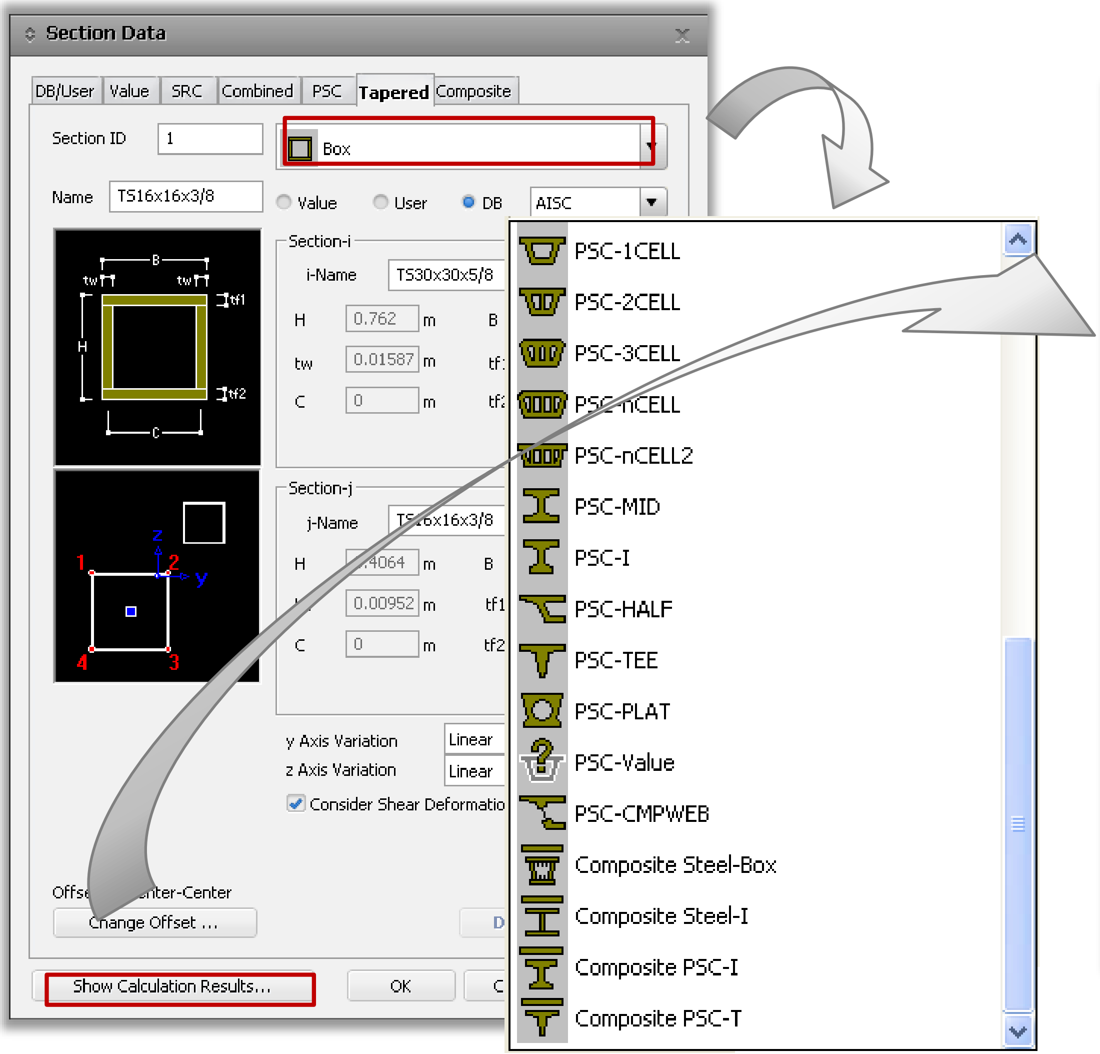
AASHTO/Caltrans PC Section DB



Italy & UK PC Section DB



Tapered Sections

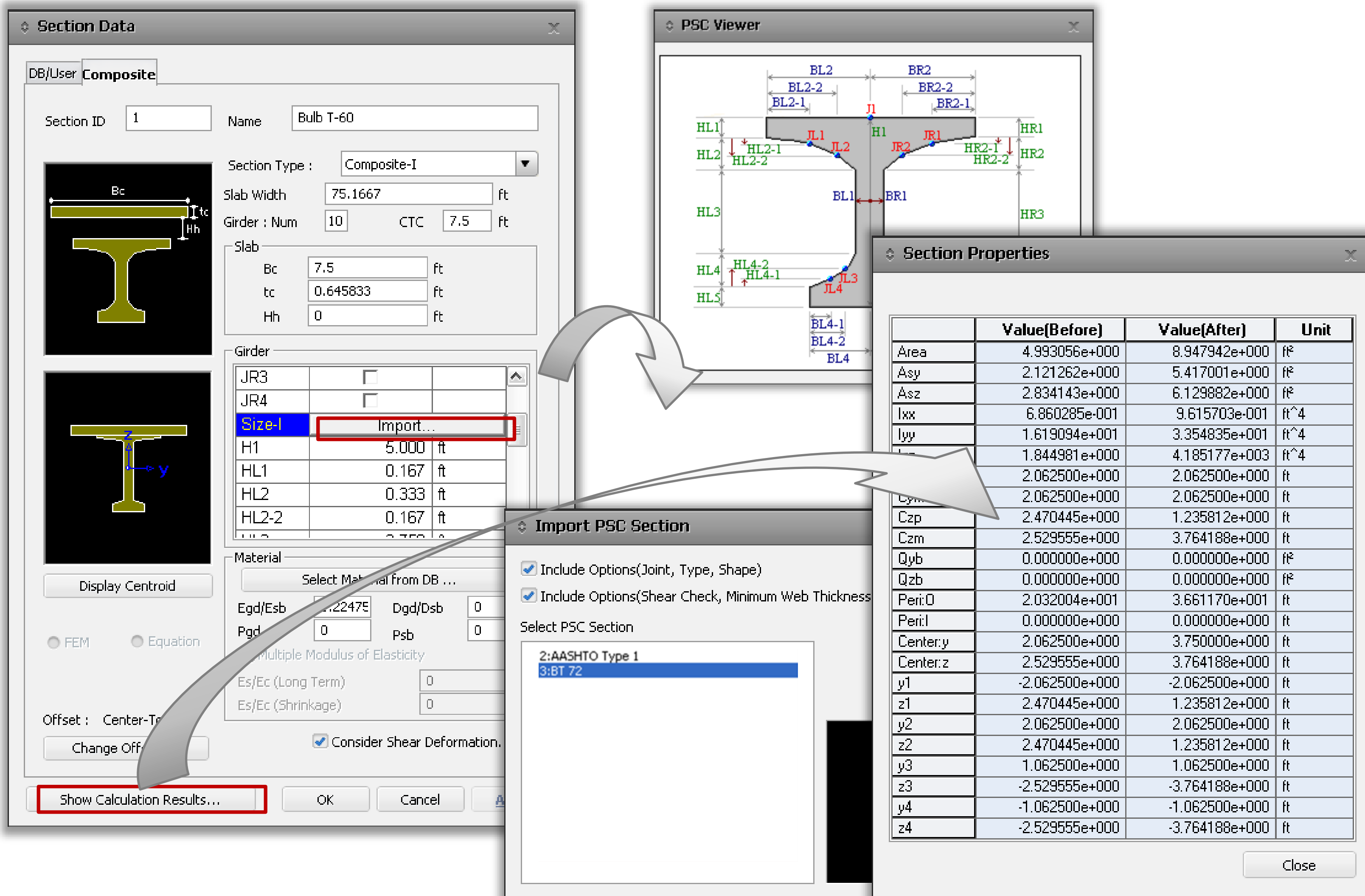


Section Properties

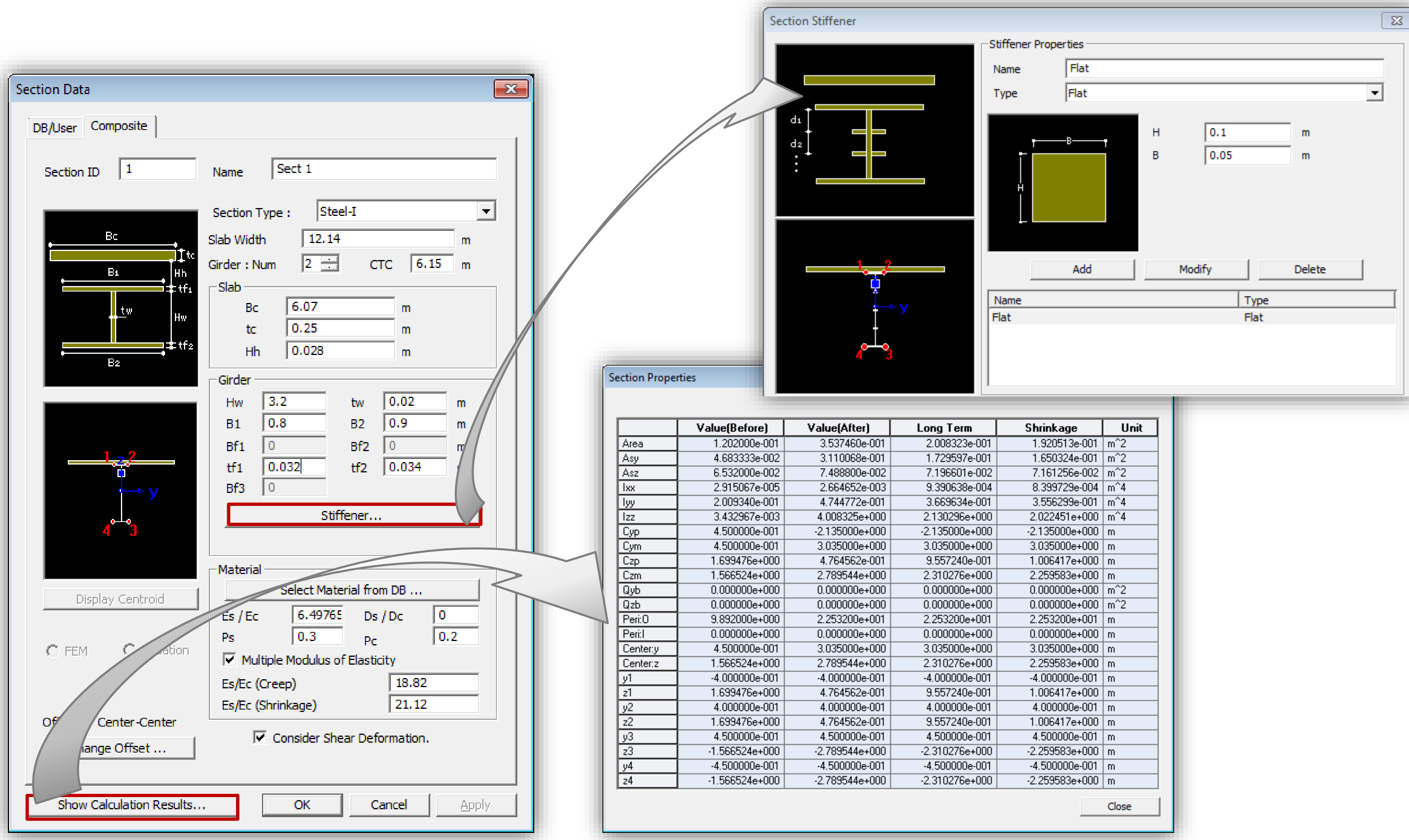
	Value(I)	Value(J)	Unit
Area	4.737894e-002	1.512094e-002	m²
Asy	2.419350e-002	7.741920e-003	m²
Asz	2.419350e-002	7.741920e-003	m²
Ixx	6.593993e-003	5.954238e-004	m^4
Iyy	4.397986e-003	3.971779e-004	m^4
Izz	4.397986e-003	3.971779e-004	m^4
Cyp	3.810000e-001	2.032000e-001	m
Cym	3.810000e-001	2.032000e-001	m
Czp	3.810000e-001	2.032000e-001	m
Czm	3.810000e-001	2.032000e-001	m
Qyb	2.087949e-001	5.907750e-002	m²
Qzb	2.087949e-001	5.907750e-002	m²
Peri:O	3.048000e+000	1.625600e+000	m
Peri:I	2.921000e+000	1.549400e+000	m
Center:y	3.810000e-001	2.032000e-001	m
Center:z	3.810000e-001	2.032000e-001	m
y1	-3.810000e-001	-2.032000e-001	m
z1	3.810000e-001	2.032000e-001	m
y2	3.810000e-001	2.032000e-001	m
z2	3.810000e-001	2.032000e-001	m
y3	3.810000e-001	2.032000e-001	m
z3	-3.810000e-001	-2.032000e-001	m
y4	-3.810000e-001	-2.032000e-001	m
z4	-3.810000e-001	-2.032000e-001	m

Close

Composite Sections



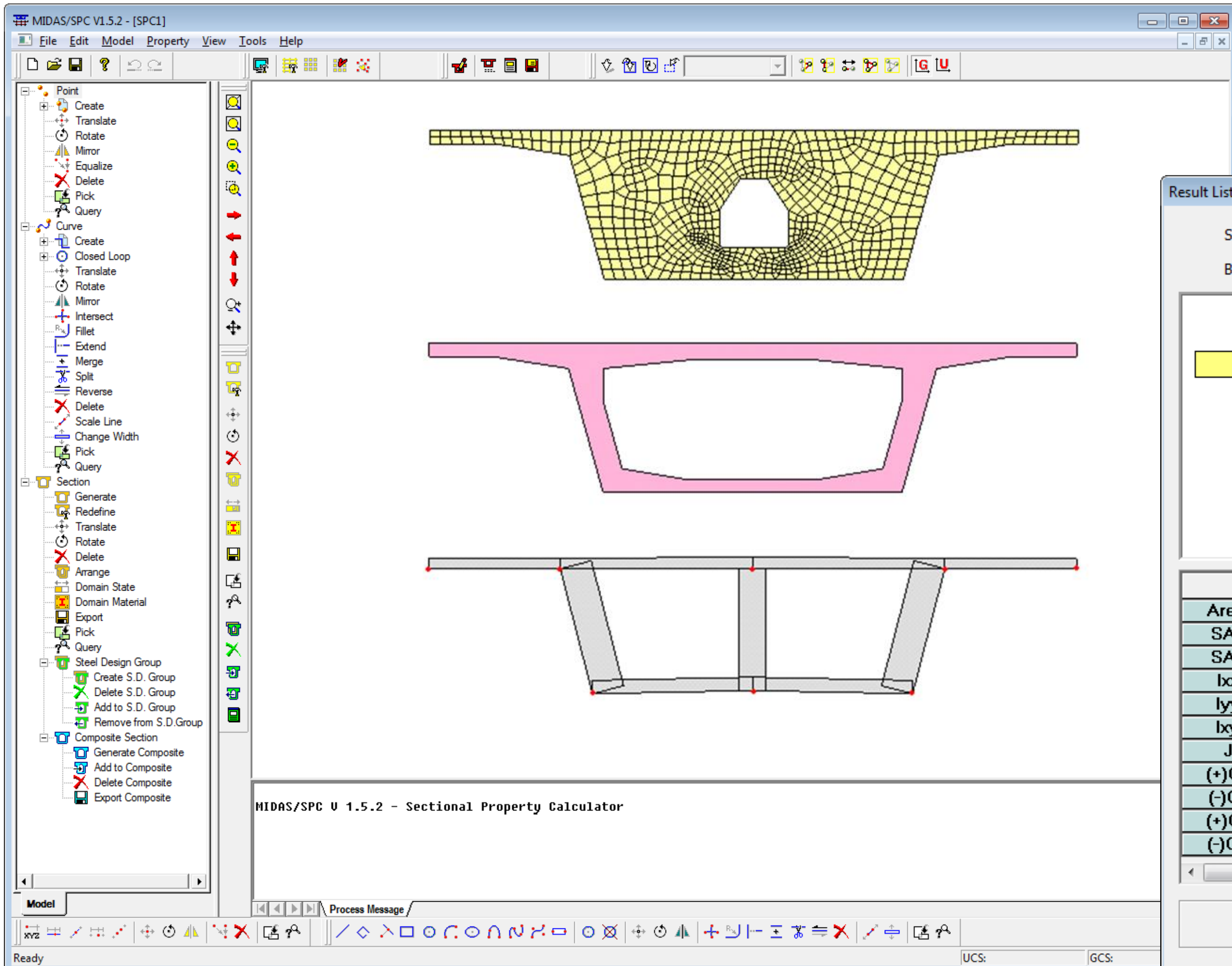
Composite Sections

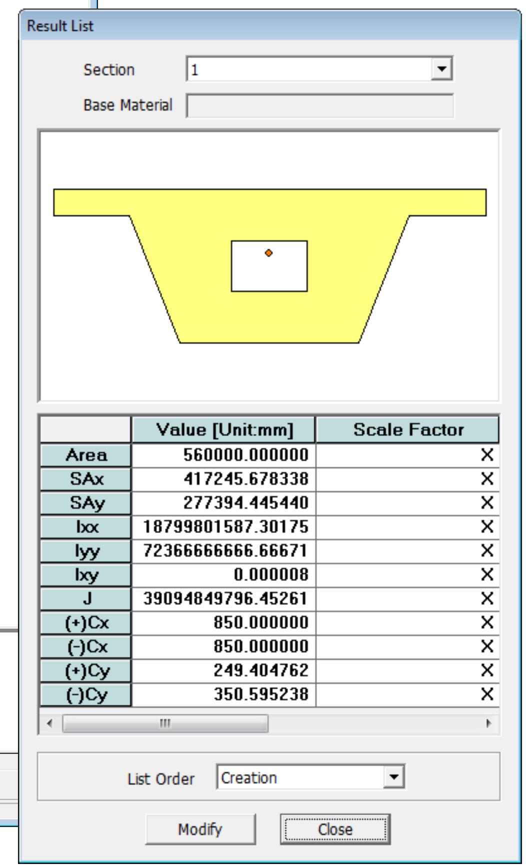


	Value(Before)	Value(After)	Long Term	Shrinkage	Unit
Area	1.202000e-001	3.537460e-001	2.008323e-001	1.920513e-001	m^2
Asy	4.683333e-002	3.110068e-001	1.729597e-001	1.650324e-001	m^2
Asz	6.532000e-002	7.488800e-002	7.196601e-002	7.161256e-002	m^2
Ixx	2.915067e-005	2.664652e-003	9.390638e-004	8.399729e-004	m^4
Iyy	2.009340e-001	4.744772e-001	3.669634e-001	3.556299e-001	m^4
Izz	3.432967e-003	4.008325e+000	2.130296e+000	2.022451e+000	m^4
Cyp	4.500000e-001	-2.135000e+000	-2.135000e+000	-2.135000e+000	m
Cym	4.500000e-001	3.035000e+000	3.035000e+000	3.035000e+000	m
Czp	1.699476e+000	4.764562e-001	9.557240e-001	1.006417e+000	m
Czm	1.566524e+000	2.789544e+000	2.310276e+000	2.259583e+000	m
Qyb	0.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000	m^2
Qzb	0.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000	m^2
Peri:O	9.892000e+000	2.253200e+001	2.253200e+001	2.253200e+001	m
Peri:I	0.000000e+000	0.000000e+000	0.000000e+000	0.000000e+000	m
Center:y	4.500000e-001	3.035000e+000	3.035000e+000	3.035000e+000	m
Center:z	1.566524e+000	2.789544e+000	2.310276e+000	2.259583e+000	m
y1	-4.000000e-001	-4.000000e-001	-4.000000e-001	-4.000000e-001	m
z1	1.699476e+000	4.764562e-001	9.557240e-001	1.006417e+000	m
y2	4.000000e-001	4.000000e-001	4.000000e-001	4.000000e-001	m
z2	1.699476e+000	4.764562e-001	9.557240e-001	1.006417e+000	m
y3	4.500000e-001	4.500000e-001	4.500000e-001	4.500000e-001	m
z3	-1.566524e+000	-2.789544e+000	-2.310276e+000	-2.259583e+000	m
y4	-4.500000e-001	-4.500000e-001	-4.500000e-001	-4.500000e-001	m
z4	-1.566524e+000	-2.789544e+000	-2.310276e+000	-2.259583e+000	m

Section Property Calculator (SPC)

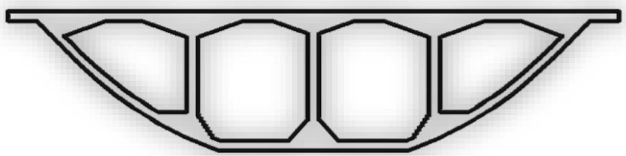
Draw sections of arbitrary shapes

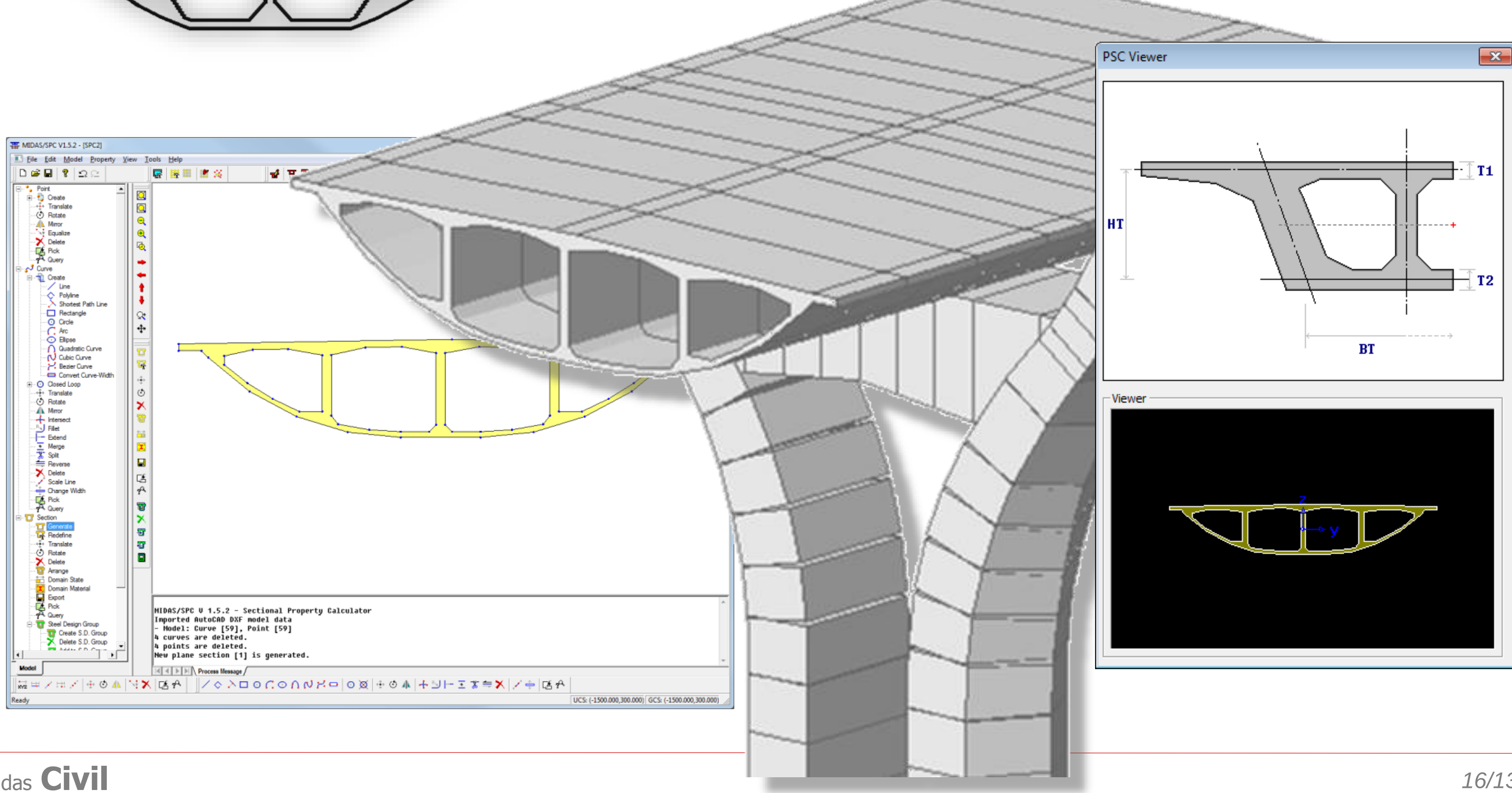




Importing CAD Files

Draw section shape using CAD → Import CAD file through SPC → Import section properties



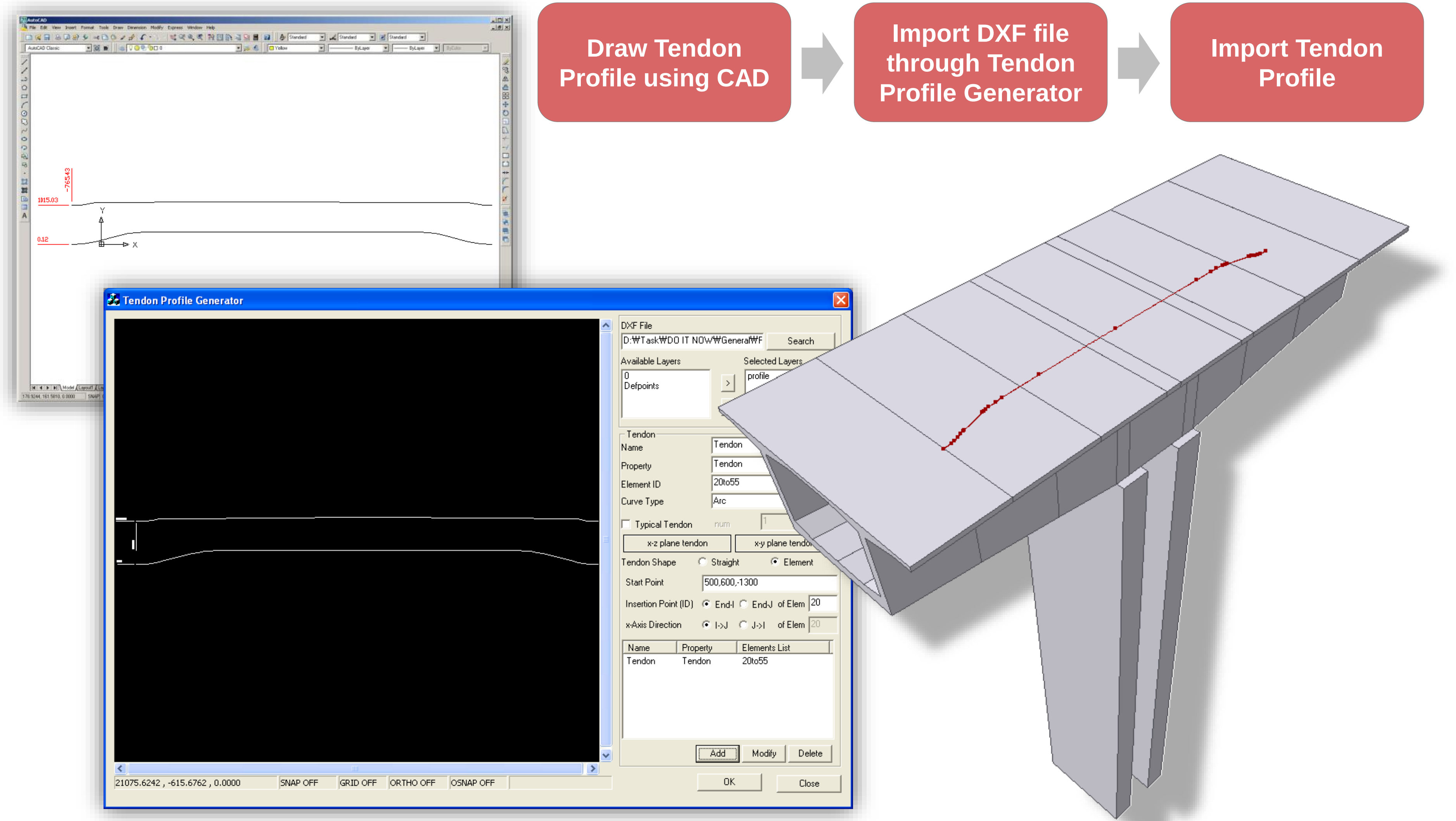


Importing Tendon Profile from AutoCAD DXF file

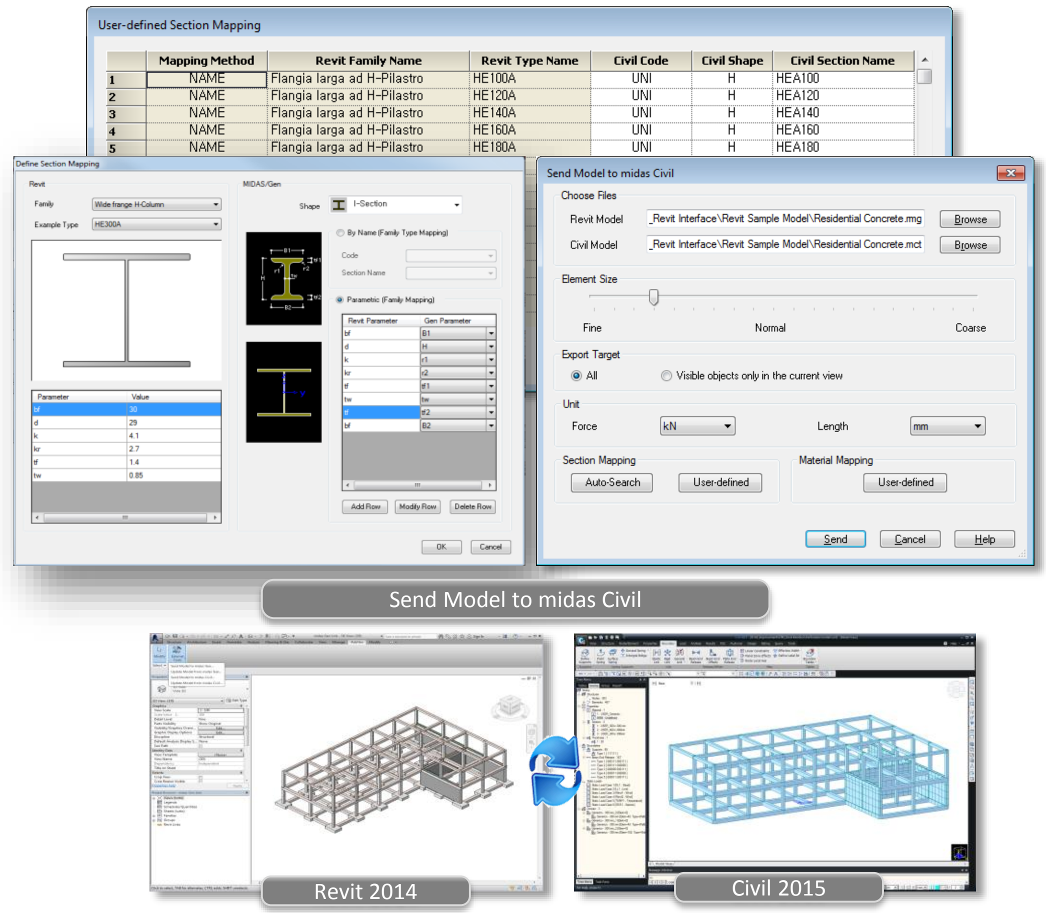
Draw Tendon Profile using CAD

Import DXF file through Tendon Profile Generator

Import Tendon Profile

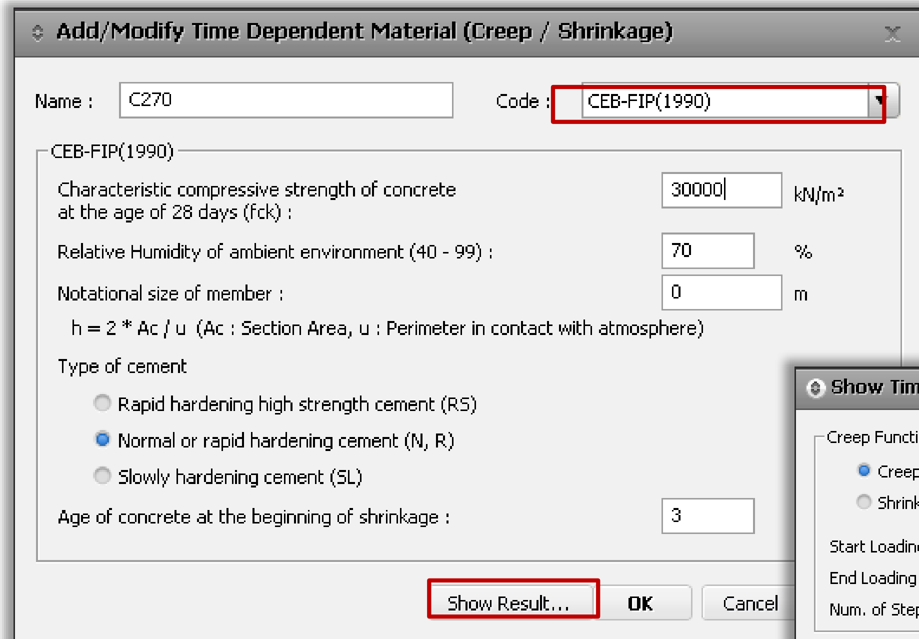


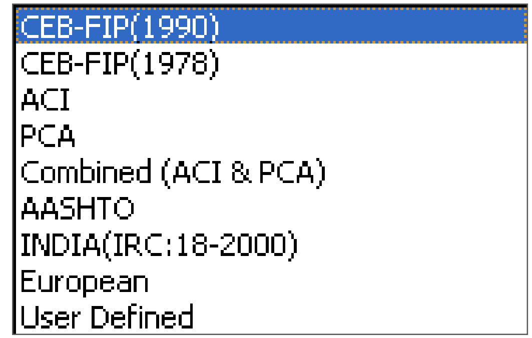
Data Transfer for BrIM (Bridge Information Modeling) Workflow

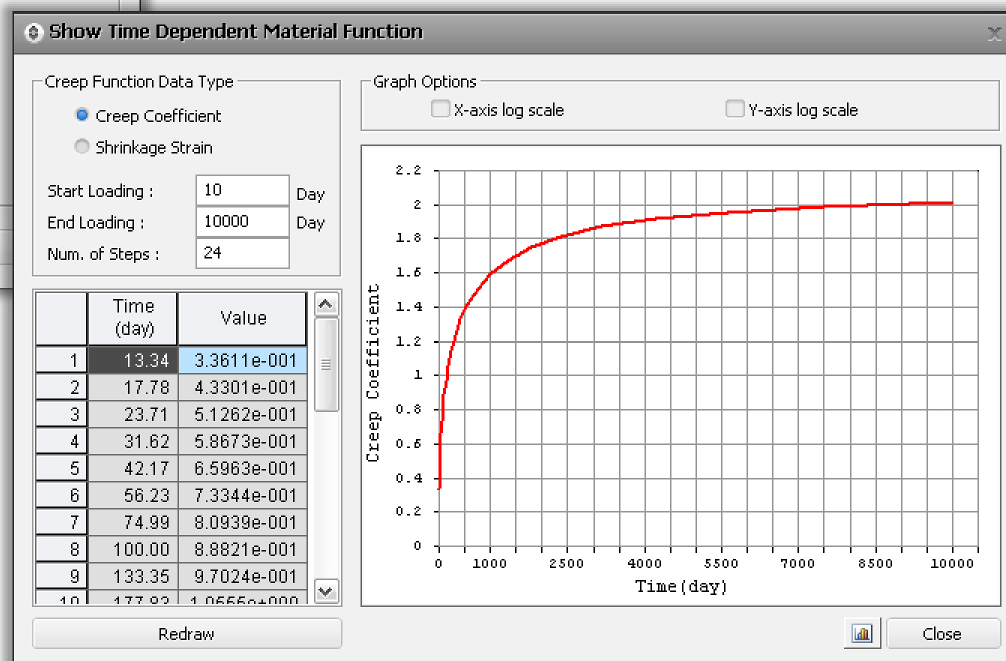


	Functions	Revit <> Civil
Linear Elements	Structural Column	<>
	Beam	<>
	Brace	<>
	Curved Beam	>
	Beam System	>
	Truss	>
Planar Elements	Foundation Slab	<>
	Structural Floor	<>
	Structural Wall	<>
	Wall Opening & Window	>
	Door	>
	Vertical or Shaft Opening	>
Boundary	Offset	>
	Rigid Link	>
	Cross-Section Rotation	>
	End Release	>
	Isolated Foundation Support	>
	Point Boundary Condition	>
	Line Boundary Condition	>
	Wall Foundation	>
	Area Boundary Condition	>
Load	Load Nature	>
	Load Case	>
	Load Combination	>
	Hosted Point Load	>
	Hosted Line Load	>
	Hosted Area Load	>
Other Parameters	Material	<>

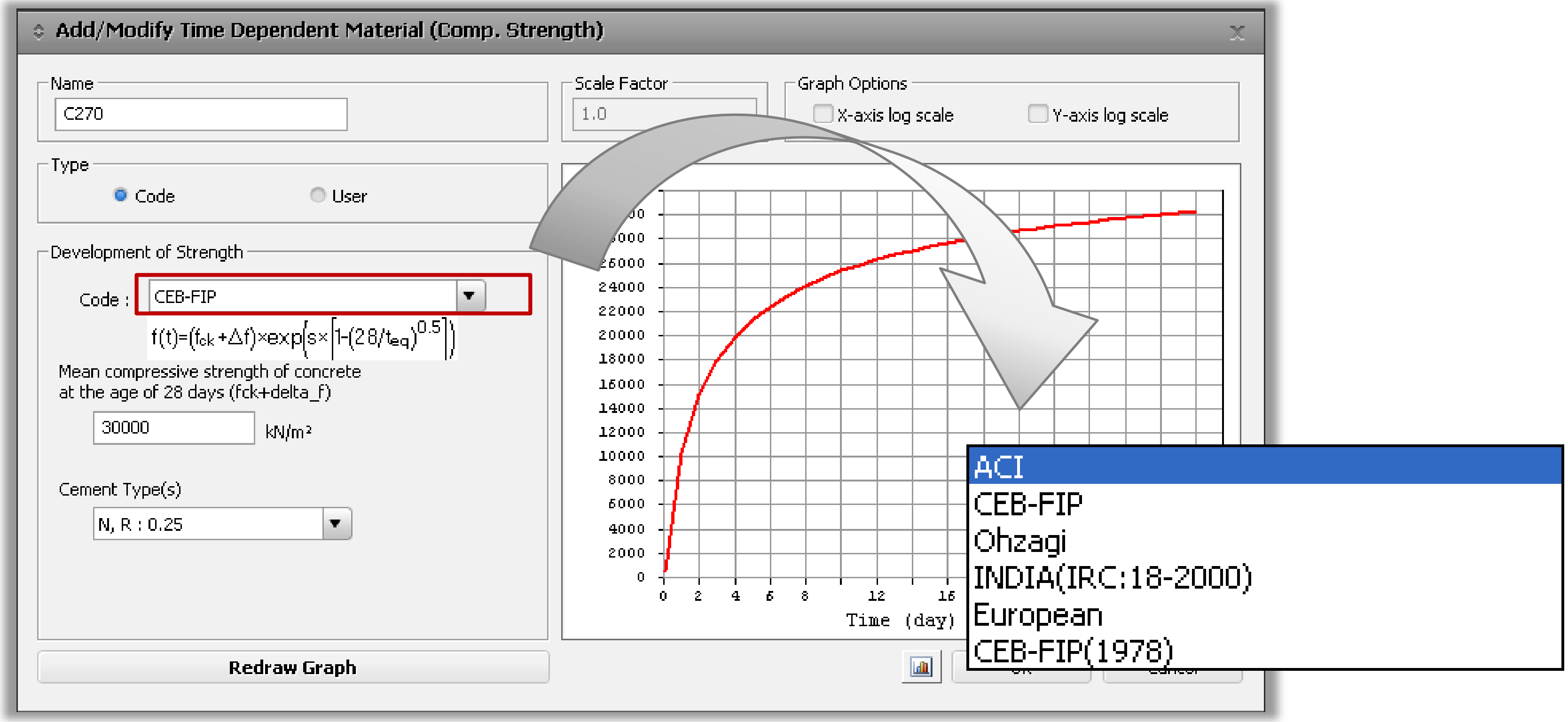
Creep/Shrinkage



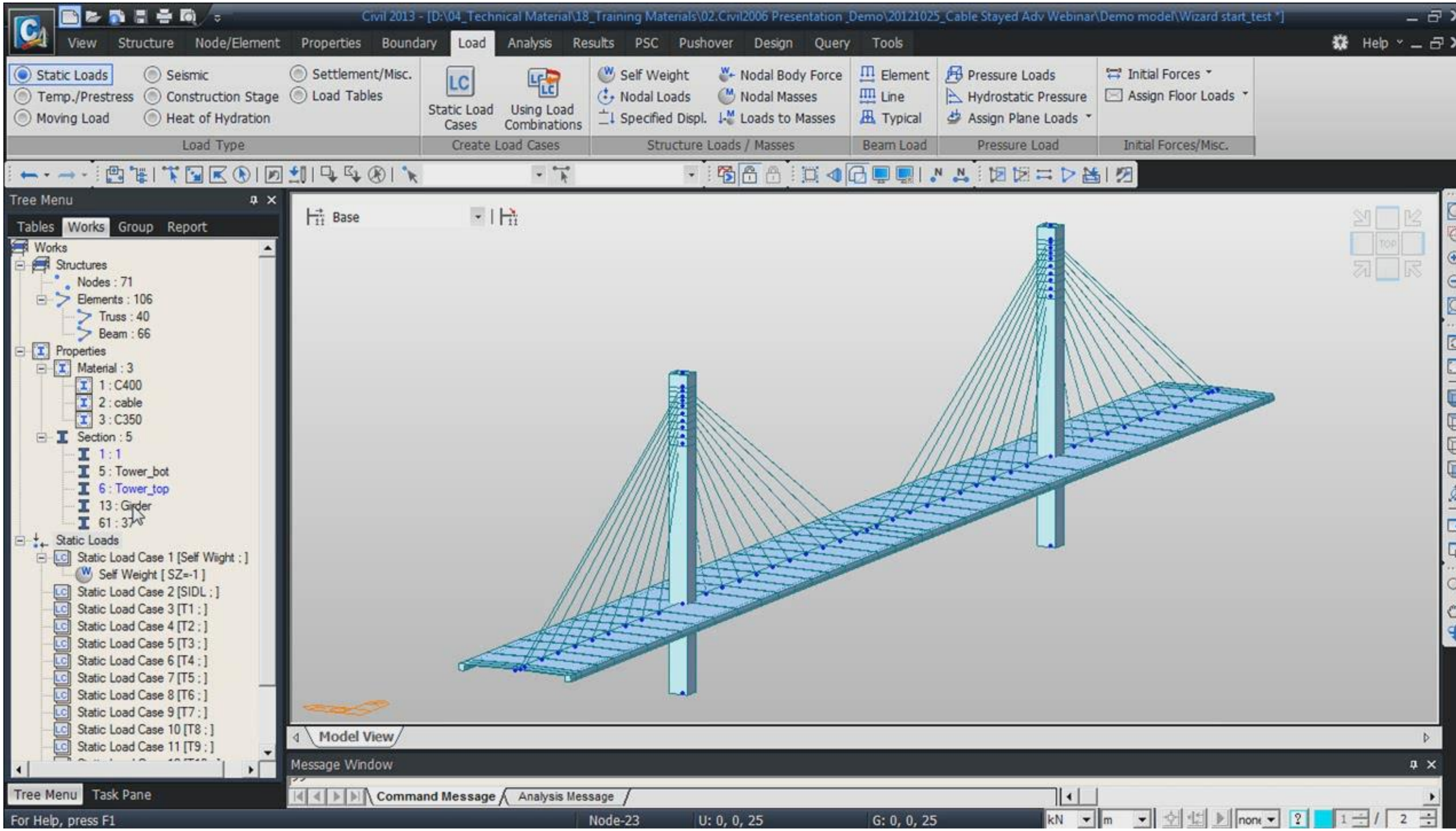


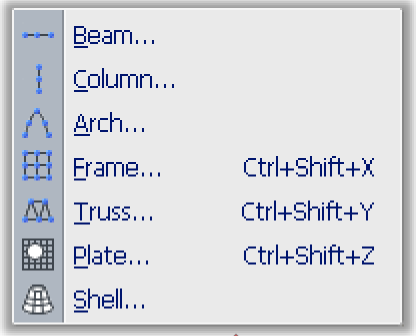


Compressive Strength



Drag & Drop material, section properties & supports





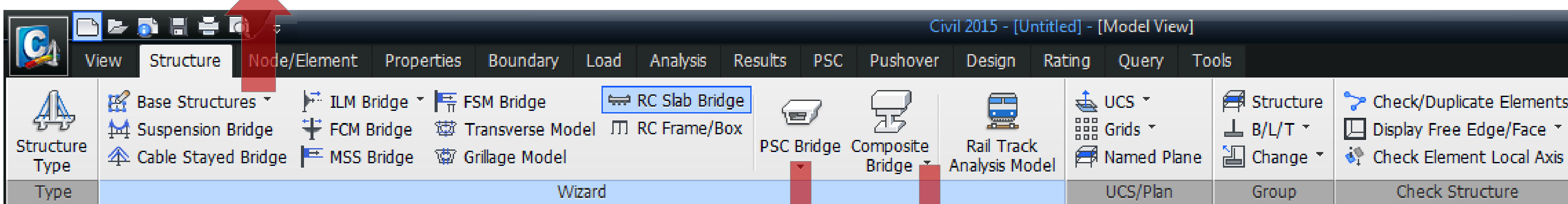
Suspension Bridge Wizard

Cable Stayed Bridge Wizard

Transverse Analysis Model Wizard

RC Slab Bridge Wizard

RC Frame/
Box Culvert Wizard



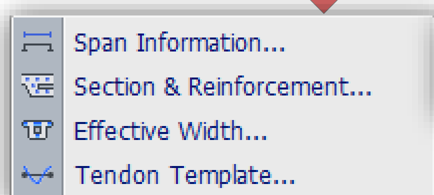
Segmental Bridge Model Wizard

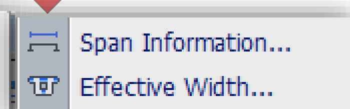
ILM Bridge Wizard

FCM Bridge Wizard

MSS Bridge Wizard

FSM Bridge Wizard



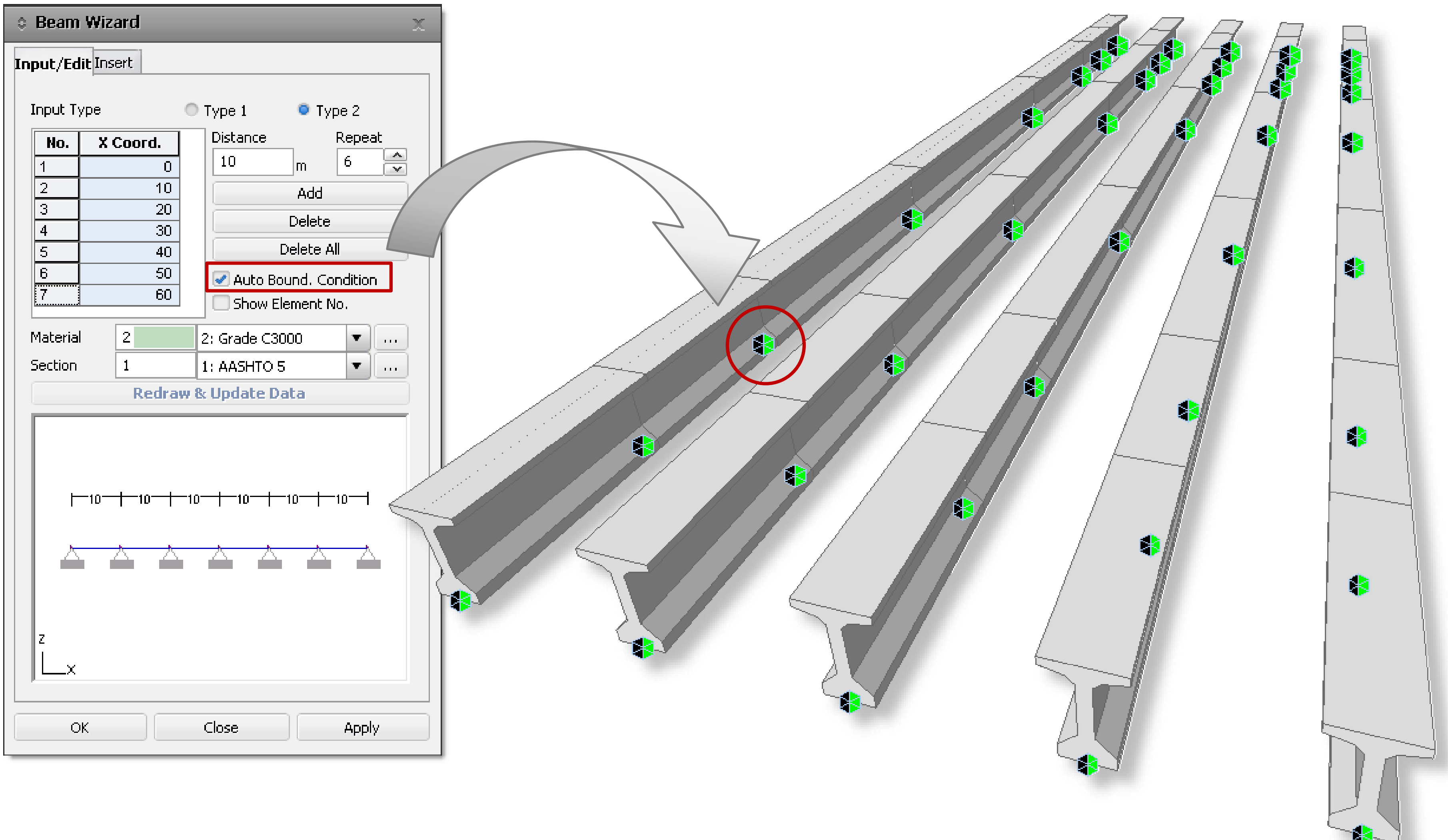


PSC Bridge Wizard

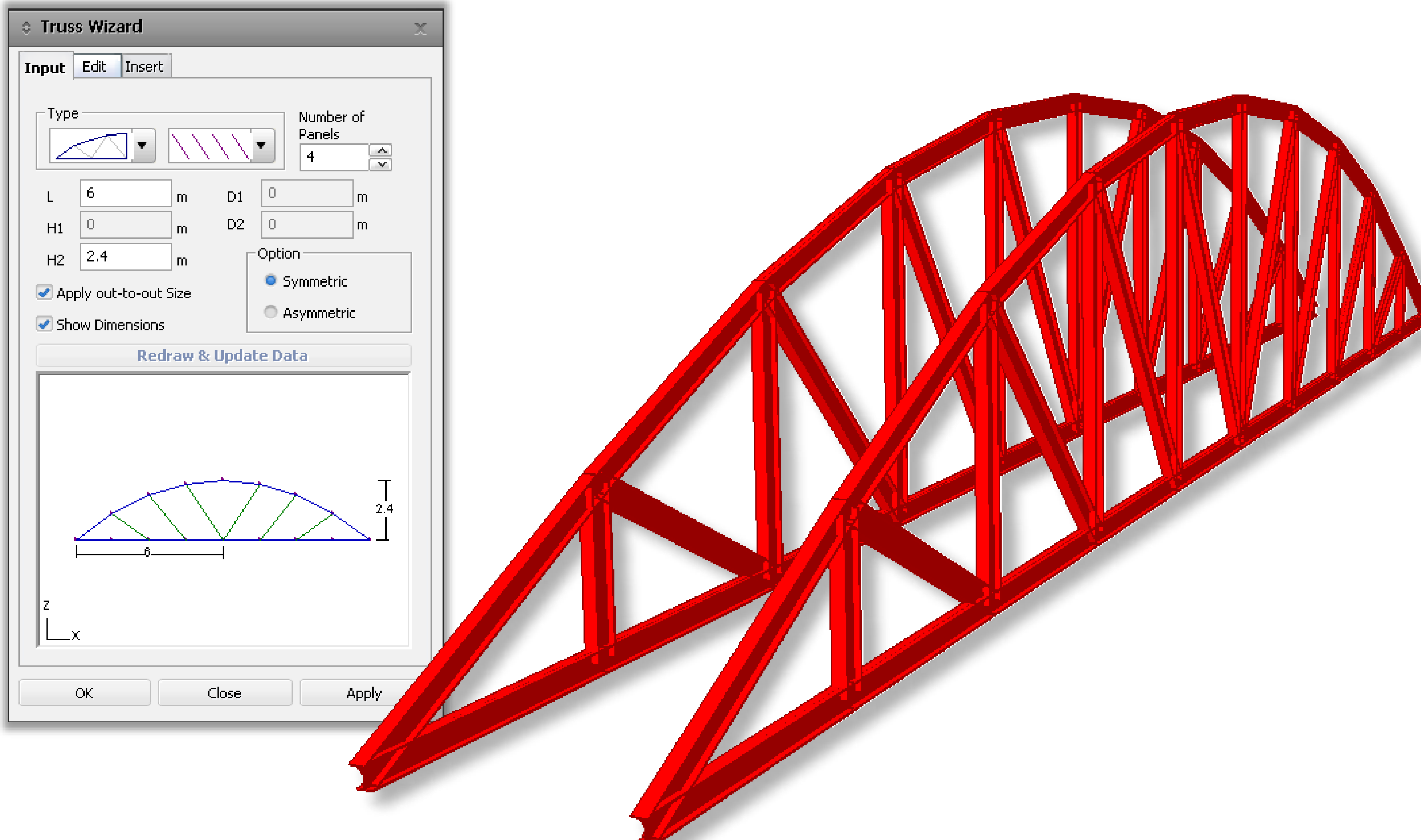
Grillage Model Wizard

Rail Track Analysis Wizard

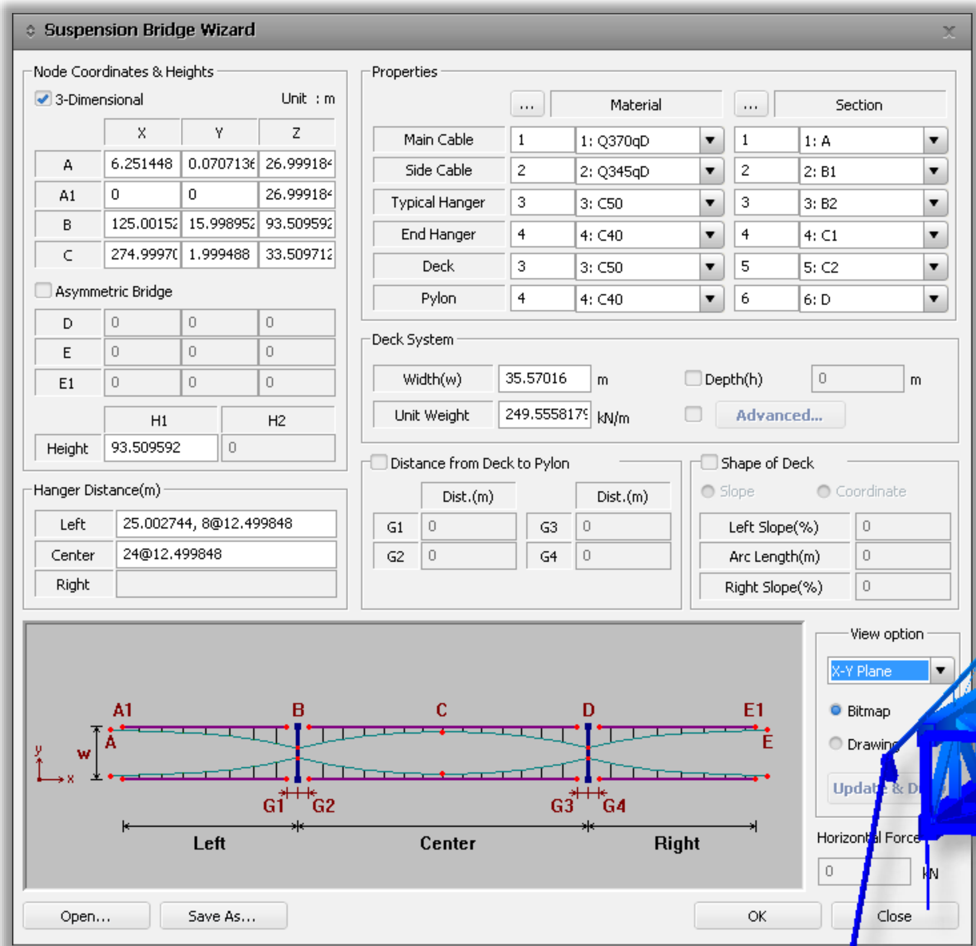
Beam Model Wizard

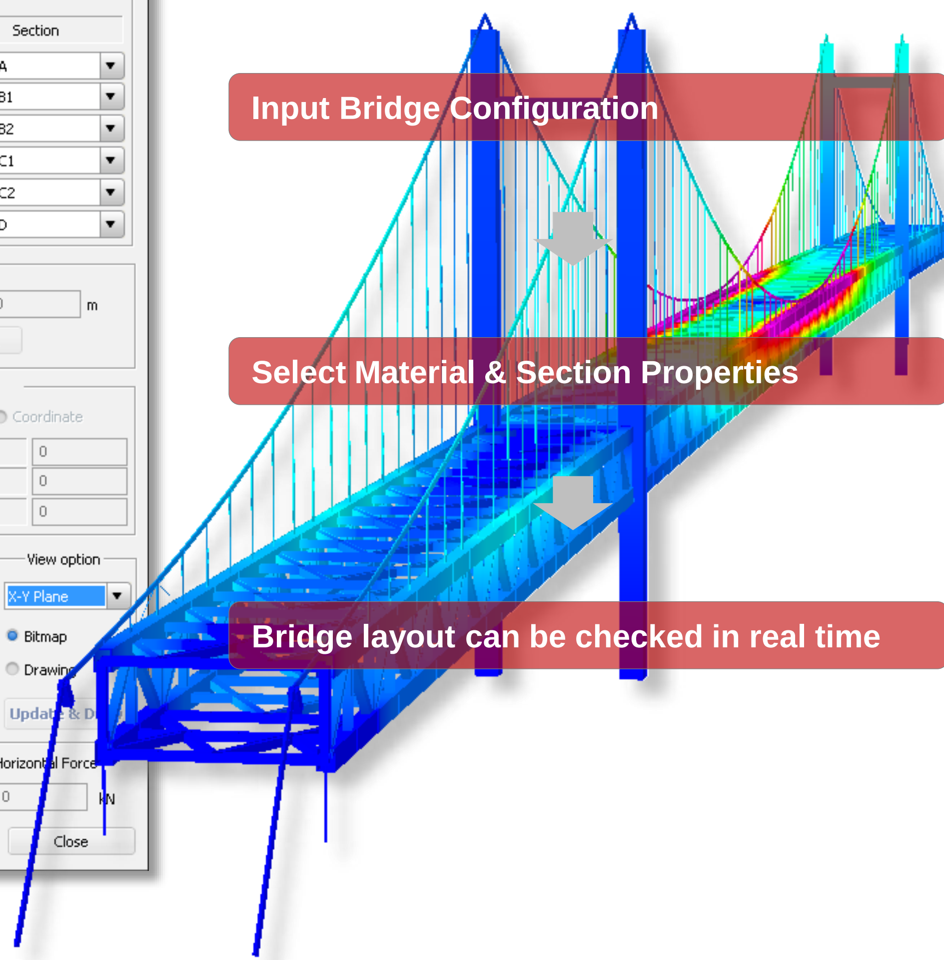


Truss Model Wizard



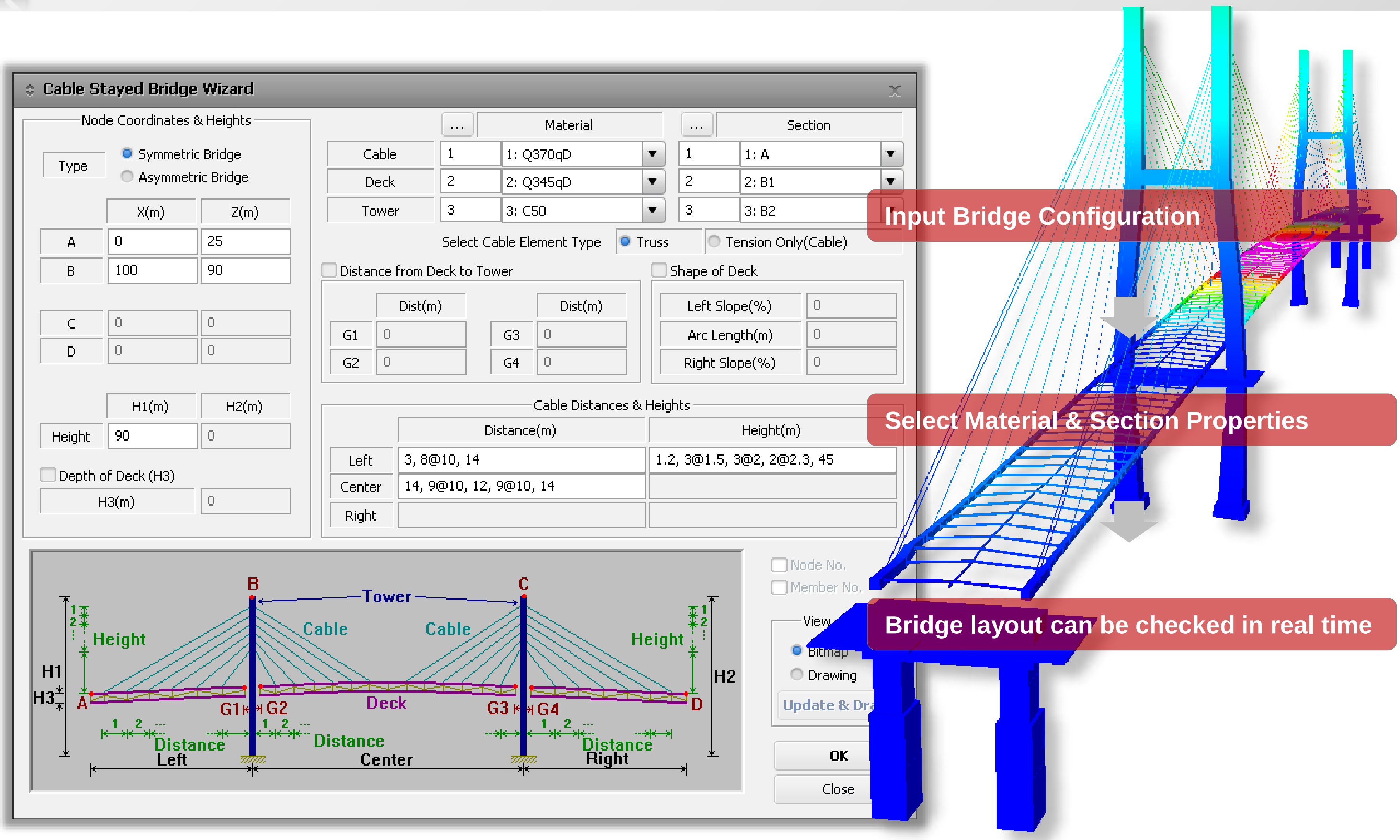
Suspension Bridge Model Wizard



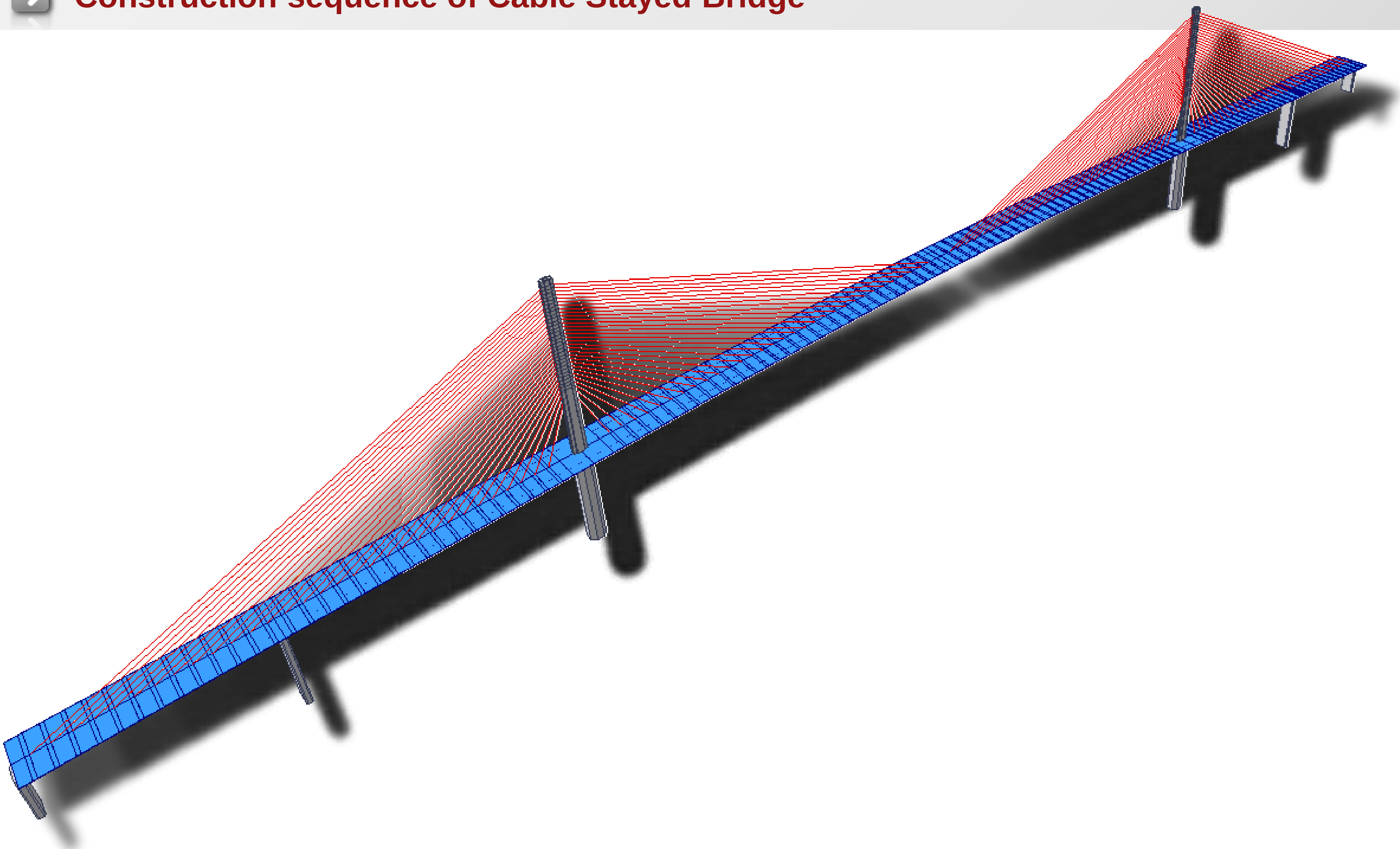


Construction sequence of Suspension Bridge

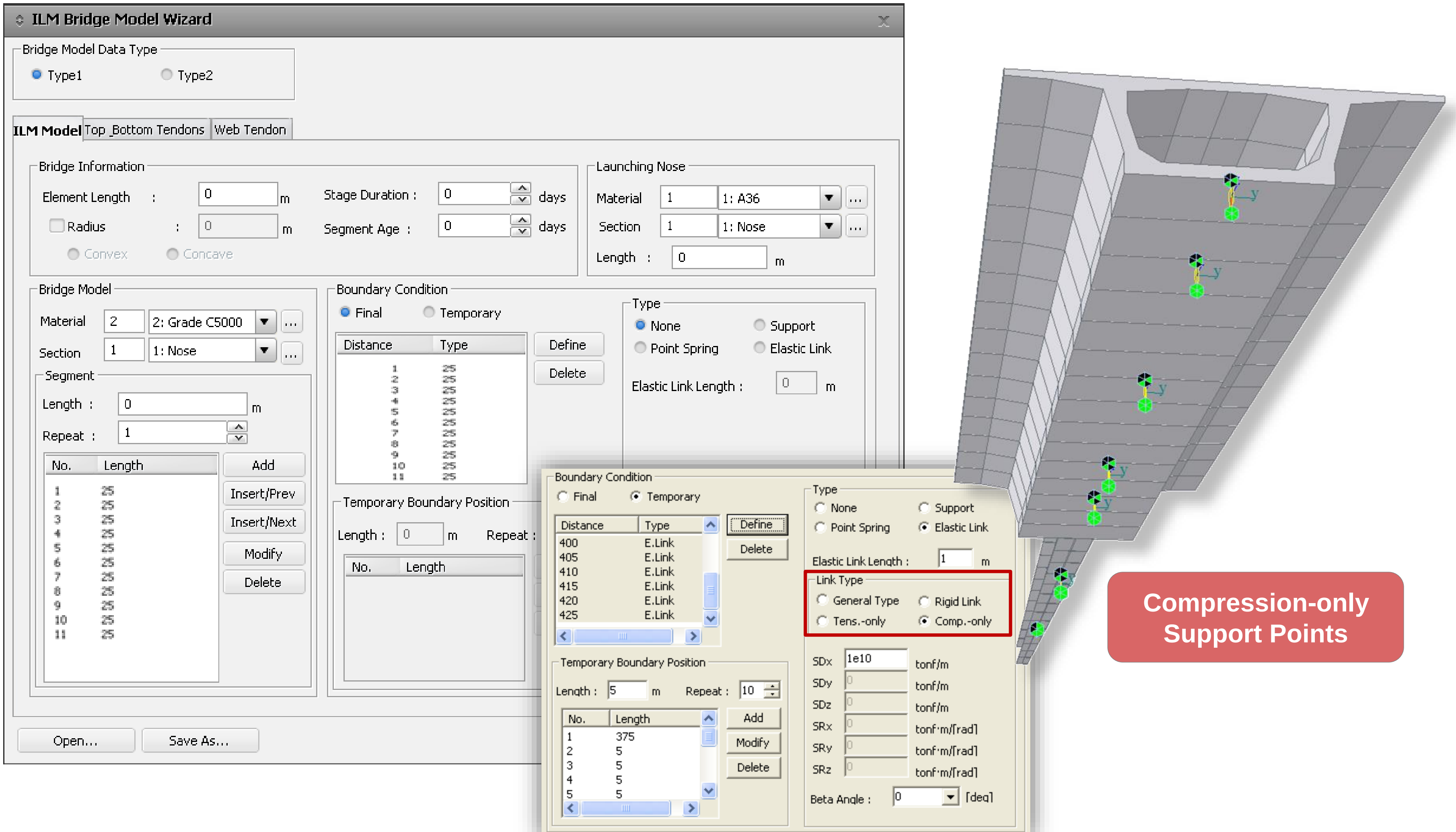
Cable Stayed Bridge Model Wizard



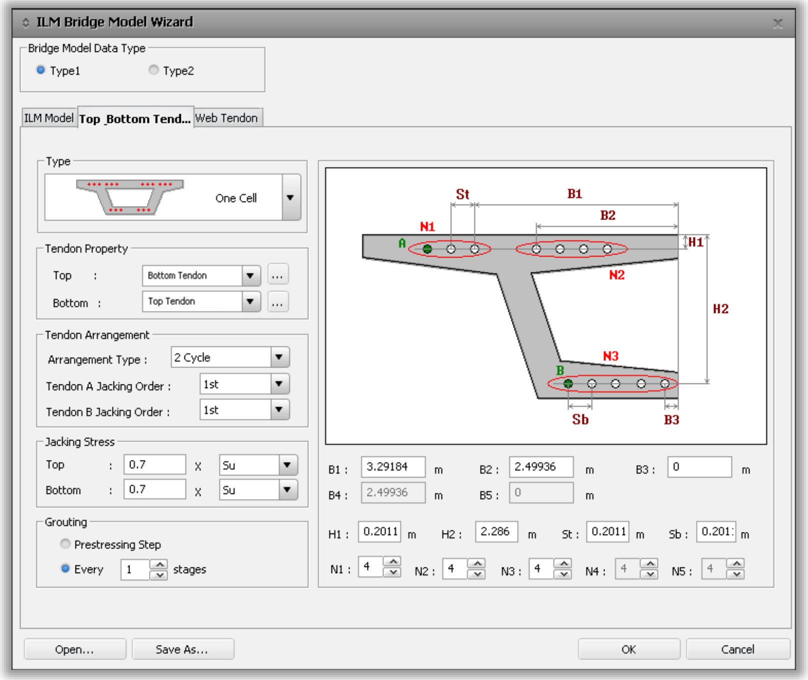
Construction sequence of Cable Stayed Bridge

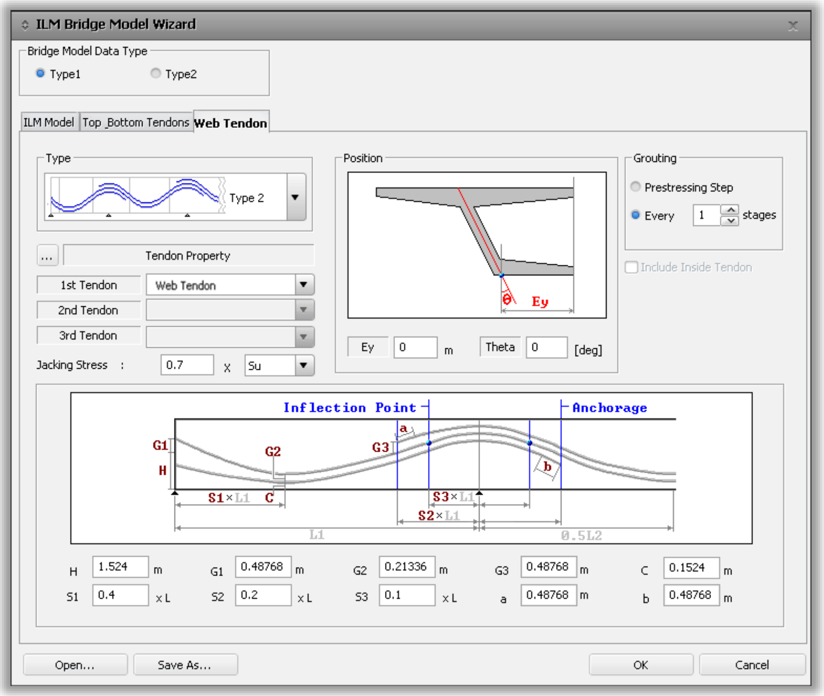


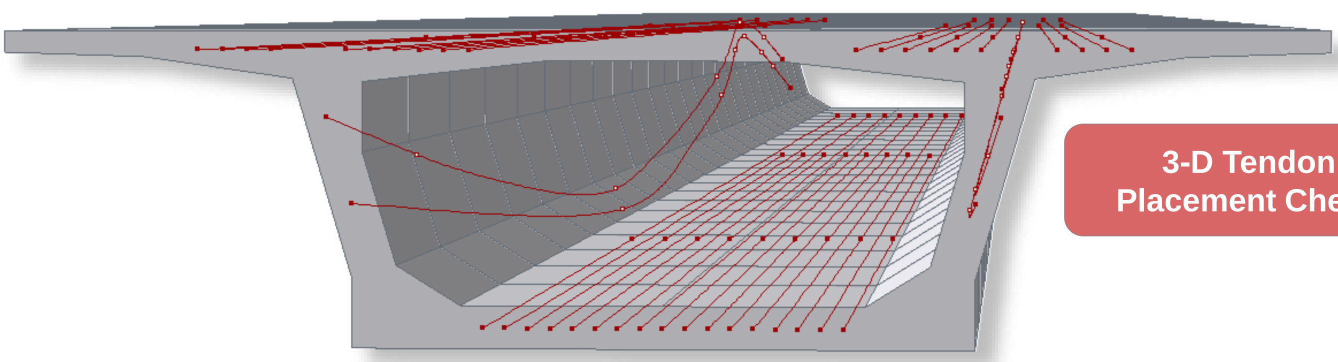
ILM Bridge Model Wizard – 1st Step: Nose & Post-tension Input, Define Each Segment and Input Support Conditions



ILM Bridge Model Wizard – 2nd Step: 1st and 2nd Stage of Tendon Input





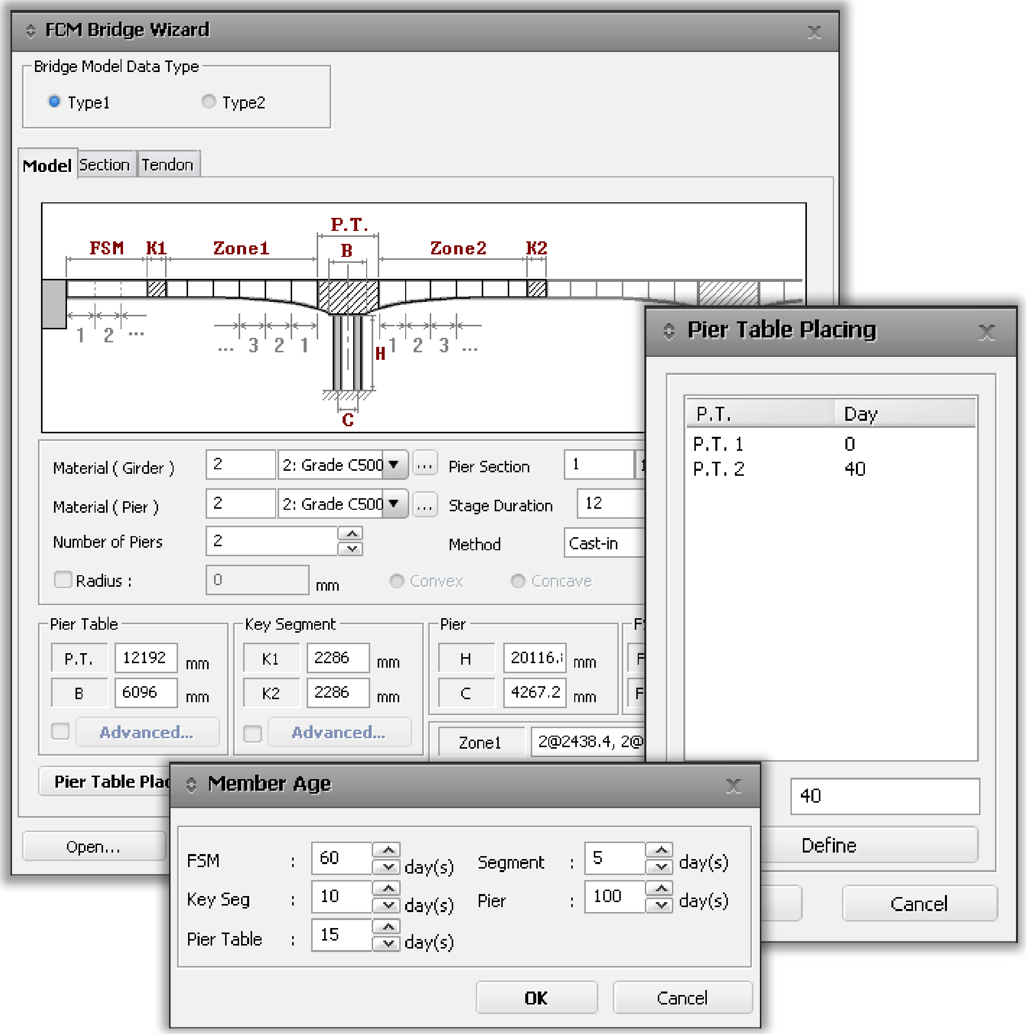


3-D Tendon Placement Check

ILM Bridge Stage Wizard – *Definition of Launching Distances & Construction Stages*

ILM Model with Defined Construction Stages

FCM Bridge Model Wizard – 1st Step: Model Tab, Type 1 & 2



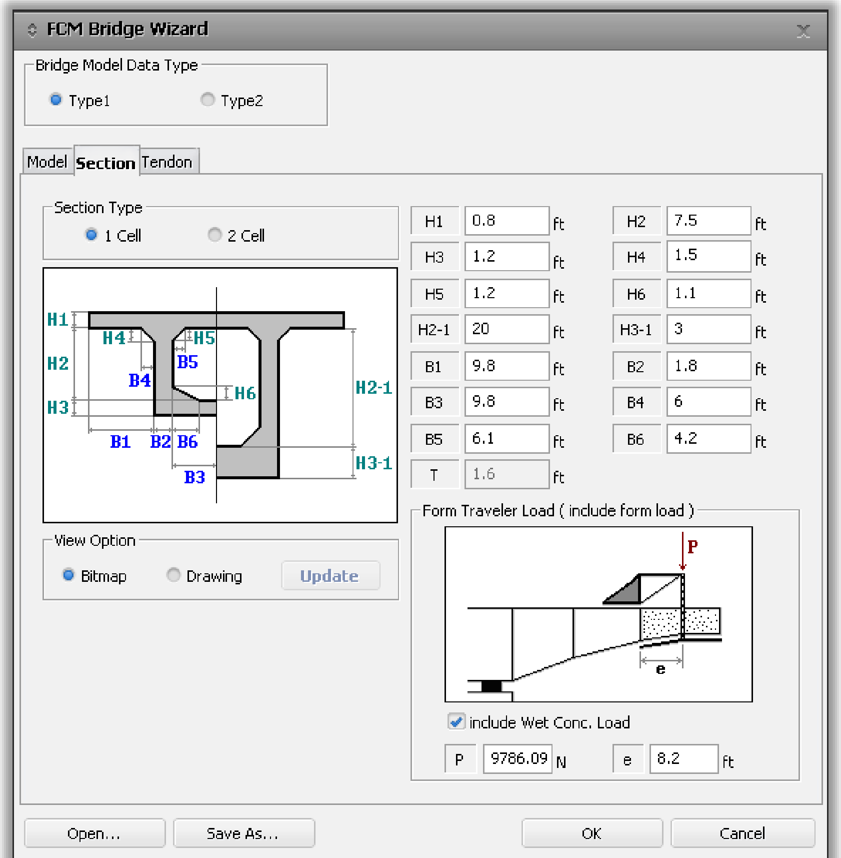
Select Material Properties & Pier Sections

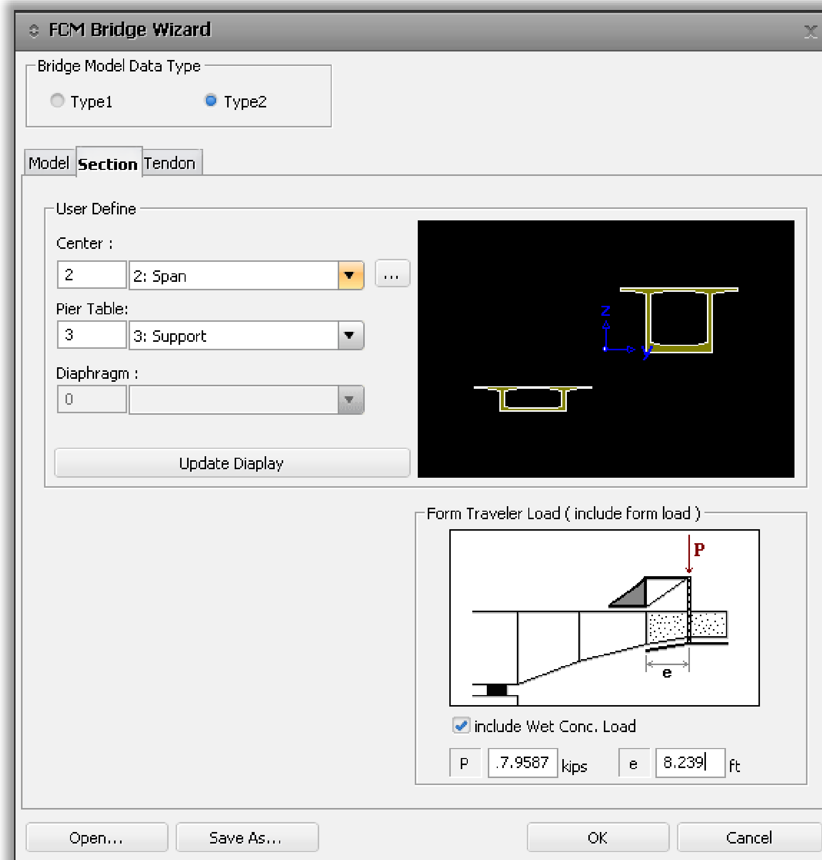
Input No. of Days for Constructing each Segment

Input Bridge Configuration & Division of Segments

Input Initial Maturity for each Member

FCM Bridge Model Wizard – *2nd Step: Section Tab, Type 1 & 2*



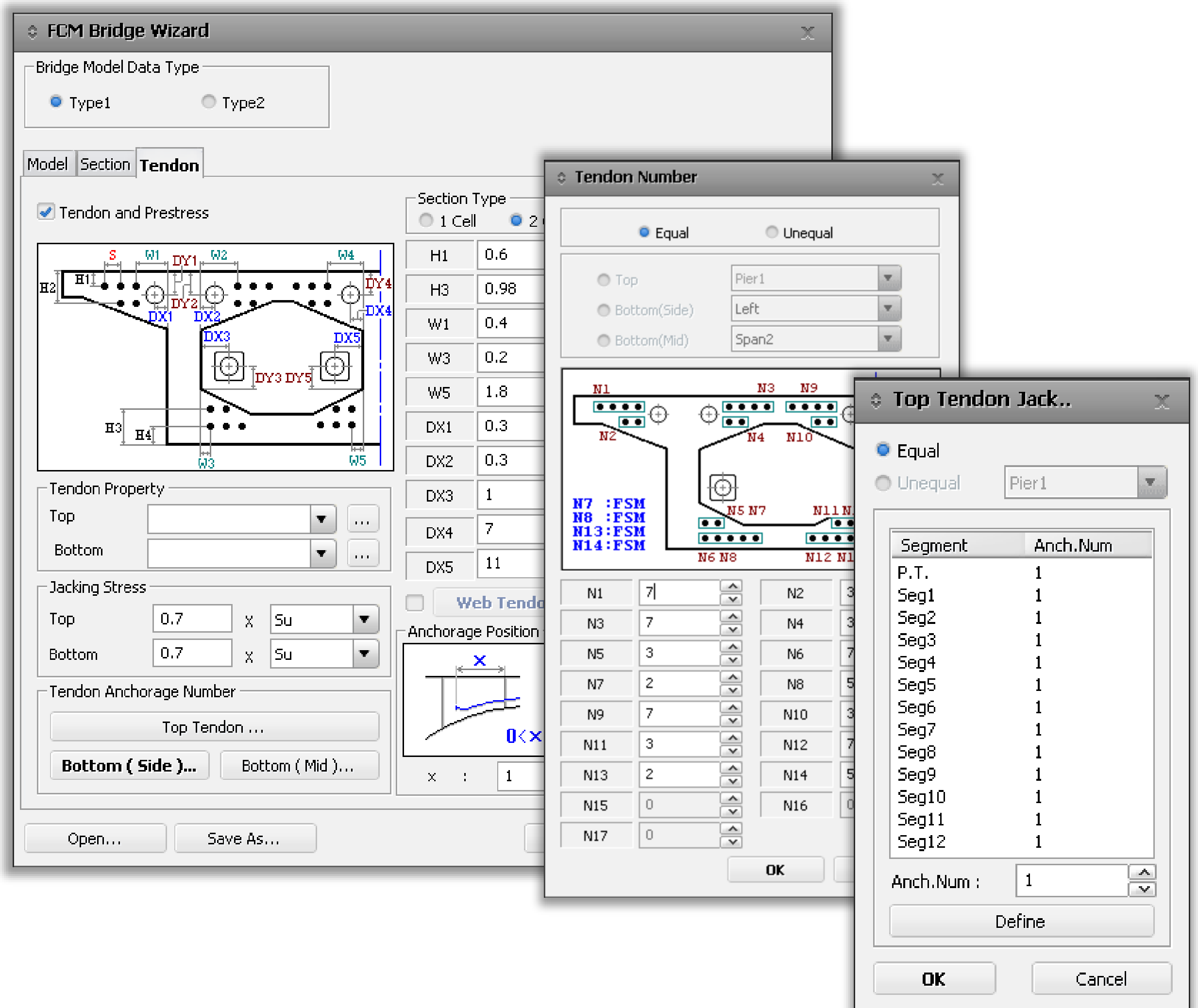


Input Section Dimensions
Select sections defined

→ **Check Sectional Configuration**

→ **Input Form Traveler Load**

FCM Bridge Model Wizard – *3rd Step: Tendon Tab, Type 1*



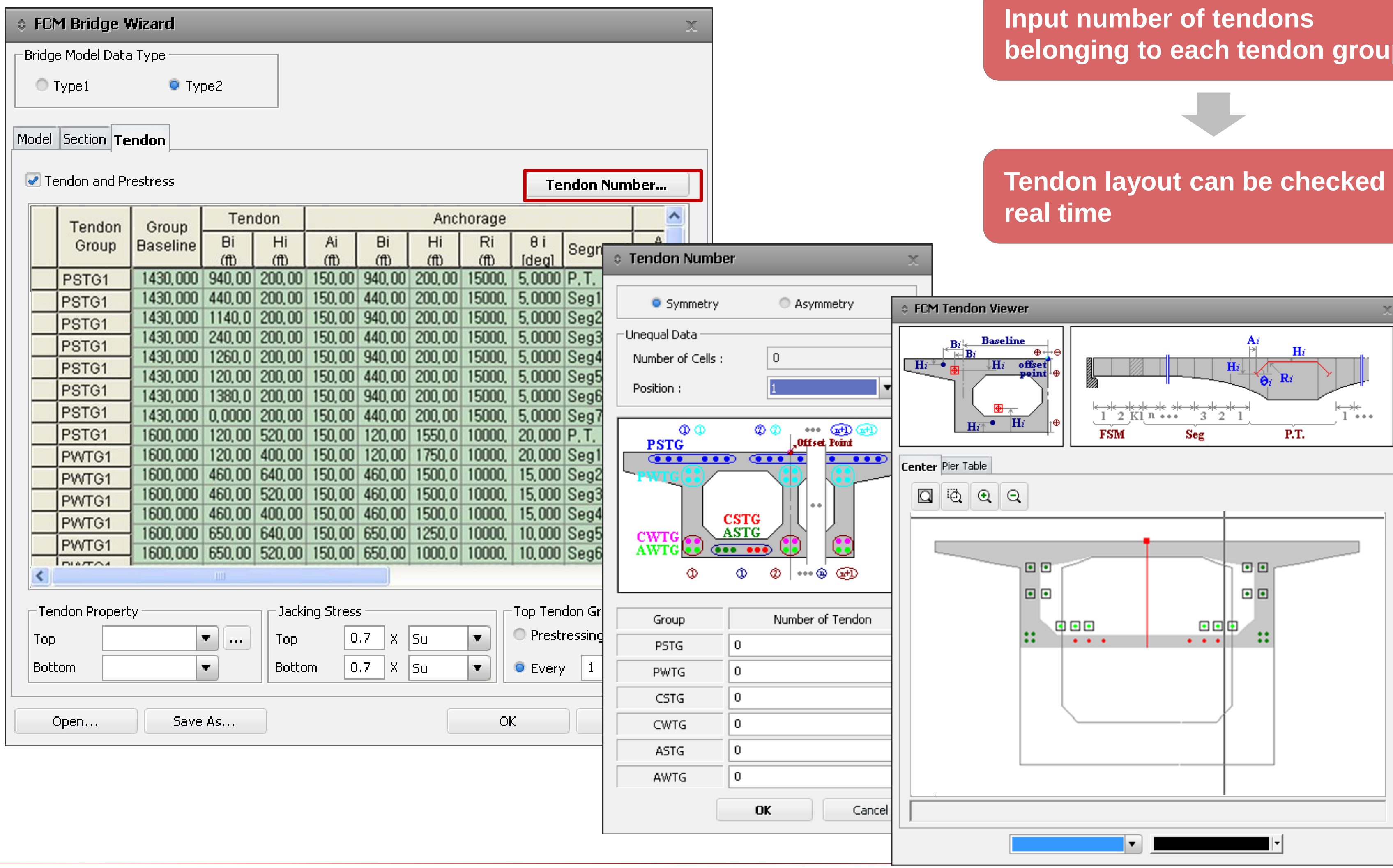
Input Tendon Placement

Input Tendon Properties & Jacking Forces

Input No. of Tendons

Input No. of Anchors for Each Segment

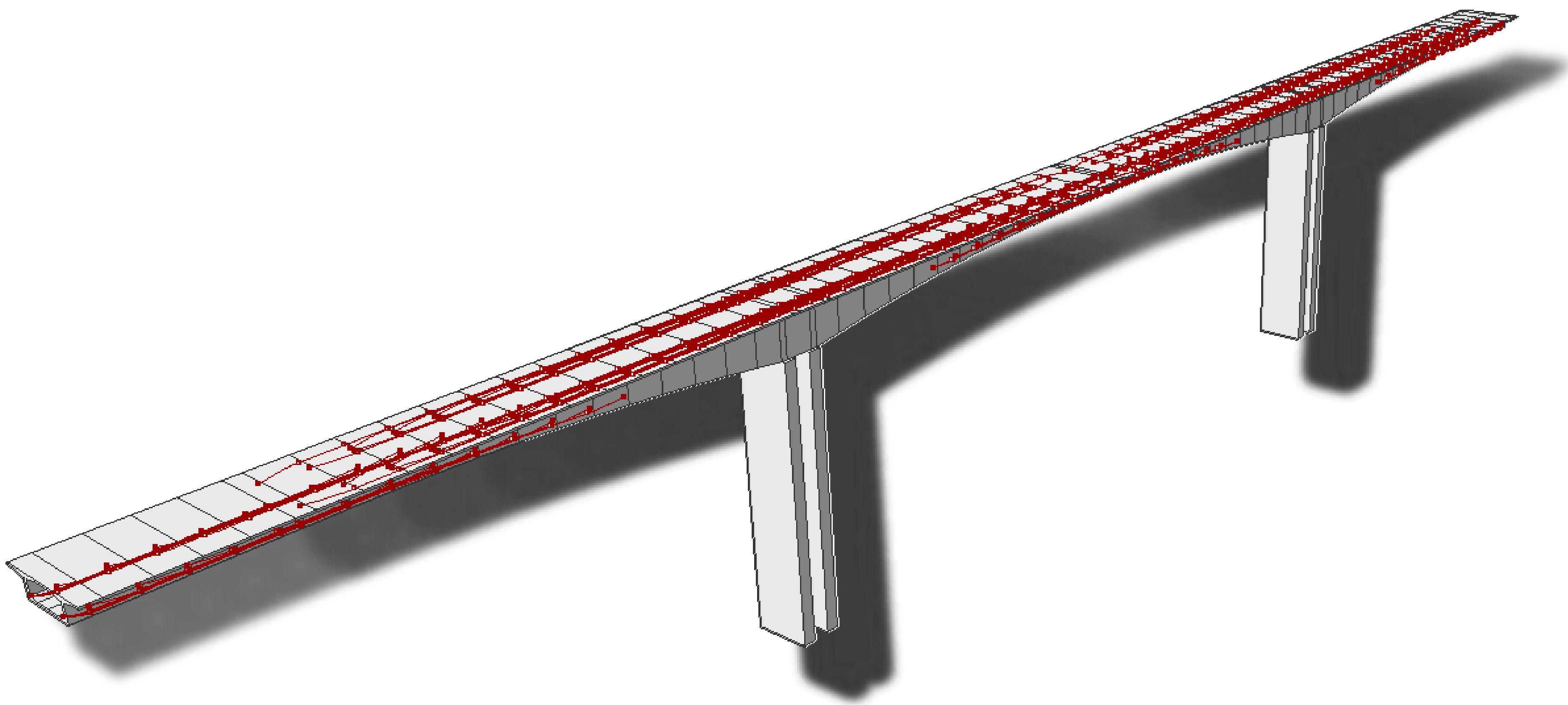
FCM Bridge Model Wizard – *3rd Step: Tendon Tab, Type 2*



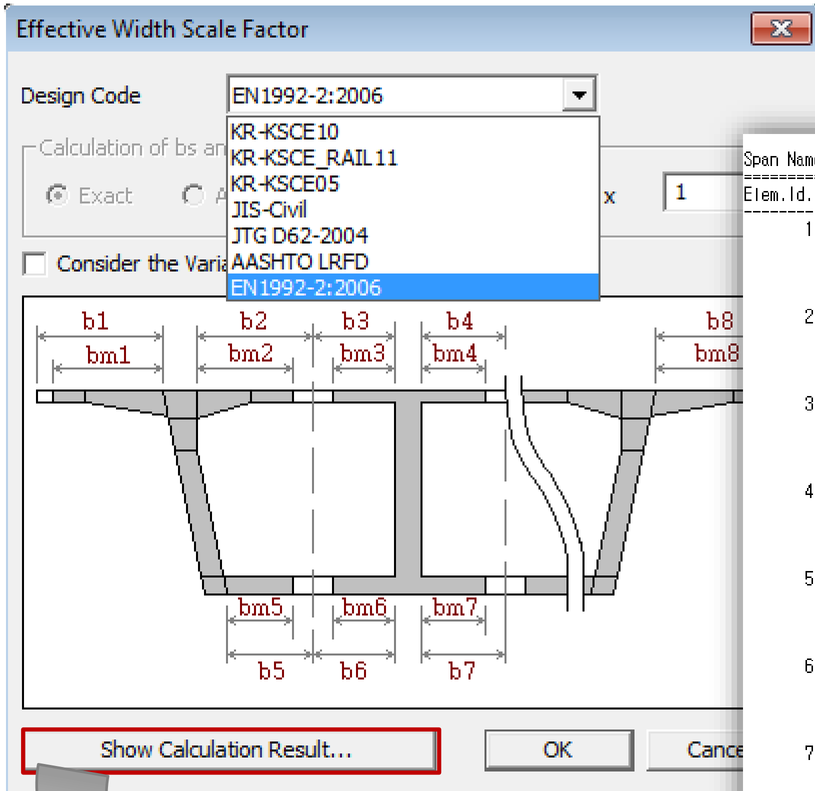
Input number of tendons belonging to each tendon group

Tendon layout can be checked in real time

FCM Bridge Model Wizard – *Completed Construction Stage Model with 3-D Tendon Layout*



PSC Bridge – *Effective Width calculation*

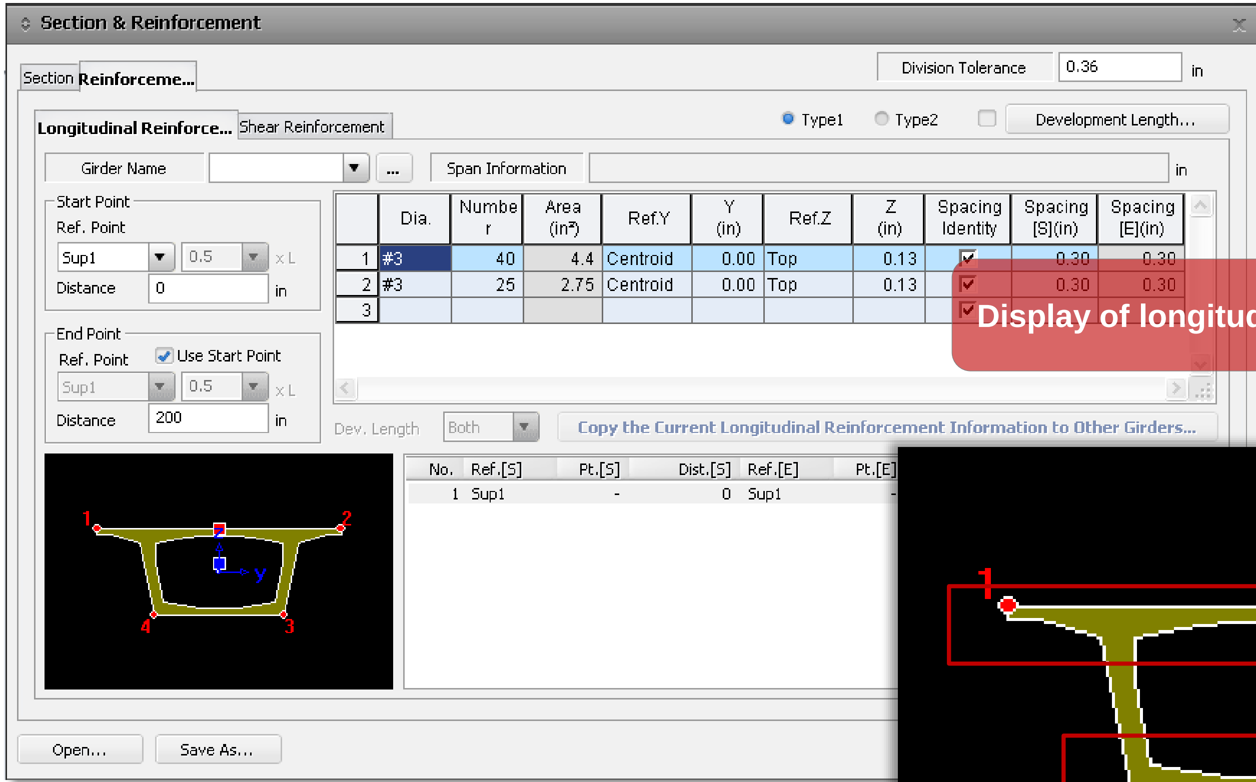


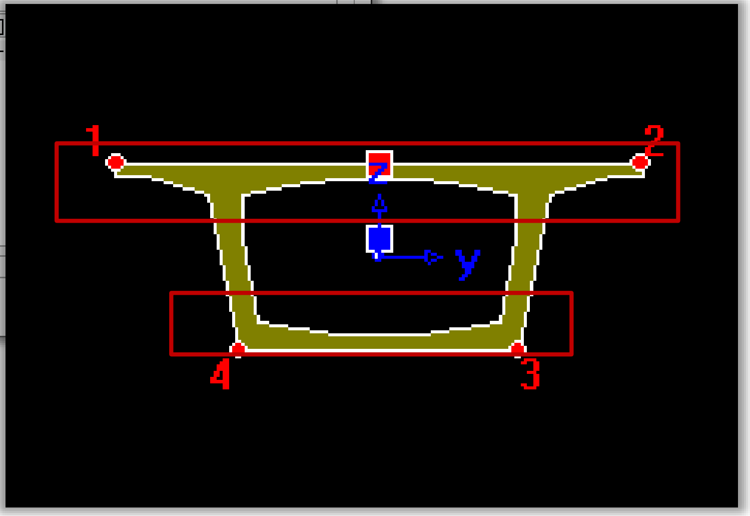
Calculation results

Span Name = G1

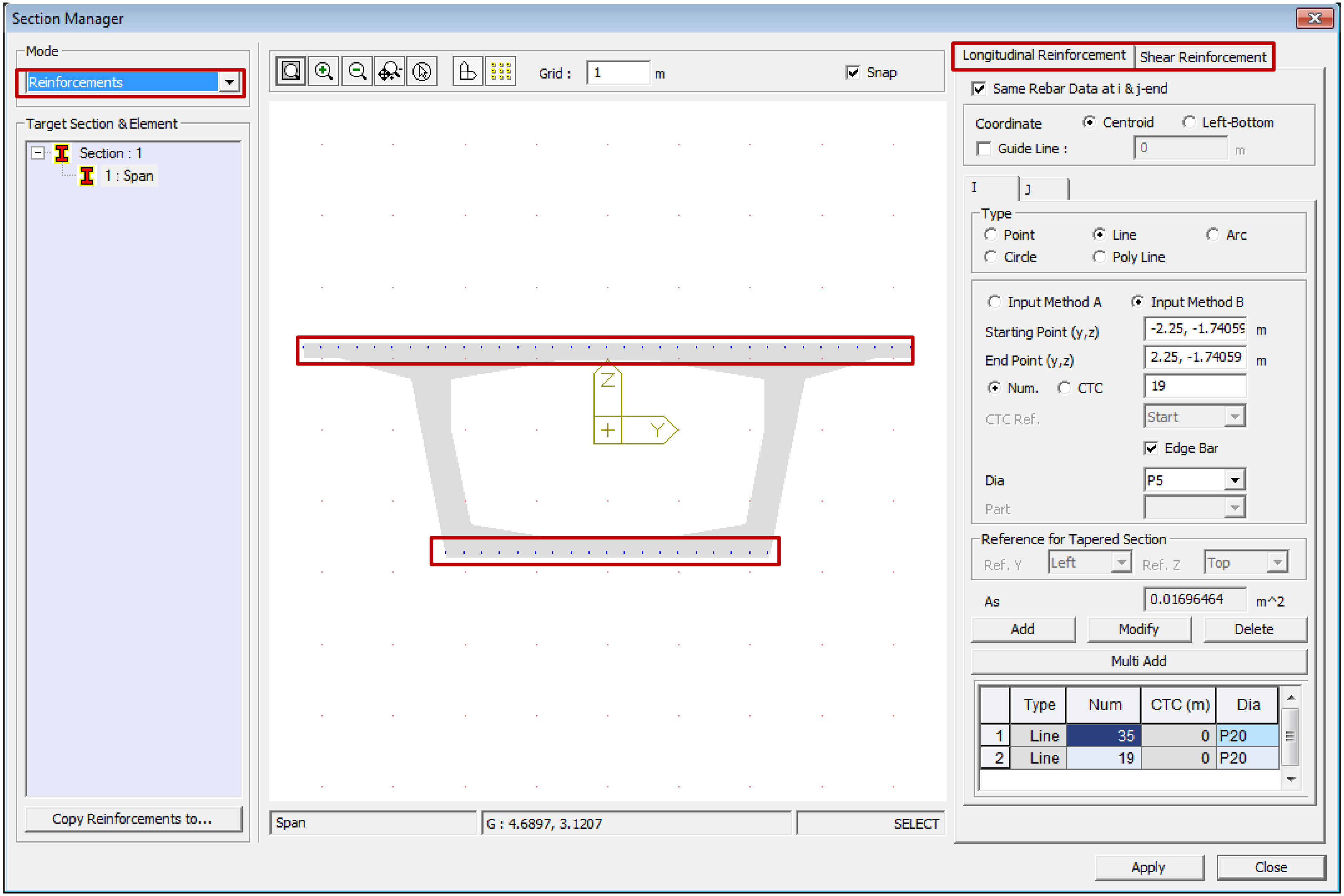
Elem.Id.	Sect.Id.		Stat	bm1	bm2	bm3	bm4	bm5	bm6	bm7	bm8
1	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.7327	-	-	1.7327	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
2	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
3	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
4	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
5	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
6	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
7	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
8	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
9	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
		J	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-
10	1	I	W	1.6000	2.0000	-	-	2.0000	-	-	-
			Eff.W	1.6000	1.9705	-	-	1.9705	-	-	-

PSC Bridge – *PSC Section (Reinforcing steel)*

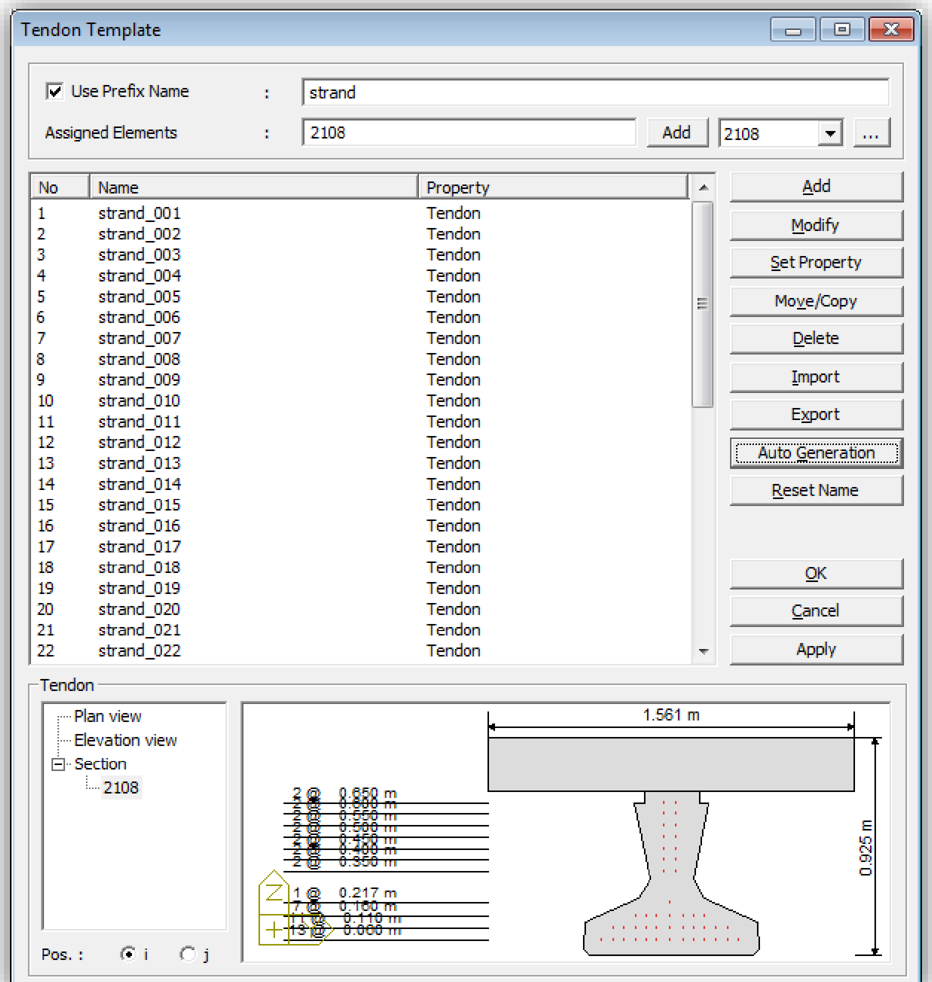




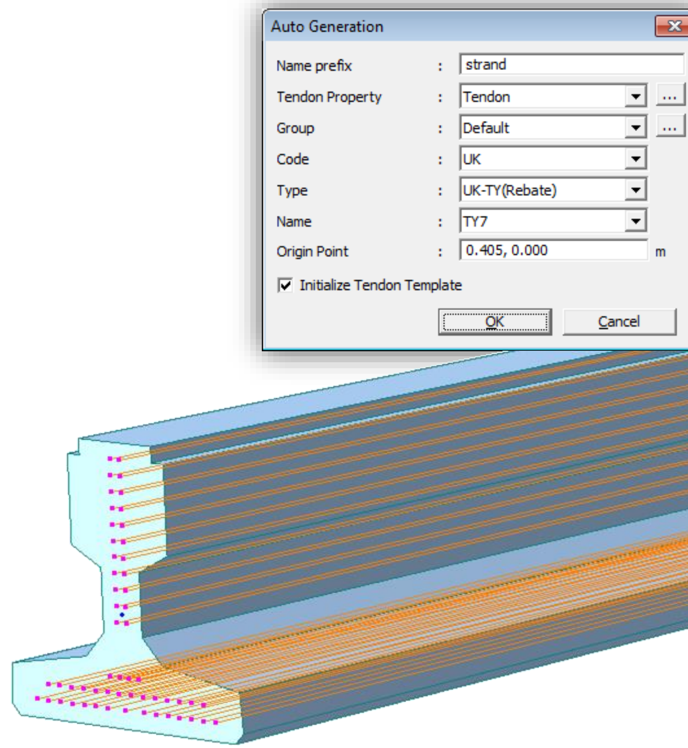
Section Manager– *PSC Section (Reinforcing steel)*



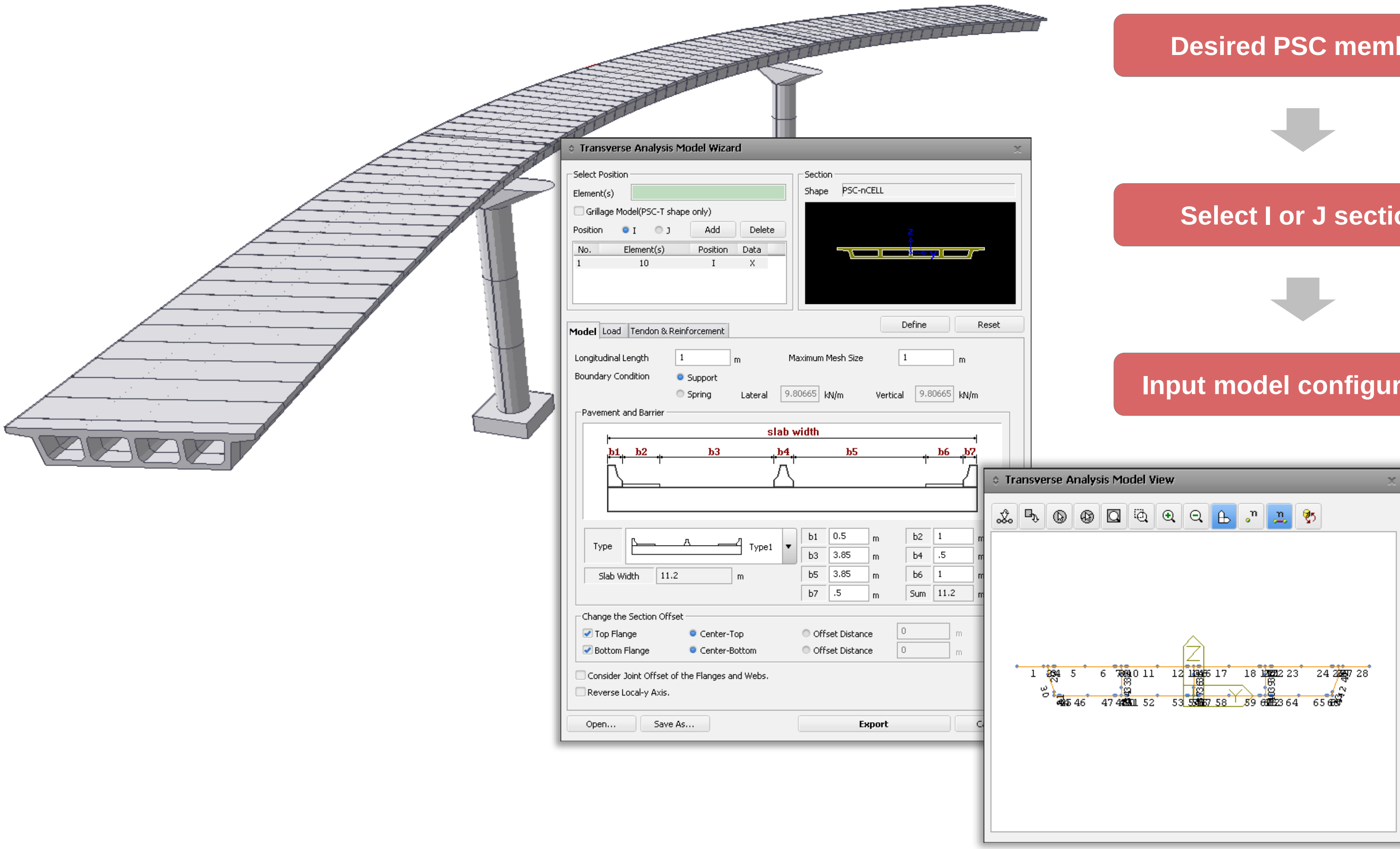
PSC Bridge – Tendon template *(Quick Tendon Profile Generation)*



Tendon template wizard



Transverse Analysis Model Wizard – 1st Step: Model configuration

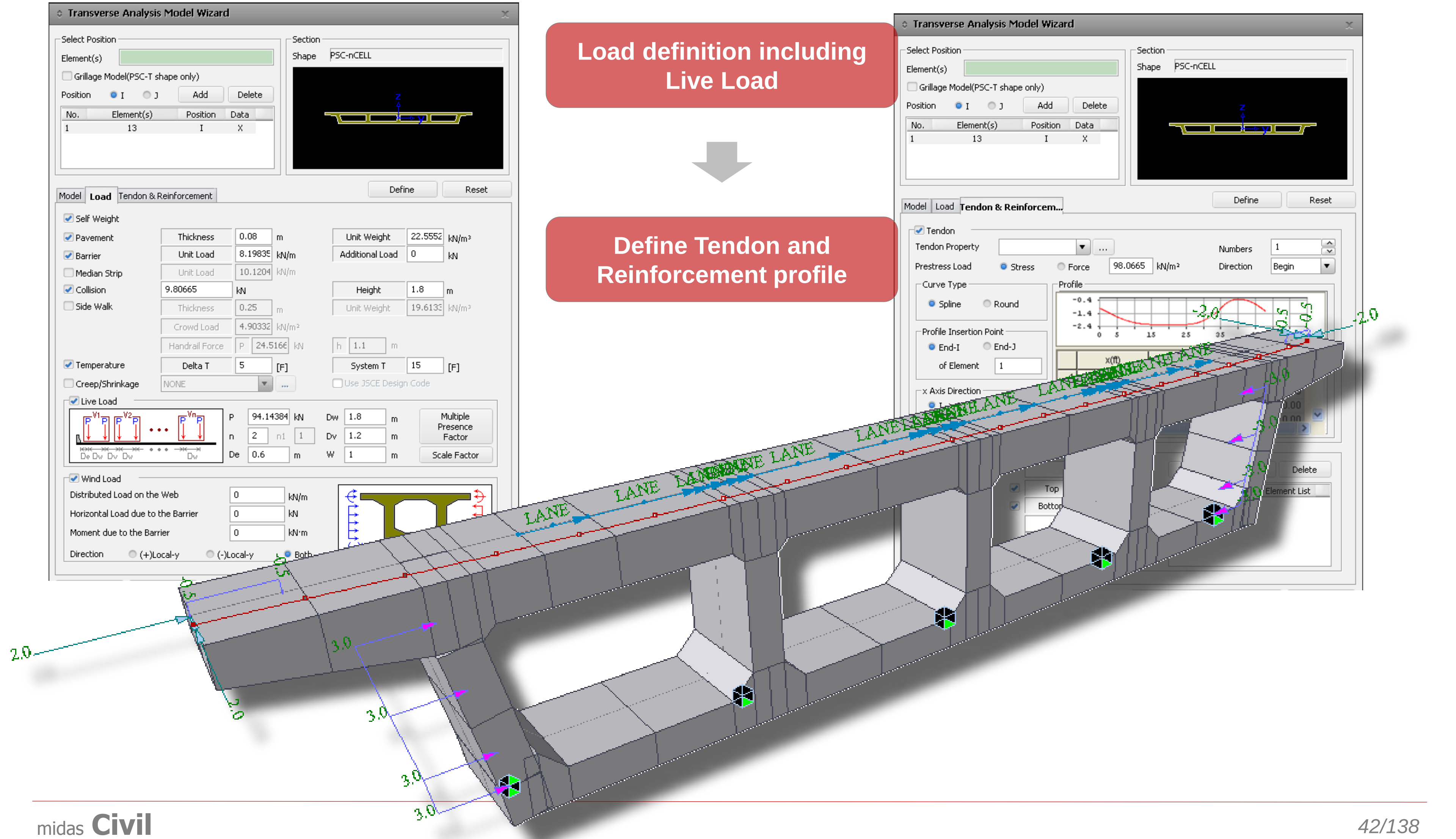


Desired PSC member

Select I or J section

Input model configuration

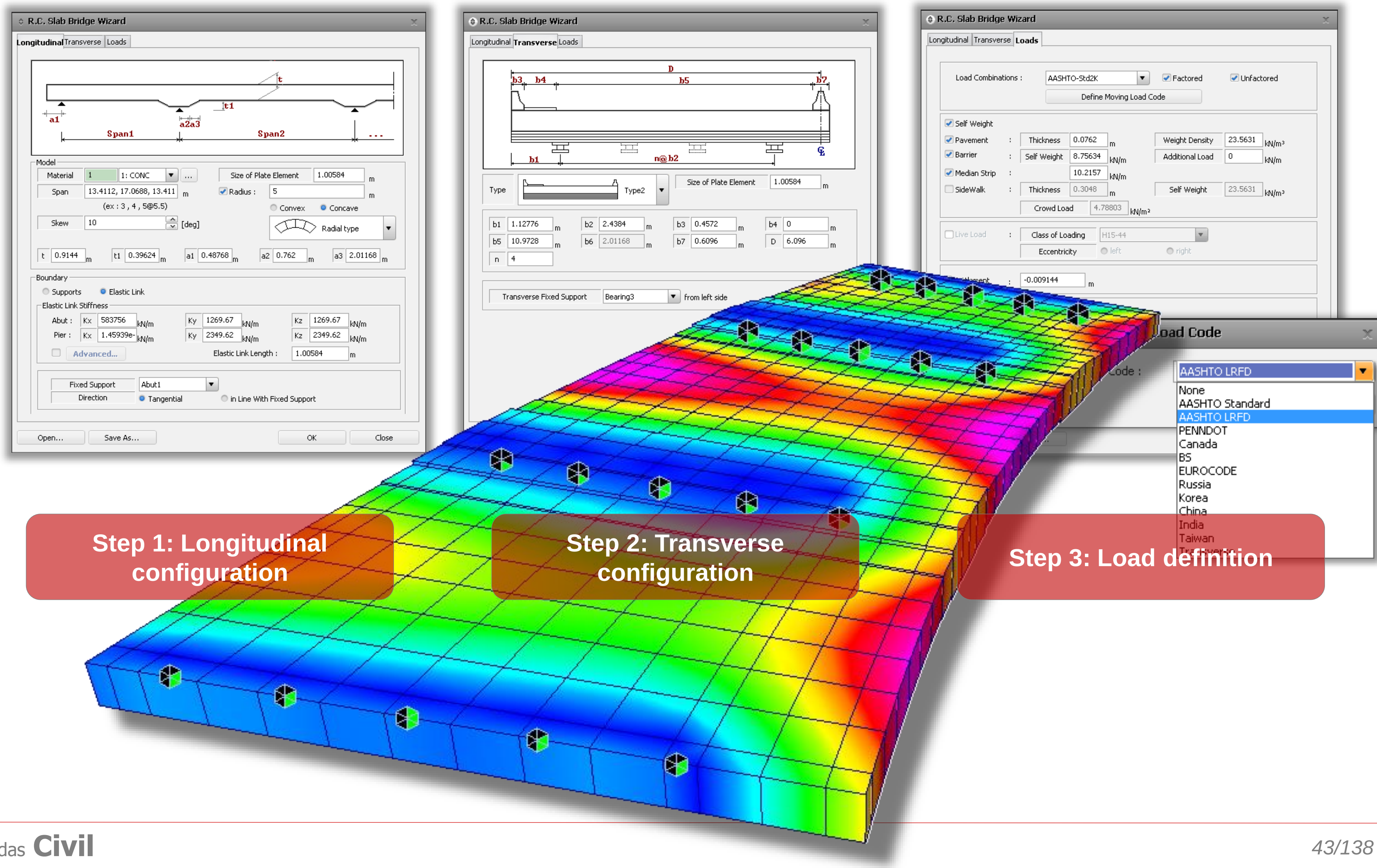
Transverse Analysis Model Wizard – 2nd & 3rd Step: Load, Tendon/Reinforcement Profile definition



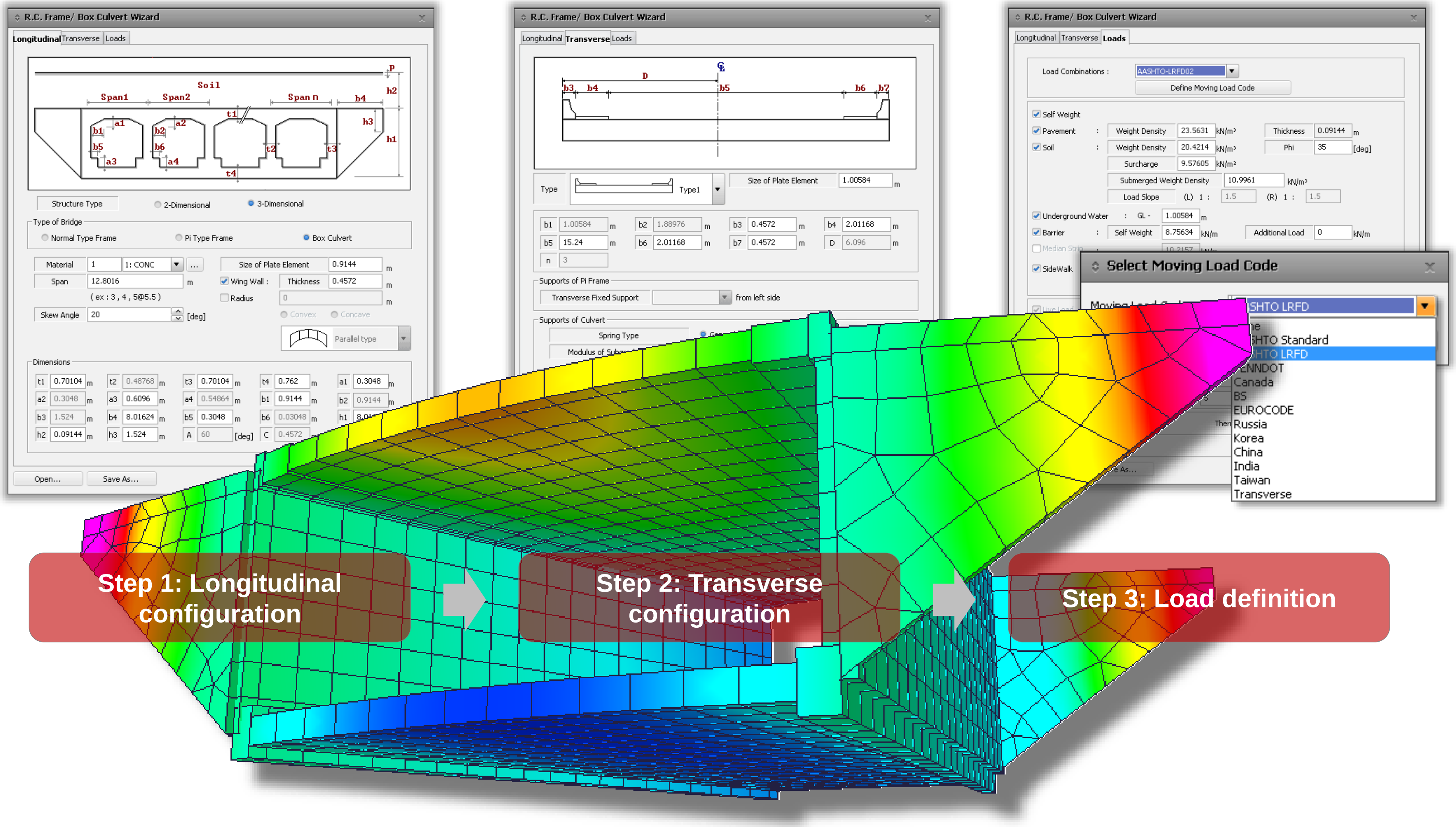
Load definition including Live Load

Define Tendon and Reinforcement profile

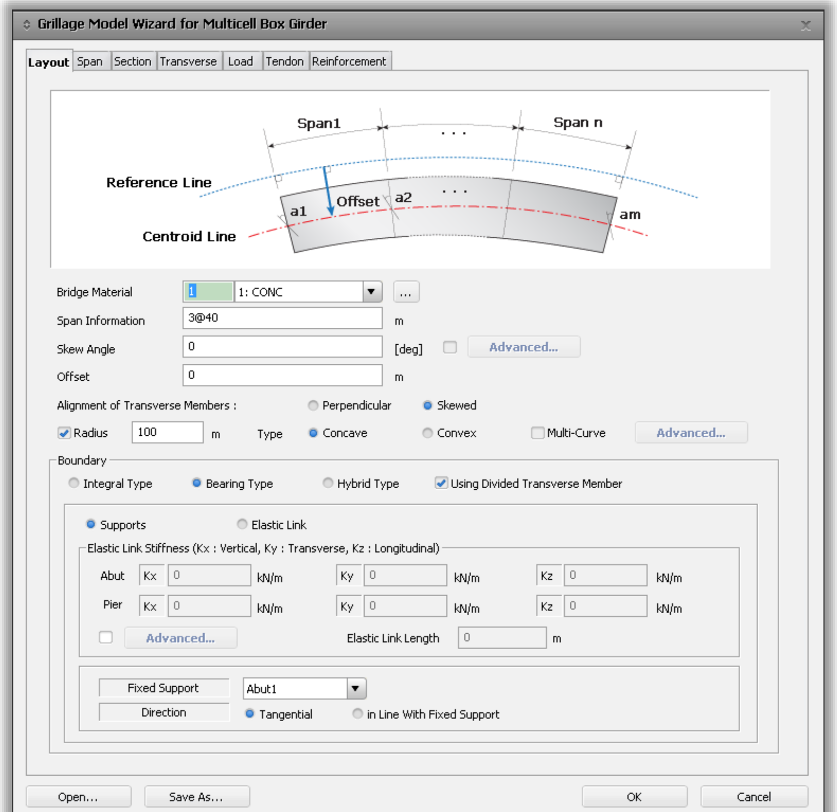
RC Slab Bridge Wizard

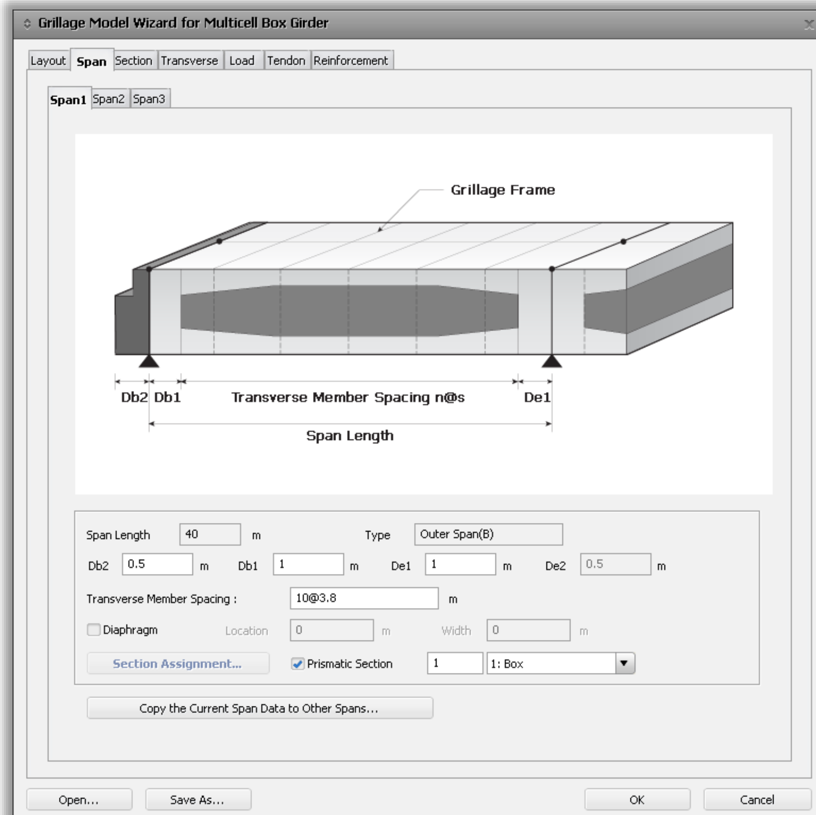


RC Frame / Box Culvert Wizards



Grillage Model Wizard – *customization for CALTRANS*

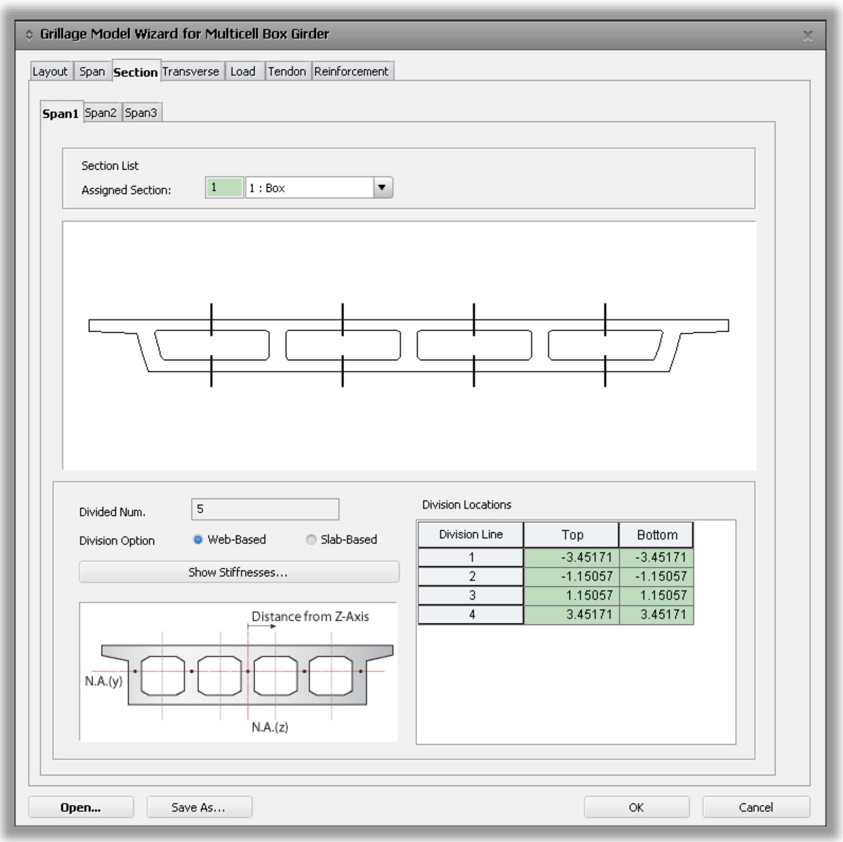


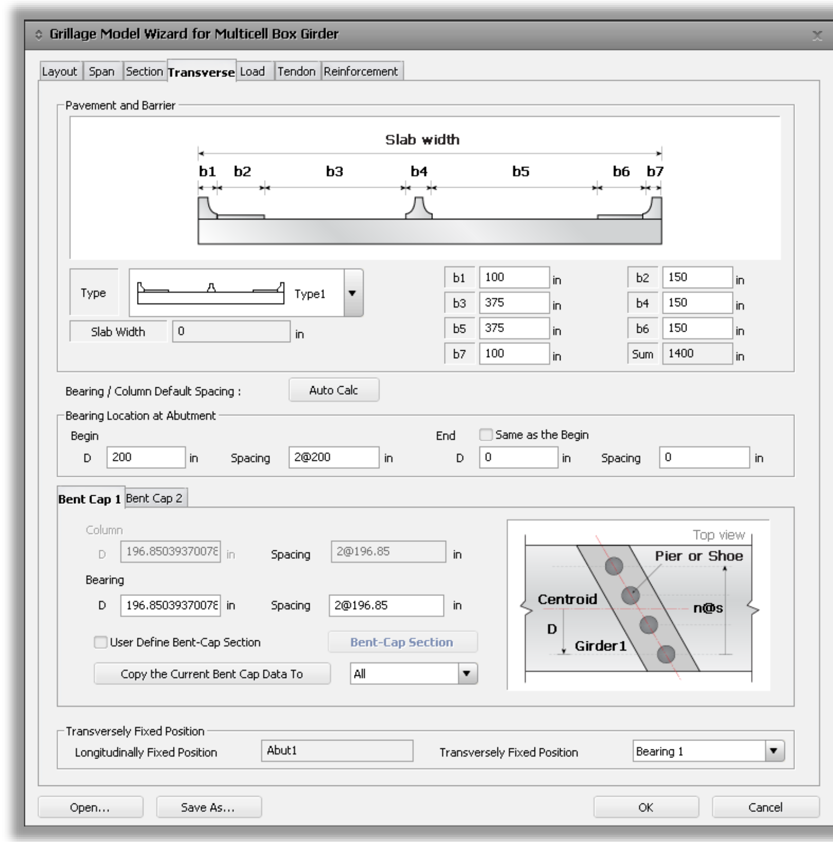


Step 1: Define Bridge Alignment

Step 2: Define Span Configuration

Grillage Model Wizard – *customization for CALTRANS*

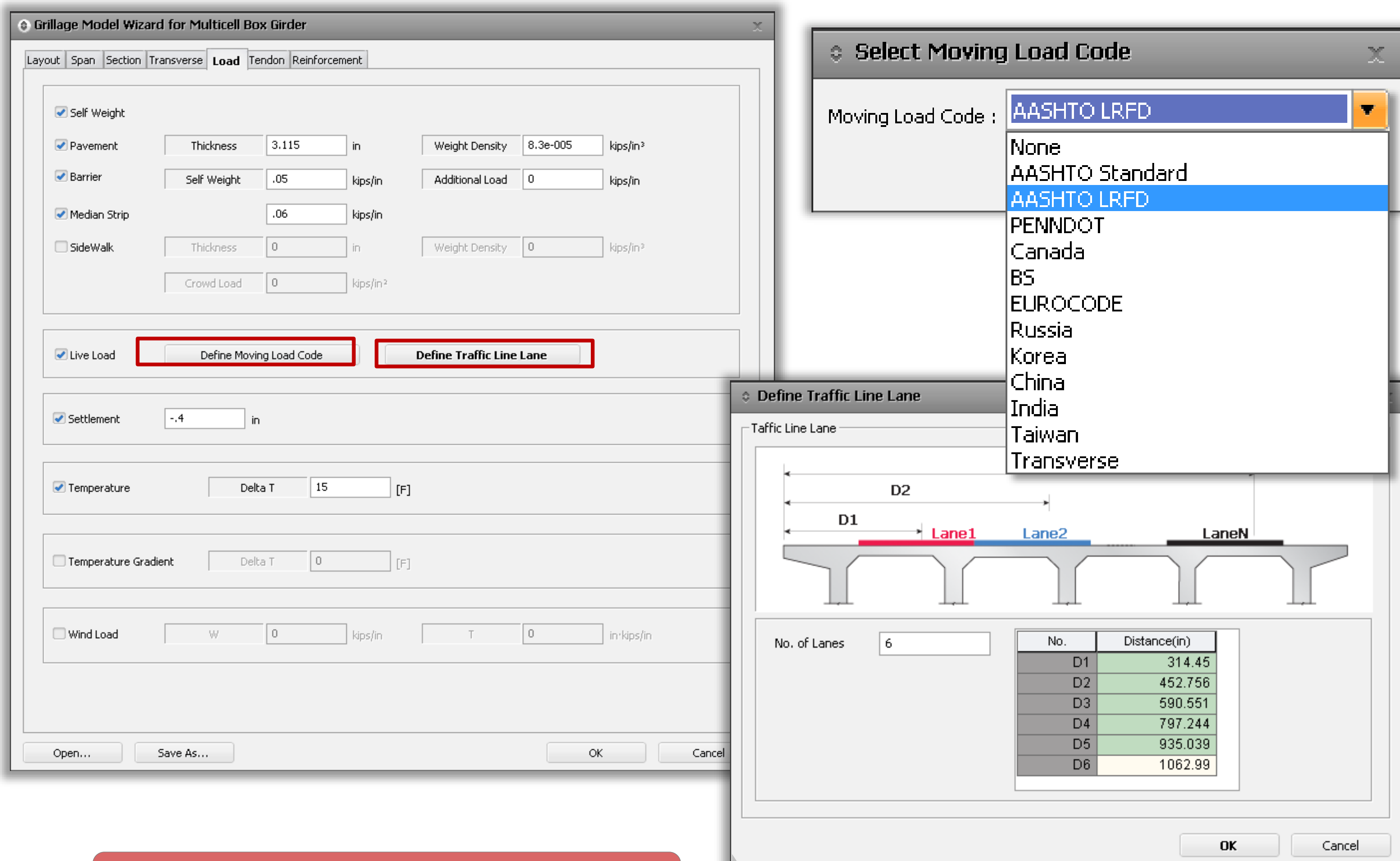




Step 3: Define Section and Division

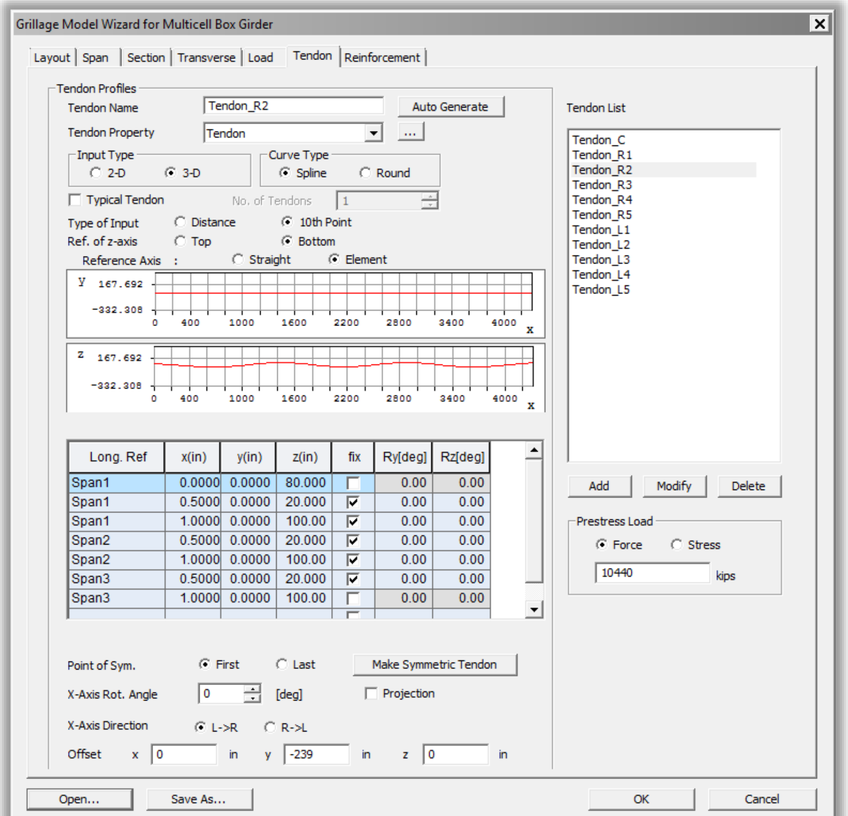
Step 4: Define Transverse Configuration

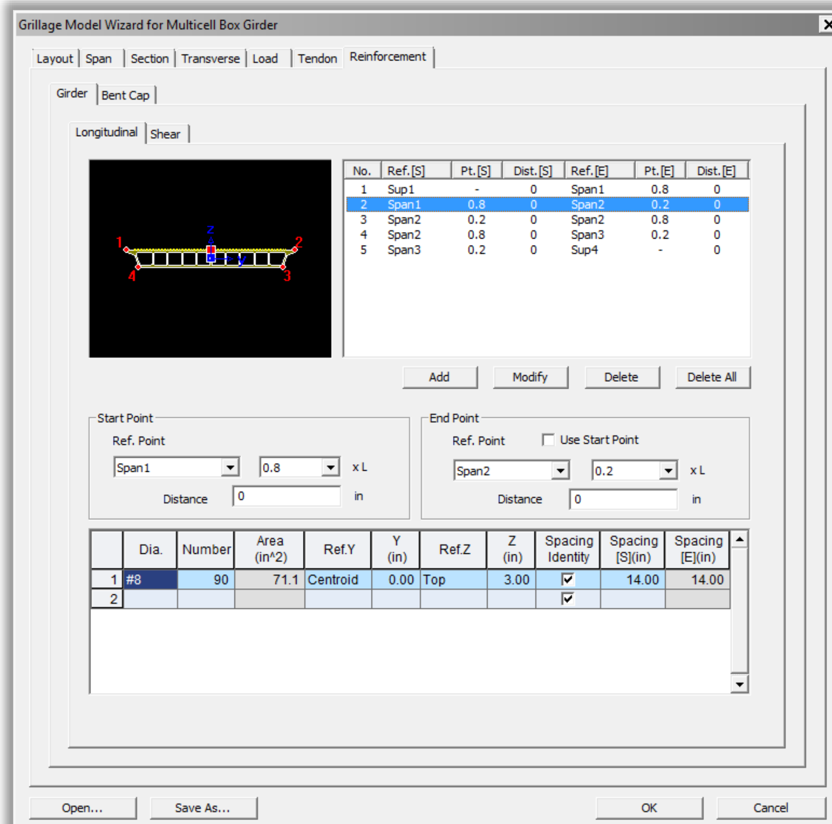
Grillage Model Wizard – *customization for CALTRANS*



Step 5: Define Loads and Traffic Lanes

Grillage Model Wizard – *customization for CALTRANS*

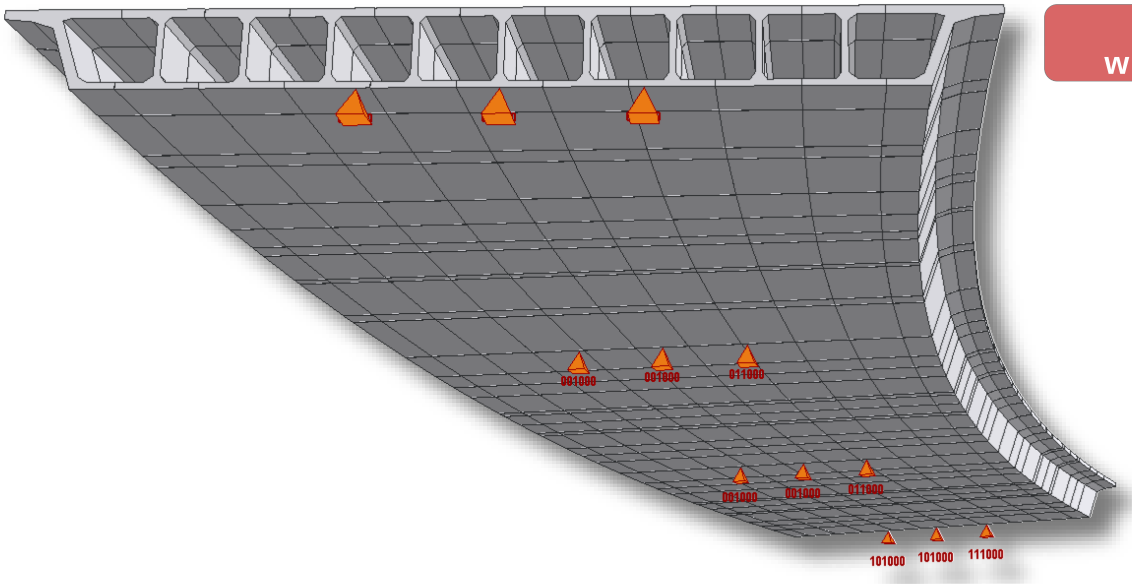




Step 6: Define Tendon Profiles

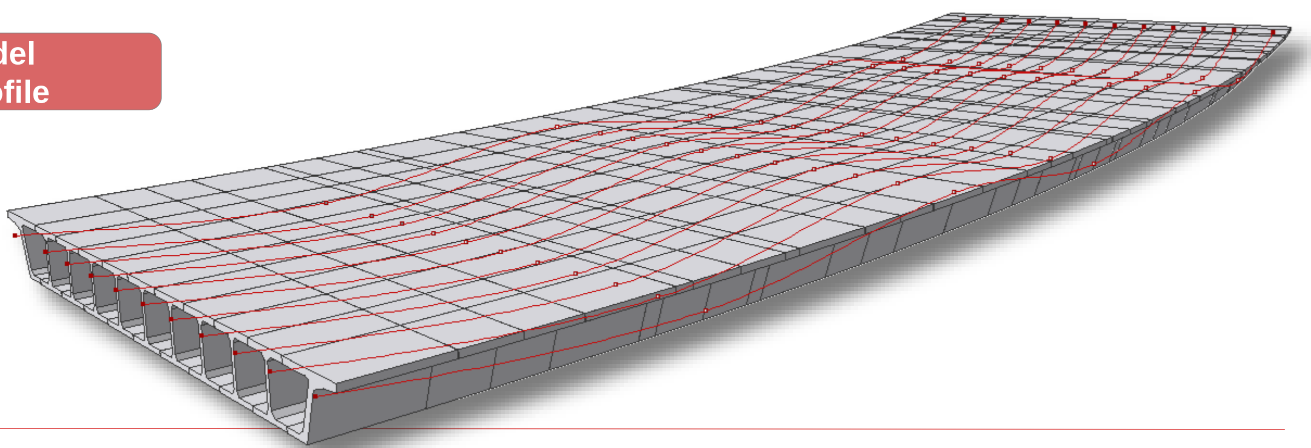
Step 7: Define Reinforcement Profiles

Grillage Model Wizard – *customization for CALTRANS*



Completed Model with Boundary Conditions

Completed Model with Tendon Profile

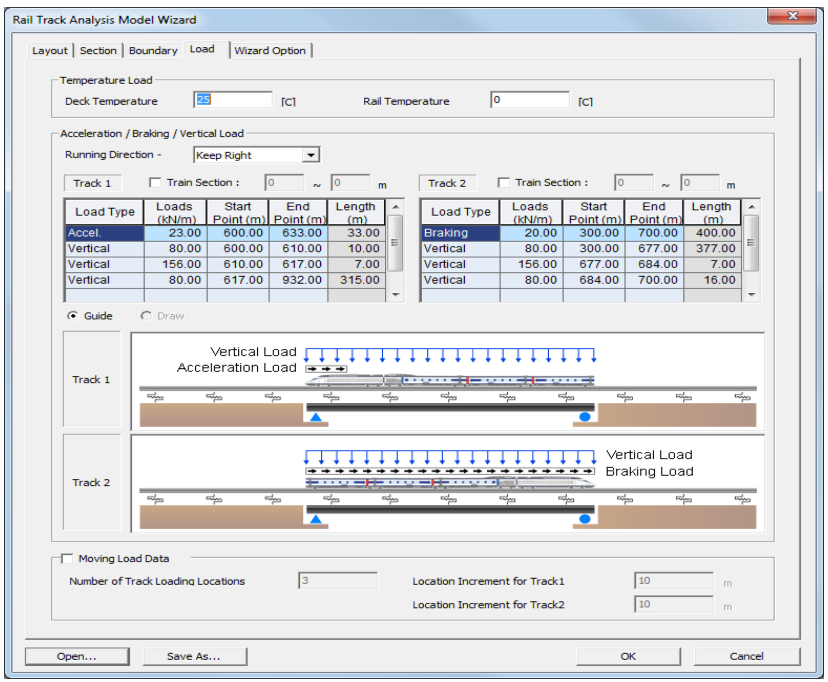


Rail Track Analysis Model Wizard

Model with Temperature Load | Model with train load (gravity direction) | Model with train acceleration and braking force

+

Construction Stage model with all load cases


Rail Track Analysis Model Wizard

Layout | Section | Boundary | Load | Wizard Option

Temperature Load

Deck Temperature 25 [C]   Rail Temperature 0 [C]

Acceleration / Braking / Vertical Load

Running Direction - Keep Right

Track 1 — Train Section : 0 ~ 0 m

Load Type	Loads (kN/m)	Start Point (m)	End Point (m)	Length (m)
Accel.	23.00	600.00	633.00	33.00
Vertical	80.00	600.00	610.00	10.00
Vertical	156.00	610.00	617.00	7.00
Vertical	80.00	617.00	932.00	315.00

Track 2 — Train Section : 0 ~ 0 m

Load Type	Loads (kN/m)	Start Point (m)	End Point (m)	Length (m)
Braking	20.00	300.00	700.00	400.00
Vertical	80.00	300.00	677.00	377.00
Vertical	156.00	677.00	684.00	7.00
Vertical	80.00	684.00	700.00	16.00

Guide   Draw

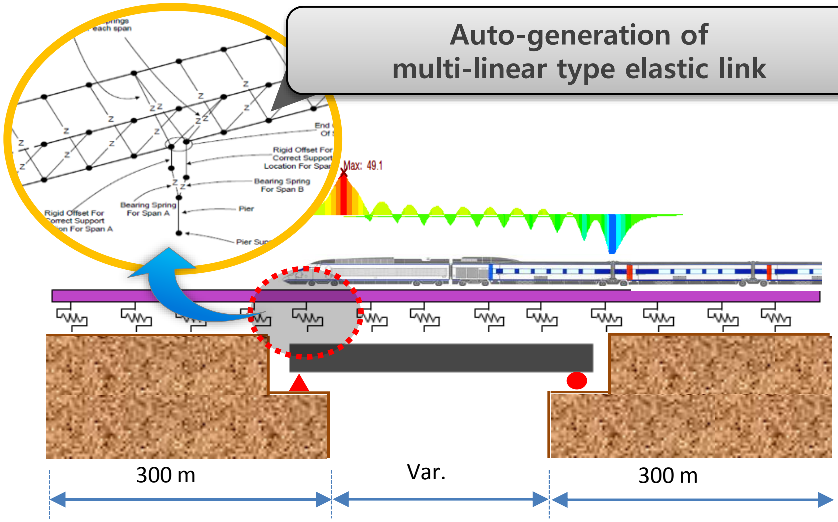
Track 1: Vertical Load, Acceleration Load

Track 2: Vertical Load, Braking Load

Moving Load Data

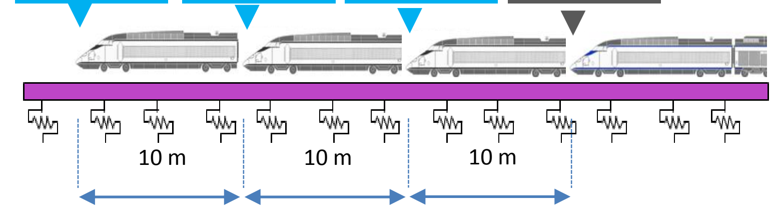
Number of Track Loading Locations 3   Location Increment for Track1 10 m   Location Increment for Track2 10 m

Open... | Save As... | OK | Cancel



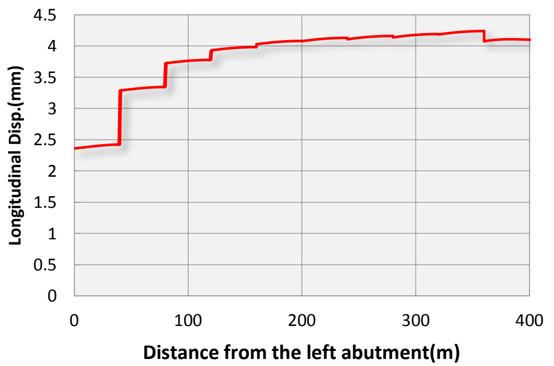
Generation of additional moving load analysis models with referring to the most critical position

Additional model | Additional model | Additional model | Most Critical Position

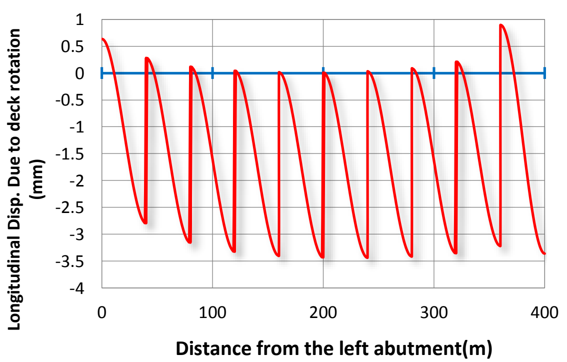


Rail Track Analysis Model Wizard

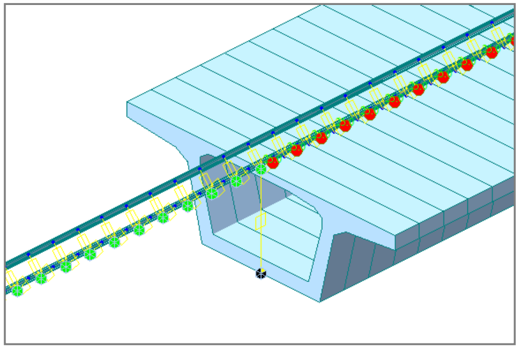
Longitudinal displacement of deck due to acceleration and breaking force



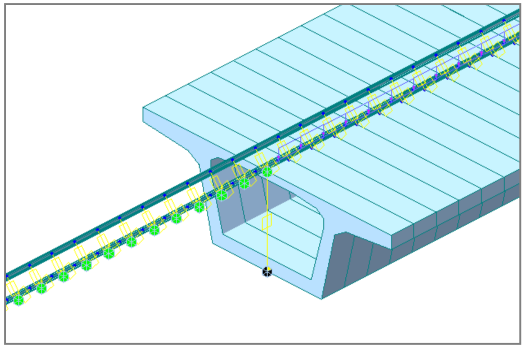
Longitudinal displacement due to rotation



Complete Model

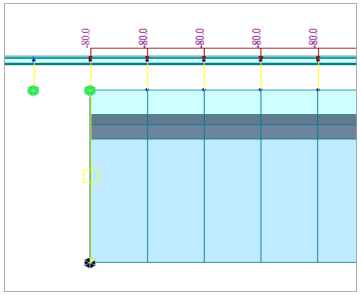


CS1: Unloaded Stage
Temperature Load only

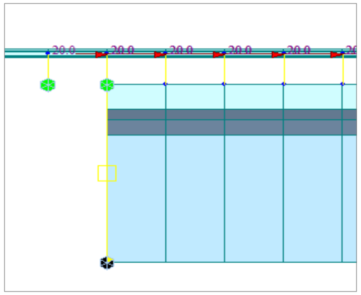


CS2: Loaded Stage
Temp. + Train Vertical/Starting/Break

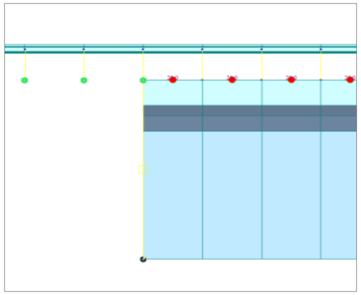
Separate Model



Relative Disp. Check



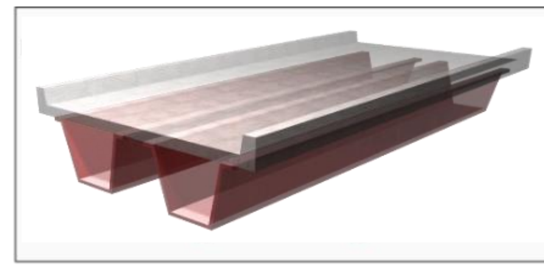
Rotational Angle Check

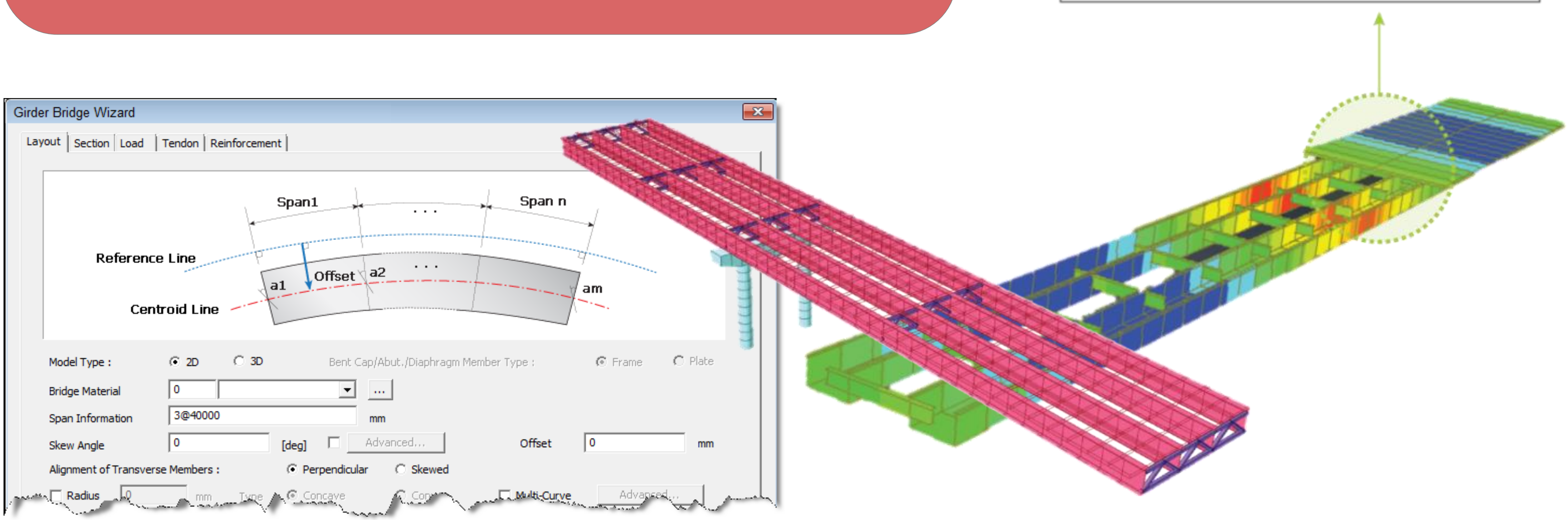


Expansion Joint Check

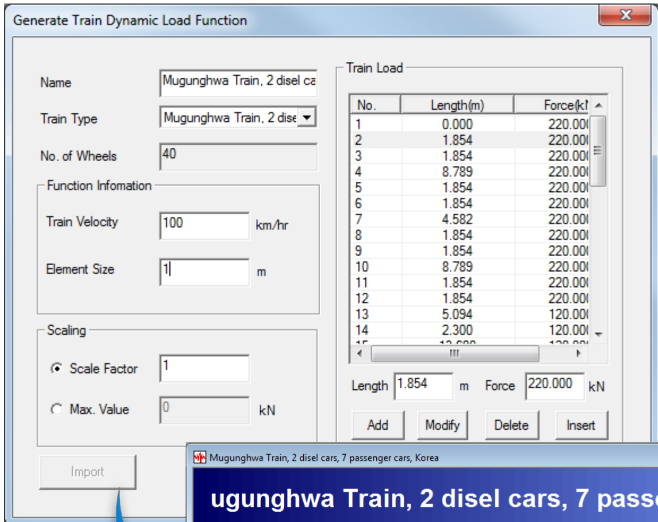
Birder Bridge Wizard

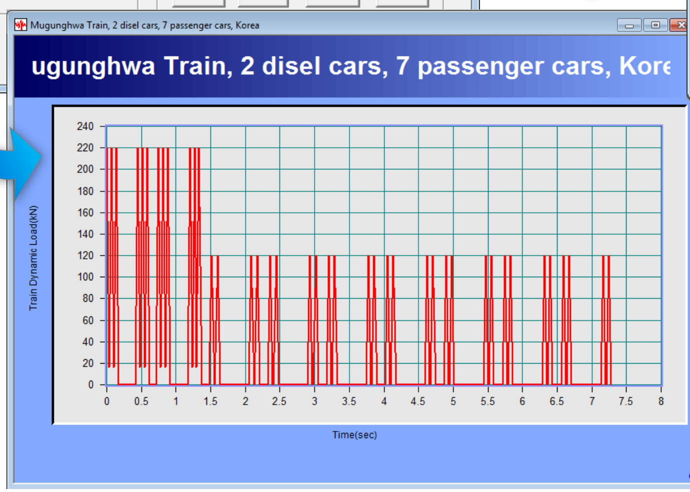
- **Automatic generation of steel composite girder bridge model**
  - Straight, curved, or skewed bridge
  - 3D bridge model with piers, abutments, cross frames
  - Automatic generation of construction sequence with composite action
- **Automatic calculation of effective width for composite section**
- **Cracked section option to ignore concrete deck stiffness in negative flexure region**
- **3D Cross frame modeling for accurate design**



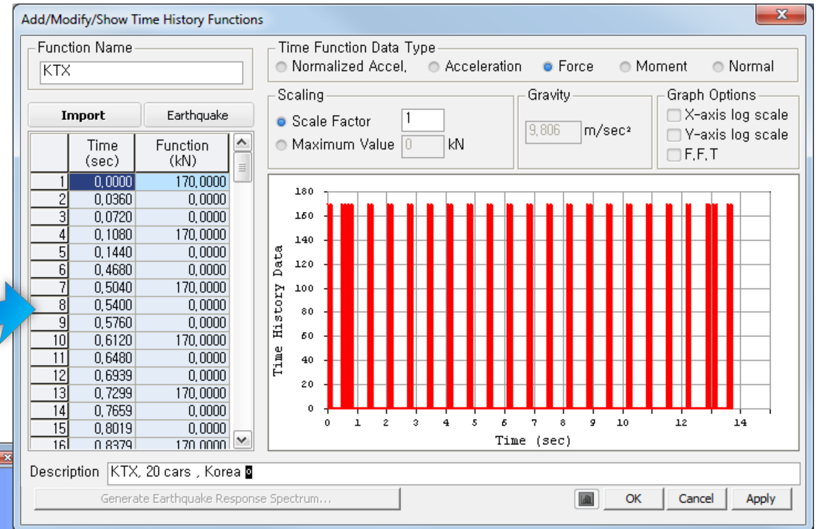


Train load for Time History Analysis

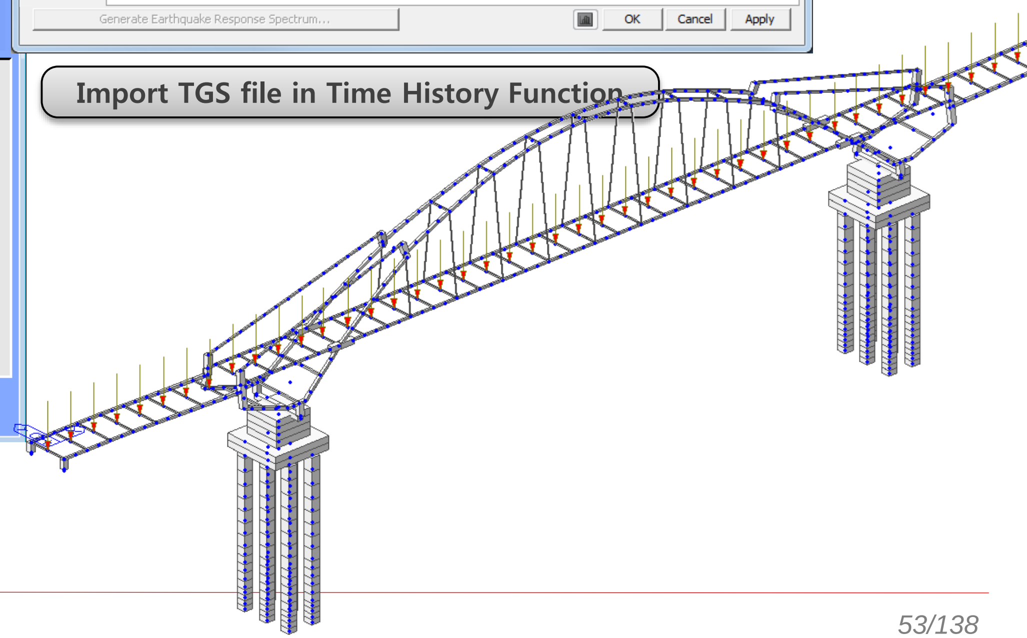




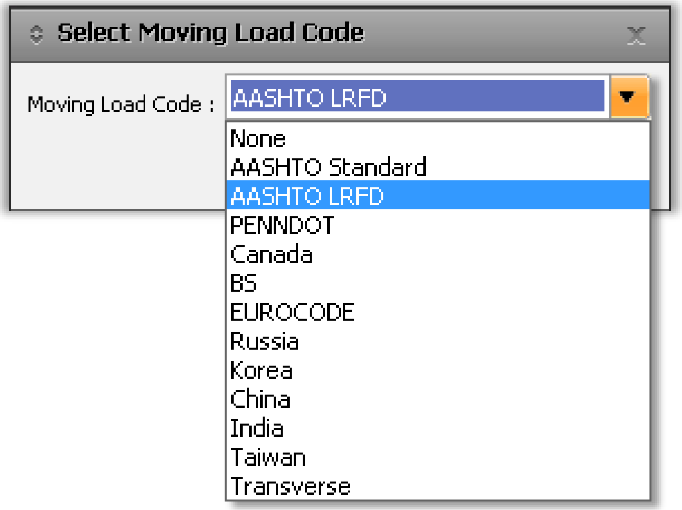
Train Dynamic Load Function

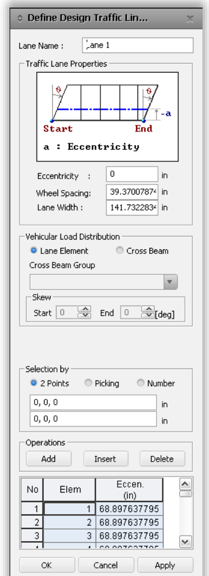


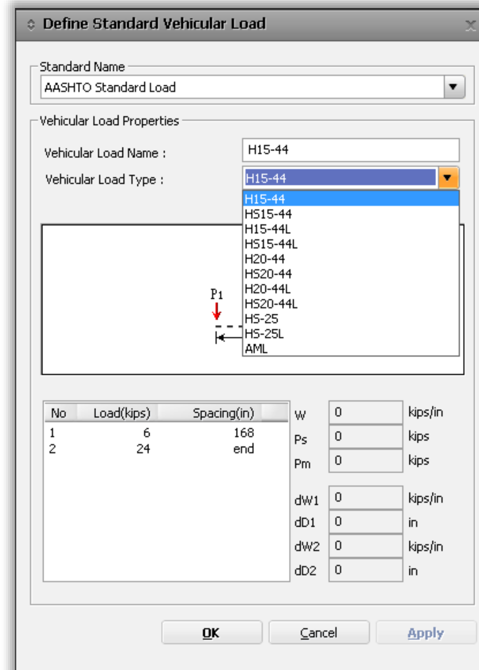
Import TGS file in Time History Function



Defining Moving Load in 3 steps







on the **Beam Elements**

on the **Plate Elements**

on the **Solid Elements**

Step 1

Select Moving Load Code

Step 2

Define Traffic Line Lane
or
Traffic Surface Lane

Step 3

Define Standard Vehicular Load
or
User-defined Vehicular Load

Concurrent Forces

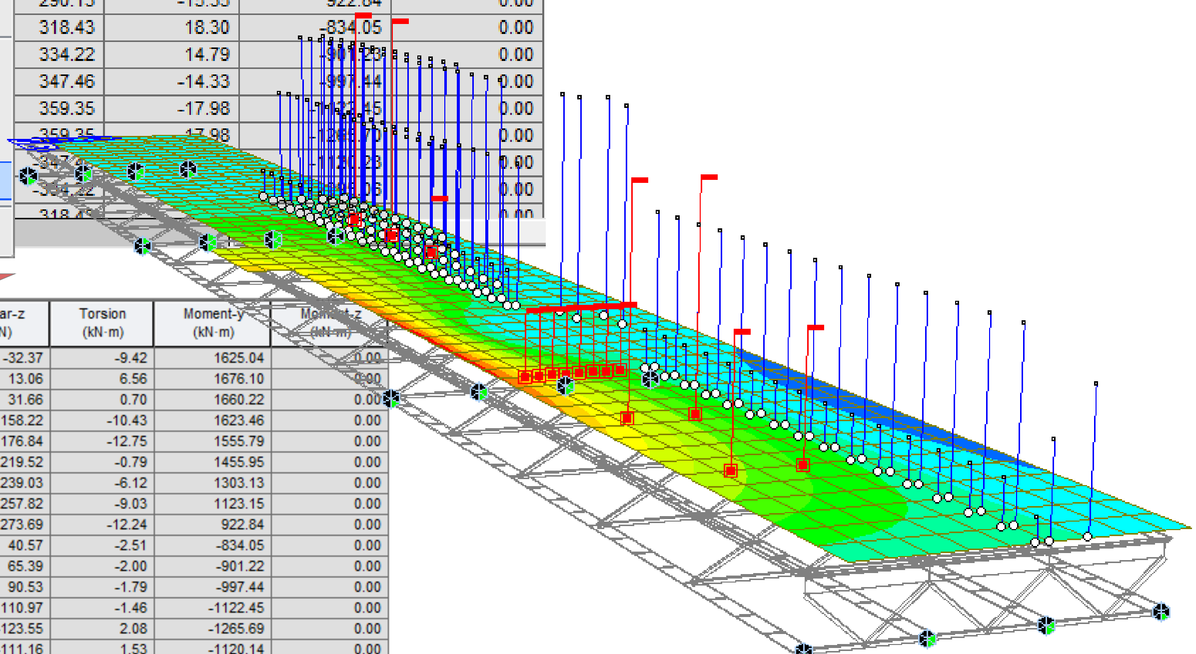
	Elem	Load	Part	Axial (kN)	Shear-y (kN)	Shear-z (kN)	Torsion (kN·m)	Moment-y (kN·m)	Moment-z (kN·m)
	332	MVL1(all	I[172]	0.00	0.00	-153.57	-16.58	1625.04	0.00
	333	MVL1(all	I[173]	0.00	0.00	150.12	15.38	1676.10	0.00
	334	MVL1(all				167.55	12.35	1660.23	0.00
	335	MVL1(all				185.14	-12.05	1623.46	0.00
	336	MVL1(all				202.69	-15.06	1555.79	0.00
	337	MVL1(all				237.73	16.67	1455.95	0.00
	338	MVL1(all				256.70	13.78	1303.13	0.00
	339	MVL1(all				273.79	-12.02	1123.15	0.00
	340	MVL1(all				290.13	-15.35	922.84	0.00
	341	MVL1(all				318.43	18.30	-834.05	0.00
	342	MVL1(all				334.22	14.79	[illegible]	0.00
	343	MVL1(all				347.46	-14.33	[illegible]	0.00
	344	MVL1(all				359.35	-17.98	[illegible]	0.00
	345	MVL1(all				359.35	-17.98	[illegible]	0.00
	346	MVL1(all				[illegible]	[illegible]	[illegible]	0.00
	347	MVL1(all				[illegible]	[illegible]	[illegible]	0.00

Beam Force

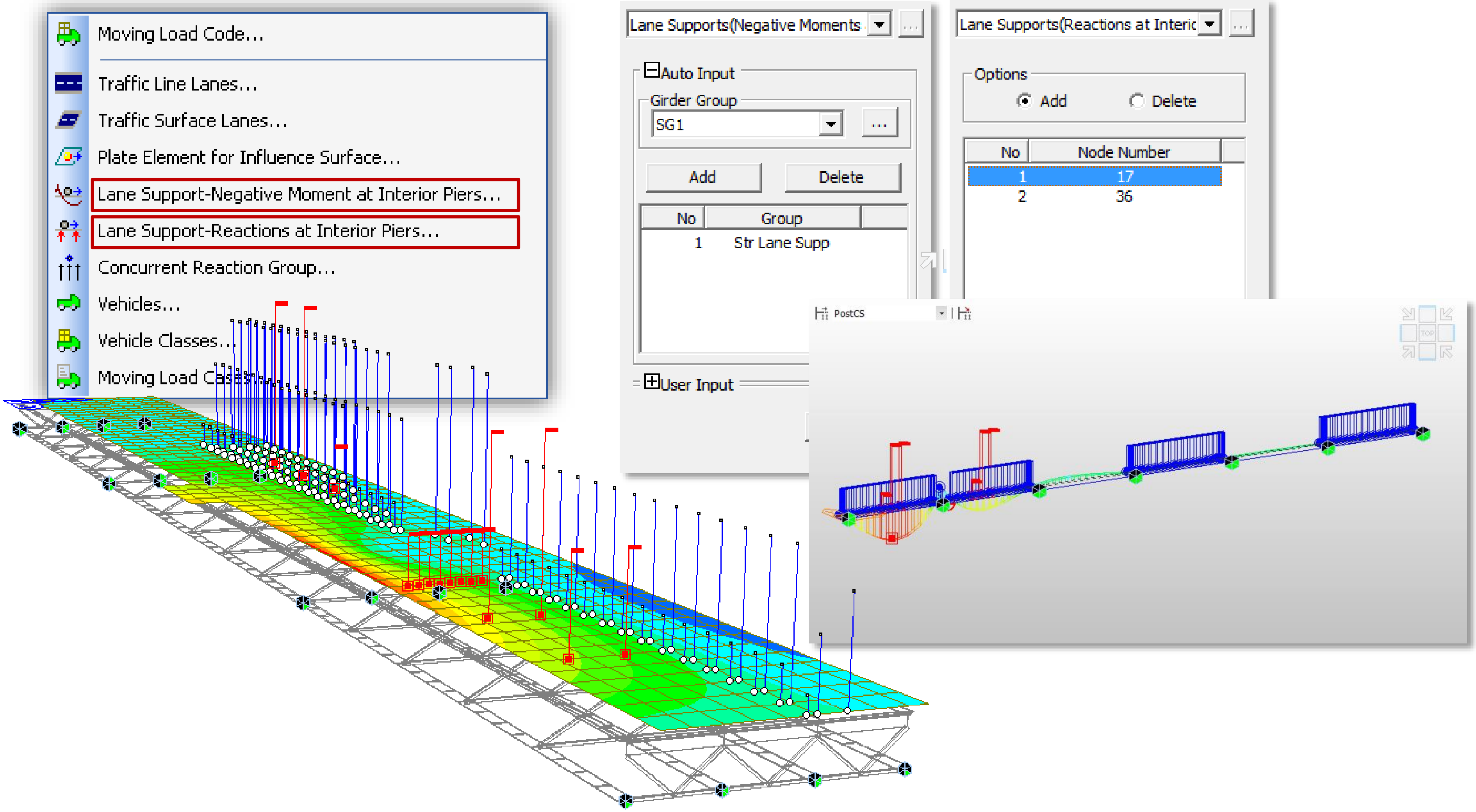
Copy
Find... Ctrl+F
Sorting Dialog...
Style Dialog...
Show Graph...
Activate Records...
Export to Excel...
View by Load Cases...
View by Max Value Item...
Dynamic Report Table...

	Elem	Load	Part	Component	Axial (kN)	Shear-y (kN)	Shear-z (kN)	Torsion (kN·m)	Moment-y (kN·m)	Moment-z (kN·m)
	332	MVL1(all	I[172]	Moment-y	0.00	0.00	-32.37	-9.42	1625.04	0.00
	333	MVL1(all	I[173]	Moment-y	0.00	0.00	13.06	6.56	1676.10	0.00
	334	MVL1(all	I[174]	Moment-y	0.00	0.00	31.66	0.70	1660.22	0.00
	335	MVL1(all	I[175]	Moment-y	0.00	0.00	158.22	-10.43	1623.46	0.00
	336	MVL1(all	I[176]	Moment-y	0.00	0.00	176.84	-12.75	1555.79	0.00
	337	MVL1(all	I[177]	Moment-y	0.00	0.00	219.52	-0.79	1455.95	0.00
	338	MVL1(all	I[178]	Moment-y	0.00	0.00	239.03	-6.12	1303.13	0.00
	339	MVL1(all	I[179]	Moment-y	0.00	0.00	257.82	-9.03	1123.15	0.00
	340	MVL1(all	I[180]	Moment-y	0.00	0.00	273.69	-12.24	922.84	0.00
	341	MVL1(all	I[181]	Moment-y	0.00	0.00	40.57	-2.51	-834.05	0.00
	342	MVL1(all	I[182]	Moment-y	0.00	0.00	65.39	-2.00	-901.22	0.00
	343	MVL1(all	I[183]	Moment-y	0.00	0.00	90.53	-1.79	-997.44	0.00
	344	MVL1(all	I[184]	Moment-y	0.00	0.00	110.97	-1.46	-1122.45	0.00
	345	MVL1(all	I[185]	Moment-y	0.00	0.00	-123.55	2.08	-1265.69	0.00
	346	MVL1(all	I[186]	Moment-y	0.00	0.00	-111.16	1.53	-1120.14	0.00
	347	MVL1(all	I[187]	Moment-y	0.00	0.00	-91.87	1.27	-994.98	0.00
	348	MVL1(all	I[188]	Moment-y	0.00	0.00	66.34	1.80	898.38	0.00

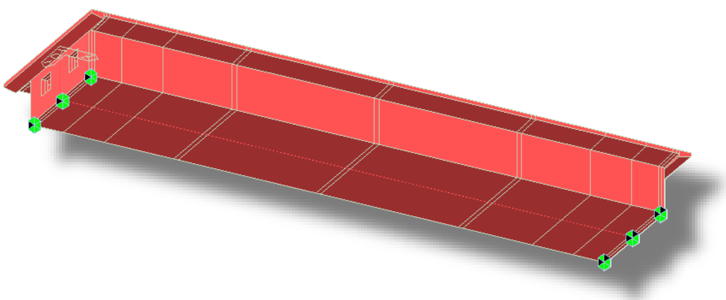
Result By Max Value-[Beam Force]



AASHTO LRFD Optimizer

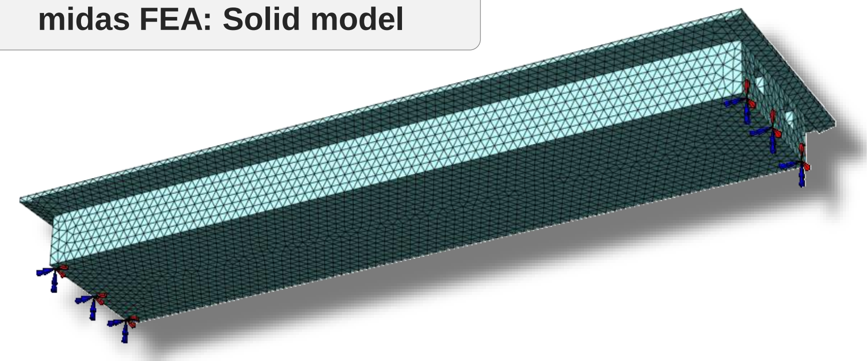


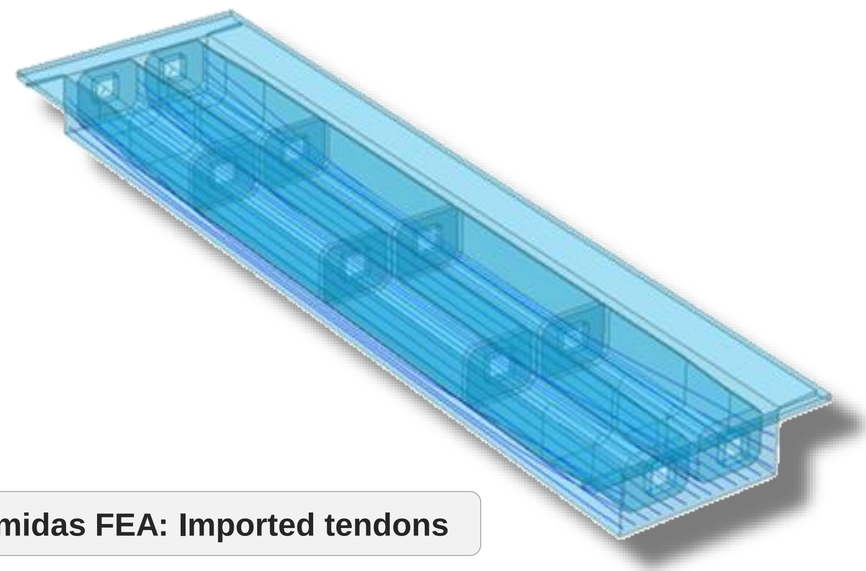
Exporting frame model to solid/plate model to readily perform Detail Analysis



midas Civil: line beam model

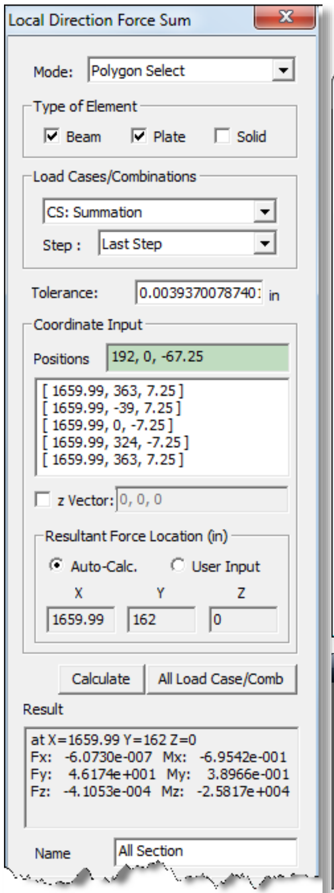
midas FEA: Solid model

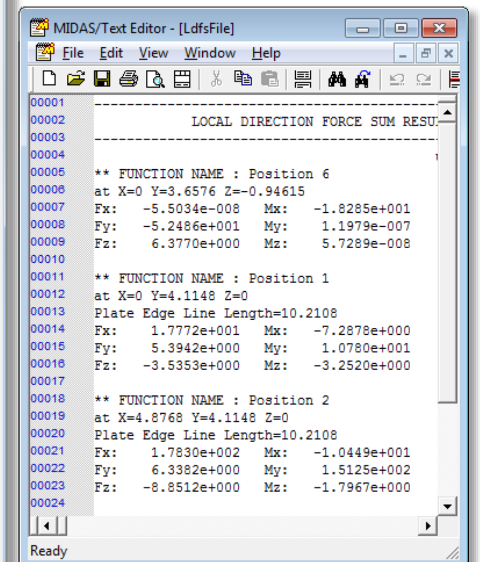




midas FEA: Imported tendons

Calculating Resultant Forces for 3D FE model






Result-[LDFS]

Name	Load	Length (m)	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kN*m)	My (kN*m)	Mz (kN*m)
Position 1	Bot.Chord_	10.21	17.17	5.04	5.04	11.41	-17.84	-3.14
Position 1	Bot.Chord_	10.21	34.31	10.08	4.32	9.78	-15.30	-6.28
Position 1	Diagonal_C	10.21	17.77	5.39	-3.54	-7.29	10.78	-3.25
Position 1	Diagonal_T	10.21	17.14	5.03	2.16	4.89	-7.65	-3.14
Position 1	MV-Cross	10.21	0.00	0.00	0.00	0.00	0.00	0.00
Position 2	Bot.Chord_	10.21	178.48	6.34	12.74	14.55	-213.32	-1.80
Position 2	Bot.Chord_	10.21	356.60	12.67	10.92	12.47	-182.85	-3.60
Position 2	Diagonal_C	10.21	178.30	6.34	-8.85	-10.45	151.25	-1.80
Position 2	Diagonal_T	10.21	178.16	6.33	5.46	6.24	-91.42	-1.80

Result-[LDFS]

Local Direction Force Sum

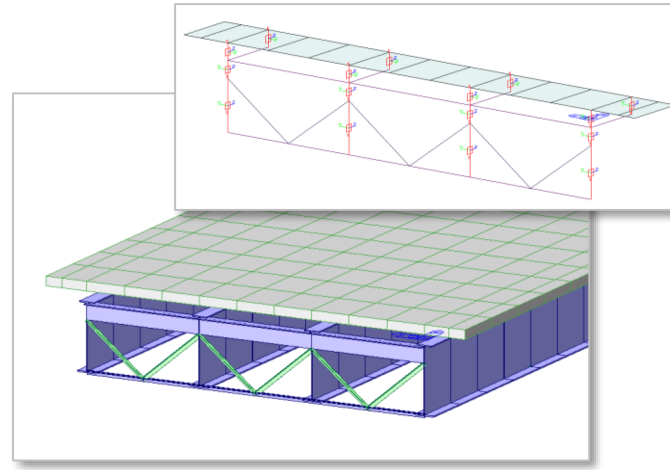
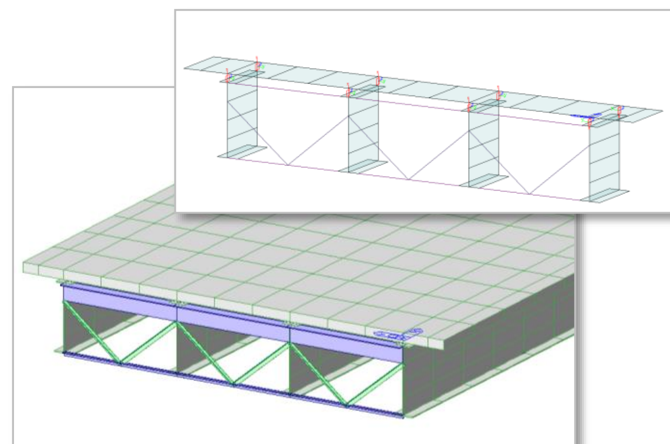
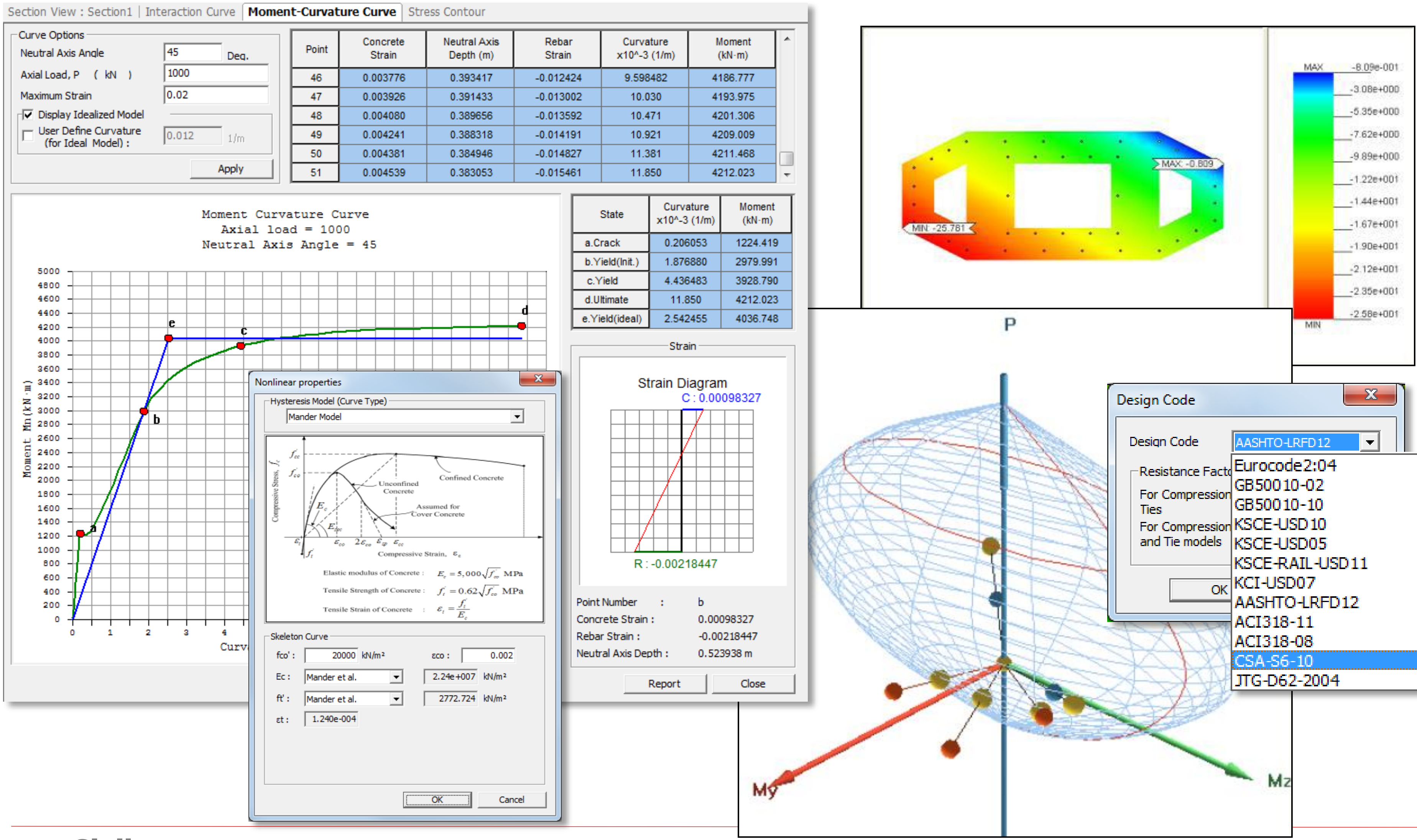


Plate + Beam Model

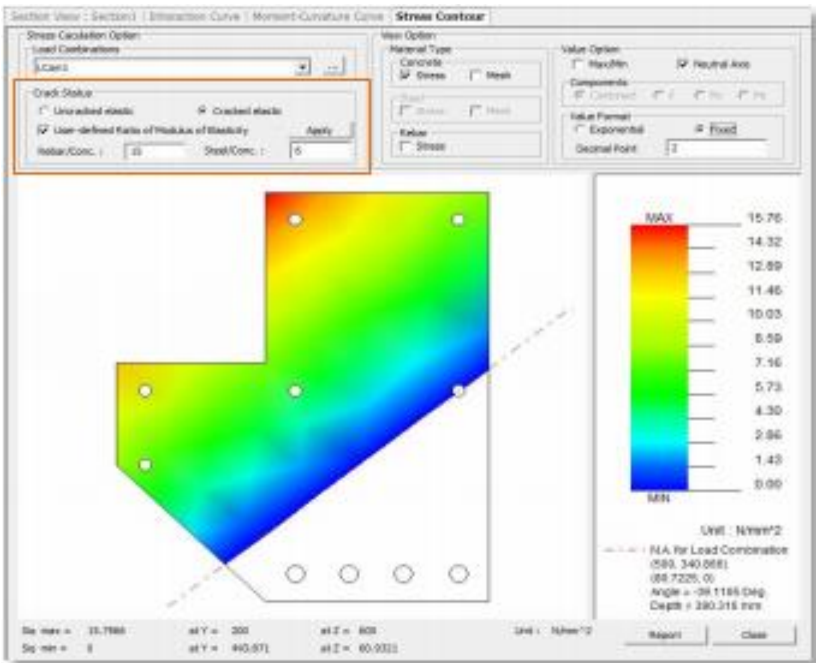


All Plate Model

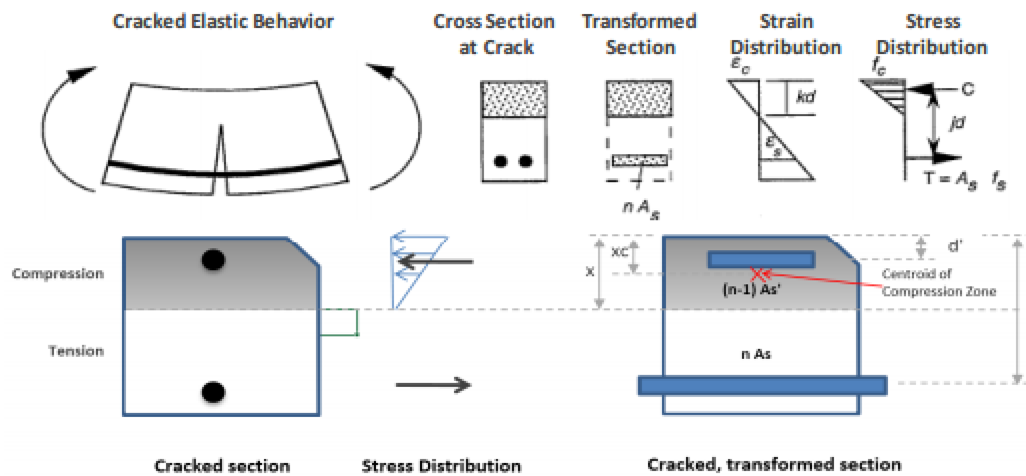
General Section Design



General Section Design – *cracked section stresses*



Cracked Section Stresses in midas GSD



$$x\{Ac + (n-1)As' + nA\} = Ac\ xc + (n-1)As'd' + nAsd$$

$$x = \{Ac\ xc + (n\text{-}1)\ As'\ d' + nAs\ d\}/\{Ac + (n\text{-}1)As' + nA\}$$

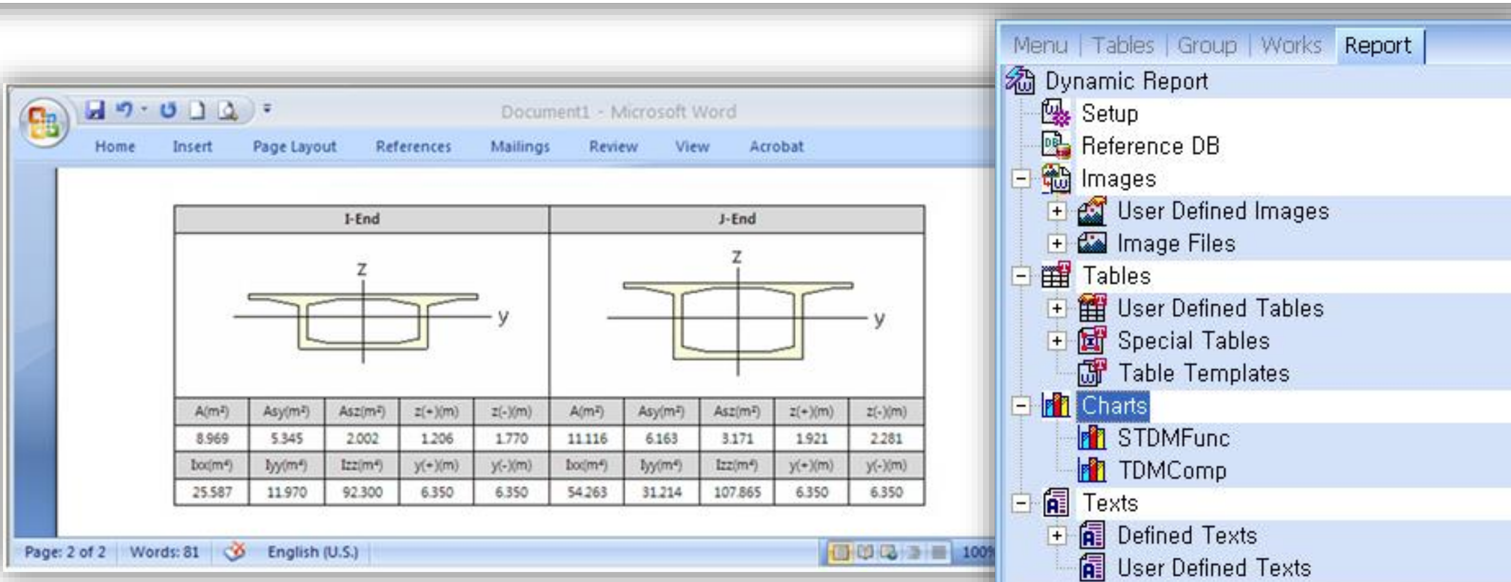
Dynamic Report Generator

Register data
- Register images, tables, and graphs to insert into the report.
- Registered data can be verified in the Report Tree.

Generate a report
- Generate a report in MS Word format.
- Insert data by Drag & Drop from the Report Tree.

Modify model data
- Modify model data.
- Re-perform analysis and design.

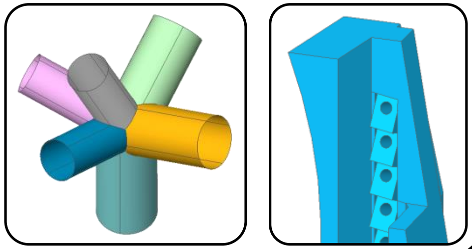
Re-generation
- Automatic re-generation of the report with updated analysis results.



I-End					J-End				
A(m²)	Asy(m²)	Asz(m²)	z(+)(m)	z(-)(m)	A(m²)	Asy(m²)	Asz(m²)	z(+)(m)	z(-)(m)
8.969	5.345	2.002	1.206	1.770	11.116	6.163	3.171	1.921	2.281
Ixx(m⁴)	Iyy(m⁴)	Izz(m⁴)	y(+)(m)	y(-)(m)	Ixx(m⁴)	Iyy(m⁴)	Izz(m⁴)	y(+)(m)	y(-)(m)
25.587	11.970	92.300	6.350	6.350	54.263	31.214	107.865	6.350	6.350

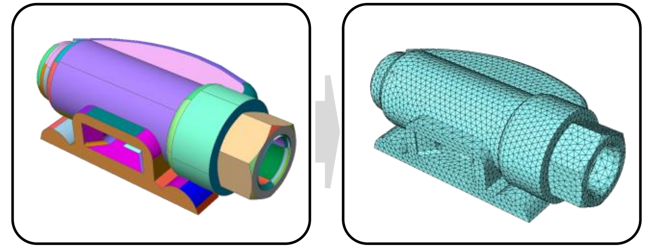
FX+ modeler for complex geometric FE modeling

Geometry modeller

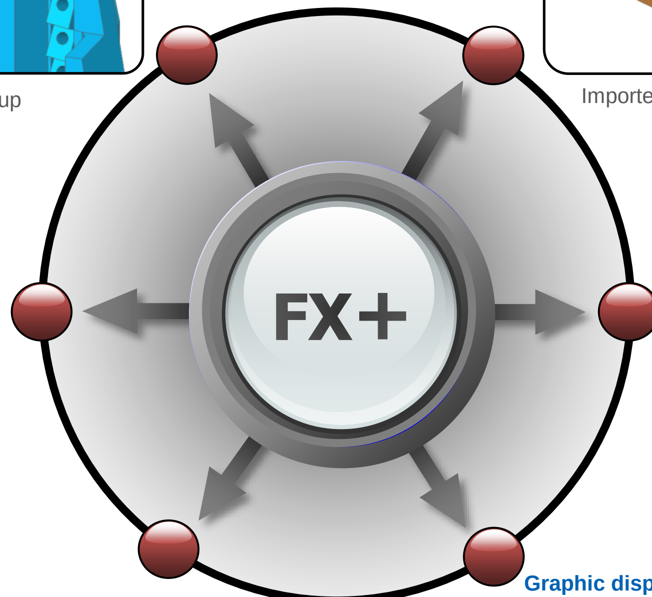


Geometry modelling and clean-up

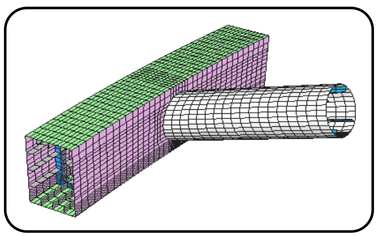
CAD data exchange (STEP, IGES)



Imported CAD geometry
Generated mesh

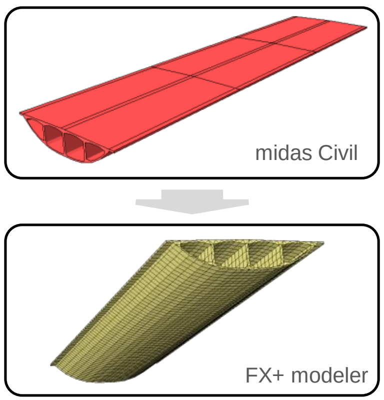


Mesh generators

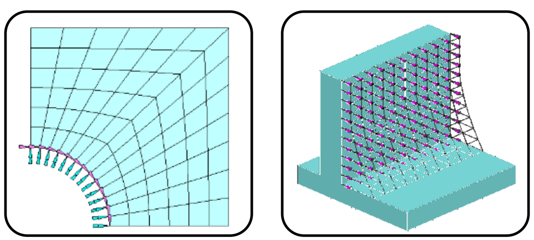


Auto, mapped and manual meshing

Convert 1D frame to planer / solid elements

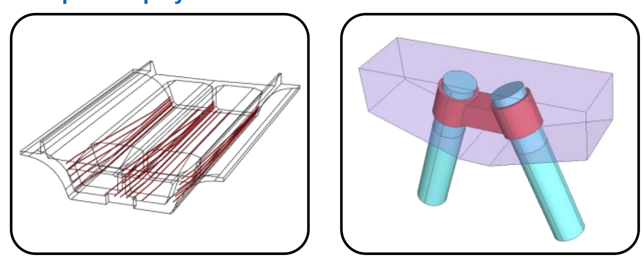


FEM pre-processor



Constraint
Spatially varying pressure

Graphic display

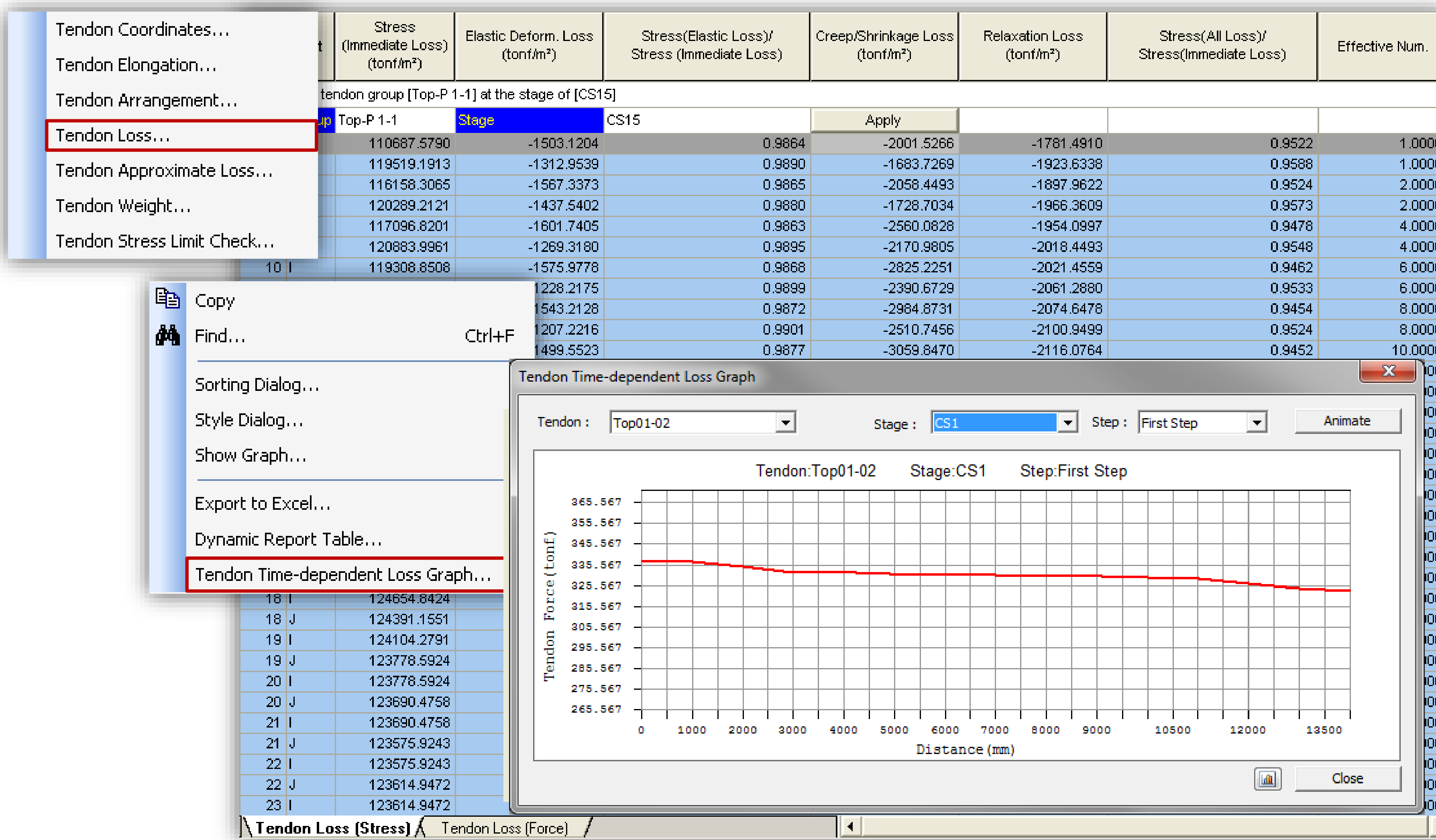


Wireframe
Shading & transparency

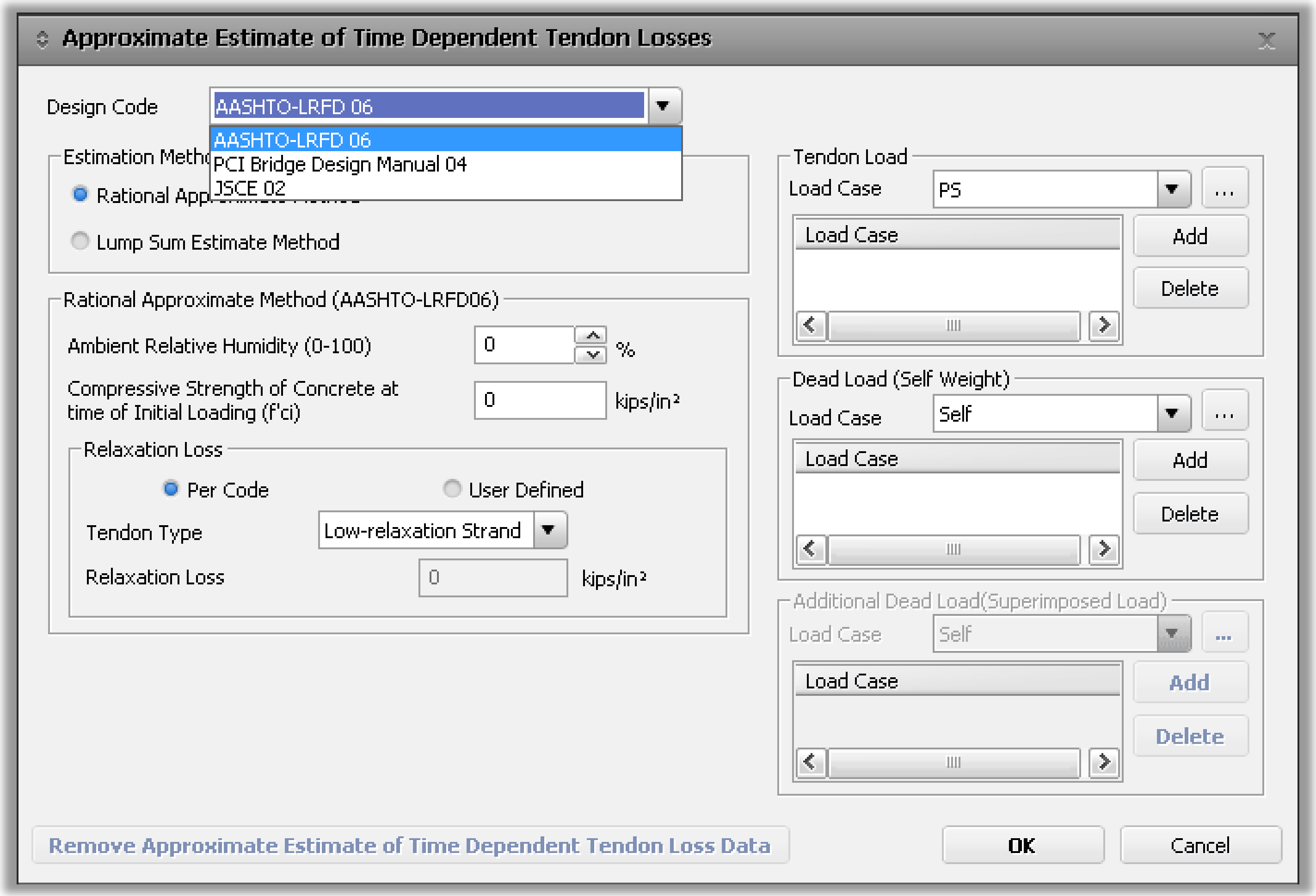
Analysis Capabilities

- **Construction Stage analysis**
- **Moving Load Analysis**
  - Influence Line & Influence Surface
- **Modal Analysis**
  - Eigen Value & Ritz Vector
- **Dynamic Analysis**
  - Static Seismic Analysis
  - Response Spectrum Analysis
  - Time History Analysis
- **Buckling Analysis**
- **Large Displacement Analysis**
- **P - Delta Analysis**
- **Thermal Stress Analysis**
- **Nonlinear Analysis**
  - Nonlinear Geometric Analysis
  - Nonlinear Material Analysis
  - Pushover & Fiber Model Analysis
  - Inelastic Time History Analysis
  - Boundary Nonlinear Analysis
- **Heat of Hydration Analysis**
- **Integral Bridge Analysis**

PSC Bridge – *Tendon Prestress Loss*



PSC Bridge – *Approximate Tendon Prestress Loss*



PSC Bridge – *Tendon Stress Limit Check*

- Tendon Coordinates...
- Tendon Elongation...
- Tendon Arrangement...
- Tendon Loss...
- Tendon Approximate Loss...
- Tendon Weight...
- Tendon Stress Limit Check...

Tendon Stress

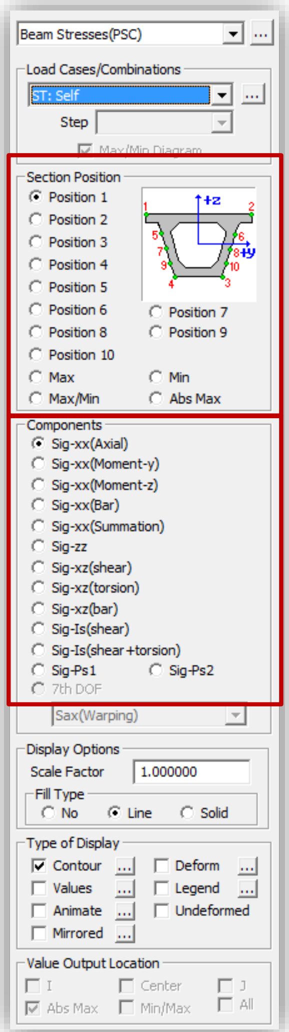
Tendon Stress Limit

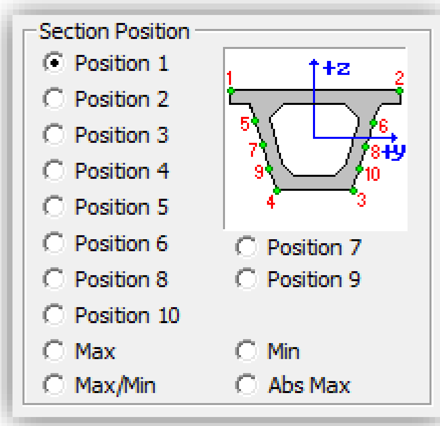
At anch.	0.7	fpu
Away from anch.	0.74	fpu
At service	0.8	fpy

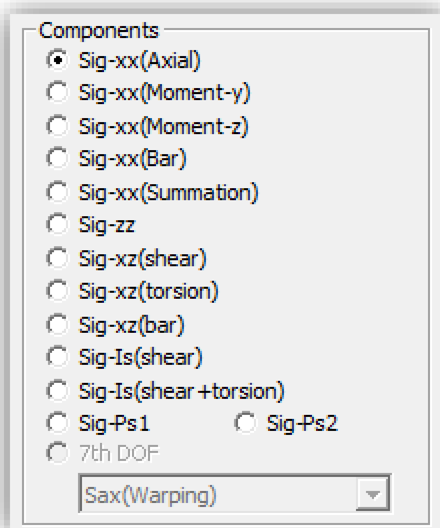
OK Cancel

Tendon	Tendon Stress FDL1 (N/mm²)	Tendon Stress FDL2 (N/mm²)	Tendon Stress FLL (N/mm²)	Tendon Stress Limit – Immediately after andhor set – At anch.	Tendon Stress Limit – Immediately after andhor set – Away from anch.	Tendon Stress Limit – At service
Bot1	867.1222	1008.6050	1008.6050	1330.0000	1406.0000	1280.0000
Bot2	866.9082	1008.4515	1008.4515	1330.0000	1406.0000	1280.0000
CS01a01_l	951.7275	1086.9387	1079.3223	1330.0000	1406.0000	1280.0000
CS01a01_r	951.9741	1087.2330	1079.6144	1330.0000	1406.0000	1280.0000
CS01a02_l	970.9649	1098.5414	1087.4911	1330.0000	1406.0000	1280.0000
CS01a02_r	971.2241	1098.8414	1087.7895	1330.0000	1406.0000	1280.0000
CS01a03_l	982.9584	1103.6489	1095.1710	1330.0000	1406.0000	1280.0000
CS01a03_r	983.2302	1103.9547	1095.4758	1330.0000	1406.0000	1280.0000
CS01b01_l	928.6975	1069.5204	1069.5204	1330.0000	1406.0000	1280.0000
01b01_r	928.8691	1069.7805	1069.7805	1330.0000	1406.0000	1280.0000
01b02_l	946.5612	1076.5253	1069.6800	1330.0000	1406.0000	1280.0000
01b02_r	946.7449	1076.8016	1069.9516	1330.0000	1406.0000	1280.0000
01b03_l	959.7907	1079.9189	1070.4710	1330.0000	1406.0000	1280.0000
01b03_r	959.9866	1080.2054	1070.7541	1330.0000	1406.0000	1280.0000
02a01_l	932.7898	1071.1960	1071.1960	1330.0000	1406.0000	1280.0000
02a01_r	932.9301	1071.3970	1071.3970	1330.0000	1406.0000	1280.0000
02a02_l	953.0678	1079.1348	1070.7337	1330.0000	1406.0000	1280.0000
02a02_r	953.2380	1079.3484	1070.9434	1330.0000	1406.0000	1280.0000
02a03_l	970.7999	1081.7421	1071.2847	1330.0000	1406.0000	1280.0000
02a03_r	970.9601	1081.9655	1071.5031	1330.0000	1406.0000	1280.0000
02b01_l	781.8189	990.2175	990.2175	1330.0000	1406.0000	1280.0000
CS02b01_r	782.0235	990.4289	990.4289	1330.0000	1406.0000	1280.0000
CS02b02_l	826.3534	1017.4450	1017.4450	1330.0000	1406.0000	1280.0000
CS02b02_r	826.5675	1017.6609	1017.6609	1330.0000	1406.0000	1280.0000
CS02b03_l	865.6381	1042.1207	1042.1207	1330.0000	1406.0000	1280.0000
CS02b03_r	865.8604	1042.3412	1042.3412	1330.0000	1406.0000	1280.0000
CS03a01_l	932.3756	1070.9447	1070.9447	1330.0000	1406.0000	1280.0000
CS03a01_r	932.5233	1071.1613	1071.1613	1330.0000	1406.0000	1280.0000
CS03a02_l	952.9029	1079.3094	1070.7975	1330.0000	1406.0000	1280.0000
CS03a02_r	953.0611	1079.5400	1071.0235	1330.0000	1406.0000	1280.0000

PSC Bridge – *Stress output locations on PSC section*

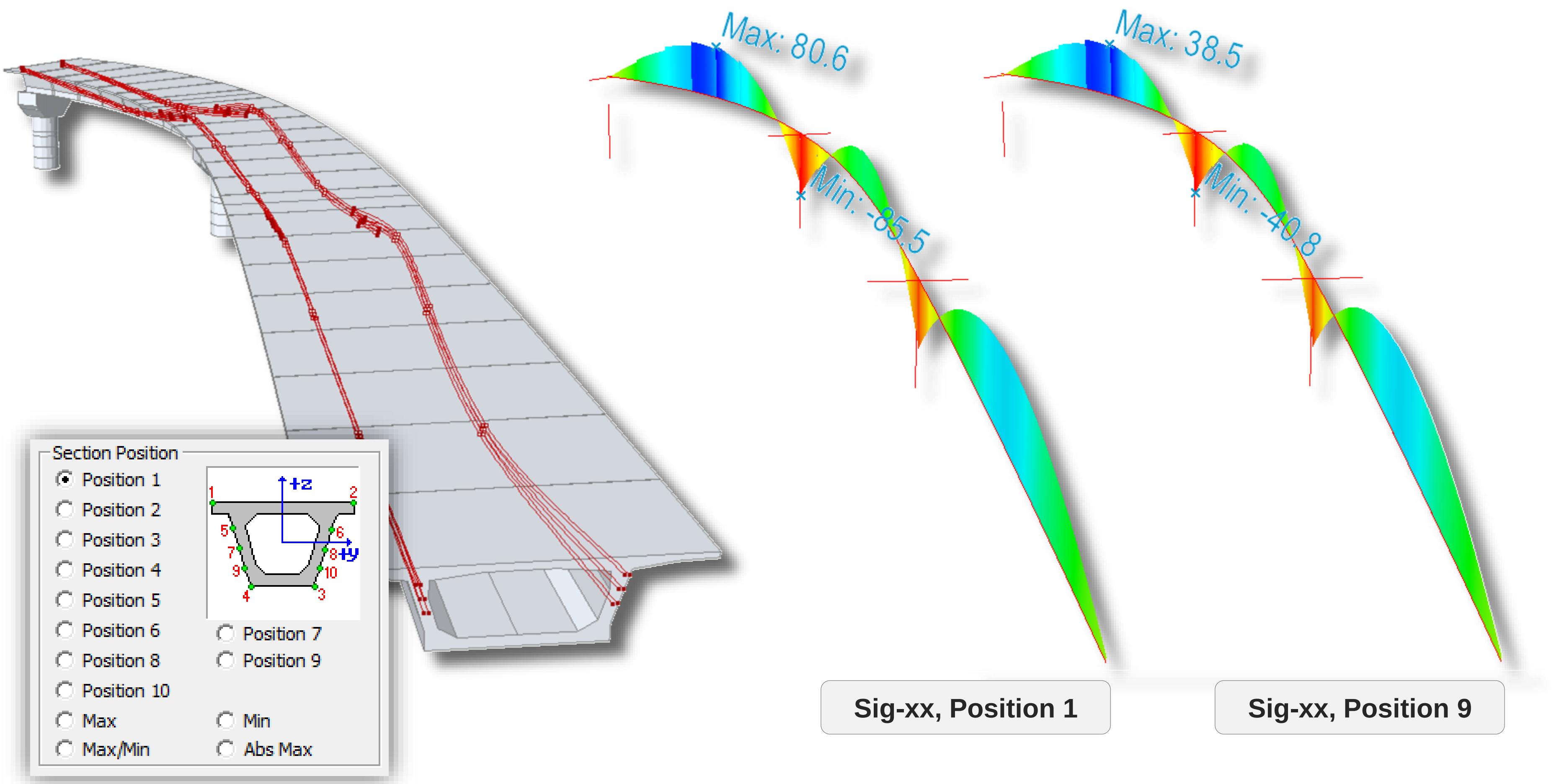






Sig-xx	Sum of axial stresses in ECS x-direction
Sig-zz	Sum of axial stresses in ECS z-direction
Sig-xz (shear)	Sum of shear stresses due to shear force and prestressing shear bars
Sig-xz (torsion)	Shear stress due to torsion
Sig-xz (bar)	Shear stress due to prestressing shear bars
Sig-Is (torsion)	Diagonal Tensile Stress excluding torsional shear stress
Sig-Is (shear + torsion)	Diagonal stress due to torsion and shear force
Sig-Ps1	Max. principal stress
Sig-Ps2	Min. principal stress

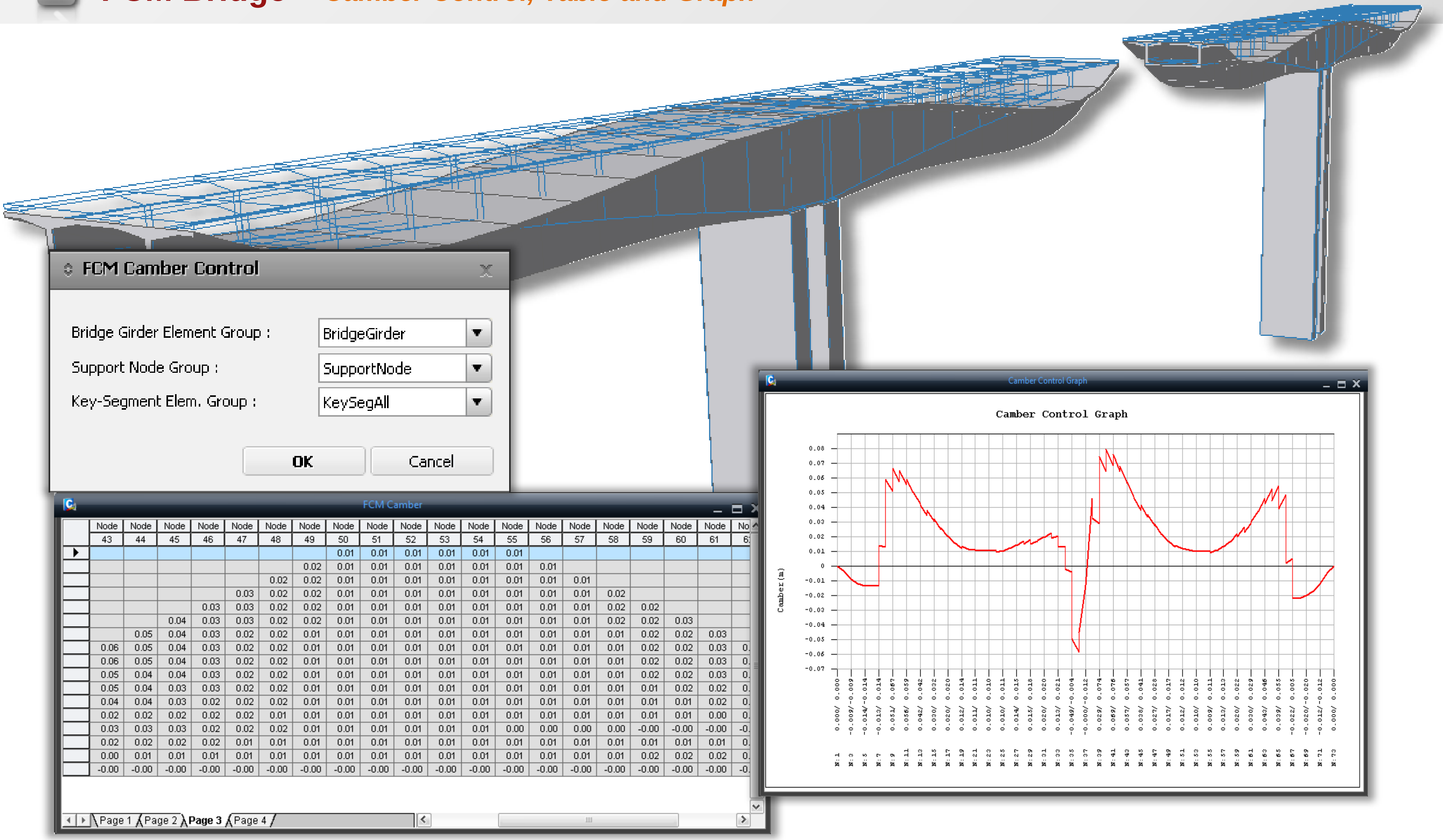
PSC Bridge – *Stress output locations on PSC section*



Sig-xx, Position 1

Sig-xx, Position 9

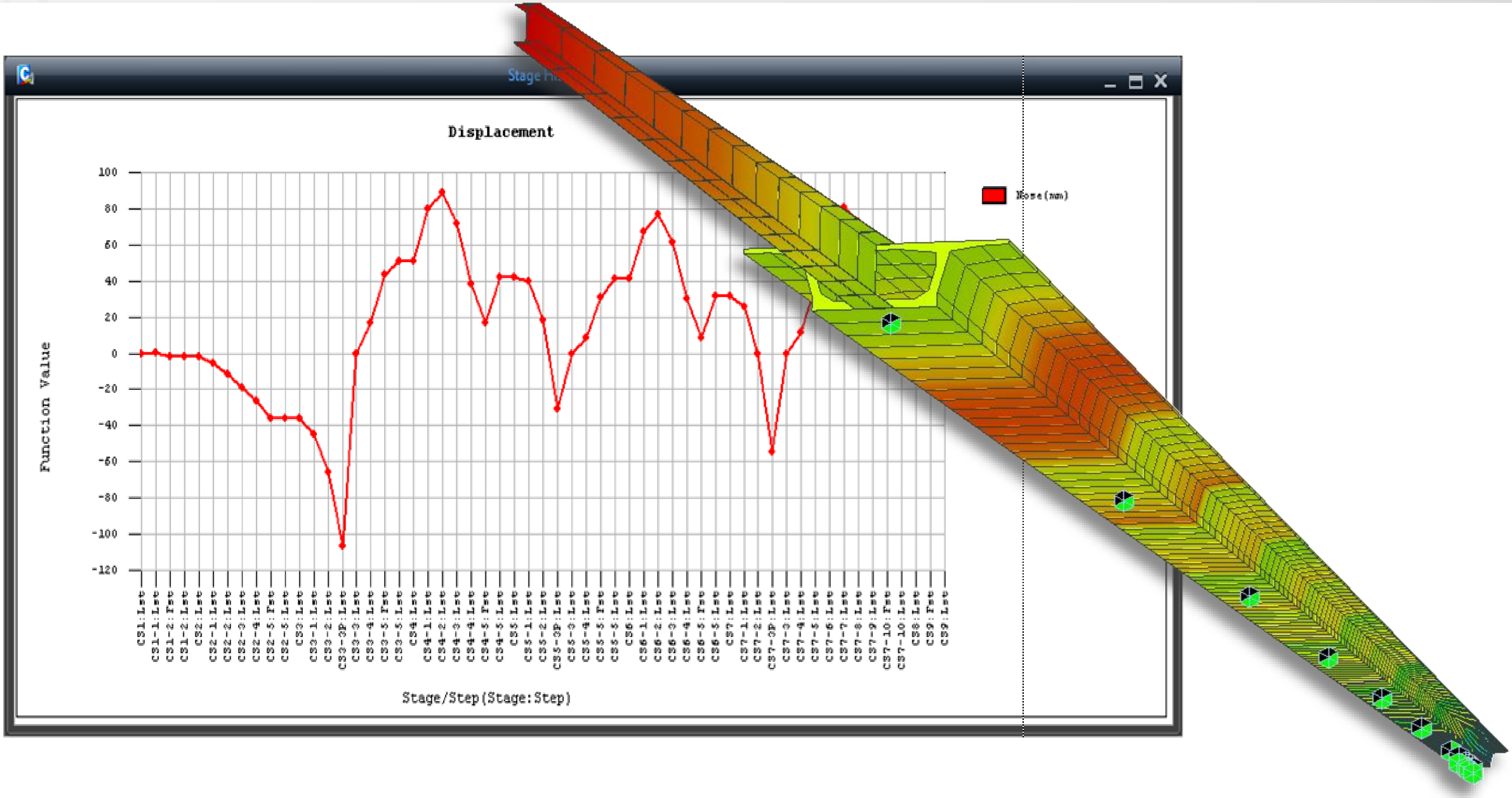
FCM Bridge – *Camber Control, Table and Graph*



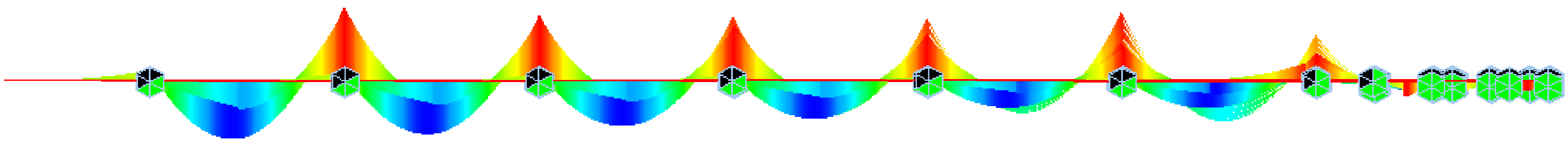
	Node 43	Node 44	Node 45	Node 46	Node 47	Node 48	Node 49	Node 50	Node 51	Node 52	Node 53	Node 54	Node 55	Node 56	Node 57	Node 58	Node 59	Node 60	Node 61	No 6
▶								0.01	0.01	0.01	0.01	0.01	0.01							
							0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01						
						0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01					
					0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02				
				0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02			
			0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03		
		0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	
	0.06	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.
	0.06	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.
	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.
	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.
	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.
	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.
	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.
	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.
	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.
	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.

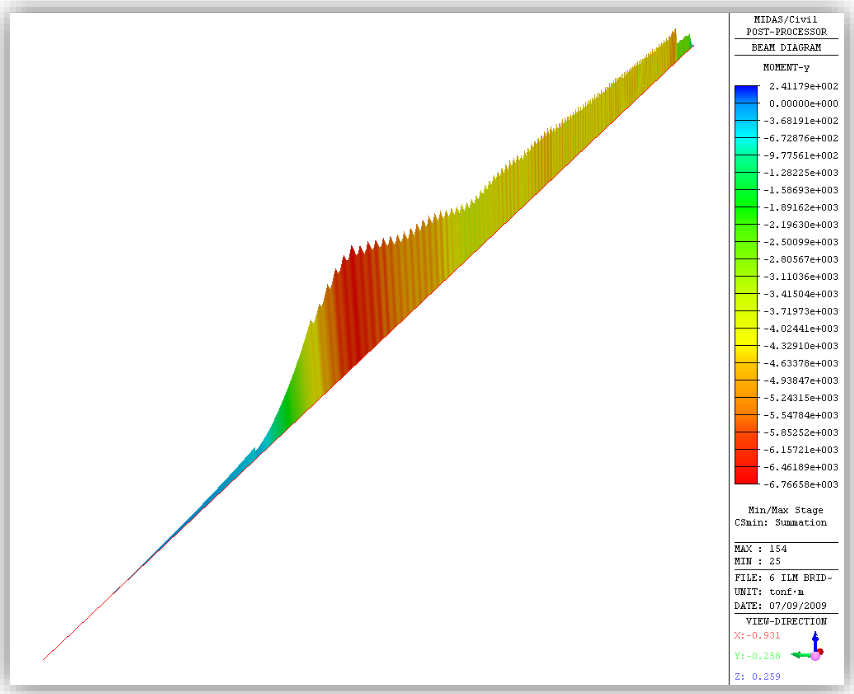
Page 1 | Page 2 | **Page 3** | Page 4

ILM Bridge – *Contour & Graph of Nose Tip Deflection*

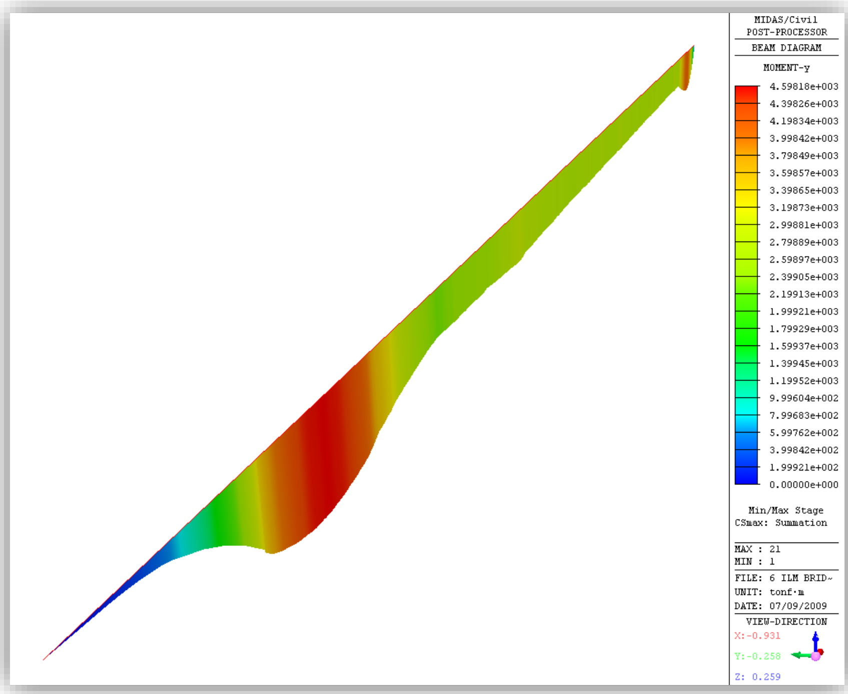


ILM Bridge – *BMD for Each Construction Stage*



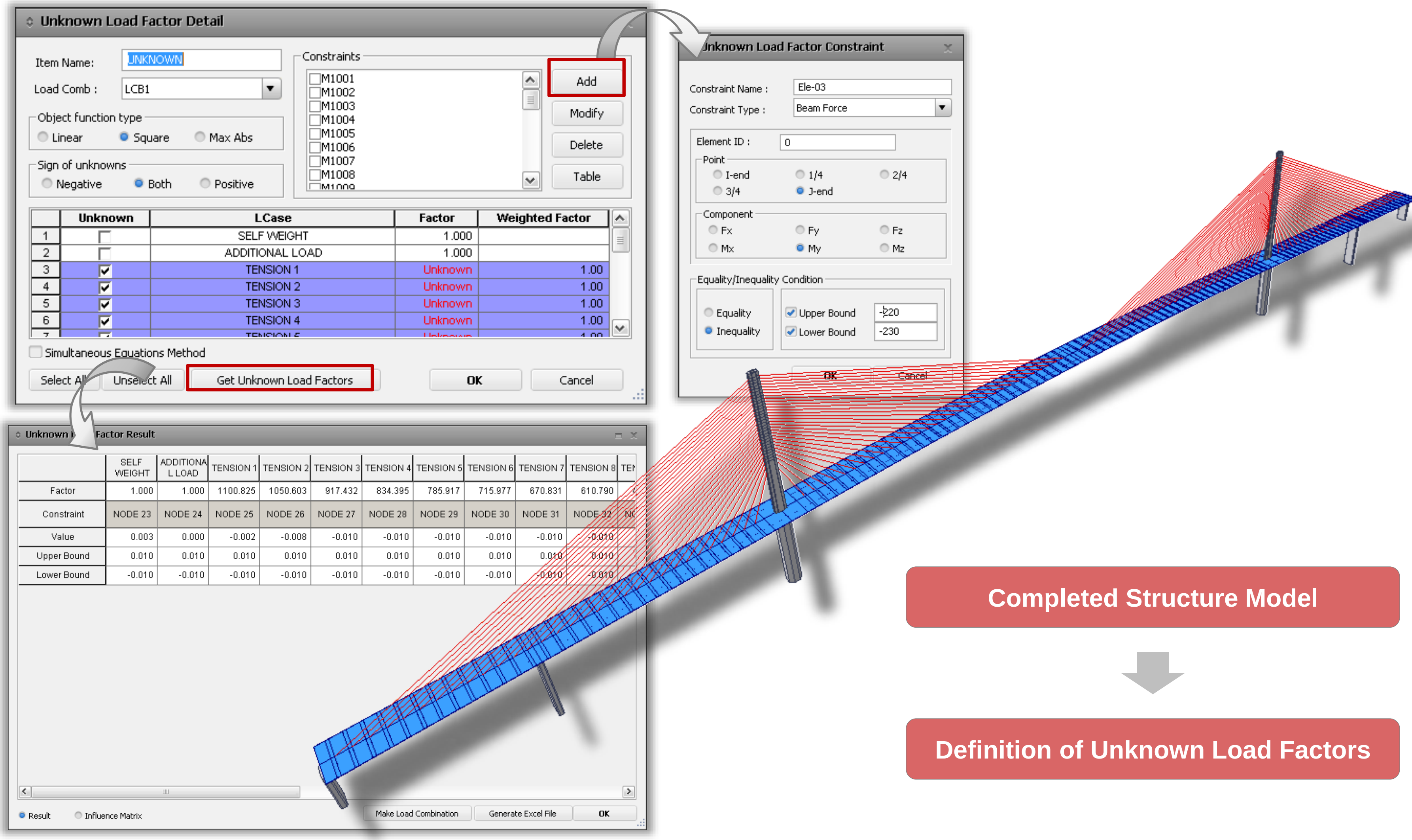


Minimum Bending Moment Envelope upon Completion



Maximum Bending Moment Envelope upon Completion

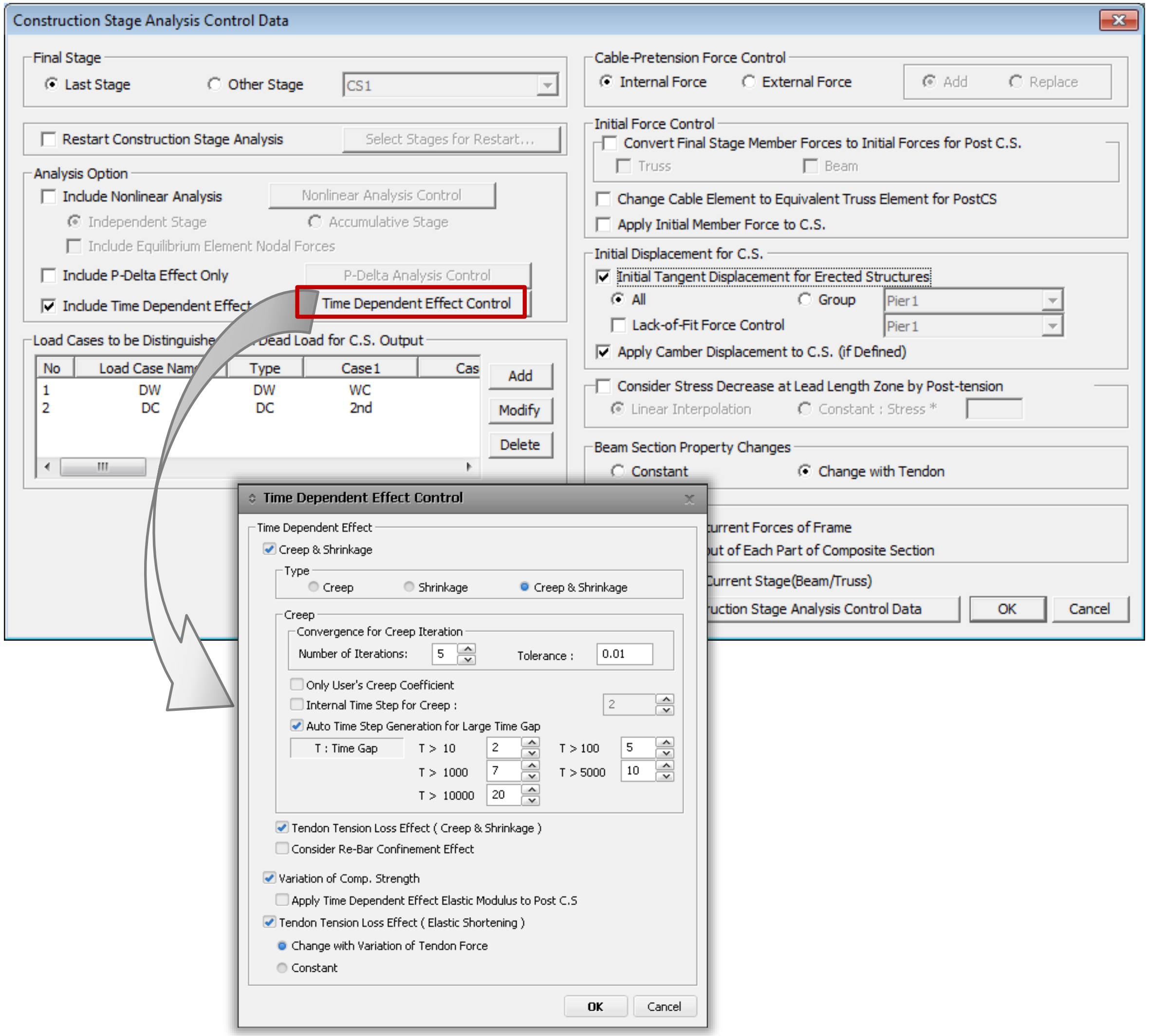
Cable-stayed Bridge – *Finding Unknown Load Factors by Optimization*



Completed Structure Model

Definition of Unknown Load Factors

Cable-stayed Bridge – *Geometric nonlinearity and tangential displacements*



Nonlinear analysis is performed by accumulating the results

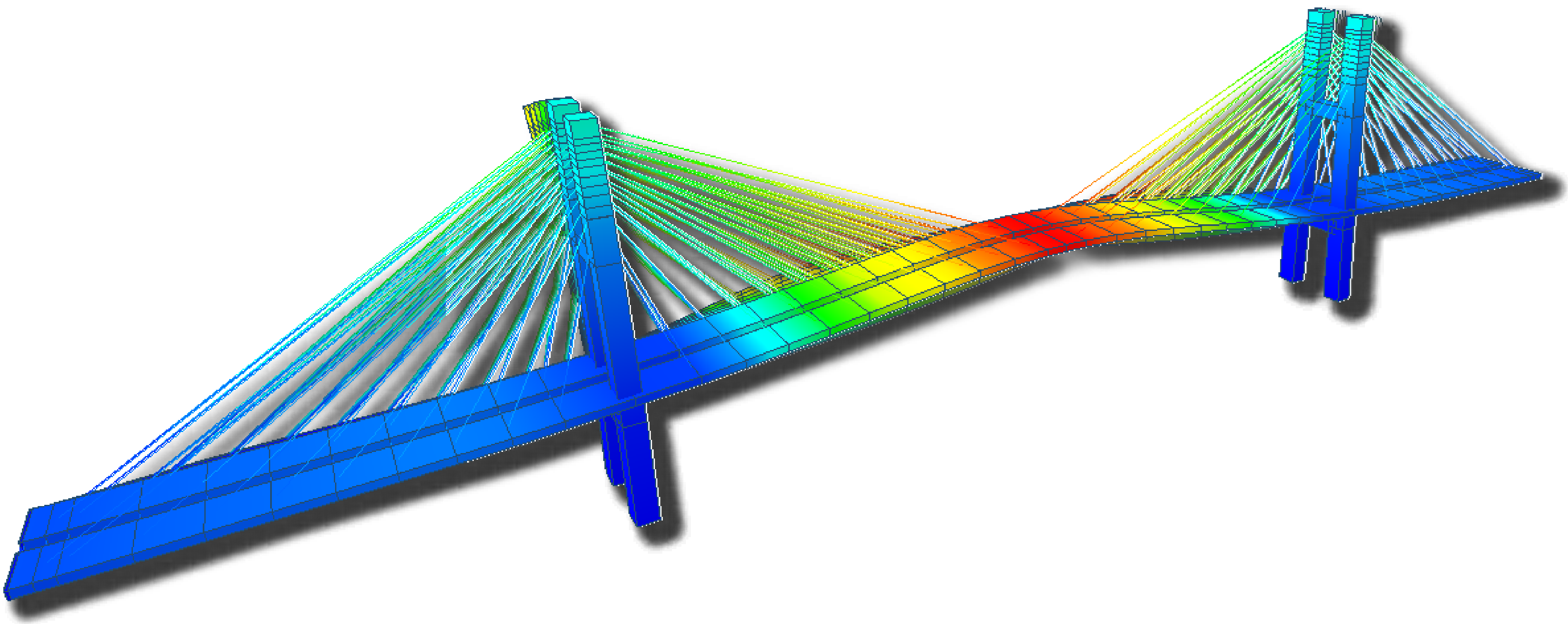
Time dependent effects (Creep/Shrinkage)

Maximum of 3 load cases distinguished from Dead Load (CS)

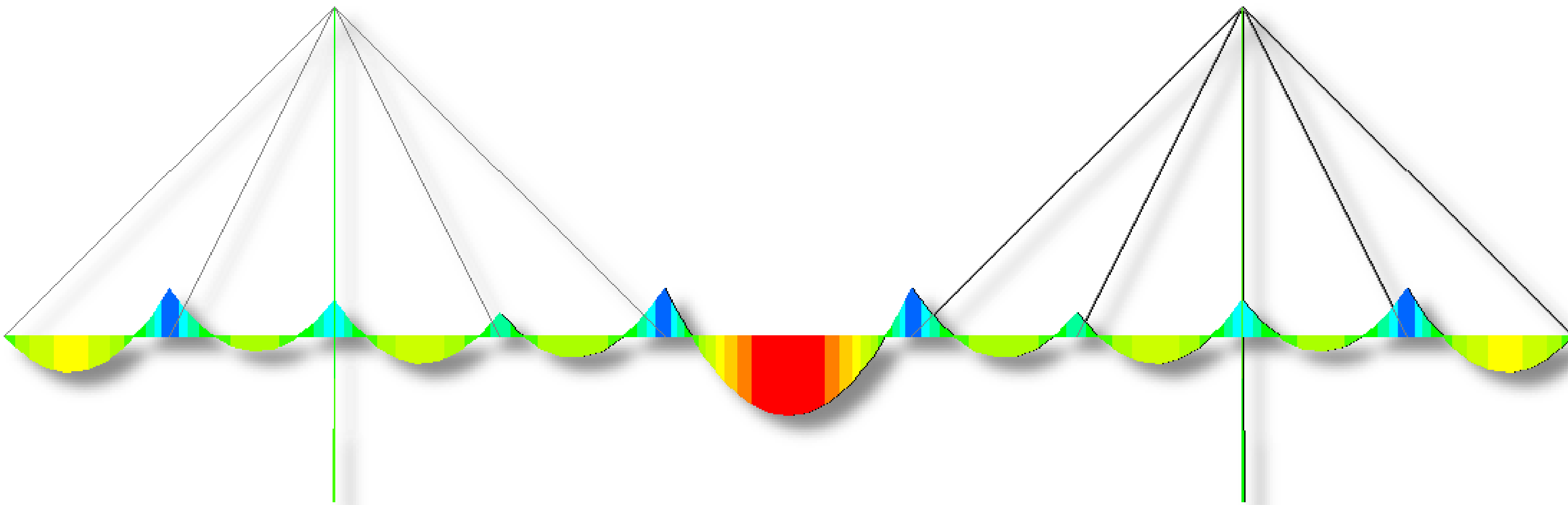
Tangential displacements (Lack of Fit Force included)

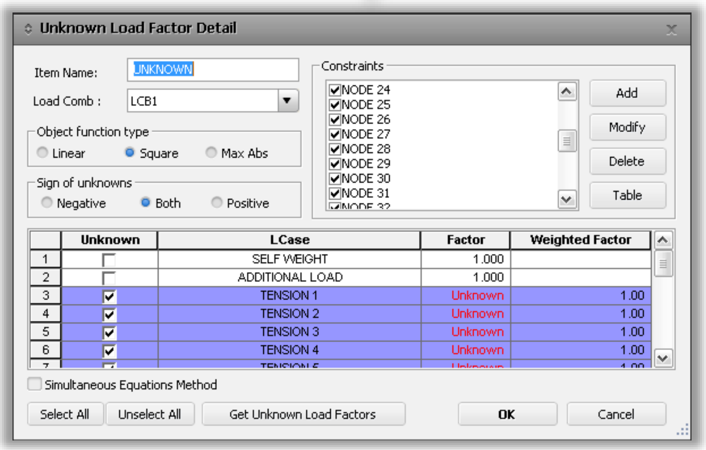
Camber for Construction Stage included in staged analysis

Cable-stayed Bridge – *Geometric nonlinearity and tangential displacements*



Cable-stayed Bridge – *Forward stage analysis step1: calculate initial tension forces at completed state*





Analysis results of initial equilibrium state (completed optimized state)

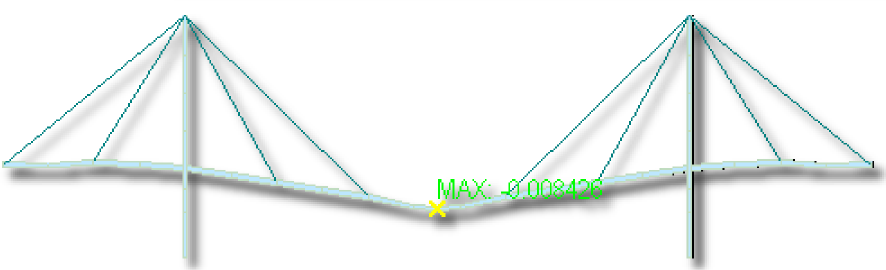
Cable-stayed Bridge – *Forward stage analysis step2: calculate construction stage pretension forces*

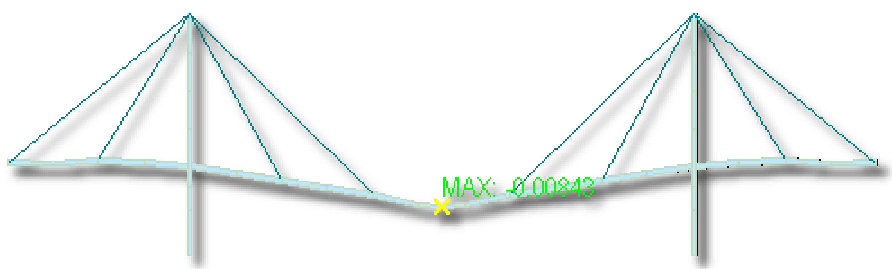
Construction stage pretension force
= Initial pretension force (from step 1) + Lack of Fit Force (additional tension required to install a cable)

Result-[Truss Lack of Fit Force]

Elem	Node I	Node J	Pretension (tonf)	LOF Force (tonf)	SUM (tonf)	Local Vector V-X	Local Vector V-Y	Local Vector V-Z	Angle ([deg])	Elasticity (tonf/m²)	Area (m²)
33	34	1	333.808	-7.153	326.655	-0.707	-0.000	-0.707	45.000	15700000.0	0.00
34	34	3	254.370	0.120	254.490	-0.447	-0.000	-0.894	63.435	15700000.0	0.00
35	34	7	193.011	51.611	244.622	0.447	-0.000	-0.894	63.435	15700000.0	0.00
36	34	9	340.835	179.826	520.661	0.707	-0.000	-0.707	45.000	15700000.0	0.00
37	35	13	340.835	179.826	520.661	-0.707	-0.000	-0.707	45.000	15700000.0	0.00
38	35	15	193.011	51.611	244.622	-0.447	-0.000	-0.894	63.435	15700000.0	0.00
39	35	19	254.370	0.120	254.490	0.447	-0.000	-0.894	63.435	15700000.0	0.00
40	35	21	333.808	-7.153	326.655	0.707	-0.000	-0.707	45.000	15700000.0	0.00

Lack of Fit Force



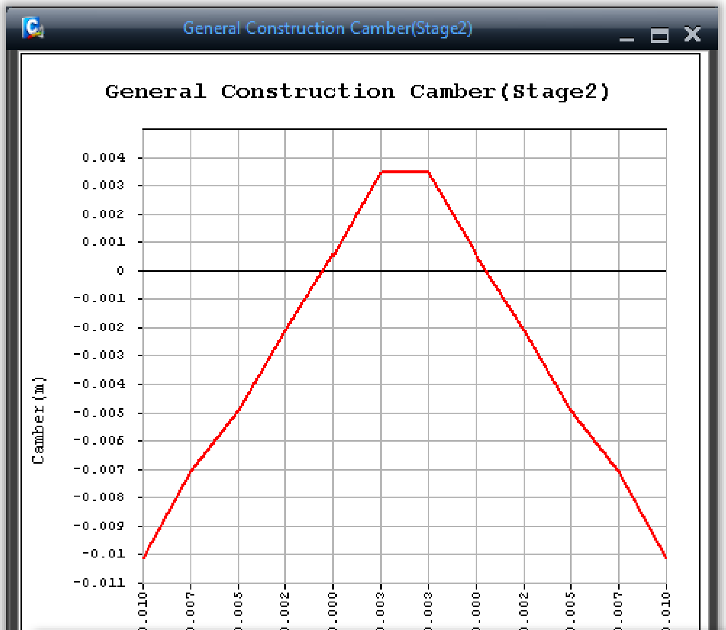


Displacements of forward stage analysis at the last stage using Lack of Fit Force
[Max. – 0.000426]

=

Displacements at the completed state
[Max. – 0.00043]

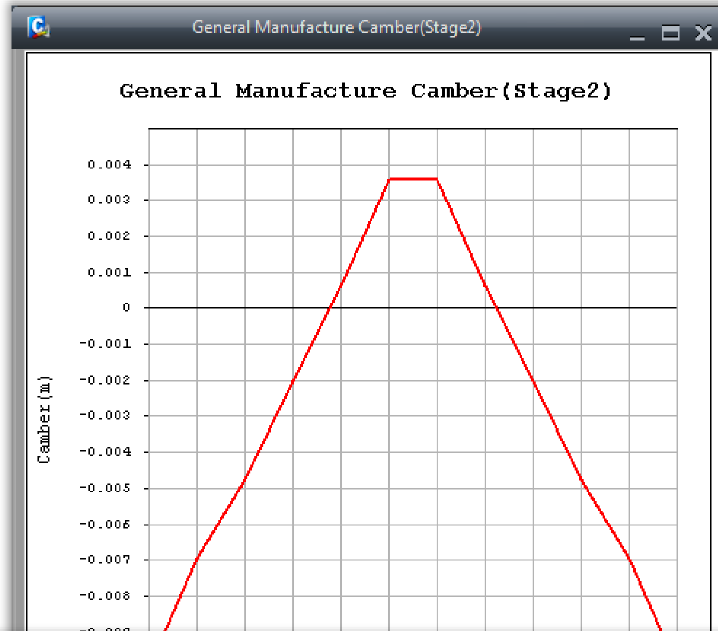
Cable-stayed Bridge – *General Camber Output*



General Constructed Camber-[Stage2]

Stage	Node 1	Node 2	Node 3	Node 4	Node 5	Node 6	Node 16	Node 17	Node 18
					0.00			0.00	
Stage1	-0.01	-0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00
Stage2	-0.01	-0.01	-0.01	-0.00	0.00	0.00	0.00	0.00	-0.00
Stage3	-0.01	-0.01	-0.01	-0.00	0.00	0.00	0.00	0.00	-0.00
Stage4	-0.01	-0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00
Stage5	-0.01	-0.01	-0.00	-0.00	0.00	-0.00	-0.00	0.00	-0.00
Stage6	-0.01	-0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00
Stage7	-0.01	-0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00
Stage 7-1	-0.01	-0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00
Stage8	-0.01	-0.01	-0.00	-0.00	0.00	-0.01	-0.01	0.00	-0.00
Stage9	-0.01	-0.01	-0.00	-0.00	0.00	0.01	0.01	0.00	-0.00

Page 1

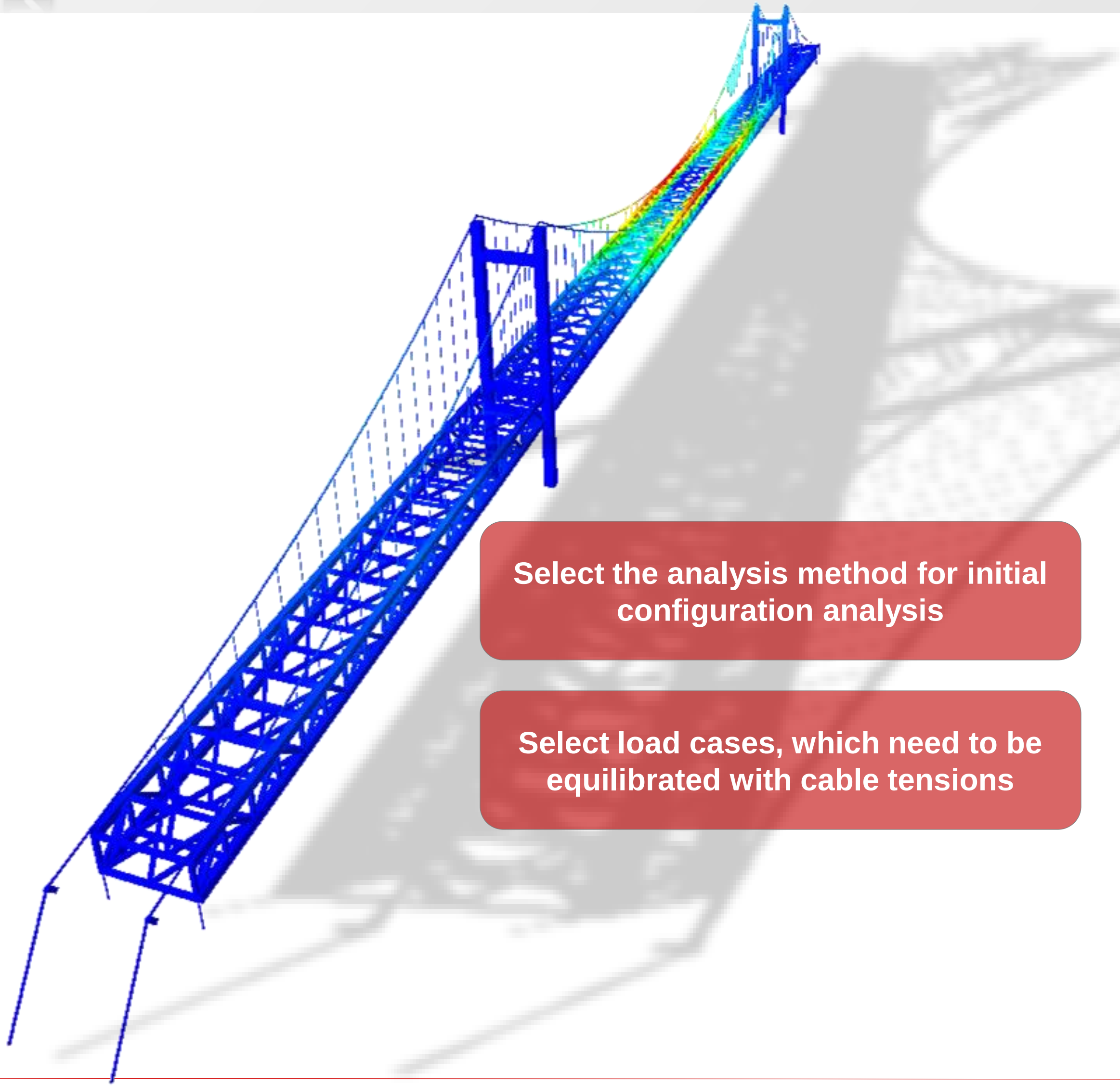


General Manufactured Camber-[Stage2]

Node 1	Node 2	Node 3	Node 4	Node 5	Node 6	Node 16	Node 17	Node 18	Node 19	Node 20
-0.01	-0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.01

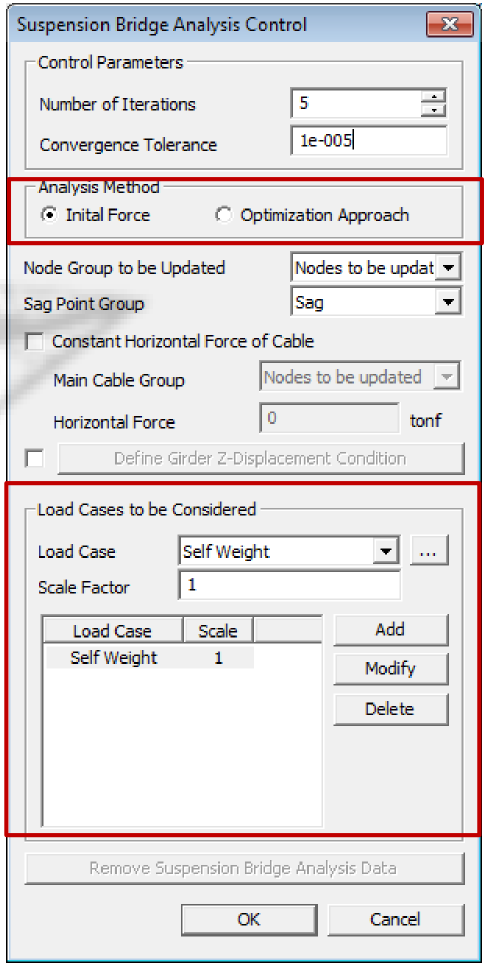
Page 1

Suspension Bridge – *Initial configuration analysis*

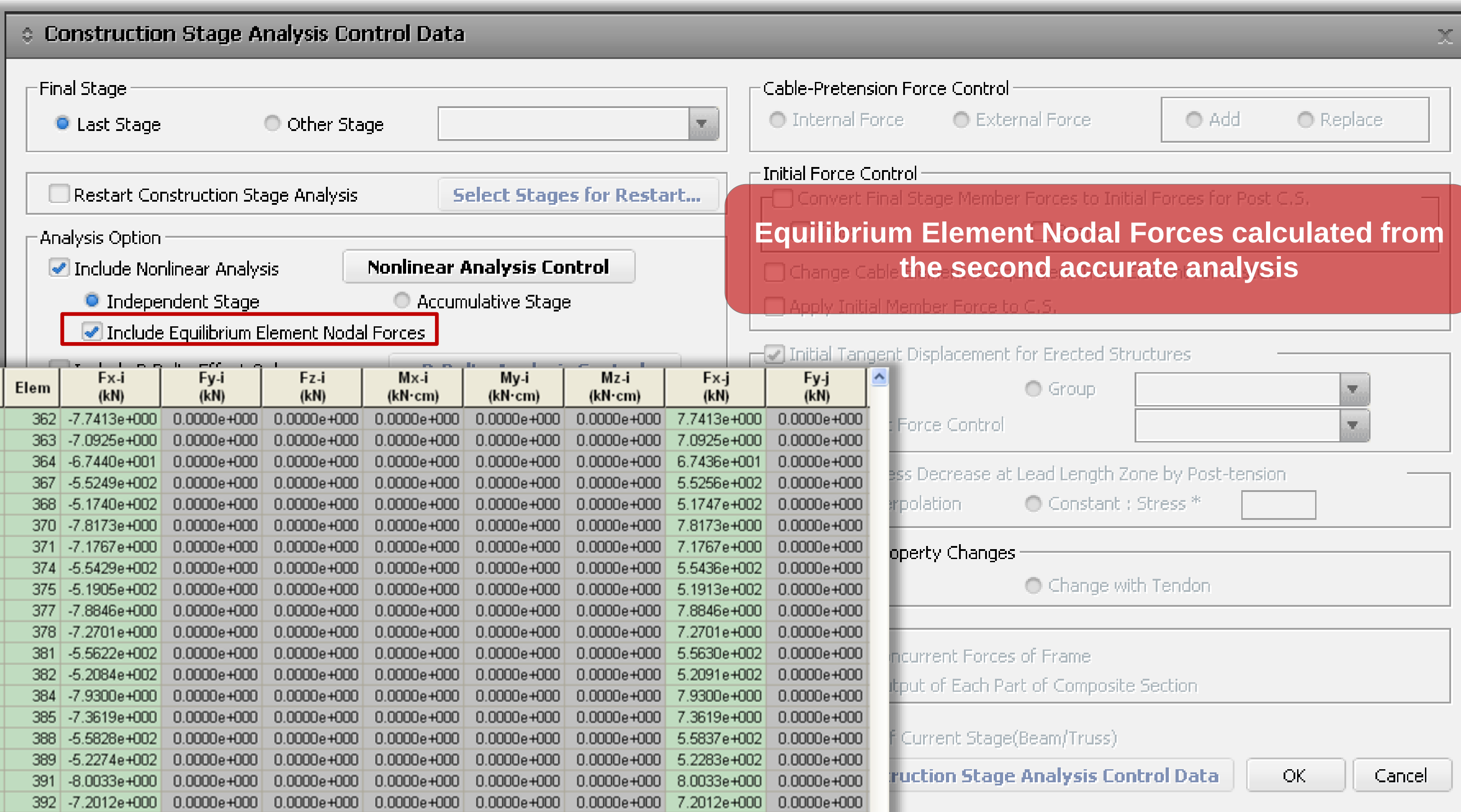


Select the analysis method for initial configuration analysis

Select load cases, which need to be equilibrated with cable tensions



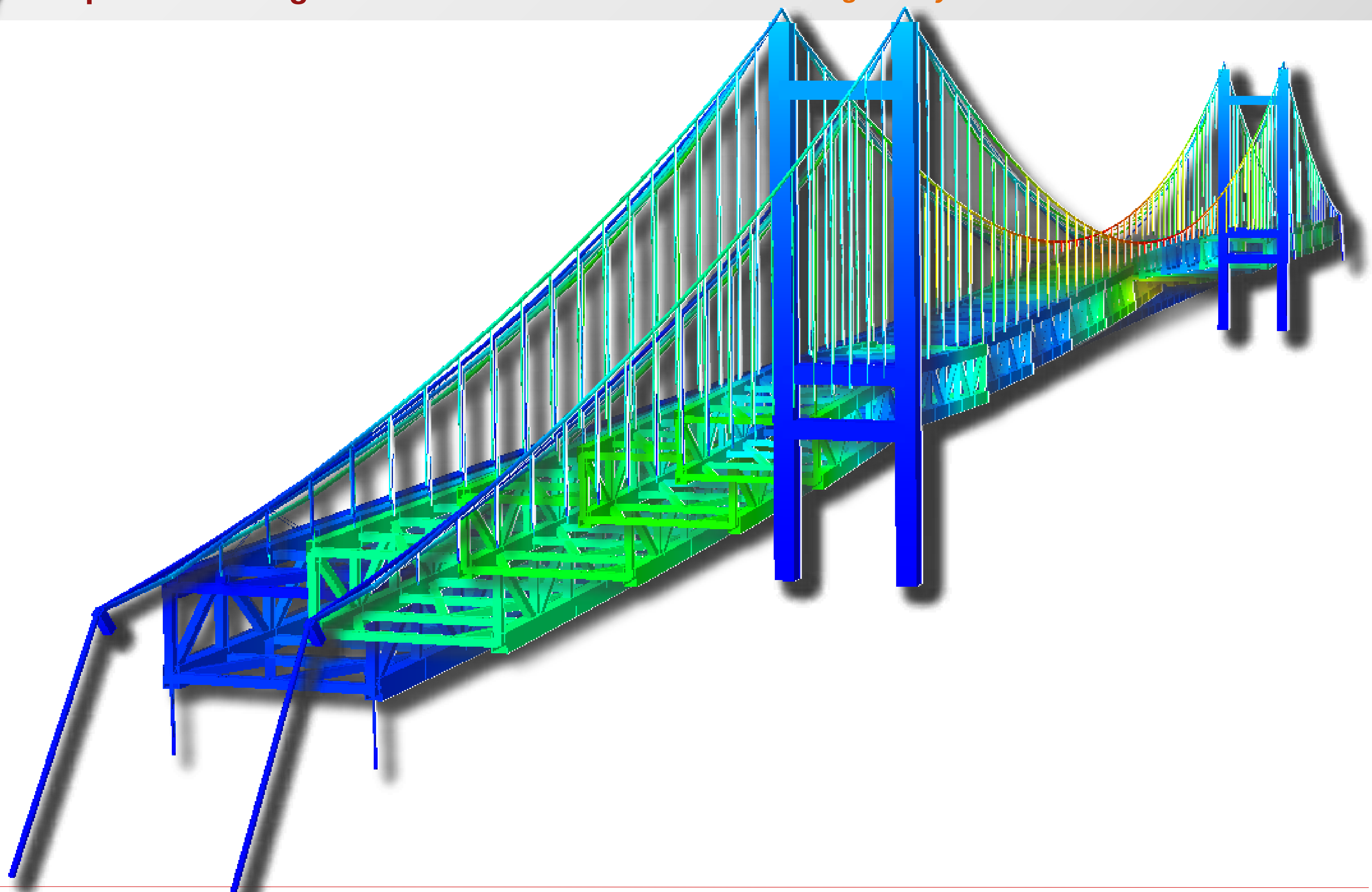
Suspension Bridge – *Nonlinear backward construction stage analysis*



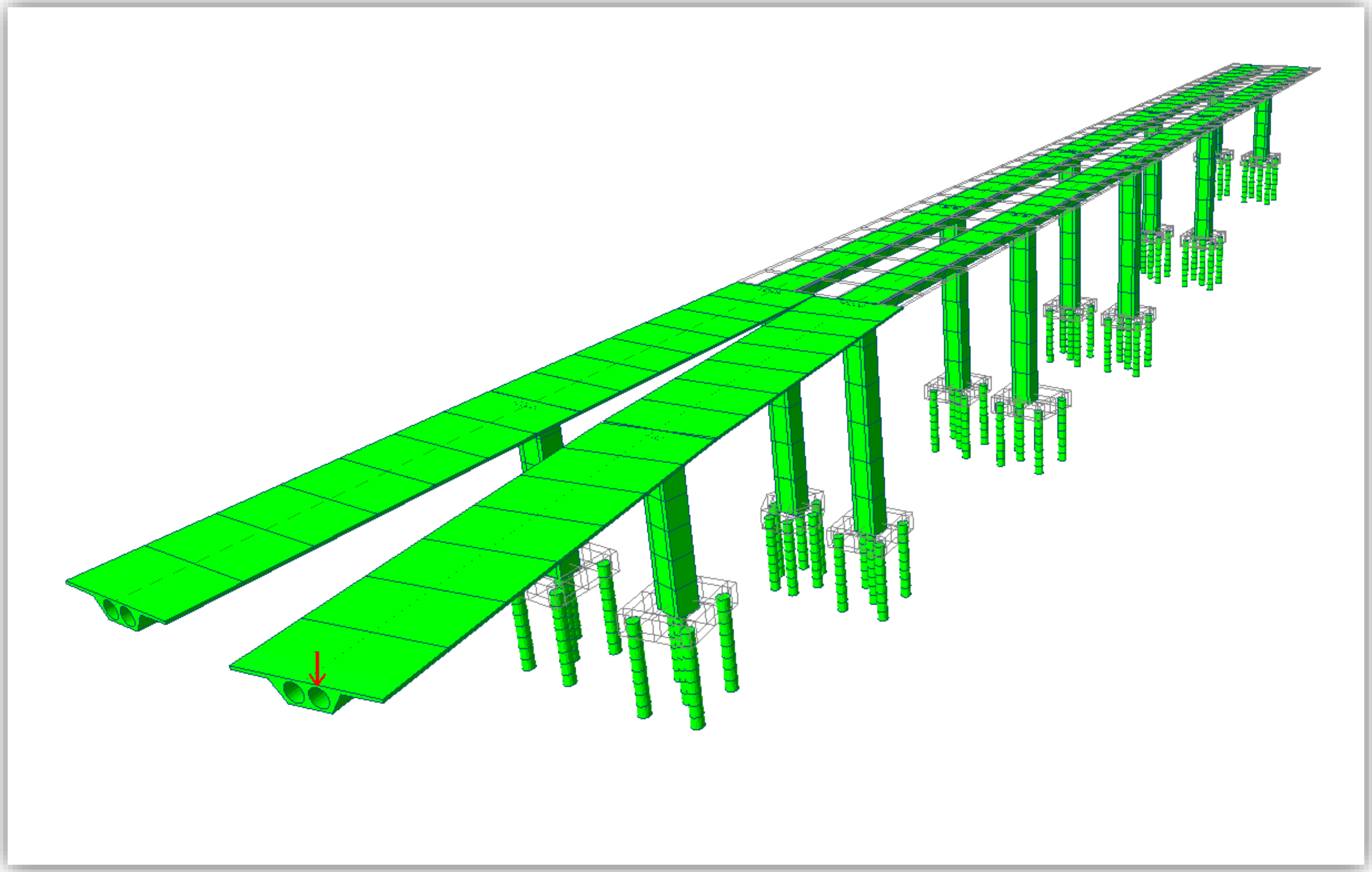
Equilibrium Element Nodal Forces calculated from the second accurate analysis

Type	Elem	Fx-i (kN)	Fy-i (kN)	Fz-i (kN)	Mx-i (kN·cm)	My-i (kN·cm)	Mz-i (kN·cm)	Fx-j (kN)	Fy-j (kN)
Truss	362	-7.7413e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.7413e+000	0.0000e+000
Truss	363	-7.0925e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.0925e+000	0.0000e+000
Truss	364	-6.7440e+001	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	6.7436e+001	0.0000e+000
Truss	367	-5.5249e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.5256e+002	0.0000e+000
Truss	368	-5.1740e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.1747e+002	0.0000e+000
Truss	370	-7.8173e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.8173e+000	0.0000e+000
Truss	371	-7.1767e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.1767e+000	0.0000e+000
Truss	374	-5.5429e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.5436e+002	0.0000e+000
Truss	375	-5.1905e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.1913e+002	0.0000e+000
Truss	377	-7.8846e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.8846e+000	0.0000e+000
Truss	378	-7.2701e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.2701e+000	0.0000e+000
Truss	381	-5.5622e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.5630e+002	0.0000e+000
Truss	382	-5.2084e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.2091e+002	0.0000e+000
Truss	384	-7.9300e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.9300e+000	0.0000e+000
Truss	385	-7.3619e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.3619e+000	0.0000e+000
Truss	388	-5.5828e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.5837e+002	0.0000e+000
Truss	389	-5.2274e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.2283e+002	0.0000e+000
Truss	391	-8.0033e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	8.0033e+000	0.0000e+000
Truss	392	-7.2012e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	7.2012e+000	0.0000e+000
Truss	395	-5.6048e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.6057e+002	0.0000e+000
Truss	396	-5.2472e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.2481e+002	0.0000e+000
Truss	398	-1.3893e+001	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	1.3893e+001	0.0000e+000
Truss	399	-1.4016e+001	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	1.4016e+001	0.0000e+000
Truss	400	-5.6449e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.6472e+002	0.0000e+000
Truss	401	-5.2875e+002	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.2899e+002	0.0000e+000

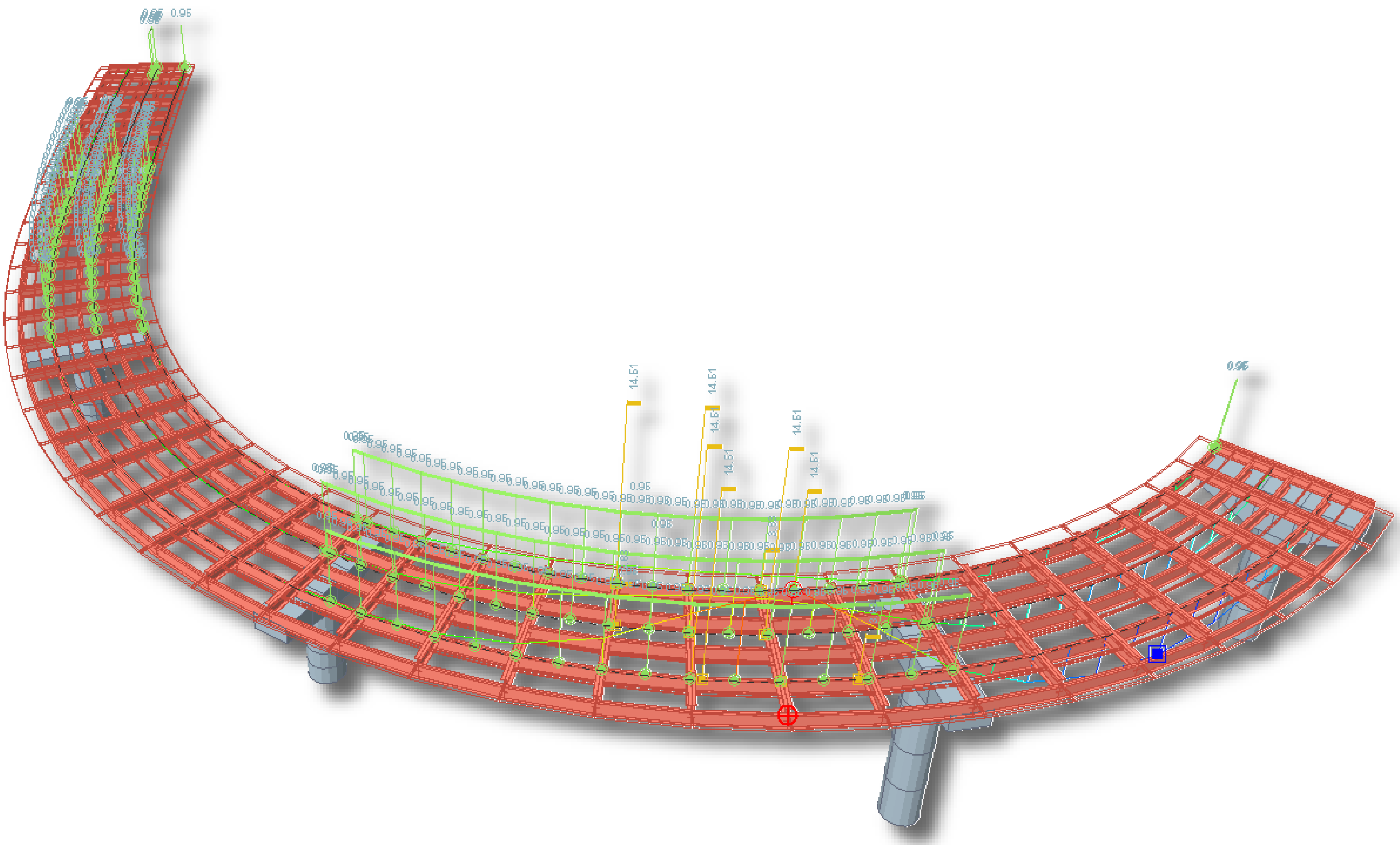
Suspension Bridge – *Nonlinear backward construction stage analysis*



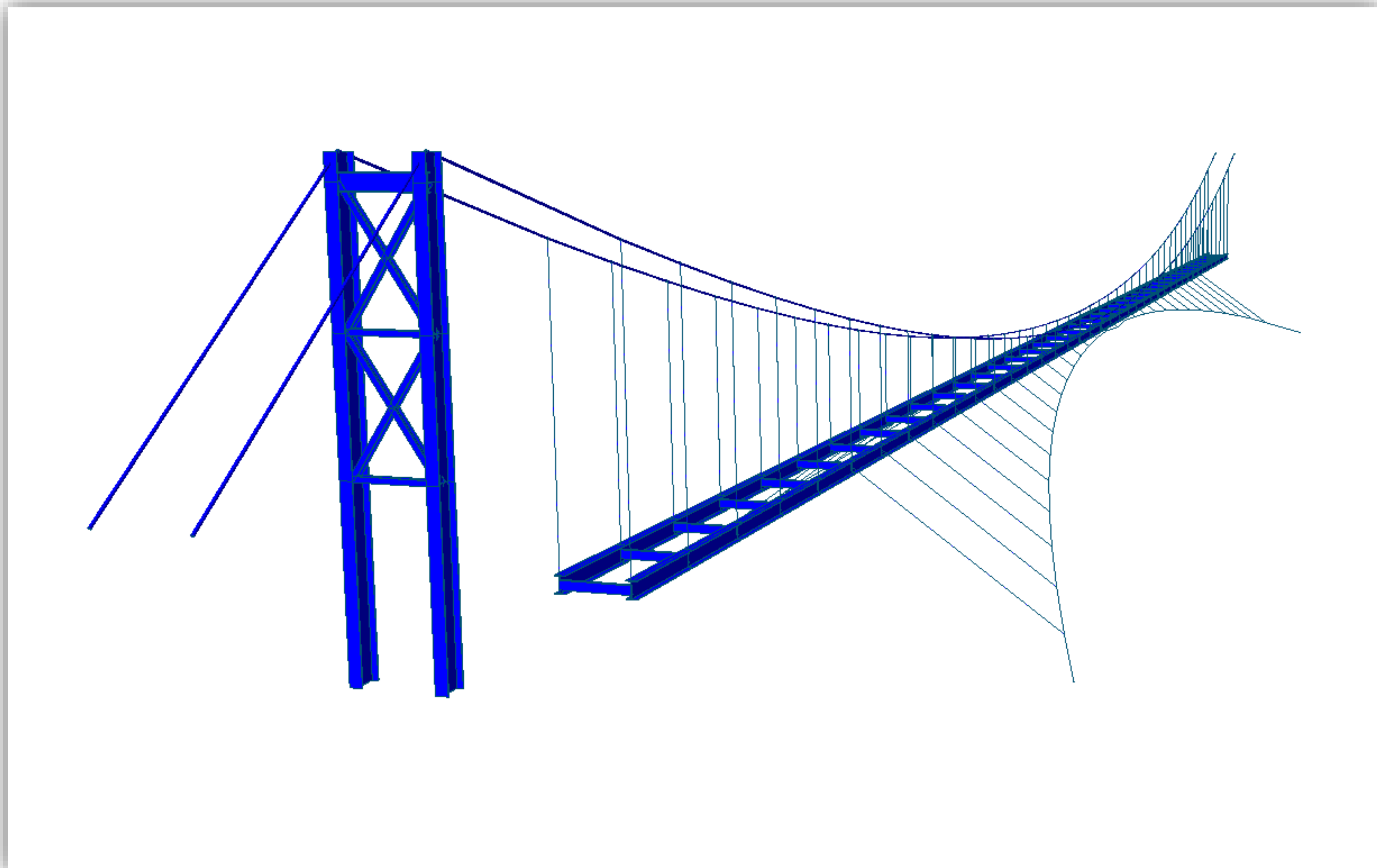
Influence Line Analysis



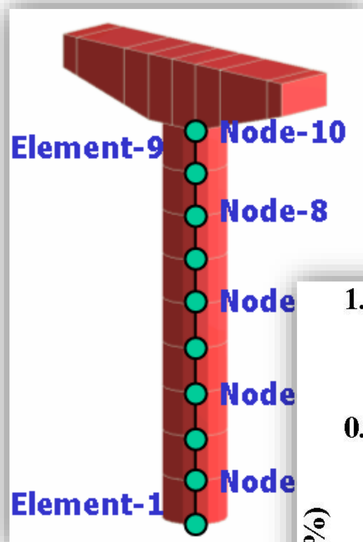
Moving Load Tracer + Vehicle Load Conversion to Static Load

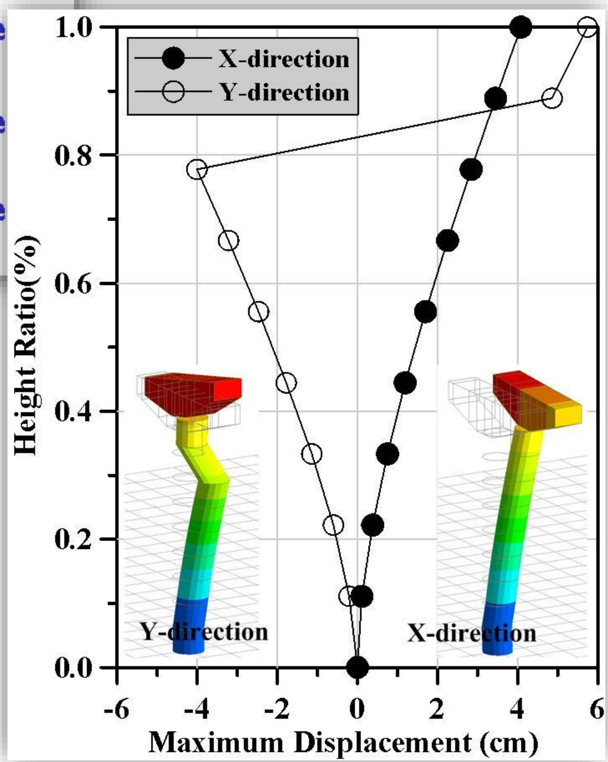


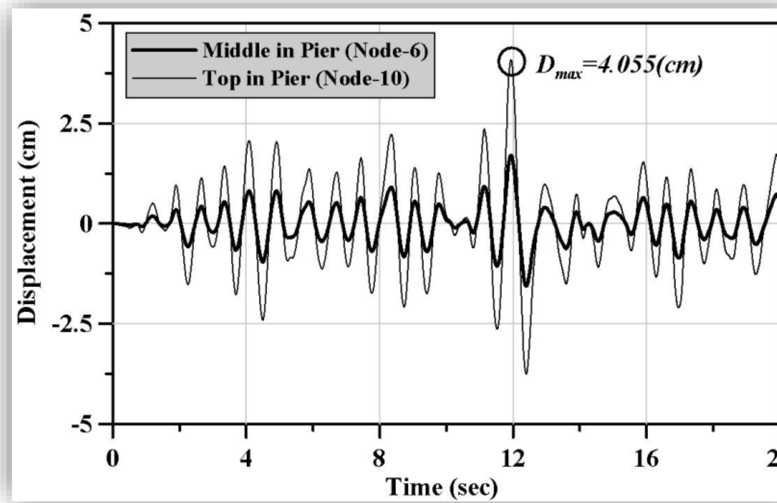
Eigen Value Analysis – *Mode 1 Vibration Shape + Contour*

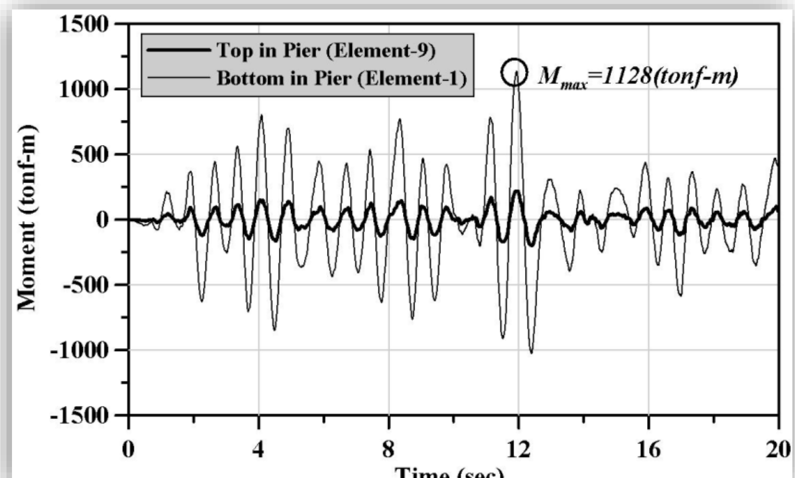


Time History Analysis – *Displacement & Moment*

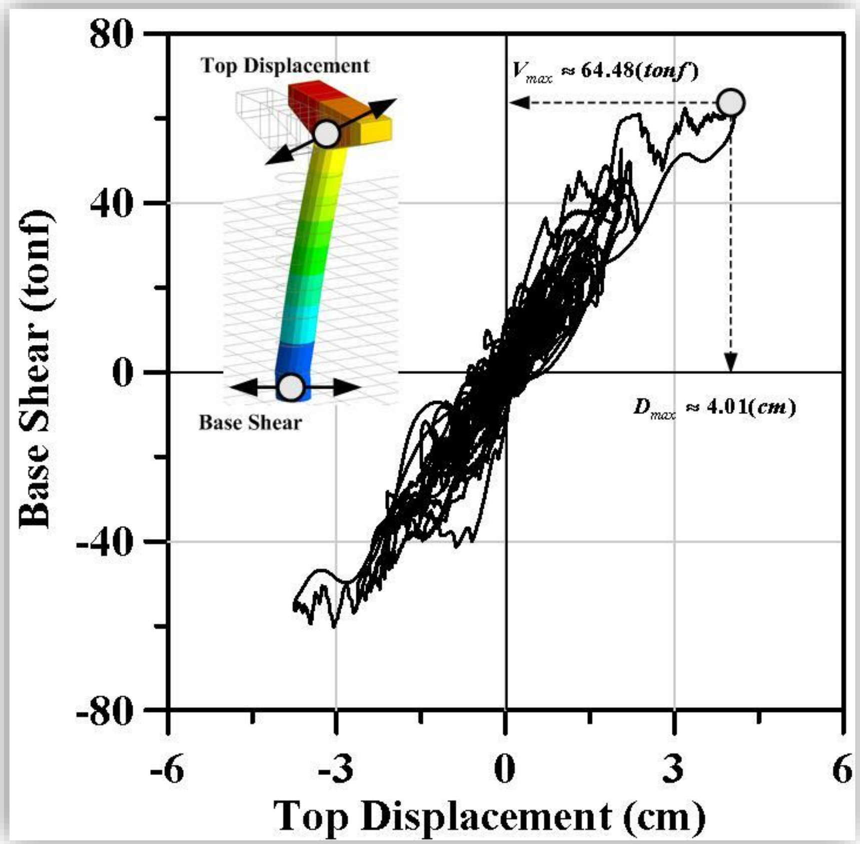


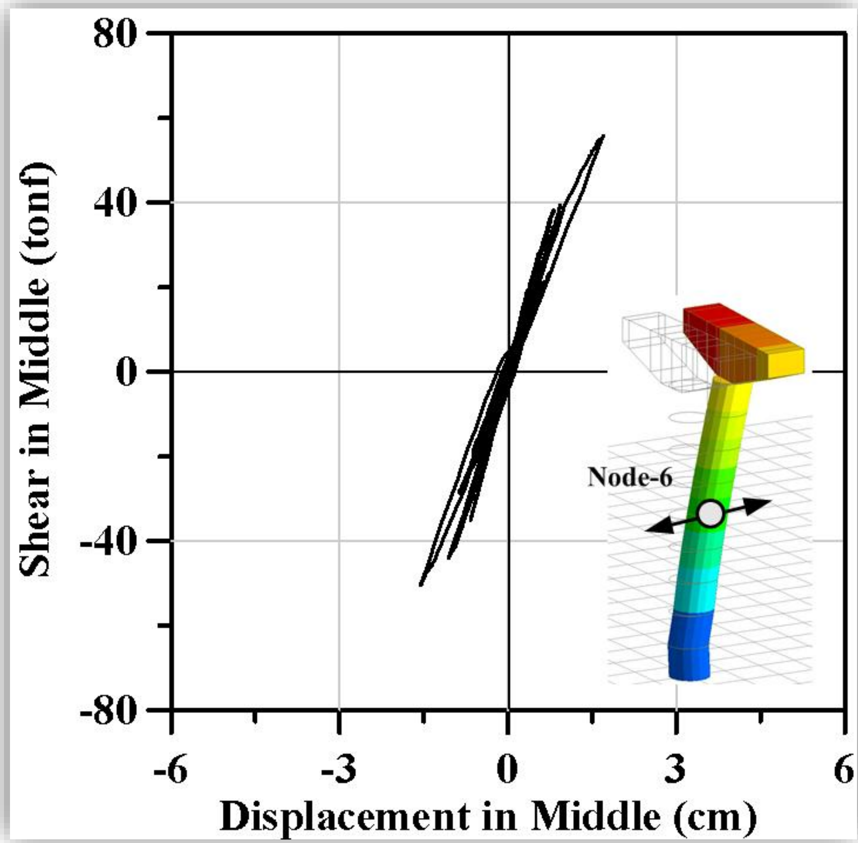




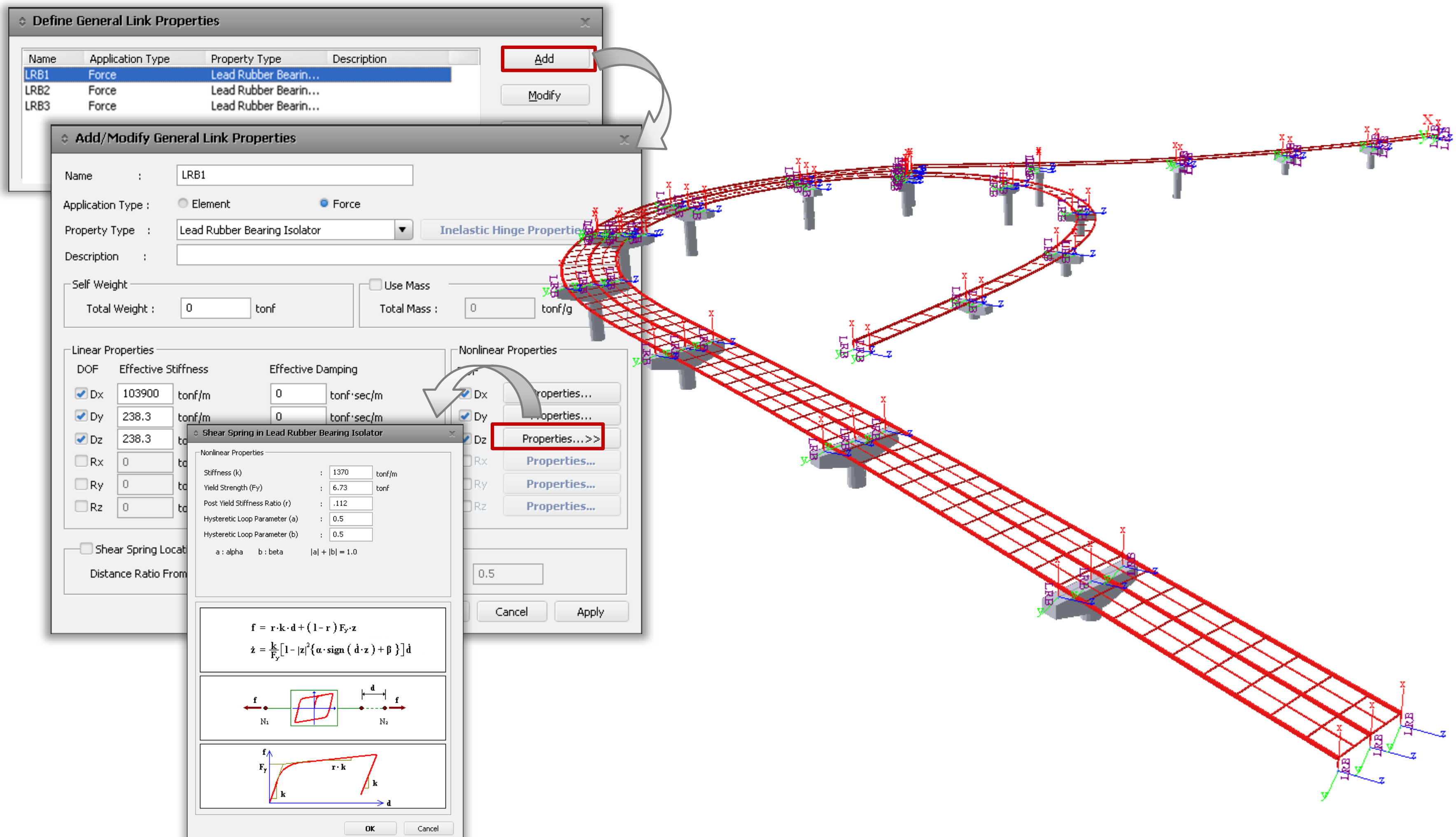


Time History Analysis – *Shear vs Displacement Graph*

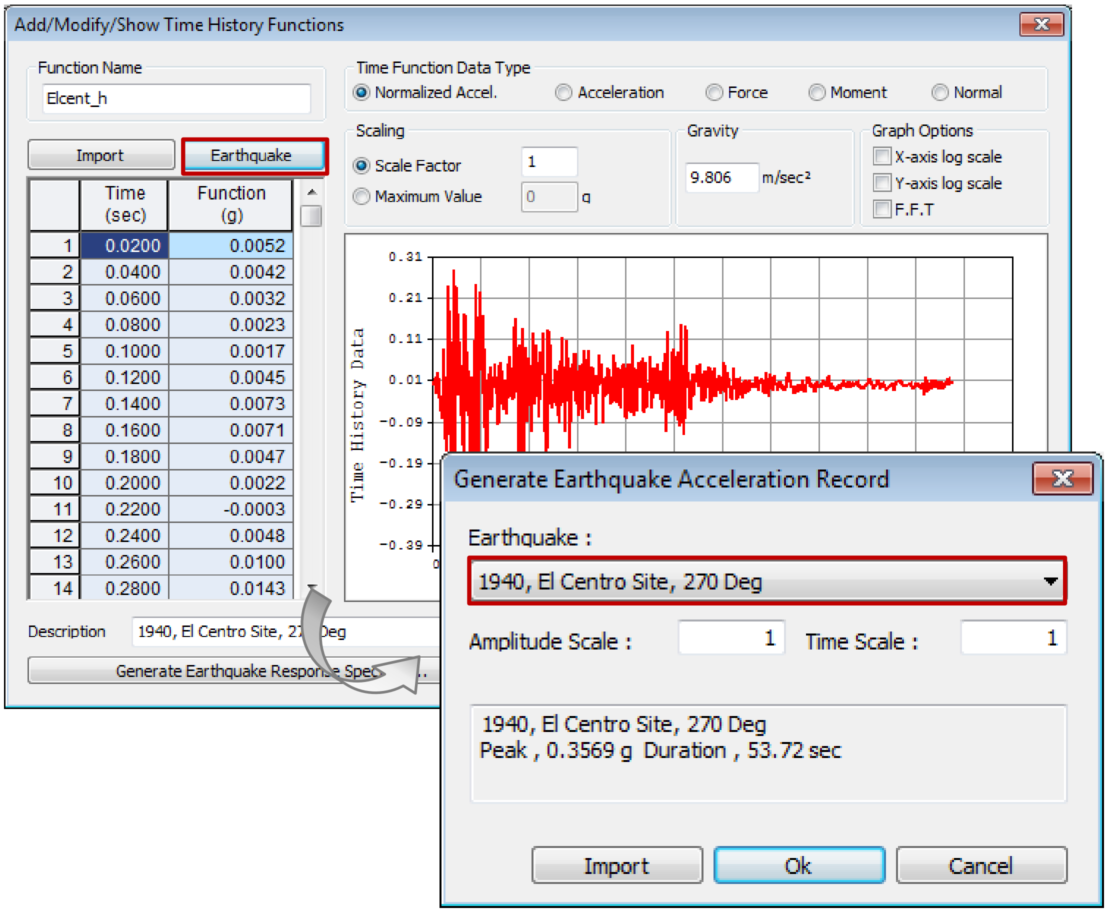




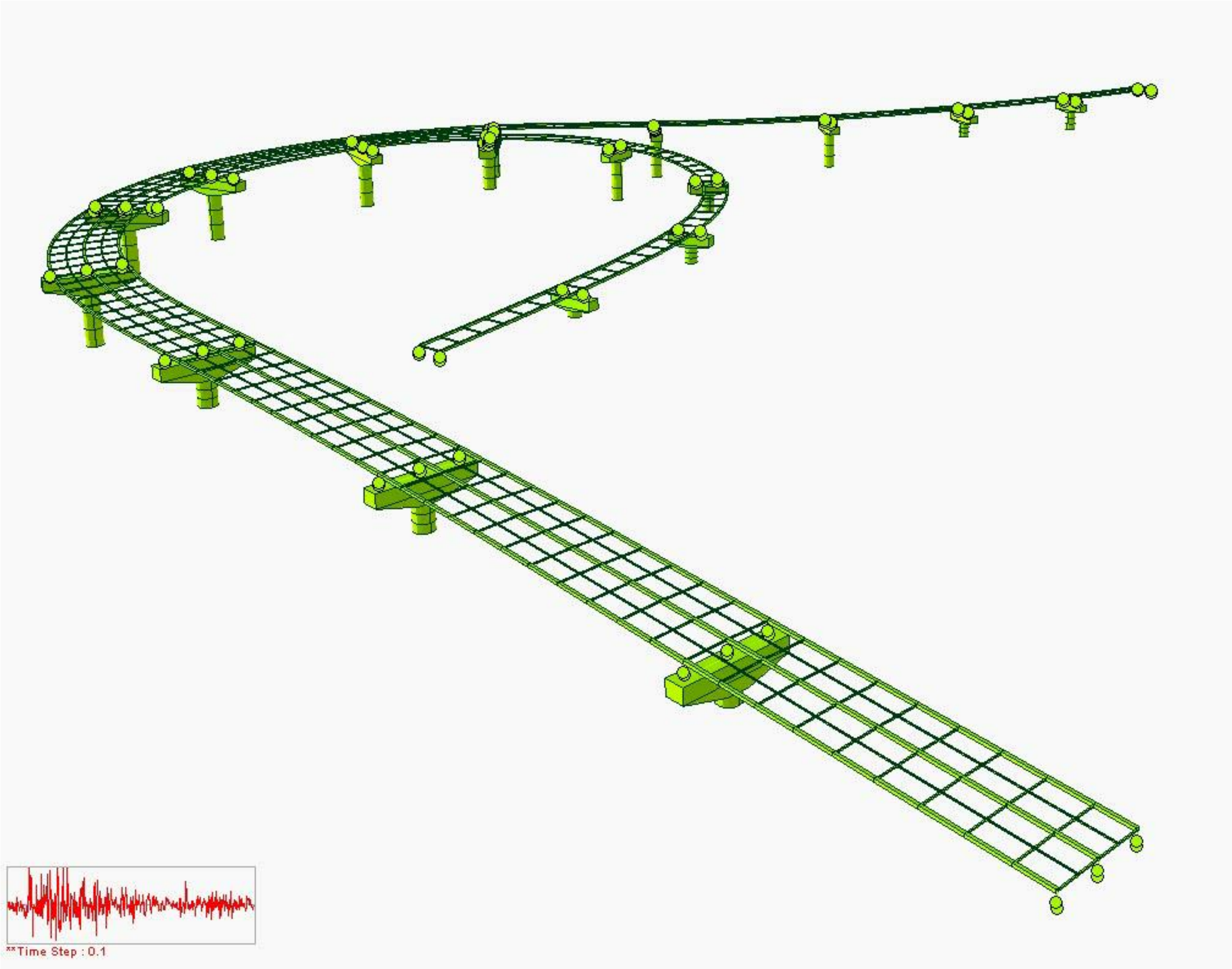
Dynamic Boundary Nonlinear Analysis – *Lead Rubber Bearing Definition*



Dynamic Boundary Nonlinear Analysis – *Built-in Earthquake Acceleration Record*

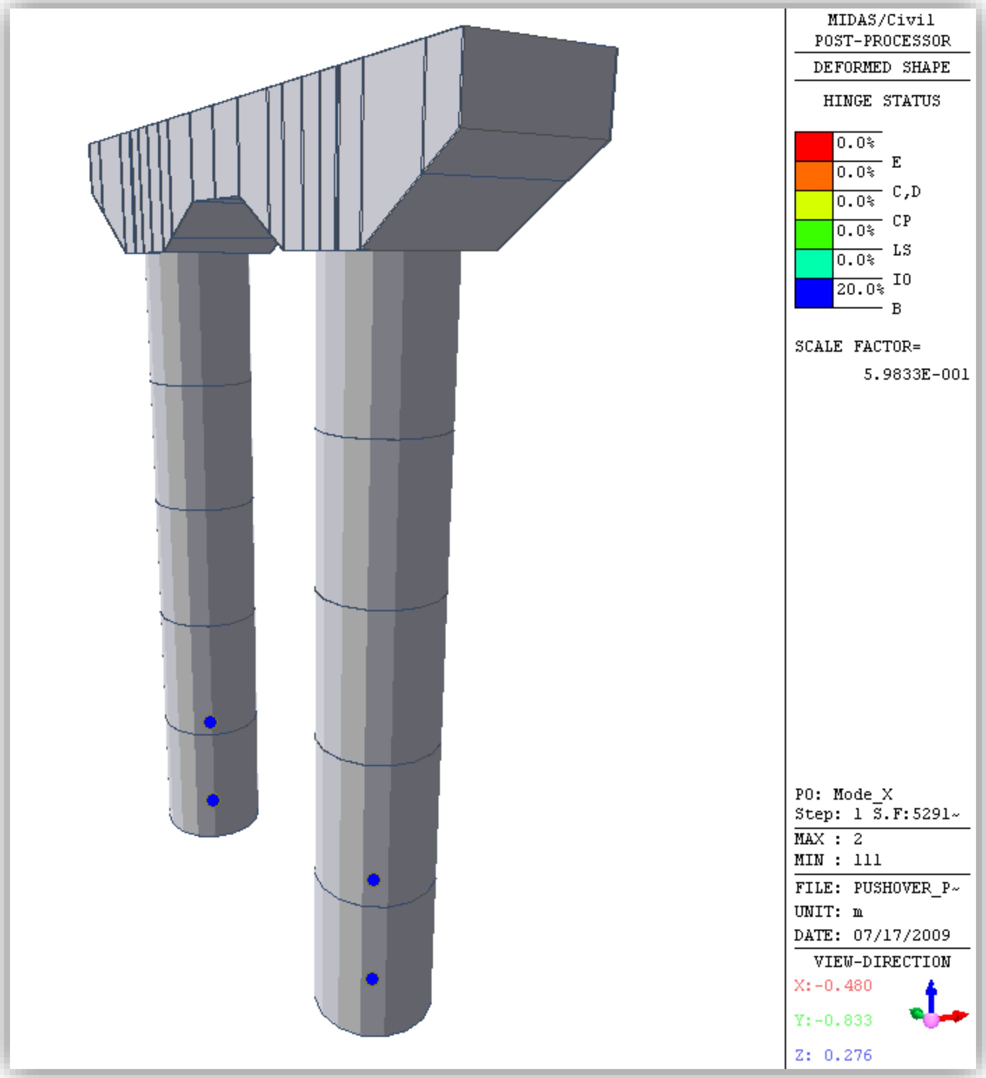


Dynamic Boundary Nonlinear Analysis – *Bridge behavior with the base isolators*

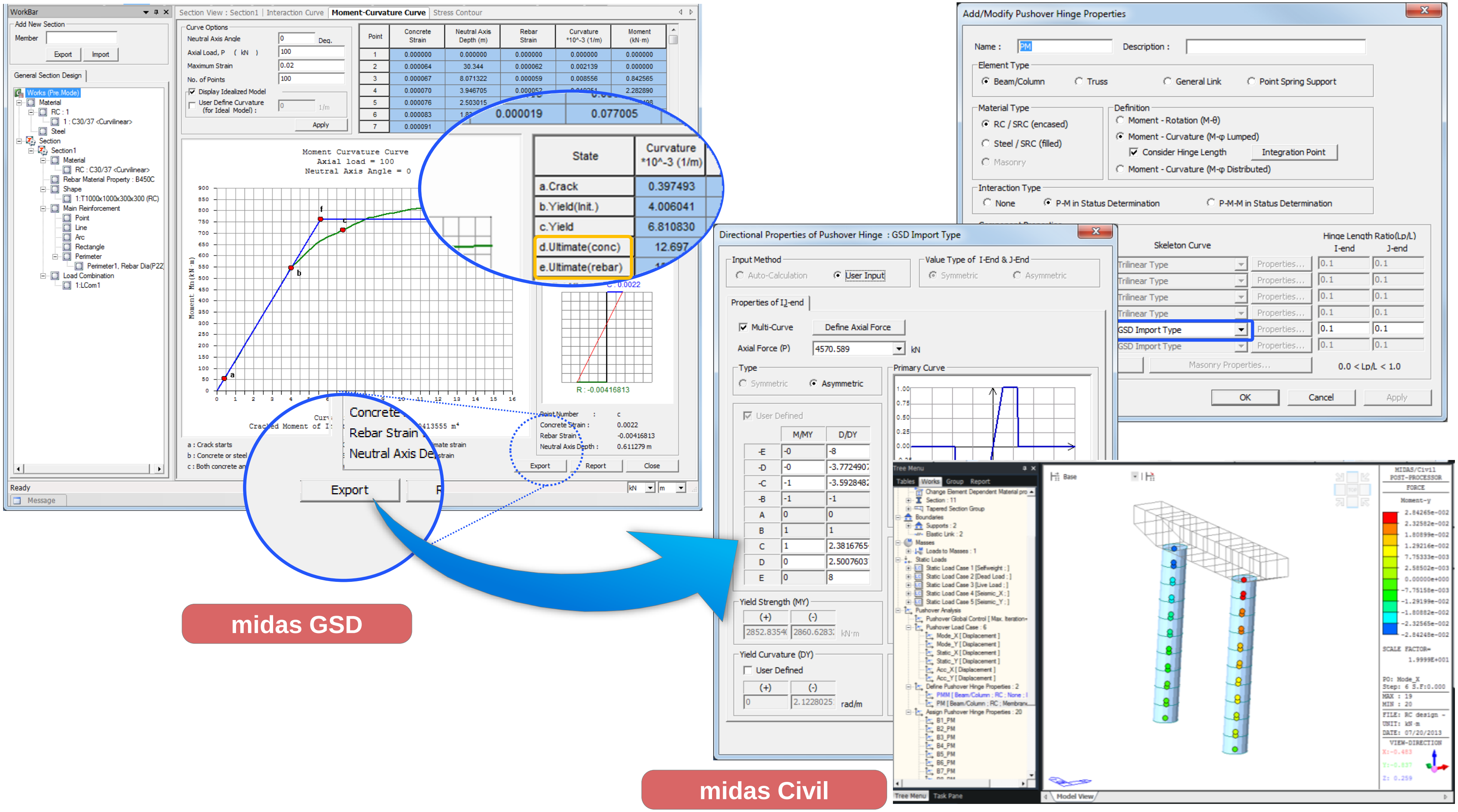


Pushover Analysis – *Performance Based Seismic Design*

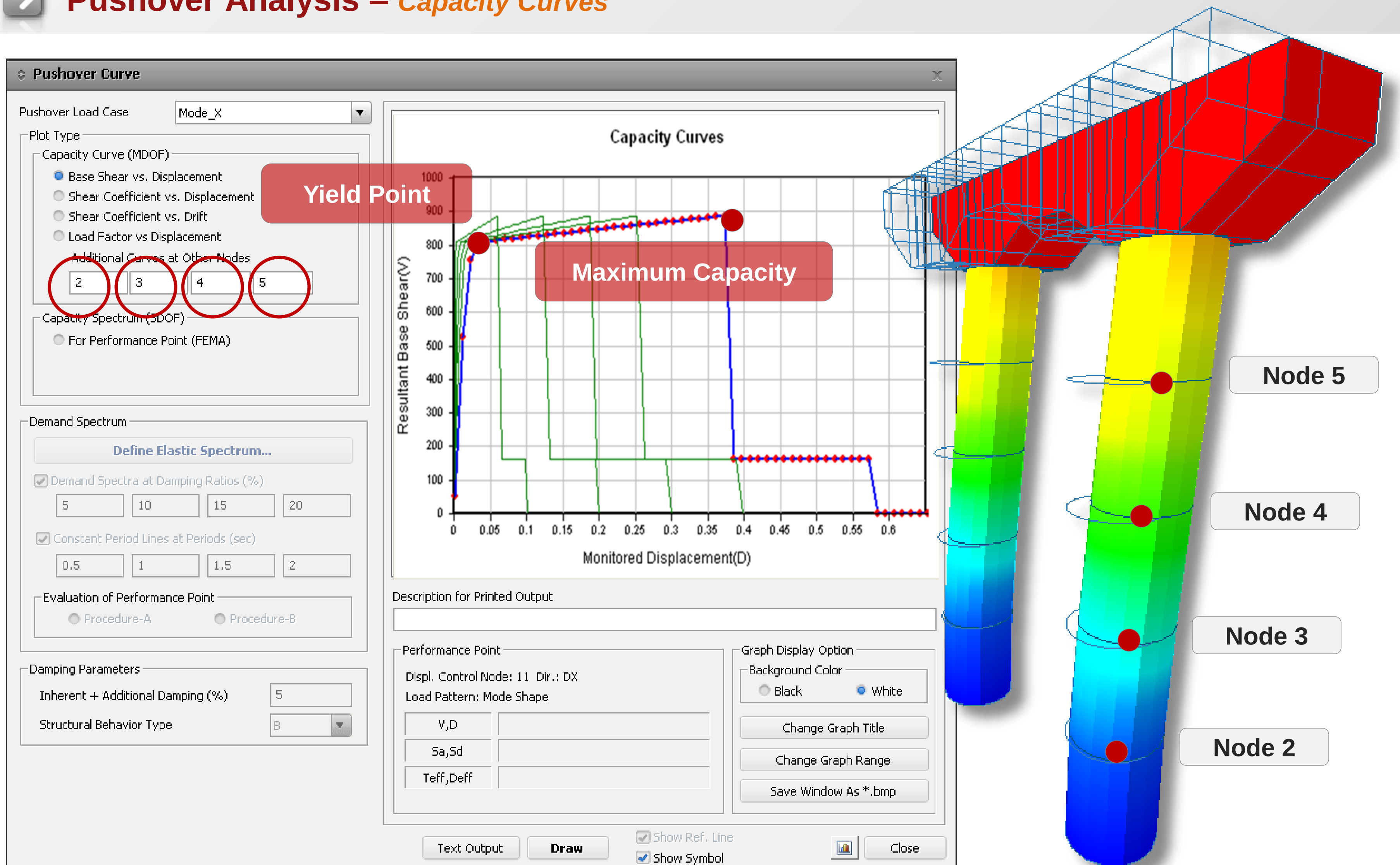
1. Static Analysis and Member Design
2. Select Load or Displacement Control
3. Define Inelastic Hinge Properties
4. Pushover Analysis
5. Review Capacity of Structure
6. Performance Point by CSM
7. Evaluation of Structure to Resist Earthquake



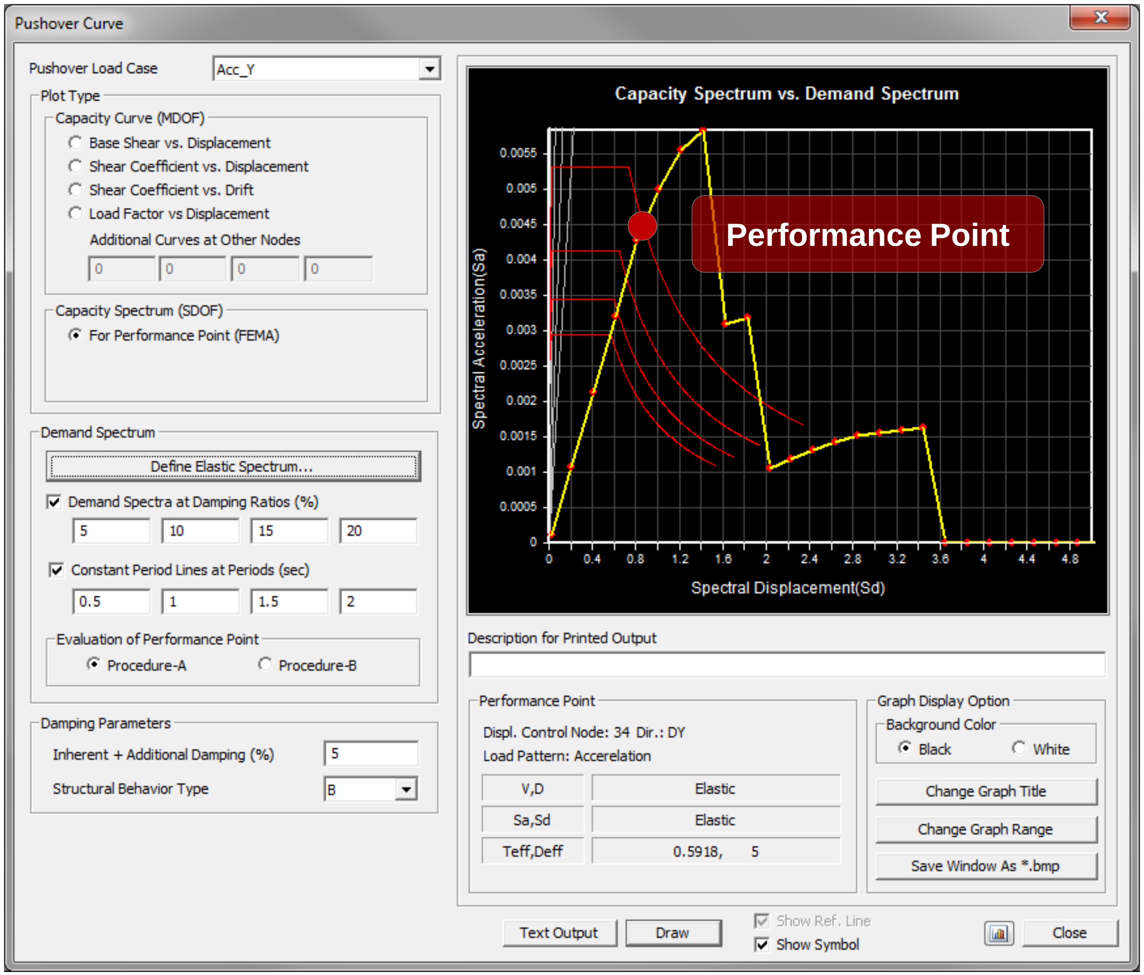
Pushover Analysis – *Export Moment-Curvature Idealized Model from midas GSD to Civil*

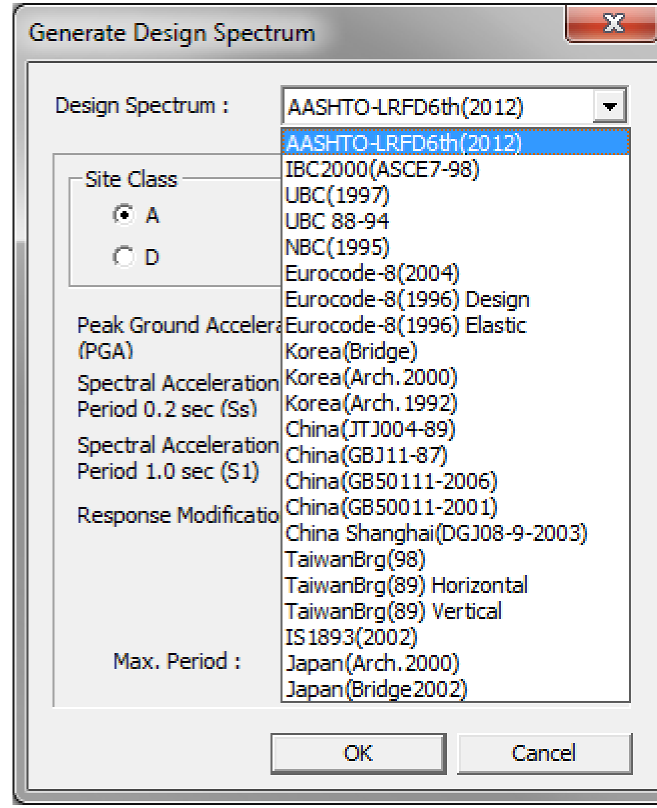


Pushover Analysis – *Capacity Curves*



Pushover Analysis – *Evaluation of Structure by Design Spectrum*





Material Nonlinear Analysis

Element types

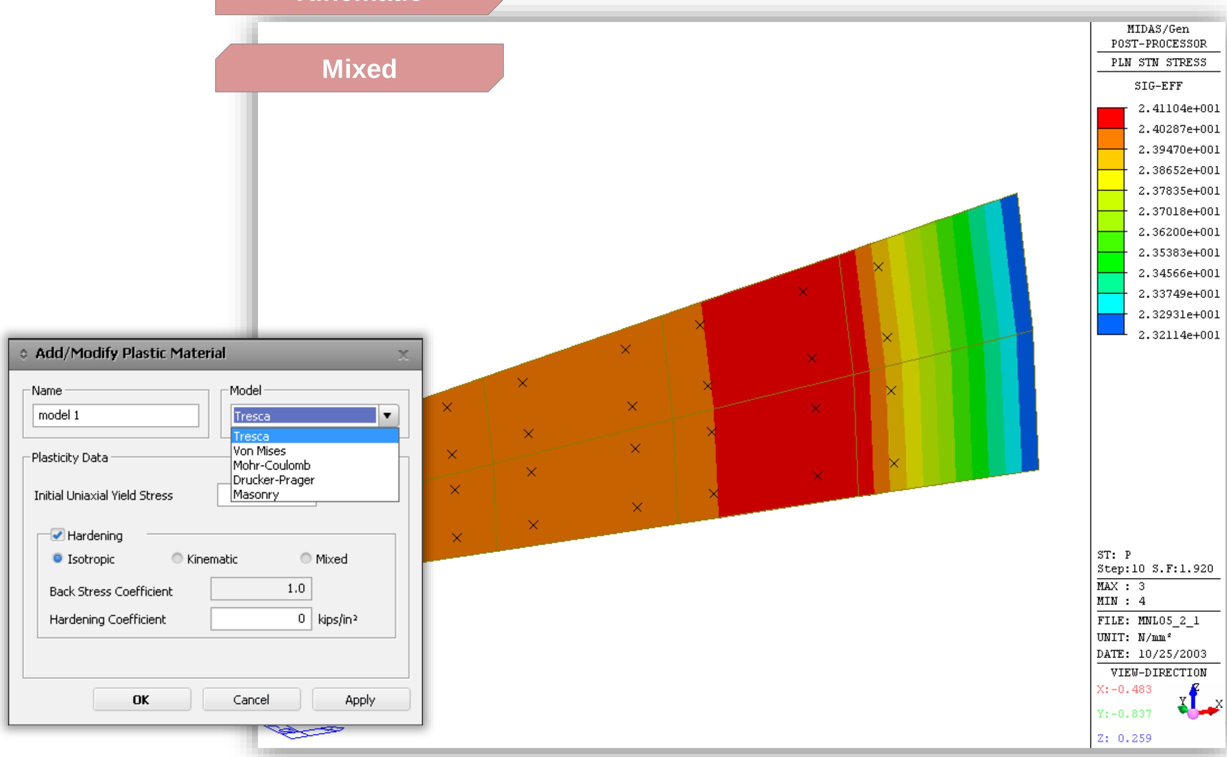
- Truss
- Plane Stress
- Plane Strain
- Axisymmetric
- Solid

Hardening Models

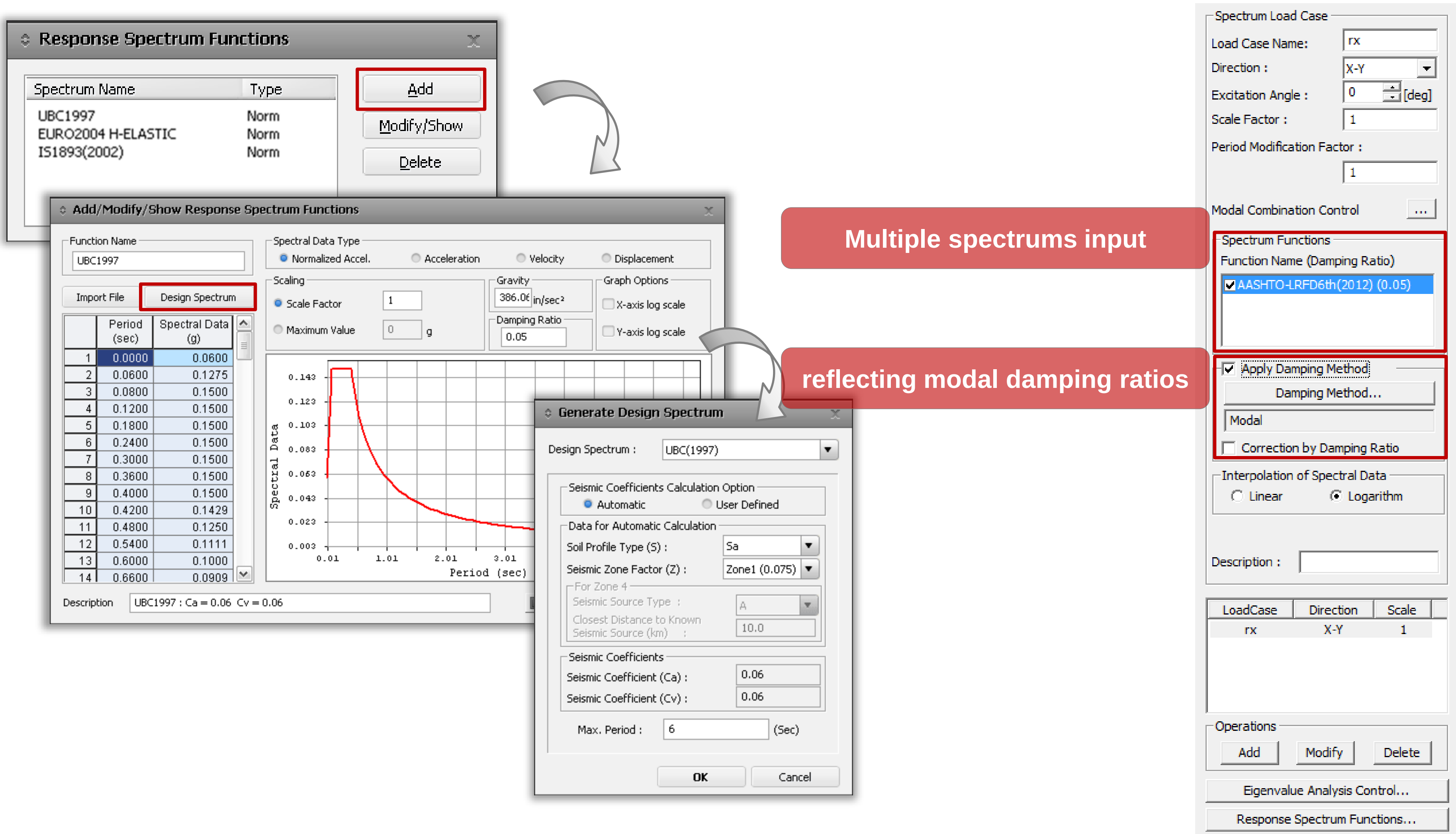
- Isotropic
- Kinematic
- Mixed

Plastic Material Models

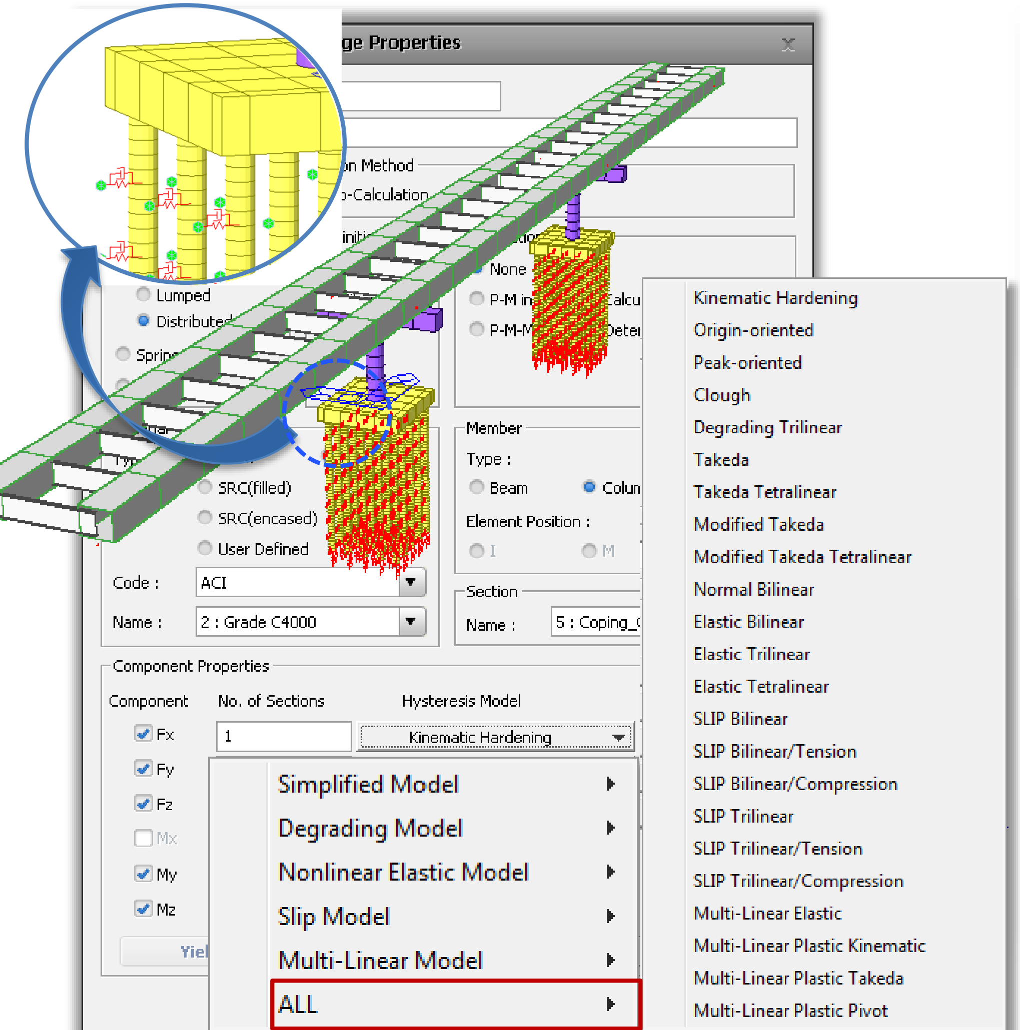
- Tresca
- Von Mises
- Mohr-Coulomb
- Drucker-Prager

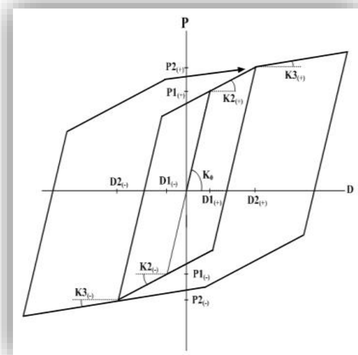


Response Spectrum Analysis

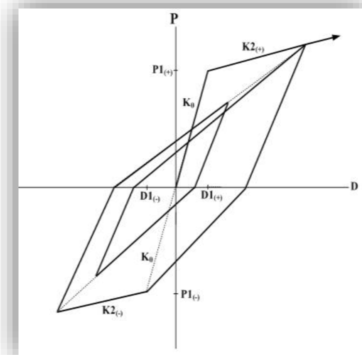


Nonlinear / Inelastic Time History Analysis

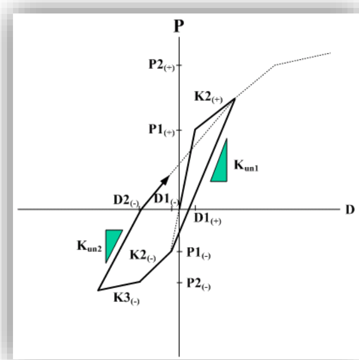




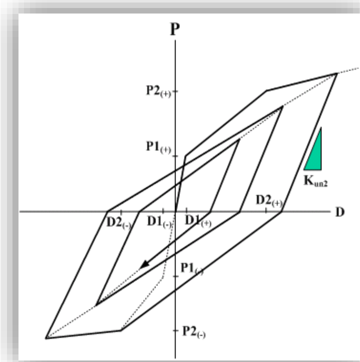
Kinematic Hardening



Clough

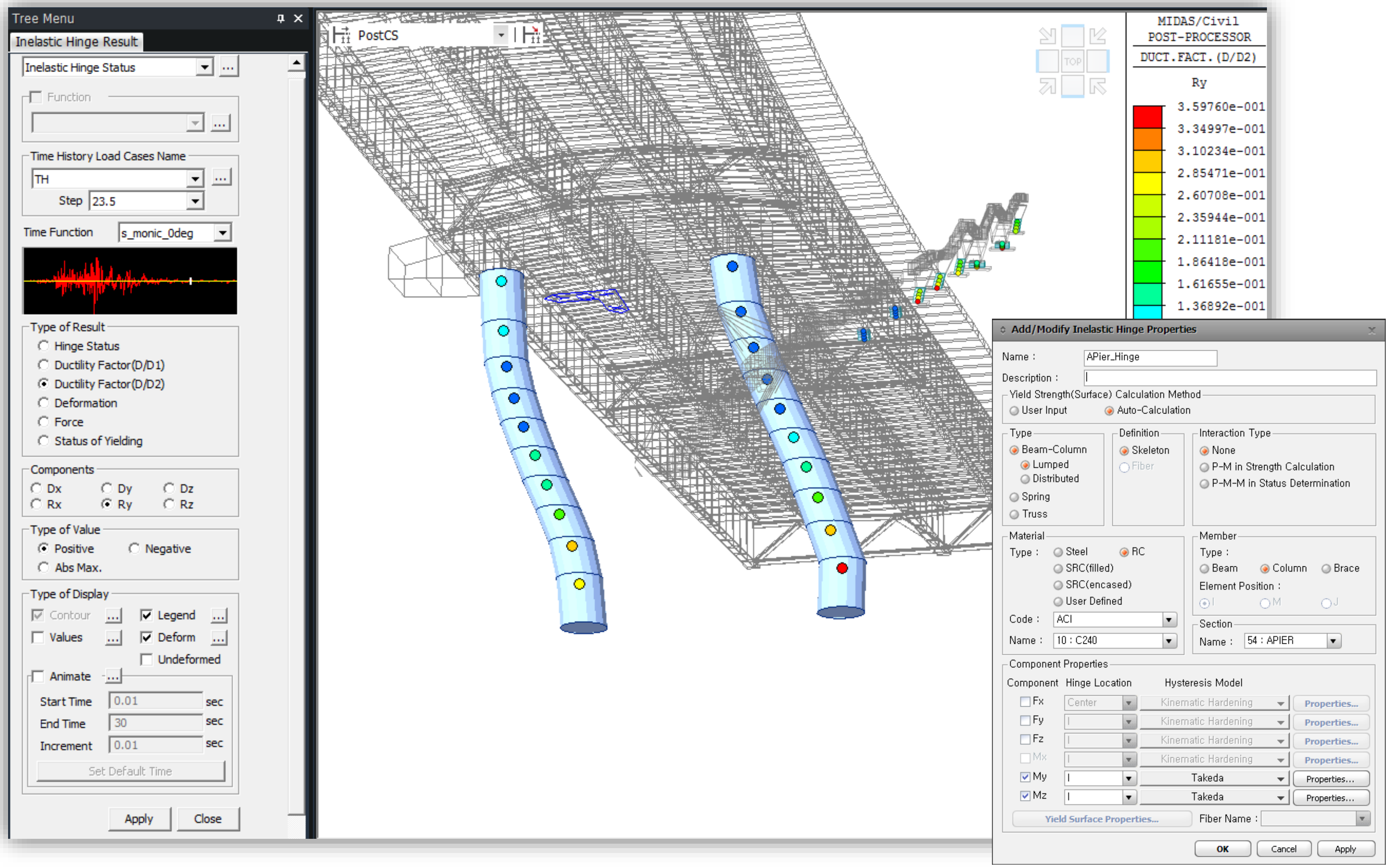


Takeda

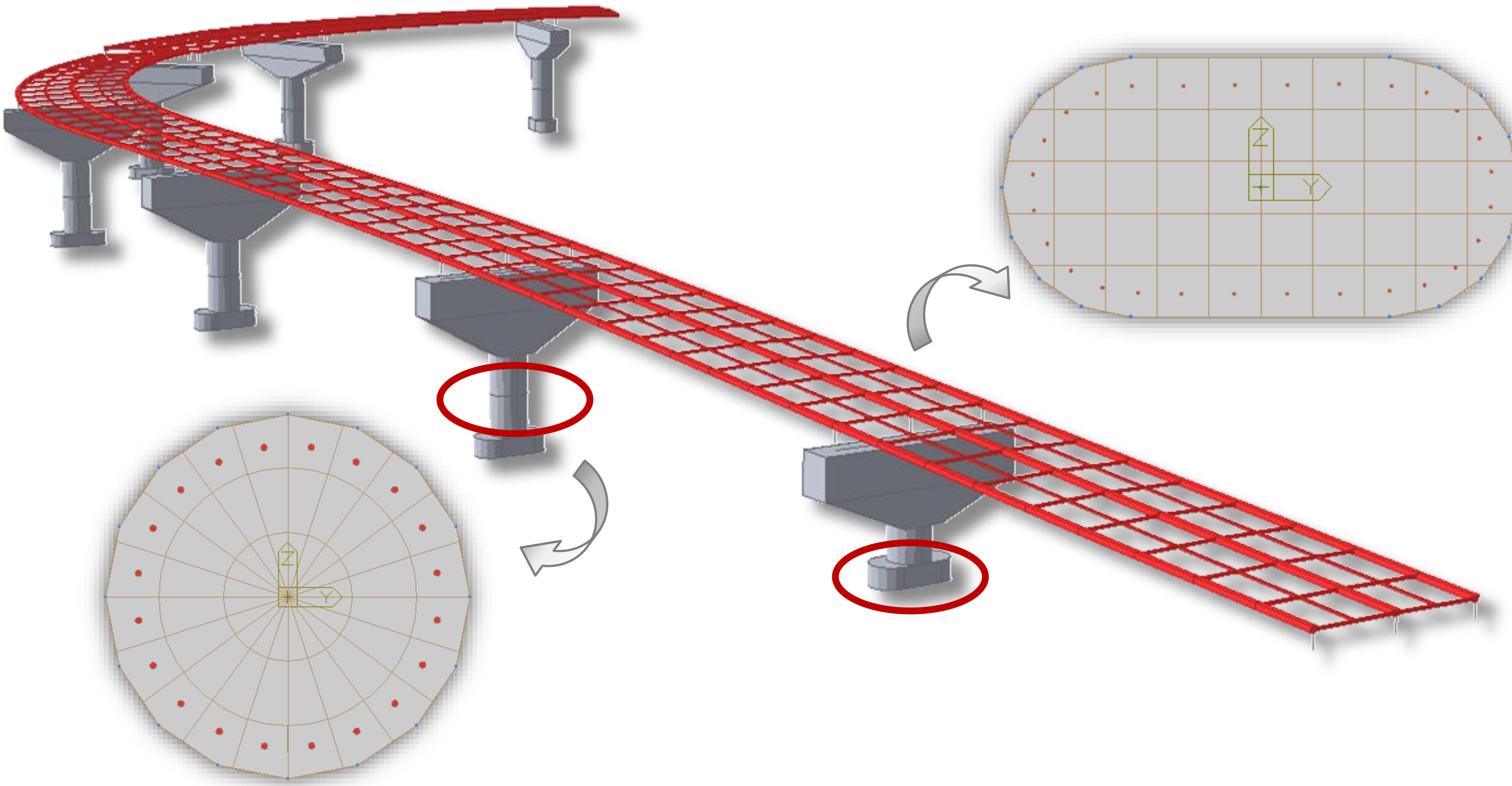


Modified Taketa

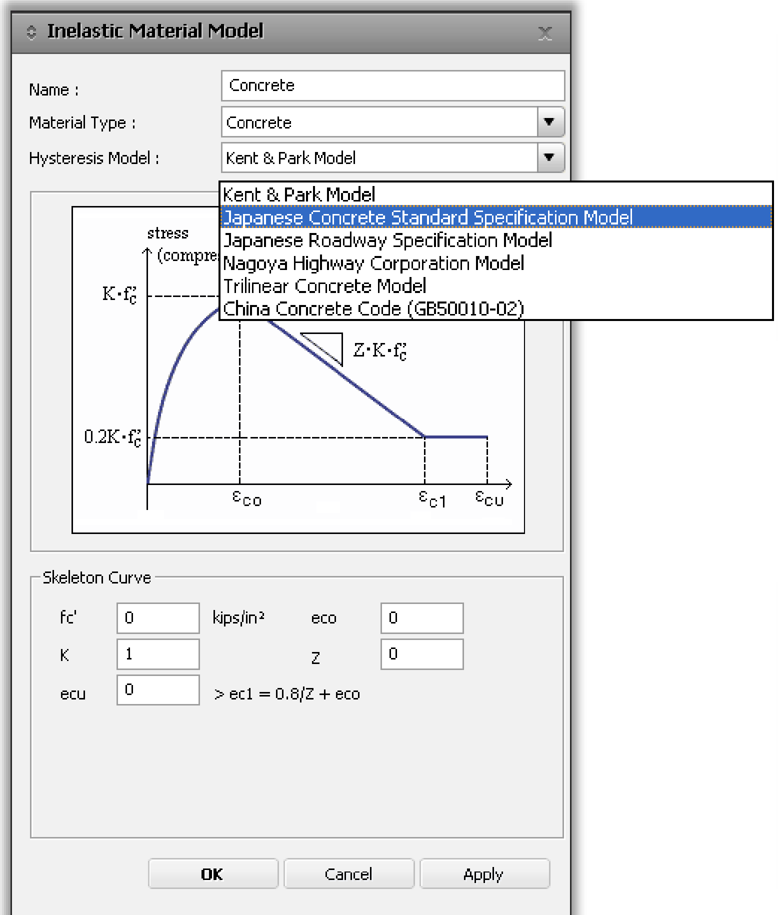
Inelastic Time History Analysis results

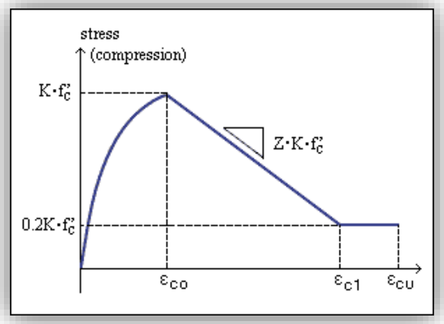


Inelastic dynamic analysis using Fiber Model

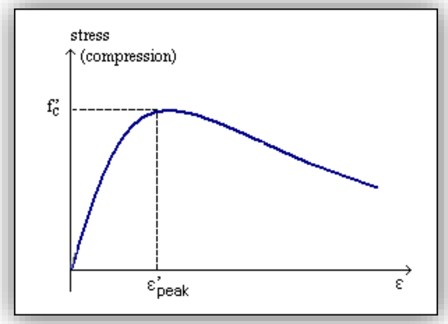


Inelastic dynamic analysis using Fiber Model – *Defining hysteretic model of concrete*

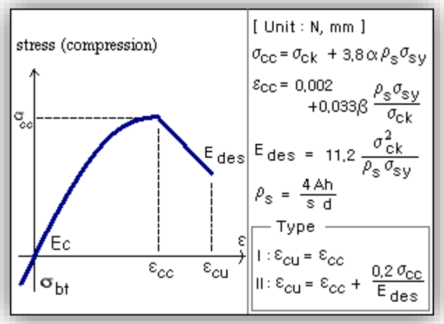




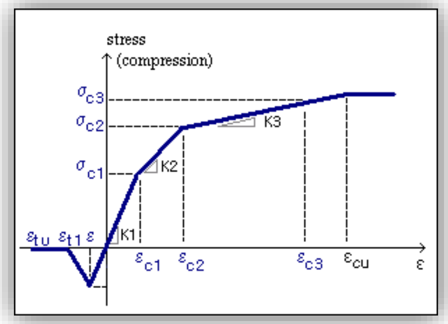
Kent & Park Model



Japan Concrete Standard Specification Model

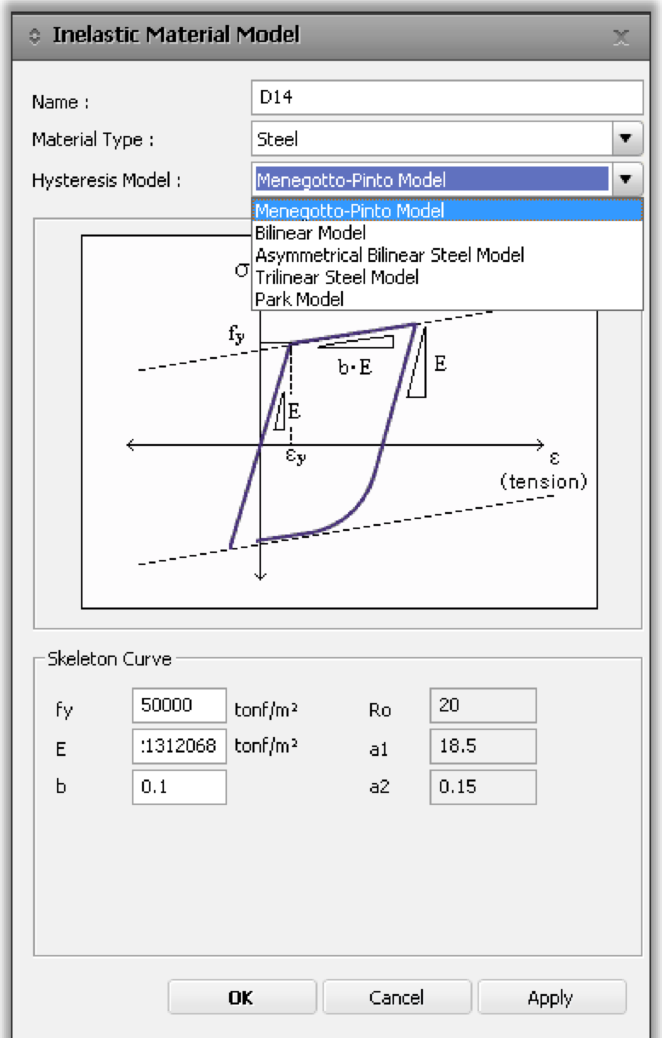


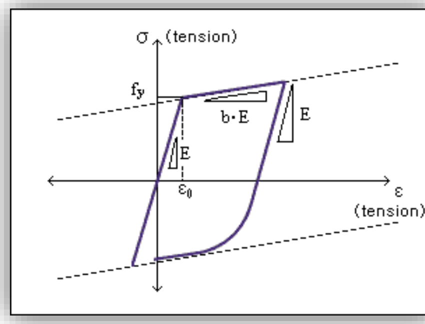
Japanese Roadway Specification Model



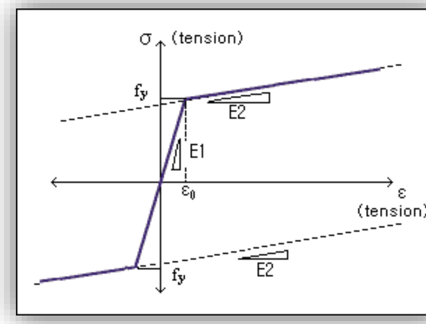
Trilinear Concrete Model

Inelastic dynamic analysis using Fiber Model – *Defining hysteretic model of steel*

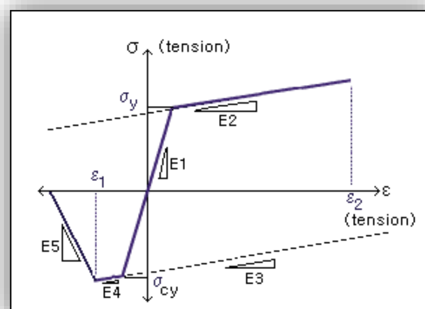




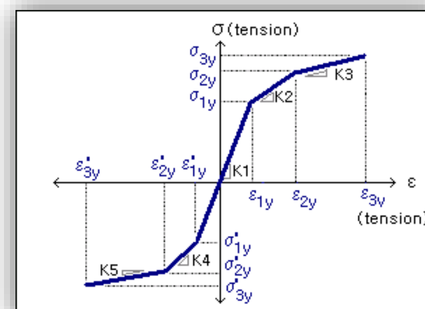
Menegotto-Pinto Model



Bilinear Model

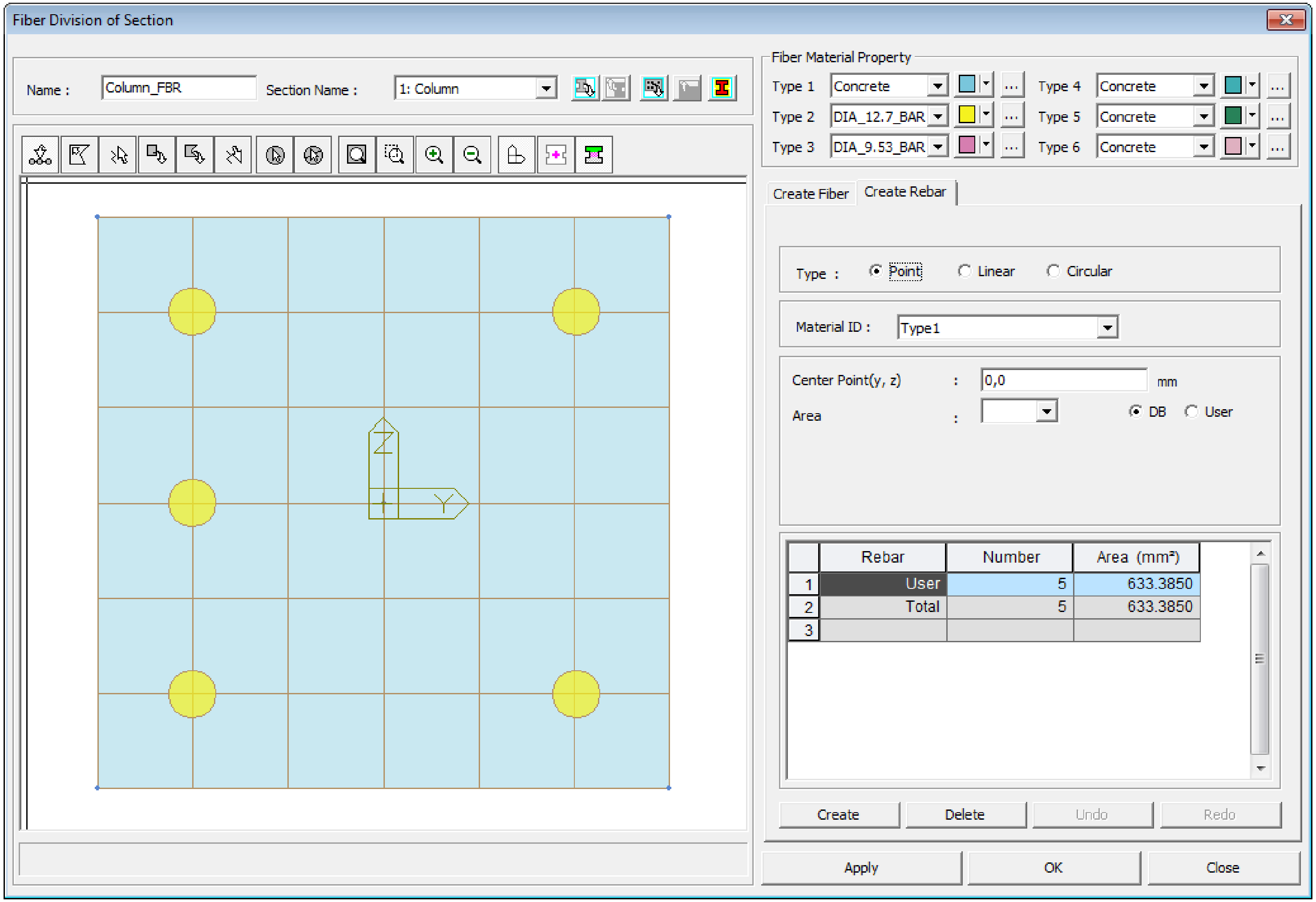


Asymmetric Bilinear Steel Model

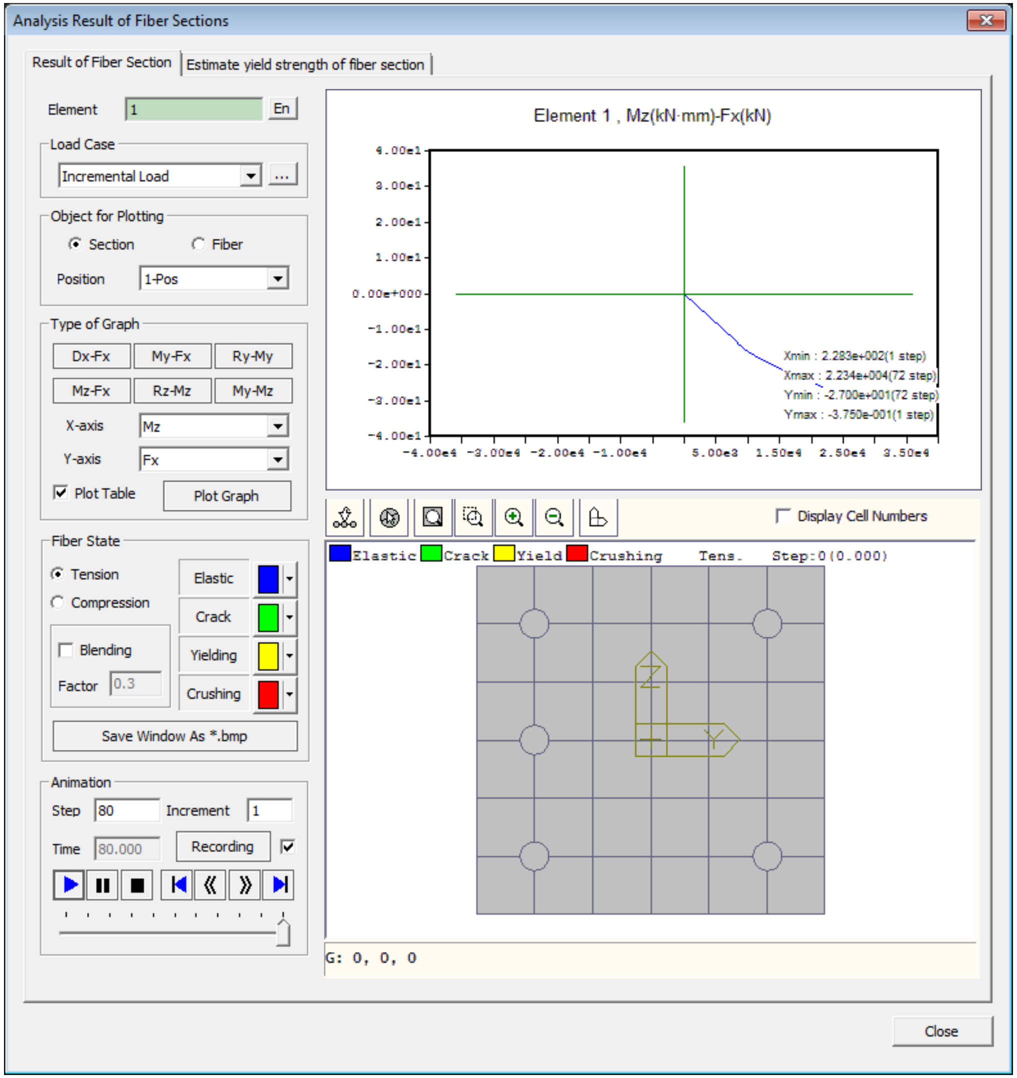


Trilinear Steel Model

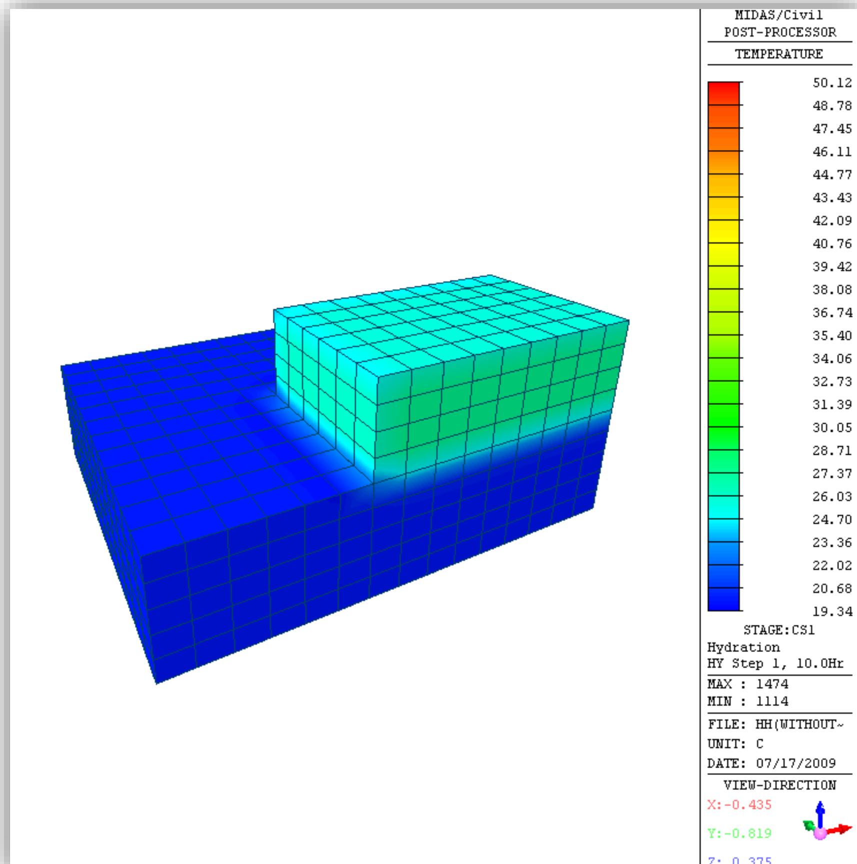
Inelastic dynamic analysis using Fiber Model – *Section division for Fiber Model definition*



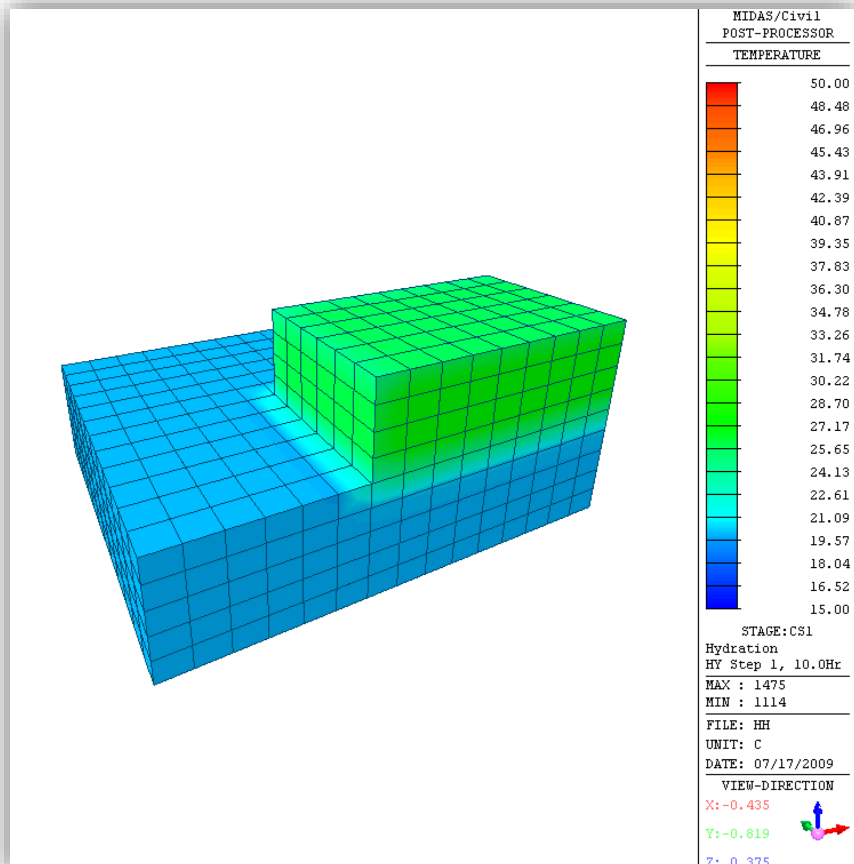
Inelastic dynamic analysis using Fiber Model – *Fiber Cell Result Plotting*



Temperature Contour with / without Cooling Pipes

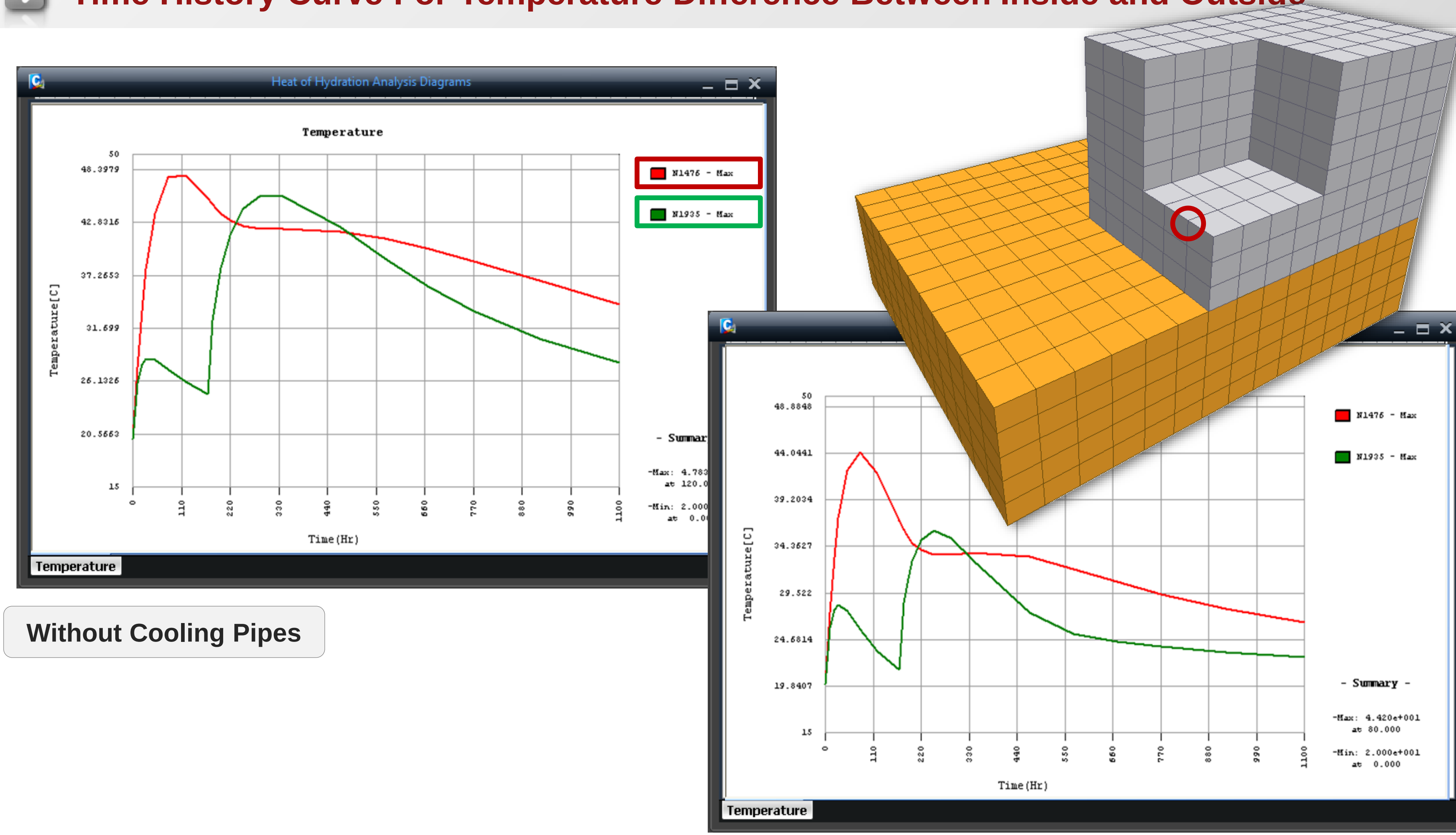


Without Cooling Pipes



With Cooling Pipes

Time History Curve For Temperature Difference Between Inside and Outside



Without Cooling Pipes

With Cooling Pipes

Multi-span integral bridge example – *Elevation & Cross-section at piers*

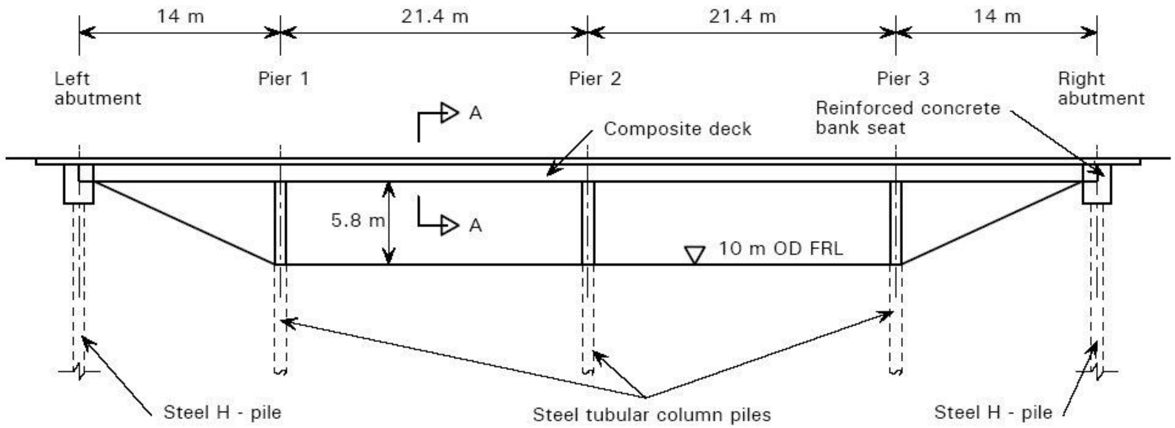


Figure 2.1 *Integral Bridge Elevation*

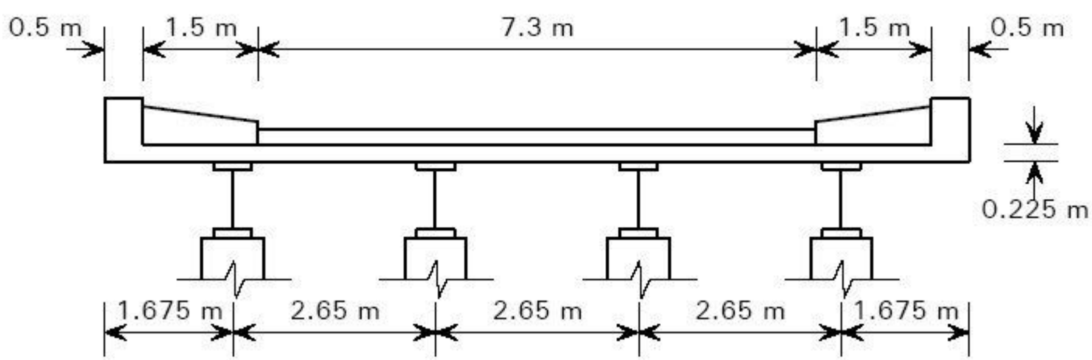


Figure 2.2 *Cross-section at piers*

Multi-span integral bridge example – *Soil profile*

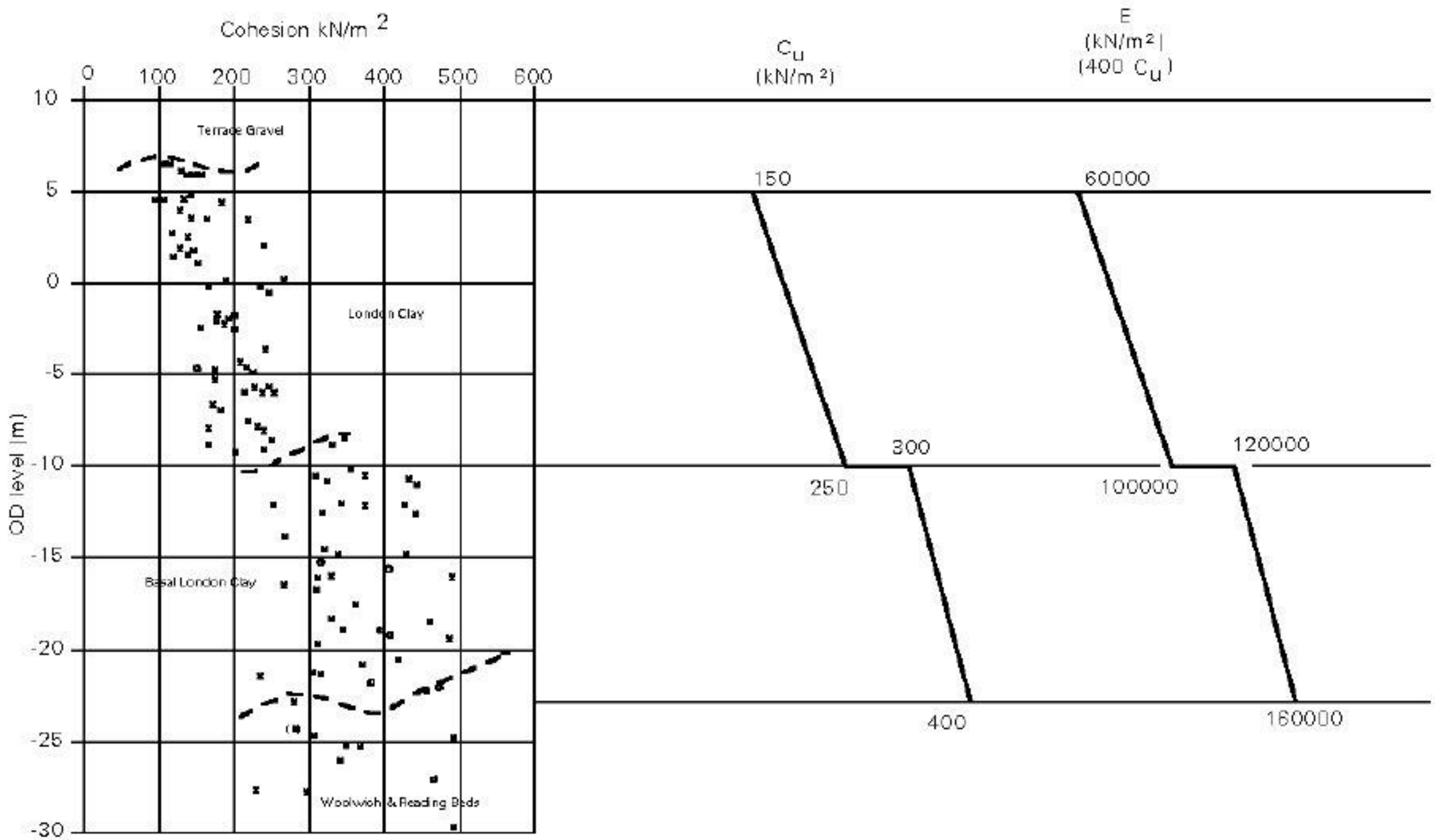
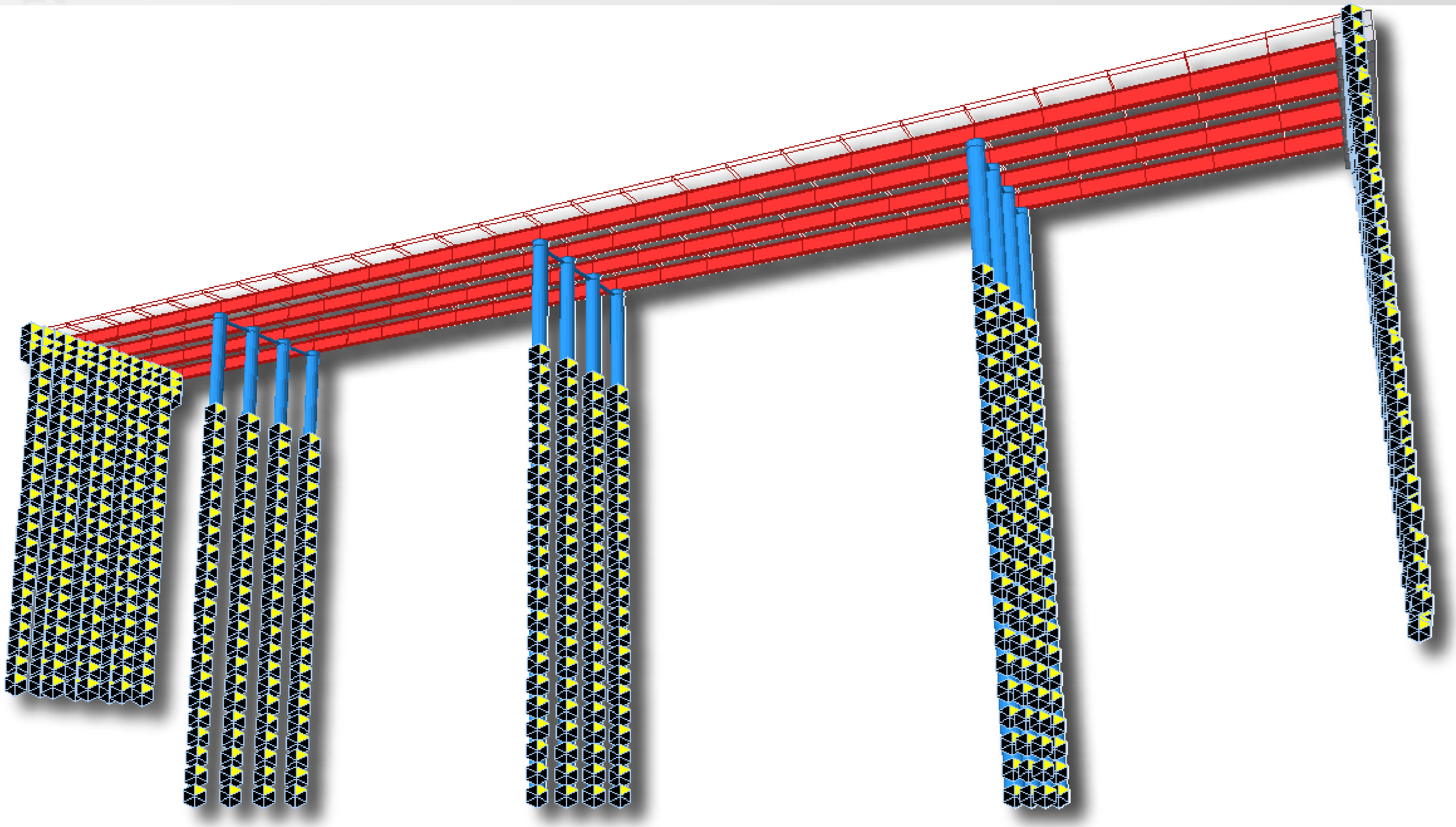
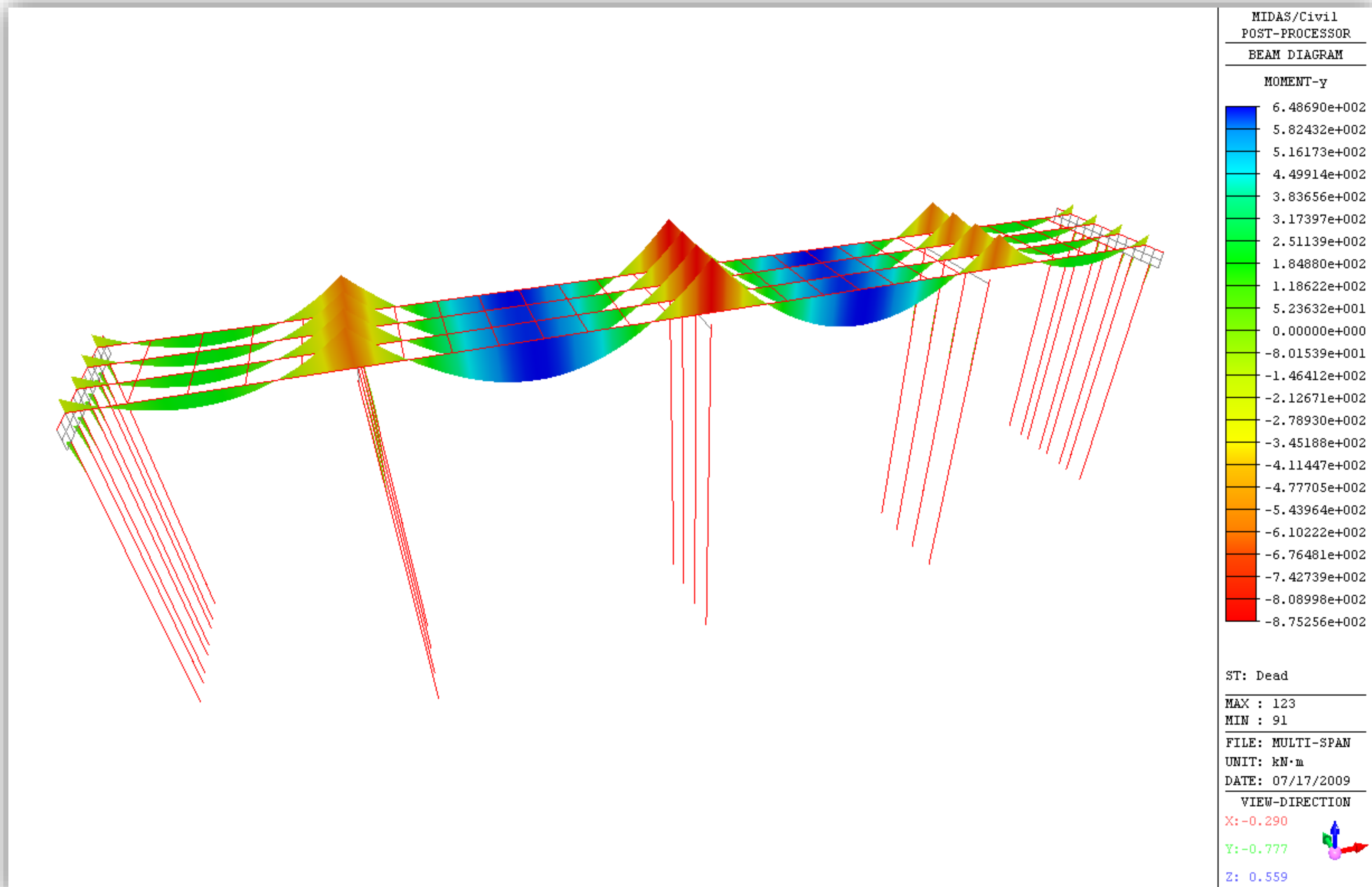


Figure 2.3 *Soil profile: undrained shear strength and elastic modulus*

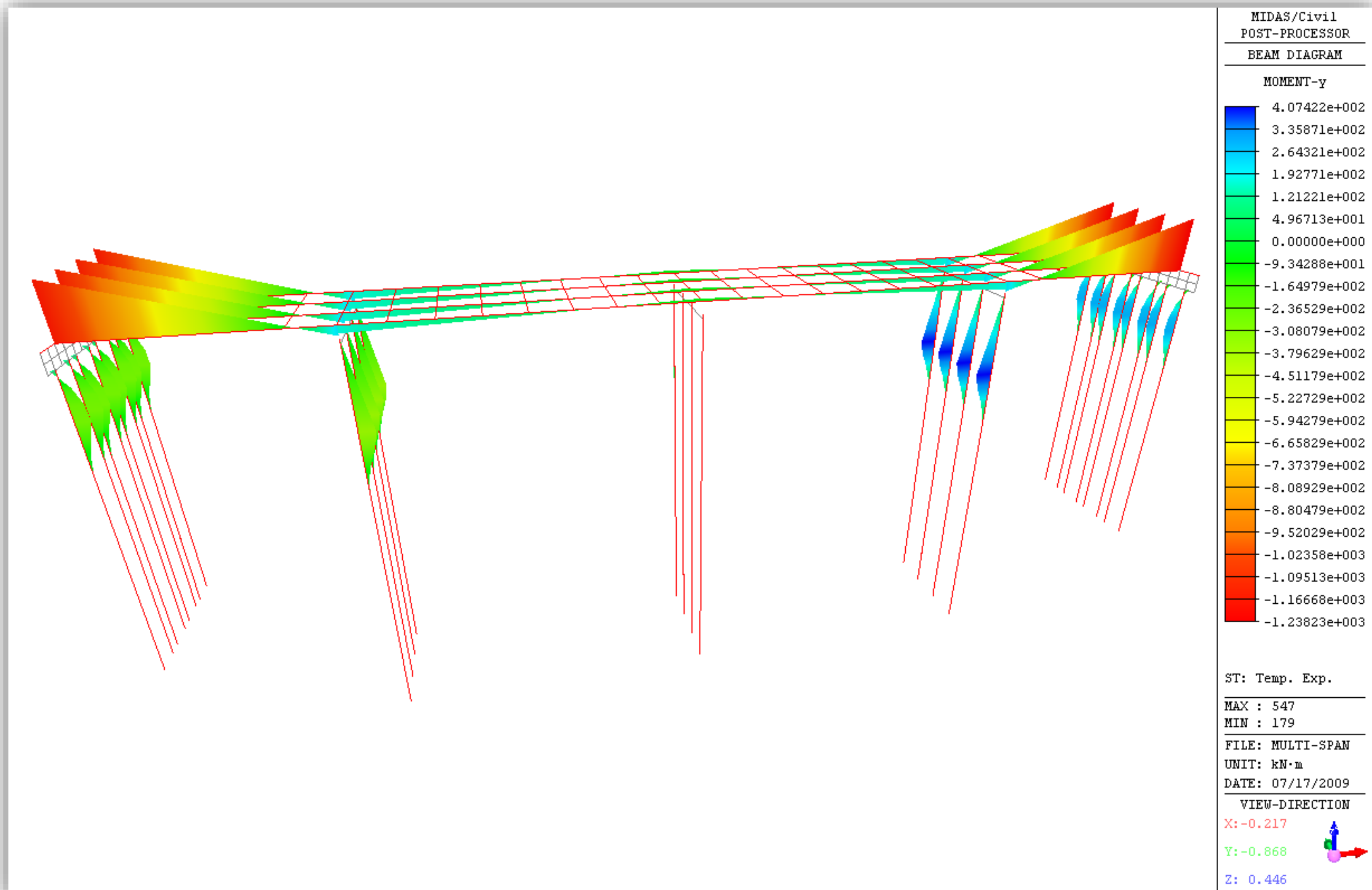
Multi-span integral bridge example – *Auto-generation of abut springs and pile springs*



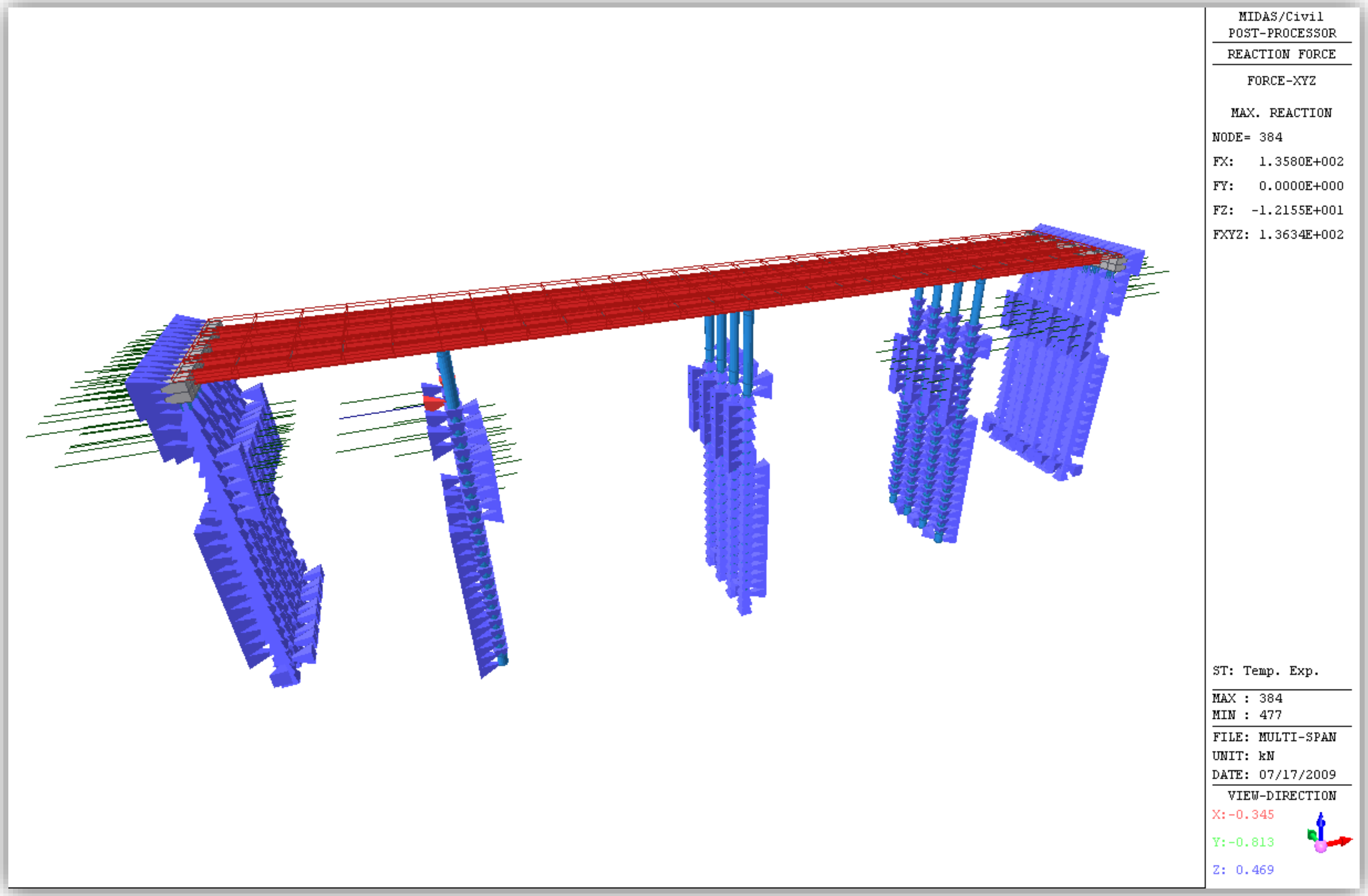
Multi-span integral bridge example – *Moment Diagram (Dead Load)*



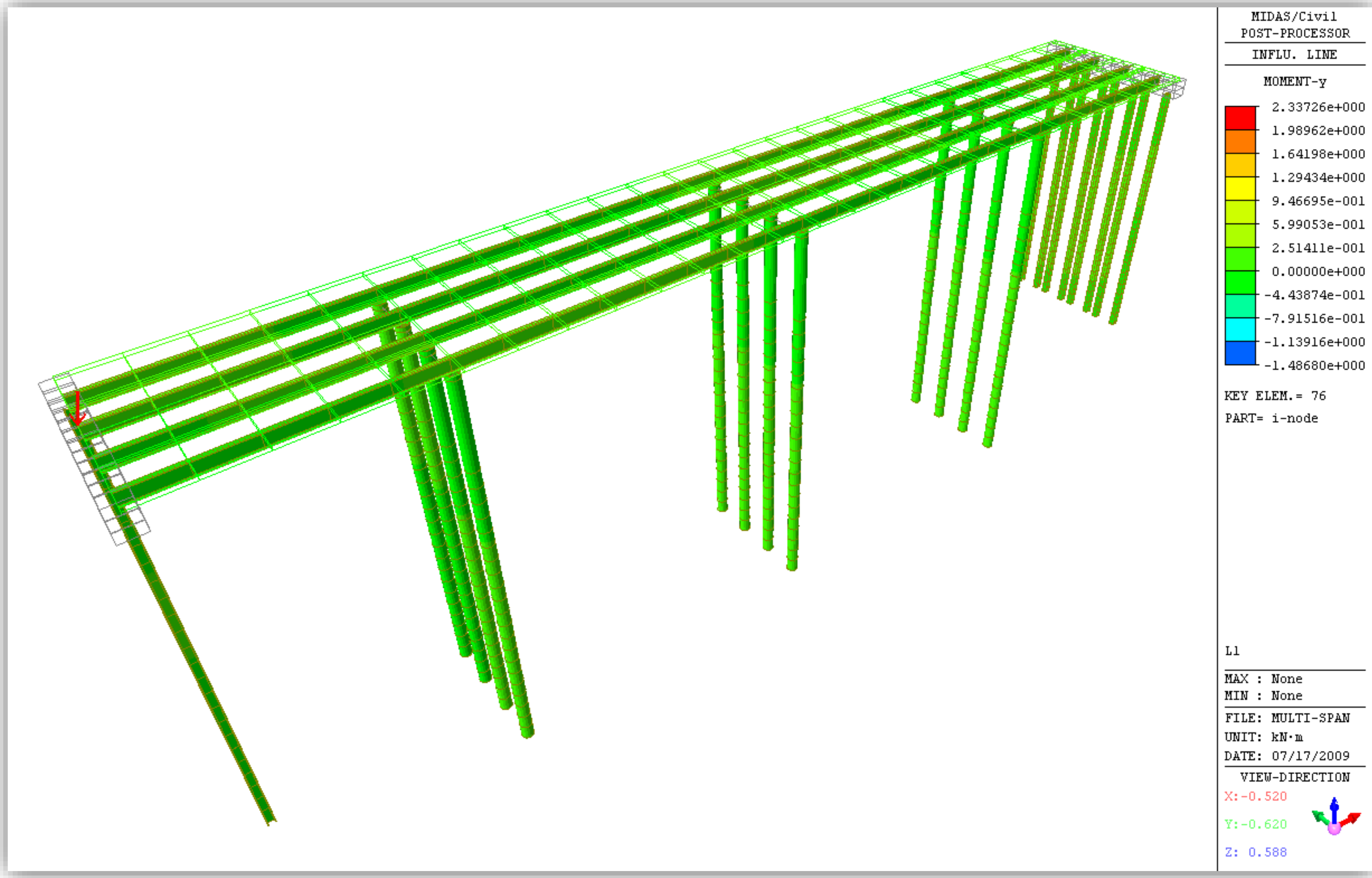
Multi-span integral bridge example – *Moment Diagram (Thermal expansion)*



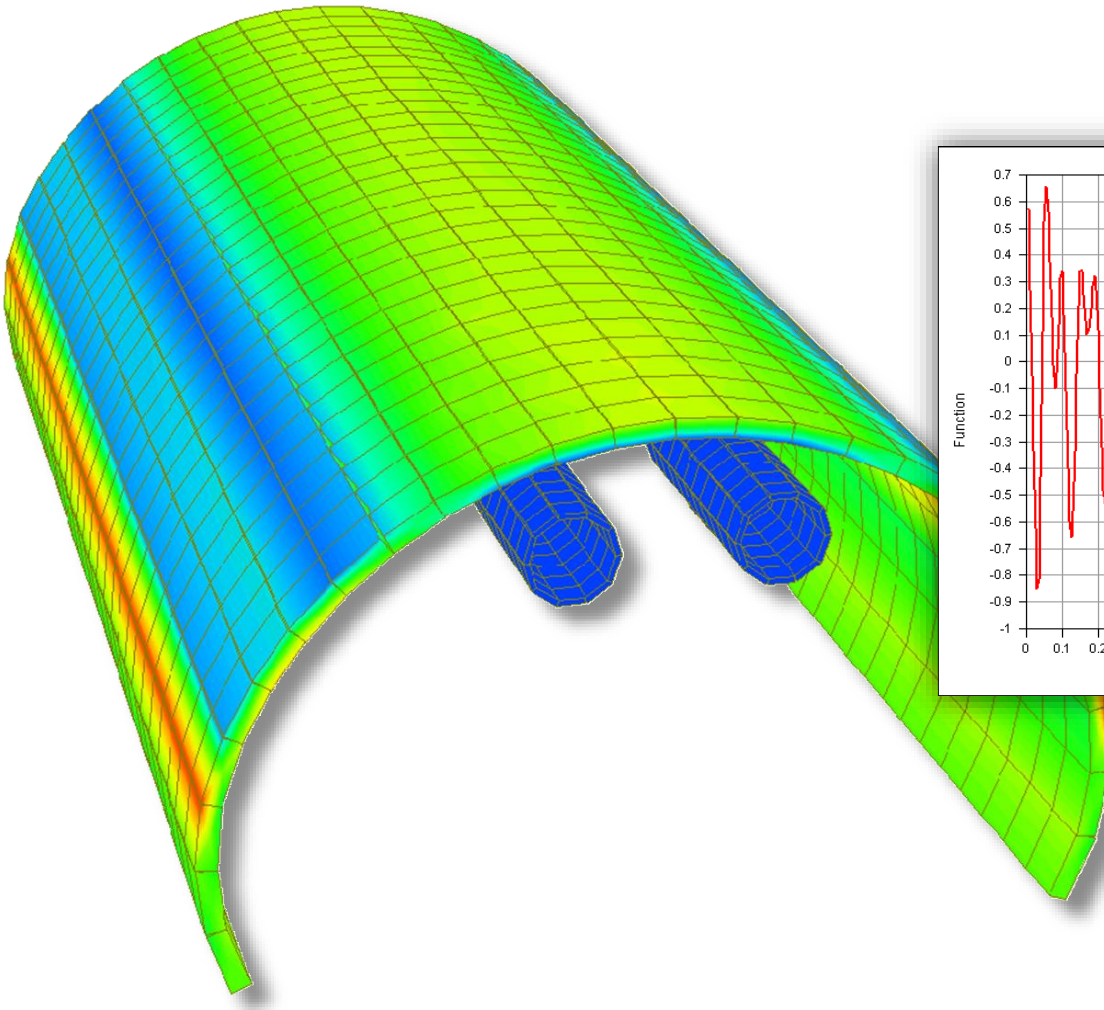
Multi-span integral bridge example – *Reactions (Thermal expansion)*

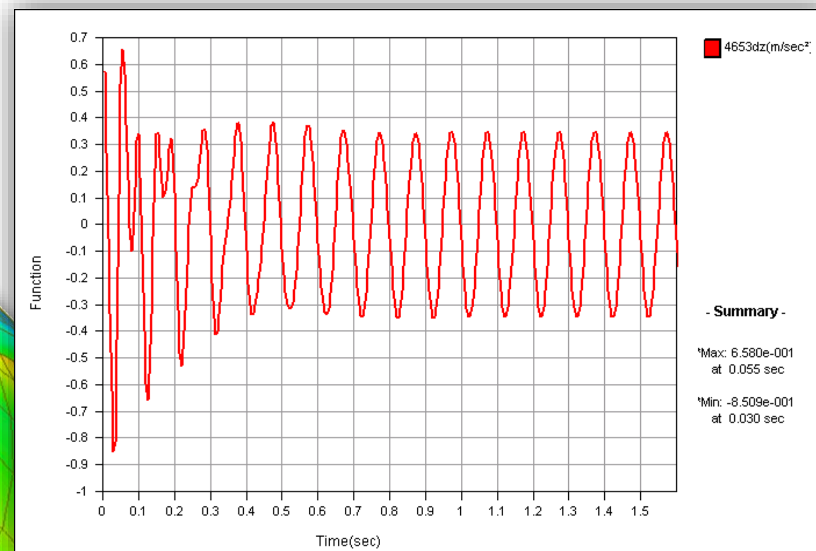


Multi-span integral bridge example – *Influence Line*



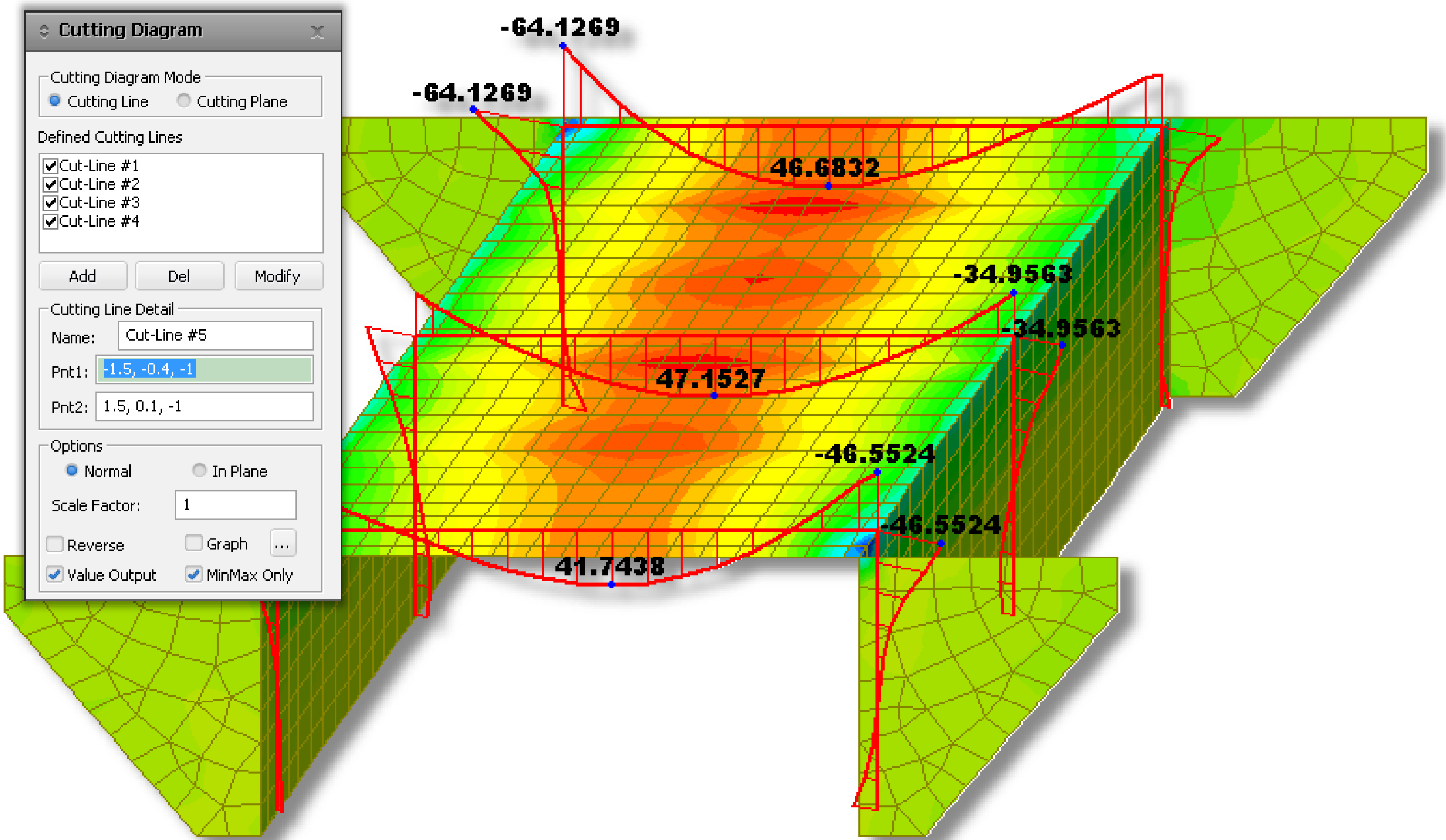
Maximum Principal Stresses



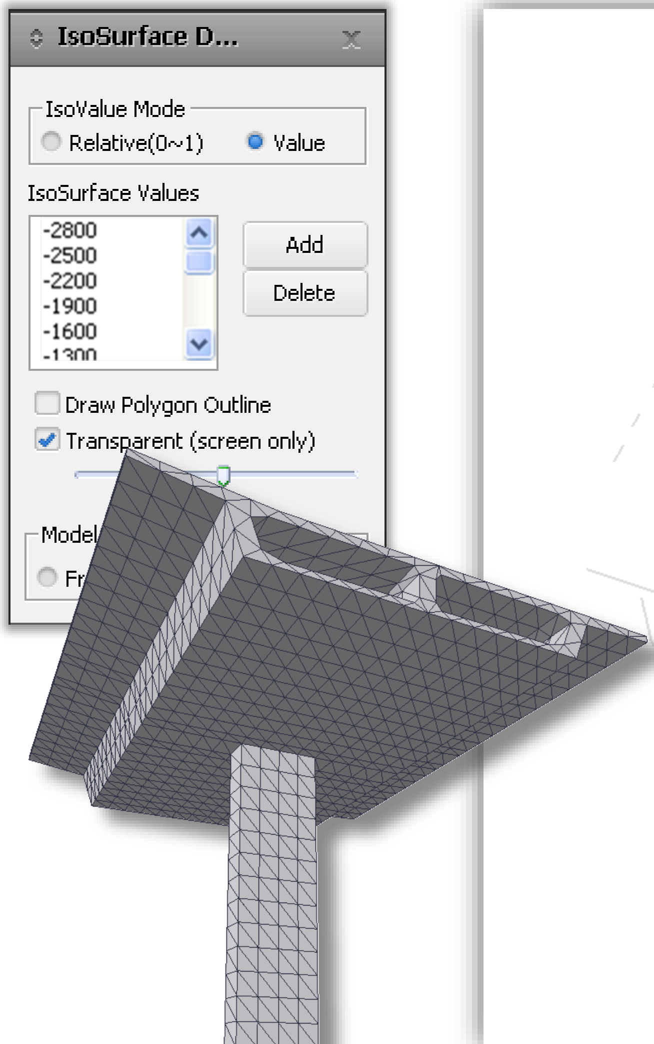


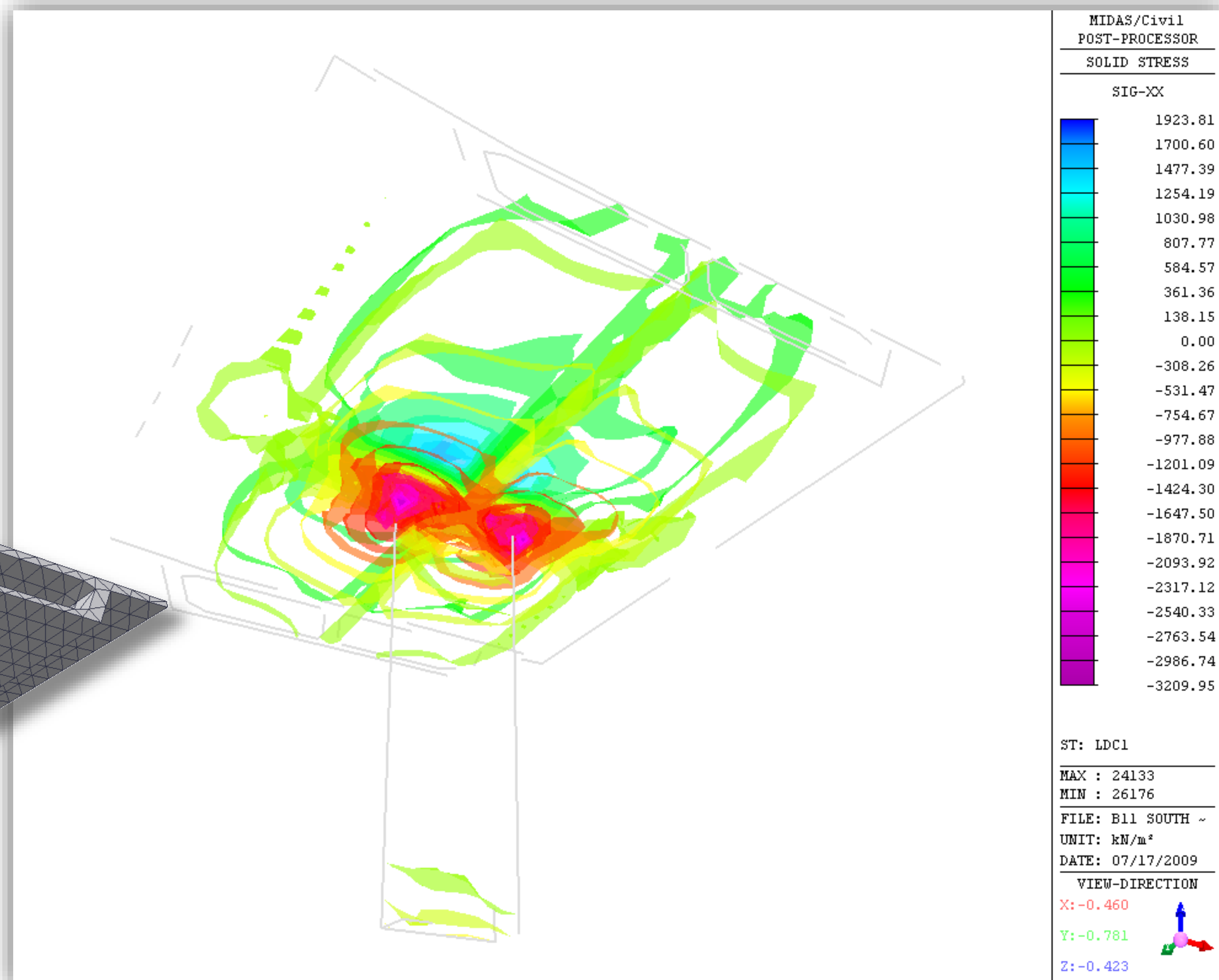
Stress time history due to jet fan vibration

Plate Moment – *Cutting Diagrams*

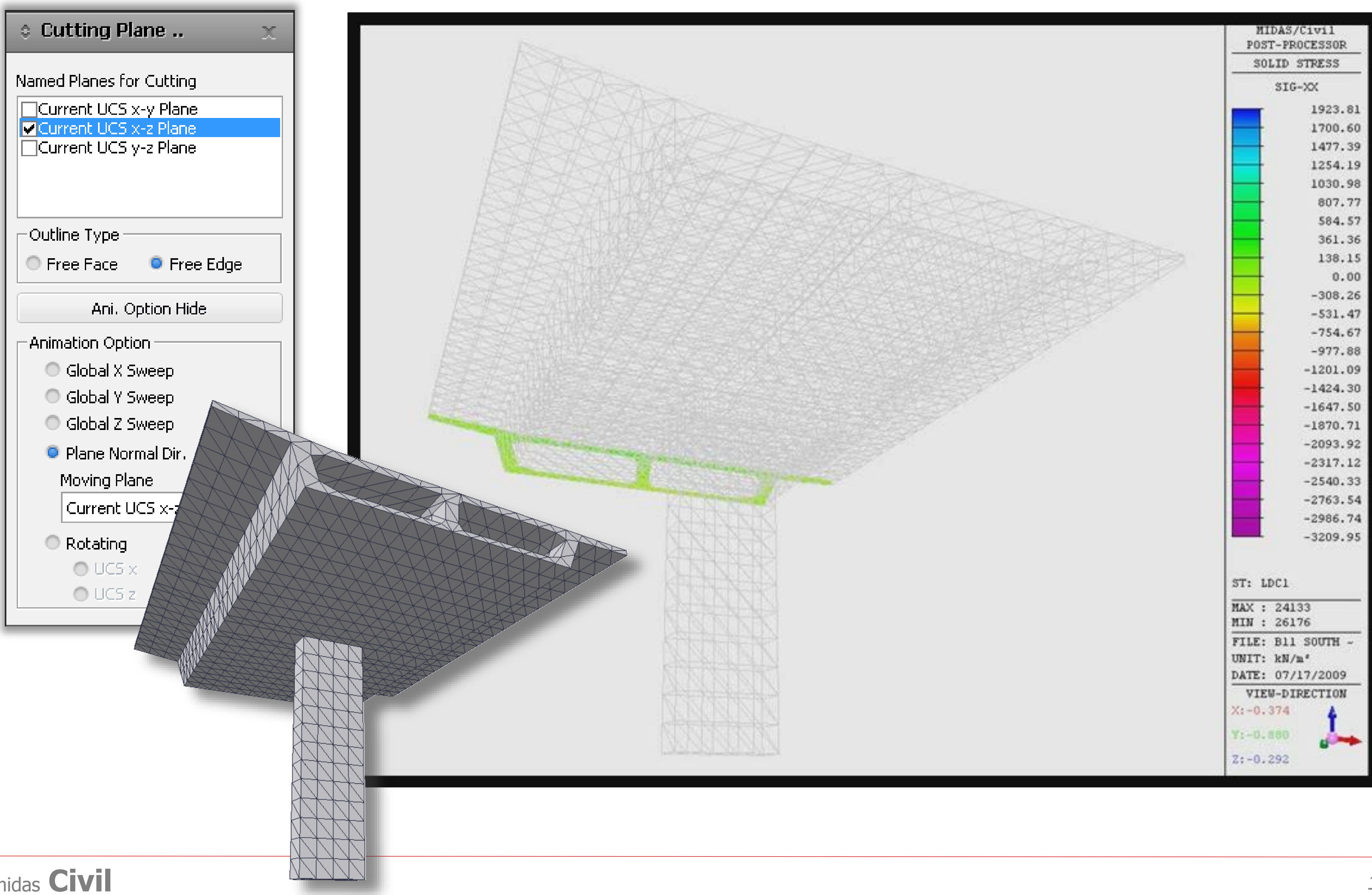


Solid Stresses – *Iso Surface*

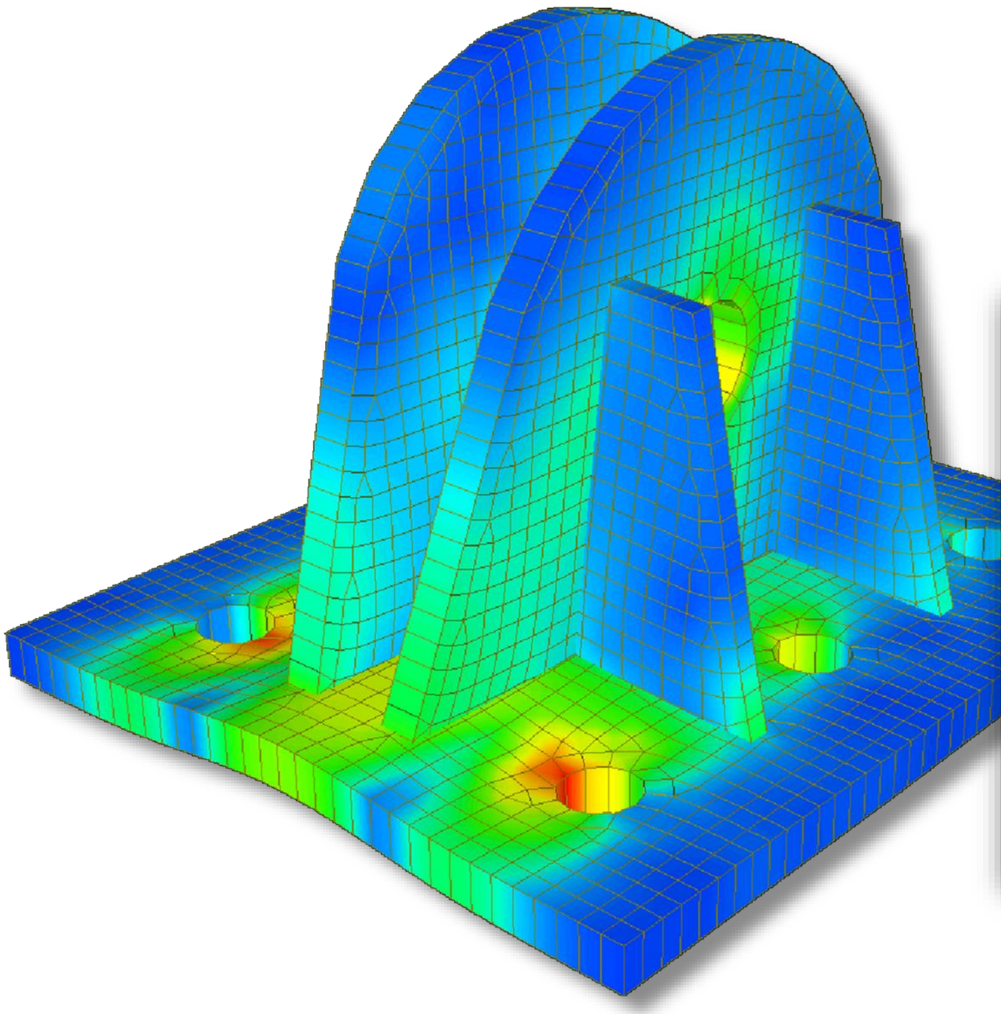


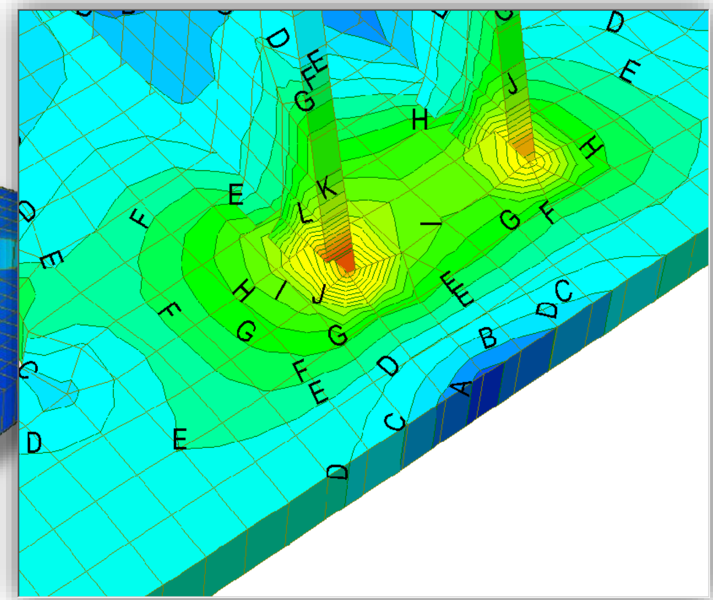


Solid Stress – *Cutting plane*



Von Mises Stresses + Deformed Shape + Contour Annotation





Design Features and Standards

PSC Composite General Design

- Eurocode2-2:05

PSC Design

- AASHTO-LRFD12
- CSA-S6S1-10
- Eurocode2-2:05
- KSCE-USD05
- JTG D62-04

Bridge Load Rating Design (PSC & Steel Composite Bridges)

- AASHTO-LRFR05
- AASHTO-LRFR12

Steel Composite Girder Design

- AASHTO-LRFD12
- EN 1994-2

SRC Design

- SSRC79
- AIJ-SRC01
- JGJ138-01
- AIK-SRC2K
- TWN-SRC92

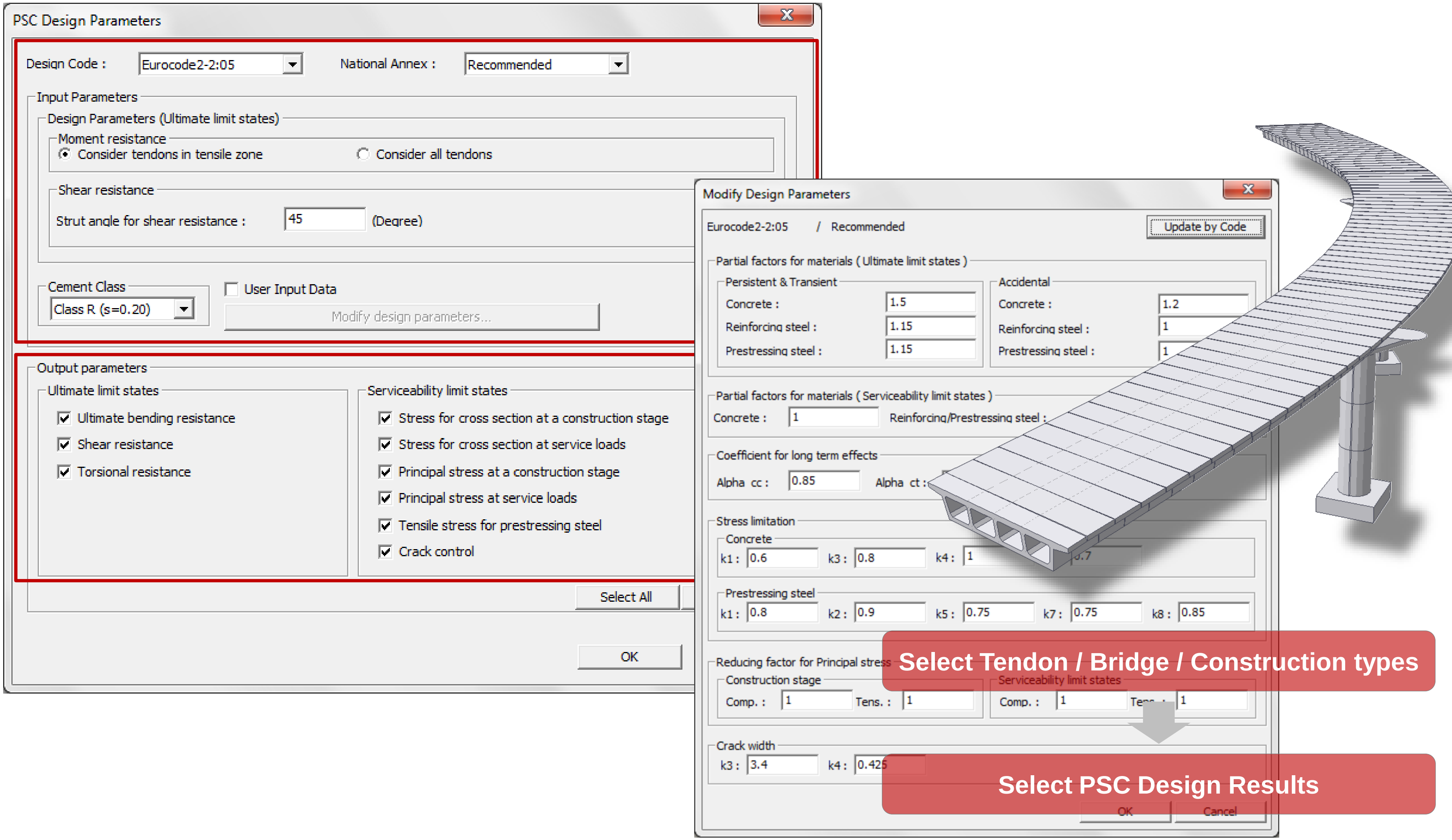
Reinforced Concrete Design

- AASHTO-LRFD12
- AASHTO-LFD96
- Eurocode2-2
- CSA-S6-00
- JTJ023-85
- IRC:21-2000
- KCI-USD99
- KSCE-USD96
- TWN-BRG-LSD90

Structural Steel Design

- AASHTO-LRFD12
- AASHTO-LFD96
- AASHTO-ASD96
- AISC-LRFD2K
- AISC-LRFD93
- AISC-ADS89
- BS5950-90
- JTJ025-86
- IS:800-2007
- Eurocode3-2
- TWN-BRG-LSD90
- TWN-BRG-LSD90

PSC Design as per Eurocode2-2:05



PSC Design as per Eurocode2-2:05 – *Cross section stress design results table*

- Check Flexure Strength...
- Check Shear Strength...
- Check Combined Shear and Torsion Strength...
- Check stress for cross section at a construction stage...
- Check tensile stress for Prestressing tendons...
- Check stress for cross sect
- Principal stress at a constr
- Principal stress at service l
- Check crack width at servi

Elem	Part	Positive/ Negative	LCom Name	Design Situations	Type	CHK	M_Ed (in·kips)	M_Rd (in·kips)	M_Ed/M_Rd	Aps (in²)
35	J[36]	Negative	cLCB10	Persistent &	FX-MAX	NG	-727548.8406	617303.8212	-1.1786	32.6778
35	J[36]	Positive	cLCB9	Persistent &	FX-MIN	NG	448736.2408	153988.0178	2.9141	32.6778
36	I[36]	Negative	cLCB10	Persistent &	FX-MAX	NG	-727531.6994	617303.8212	-1.1786	32.6778
36	I[36]	Positive	cLCB9	Persistent &	FX-MIN	NG	448753.3821	153987.8989	2.9142	32.6778
36	J[37]	Negative	cLCB10	Persistent &	FX-MAX	OK	-564857.8570	596845.4910	-0.9464	32.6778
36	J[37]	Positive	cLCB9	Persistent &	FX-MIN	NG	552612.9710	174810.4167	3.1612	32.6778
44	I[44]	Negative	cLCB10	Persistent &	FX-MAX	OK	-82015.9135	121863.0029	-0.6730	32.6778
44	I[44]	Positive	cLCB9	Persistent &	FX-MIN	OK	579644.4440	662370.1349	0.8751	32.6778
44	J[45]	Negative	cLCB10	Persistent &	FX-MAX	OK	-18289.4529	121793.2747	-0.1502	32.6778
44	J[45]	Positive	cLCB9	Persistent &	FX-MIN	OK	569853.0878	662392.4015	0.8603	32.6778
45	I[45]	Negative	cLCB10	Persistent &	FX-MIN	OK	-18285.0452	121793.2580	-0.1501	32.6778
45	I[45]	Positive	cLCB9	Persistent &	FX-MAX	OK	569857.4956	662392.4015	0.8603	32.6778
45	J[46]	Negative	cLCB10	Persistent &	FX-MIN	OK	0.0000	121735.8175	0.0000	32.6778
45	J[46]	Positive	cLCB9	Persistent &	FX-MAX	OK	539835.7499	662375.4224	0.8150	32.6778
46	I[46]	Negative	cLCB10	Persistent &	FX-MAX	OK	0.0000	121735.7927	0.0000	32.6778
46	I[46]	Positive	cLCB9	Persistent &	FX-MIN	OK	539842.1750	662375.4224	0.8150	32.6778
46	J[47]	Negative	cLCB10	Persistent &	FX-MAX	OK	0.0000	121641.3761	0.0000	32.6778
46	J[47]	Positive	cLCB9	Persistent &	FX-MIN	OK	489719.0262	662392.6544	0.7393	32.6778
47	I[47]	Negative	cLCB10	Persistent &	FX-MIN	OK	0.0000	121641.3401	0.0000	32.6778
47	I[47]	Positive	cLCB9	Persistent &	FX-MAX	OK	489726.9210	662392.6544	0.7393	32.6778
47	J[48]	Negative	cLCB10	Persistent &	FX-MIN	OK	0.0000	126959.9135	0.0000	32.6778
47	J[48]	Positive	cLCB9	Persistent &	FX-MAX	OK	425374.7217	656211.5547	0.6482	32.6778

Check Flexure Strength

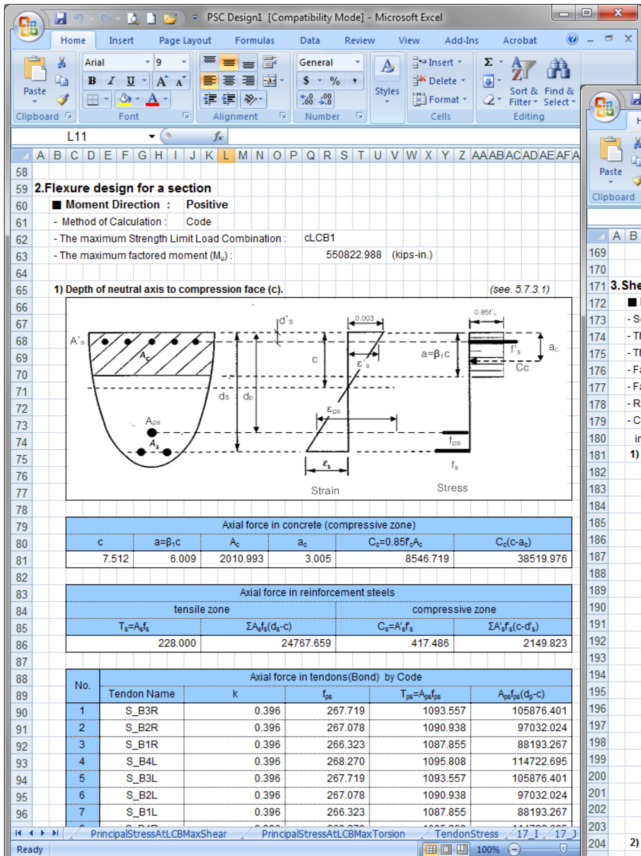
PSC Design as per Eurocode2-2:05 – *Shear strength design results table*

- Check Flexure Strength...
- Check Shear Strength...
- Check Combined Shear and Torsion Strength...
- Check stress for cross section at a construction stage...
- Check tensile stress for Prestressing tendons...
- Check stress for cross
- Principal stress at a co
- Principal stress at serv
- Check crack width at

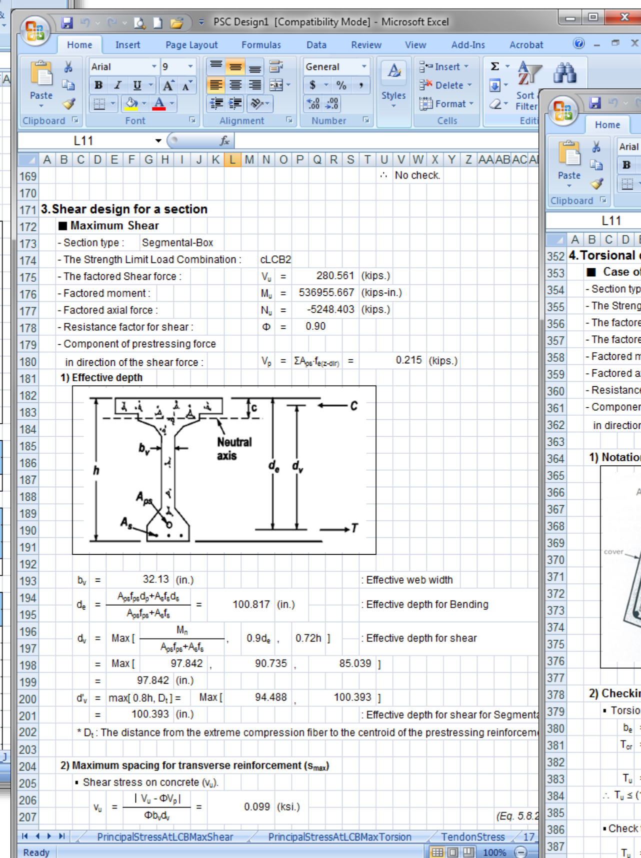
Elem	Part	Comp./Tens.	Stage	CHK	FT (N/mm^2)	FB (N/mm^2)	FTL (N/mm^2)	FBL (N/mm^2)	FTR (N/mm^2)	FBR (N/mm^2)	FMAX (N/mm^2)	ALW (N/mm^2)
7	I[7]	Compression	CS1	OK	2.7301	5.8875	2.7301	5.8875	2.7301	5.8875	5.8875	20.6843
7	J[8]	Compression	CS1	OK	2.8913	5.4731	2.8913	5.4731	2.8913	5.4731	5.4731	20.6843
8	I[8]	Compression	CS1	OK	2.8913	5.4731	2.8913	5.4731	2.8913	5.4731	5.4731	20.6843
8	J[9]	Compression	CS1	OK	2.9134	5.2773	2.9134	5.2773	2.9134	5.2773	5.2773	20.6843
15	I[15]	Compression	CS2	OK	3.9705	1.5415	3.9705	1.5415	3.9705	1.5415	3.9705	20.6843
15	J[16]	Compression	CS1	OK	4.4448	0.9699	4.4448	0.9699	4.4448	0.9699	4.4448	20.6843
16	I[16]	Compression	CS1	OK	4.4442	0.9694	4.4442	0.9694	4.4442	0.9694	4.4442	20.6843
16	J[17]	Compression	CS1	OK	3.6221	1.8295	3.6221	1.8295	3.6221	1.8295	3.6221	20.6843
26	I[26]	Compression	CS4	OK	4.2687	2.9289	4.2687	2.9289	4.2687	2.9289	4.2687	20.6843
26	J[27]	Compression	CS4	OK	4.3706	2.6322	4.3706	2.6322	4.3706	2.6322	4.3706	20.6843
27	I[27]	Compression	CS4	OK	4.3711	2.6325	4.3711	2.6325	4.3711	2.6325	4.3711	20.6843
27	J[28]	Compression	CS4	OK	4.2999	2.5879	4.2999	2.5879	4.2999	2.5879	4.2999	20.6843
35	I[35]	Compression	CS3	OK	4.6754	0.1127	4.6754	0.1127	4.6754	0.1127	4.6754	20.6843
35	J[36]	Compression	CS3	OK	3.7373	1.1195	3.7373	1.1195	3.7373	1.1195	3.7373	20.6843
36	I[36]	Compression	CS3	OK	3.7379	1.1199	3.7379	1.1199	3.7379	1.1199	3.7379	20.6843
36	J[37]	Compression	CS3	OK	4.3814	-0.0559	4.3814	-0.0559	4.3814	-0.0559	4.3814	20.6843
44	I[44]	Compression	CS3	OK	3.2333	5.0838	3.2333	5.0838	3.2333	5.0838	5.0838	20.6843
44	J[45]	Compression	CS3	OK	3.3320	4.7690	3.3320	4.7690	3.3320	4.7690	4.7690	20.6843
45	I[45]	Compression	CS3	OK	3.3320	4.7690	3.3320	4.7690	3.3320	4.7690	4.7690	20.6843
45	J[46]	Compression	CS3	OK	3.2928	4.6669	3.2928	4.6669	3.2928	4.6669	4.6669	20.6843
46	I[46]	Compression	CS3	OK	3.2928	4.6669	3.2928	4.6669	3.2928	4.6669	4.6669	20.6843
46	J[47]	Compression	CS3	OK	3.1152	4.7712	3.1152	4.7712	3.1152	4.7712	4.7712	20.6843
47	I[47]	Compression	CS3	OK	3.1152	4.7712	3.1152	4.7712	3.1152	4.7712	4.7712	20.6843

Check stress for cross section at a construction stage

PSC Design as per Eurocode2-2:05 – *Design Report (EXCEL compatible)*

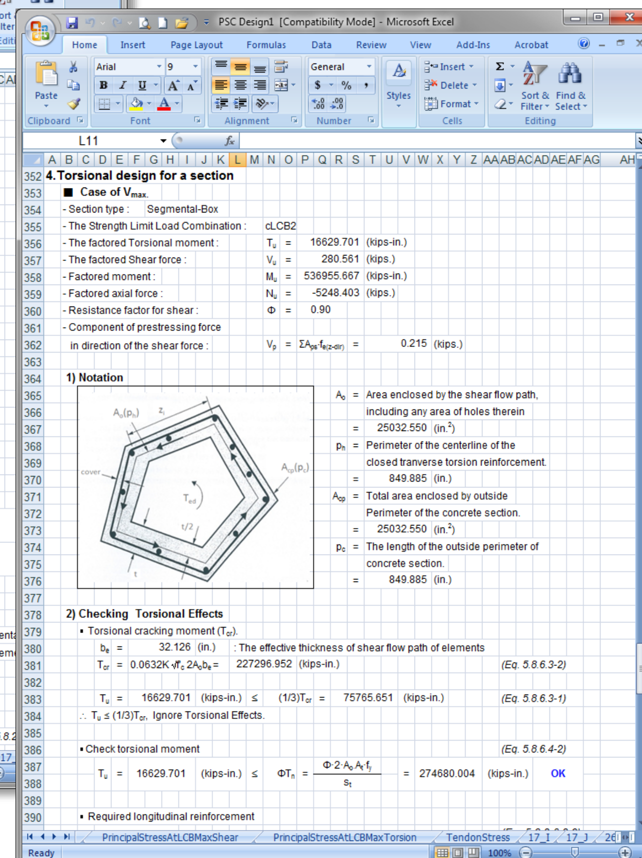


Flexure Design

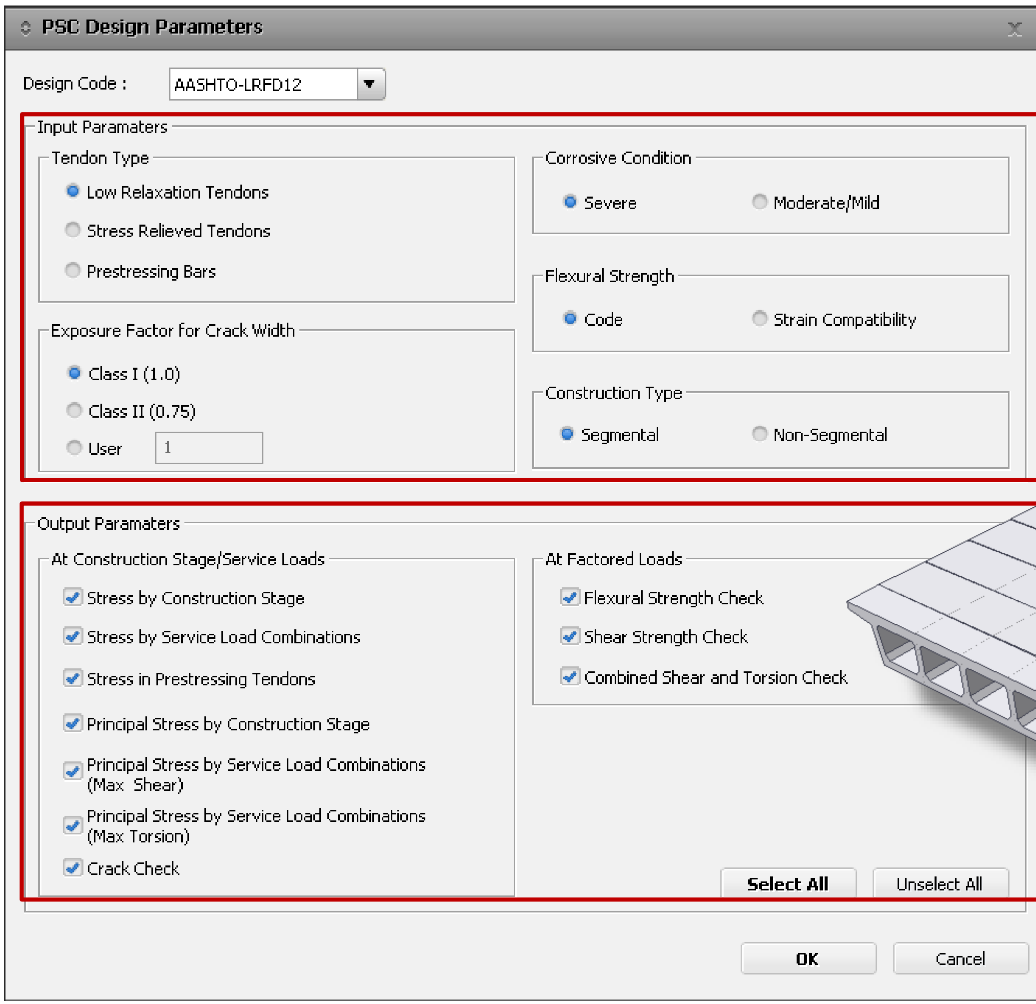


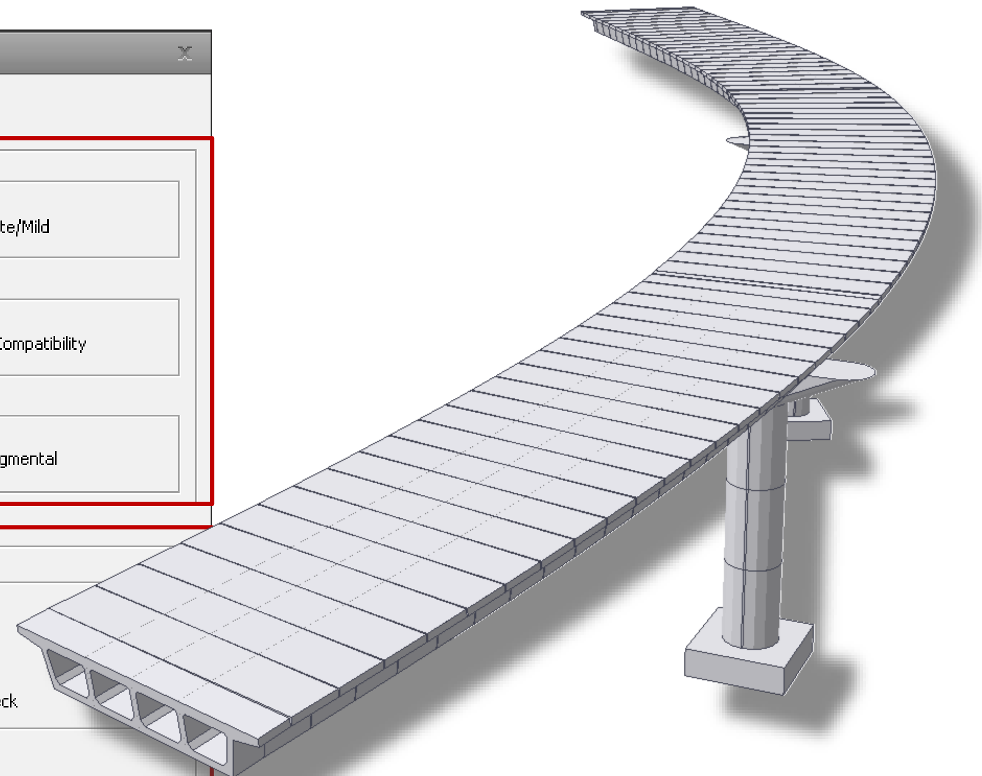
Shear Design

Torsional Design



PSC Design as per AASHTO LRFD12





Select Tendon / Bridge / Construction types

Select PSC Design Results

PSC Design as per AASHTO LRFD12 – *Cross section stress design results table*

- Check stress for cross section at a construction stage...
- Check tensile stress for Prestressing tendons...
- Check stress for cross section at service loads...
- Principal stress at a construction stage...
- Principal stress at service loads (at the maximum shear force)...
- Principal stress at service loads (at the maximum torsion)...
- Check crack width at service loads...
- Tension reinforcement...
- Check Flexure Strength...
- Check Shear Strength...
- Check Combined Shear and Torsion Strength...

			Stage	OK	FT (kgf/cm²)	FB (kgf/cm²)	FTL (kgf/cm²)	FBL (kgf/cm²)	FTR (kgf/cm²)	FBR (kgf/cm²)	FMAX (kgf/cm²)	ALW (kgf/cm²)
			Stage2	OK	33.2877	37.4631	33.2810	37.4598	33.2944	37.4665	37.4665	103.3513
			Stage3	OK	29.5953	23.4831	29.5892	23.4800	29.6014	23.4862	23.4800	0.0000
			Stage1	OK	34.6419	35.5895	34.6479	35.5925	34.6359	35.5864	35.5925	103.3513
			Stage3	OK	32.2258	18.4206	32.2312	18.4233	32.2205	18.4178	18.4178	0.0000
25	I[15]	Max	Stage1	OK	34.6396	35.5880	34.6361	35.5862	34.6430	35.5897	35.5897	103.3513
25	I[15]	Min	Stage3	OK	32.2241	18.4196	32.2209	18.4180	32.2272	18.4212	18.4180	0.0000
25	J[16]	Max	Stage2	OK	41.6702	22.0575	41.6730	22.0589	41.6673	22.0560	41.6730	103.3513
25	J[16]	Min	Stage3	OK	38.7243	7.7609	38.7269	7.7622	38.7217	7.7595	7.7595	0.0000
26	I[16]	Max	Stage2	OK	41.6697	22.0574	41.6676	22.0563	41.6718	22.0585	41.6718	103.3513
26	I[16]	Min	Stage3	OK	38.7238	7.7608	38.7219	7.7598	38.7257	7.7617	7.7598	0.0000
26	J[17]	Max	Stage2	OK	46.9418	13.3211	46.9437	13.3220	46.9398	13.3201	46.9437	103.3513
26	J[17]	Min	Stage3	NG	44.0550	-0.6673	44.0567	-0.6664	44.0532	-0.6682	-0.6682	0.0000
27	I[17]	Max	Stage2	OK	46.9416	13.3212	46.9401	13.3204	46.9431	13.3219	46.9431	103.3513
27	I[17]	Min	Stage3	NG	44.0548	-0.6673	44.0534	-0.6680	44.0562	-0.6666	-0.6680	0.0000
27	J[18]	Max	Stage2	OK	49.9338	8.2220	49.9350	8.2226	49.9325	8.2214	49.9350	103.3513
27	J[18]	Min	Stage3	NG	47.0774	-5.5517	47.0786	-5.5511	47.0763	-5.5523	-5.5523	0.0000
28	I[18]	Max	Stage2	OK	49.9336	8.2222	49.9332	8.2220	49.9341	8.2225	49.9341	103.3513
28	I[18]	Min	Stage3	NG	47.0773	-5.5515	47.0769	-5.5517	47.0777	-5.5513	-5.5517	0.0000
28	J[19]	Max	Stage2	OK	50.8826	6.3179	50.8826	6.3179	50.8825	6.3179	50.8826	103.3513
28	J[19]	Min	Stage3	NG	48.0345	-7.3566	48.0345	-7.3566	48.0345	-7.3566	-7.3566	0.0000
29	I[19]	Max	Stage2	OK	50.8826	6.3179	50.8826	6.3179	50.8825	6.3179	50.8826	103.3513
29	I[19]	Min	Stage3	NG	48.0345	-7.3566	48.0345	-7.3566	48.0345	-7.3566	-7.3566	0.0000
29	J[20]	Max	Stage2	OK	49.9336	8.2222	49.9332	8.2220	49.9341	8.2224	49.9341	103.3513
29	J[20]	Min	Stage3	NG	47.0773	-5.5515	47.0769	-5.5517	47.0777	-5.5513	-5.5517	0.0000

Check stress for cross section at a construction stage

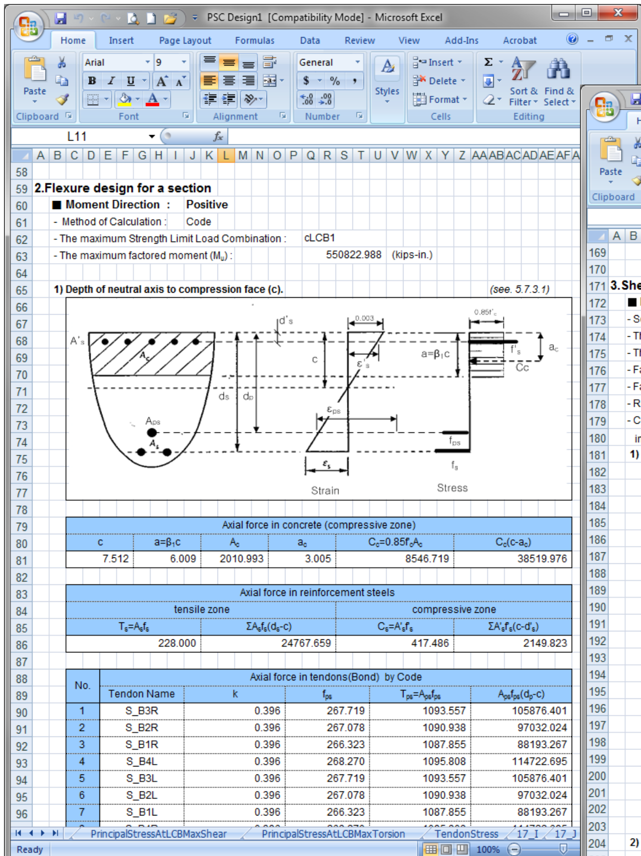
PSC Design as per AASHTO LRFD12 – *Shear strength design results table*

- Check stress for cross section at a construction stage...
- Check tensile stress for Prestressing tendons...
- Check stress for cross section at service loads...
- Principal stress at a construction stage...
- Principal stress at service loads (at the maximum shear force)...
- Principal stress at service loads (at the maximum torsion)...
- Check crack width at service loads...
- Tension reinforcement...
- Check Flexure Strength...
- **Check Shear Strength...**
- Check Combined Shear and Torsion Strength...

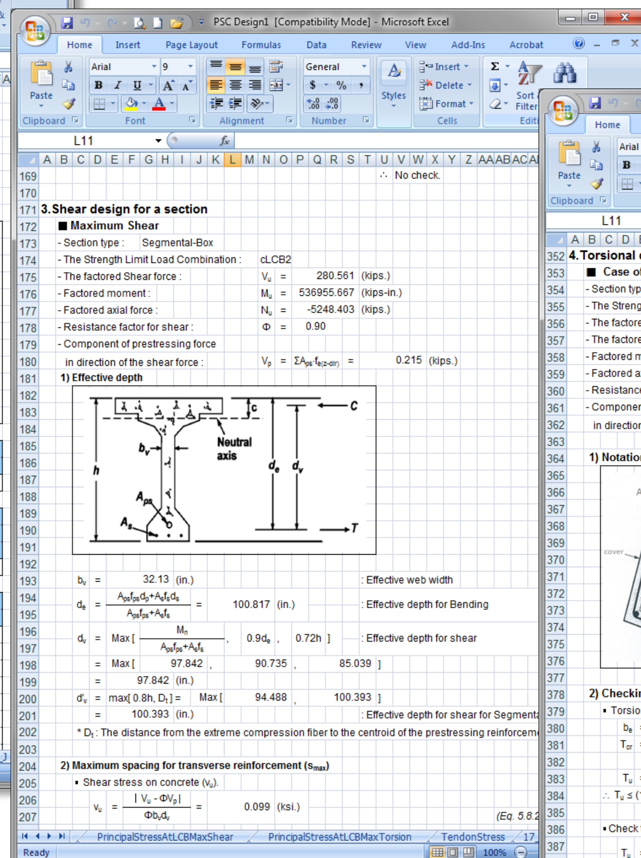
			LCom Name	Type	CHK	Vu (kgf)	Mu (kgf·cm)	VN (kgf)	Phi	Vc (kgf)
			CB4	-	OK	-1.3038	-163.1357	0.7287	0.9000	0.7287
			CB1	-	OK	-2.3691	-186.6578	0.7287	0.9000	0.7287
			CB4	-	OK	-2.5836	-76.5243	0.7287	0.9000	0.7287
			CB1	-	OK	-3.4358	-55.4639	0.7287	0.9000	0.7287
			CB4	-	OK	-2.5843	-76.5287	0.7287	0.9000	0.7287
25	I[15]	Min	cLCB1	-	OK	-3.4364	-55.4684	0.7287	0.9000	0.7287
25	J[16]	Max	cLCB4	-	OK	-2.5644	53.0203	0.7474	0.9000	0.7474
25	J[16]	Min	cLCB1	-	OK	-3.2035	108.7505	0.7474	0.9000	0.7474
26	I[16]	Max	cLCB4	-	OK	-2.5646	53.0183	0.7474	0.9000	0.7474
26	I[16]	Min	cLCB1	-	OK	-3.2036	108.7485	0.7474	0.9000	0.7474
26	J[17]	Max	cLCB4	-	OK	-1.6905	154.1742	0.7696	0.9000	0.7696
26	J[17]	Min	cLCB1	-	OK	-2.1166	234.6677	0.7696	0.9000	0.7696
27	I[17]	Max	cLCB4	-	OK	-1.6906	154.1727	0.7696	0.9000	0.7696
27	I[17]	Min	cLCB1	-	OK	-2.1166	234.6662	0.7696	0.9000	0.7696
27	J[18]	Max	cLCB4	-	OK	-0.7966	213.1669	0.7849	0.9000	0.7849
27	J[18]	Min	cLCB1	-	OK	-1.0096	308.5186	0.7849	0.9000	0.7849
28	I[18]	Max	cLCB4	-	OK	-0.7967	213.1651	0.7849	0.9000	0.7849
28	I[18]	Min	cLCB1	-	OK	-1.0097	308.5169	0.7849	0.9000	0.7849
28	J[19]	Max	cLCB4	-	OK	0.0001	233.6002	0.7908	0.9000	0.7908
28	J[19]	Min	cLCB1	-	OK	0.0001	333.9048	0.7908	0.9000	0.7908
29	I[19]	Max	cLCB1	-	OK	-0.0001	333.9048	0.7908	0.9000	0.7908
29	I[19]	Min	cLCB4	-	OK	-0.0001	233.6002	0.7908	0.9000	0.7908
29	J[20]	Max	cLCB1	-	OK	1.0097	308.5169	0.7849	0.9000	0.7849
29	J[20]	Min	cLCB4	-	OK	0.7967	213.1652	0.7849	0.9000	0.7849

Check Shear Strength

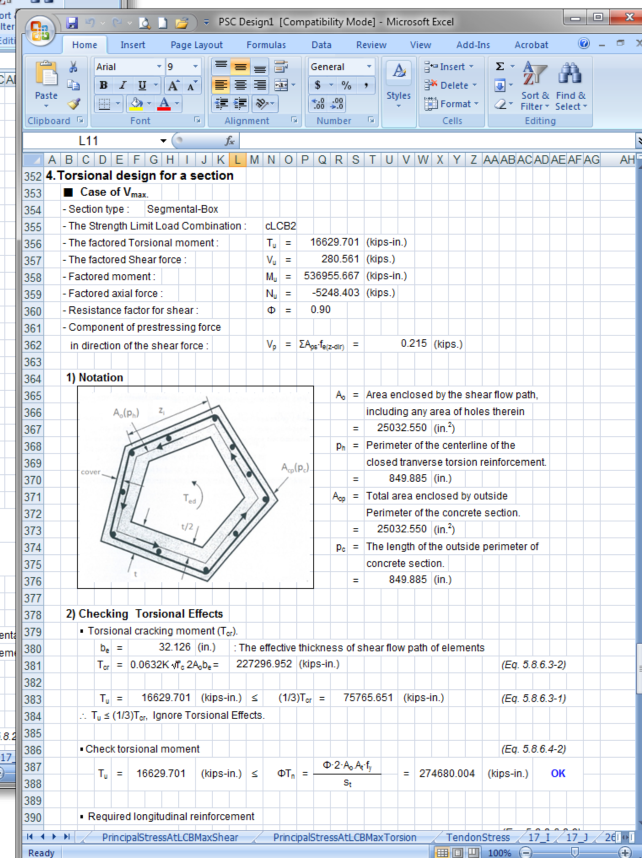
PSC Design as per AASHTO LRFD12 – *Design Report (EXCEL compatible)*



Flexure Design

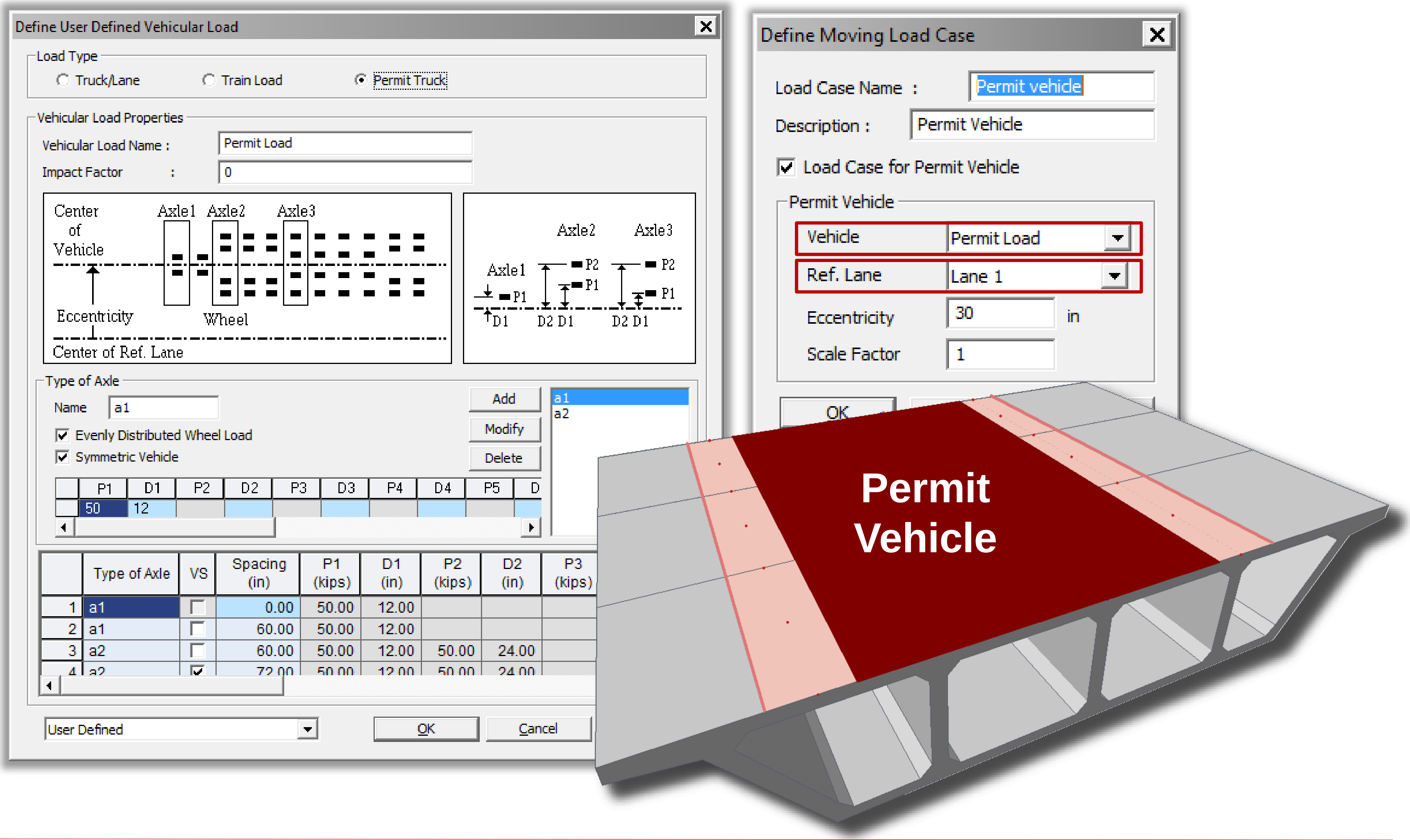


Shear Design

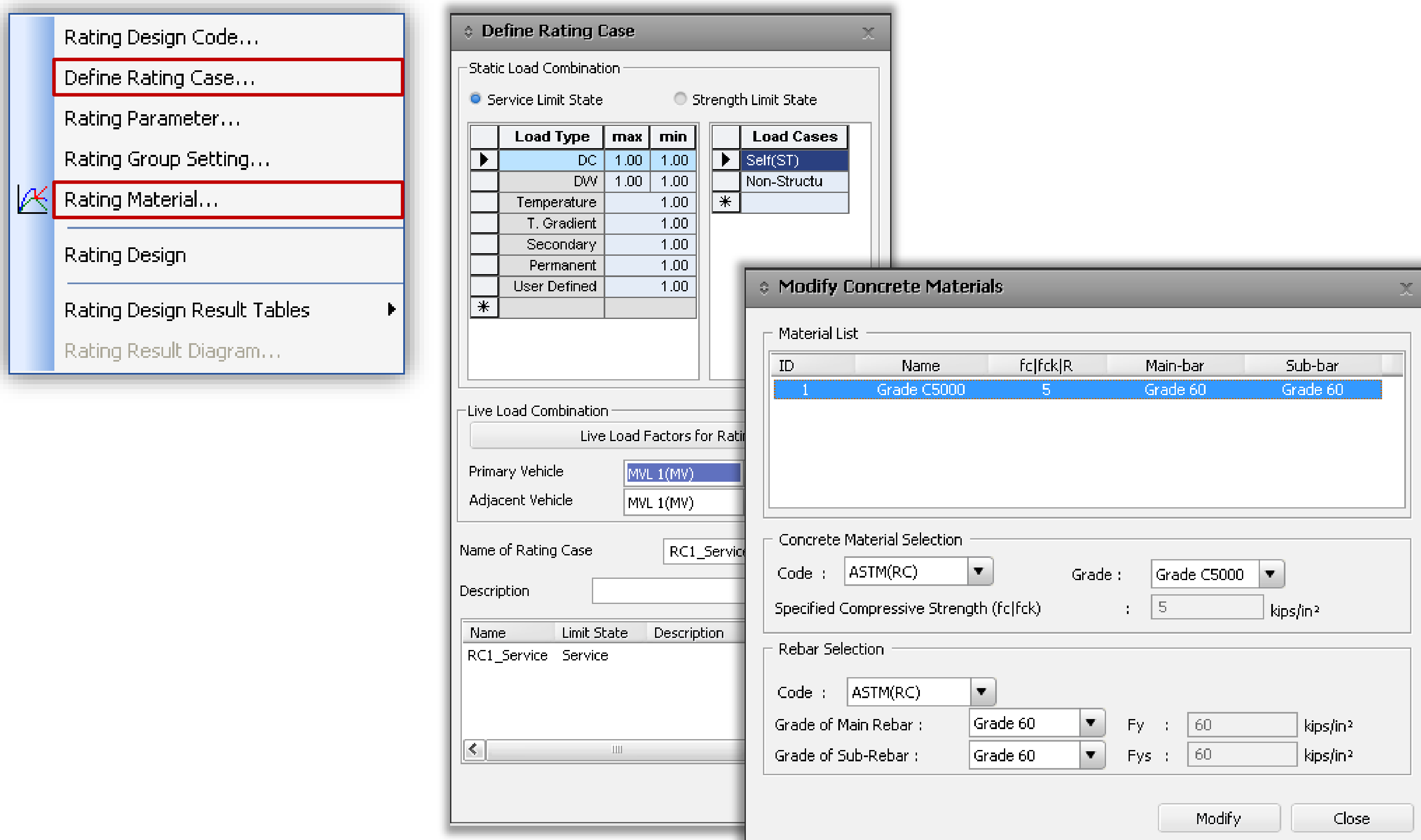


Torsional Design

Bridge Load Rating Design as per AASHTO LRFR – *Permit Vehicle & Moving Load Case*



Bridge Load Rating Design as per AASHTO LRFR – *Rating Cases and Materials*



Bridge Load Rating Design as per AASHTO LRFR – *Concrete Stress Results*

- Rating Result Summary of Service...
- Rating Result Summary of Strength...
- **Concrete Stress...**
- Prestressing Steel Tension...
- Flexural Rating Data...
- Shear Strength...
- Concrete Stress Data...
- Prestressing Steel Tension Data...
- Flexural Capacity Demand Ratio...
- Shear Strength Data...

...oup	Elem.	Part	Comp./Tens.	Rating Case	Rating Factor	Check
	1	I[1]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	82.5240	OK
	1	I[1]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	14.4539	OK
	2	I[2]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-32420.46	NG
	2	I[2]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-10719.08	NG
	3	I[4]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-41.1026	NG
	3	I[4]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-77.2487	NG
	4	I[5]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-37.1217	NG
	4	I[5]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-67.7637	NG
Span1	5	I[6]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-31.6631	NG
Span1	5	I[6]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-56.9274	NG
Span1	6	I[7]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-25.4320	NG
Span1	6	I[7]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-45.4712	NG
Span1	7	I[8]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-18.5434	NG
Span1	7	I[8]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-33.4260	NG
Span1	8	I[9]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-11.5097	NG
Span1	8	I[9]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-21.2385	NG
Span1	9	I[10]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-5.0862	NG
Span1	9	I[10]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	-9.2084	NG
Span1	10	I[11]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-2.7640	NG
Span1	10	I[11]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-3.0265	NG
Span1	11	I[12]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-16.0392	NG
Span1	11	I[12]	Tens.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-8.9621	NG
Span2	12	I[13]	Comp.	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-30.2656	NG

Bridge Load Rating Design as per AASHTO LRFR – *Flexural Rating Results*

- Rating Result Summary of Service...
- Rating Result Summary of Strength...
- Concrete Stress...
- Prestressing Steel Tension...
- **Flexural Rating Data...**
- Shear Strength...
- Concrete Stress Data...
- Prestressing Steel Tension Data...
- Flexural Capacity Demand Ratio...
- Shear Strength Data...

		Part	Positive/ Negative	Rating Case	LRFD Resistance Factor	System Factor	Condition Factor	Rating Factor	Check
			Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1.0000	1.0000	1.0000	108820106	OK
			Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1.0000	1.0000	1.0000	370818082	OK
			Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9925	1.0000	1.0000	1.5720	OK
			Positive	-	-	-	-	-	-
			Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1.0000	1.0000	1.0000	133.9091	OK
			Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1.0000	1.0000	1.0000	8.1854	OK
			Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1.0000	1.0000	1.0000	44.4400	OK
Span1	4	I[5]	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1.0000	1.0000	1.0000	4.0846	OK
Span1	5	I[6]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	18.3760	OK
Span1	5	I[6]	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	3.4979	OK
Span1	6	I[7]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	9.2998	OK
Span1	6	I[7]	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	3.4362	OK
Span1	7	I[8]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	9.3545	OK
Span1	7	I[8]	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	3.4687	OK
Span1	8	I[9]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	13.6455	OK
Span1	8	I[9]	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	3.6914	OK
Span1	9	I[10]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	18.9540	OK
Span1	9	I[10]	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9980	1.0000	1.0000	4.8790	OK
Span1	10	I[11]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9908	1.0000	1.0000	22.8478	OK
Span1	10	I[11]	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9908	1.0000	1.0000	10.5122	OK
Span1	11	I[12]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9925	1.0000	1.0000	10.8853	OK
Span1	11	I[12]	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9925	1.0000	1.0000	25.0889	OK
Span2	12	I[13]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0.9925	1.0000	1.0000	3.6223	OK

Bridge Load Rating Design as per AASHTO LRFR – *Shear Strength Results*

- Rating Result Summary of Service...
- Rating Result Summary of Strength...
- Concrete Stress...
- Prestressing Steel Tension...
- Flexural Rating Data...
- Shear Strength...
- Concrete Stress Data...
- Prestressing Steel Tension Data...
- Flexural Capacity Demand Ratio...
- Shear Strength Data...

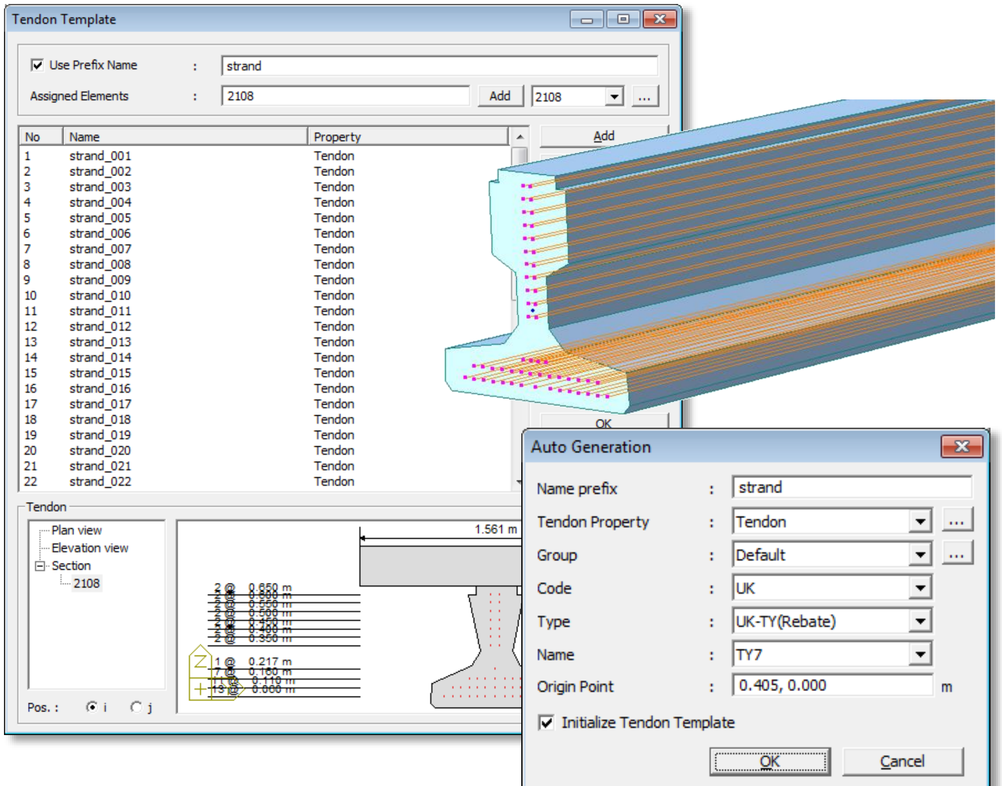
oup	Elem.	Part	Rating Case	LRFD Resistance Factor	System Factor	Condition Factor	Rating Factor	Check
	1	I[1]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-1,3436	NG
	2	I[2]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-2,1092	NG
	3	I[4]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-2,6095	NG
	4	I[5]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-1,2378	NG
	5	I[6]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	1,1188	OK
	6	I[7]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	5,1356	OK
	7	I[8]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	1,4943	OK
	8	I[9]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-1,0947	NG
	9	I[10]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-2,5213	NG
Span1	10	I[11]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-11,0867	NG
Span1	11	I[12]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-2,1379	NG
Span2	12	I[13]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-1,4133	NG
Span2	13	I[14]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-3,7990	NG
Span2	14	I[15]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-2,2241	NG
Span2	15	I[16]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-1,0790	NG
Span2	16	I[17]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	0,5556	NG
Span2	17	I[18]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	3,0244	OK
Span2	18	I[19]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	3,0225	OK
Span2	19	I[20]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	0,8440	NG
Span2	20	I[21]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-0,6488	NG
Span1	21	I[22]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-8,6783	NG
Span1	22	I[23]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	0,4312	NG
Span1	23	I[24]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-3,1678	NG
Span1	24	I[25]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-43,2161	NG
Span2	25	I[26]	RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000	1,0000	-4,5478	NG

Bridge Load Rating Design as per AASHTO LRFR – *Tendon Results*

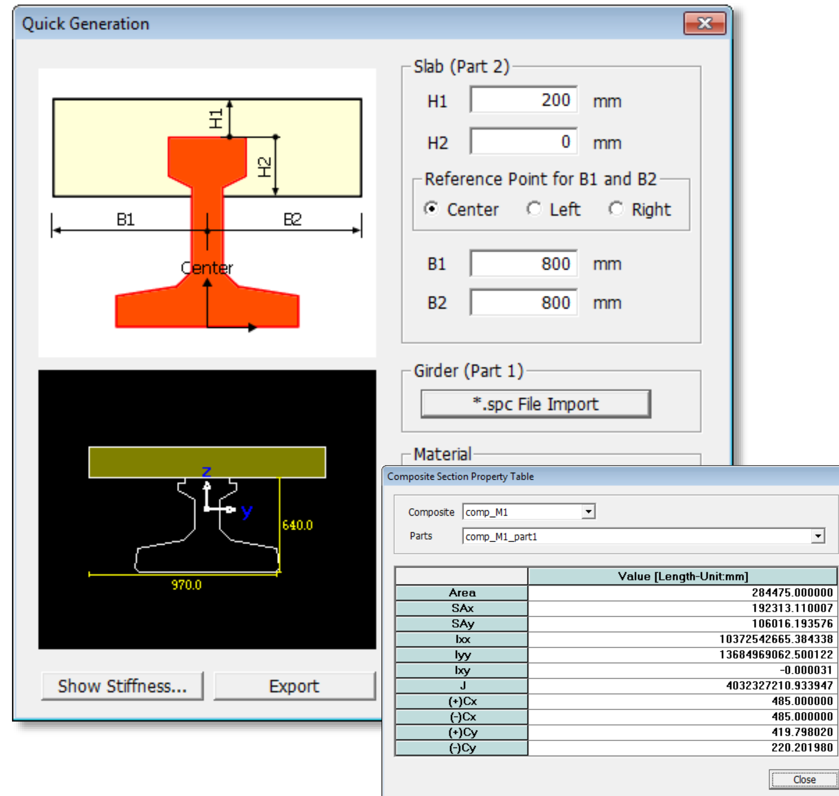
- Rating Result Summary of Service...
- Rating Result Summary of Strength...
- Concrete Stress...
- Prestressing Steel Tension...
- Flexural Rating Data...
- Shear Strength...
- Concrete Stress Data...
- Prestressing Steel Tension Data...
- Flexural Capacity Demand Ratio...
- Shear Strength Data...

...up	Elem.	Part	Tendon	Rating Case	Rating Factor
	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Max)	-
	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fx-Min)	235360984
	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fy-Max)	-
	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fy-Min)	235360984
	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fz-Max)	-
	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Fz-Min)	235360984
	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Mx-Max)	-
	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Mx-Min)	235360984
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(My-Max)	-
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(My-Min)	235360984
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Mz-Max)	-
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A.V(Mz-Min)	235360984
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Fx-Max)	-
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Fx-Min)	235360984
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Fy-Max)	-
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Fy-Min)	235360984
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Fz-Max)	-
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Fz-Min)	235360984
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Mx-Max)	-
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Mx-Min)	235360984
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(My-Max)	-
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(My-Min)	235360984
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Mz-Max)	-
Span1	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A.V(Mz-Min)	235360984

Composite PC Girder Design as per EN1992-2

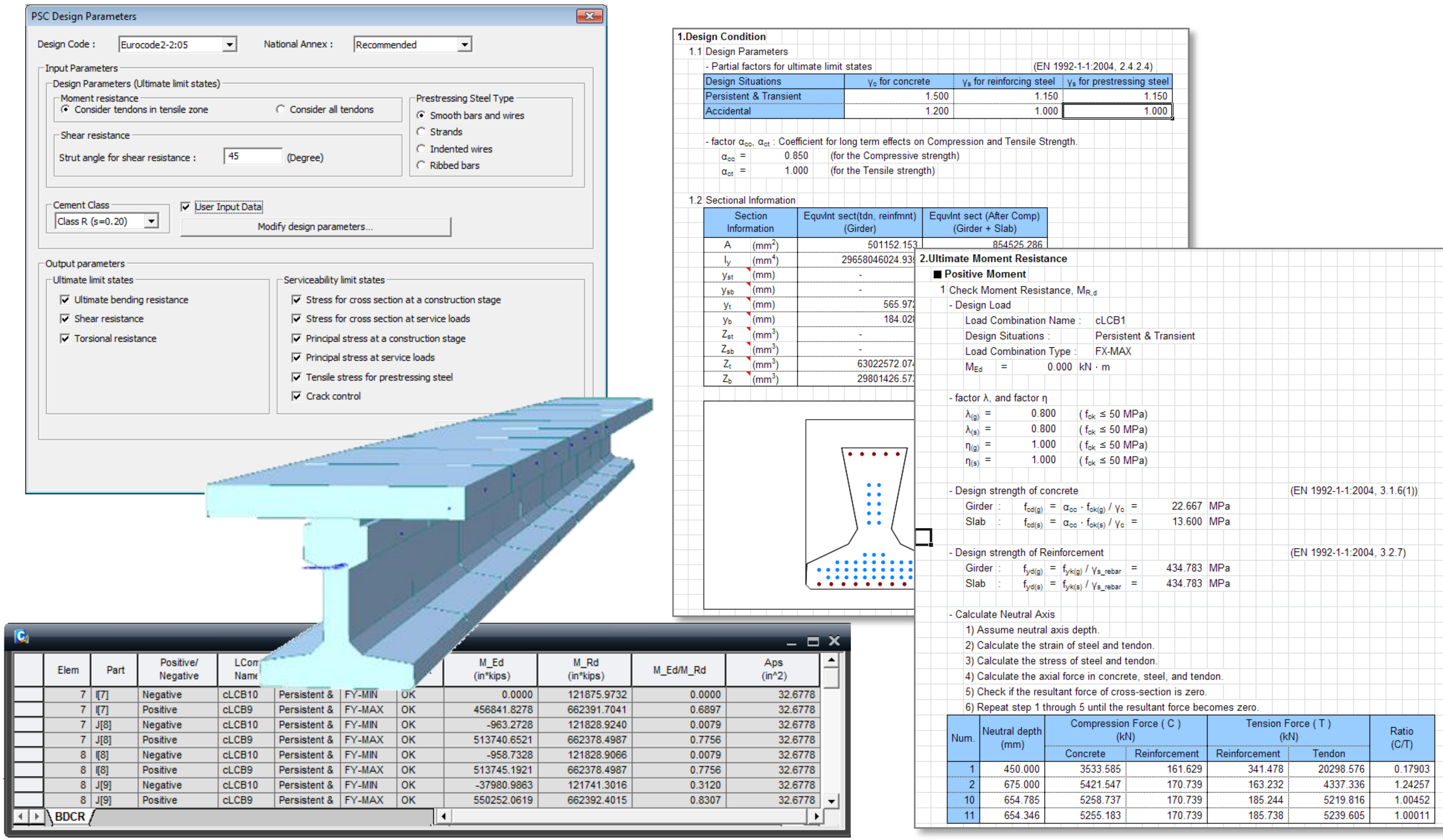


Tendon template wizard

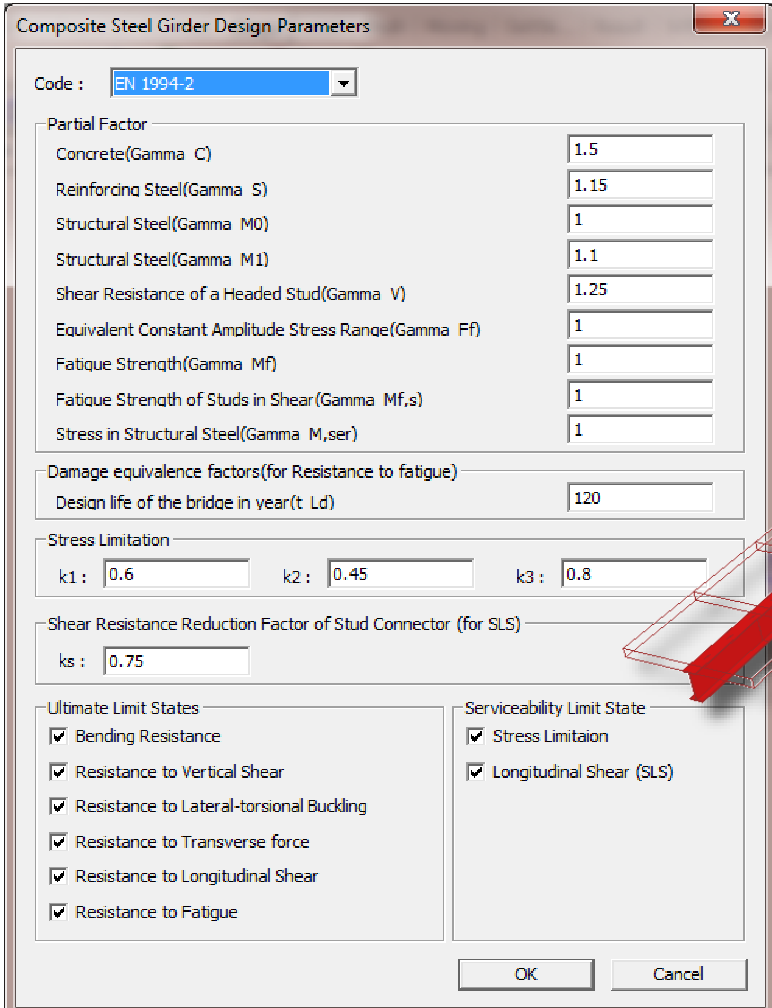


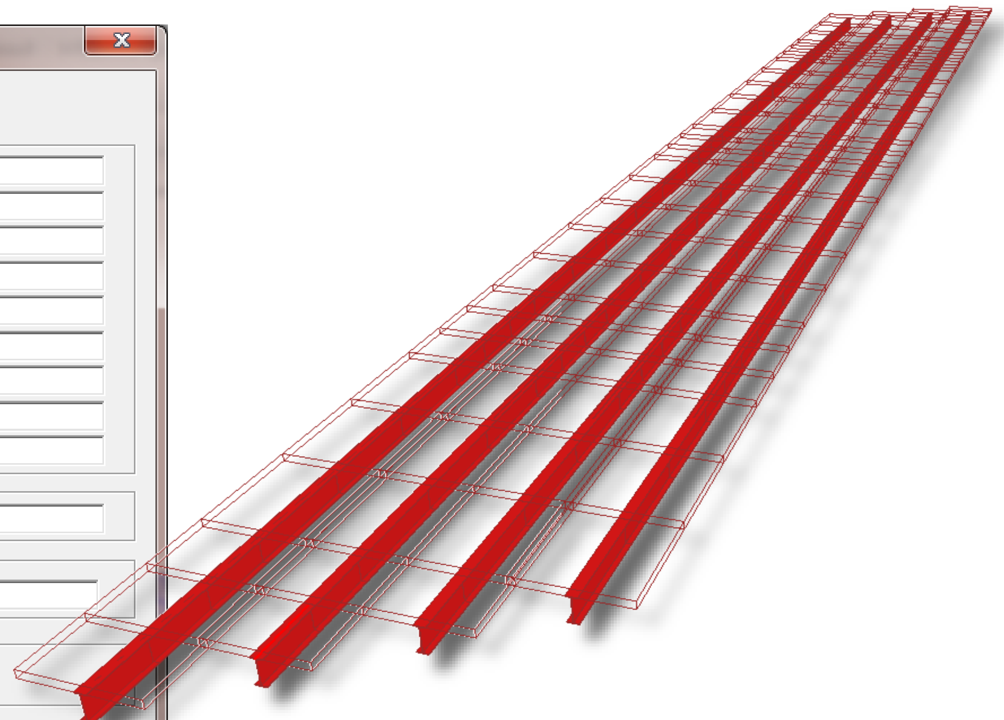
Quick generation of
PSC composite section

Composite PC Girder Design as per EN1992-2



Composite Girder Design as per EN1994-2





Enter the Partial Factors

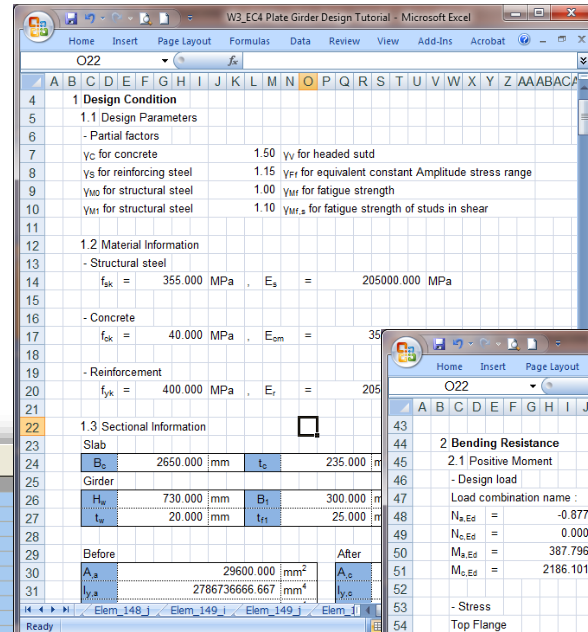
Select the desired Ultimate Limit Stress

Composite Girder Design as per EN1994-2

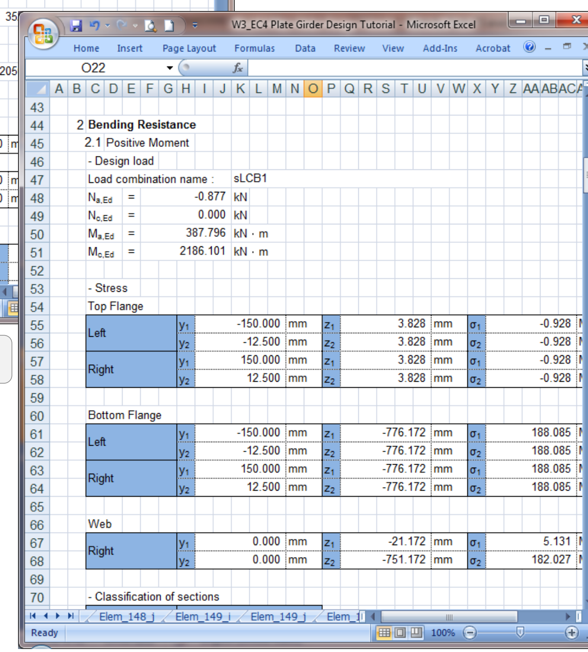
- Bending Resistance...
- Resistance to Vertical Shear...
- Resistance to Lateral-Torsional Buckling...
- Resistance to Transverse Force...
- Resistance to Longitudinal Shear...
- Resistance to Fatigue...

Elem	Position	Lcom	Type	Top Class	Bot Class	Web Class	Sect. Class	N_Ed (kN)	M_Ed (kN·m)	V_Ed (kN)	Vpl,Rd (kN)	
6	I[1]	sLCB1	-	1	1	1	1	0.6259	1.1904	-176.7416	3949.9765	
6	J[40]	sLCB1	-	1	1	1	1	0.6259	12321.4707	-114.4802	3949.9765	
7	I[2]	sLCB1	-	1	1	1	1	1.0510	2438.9203	-350.1550	3949.9765	
7	J[52]	sLCB1	-	1	1	1	1	1.0510	1177.7102	-287.8936	3949.9765	
8	I[3]	sLCB1	-	1	1	1	1	0.7001	3024.5954	-374.4171	3949.9765	
8	J[64]	sLCB1	-	1	1	1	1	0.7001	1665.4164	-312.1557	3949.9765	
9	I[4]	sLCB1	-	1	1	1	1	0.5141	2431.8452	-324.8943	3949.9765	
9	J[76]	sLCB1	-	1	1	1	1	0.5141	1268.8570	-262.6329	3949.9765	
19	I[23]	sLCB1	-	1	1	3	2	-0.5644	0.5524	-176.0313	3949.9765	
19	J[42]	sLCB1	-	1	1	1	1	-0.5644	82856.0258	-113.7699	3949.9765	
21	I[28]	sLCB1	-	1	1	1	1	-0.8767	2314.0744	-353.0809	3949.9765	
21	J[54]	sLCB1	-	1	1	1	1	-0.8767	1107.3921	-290.8195	3949.9765	3590.8877
23	I[29]	sLCB1	-	1	1	1	1	-0.8744	2872.4051	-378.1429	3949.9765	27[illegible]
23	J[66]	sLCB1	-	1	1	1	1	-0.8744	1571.0681	-315.8815	3949.9765	35[illegible]
25	I[30]	sLCB1	-	1	1	1	1	-0.5756	2311.5367	-327.6890	3949.9765	27[illegible]
25	J[78]	sLCB1	-	1	1	1	1	-0.5756	1198.6262	-265.4276	3949.9765	3590.8877
27	I[25]	sLCB1	-	1	1	3	2	-0.5756	0.8506	-175.3563	3949.9765	3590.8877
27	J[44]	sLCB1	-	1	1	1	1	-0.5756	82859.6707	-113.0949	3949.9765	2720.3695
28	I[32]	sLCB1	-	1	1	1	1	-0.8744	2310.7684	-352.5907	3949.9765	2720.3695
28	J[56]	sLCB1	-	1	1	1	1	-0.8744	1104.9284	-290.3293	3949.9765	3590.8877
31	I[33]	sLCB1	-	1	1	1	1	-0.8767	2871.7074	-378.4419	3949.9765	2720.3695
31	J[68]	sLCB1	-	1	1	1	1	-0.8767	1569.8547	-316.1805	3949.9765	3590.8877
33	I[34]	sLCB1	-	1	1	1	1	-0.5644	2313.7997	-328.7311	3949.9765	2720.3695
33	J[80]	sLCB1	-	1	1	1	1	-0.5644	1199.0975	-266.4697	3949.9765	3590.8877
34	I[27]	sLCB1	-	1	1	1	1	0.5141	0.9795	-176.3204	3949.9765	3590.8877
34	J[100]	sLCB1	-	1	1	1	1	0.5141	17894.7928	-69.7468	3949.9765	2720.3695
35	I[36]	sLCB1	-	1	1	1	1	0.7001	2429.5396	-356.7345	3949.9765	2720.3695
35	J[106]	sLCB1	-	1	1	1	1	0.7001	354.0095	-247.2050	3949.9765	3590.8877

Resistance to Vertical Shear

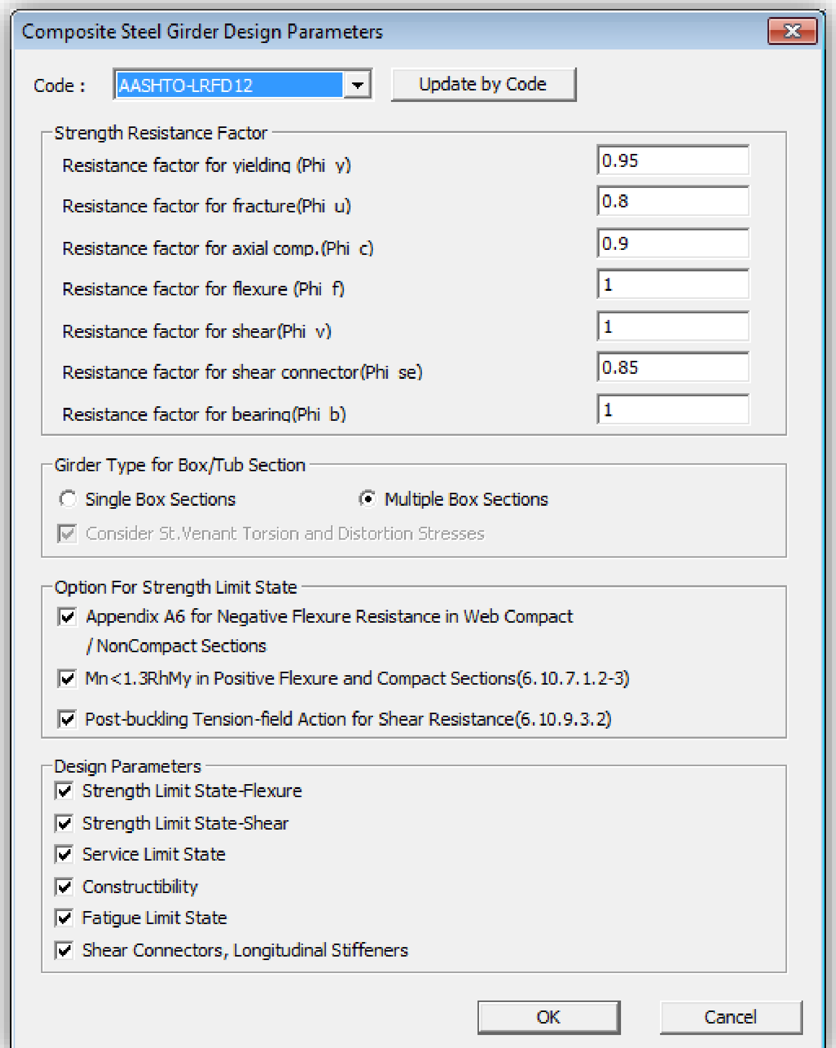


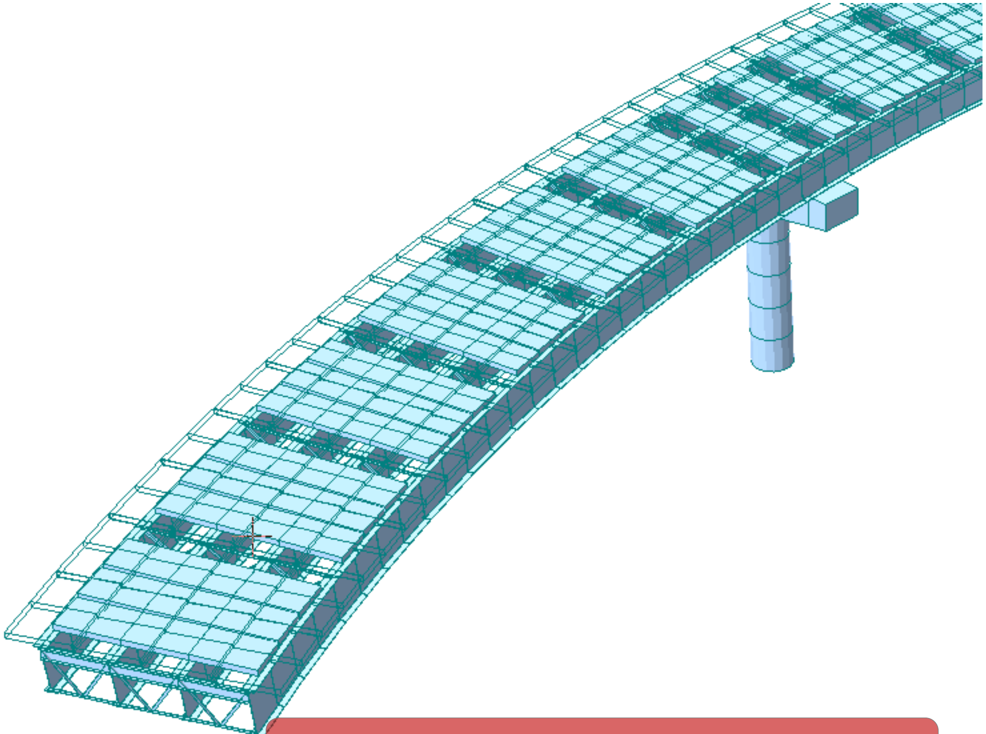
Design Parameter



Flexural Resistance

Composite Girder Design as per AASHTO LRFD 12



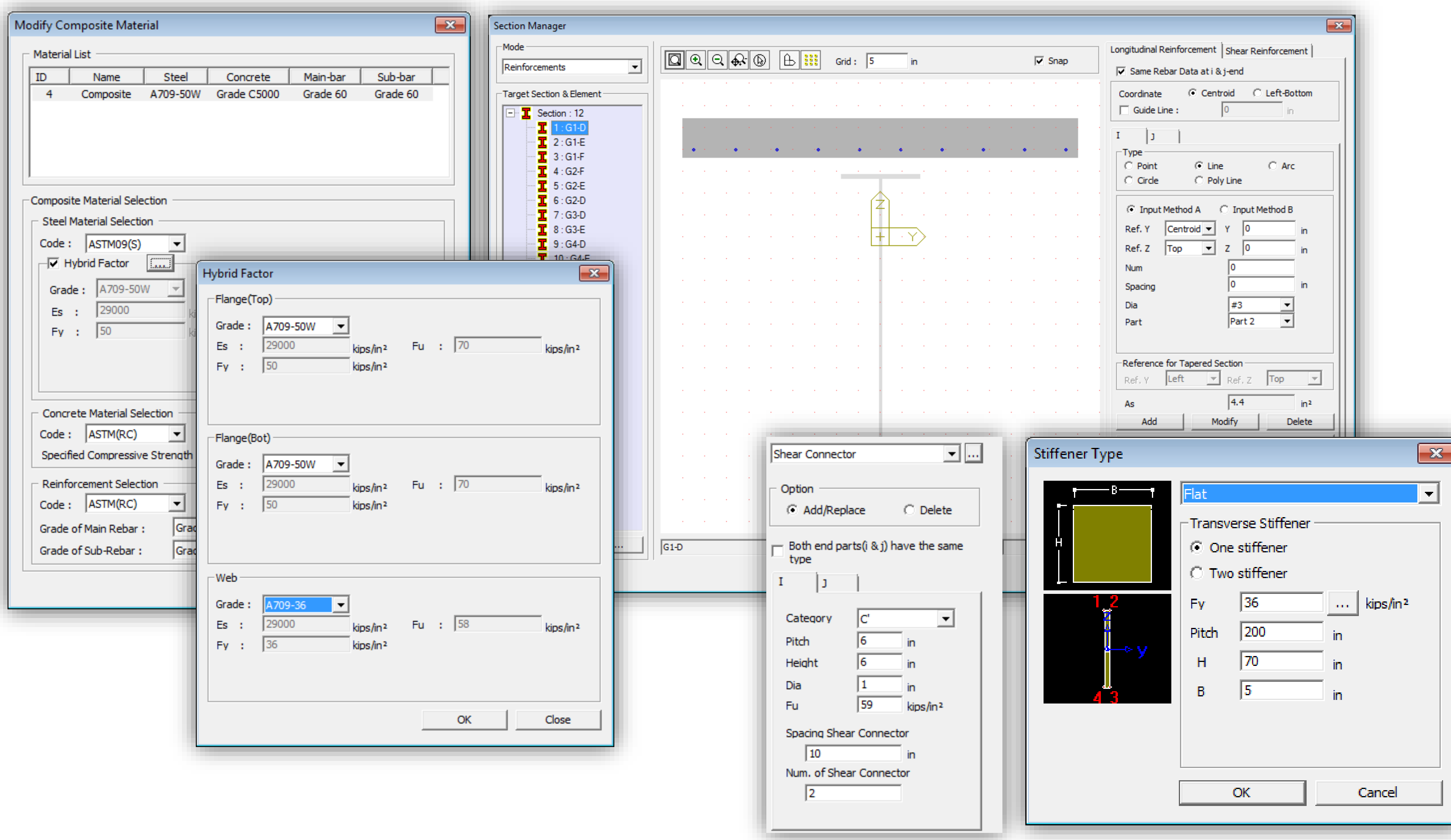


Enter Strength Reduction Factor

Option for Strength Limit State Calculation

Select the desired Limit Stress

Composite Girder Design as per AASHTO LRFD 12 *Materials, Rebar, Stiffener and Shear Connector*



Composite Girder Design as per AASHTO LRFD 12 *Design Force/Moment*

Design Force/Moment

Elem	Part	Lcom	Moment(My) Dead(Before) (in·kips)	Moment(My) Dead(After) (in·kips)	Moment(My) Short Term (in·kips)	Moment(Mz) Dead(Before) (in·kips)	Moment(Mz) Dead(After) (in·kips)	Moment(Mz) Short Term (in·kips)	Shear Dead(Before) (kips)	Shear Dead(After) (kips)	Shear Short Term (kips)
1001	I[359]	scLCB5(mi	11372.1953	215.9833	-1147.9232	-21.0406	1661.9515	-454.0037	89.5496	-1.7216	-8.1399
1001	I[359]	scLCB6(all	11372.1953	215.9833	4337.6076	-21.0406	1661.9515	118.2416	89.5496	-1.7216	36.2508
1001	I[359]	scLCB6(m	11372.1953	215.9833	4337.6076	-21.0406	1661.9515	118.2416	89.5496	-1.7216	36.2508
1001	I[359]	scLCB6(mi	11372.1953	215.9833	-706.4143	-21.0406	1661.9515	-279.3869	89.5496	-1.7216	-5.0091
1001	I[359]	scLCB7	11372.1953	215.9833	-0.0000	-21.0406	1661.9515	-0.0000	89.5496	-1.7216	0.0000
1002	I[121]	scLCB5(mi	21112.3313	388.7998	-1967.4026	-54.7506	-565.5808	-322.3600	77.4806	-3.8906	-8.0396
1002	I[121]	scLCB6(all	21112.3313	388.7998	8449.2946	-54.7506	-565.5808	-198.3754	77.4806	-3.8906	36.1811
1002	I[121]	scLCB6(m	21112.3313	388.7998	8449.2946	-54.7506	-565.5808	115.0004	77.4806	-3.8906	36.1811
1002	I[121]	scLCB6(mi	21112.3313	388.7998	-1210.7093	-54.7506	-565.5808	-198.3754	77.4806	-3.8906	-4.9475
1002	I[121]	scLCB7	21112.3313	388.7998	0.0000	-54.7506	-565.5808	0.0000	77.4806	-3.8906	-0.0000
1003	I[358]	scLCB5(mi	24331.8039	380.7455	-2460.6182	-44.8875	355.4202	-272.5318	51.6313	-1.3899	-8.4942
1003	I[358]	scLCB6(all	24331.8039	380.7455	10292.4052	-44.8875	355.4202	142.5760	51.6313	-1.3899	32.8944
1003	I[358]	scLCB6(m	24331.8039	380.7455	10292.4052	-44.8875	355.4202	142.5760	51.6313	-1.3899	32.8944
1003	I[358]	scLCB6(mi	24331.8039	380.7455	-1514.2266	-44.8875	355.4202	-167.7119	51.6313	-1.3899	-5.2272
1003	I[358]	scLCB7	24331.8039	380.7455	-0.0000	-44.8875	355.4202	0.0000	51.6313	-1.3899	0.0000
1004	I[120]	scLCB5(mi	27167.0964	337.5685	-2901.017						
1004	I[120]	scLCB6(all	27167.0964	337.5685	12024.528						
1004	I[120]	scLCB6(m	27167.0964	337.5685	12024.528						
1004	I[120]	scLCB6(mi	27167.0964	337.5685	-1785.241						
1004	I[120]	scLCB7	27167.0964	337.5685	0.000						
1005	I[357]	scLCB5(mi	29645.0781	143.1069	-3304.339						
1005	I[357]	scLCB6(all	29645.0781	143.1069	13506.446						
1005	I[357]	scLCB6(m	29645.0781	143.1069	13506.446						
1005	I[357]	scLCB6(mi	29645.0781	143.1069	-2033.439						

Design Force/Moment

Load Combinations

General | Steel Design | Concrete Design | SRC Design | Composite Steel Girder Design

Load Combination List

No	Name	Active	Type	Description
1	scLCB1	Stren	Add	Strength-I:1.75M[1],1.25(cD),1.
2	scLCB2	Stren	Add	Strength-II:1.35M[1],1.25(cD),1.
3	scLCB3	Stren	Add	Strength-IV:1.50(cD),1.50(cEL1
4	scLCB4	Servi	Add	Service-I:1.00M[1],1.00(cD),1.0
5	scLCB5	Servi	Add	Service-II:1.30M[1],1.00(cD),1.0
6	scLCB6	Servi	Add	Service-III:0.80M[1],1.00(cD),1.
7	scLCB7	Servi	Add	Service-IV:1.00(cD),1.00(cEL1),
8	scLCB8	Servi	Add	Fatigue-I:1.50M[1],1.00(cD),1.0
9	scLCB9	Servi	Add	Fatigue-II:0.75M[1],1.00(cD),1.0

Load Cases and Factors

LoadCase	Facto
MVL(MV)	1.75
Dead Load(CS)	1.25
SIDL(CS)	1.50
Creep Secondary(	0.50
Shrinkage Second	0.50

Composite Girder Design as per AASHTO LRFD 12– *Design Result Table*

Span Checking

Span	Positive/Negative	Strength Limit(Flexure) Elem	part	Lcom	Mu/Mr	CHK	Strength Limit(Shear) Elem	part	Lcom	Vu/Vr	do	bt	lt	As	CHK
S1-L	Neg	1028	I[11]	scLCB1	0.9595	OK	1026	I[109]	scLCB1	0.4516	OK	OK	OK	OK	OK
S1-L	Pos	1009	J[118]	scLCB1	0.5734	OK	1026	I[109]	scLCB1	0.4516	OK	OK	OK	OK	OK
S1-R	Neg	1029	J[11]	scLCB1	0.7534	OK	1031	J[66]	scLCB1	0.3564	OK	OK	OK	OK	OK
S1-R	Pos	1045	J[59]	scLCB1	0.4849	OK	1031	J[66]	scLCB1	0.3564	OK	OK	OK	OK	OK
S2-L	Neg	2028	I[10]	scLCB1	1.1065	NG	2028	I[10]	scLCB1	0.6630	OK	OK	OK	OK	OK
S2-L	Pos	2009	J[104]	scLCB1	0.5763	OK	2028	I[10]	scLCB1	0.6630	OK	OK	OK	OK	OK
S2-R	Neg	2029	J[10]	scLCB1	0.9201	OK	2029	J[10]	scLCB1	0.6095	OK	OK	OK	OK	OK
S2-R	Pos	2046	J[283]	scLCB1	0.5247	OK	2029	J[10]	scLCB1	0.6095	OK	OK	OK	OK	OK
S3-L	Neg	3028	I[9]	scLCB1	1.0562	NG	3028	I[9]	scLCB1	0.3825	OK	OK	OK	OK	OK
S3-L	Pos	3010	J[327]	scLCB1	0.4447	OK	3028	I[9]	scLCB1	0.3825	OK	OK	OK	OK	OK
S3-R	Neg	3029	J[9]	scLCB1	0.9347	OK	3029	J[9]	scLCB1	0.3691	OK	OK	OK	OK	OK
S3-R	Pos	3046	J[270]	scLCB1	0.4314	OK	3029	J[9]	scLCB1	0.3691	OK	OK	OK	OK	OK
S4-L	Neg	4028	I[8]	scLCB1	0.9861	OK	4028	I[8]	scLCB1	0.2739	OK	OK	OK	OK	OK
S4-L	Pos	4012	J[313]	scLCB1	0.3537	OK	4028	I[8]	scLCB1	0.2739	OK	OK	OK	OK	OK
S4-R	Neg	4029	J[8]	scLCB1	0.8466	OK	4029	J[8]	scLCB1	0.3050	OK	OK	OK	OK	OK
S4-R	Pos	4046	I[22]	scLCB1	0.3613	OK	4029	J[8]	scLCB1	0.3050	OK	OK	OK	OK	OK

Span	Positive/Negative	Service Limit Elem	part	Lcom	tcw Ratio	tcf Ratio	tft Ratio	CHK	Fatigue Limit Elem	part	Lcom	Gamma(Delta_f) Ratio	fcf Ratio	Vcf Ratio	CHK	Elem
S1-L	Neg	1028	I[11]	scLCB5	0.4594	0.4836	0.4076	OK	1028	I[11]	scLCB8	0.7863	0.0000	0.4286	OK	1028
S1-L	Pos	1009	J[118]	scLCB5	-	0.2945	0.4905	OK	1028	I[11]	scLCB8	0.7863	0.0000	0.4286	OK	1009
S1-R	Neg	1029	J[11]	scLCB5	0.3837	0.4039	0.3461	OK	1054	I[7]	scLCB8	0.0008	0.0000	0.3258	OK	1029
S1-R	Pos	1045	J[59]	scLCB5	-	0.2262	0.3849	OK	1054	I[7]	scLCB8	0.0008	0.0000	0.3258	OK	1046
S2-L	Neg	2028	I[10]	scLCB5	0.6031	0.6349	0.5202	OK	2028	I[10]						
S2-L	Pos	2009	J[104]	scLCB5	-	0.2071	0.4666	OK	2028	I[10]						
S2-R	Neg	2029	J[10]	scLCB5	0.5615	0.5910	0.4875	OK	2054	I[6]						
S2-R	Pos	2046	J[283]	scLCB5	-	0.1590	0.4058	OK	2054	I[6]						
S3-L	Neg	3028	I[9]	scLCB5	0.6366	0.6063	0.4410	OK	3028	I[9]						
S3-L	Pos	3009	I[327]	scLCB5	-	0.1026	0.4215	OK	3028	I[9]						
S3-R	Neg	3029	J[9]	scLCB5	0.6526	0.6157	0.4431	OK	3054	I[5]						
S3-R	Pos	3046	J[270]	scLCB5	-	0.1047	0.4211	OK	3054	I[5]						
S4-L	Neg	4028	I[8]	scLCB5	0.6052	0.5873	0.4366	OK	4028	I[8]						
S4-L	Pos	4010	I[75]	scLCB5	-	0.1100	0.4305	OK	4028	I[8]						
S4-R	Neg	4029	J[8]	scLCB5	0.6443	0.6350	0.4805	OK	4054	I[2]						
S4-R	Pos	4052	I[19]	scLCB4	-	0.0493	0.3687	OK	4054	I[2]						

Check Span

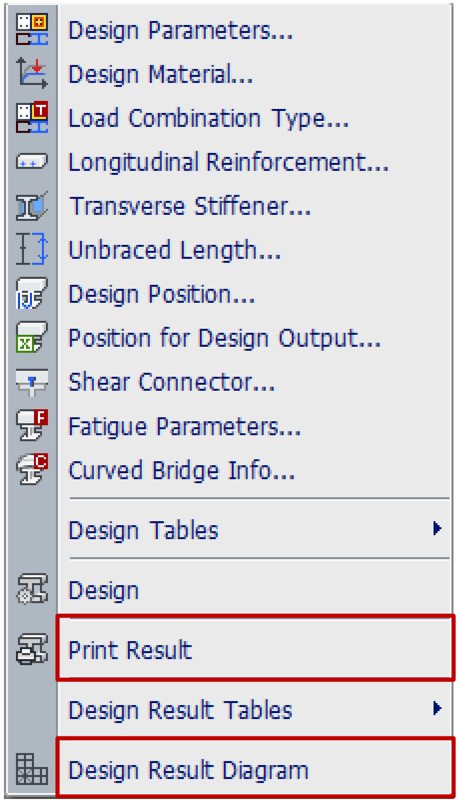
- Span Checking...
- Total Checking...
- Strength Limit State(Flexure)...
- Strength Limit State(Shear)...
- Service Limit State...
- Fatigue Limit State...
- Constructibility(Flexure)...
- Constructibility(Shear)...
- Shear Connector...
- Longitudinal Stiffener...

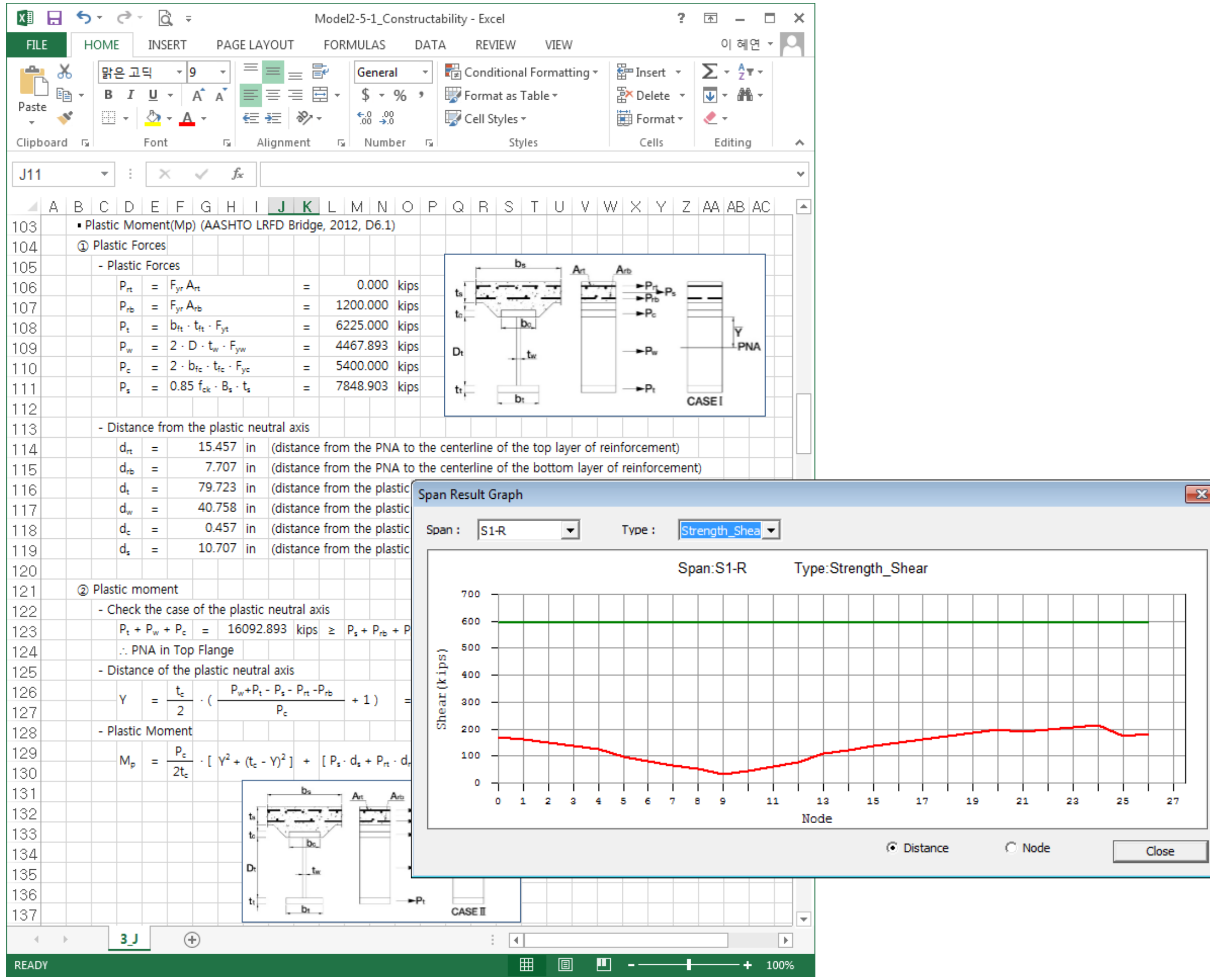
Total Checking

Elem	part	Positive/Negative	CHK	Strength Limit(Flexure) Lcom	Mu/phiMn	Strength Limit(Shear) Lcom	Vu/phiVn	bt	lt	Service Limit Lcom	tcw Ratio	tcf Ratio	tft Ratio	Fatigue Lcom	Gamma(Delta Ratio			
1015	J[115]	Pos	OK	scLCB1	0.3823	scLCB1	0.2752	OK	OK	scLCB5	-	0.2018	0.2752	scLCB8	0.5			
1016	I[114]	Neg	OK	-	-	scLCB1	0.3168	OK	OK	-	-	-	-	scLCB8	0.4			
1016	I[114]	Pos	OK	scLCB1	0.2986	scLCB1	0.3168	OK	OK	scLCB5	-	0.1259	0.2304	scLCB8	0.4			
1016	J[352]	Neg	OK	-	-	scLCB1	0.2981	OK	OK	-	-	-	-	scLCB8	0.5274	0.3862	CS2	0.0000
1016	J[352]	Pos	OK	scLCB1	0.3412	scLCB1	0.2981	OK	OK	scLCB5	-	0.1656	0.2617	scLCB8	0.5274	0.3862	CS4	0.2487
1017	I[351]	Neg	OK	-	-	scLCB1	0.3461	OK	OK	scLCB6	0.0097	0.0103	0.0555	scLCB8	0.4295	0.4403	CS2	0.0000
1017	I[351]	Pos	OK	scLCB1	0.2193	scLCB1	0.3461	OK	OK	scLCB5	-	0.0833	0.1569	scLCB8	0.4295	0.4403	CS4	0.1343
1017	J[114]	Neg	OK	-	-	scLCB1	0.3274	OK	OK	-	-	-	-	scLCB8	0.4828	0.4178	CS2	0.0000
1017	J[114]	Pos	OK	scLCB1	0.3111	scLCB1	0.3274	OK	OK	scLCB5	-	0.1261	0.2346	scLCB8	0.4828	0.4178	CS4	0.1938
1018	I[113]	Neg	OK	scLCB1	0.0537	scLCB1	0.3687	OK	OK	scLCB5	0.0629	0.0332	0.0100	scLCB8	0.3787	0.4678	CS2	0.0000
1018	I[113]	Pos	OK	scLCB1	0.1335	scLCB1	0.3687	OK	OK	scLCB5	-	0.0376	0.0569	scLCB8	0.3787	0.4678	CS4	0.0702
1018	J[351]	Neg	OK	-	-	scLCB1	0.3500	OK	OK	scLCB6	0.0096	0.0101	0.0554	scLCB8	0.4311	0.4454	CS2	0.0000
1018	J[351]	Pos	OK	scLCB1	0.2299	scLCB1	0.3500	OK	OK	scLCB5	-	0.0833	0.1639	scLCB8	0.4311	0.4454	CS4	0.1343
1019	I[350]	Neg	OK	scLCB1	0.1085	scLCB1	0.3783	OK	OK	scLCB5	0.0927	0.0639	0.0303	scLCB8	0.3131	0.4748	CS2	0.0000
1019	I[350]	Pos	OK	scLCB1	0.0777	scLCB1	0.3783	OK	OK	scLCB5	-	0.0076	0.0404	scLCB8	0.3131	0.4748	CS4	0.0072
1019	J[113]	Neg	OK	scLCB1	0.0535	scLCB1	0.3595	OK	OK	scLCB5	0.0642	0.0335	0.0098	scLCB8	0.3792	0.4523	CS2	0.0000
1019	J[113]	Pos	OK	scLCB1	0.1345	scLCB1	0.3595	OK	OK	scLCB5	-	0.0373	0.0555	scLCB8	0.3792	0.4523	CS4	0.0698
1020	I[112]	Neg	OK	scLCB1	0.1678	scLCB1	0.3988	OK	OK	scLCB5	0.0984	0.0979	0.0738	scLCB8	0.2619	0.4996	CS2	0.0000

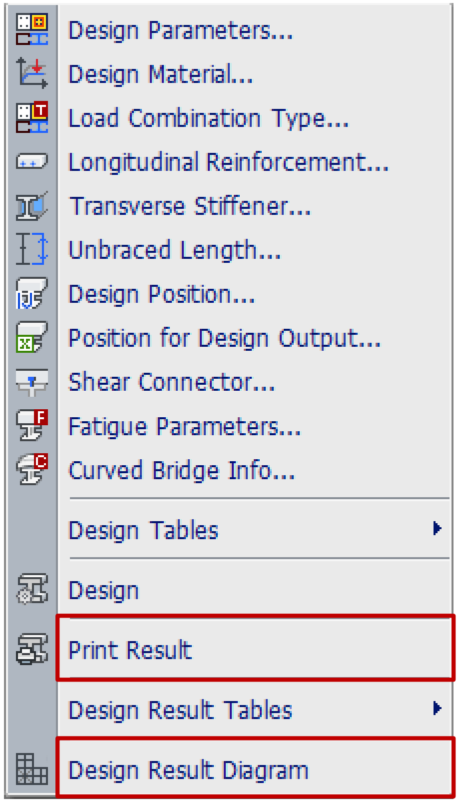
Check Element

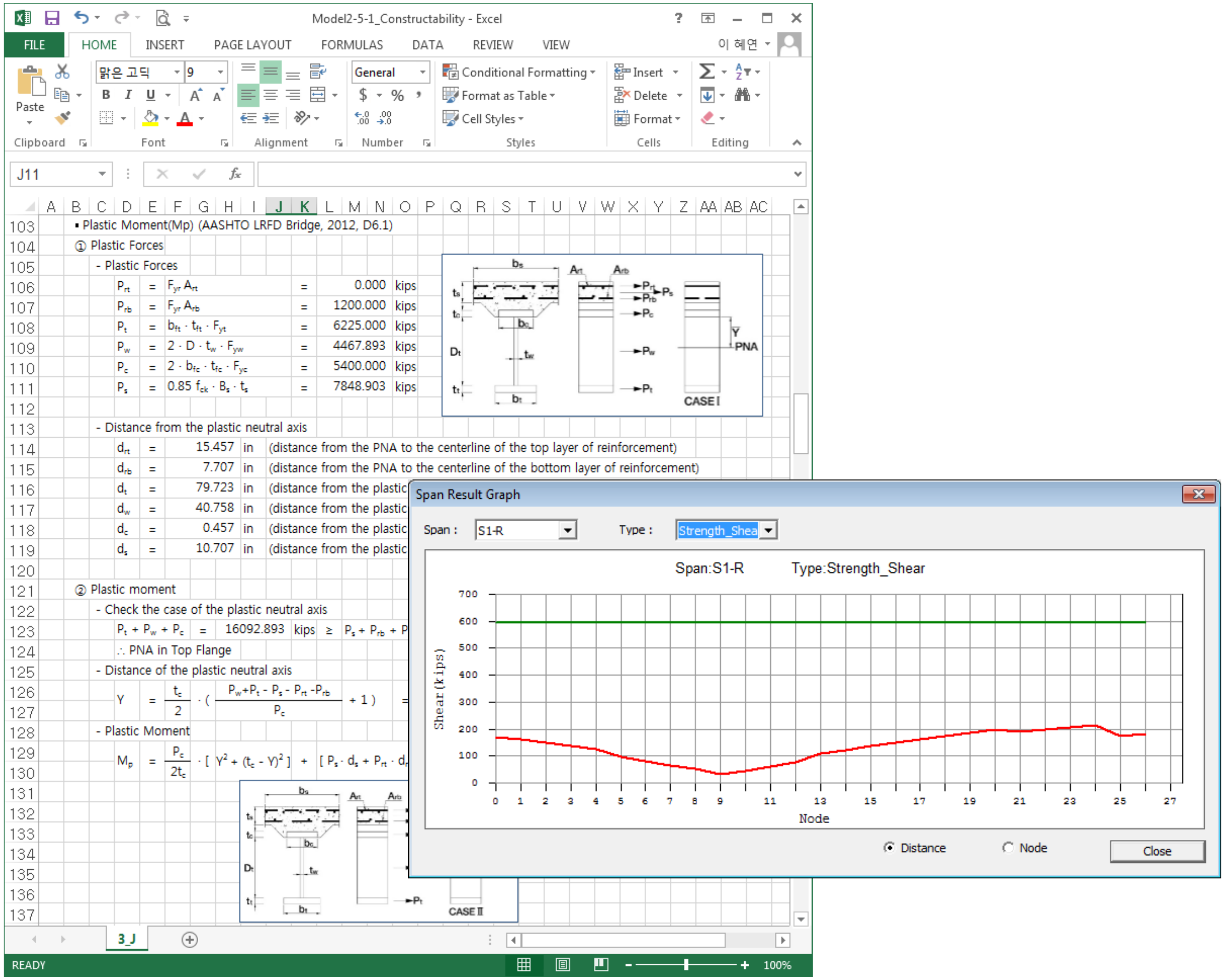
Composite Girder Design as per AASHTO LRFD 12– *Excel Report and Result Diagram*



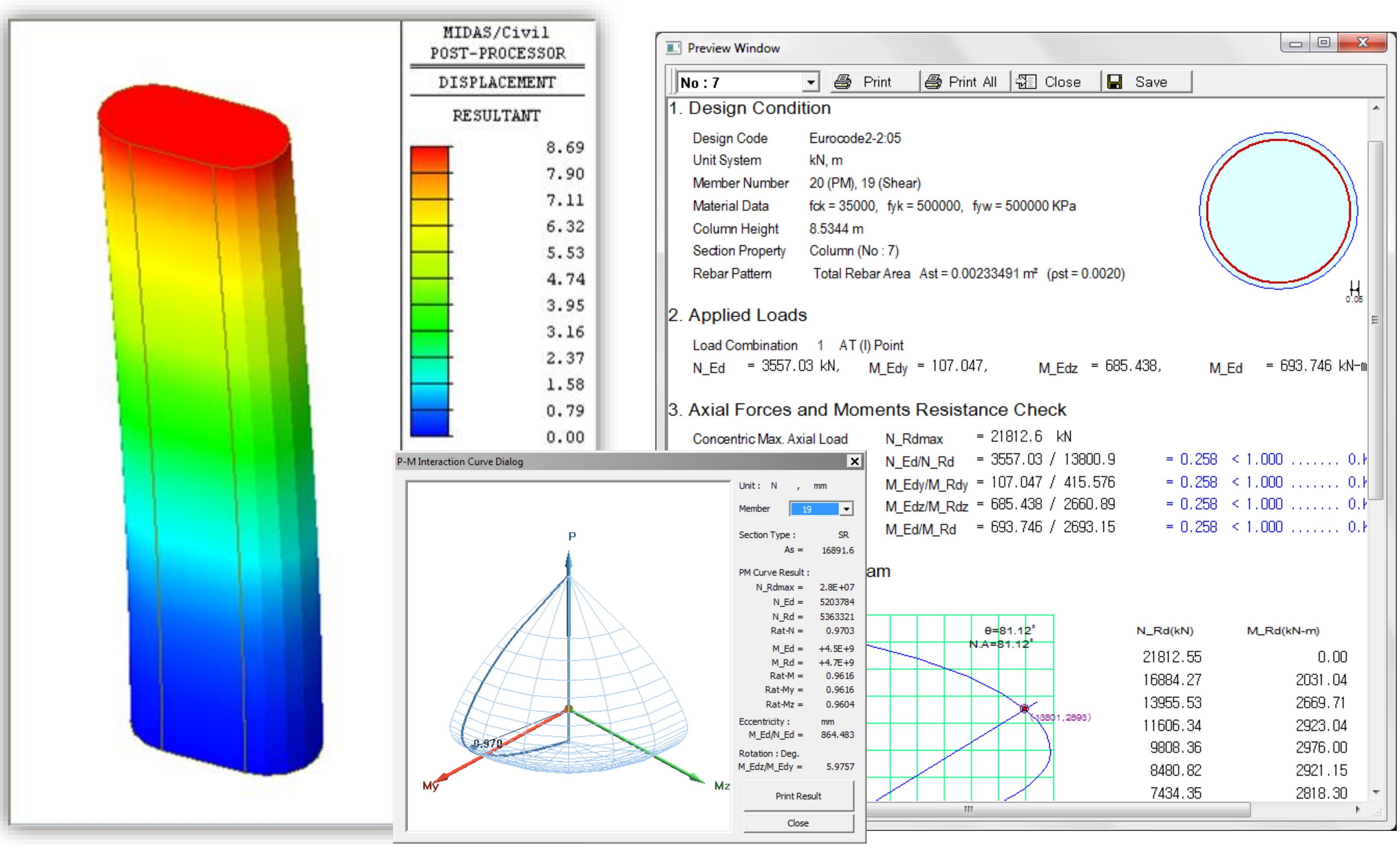


Composite Girder Design as per AASHTO LRFD 12– *Excel Report and Result Diagram*





Reinforced Concrete Design as per Eurocode2-2:05 – *Design Report*



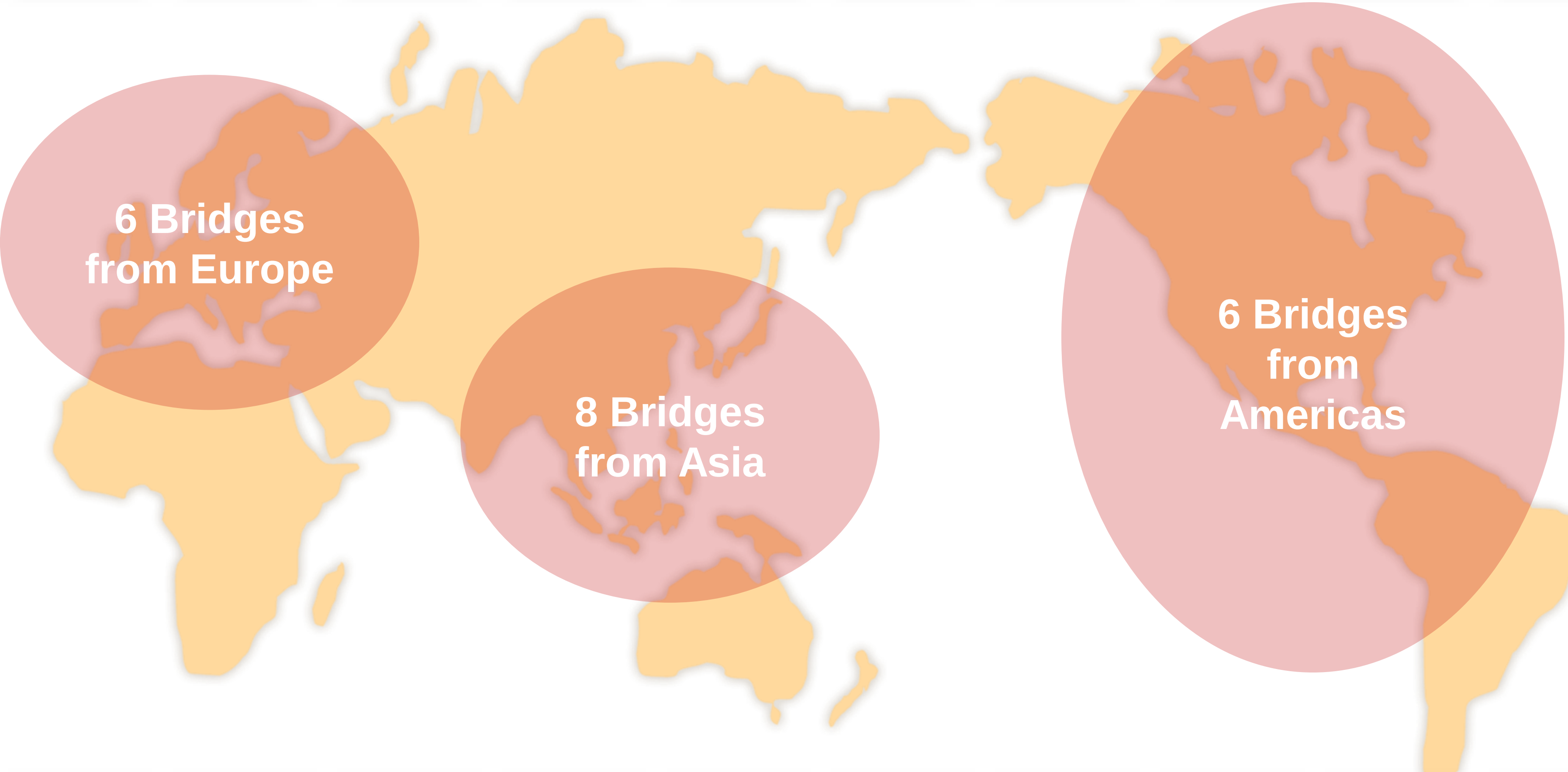
20 Bridge Project Applications selected worldwide









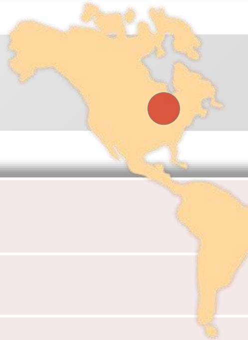


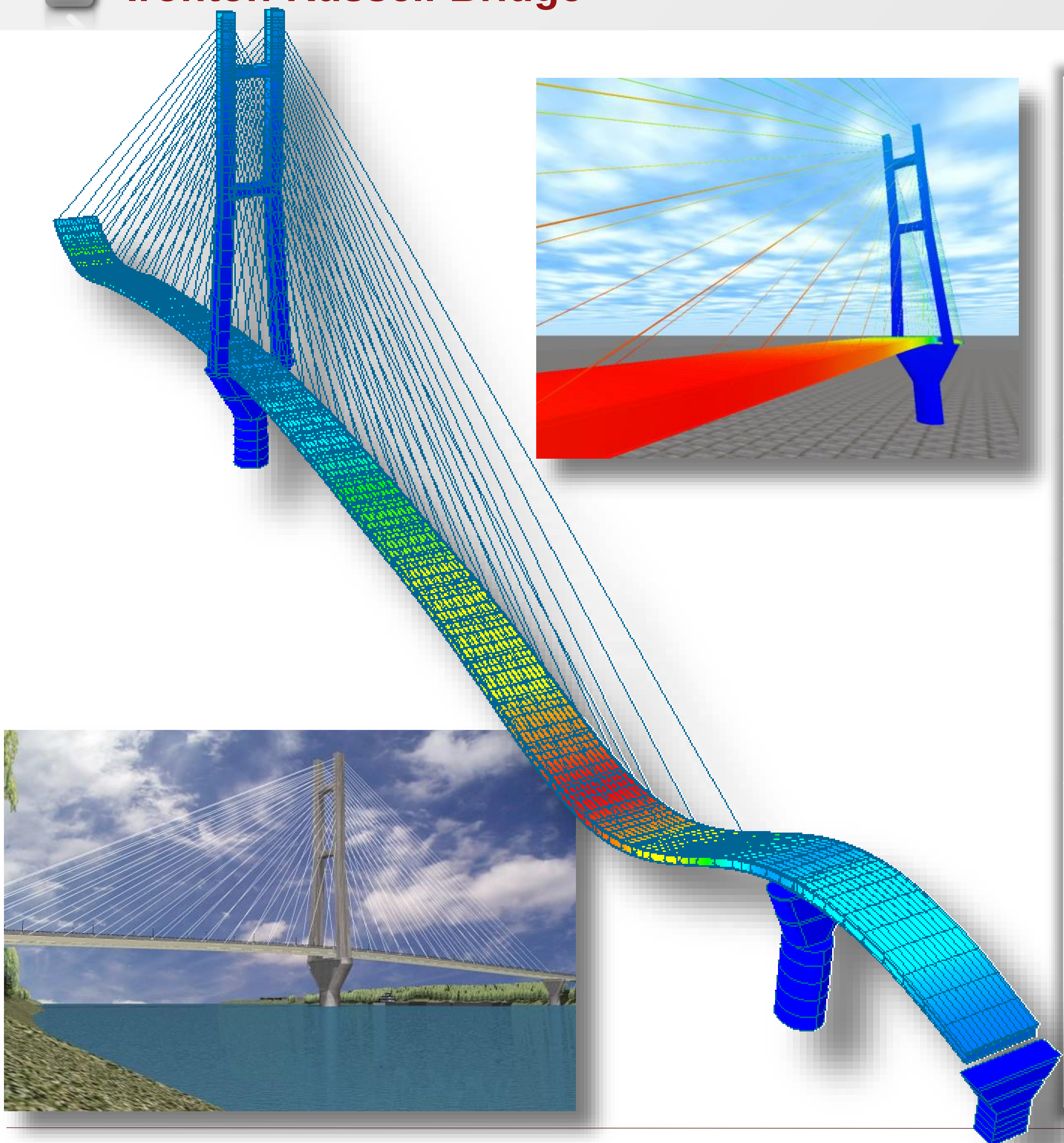






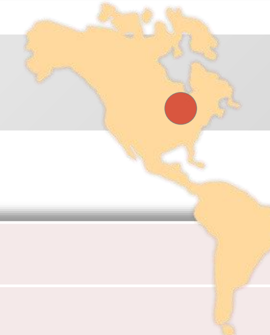

Ironton-Russell Bridge

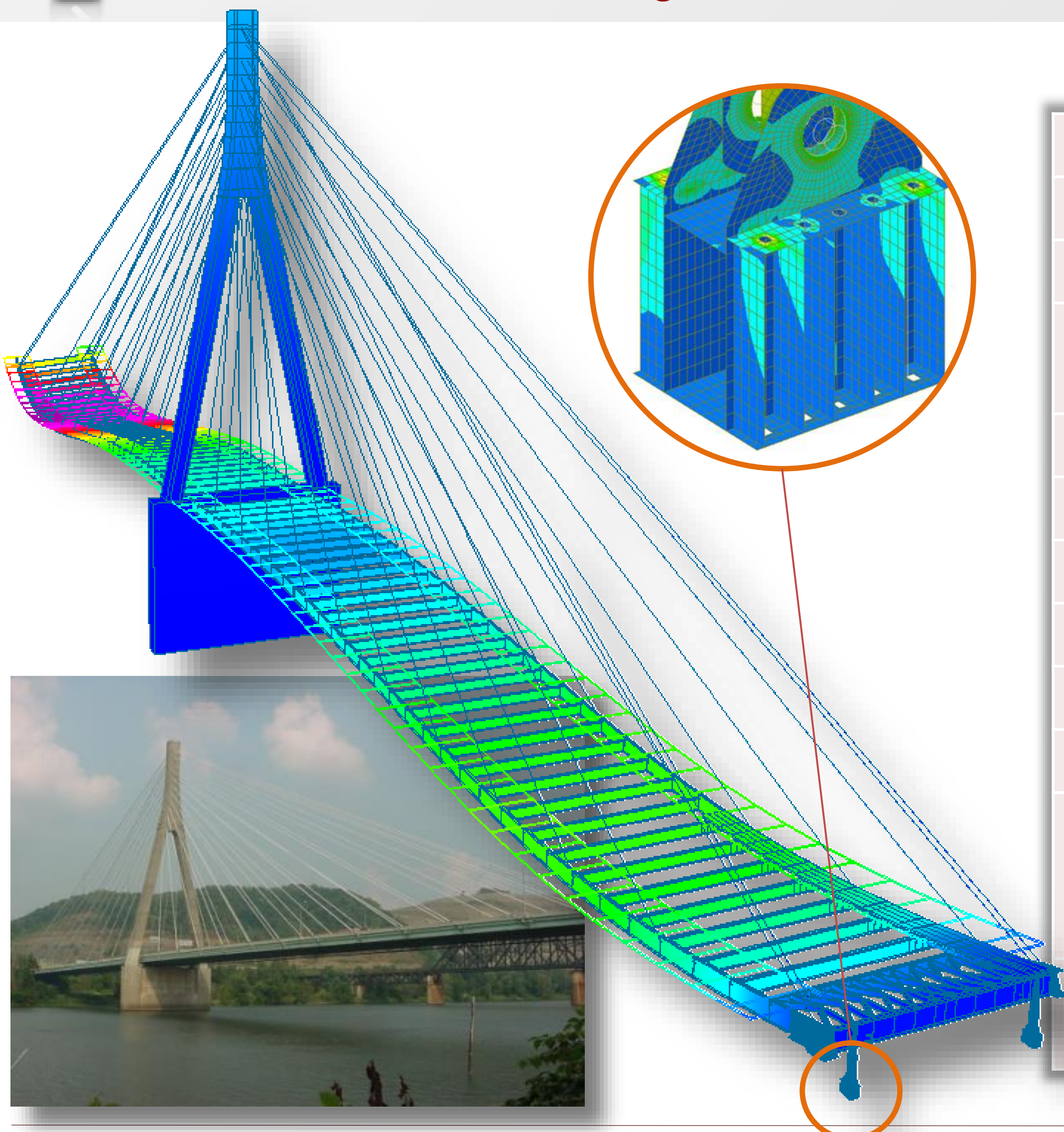




Overall bridge length	1,900 ft
Main span	950 ft
Tower height	519 ft
Location	Crossing the Ohio River between Ironton and Russell
Function/usage	Roadway Bridge
Designer	Michael Baker, Jr., Inc.
Cost of construction	$110 Million
Number of elements and element types used	Truss (Cable): 70 Beam: 2088 Shell: 2730
Type of analysis	Construction Stage Analysis with Time-Dependent Effects Unknown Load Factor Analysis Eigenvalue Analysis Thermal Analysis Vehicle Load Optimization

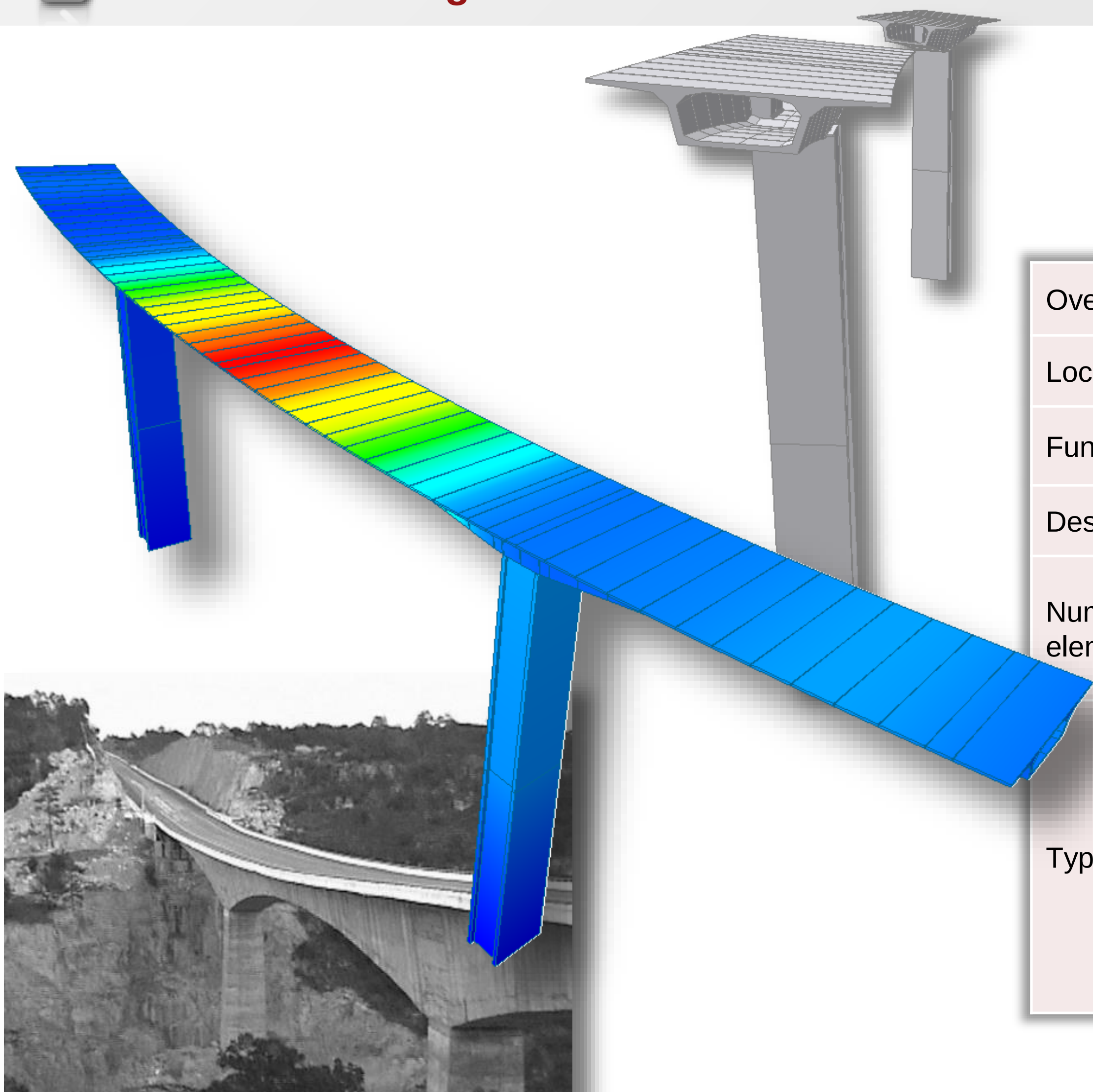
Weirton-Steubenville Bridge





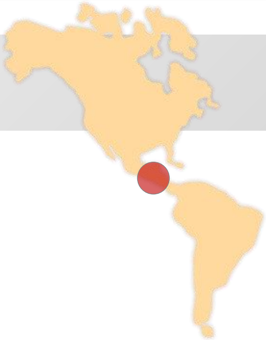
Overall bridge length	1,965 ft
Main span	820 ft
Tower height	365 ft
Location	Crossing the Ohio River between Weirton (West Virginia) and Steubenville (Ohio)
Function/usage	Roadway Bridge
Contractor	S.J. Groves & Sons Co.
Designer	Michael Baker, Jr., Inc.
Consultant	T.Y. Lin International
Year of completion	1989 (Health Monitoring, 2005)
Cost of construction	$30 Million
Number of elements and element types used	Truss (Cable): 52 Beam: 484 Shell: 13312
Type of analysis	Construction Stage Analysis Cable Tension Optimization

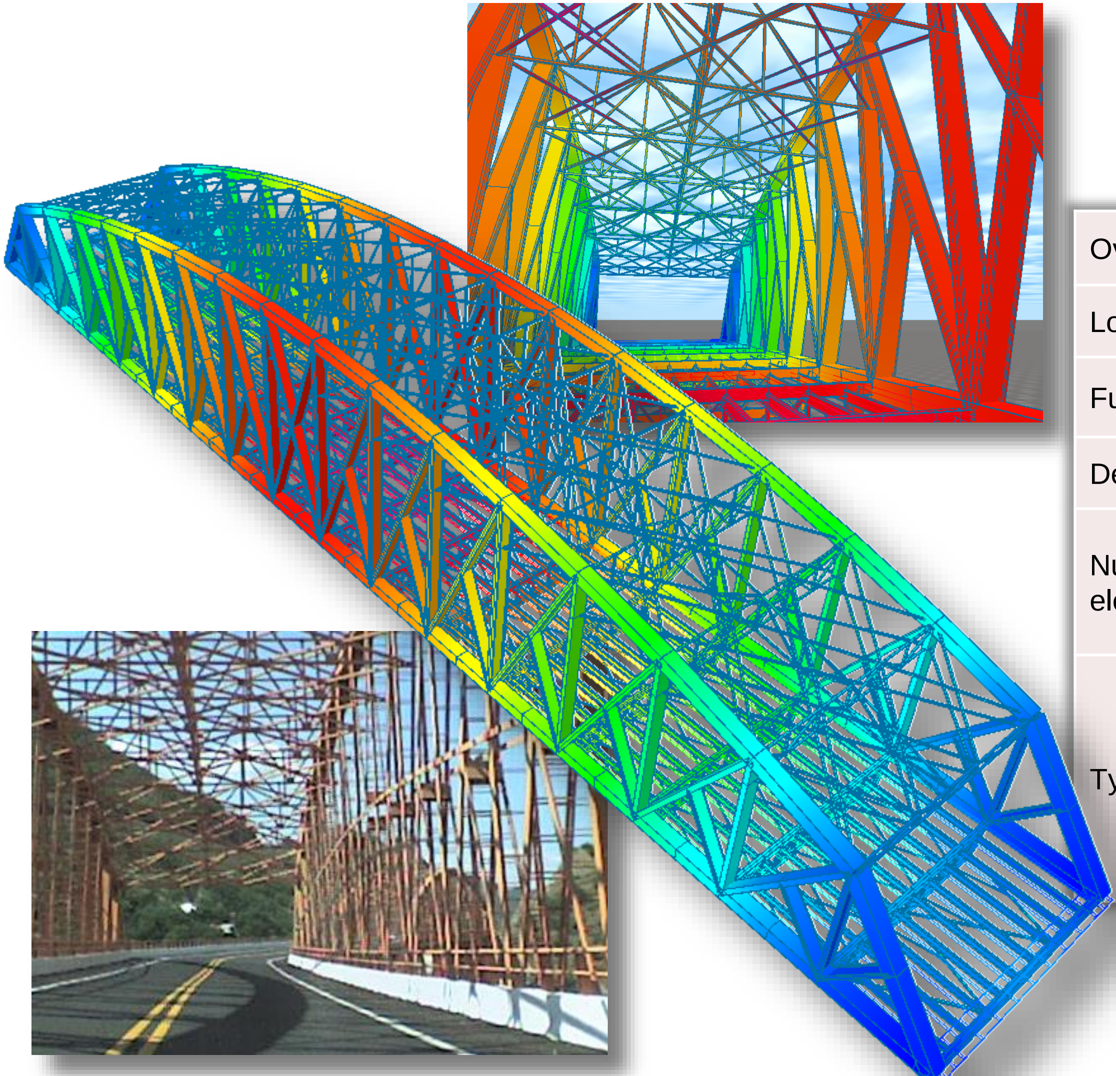
La Jabalina Bridge



Overall bridge length	191 m
Location	Durango
Function/usage	Roadway Bridge
Designer	TRIADA SA de CV
Number of elements and element types used	Beam: 63 Tendon Profile: 64
Type of analysis	Construction Stage Analysis with Time-Dependent Effects Response Spectrum Analysis Eigen Value Analysis Vehicle Load Optimization

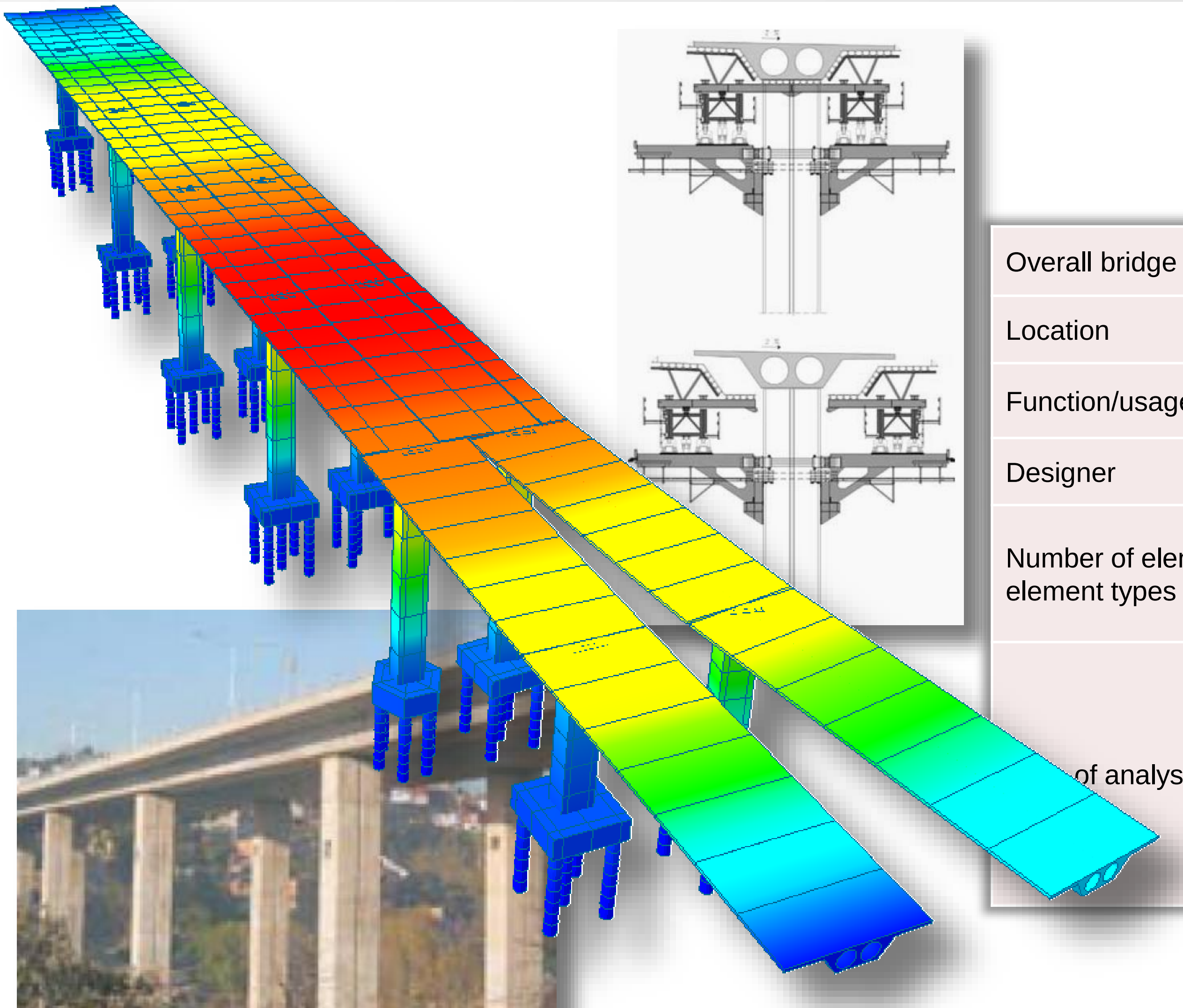
El Marquéz Bridge





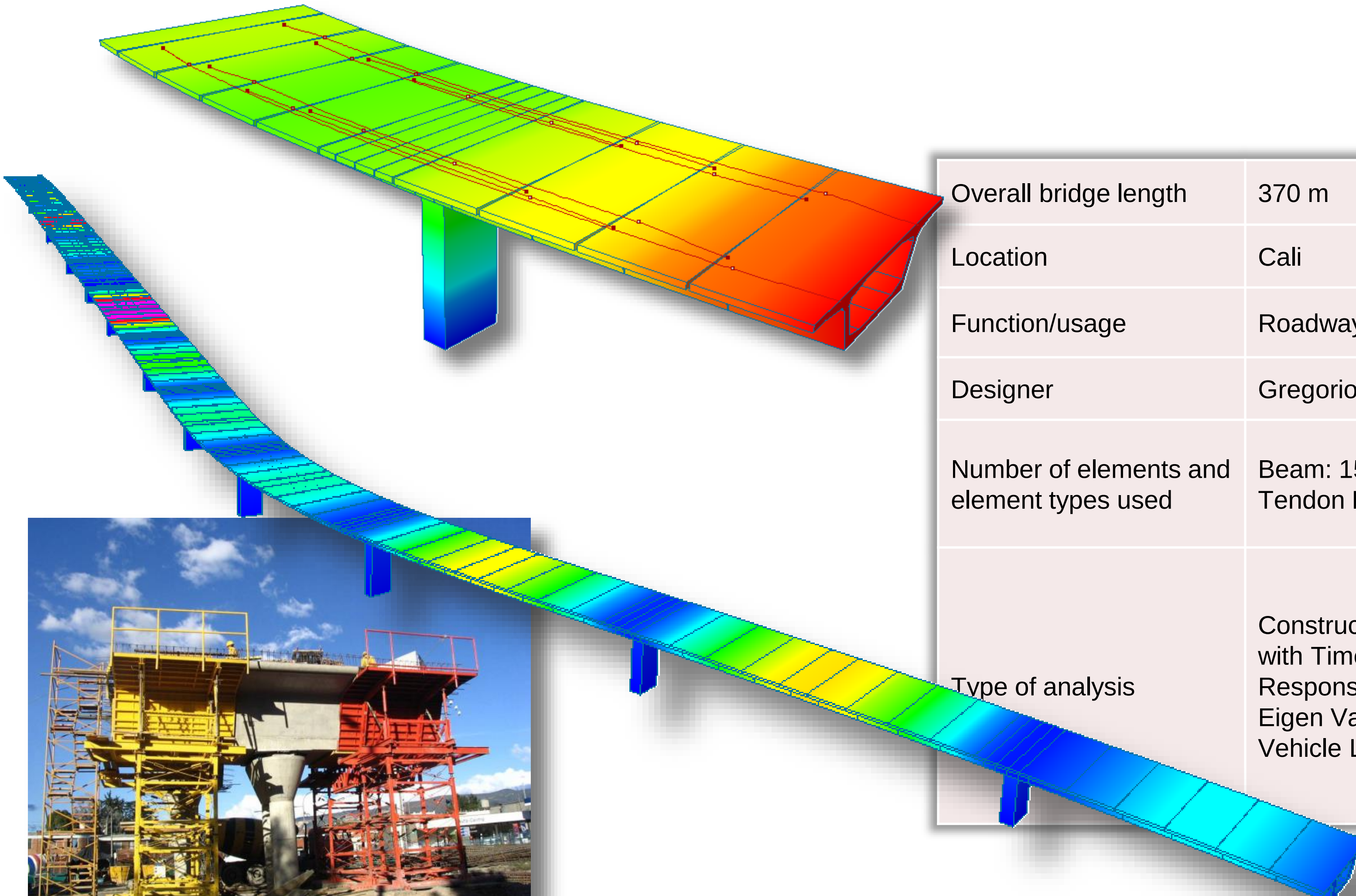
Overall bridge length	102 m
Location	Michoacán
Function/usage	Roadway Bridge
Designer	COPECSA de CV
Number of elements and element types used	Beam: 2224
Type of analysis	Response Spectrum Analysis Eigen Value Analysis Vehicle Load Optimization

Tarango Bridge



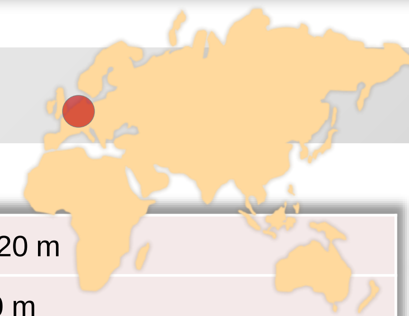
Overall bridge length	206 m
Location	Mexico City
Function/usage	Roadway Bridge
Designer	Carlos Fernandez Casado S de RL
Number of elements and element types used	Truss (Cable): 176 Beam: 1653
of analysis	Construction Stage Analysis with Time-Dependent Effects Response Spectrum Analysis Eigen Value Analysis Vehicle Load Optimization

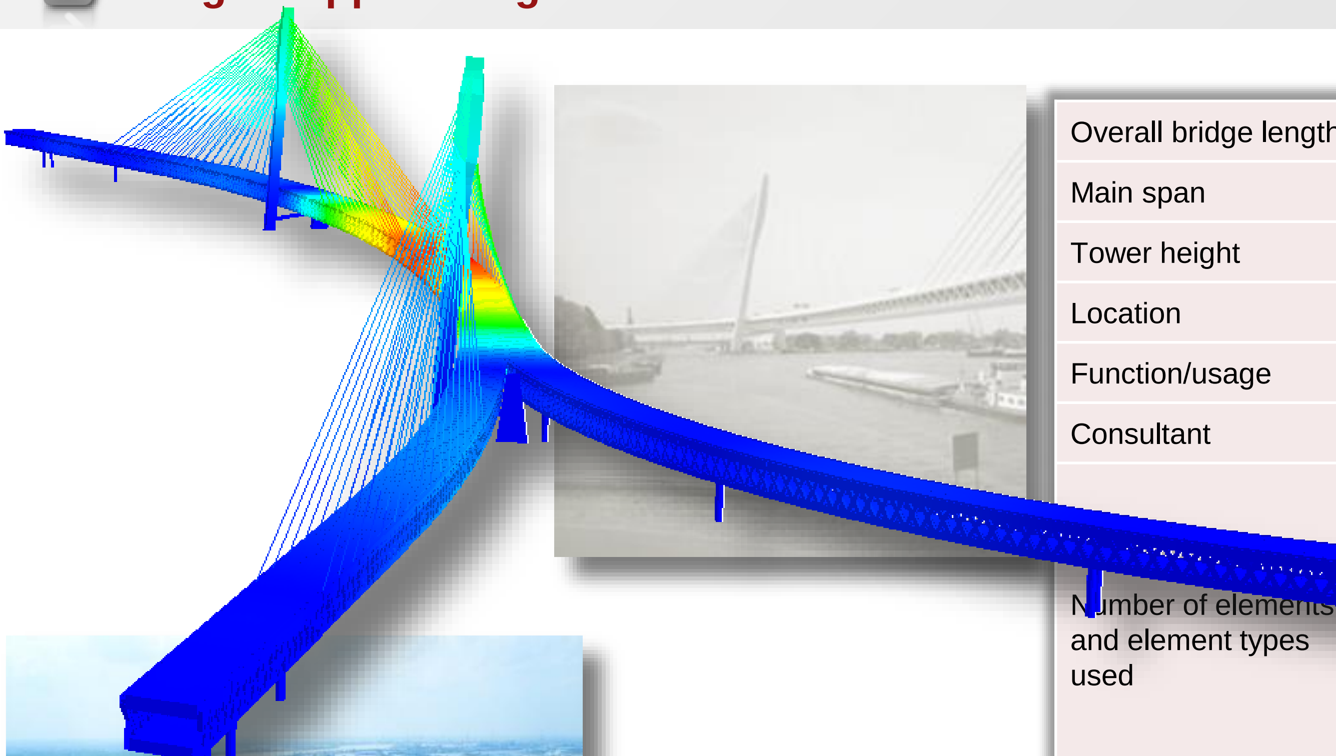
Avenida Suba - Avenida Boyacá Bridge



Overall bridge length	370 m
Location	Cali
Function/usage	Roadway Bridge
Designer	Gregorio Renteria
Number of elements and element types used	Beam: 153 Tendon Profile: 140
Type of analysis	Construction Stage Analysis with Time-Dependent Effects Response Spectrum Analysis Eigen Value Analysis Vehicle Load Optimization

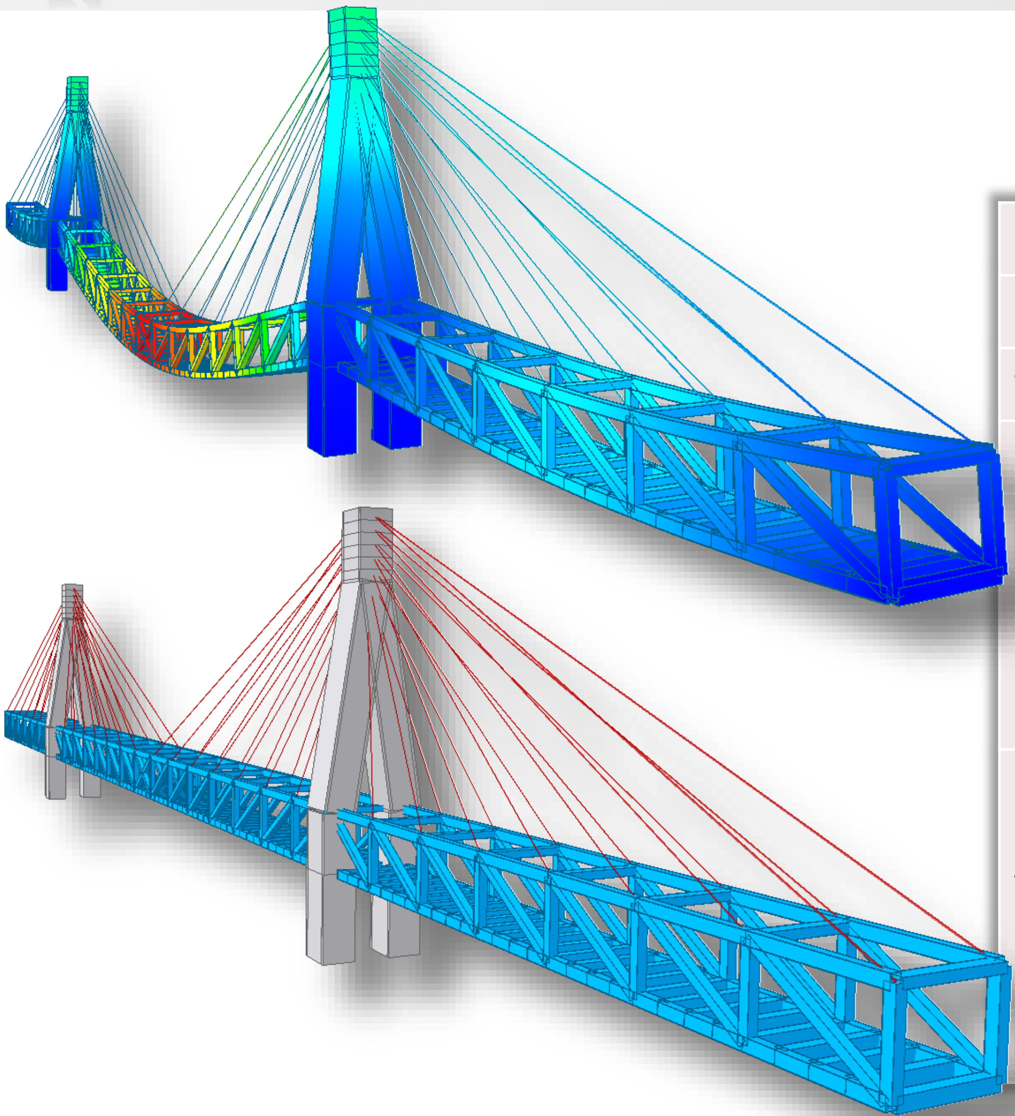
Lange Wapper Bridge





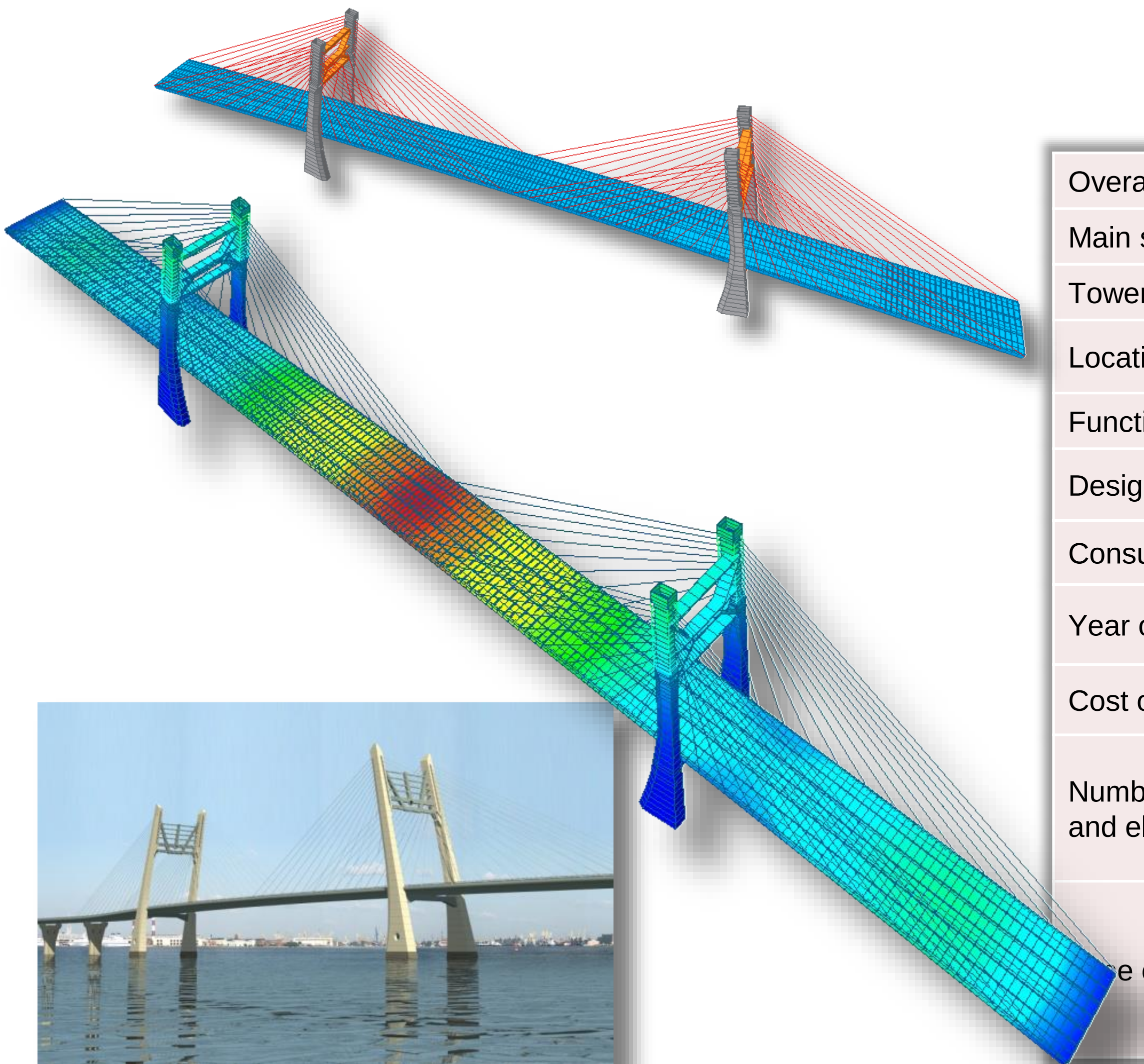
Overall bridge length	1,520 m
Main span	600 m
Tower height	150 m
Location	Antwerp
Function/usage	Roadway Bridge
Consultant	IC+E, TUDelft
Number of elements and element types used	Solid: 7930 (concrete deck) Shell: 7733 (crossbeam’s web) Beam: 20151 (crossbeam’s flange, truss’s top and bottom chord and diagonal) Truss: 128 (Stay cables)
Type of analysis	Construction Stage Analysis Cable Tension Optimization Vehicle Load Optimization
FE model by	N. Löfgren

TU Delft / Movares Research Project on Train-Structure Interaction



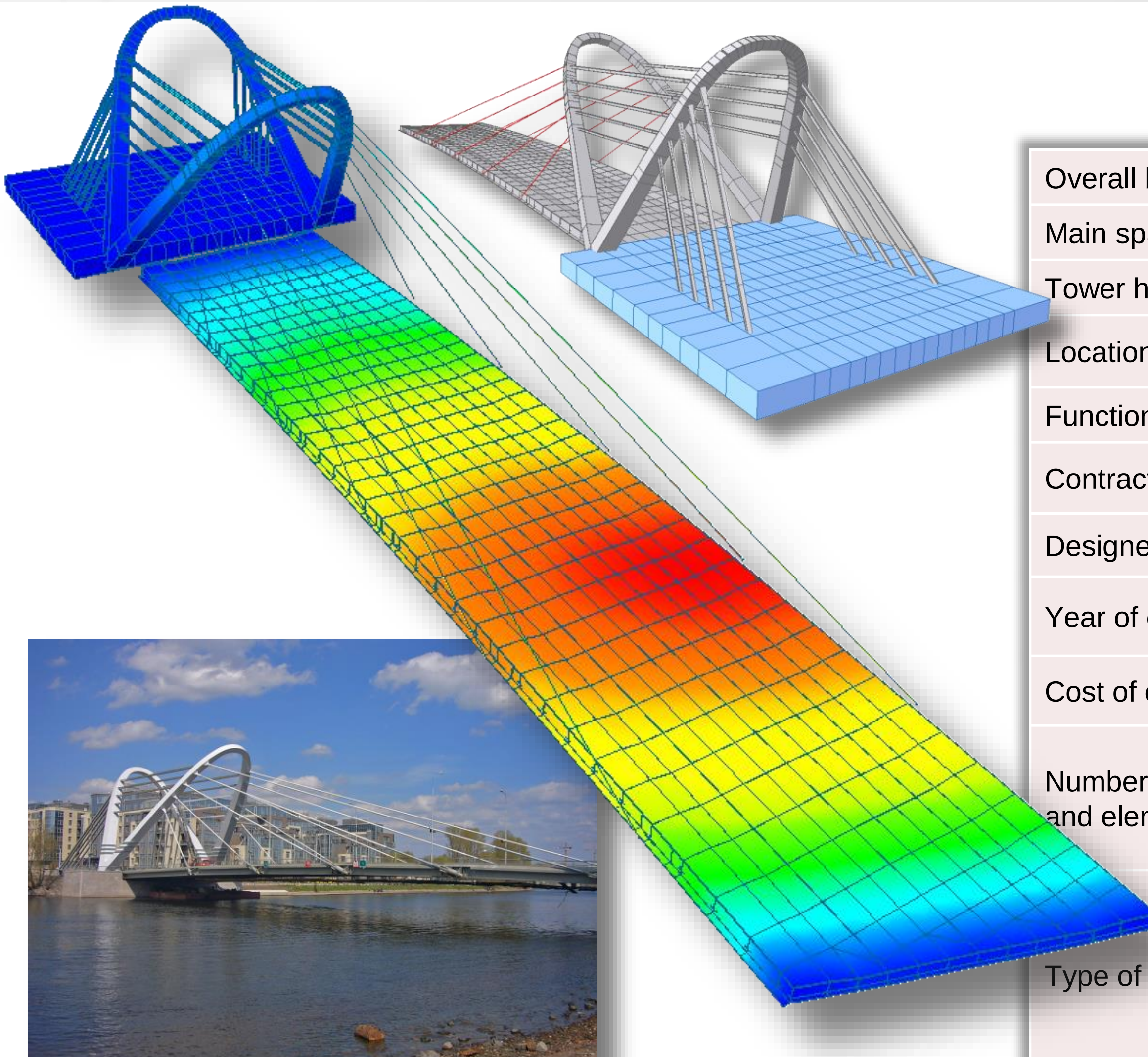
Overall bridge length	400 m
Main span	200 m
Tower height	75 m (60 m above the deck)
Function/usage	Railway Bridge
Consultant	Movares Nederland BV
Number of elements and element types used	Truss: 56 (Stay cables) Beam: 582 (Deck and Tower)
type of analysis	Static Analysis Vehicle Load Optimization Time History Analysis
FE model by	A. Steenbrink

Korabelny Farvater Bridge



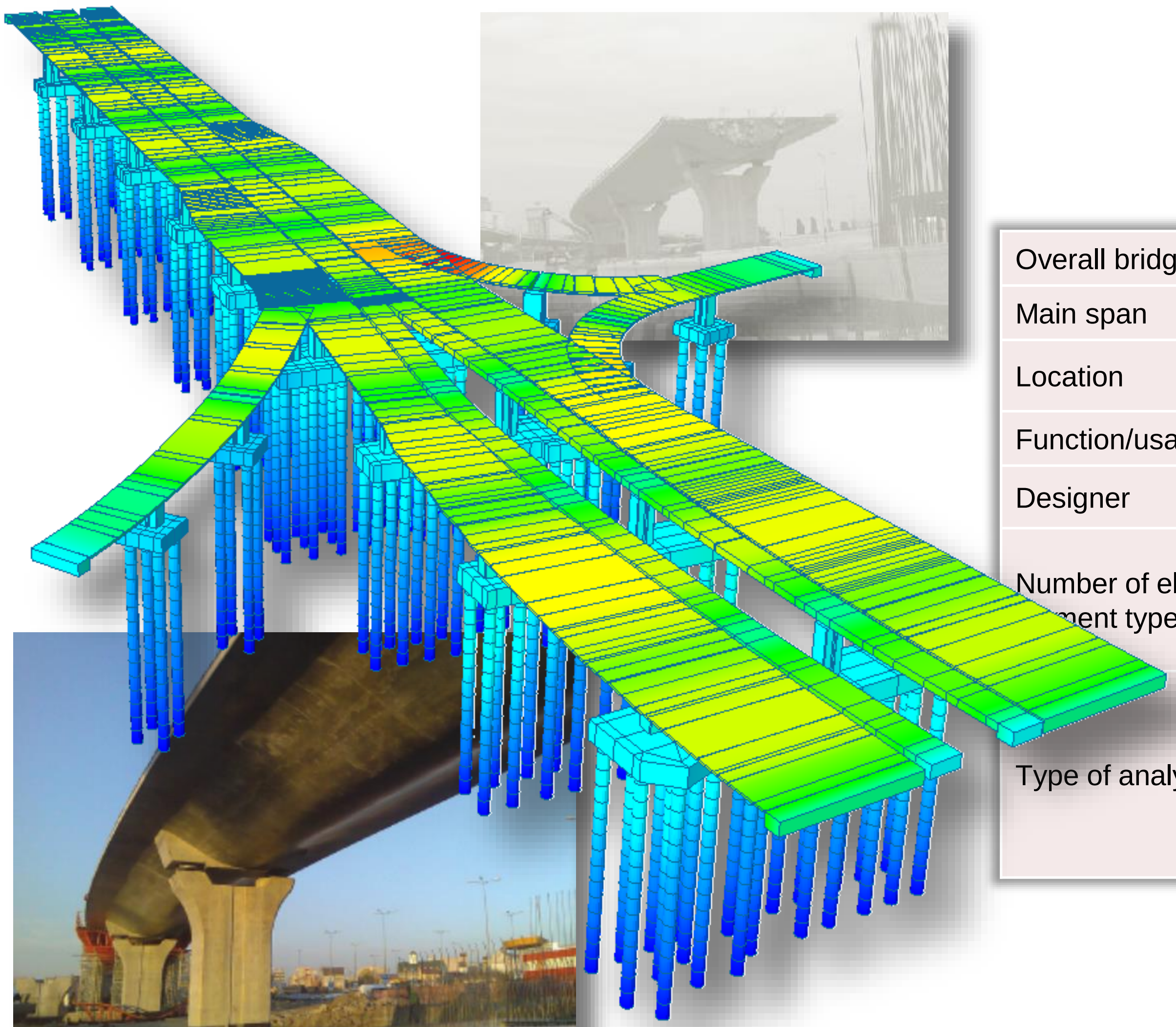
Overall bridge length	620 m
Main span	310 m
Tower height	128 m
Location	Saint-Petersburg
Function/usage	Roadway Bridge
Designer	Institute Strojproject
Consultant	Freyssinet International
Year of completion	Under design
Cost of construction	$ 20 Million
Number of elements and element types used	Truss (Cable): 104 Beam: 4063 Shell: 2288
e of analysis	Static Analysis Vehicle Load Optimization Eigenvalue Analysis

Lazarevsky Bridge



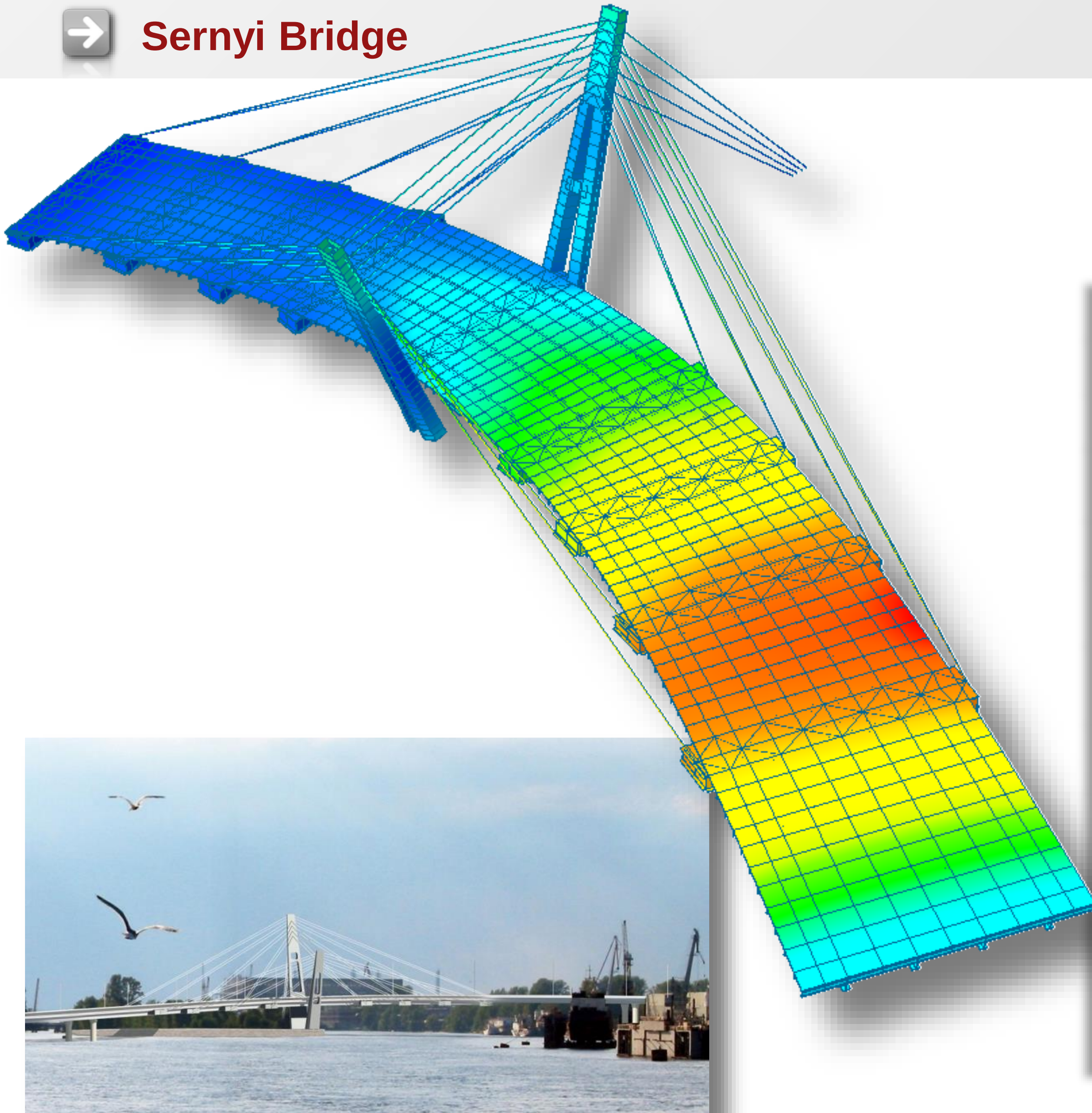
Overall bridge length	120 m
Main span	120 m
Tower height	26 m
Location	Saint-Petersburg
Function/usage	Roadway Bridge
Contractor	Mostostroj 6
Designer	Institute Strojproject
Year of completion	2009
Cost of construction	$ 30 Million
Number of elements and element types used	Truss: 10 Beam: 903 Shell: 637
Type of analysis	Static Analysis Vehicle Load Optimization Eigenvalue Analysis Construction Stage Analysis

Basarab viaduct Bridge



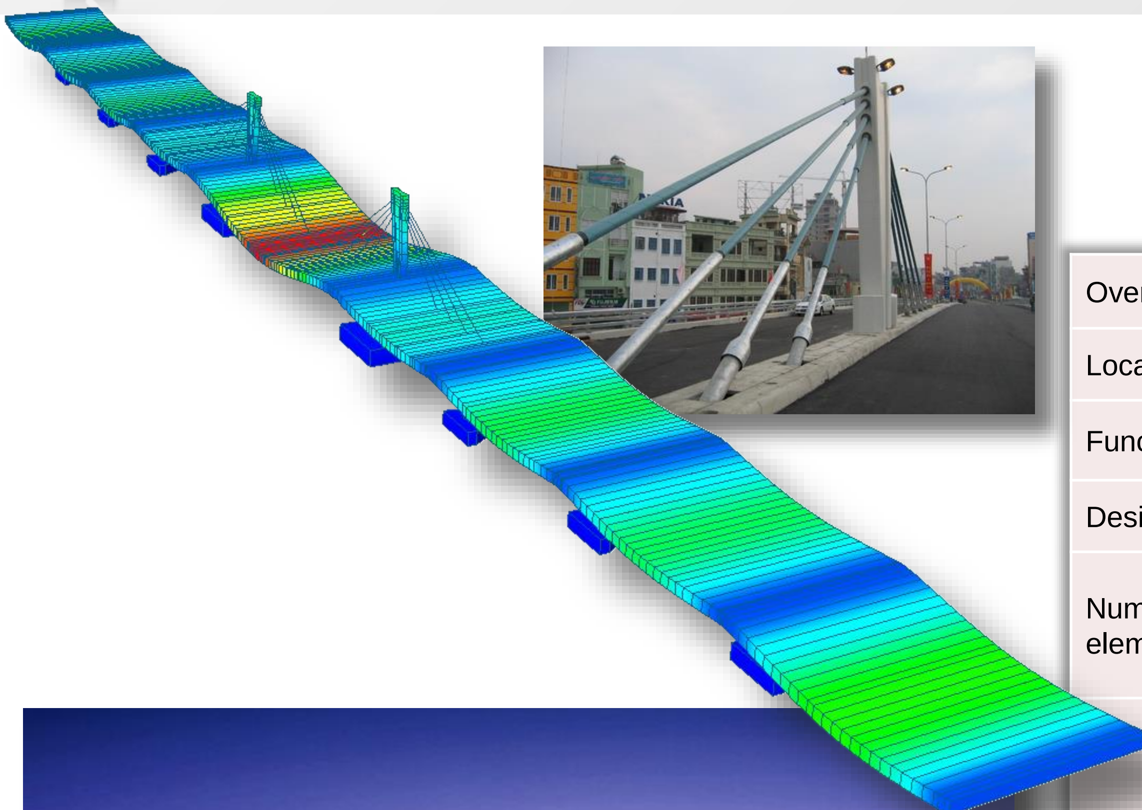
Overall bridge length	1478.5 m
Main span	125 m
Location	Bucharest
Function/usage	Roadway / Tramway Bridge
Designer	C&T Enginreering Srl
Number of elements and element types used	Beam: 3073 Plate: 549
Type of analysis	Nonlinear dynamic time history analysis with Lead Rubber Bearing Isolators (LRB) and Viscous Dampers

Sernyi Bridge



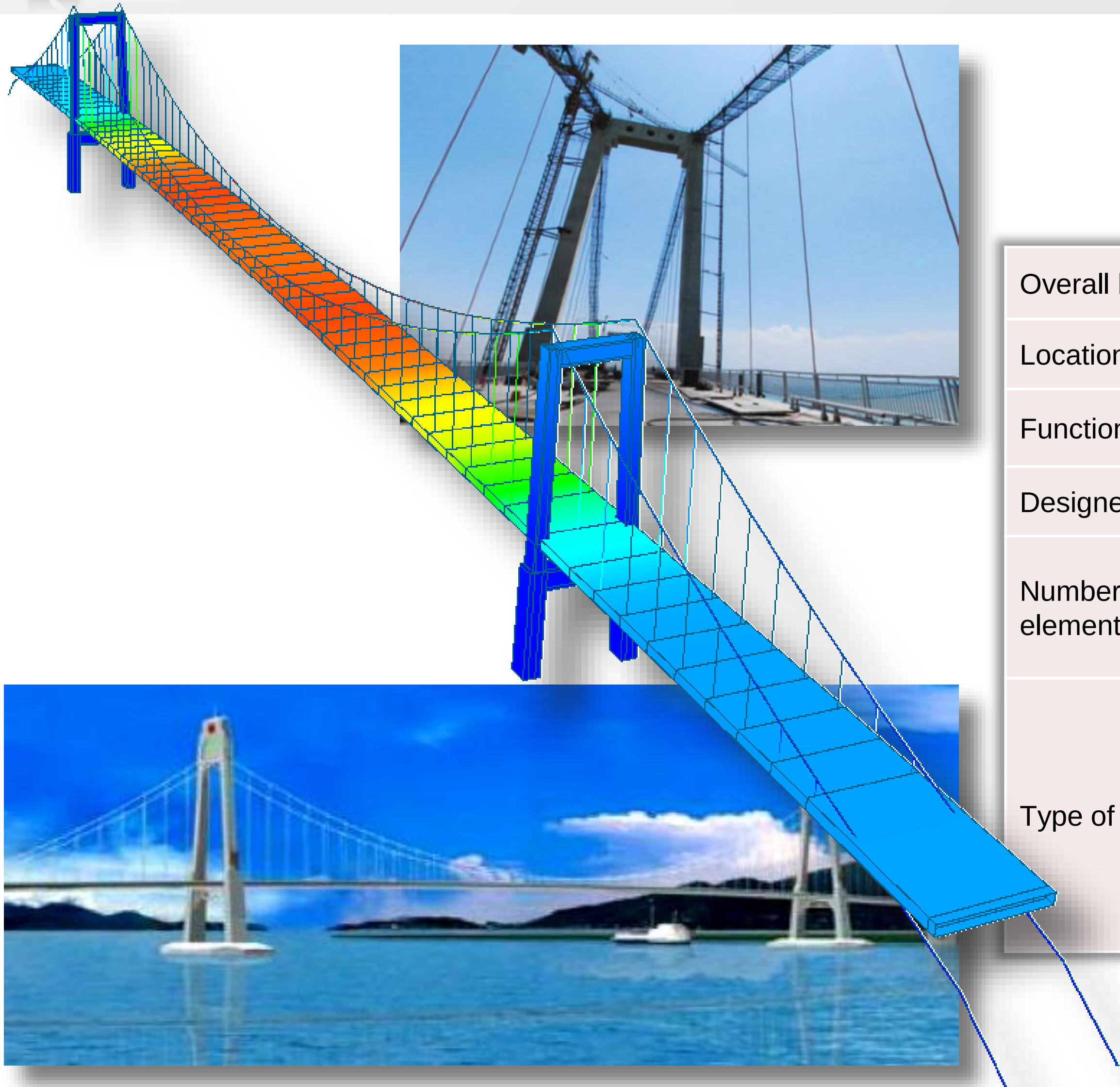
Overall bridge length	248 m
Main span	144 m
Tower height	66 m and 48 m
Location	Saint-Petersburg
Function/usage	Roadway Bridge
Designer	Institute Strojproject
Year of completion	Under design
Cost of construction	$ 50 Million
Number of elements and element types used	Truss (Cable): 40 Beam: 1633 Shell: 926
Type of analysis	Static Analysis Vehicle Load Optimization

Nga Tu So Overfly Bridge



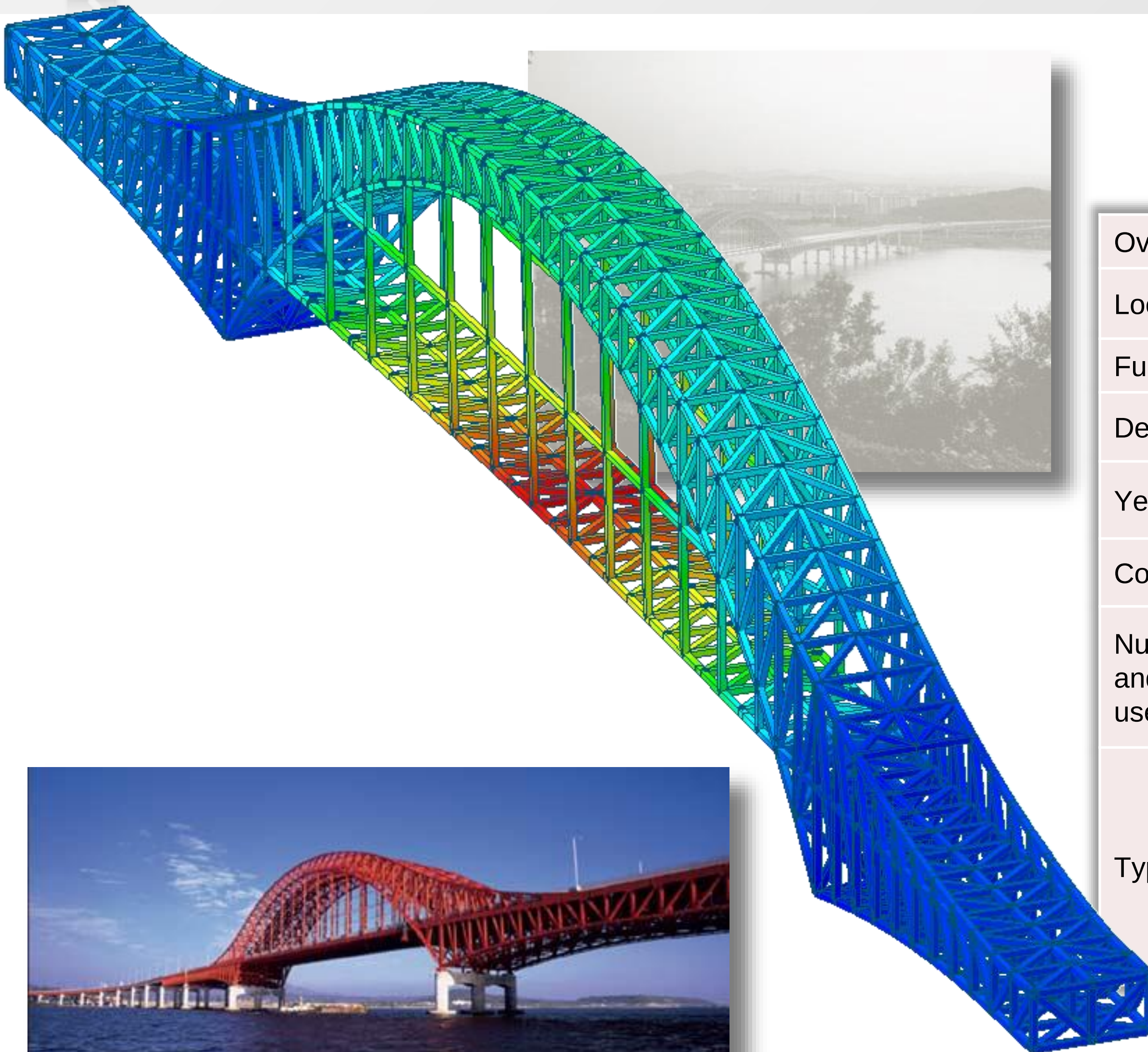
Overall bridge length	189 m
Location	HaNoi
Function/usage	Roadway Bridge
Designer	VINACONEX, CIPHanoi
Number of elements and element types used	Truss (Cable): 16 Beam: 308
Type of analysis	Construction Stage Analysis with Time-Dependent Effects Response Spectrum Analysis Eigen Value Analysis Vehicle Load Optimization

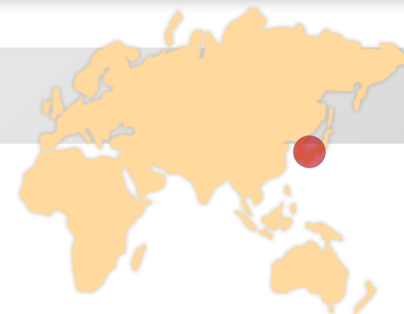
Thuan Phuoc Bridge



Overall bridge length	654 m
Location	Da Nang
Function/usage	Roadway Bridge
Designer	Tecco533, CIPHanoi
Number of elements and element types used	Truss (Cable): 266 Beam: 82
Type of analysis	Response Spectrum Analysis Eigen Value Analysis Large Displacement Analysis Vehicle Load Optimization

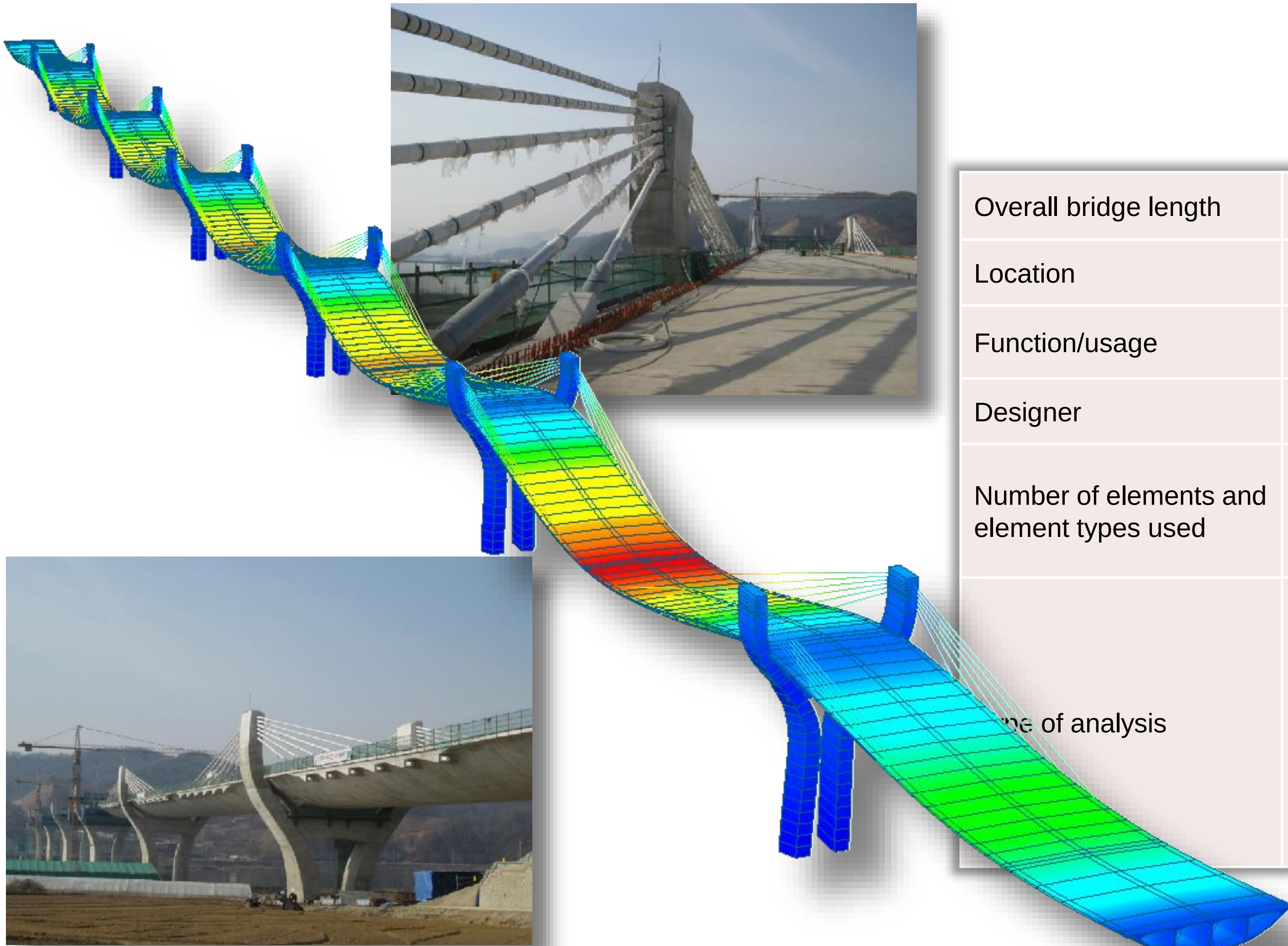
Bang Hwa Bridge





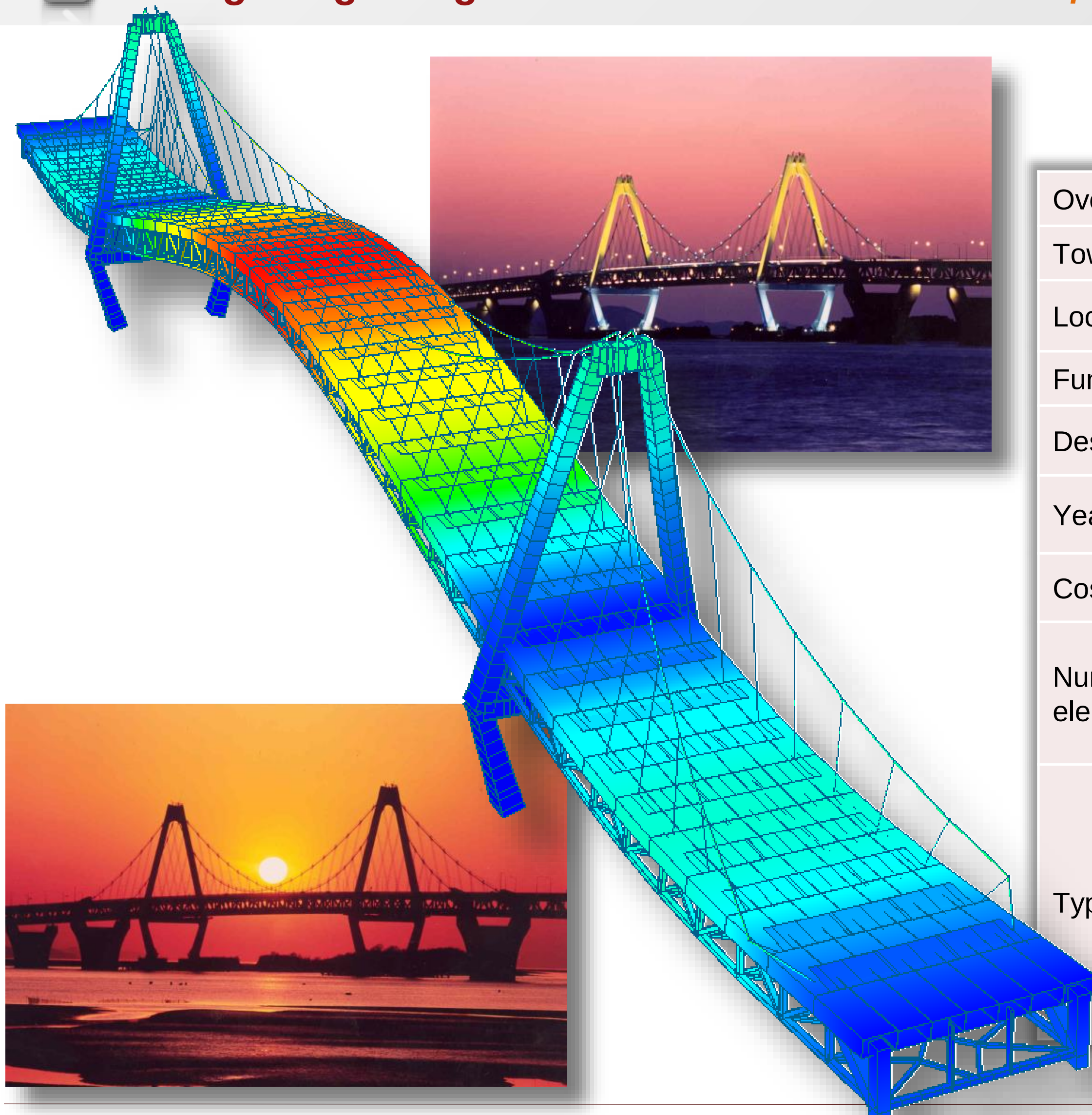
Overall bridge length	2559 m
Location	Seoul
Function/usage	Roadway Bridge
Designer	Sam An Engineering
Year of completion	2000
Cost of construction	$ 0.2 Billion
Number of elements and element types used	Beam: 2603
Type of analysis	Eigen Value Analysis Response Spectrum Analysis Vehicle Load Optimization

Kum Ga Bridge – *7 Spans of Extradosed bridge*



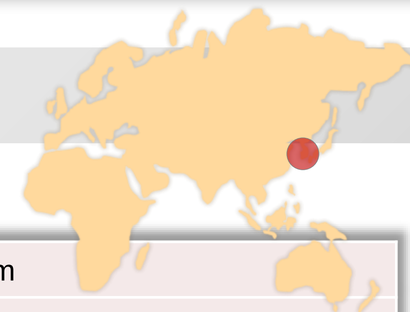
Overall bridge length	795 m
Location	Chung Ju
Function/usage	Roadway Bridge
Designer	Chung Suk Engineering
Number of elements and element types used	Truss (Cable): 144 Beam: 644
Type of analysis	Construction Stage Analysis with Time-Dependent Effects Cable Tension Optimization Geometric Nonlinear Analysis Vehicle Load Optimization

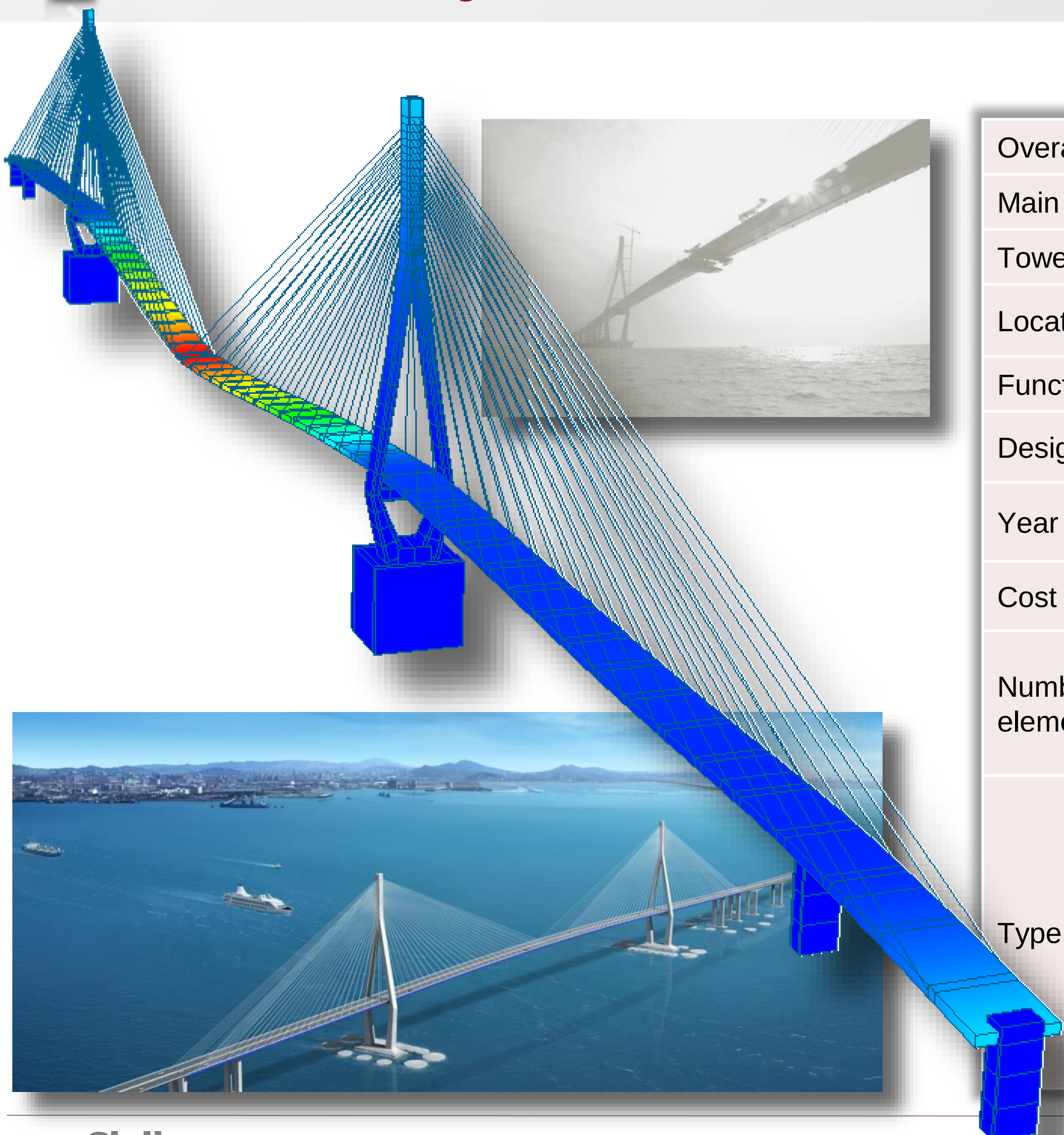
Young Jong Bridge – *World's 1st 3D self-anchored suspension bridge*



Overall bridge length	4420 m
Tower height	107 m
Location	Incheon
Function/usage	Roadway / Railway Bridge
Designer	U Sin Corporation
Year of completion	2000
Cost of construction	$ 0.9 Billion
Number of elements and element types used	Truss (Cable): 162 Beam: 1930
Type of analysis	Response Spectrum Analysis Eigen Value Analysis Large Displacement Analysis Vehicle Load Optimization

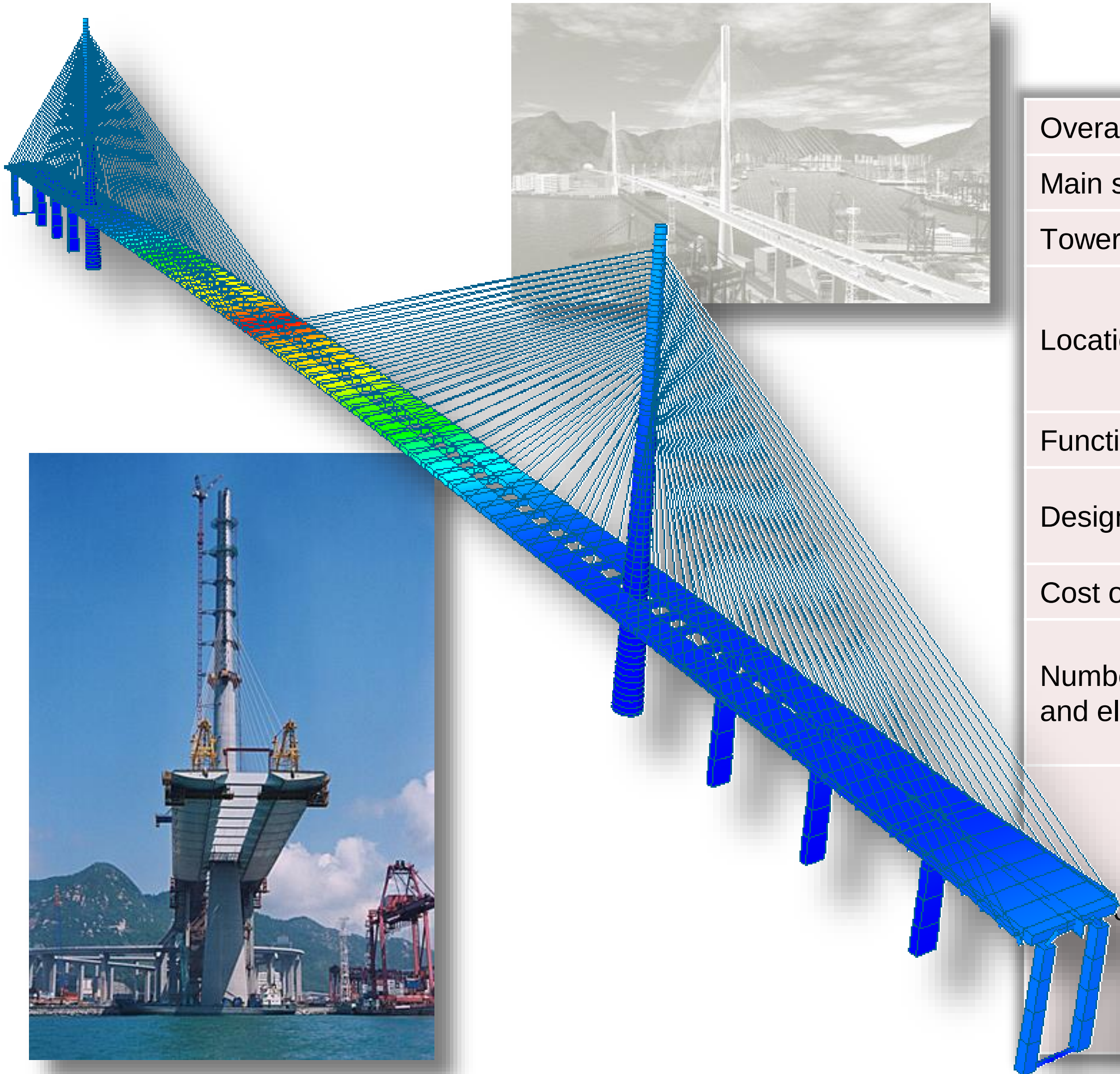
Incheon 2nd Bridge – *5th Longest Cable Stayed Bridge*





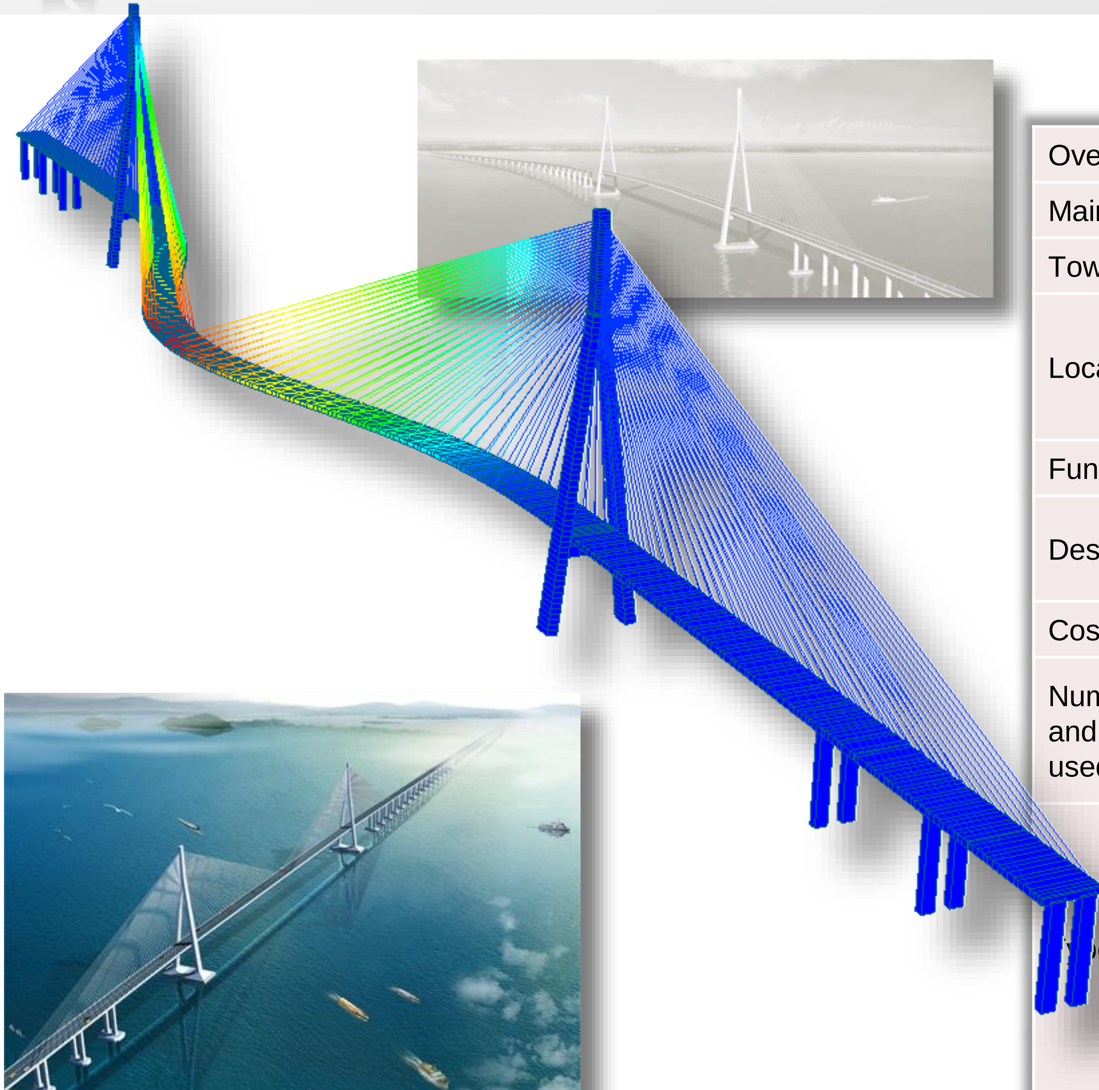
Overall bridge length	1480 m
Main span	800 m
Tower height	230 m
Location	Incheon
Function/usage	Roadway Bridge
Designer	Seoyeong Engineering and Chodai Co., Ltd
Year of completion	2009
Cost of construction	$ 2.4 Billion
Number of elements and element types used	Truss (Cable): 176 Beam: 1653
Type of analysis	Construction Stage Analysis with Time-Dependent Effects Cable Tension Optimization Geometric Nonlinear Analysis Vehicle Load Optimization

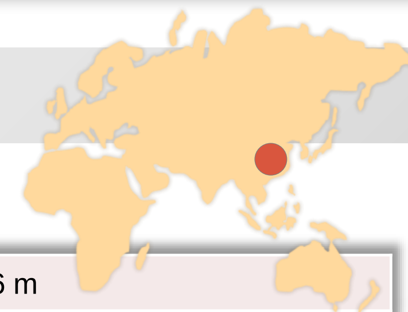
Stonecutters Bridge – *2nd Longest Cable Stayed Bridge*



Overall bridge length	1600 m
Main span	1018 m
Tower height	295 m
Location	Between Tsing Yi and Kowloon City, Hong Kong, China
Function/usage	Roadway Bridge
Designer	Ove Arup & Partners
Cost of construction	$355 Million
Number of elements and element types used	Truss (Cable): 224 Beam: 1638
of analysis	Construction Stage Analysis with Time-Dependent Effects Cable Tension Optimization Geometric Nonlinear Analysis Eigenvalue Analysis Thermal Analysis Buckling Analysis

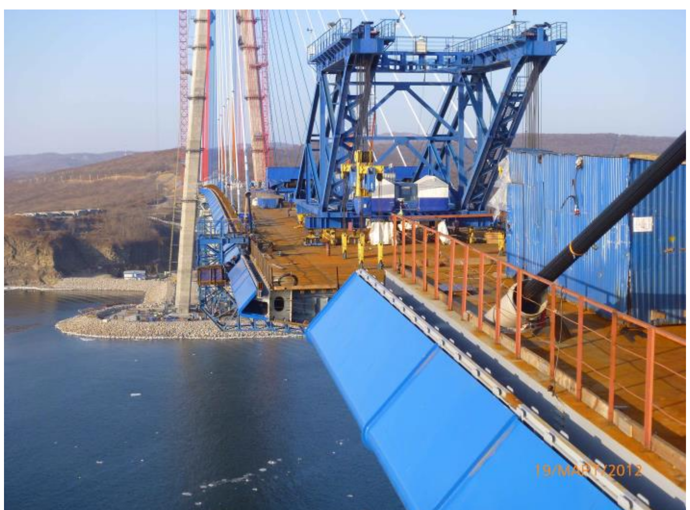
Sutong Bridge – *Longest Cable Stayed Bridge*





Overall bridge length	8206 m
Main span	1088 m
Tower height	306 m
Location	Crossing Yangtze River in China between Nantong and Changshu
Function/usage	Roadway Bridge
Designer	Jiangsu Province Communications Planning and Design Institute
Cost of construction	$750 Million
Number of elements and element types used	Truss (Cable): 272 Beam: 760
Type of analysis	Construction Stage Analysis with Time-Dependent Effects Cable Tension Optimization Geometric Nonlinear Analysis Eigenvalue Analysis Thermal Analysis Buckling Analysis

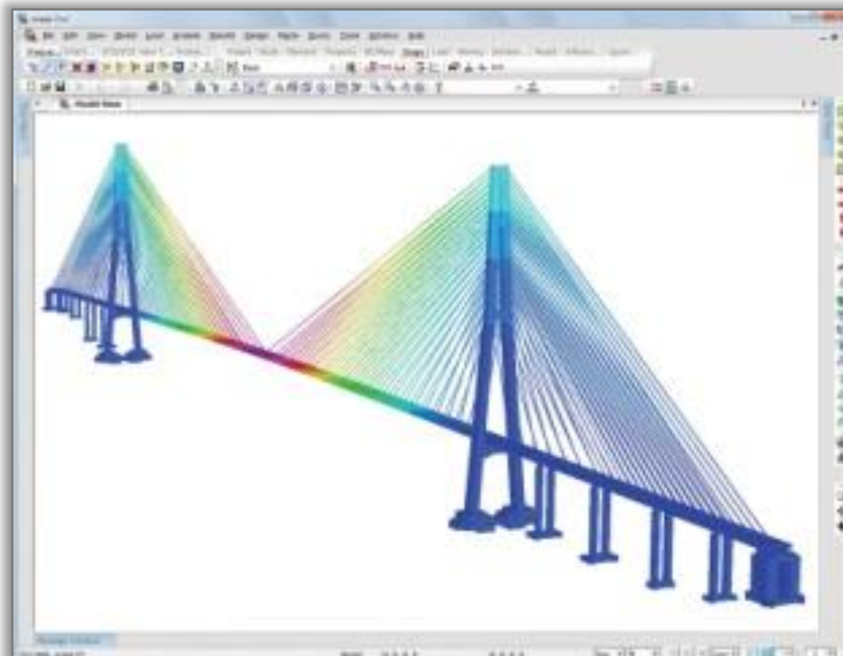
Russky Island Bridge – *Longest Cable Stayed Bridge*



Russky Island Bridge (Russia)

World's Longest Cable Stayed Bridge

Main Span = 1,104 m



Sunda Strait Bridge – *Longest Suspension Bridge*

Sunda Strait Bridge (Indonesia)

World's Longest Suspension Bridge

Main Span = 3,500 m

" Thank you "

Bridging Your Innovations to Realities – *midas Civil*