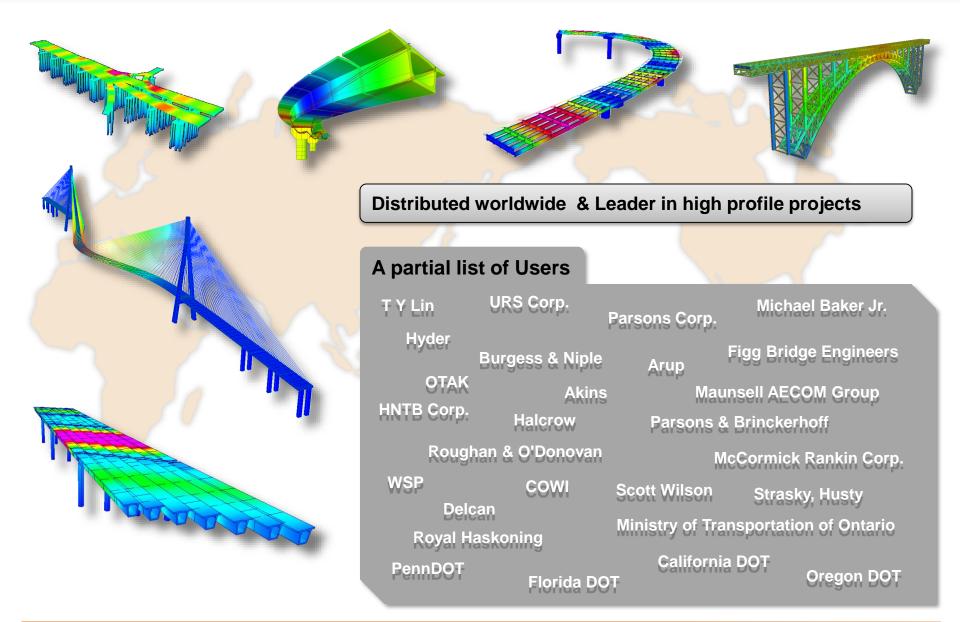
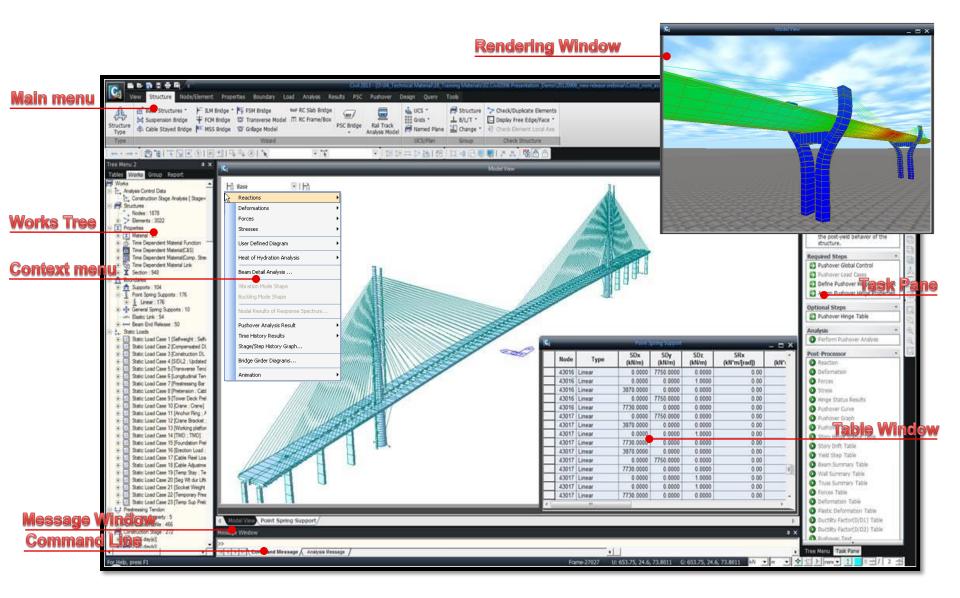
Bridging Your Innovations to Realities

Integrated Solution System for Bridge and Civil Engineering

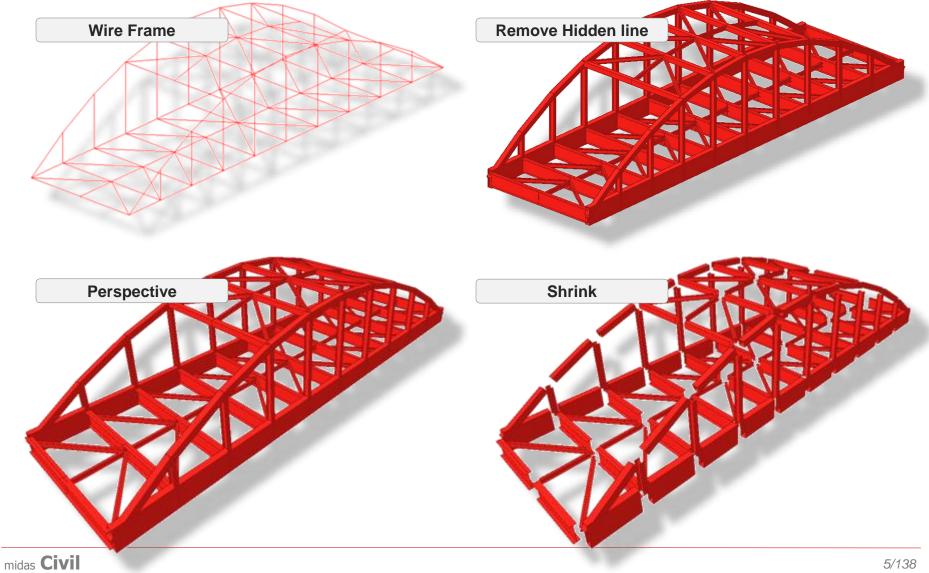
Contents



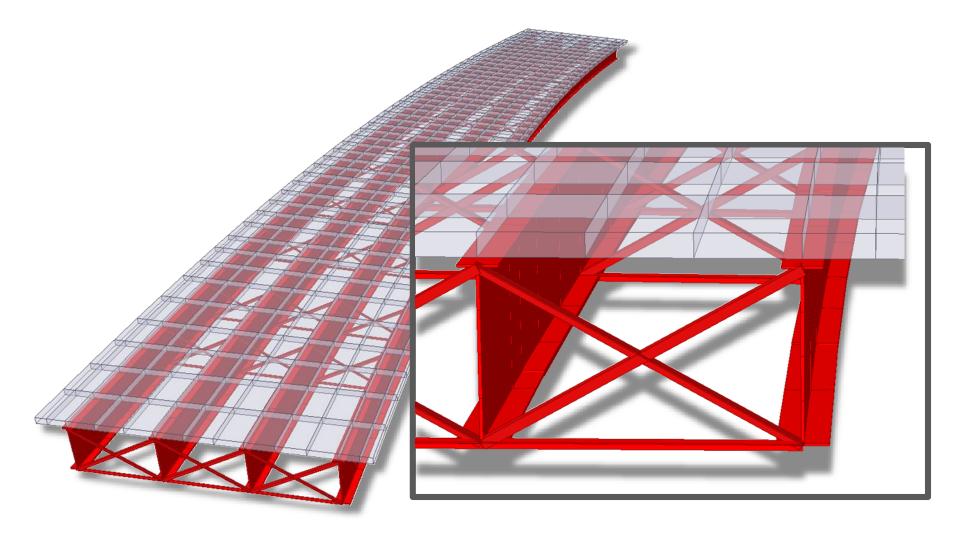




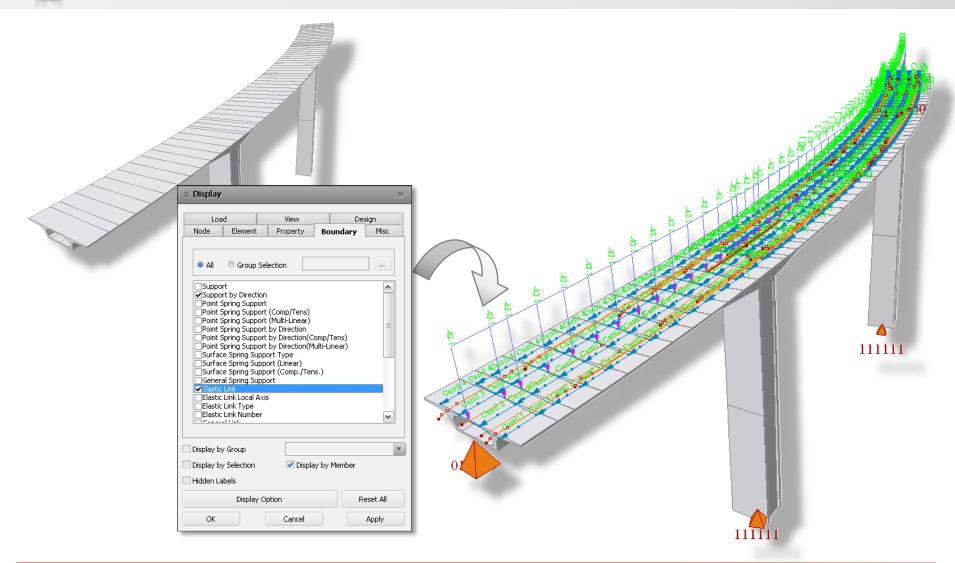




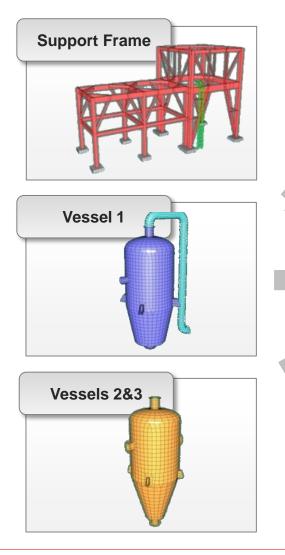
See-through Effect of Composite Bridge by Blending (Transparency) effect

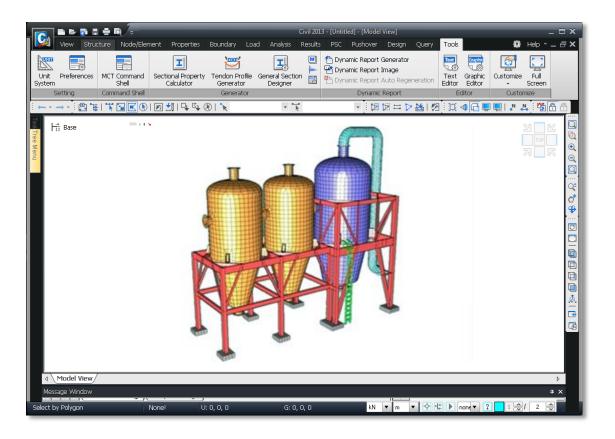


Visualization options for Elements / Load / Boundary Conditions

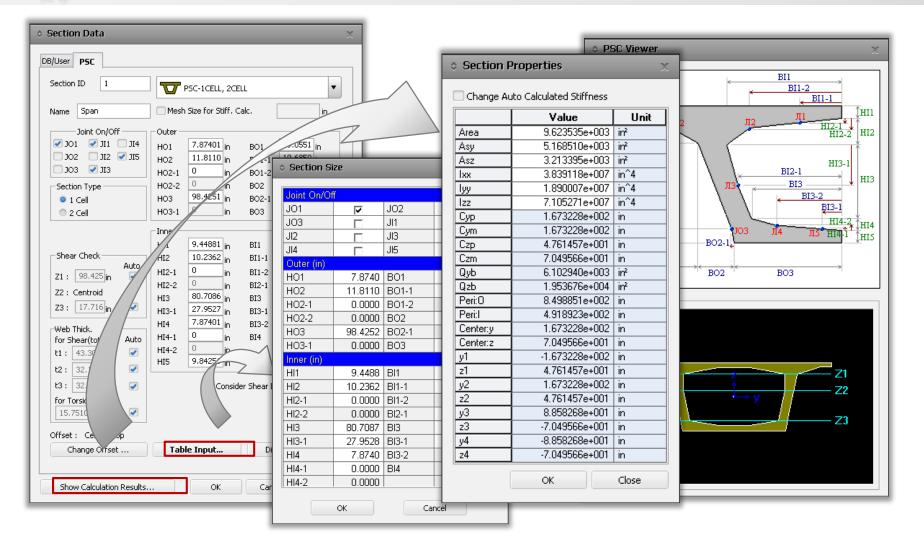


3 separate data files merged into one total model

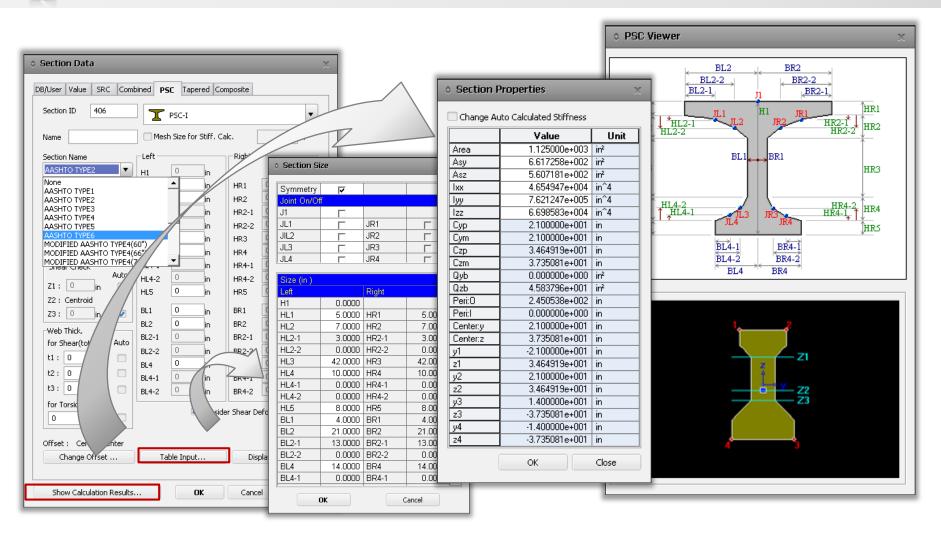




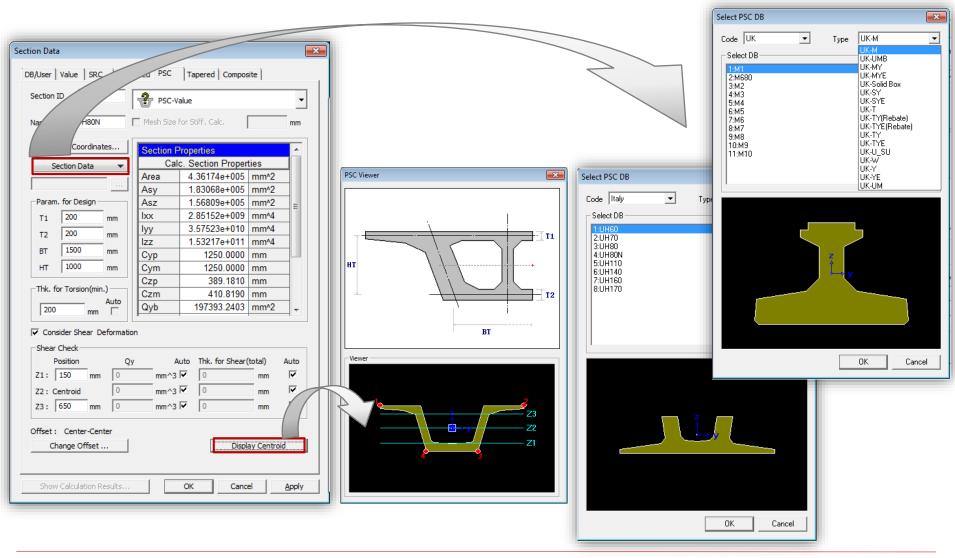
Prestressed & Post-tension Concrete Box Sections



AASHTO/Caltrans PC Section DB

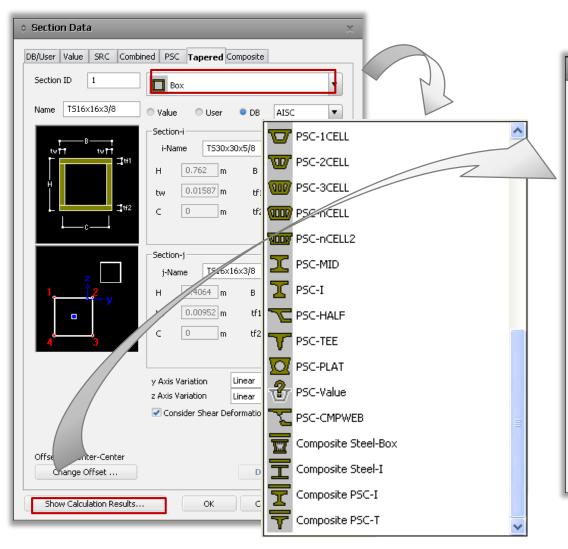


Italy & UK PC Section DB





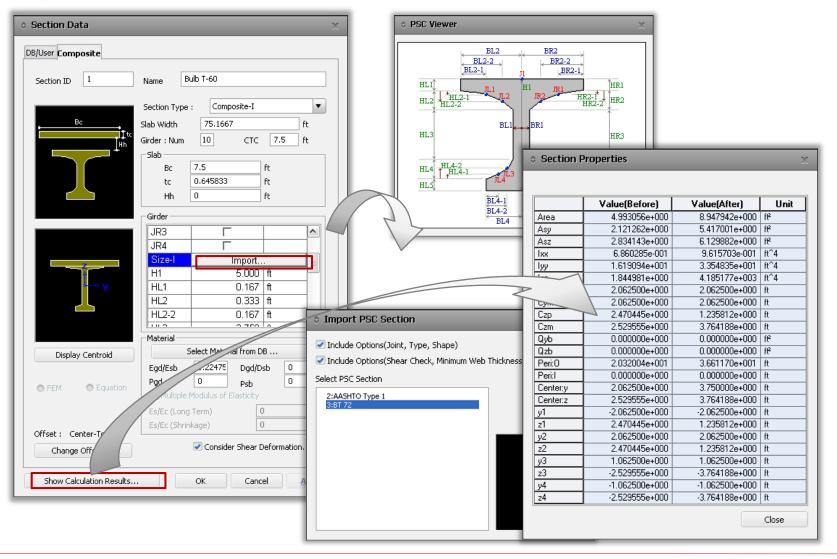
Tapered Sections



Section Pr	operties	_	X
	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
lxx	6.593993e-003	5.954238e-004	m^4
lyy	4.397986e-003	3.971779e-004	m^4
lzz	4.397986e-003	3.971779e-004	m^4
Сур	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:0	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
уЗ	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

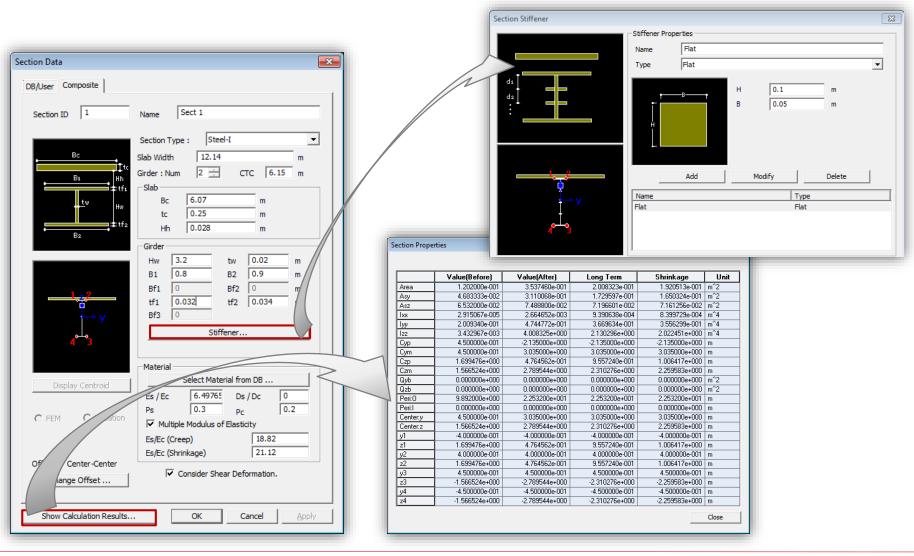


Composite Sections

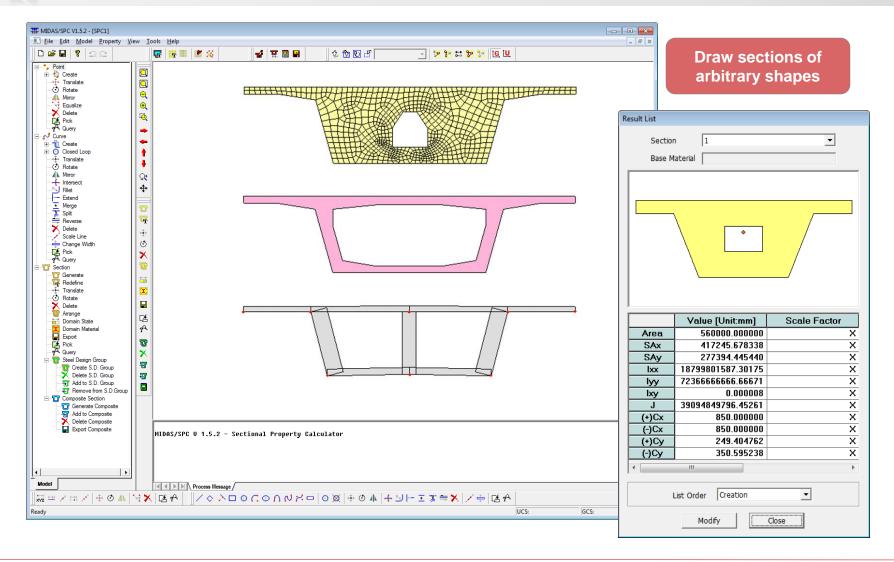




Composite Sections

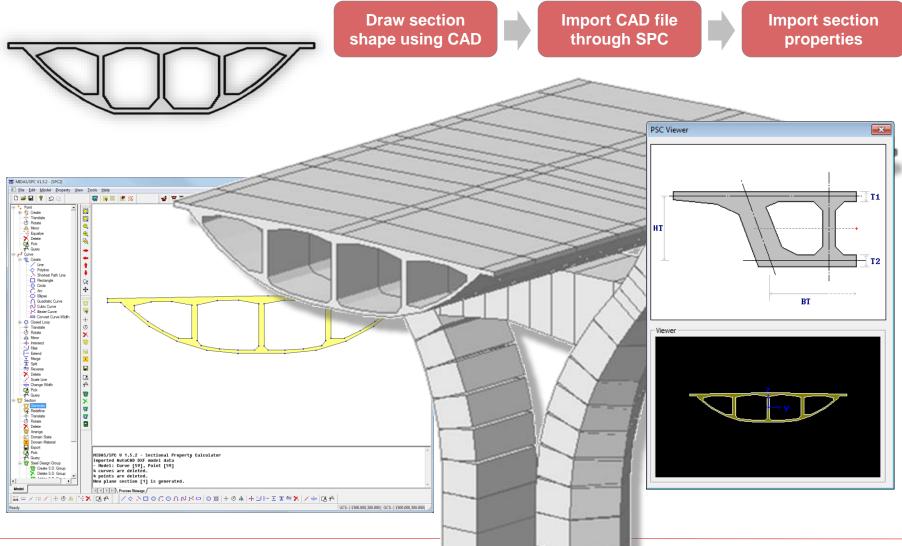




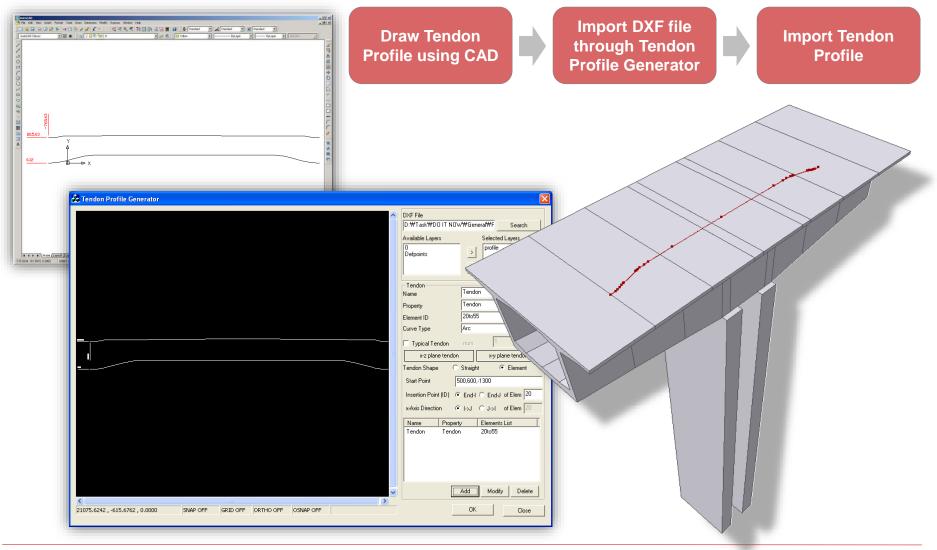


User Defined Section

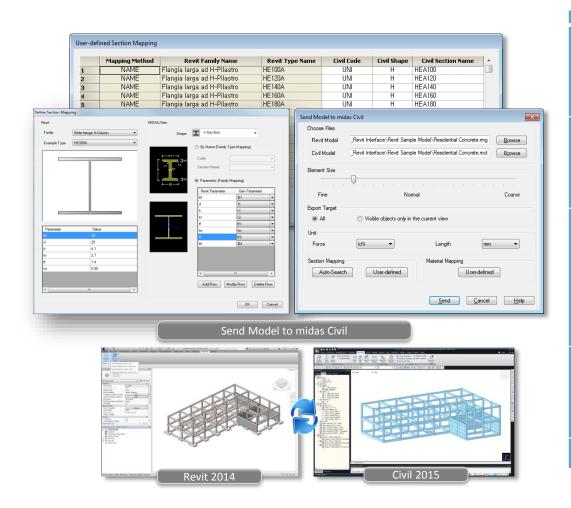




Importing Tendon Profile from AutoCAD DXF file



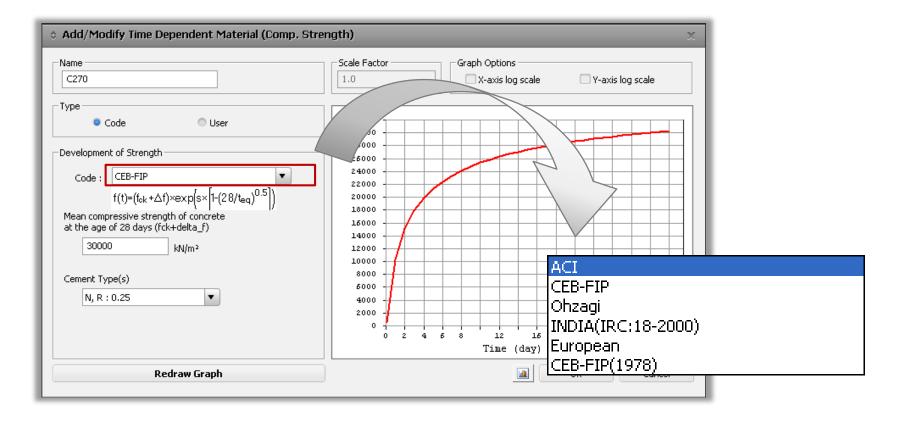
Data Transfer for BrIM (Bridge Information Modeling) Workflow



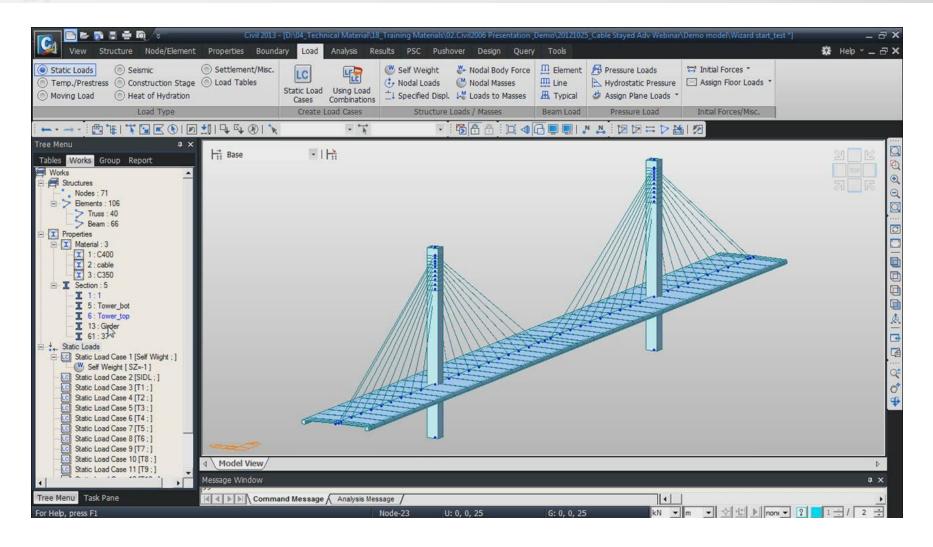
	Functions	Revit <> Civil
	Structural Column	<>
	Beam	<>
Linear	Brace	<>
Elements	Curved Beam	>
	Beam System	>
	Truss	>
	Foundation Slab	\diamond
	Structural Floor	<>
Planar	Structural Wall	\diamond
Elements	Wall Opening & Window	>
	Door	>
	Vertical or Shaft Opening	>
	Offset	>
	Rigid Link	>
	Cross-Section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

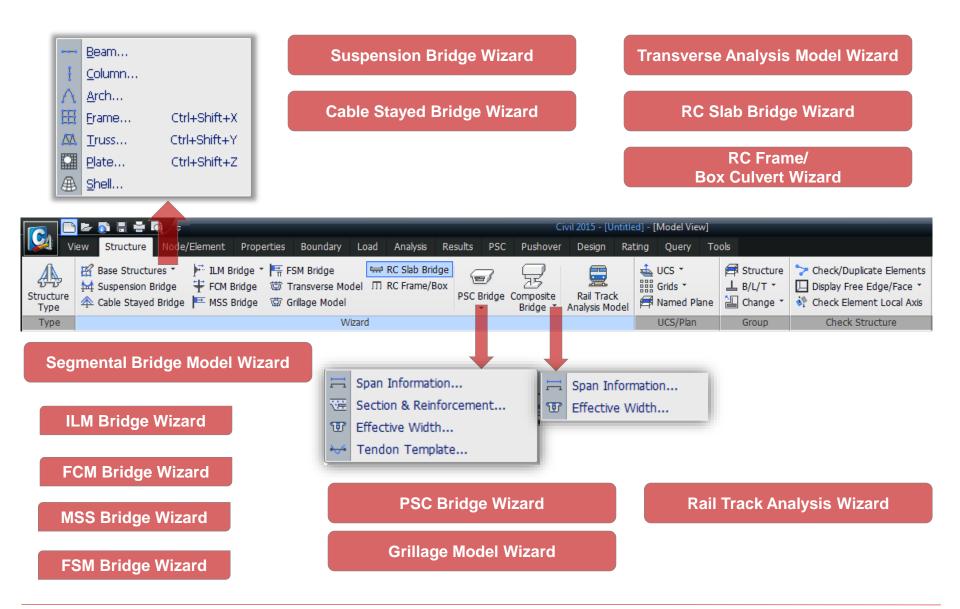
Creep/Shrinkage			
 Add/Modify Time Dependent Material (Creep / Shrinkage) Name : C270 Code : CEB-FIP(1990) CEB-FIP(1990) Characteristic compressive strength of concrete at the age of 28 days (fck) : Relative Humidity of ambient environment (40 - 99) : 70 Notational size of member : h = 2 * Ac / u (Ac : Section Area, u : Perimeter in contact with atmosphere) 	KN/m ²	(IRC:18-2000)	
Type of cement Rapid hardening high strength cement (R5) Normal or rapid hardening cement (N, R) Slowly hardening cement (SL) Age of concrete at the beginning of shrinkage : 3 Show Result OK Cancel	Show Time Dependent Material Creep Function Data Type Creep Coefficient Shrinkage Strain Start Loading : 10 Day End Loading : 10000 Day Num. of Steps : 24	Graph Options	-axis log scale
	Time (day) Value Value 1 13.34 3.3611e-001 2 17.78 4.3301e-001 3 23.71 5.1262e-001 4 31.62 5.8673e-001 5 42.17 6.5963e-001 6 56.23 7.3344e-001 7 74.99 8.0939e-001 8 100.00 8.8821e-001 9 133.35 9.7024e-001 10 177.92 1.05555e+000	U 1.4 1.2 1.2 0.8 0.4 0.4 0.2 0 0 1000 2500 4000 5500 Time (day)	7000 8500 10000
	Redraw		Close





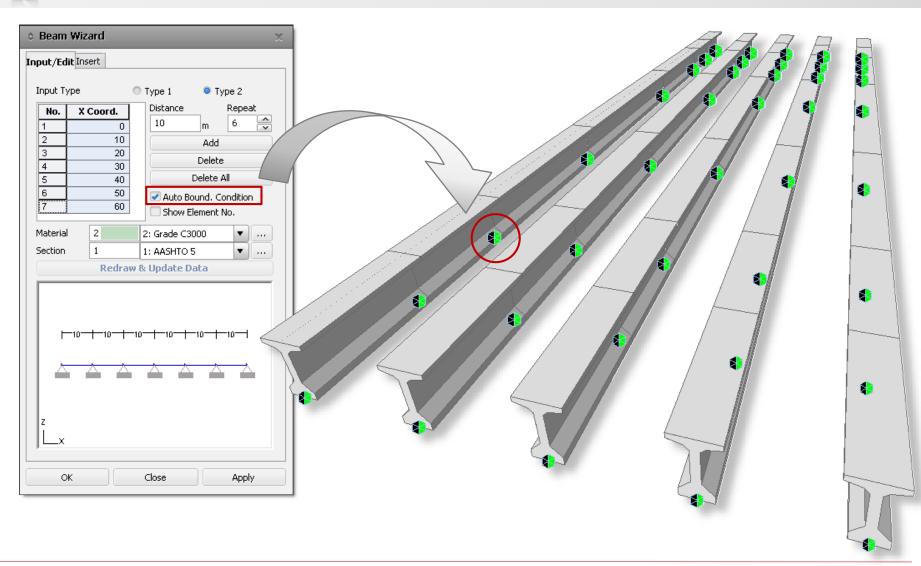
Drag & Drop material, section properties & supports





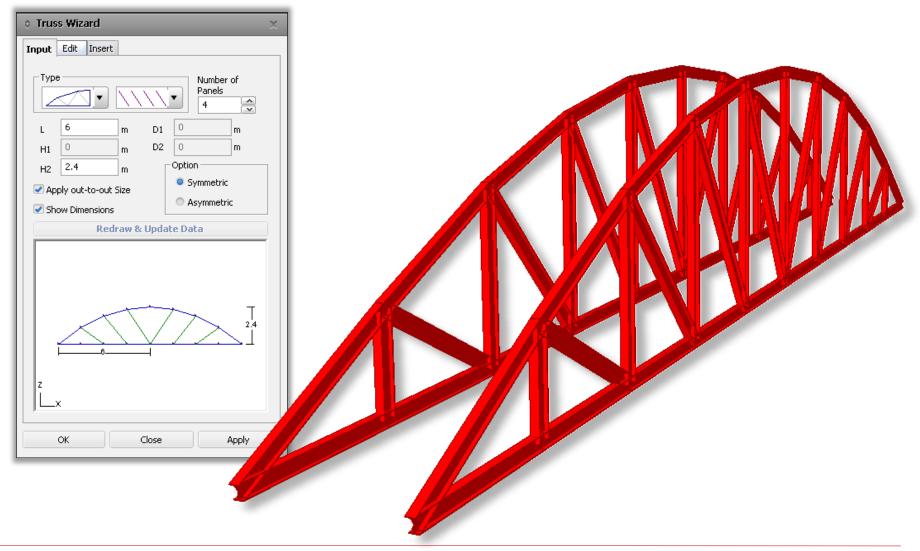
Ð

Beam Model Wizard



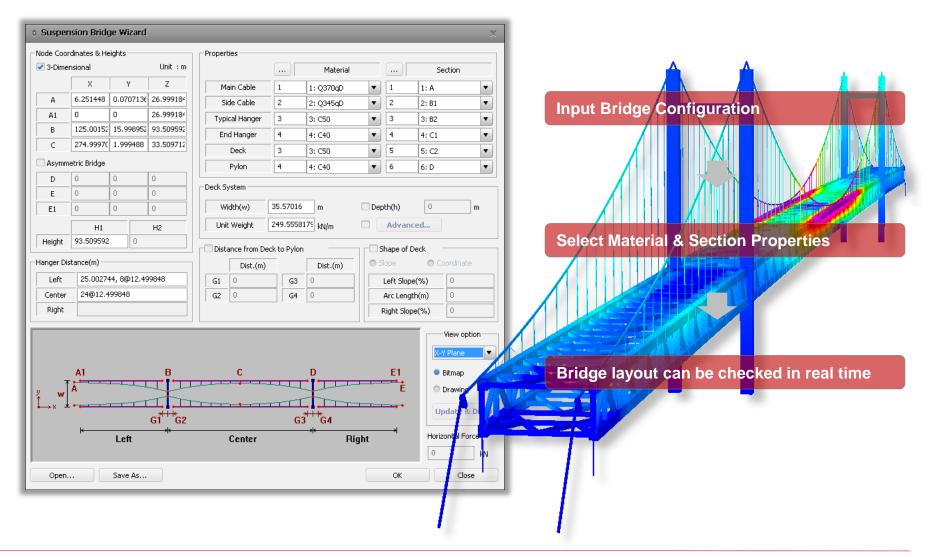


Truss Model Wizard



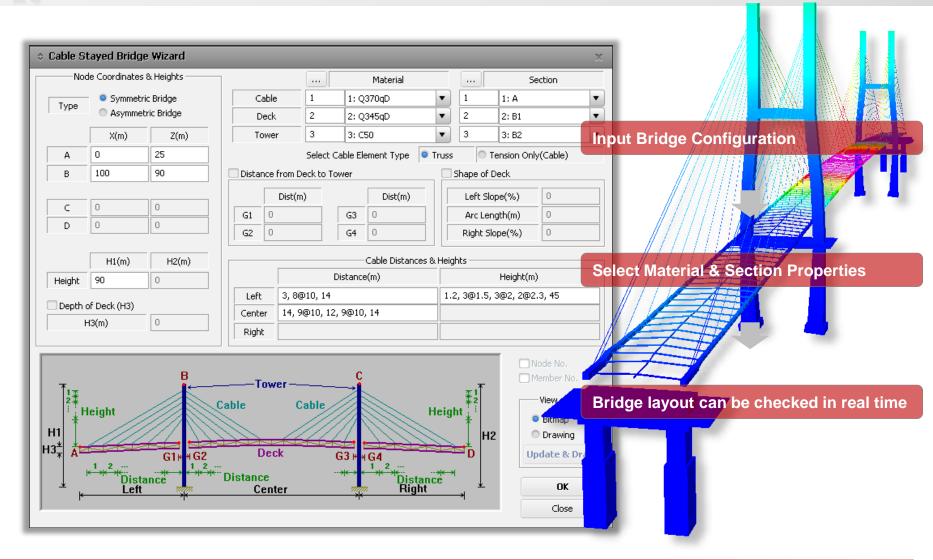


Suspension Bridge Model Wizard



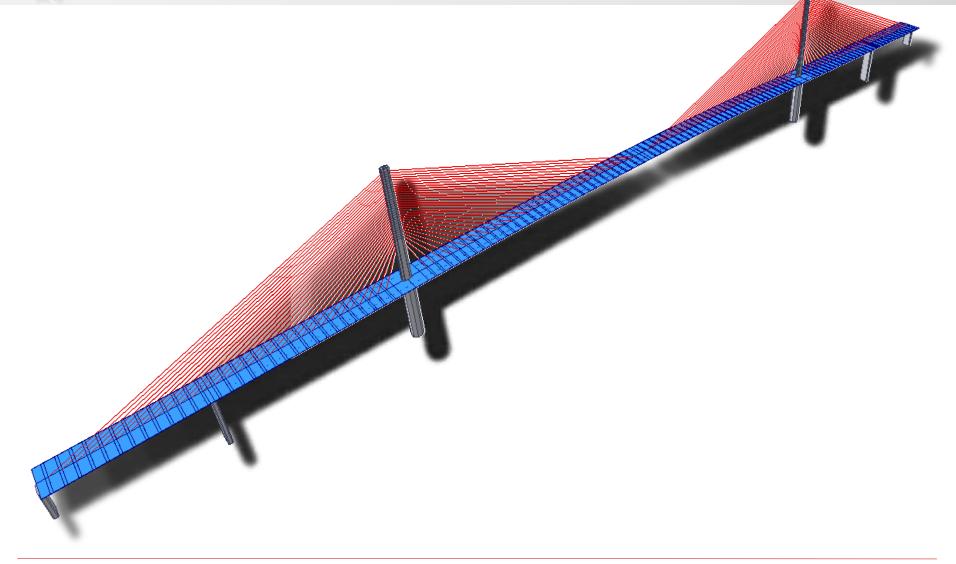








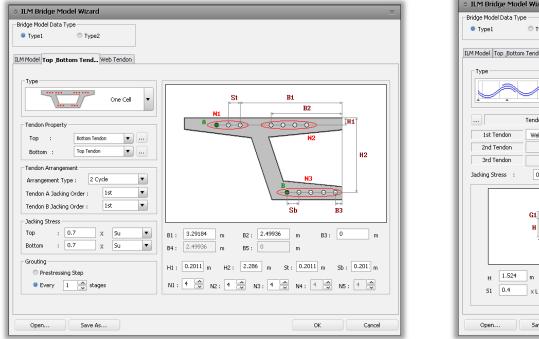
Construction sequence of Cable Stayed Bridge

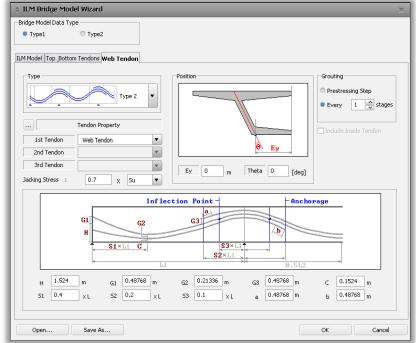


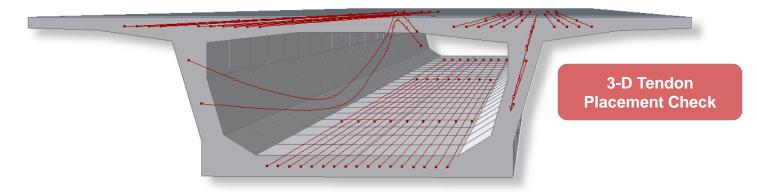
٦

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

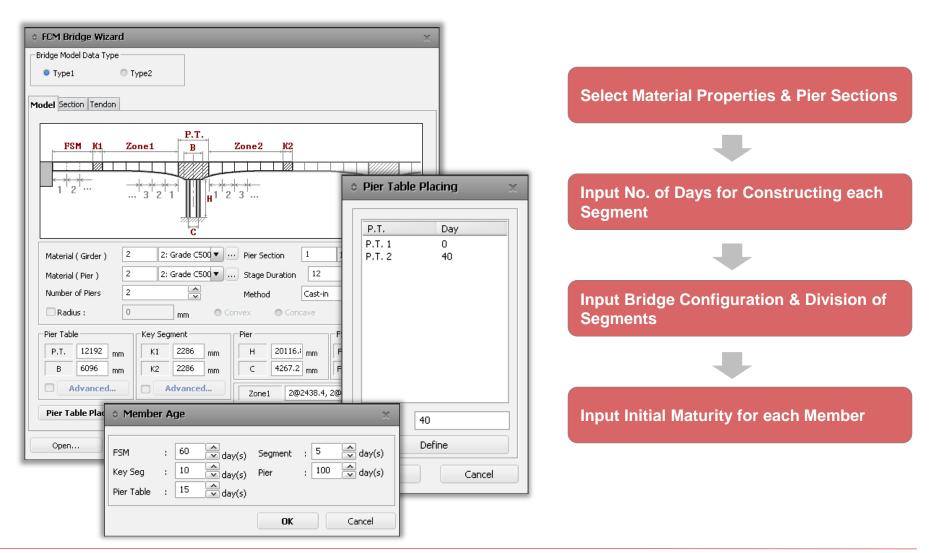








FCM Bridge Model Wizard – 1st Step: Model Tab, Type 1 & 2



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

FCM Bridge Wizard						x
Bridge Model Data Type						
Type1						
Model Section Tendon						
Section Type 1 Cell 2 Cell	H1	0.8	ft	H2	7.5	ft
	НЗ	1.2	ft	H4	1.5	ft
	H5	1.2	ft	H6	1.1	ft
	H2-1	20	ft	H3-1	3	ft
H2 B5 B4 H2.1	B1	9.8	ft	B2	1.8	ft
H31 H6 H2-1	B3	9.8	ft	B4	6	ft
B1 B2 B6	B5	6.1	ft	B6	4.2	ft
B3 H3-1	Т	1.6	ft			
· · · · · · · · · · · · · · · · · · ·	Form	Traveler Lo	ad (includ	de form le	oad) ——	
View Option					P	
Bitmap Drawing Update				Δ	1	
					, ×	
✓ include Wet Conc. Load						
			<n< td=""><td></td><td>3.2 ft</td><td></td></n<>		3.2 ft	
Open Save As			ОК		Car	ncel

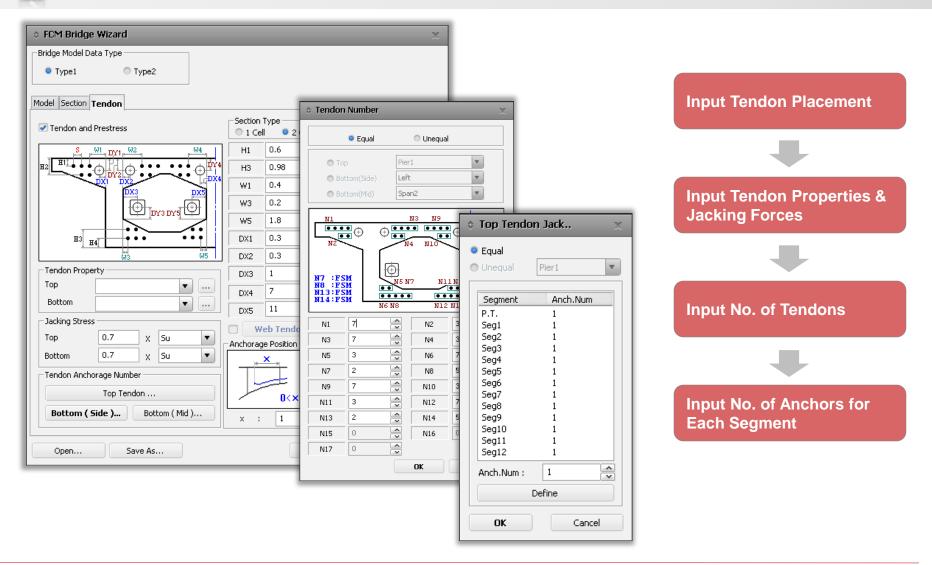
© FCM Bridge Wizard	x
Bridge Model Data Type	
Type1 Type2	
Model Section Tendon	
User Define	
Center :	
2 2: Span	✓ …
Pier Table:	Z
3 3: Support	
Diaphragm :	
	×
Update Diaplay	
	Form Traveler Load (include form load)
	✓ include Wet Conc. Load
	P .7.9587 kips e 8.239 ft
Open Save As	OK Cancel

Input Section Dimensions Select sections defined

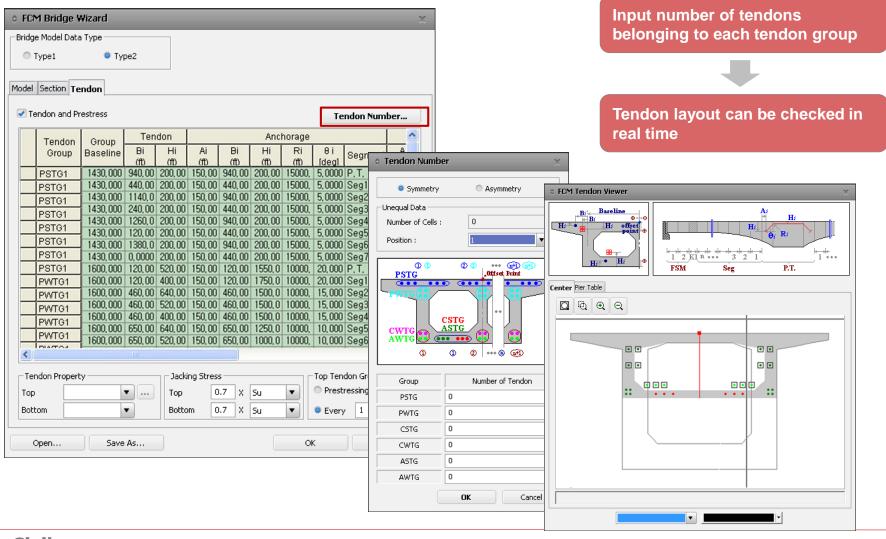
Check Sectional Configuration

Input Form Traveler Load

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



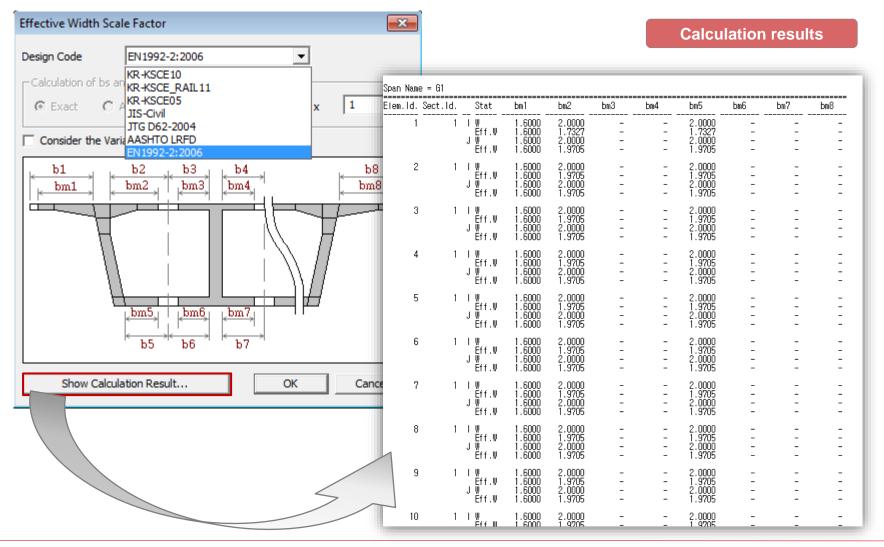
FCM Bridge Model Wizard – 3rd Step: Tendon Tab, Type 2



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



SC Bridge – Effective Width calculation



PSC Bridge – *PSC Section (Reinforcing steel)*

© Section & Reinforcement		×	
Section Reinforceme		Division Tolerance 0.36 in	
Longitudinal Reinforce Shear Reinfor	rcement © Type1	e1 Type2 Development Length	
Girder Name	▼ Span Information	in	
Start Point	Dia. Numbe Area Ref.Y Y Ref.Z	Z Spacing Spacing Spacing (in) Identity [S](in) [E](in)	
Sup1 • 0.5 • xL	1 #3 40 4.4 Centroid 0.00 Top		
Distance 0 in	2 #3 25 2.75 Centroid 0.00 Top	0.13 🔽 0.30 0.30	
	3	✓ Display of longitudinal rebars input	
End Point Ref. Point 🕑 Use Start Point			
Sup1 V 0.5 V ×L	<		
Distance 200 in	Dev. Length Both Copy the Current Longitudinal Rei	Reinforcement Information to Other Girders	
Open Save As	No. Ref.[S] Pt.[S] Dist.[S] Ref.[E] 1 Sup1 - 0 Sup1		

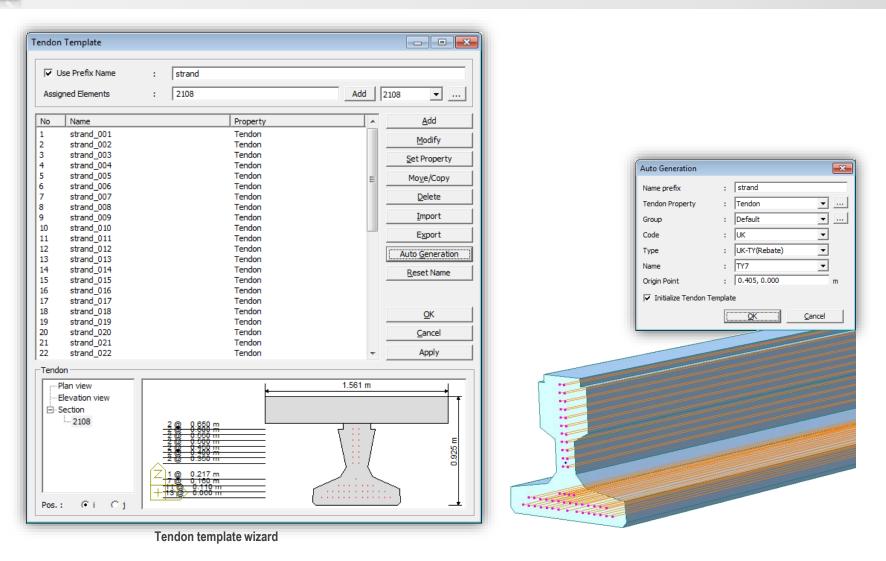
۲

Section Manager- PSC Section (Reinforcing steel)

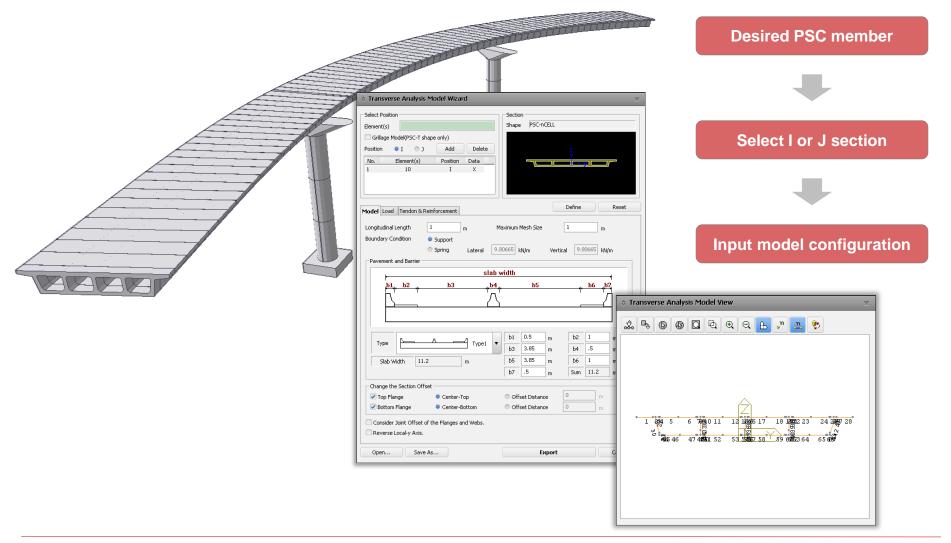
Section Manager				
Mode				Longitudinal Reinforcement Shear Reinforcement
Reinforcements		Grid : 1 m	Snap	🔽 Same Rebar Data at i & j-end
Target Section & Element				Coordinate C Centroid C Left-Bottom
	· · ·			I J Type C Point C Line C Arc C Cirde C Poly Line
				C Input Method A C Input Method B Starting Point (y,z) -2.25, -1.74055 m
		(Z		End Point (y,z) 2.25, -1.74059 m © Num. C CTC 19
		· · · + · · ·		CTC Ref. Start 💌
		$(1,1,2,\ldots,n_{n-1})$		Dia P5 V Part V
	[Reference for Tapered Section Ref. Y Left Ref. Z Top
				As 0.01696464 m^2 Add Modify Delete Multi Add
	· · ·			Type Num CTC (m) Dia 1 Line 35 0 P20 E 2 Line 19 0 P20 E
Copy Reinforcements to	Span	G : 4.6897, 3.1207	SELECT	
				Apply Close

midas **Civil**

PSC Bridge – Tendon template (Quick Tendon Profile Generation)

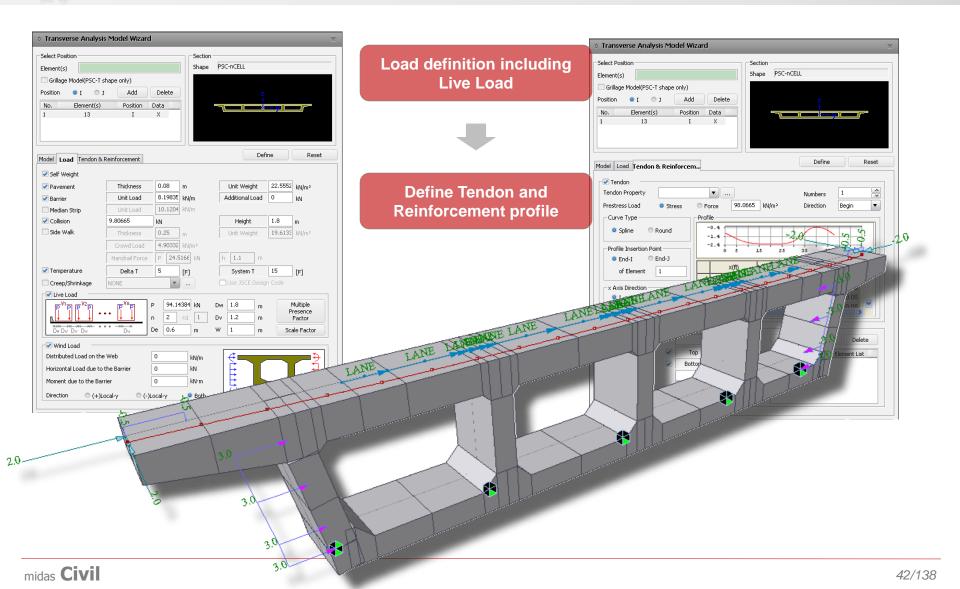


Transverse Analysis Model Wizard – 1st Step: Model configuration

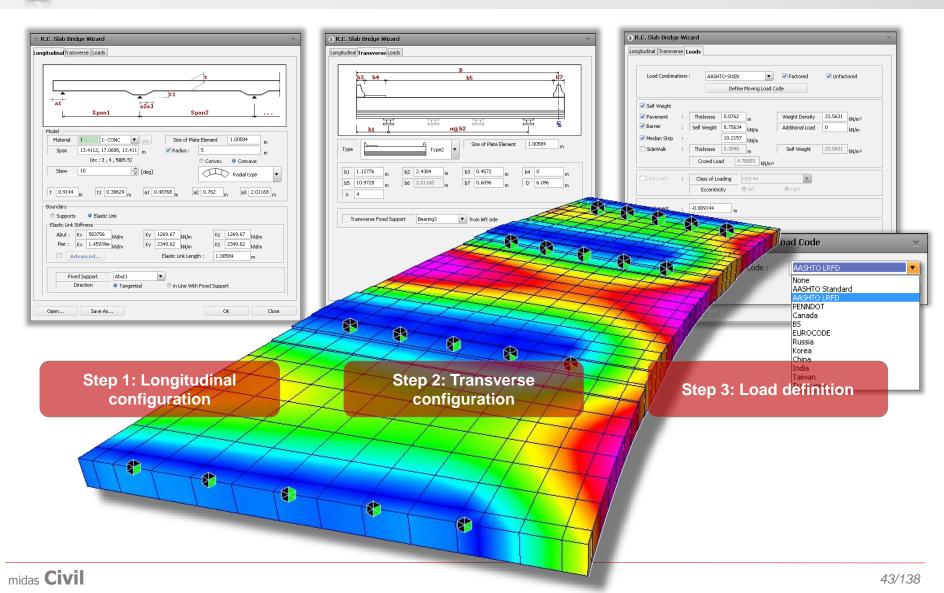


Bridge Model Wizards

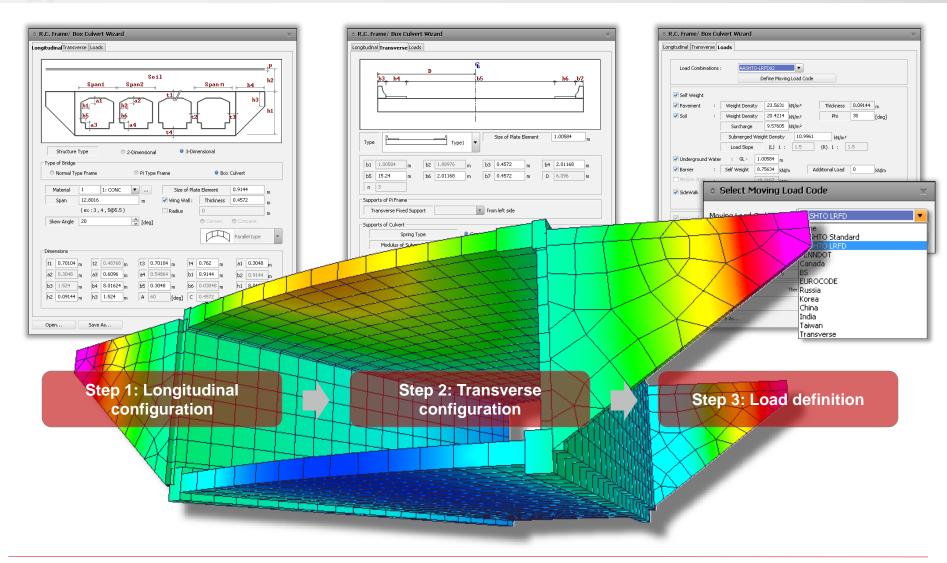
Transverse Analysis Model Wizard – 2nd & 3rd Step: Load, Tendon/Reinforcement Profile definition



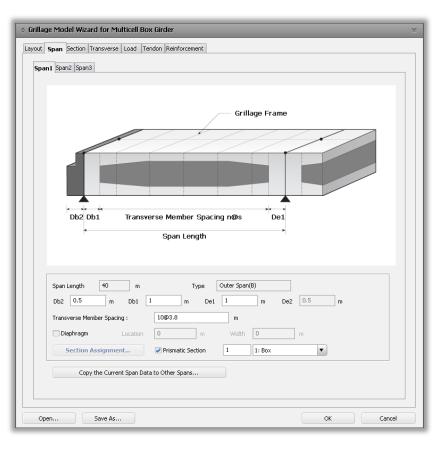
RC Slab Bridge Wizard



RC Frame / Box Culvert Wizards



© Grillage Model Wizard for Multicell Box Girder 🛛 🗙
Layout Span Section Transverse Load Tendon Reinforcement
Span 1 Span n Reference Line Centroid Line
Bridge Material 1: CONC 💌
Span Information 3@40 m
Skew Angle 0 [deg] C Advanced
Offset 0 m
Alignment of Transverse Members : O Perpendicular O Skewed
Radius 100 m Type Concave Convex Multi-Curve Advanced
Boundary Boundary Integral Type Bearing Type Hybrid Type Using Divided Transverse Member
Supports Elastic Link r-Elastic Link Stiffness (Kx : Vertical, Ky : Transverse, Kz : Longitudinal)
Abut Kx 0 kN/m Ky 0 kN/m Kz 0 kN/m
Pier Kx 0 kN/m Ky 0 kN/m Kz 0 kN/m
Advanced Elastic Link Length 0 m
Fixed Support Abut1 Image: Constraint of the second secon
Open Save As OK Cancel



Step 2: Define Span Configuration

Step 1: Define Bridge Alignment

Grillage Model Wizard for Multicell Box Girder	_		x
Layout Span Section Transverse Load Tendon Reinforcement			
Span1 Span2 Span3			
Span1 span2 span3			
Section List			
Assigned Section: 1 1 : Box			
	1		
	I		
Divided Num. 5 Division Locations			
Division Option 💿 Web-Based 💿 Slab-Based Division Line	Тор	Bottom	
Show Stiffnesses 2	-3.45171 -1.15057	-3.45171 -1.15057	
	1.15057	1.15057	
Distance from Z-Axis	3.45171	3.45171	
N.A.(y)			
N.A.(z)			
Open Save As		ок	ancel

Layout Span Section Transverse Load Tendon Reinforcement -Pavement and Barrier Slab width bЗ b1 b2 b4 b5 b6 b7 یاد یاد - 14-14 Л b1 100 b2 150 in Туре Type1 b3 375 b4 150 in b5 375 b6 150 Slab Width 0 in in b7 100 Sum 1400 in Bearing / Column Default Spacing : Auto Calc Bearing Location at Abutment End 📃 Same as the Begin Begin D 200 in Spacing 2@200 D 0 in Spacing 0 in in Bent Cap 1 Bent Cap 2 Top view 196.8503937007E in 2@196.85 Spacing in Pier or Shoe Bearing Centroid D 196.85039370078 in 2@196.85 Spacing in n@s D Bent-Cap Section , Girder1 User Define Bent-Cap Section Copy the Current Bent Cap Data To All • Transversely Fixed Position Longitudinally Fixed Position Abut1 Transversely Fixed Position Bearing 1 • Open... Save As... OK Cancel

Grillage Model Wizard for Multicell Box Girder

Step 4: Define Transverse Configuration

Step 3: Define Section and Division

Grillage Model Wizard for Multicell Box Girder	x
Layout Span Section Transverse Load Tendon Reinforcement	♦ Select Moving Load Code
✓ Self Weight	Moving Load Code : AASHTO LRFD
Pavement Thickness 3.115 in Weight Density 8.3e-005 kips/in ³	None
✓ Barrier Self Weight .05 kips/in Additional Load 0 kips/in	AASHTO Standard
✓ Median Strip .06 kips/in	AASHTO LRFD
	PENNDOT
Sidewalk Thickness 0 in Weight Density 0 kips/in?	Canada
Crowd Load 0 kips/in 2	BS EUROCODE
	Russia
Live Load Define Moving Load Code Define Traffic Line Lane	Korea
	China
Settlement4 in	Define Traffic Line Lane India
	Taffic Line Lane Taiwan
	Transverse
Temperature Delta T [F]	D2
	D1 Lane1 Lane2 LaneN
Temperature Gradient Delta T 0 [F]	
Wind Load W 0 kips/in T 0 in kips/in	No. of Lanes 6 No. Distance(in)
	D1 314.45 D2 452.756
	D3 590.551
	D4 797.244 D5 935.039
Open Save As OK Cancel	D6 1062.99
	OK Cancel
Step 5: Define Loads and Traffic Lanes	
	7

Grillage Model Wizard for Multicell Box Girder	×
Layout Span Section Transverse Load Tendon Reinforcement	
Tendon Profiles	
Tendon Name Tendon_R2 Auto Generate	Tendon List
Tendon Property Tendon 💌	Tendon C
Input Type Curve Type	Tendon_R1
C 2-D	Tendon_R2 Tendon_R3
Typical Tendon No. of Tendons 1	Tendon_R4
Type of Input C Distance 🕞 10th Point	Tendon_R5
Ref. of z-axis C Top G Bottom	Tendon_L1 Tendon L2
Reference Axis : C Straight 📀 Element	Tendon_L3
У 167.692	Tendon_L4 Tendon L5
-332,308	Tendon_co
0 400 1000 1600 2200 2800 3400 4000 x	
Z 167.692	
-332.308	
x x x x x x x x x x x x x x x x x x x	
Long. Ref x(in) y(in) z(in) fix Ry[deg] Rz[deg]	
Span1 0.0000 0.0000 80.000 🔽 0.00 0.00	Add Modify Delete
Span1 0.5000 0.0000 20.000 🔽 0.00 0.00	
Span1 1.0000 0.0000 100.00 🔽 0.00 0.00	Prestress Load
Span2 0.5000 0.0000 20.000 🔽 0.00 0.00	Force C Stress
Span2 1.0000 0.0000 100.00 🔽 0.00 0.00	10440 kips
Span3 0.5000 0.0000 20.000 ▼ 0.00 0.00	kips
Span3 1.0000 0.0000 100.00 🔽 0.00 0.00	
Point of Sym. First C Last Make Symmetric Tendon	
X-Axis Rot. Angle 0 📩 [deg] 🗌 Projection	
X-Axis Direction (L->R C R->L	
Offset x 0 in y -239 in z 0 in	
Open Save As	OK Cancel

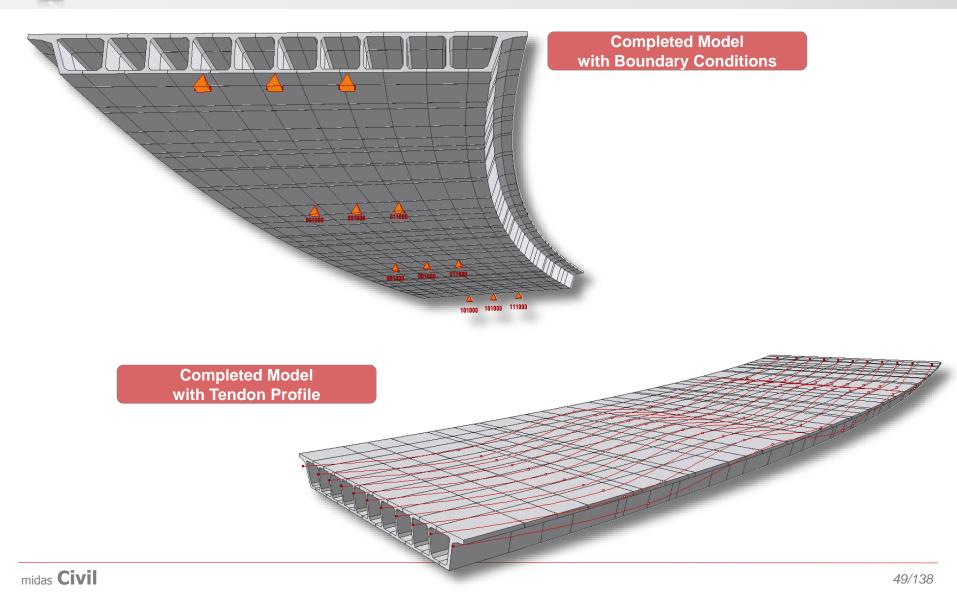
Grillage Model Wizard for Multicell Box Girder
Layout Span Section Transverse Load Tendon Reinforcement
Girder Bent Cap
Longitudinal Shear
No. Ref.[S] Pt.[S] Dist.[S] Ref.[E] Pt.[E] Dist.[E] 1 Sup1 - 0 Span1 0.8 0 2 Span1 0.8 0 Span2 0.2 0 3 Span2 0.2 0 Span3 0.2 0 4 Span2 0.8 0 Span3 0.2 0 5 Span3 0.2 0 Sup4 - 0
Add Modify Delete Delete All Start Point End Point End Point Ref. Point Use Start Point Span1 0.8 Distance 0 in
DIa. Number (in^2) Ref.Y (in) Ref.Z (in) Identity [S](in) [E](in)
1 #8 90 71.1 Centroid 0.00 Top 3.00 Image: Im
Open Save As OK Cancel

Step 7: Define Reinforcement Profiles

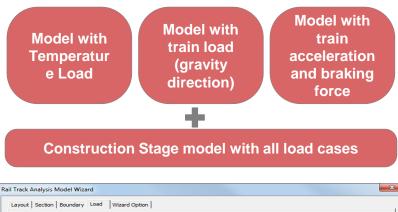
Step 6: Define Tendon Profiles

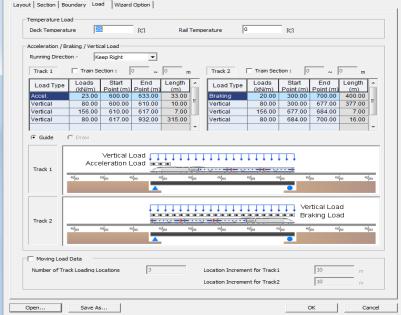
Bridge Model Wizards

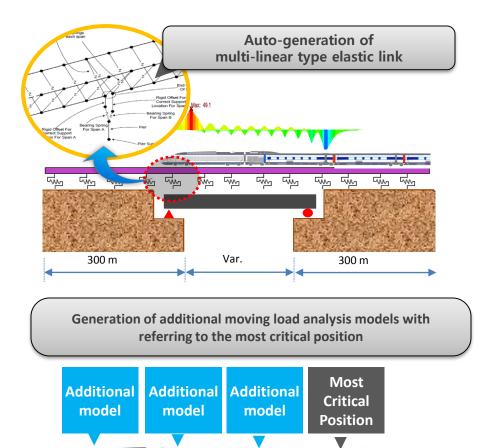
Grillage Model Wizard – *customization for CALTRANS*



Rail Track Analysis Model Wizard







w w

Ś

ц.

10 m

Ś

Ś

10 m

W

10 m

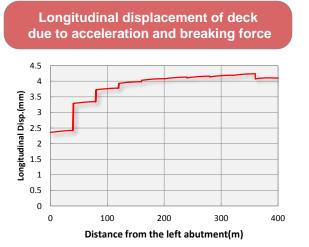
ω.

5

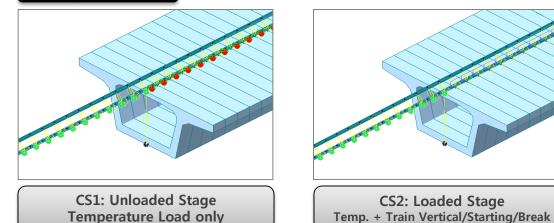
Ŵ

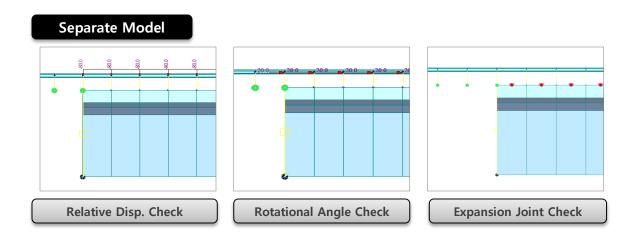
W



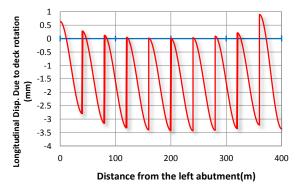


Complete Model



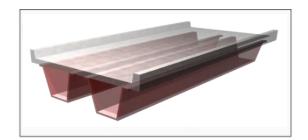


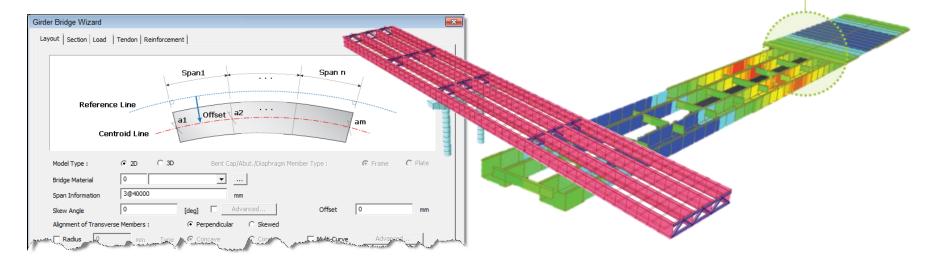
Longitudinal displacement due to rotation



Birder Bridge Wizard

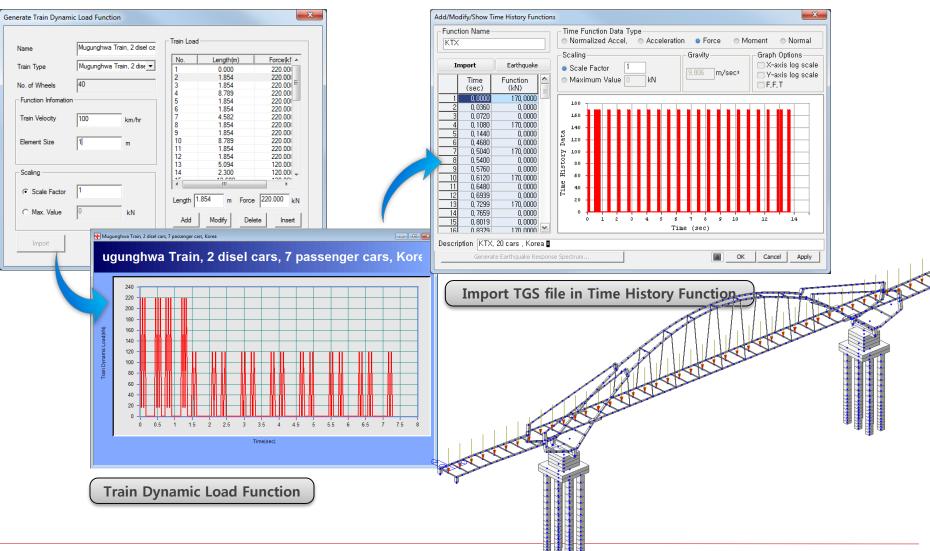
- Automatic generation of steel composite girder bridge model
 - Straight, curved, or skewed bridge
 - 3D bridge model with piers, abutments, cross frames
 - Automatic generation of construction sequence with composite action
- Automatic calculation of effective width for composite section
- Cracked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





COMING SOON!



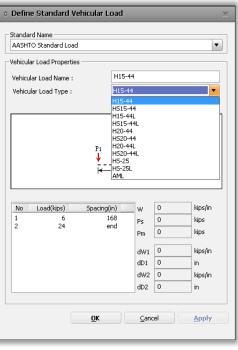




Select Moving Load Code Moving Load Code : AASHTO LRFD None None	Lane Name :	Define Standard Vehicu Standard Name AASHTO Standard Load Vehicular Load Properties Vehicular Load Name : Vehicular Load Type :
AASHTO Standard AASHTO LRFD PENNDOT Canada BS EUROCODE Russia Korea China India Taiwan Transverse	set set row dag set row dag n set row dag n	No Load(kips) Sp 1 6 2 24
	on the Solid Elements	
Step 1 Select Moving Load Code	Step 2 Define Traffic Line Lane or Traffic Surface Lane	Define S User-de

Define Design Traffic Lin...

O Define Design Traffic Sur..



Step 3

Define Standard Vehicular Load or User-defined Vehicular Load

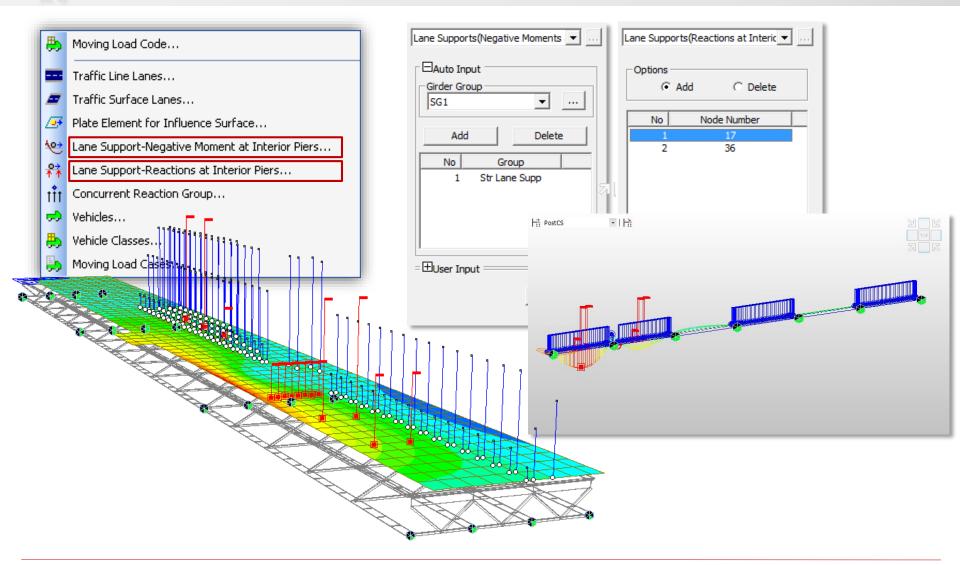


Concurrent Forces

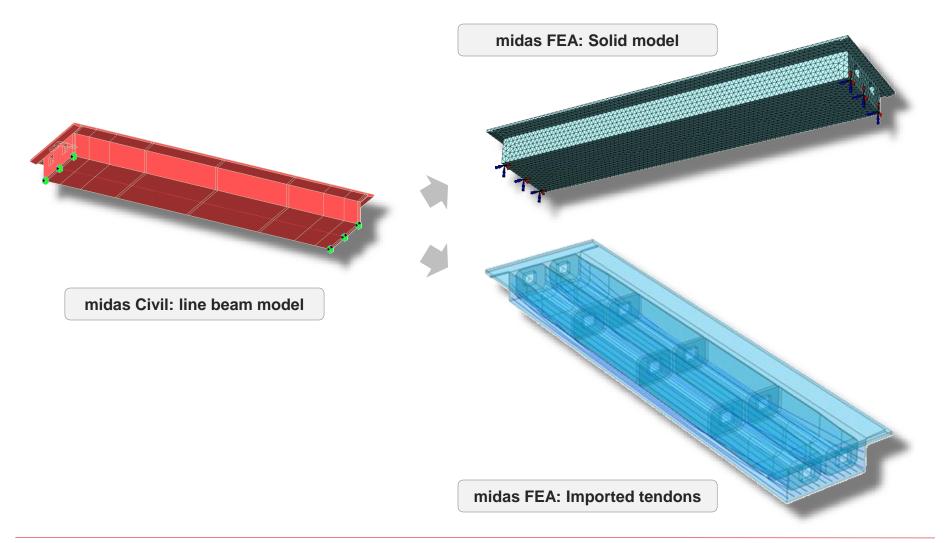
	Load	Part	Axial (kN)	Shear-y (kN)	Shear-z (kN)	Torsior (kN-m)		Moment-y (kN·m)	Moment-z (kN·m)	
332	MVL1(all	[172]	0.00	0.00			6.58	1625.04	0.00	
	MVL1(all	[173]		0.00			5.38	1676.10	0.00	
334	MVL1(all		Сору		167.5	5 12	2.35	1660.23	0.00	
335	MVL1(all				185.1	4 -12	2.05	1623.46	0.00	
336	MVL1(all		Find	Ctr	I+F 202.6	-19	5.06	1555.79	0.00	
337	MVL1(all		a the picks	_	237.7	3 10	6.67	1455.95	0.00	
338	MVL1(all		Sorting Dialog		256.7) 1:	3.78	1303.13	0.00	
339	MVL1(all		Style Dialog		273.7	-12	2.02	1123.15	0.00	
340	MVL1(all		Show Graph.		290.1	3 -19	5.35	922.84	0.00	
341	MVL1(all		Show Graph.		318.4	3 18	8.30	-834 <mark>.0</mark> 5	0.00	
342	MVL1(all		Activate Reco	orde	334.2	2 14	4.79	901.23	444 . 0.00	
343	MVL1(all		-		347.4	5 -14	4.33	997.44	1 0.00	
344	MVL1(all		Export to Exc	cel	359.3	5 -17	7.98	11122 45	0.00	
345	MVL1(all		View by Load	Cases	350 2		<u>2.98</u>	+1264.7D	0.00	
346	MVL1(all		-		-347.4			-1120.2B	00.00	
347	MVL1(all		View by Max	Value Item	-362			i i i i i i i i i i i i i i i i i i i	0.00	
	MV/ 1/al				318 /			0008991999	000	
	Force /		Dynamic Repo	ort Table				EROSHG		
						P.	23	A C C A		
		1	, Axial	Shear-y	Shear-z T	orsion Mo	oment-y	Mount 7		
Elem Lo	oad Part	Comp	onent (kN)	(kN)			kN·m)	(kN-m)		
332 MVL			ment-y 0.00		-32.37	-9.42	1625.04	0.00		
333 MVL			ment-y 0.00 ment-y 0.00		13.06 31.66	6.56 0.70	1676.10 1660.22	0.00		
334 MVL 335 MVL			ment-y 0.00 ment-y 0.00		158.22	-10.43	1660.22	0.00		
336 MVL			ment-y 0.00		176.84	-12.75	1555.79	0.00		
337 MVL			ment-y 0.00		219.52	-0.79	1455.95	0.00		
338 MVL 339 MVL			ment-y 0.00 ment-y 0.00		239.03 257.82	-6.12 -9.03	1303.13 1123.15	0.00	Ē	
340 MVL			ment-y 0.00		273.69	-12.24	922.84	0.00		
341 MVL	'L1(all [181]] Mo	ment-y 0.00		40.57	-2.51	-834.05	0.00		H M H H
342 MVL			ment-y 0.00		65.39	-2.00	-901.22	0.00		
343 MVL 344 MVL			ment-y 0.00 ment-y 0.00		90.53 110.97	-1.79 -1.46	-997.44 -1122.45	0.00		H KENTE IX.
345 MVL			ment-y 0.00		-123.55	2.08	-1265.69	0.00		
346 MVL			ment-y 0.00		-111.16	1.53	-1120.14	0.00		A CONTRACTOR OF A CONTRACTOR OFTA CONTRACTOR O
247 1410	L1(all [187]	Mo Mo	ment-y 0.00		-91.87	1.27	-994.98	0.00		

Result By Max Value-[Beam Force]

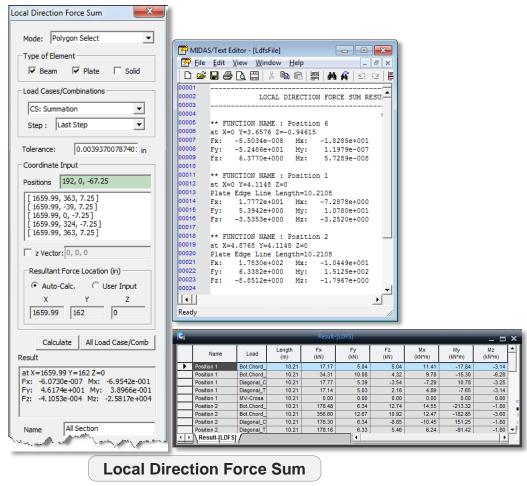
AASHTO LRFD Optimizer

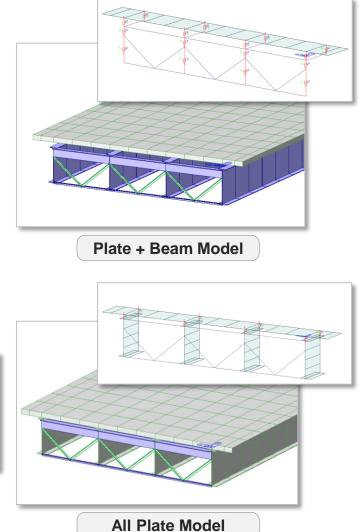


Exporting frame model to solid/plate model to readily perform Detail Analysis

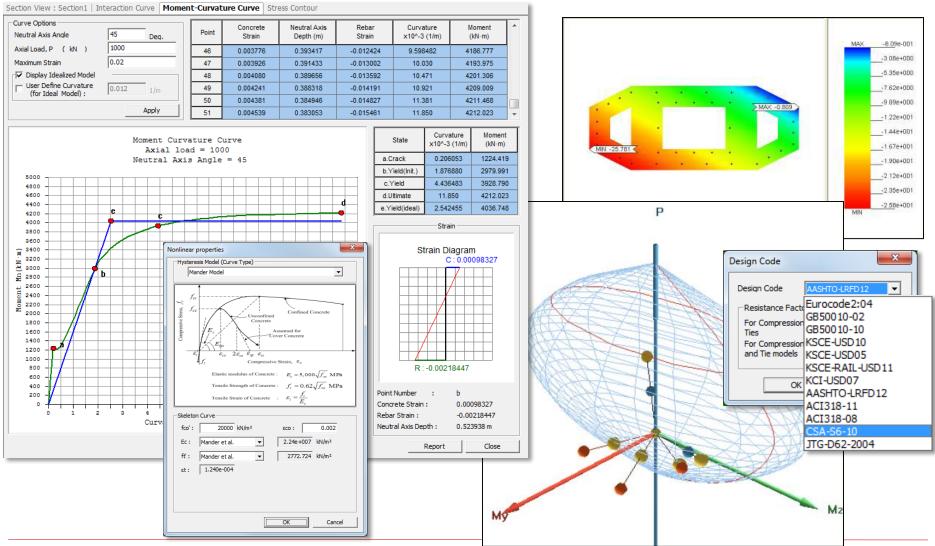


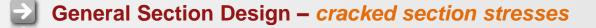


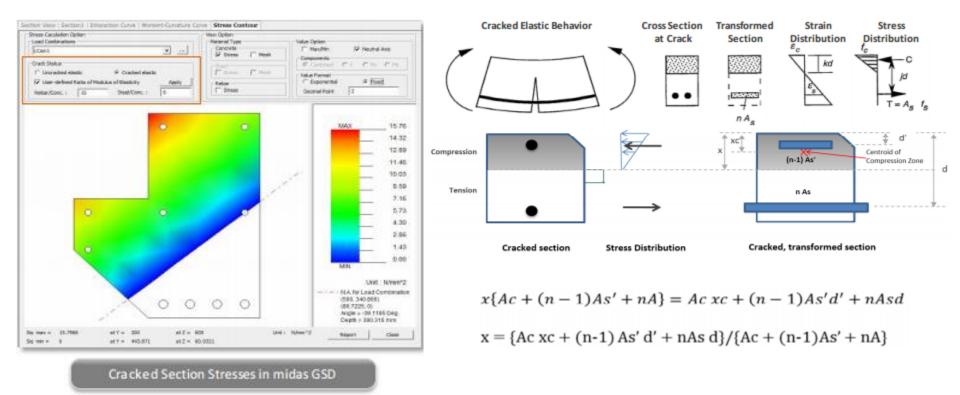




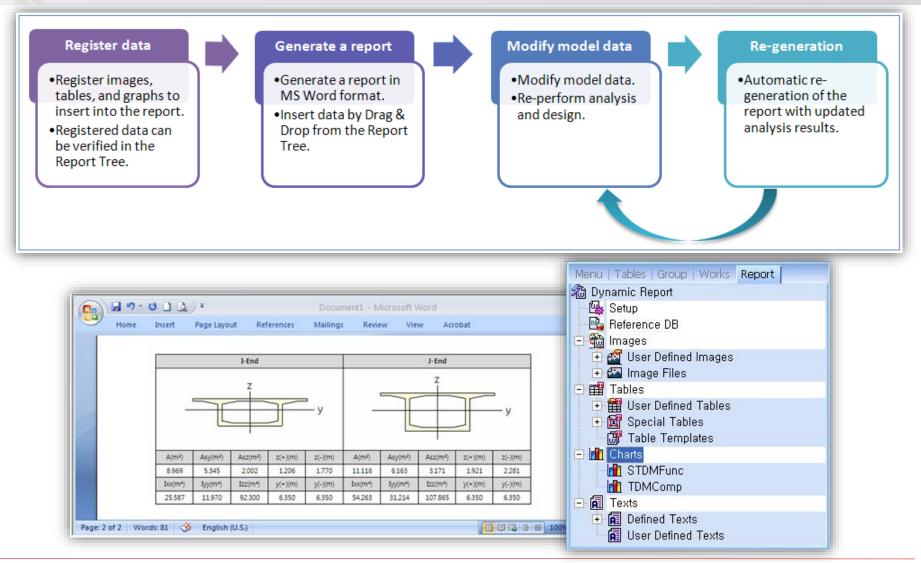


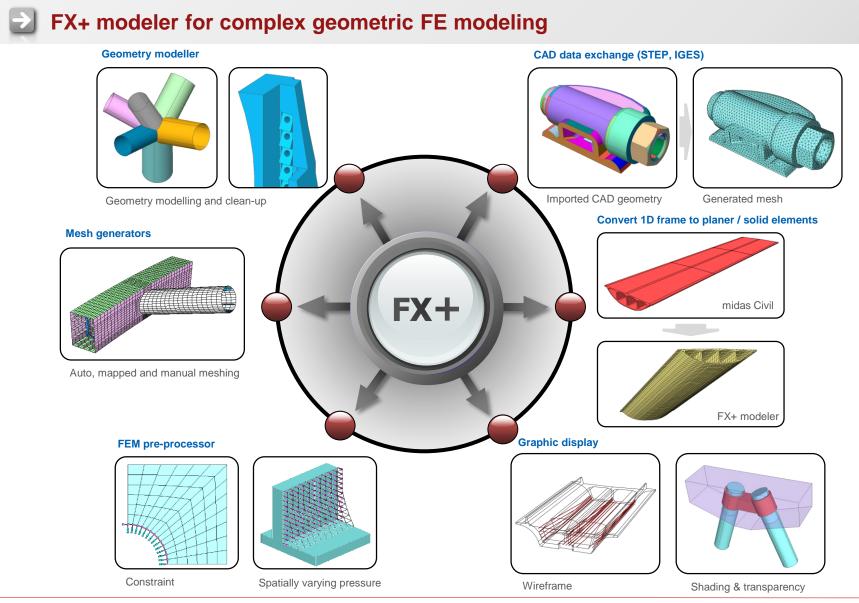












midas Civil

Part 2. Analysis

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

midas **Civil**

PSC Bridge – *Tendon Prestress Loss*

Tendon Coordinates Tendon Elongation	t (Immediate Loss) (tonf/m²)		eform.Loss onf/m²)		ess(Elastic Loss)/ s (Immediate Loss)	Creep/Shrinkag (tonf/m²	- 1	Relaxation Loss (tonf/m²)	Stress(All Stress(Immedi		Effective Num
Tendon Arrangement	tendon group [Top-P 1-	-1] at the	stage of [CS1	5]						,	
-	up Top-P1-1 S	Stage		CS15		Apply					
Tendon Loss	110687.5790		-1503.1204		0.9864	-200	01.5266	-1781.4910		0.9522	1.00
Tendon Approximate Loss	119519.1913		-1312.9539		0.9890	-168	83.7269	-1923.6338		0.9588	1.00
	116158.3065		-1567.3373		0.9865		58.4493	-1897.9622		0.9524	2.00
Tendon Weight	120289.2121		-1437.5402		0.9880		28.7034	-1966.3609		0.9573	2.00
Tendon Stress Limit Check	117096.8201		-1601.7405		0.9863		60.0828	-1954.0997		0.9478	4.00
	120883.9961		-1269.3180		0.9895		70.9805	-2018.4493		0.9548	4.00
10	119308.8508		-1575.9778 1228.2175		0.9868		25.2251 90.6729	-2021.4559		0.9462	6.00
🛛 🖻 Copy			1543.2175		0.9899 0.9872		90.6729 84.8731	-2061.2880 -2074.6478		0.9533	6.0 8.0
					0.9972		10.7456	-2074.8478		0.9454	8.0
💏 Find		Ctrl+F	1499.5523		0.9877		59.8470	-2116.0764		0.9452	10.0
		ſ					00.0110	-2110.0101		0.0102	-X-
Sorting Dialog			Tendon Time	-depend	ent Loss Graph						
Style Dialog			Tendon :	Top01-0		-	CS1	▼ Ste	p: First Step	•	Animate
Devie Dialog			rendon :	10001-0	2 💌	Stage	: J <u>C51</u>	▼ Ste	p: [First Step	<u> </u>	Animate
Show Graph											
					lendon	:Top01-02	Stage:0	CS1 Step:First St	ep		
Export to Excel.			365.	567 -							
			355.	567 -							-
Dynamic Report	Table		월 345.1	567 -							-
Tendon Time-de	pendent Loss Grapi	ь	U 345.1 0 335.1 0 325.1 0 325.1 0 315.1	567 -	╞╼╞╼┿╍┾╍┾╍ ┿						-
18 1	124654.8424		U 325.9								
18 J	124391.1551										
	124104.2791		8 305.1								
19			음 295.1	567							
19 I 19 J			l l ă								
19 J	123778.5924		E 285.9								
19 J 20 I	123778.5924 123778.5924		275.	567 -							
19 J 20 I 20 J	123778.5924 123778.5924 123690.4758			567 -							
19 J 20 I 20 J 21 I	123778.5924 123778.5924 123690.4758 123690.4758		275.	567 -	1000 2000 3000	4000 5000			10500	12000 13	500
19 J 20 I 20 J 21 I 21 J	123778.5924 123778.5924 123690.4758 123690.4758 123690.4758 123575.9243		275.	567 -	1000 2000 3000	4000 5000		7000 8000 9000 nce(mm)	10500	12000 13	500
19 J 20 I 20 J 21 I 21 J 22 I	123778.5924 123778.5924 123690.4758 123690.4758 123575.9243 123575.9243		275.	567 -	1000 2000 3000	4000 5000			10500		500 Close
19 J 20 I 20 J 21 I 21 J	123778.5924 123778.5924 123690.4758 123690.4758 123690.4758 123575.9243		275.	567 -	1000 2000 3000	4000 5000			10500	12000 13	

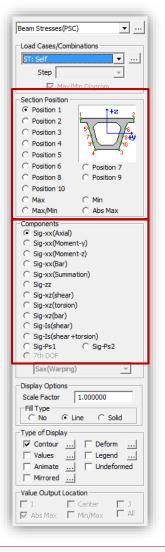
PSC Bridge – Approximate Tendon Prestress Loss

Approximate Estimate of Time Dependent Tendon Losses	x
Design Code AASHTO-LRFD 06 AASHTO-LRFD 06 Estimation Method Rational App JSCE 02 Lump Sum Estimate Method	Tendon Load Load Case PS Load Case Add
Rational Approximate Method (AASHTO-LRFD06) Ambient Relative Humidity (0-100) O Compressive Strength of Concrete at time of Initial Loading (f'ci) Relaxation Loss	Delete Delete Delete Dead Load (Self Weight) Load Case Self Add
● Per Code ● User Defined Tendon Type Low-relaxation Strand Relaxation Loss 0	Additional Dead Load(Superimposed Load)
Remove Approximate Estimate of Time Dependent Tendon Loss Da	Load Case Add Delete

PSC Bridge – *Tendon Stress Limit Check*

Tendon Coordinates						Tendon Stress			Tendon Stress Limit	
Fendon Elongation			Ten	idon 🛛	FDL1	FDL2	FLL	Immediately a	fter andhor set	At service
					(N/mm²)	(N/mm²)	(N/mm²)	At anch.	anch. Away from anch.	
Tendon Arrangement		\mathbf{F}	Bo	ot1	867.1222	1008.6050	1008.6050	1330.0000	1406.0000	1280.0000
Tendon Loss			Bo	ot2	866.9082	1008.4515	1008.4515	1330.0000	1406.0000	1280.0000
Tendon Approximate Los	-e		CS01	a01_I	951.7275	1086.9387	1079.3223	1330.0000	1406.0000	1280.0000
rendon Approximate Los			CS01:	a01_r	951.9741	1087.2330	1079.6144	1330.0000	1406.0000	1280.0000
Tendon Weight			CS01	a02_I	970.9649	1098.5414	1087.4911	1330.0000	1406.0000	1280.0000
Tendon Stress Limit Che	rk 🛛		CS01:	a02_r	971.2241	1098.8414	1087.7895	1330.0000	1406.0000	1280.0000
Toridon beloss cinic cho			CS01	a03_I	982.9584	1103.6489	1095.1710	1330.0000	1406.0000	1280.0000
			CS01:	a03_r	983.2302	1103.9547	1095.4758	1330.0000	1406.0000	1280.0000
			CS01	b01_l	928.6975	1069.5204	1069.5204	1330.0000	1406.0000	1280.0000
Tendon Stress		· · · ·	p1I	b01_r	928.8691	1069.7805	1069.7805	1330.0000	1406.0000	1280.0000
 Tenuori arress 			× 01	b02_l	946.5612	1076.5253	1069.6800	1330.0000	1406.0000	1280.0000
			011	b02_r	946.7449	1076.8016	1069.9516	1330.0000	1406.0000	1280.0000
\Box Tendon Stress Limit –		_	01	b03_l	959,7907	1079.9189	1070.4710	1330.0000	1406.0000	1280.0000
At anch.	0.7	fpu	011	b03_r	959.9866	1080.2054	1070.7541	1330.0000	1406.0000	1280.0000
	0.74	ī.	02	2a01_l	932.7898	1071.1960	1071.1960	1330.0000	1406.0000	1280.0000
Away from anch.	0.74	fpu	02:	a01_r	932.9301	1071.3970	1071.3970	1330.0000	1406.0000	1280.0000
At service	0.8	fpy	02	2a02_l	953.0878	1079.1348	1070.7337	1330.0000	1406.0000	1280.0000
			02:	a02_r	953.2380	1079.3484	1070.9434	1330.0000	1406.0000	1280.0000
			02	2a03_l	970.7999	1081.7421	1071.2847	1330.0000	1406.0000	1280.0000
OK	Cancel		02;	a03_r	970.9601	1081.9655	1071.5031	1330.0000	1406.0000	1280.0000
			02	2b01_l	781.8189	990.2175	990.2175	1330.0000	1406.0000	1280.0000
			CS02	:b01_r	782.0235	990.4289	990.4289	1330.0000	1406.0000	1280.0000
			CS02	2b02_l	826.3534	1017.4450	1017.4450	1330.0000	1406.0000	1280.0000
				b02_r	826.5675	1017.6609	1017.6609	1330.0000	1406.0000	1280.0000
				2b03_l	865.6381	1042.1207	1042.1207	1330.0000	1406.0000	1280.0000
			CS02	-	865.8604	1042.3412	1042.3412	1330.0000	1406.0000	1280.0000
				3a01_l	932.3756	1070.9447	1070.9447	1330.0000	1406.0000	1280.0000
			CS03	a01_r	932.5233	1071.1613	1071.1613	1330.0000	1406.0000	1280.0000
			CS03	3a02_I	952.9029	1079.3094	1070.7975	1330.0000	1406.0000	1280.0000
			CS03	a02_r	953.0611	1079.5400	1071.0235	1330.0000	1406.0000	1280.0000

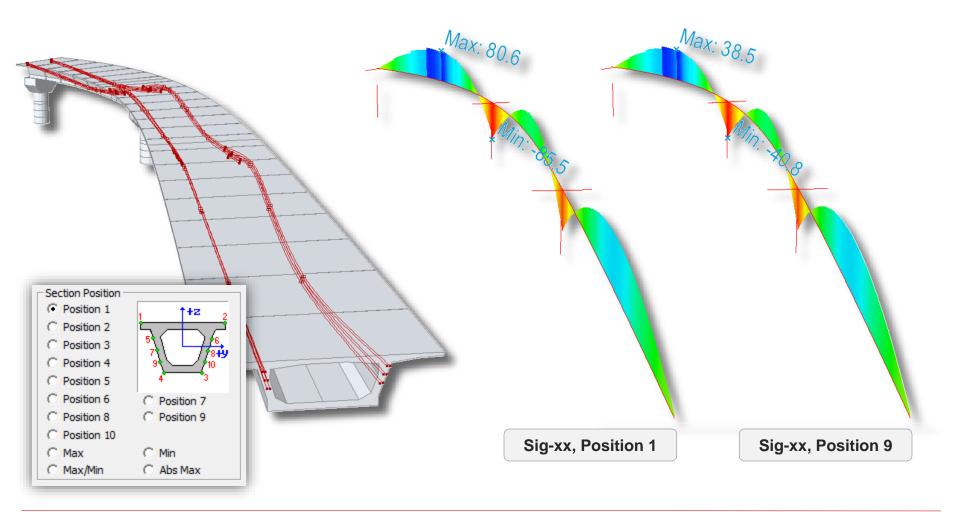
PSC Bridge – Stress output locations on PSC section

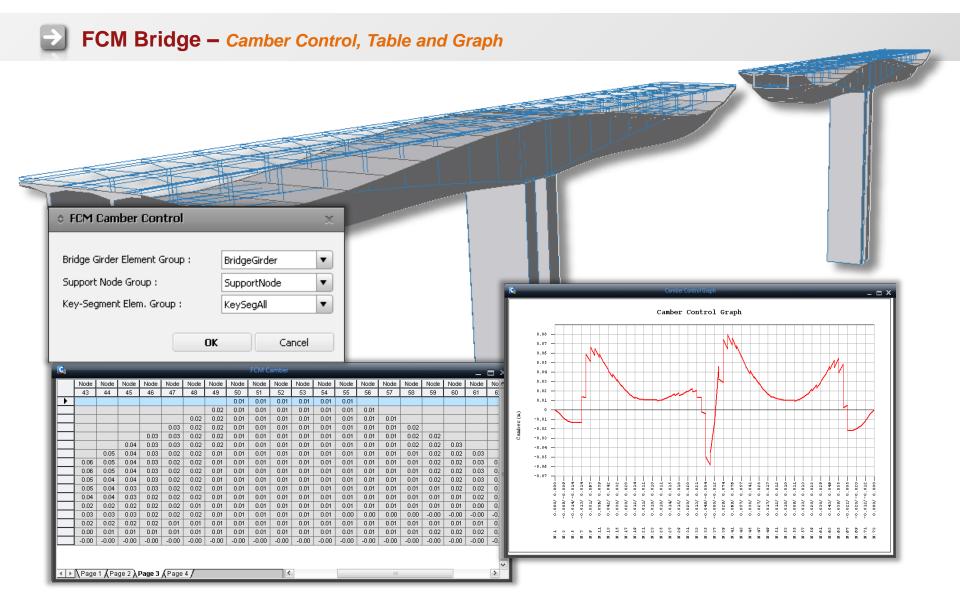


Section Position	
Position 1	1 1+2 2
O Position 2	
Position 3	
Position 4	9
O Position 5	4 3
C Position 6	C Position 7
C Position 8	C Position 9
C Position 10	
C Max	C Min
C Max/Min	O Abs Max
Components ⓒ Sig-xx(Axial)	
Components	
Sig-xx(Axial)	
 Sig-xx(Axial) Sig-xx(Mome 	nt-y)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome 	nt-y)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome Sig-xx(Bar) 	nt-y) nt-z)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome 	nt-y) nt-z)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome Sig-xx(Bar) Sig-xx(Summ 	nt-y) nt-z) ation)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome Sig-xx(Bar) Sig-xx(Summ Sig-xx(Summ 	nt-y) nt-z) ation)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome Sig-xx(Bar) Sig-xx(Summ Sig-xx(Summ Sig-xz(Summ Sig-xz(shear) Sig-xz(torsion Sig-xz(bar) 	nt-y) nt-z) ation)) n)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome Sig-xx(Bar) Sig-xx(Summ Sig-xz(Summ Sig-xz(shear) Sig-xz(torsion Sig-xz(bar) Sig-sz(bar) Sig-Is(shear) 	nt-y) nt-z) ation)) n)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome Sig-xx(Bar) Sig-xx(Summ Sig-xz(Summ Sig-xz(shear) Sig-xz(torsion Sig-xz(bar) Sig-Is(shear) Sig-Is(shear) 	nt-y) nt-z) ation)) n) +torsion)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome Sig-xx(Bar) Sig-xx(Summ Sig-xx(Summ Sig-xz(shear) Sig-xz(shear) Sig-xz(torsion Sig-xz(bar) Sig-Is(shear) Sig-Is(shear) Sig-Sig-Sig-Sig-Sig-Sig-Sig-Sig-Sig-Sig-	nt-y) nt-z) ation)) n)
 Sig-xx(Axial) Sig-xx(Mome Sig-xx(Mome Sig-xx(Bar) Sig-xx(Summ Sig-xz(Summ Sig-xz(shear) Sig-xz(torsion Sig-xz(bar) Sig-Is(shear) Sig-Is(shear) 	nt-y) nt-z) ation)) n) +torsion) C Sig-Ps2

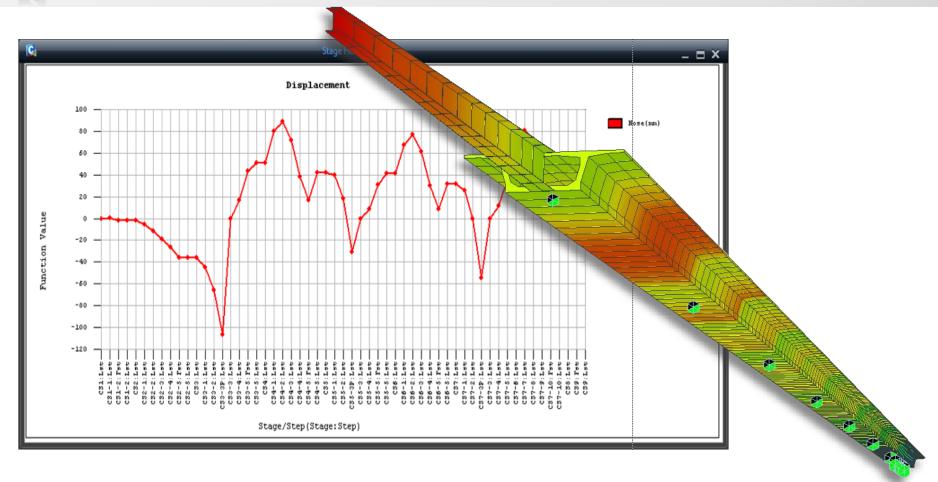
Sig-xx	Sum of axial stresses in ECS x-direction
Sig-zz	Sum of axial stresses in ECS z-direction
Sig-xz (shear)	Sum of shear stresses due to shear force and prestressing shear bars
Sig-xz (torsion)	Shear stress due to torsion
Sig-xz (bar)	Shear stress due to prestressing shear bars
Sig-Is (torsion)	Diagonal 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

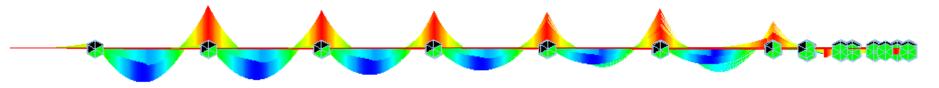


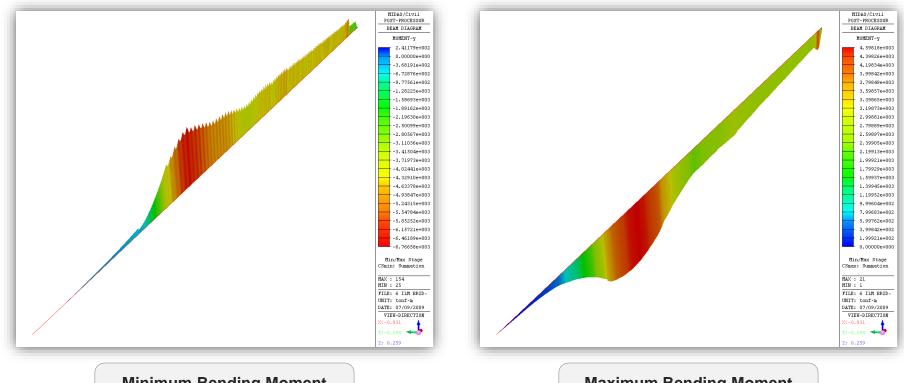












Minimum Bending Moment Envelope upon Completion Maximum Bending Moment Envelope upon Completion

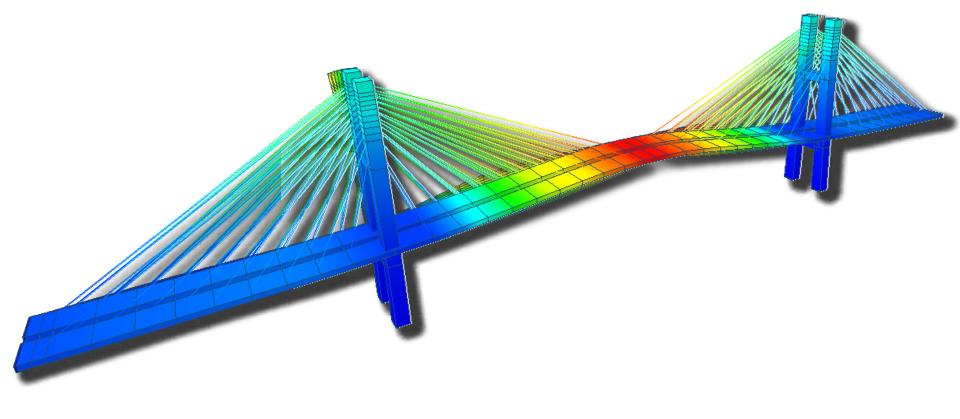
Cable-stayed Bridge – *Finding Unknown Load Factors by Optimization*

Ounknown Load Factor	Detail	<u> </u>	
Item Name: UNKNOWN Load Comb : LCB1 Object function type Linear Square	Constraints M1001 M1002 M1003 M1004 M1005 M1006	Add Modify Delete	Inknown Load Factor Constraint X Constraint Name : Ele-03 Constraint Type : Beam Force Element ID : 0
Sign of unknowns Negative Both Unknown 1	Positive Positive Case SELF WEIGHT	Factor Weighted Factor	Point 1/4 2/4 3/4 3-end 2/4 Component
2 3 4 5 6 V	ADDITIONAL LOAD TENSION 1 TENSION 2 TENSION 3 TENSION 4	1.000 Unknown 1.00 Unknown 1.00 Unknown 1.00 Unknown 1.00	Equality / Inequality Condition Equality Upper Bound 220 DK Cancel
Simultaneous Equations Met	Get Unknown Load Factors		Inequality Cover Bound Carcel DK Carcel The transmission
Factor 1.000 1 Constraint NODE 23 NOD Value 0.003 0	1.000 1100.825 1050.603 917.432 834. DE 24 NODE 25 NODE 26 NODE 27 NODE 0.000 -0.002 -0.008 -0.010 -0.	395 785.917 715.977 670.831 610.790 28 NODE 29 NODE 30 NODE 31 NODE 31 010 -0.010 -0.010 -0.010 5019	
		010 0.010 0.010 0.000 5000 010 -0.010 -0.010 5000 5000	Completed Structure Model
			Definition of Unknown Load Factors
Result Influence Matrix	Make	e Load Combination Generate Excel File OK	

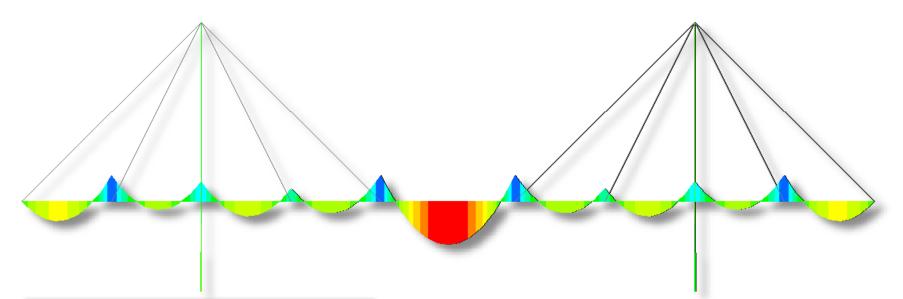
Cable-stayed Bridge – Geometric nonlinearity and tangential displacements

Construction Stage Analysis Control Data		
Final Stage C Other Stage CS1	Cable-Pretension Force Control	Nonlinear analysis is performed by accumulating the results
		by accumulating the results
Restart Construction Stage Analysis Select Stages for Restart Analysis Option	Initial Force Control Convert Final Stage Member Forces to Initial Forces for Post C.S. Truss Beam	
Include Nonlinear Analysis Nonlinear Analysis Control	Change Cable Element to Equivalent Truss Element for PostCS	
	Apply Initial Member Force to C.S.	
🔲 Include Equilibrium Element Nodal Forces	Initial Displacement for C.S.	Time dependent effects
Include P-Delta Effect Only P-Delta Analysis Control	▼ Initial Tangent Displacement for Erected Structures	(Creep/Shrinkage)
✓ Include Time Dependent Effect Time Dependent Effect Control	Group Pier1 ✓	(Creep/Shinikage)
	Lack-of-Fit Force Control	
Load Cases to be Distinguishe Dead Load for C.S. Output	Apply Camber Displacement to C.S. (if Defined)	
No Load Case Nam Type Case 1 Cas Add 1 DW DW WC Add A	Consider Stress Decrease at Lead Length Zone by Post-tension	
2 DC DC 2nd Modify	© Linear Interpolation C Constant : Stress *	
Delete		
	Beam Section Property Changes	Maximum of 3 load cases
	C Constant © Change with Tendon	distinguished from Dead Load
	X	(CS)
Time Dependent Effect Greep & Shrinkage	turrent Forces of Frame	(03)
Туре	ut of Each Part of Composite Section	
Creep Shrinkage Creep	& Shrinkage	
Creep	ruction Stage Analysis Control Data OK Cancel	
Convergence for Creep Iteration Number of Iterations: 5 Tolerance		
		Tennentiel dienlesemente
Only User's Creep Coefficient Internal Time Step for Creep :	2	Tangential displacements
Auto Time Step Generation for Large Time Gap		(Lack of Fit Force included)
T : Time Gap T > 10 2 🔦 T	> 100 5 🔦	, i i i i i i i i i i i i i i i i i i i
	> 5000 10 📉	
T > 10000 20 📉		
✓ Tendon Tension Loss Effect (Creep & Shrinkage)		
Consider Re-Bar Confinement Effect		
Variation of Comp. Strength		
Apply Time Dependent Effect Elastic Modulus to Post (.5	Camber for Construction Stage
Tendon Tension Loss Effect (Elastic Shortening) Ochange with Variation of Tendon Force		included in staged analysis
Constant		included in staged analysis
	OK Cancel	

Cable-stayed Bridge – Geometric nonlinearity and tangential displacements



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



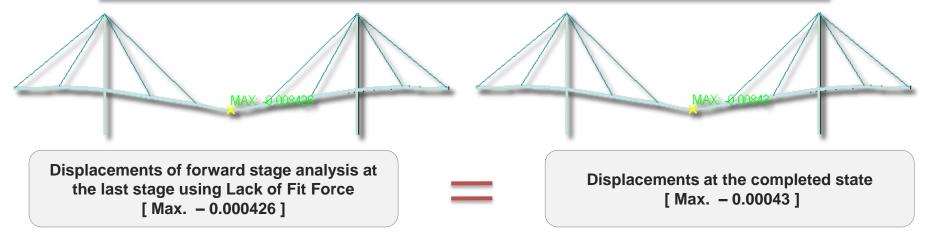
	ame: 🛄 🕅		onstraints			
Load C	omb : LCB1		✓NODE 24 ✓NODE 25		Add Add	
2000 0			VINODE 25			
Object	: function type -		✓NODE 27		Modify	
🔍 Line	ear 💿 Squ		NODE 28		Delete	
-	f unknowns gative 🌼 I		VNODE 30 NODE 31 NODE 32		Table	
	Unknown	LCase		Factor	Weighted Factor	
1	Г	SELF WEIGHT		1.000		
2	Г	ADDITIONAL LOA	٨D	1.000		-1-1
3	V	TENSION 1		Unknown	1.00	
	V	TENSION 2		Unknown	1.00	
4		TENSION 3		Unknown	1.00	
4	V			Unknown	1.00	
	<u>v</u>	TENSION 4		OTINITOWIT		- v

Analysis results of initial equilibrium state (completed optimized state)

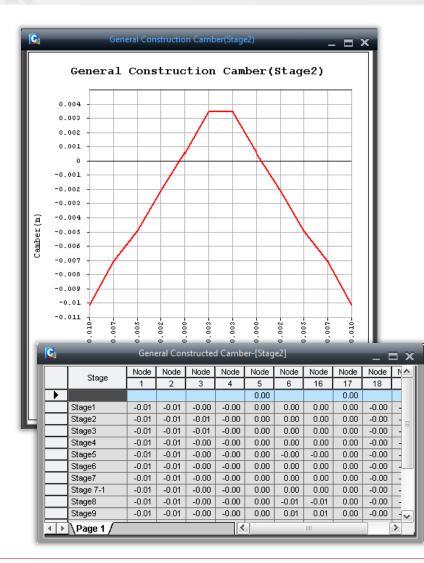
Cable-stayed Bridge – Forward stage analysis step2: calculate construction stage pretension forces

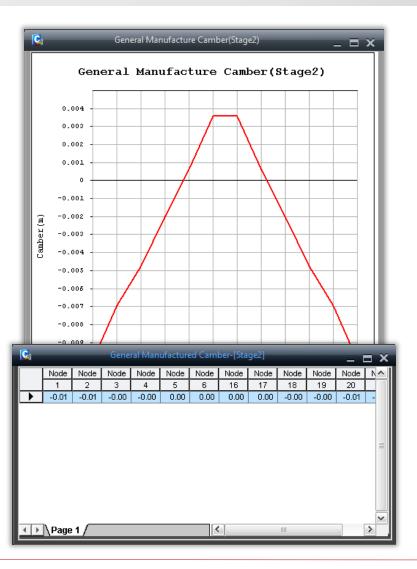
Construction stage pretension force = Initial pretension force (from step 1) + Lack of Fit Force (additional tension required to install a cable)

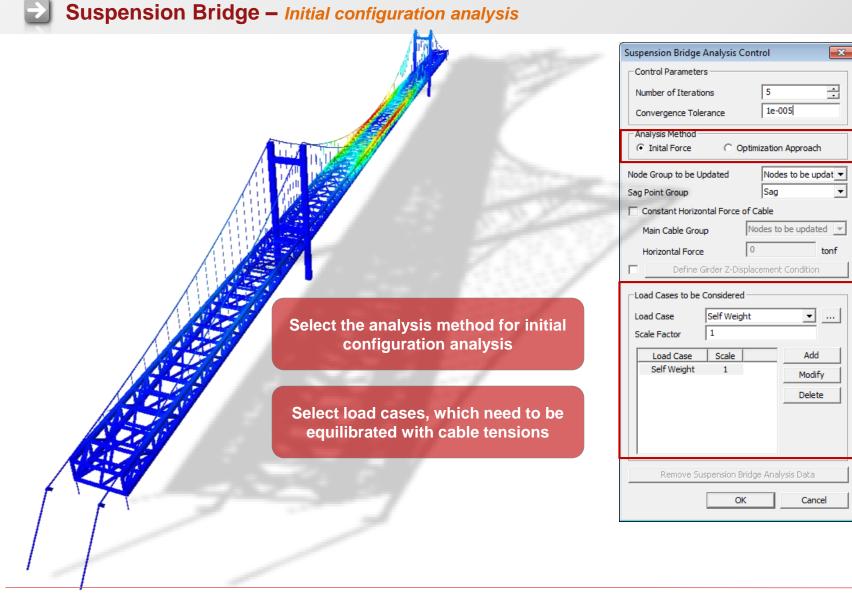
Result-[Truss Lack of Fit Force]										_ = ×	
Elem	Node I	Node J	Pretension	LOF Force	LOF Force SUM		Local Vector		Angle	Elasticity	Area
Lieni	Nodel	Node 3	(tonf)	(tonf)	(tonf)	V-X	V-Y	V-Z	([deg])	(tonf/m²)	(m²)
33	34	1	333.808	-7.153	326.655	-0.707	-0.000	-0.707	45.000	15700000.0	0.00
34	34	3	254.370	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
N 40	25	/ 24	222 000	7450	206.655	0.707	0.000	0 707	45 000	45700000.0	$\sim \sim$
Ласко	of Fit Force	9/				<	1111				>









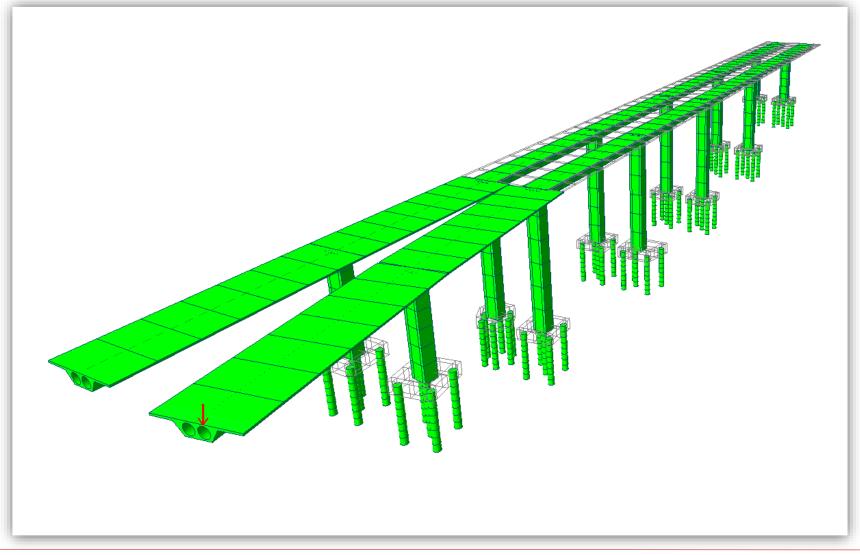


Suspension Bridge – Nonlinear backward construction stage analysis

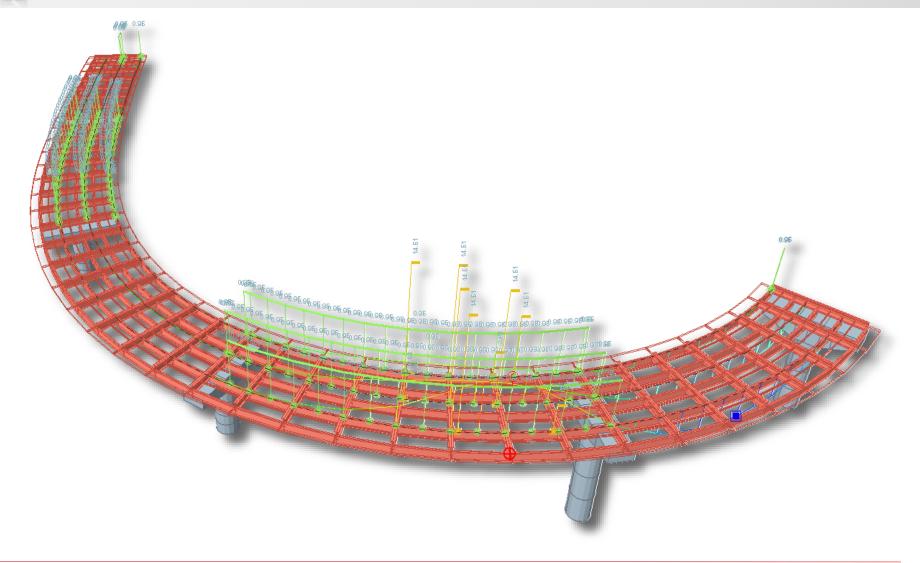
	Construction Stage Analysis Control Data								
	Final Stage • Last Stage • Other Stage								rce External Force Add Replace
	Restart Co	onstruction St	age Analysis	5	elect Stage	s for Resta		Initial Force Cor	ntrol
			-9					auilibriu	m Element Nedel Ferress coloulated from
	Analysis Option							zquilibriu	Im Element Nodal Forces calculated from
	🚽 🗹 Include No	Analysis Co	ntrol			the second accurate analysis			
	💿 Indep	endent Stage		Accum	ulative Stage	e			Member Force to C.S.
	Includ	e Equilibrium B	Element Noda	Forces					
								🕢 Initial Tangei	ant Displacement for Erected Structures
Туре	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)	Group
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	: Force Control
Truss	363 -7.0925e+000			0.0000e+000	0.0000e+000	0.0000e+000	7.0925e+000		
Truss	364 -6.7440e+001					0.0000e+000			ess Decrease at Lead Length Zone by Post-tension
Truss	367 -5.5249e+002		0.0000e+000		0.0000e+000	0.0000e+000			
Truss Truss	368 -5.1740e+002 370 -7.8173e+000				0.0000e+000 0.0000e+000	0.0000e+000 0.0000e+000	5.1747e+002 7.8173e+000		rpolation 🔿 Constant ; Stress *
Truss	370 -7.01730+000 371 -7.1767e+000		0.0000e+000		0.0000e+000	0.0000e+000	7.1767e+000	0.0000	
Truss	374 -5.5429e+002					0.0000e+000			operty Changes
Truss	375 -5.1905e+002					0.0000e+000			Change with Tendon
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	ncurrent Forces of Frame
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	Itput of Each Part of Composite Section
Truss	384 -7.9300e+000				0.0000e+000	0.0000e+000			epactor Each Parc or Composite Dection
Truss	385 -7.3619e+000		0.0000e+000		0.0000e+000	0.0000e+000			
Truss	388 -5.5828e+002				0.0000e+000	0.0000e+000			f Current Stage(Beam/Truss)
Truss	389 -5.2274e+002					0.0000e+000			ruction Stage Analysis Control Data OK Cancel
Truss	391 -8.0033e+000 392 -7.2012e+000		0.0000e+000 0.0000e+000		0.0000e+000 0.0000e+000	0.0000e+000 0.0000e+000			Curco
Truss Truss	392 -7.2012e+000 395 -5.6048e+002				0.0000e+000	0.0000e+000			
Truss	396 -5.2472e+002				0.0000e+000	0.0000e+000			
Truss	398 -1.3893e+001		0.0000e+000		0.0000e+000	0.0000e+000	1.3893e+001		
Truss	399 -1.4016e+001		0.0000e+000		0.0000e+000	0.0000e+000	1.4016e+001		
Truss	400 -5.6449e+002		0.0000e+000	0.0000e+000	0.0000e+000	0.0000e+000	5.6472e+002		
Truce	/01 _5 2875o+003		0 0000+000	0.0000+000	0 00000+0000	0 0000+000			
<								>	



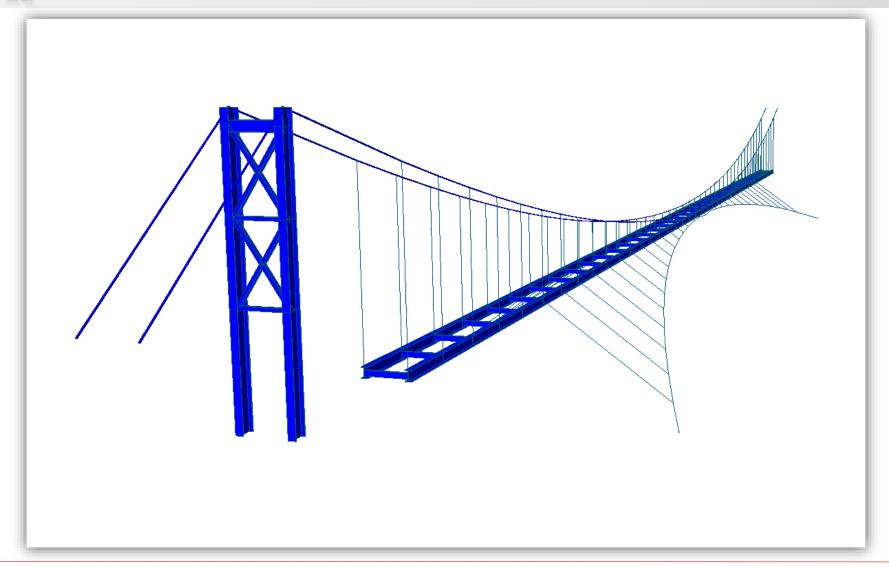
Influence Line Analysis



Moving Load Tracer + Vehicle Load Conversion to Static Load







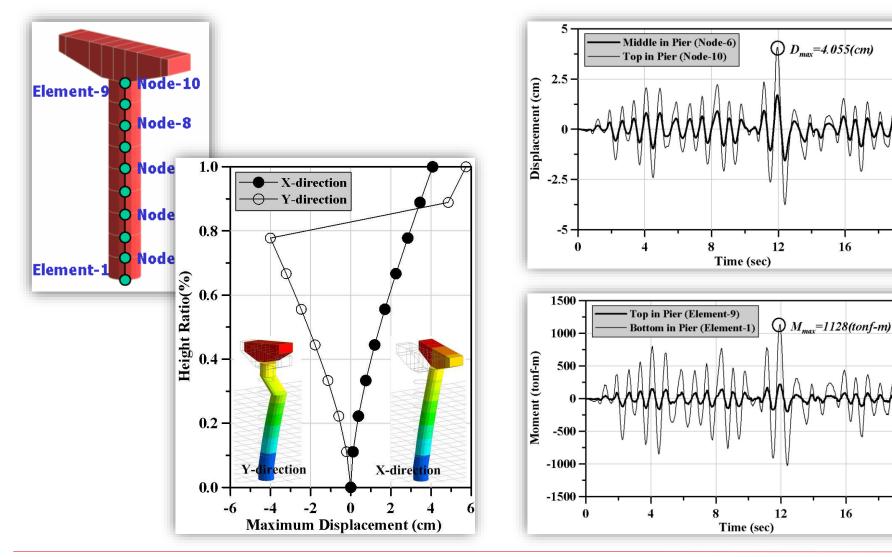
Dynamic Analysis

16

16

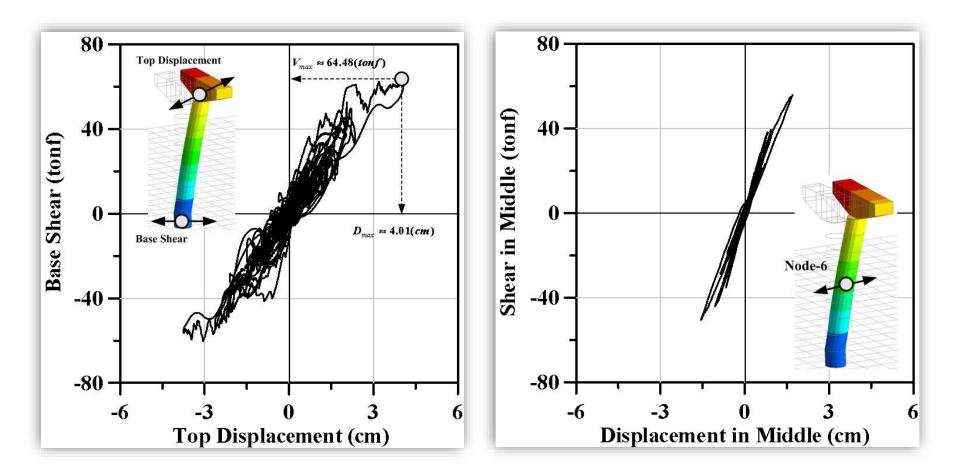
20

Time History Analysis – Displacement & Moment



20

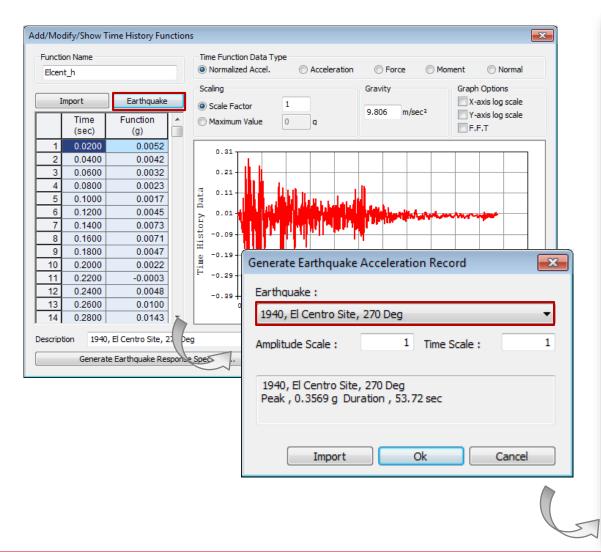




Dynamic Boundary Nonlinear Analysis – *Lead Rubber Bearing Definition*

Operation Contraction Contractica Contr	al Link Properties		X		
Name Applic LRB1 Force LRB2 Force LRB3 Force	e Lead Rubber I	earin earin	<u>A</u> dd <u>M</u> odify		v
LRB3 Force Add/M Name Application Property T Descriptior Self Weig Total V Unear Prr DOF Do Dx Dy Dz Rx Ry Rz Shed	e Lead Rubber I Addify General Link Propert : LRB1 Type : Element Type : Lead Rubber Bearing n :	iearin ies Force Isolator Government Government	Properties>> Rx Properties Rx Properties Rz Properties		
		OK Cancel			

Dynamic Boundary Nonlinear Analysis – Built-in Earthquake Acceleration Record



19	40, El Centro Site, 270 Deg	~
19	40, El Centro Site, 180 Deg	
	40, El Centro Site, Vertical	
19	52, Taft Lincoln School, 69 Deg	
19	52, Taft Lincoln School, 339 Deg	
	52, Taft Lincoln School, Vertical	
19	52, Hollywood Storage P.E., 270 Deg	
	52, Hollywood Storage P.E., O Deg	
19	52, Hollywood Storage P.E., Vertical	
	71, San Fernando, 69 Deg	
19	71, San Fernando, 159 Deg	
19	71, San Fernando, Down	
	79, James RD. El Centro, 220 Deg	
	79, James RD. El Centro, 310 Deg	
19	79, James RD. El Centro, Up	
	85, Mexico City, Station 1, 180 Deg	
	85, Mexico City, Station 1, 270 Deg	=
	94, Northridge, Sylmar County Hosp., 90 Deg	-
	94, Northridge, Santa Monica, City Hall Grounds, O Deg	
	94, Northridge, Santa Monica, City Hall Grounds, 90 De	
	94, Northridge, Arleta and Nordhoff Fire Station, 90 De	
	89, Loma Prieta, Oakland Outer Wharf, 270 Deg	
	89, Loma Prieta, Oakland Outer Wharf, 0 Deg	
	71, San Fernando Pocoima Dam, 196 Deg	
	71, San Fernando Pocoima Dam, 286 Deg	
	66, Parkfield Cholame, Shandon, 40 Deg	
	66, Parkfield Cholame, Shandon, 130 Deg	
	71, San Fernando 8244 Orion Blvd., 90 Deg	
	71, San Fernando 8244 Orion Blvd., 180 Deg	
	thod of Seismic Intensity- level -Type I	
	thod of Seismic Intensity- level -Type II	
	thod of Seismic Intensity- level -Type III	
	-I-1 (1978, MIYAGI-Coast, LG)	
	-I-2 (1978, MIYAGI-Coast, TR)	
	-I-3 (1993, HOKKAIDO-5/W_Coast, LG)	
	-II-1 (1968, HYUGANADA-Coast, LG)	
	-II-2 (1968, HYUGANADA-Coast, TR)	
	-II-3 (1994, HOKKAIDO-EastCoast, TR)	
	-III-1 (1983, NIHONKAI-Central, TR)	
	-III-2 (1983, NIHONKAI-Central, LG) -III-3 (1994, HOKKAIDO-EastCoast, LG)	Y
111		

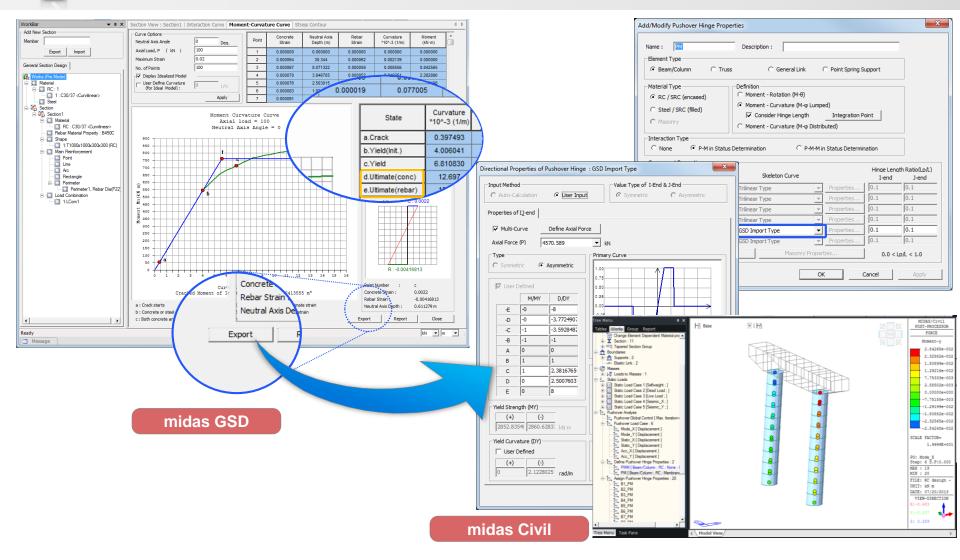
Dynamic Boundary Nonlinear Analysis – Bridge behavior with the base isolators





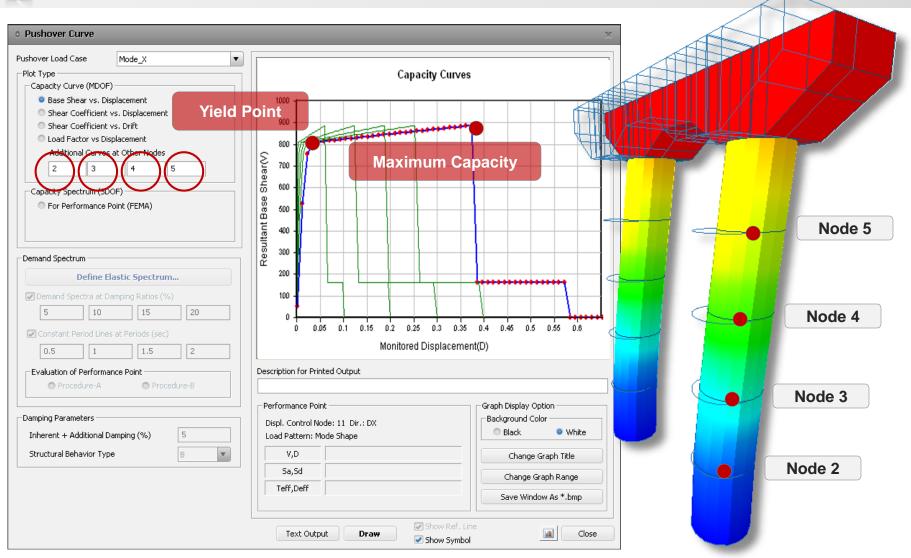


Pushover Analysis – Export Moment-Curvature Idealized Model from midas GSD to Civil

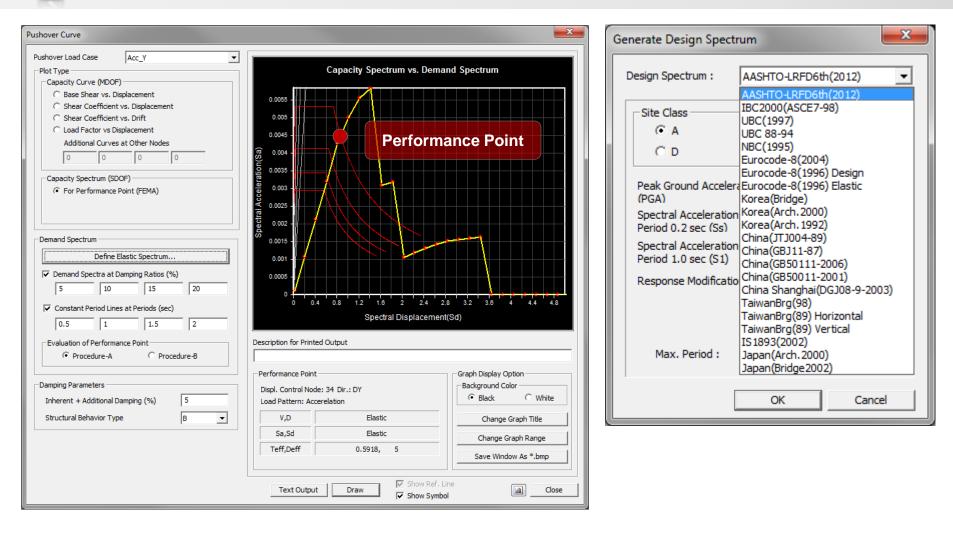


Nonlinear Analysis

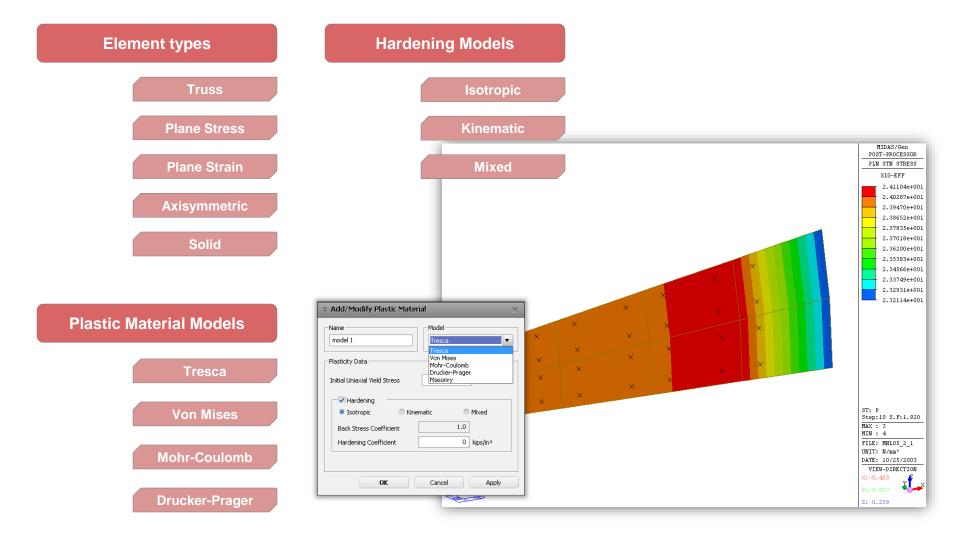
Pushover Analysis – Capacity Curves



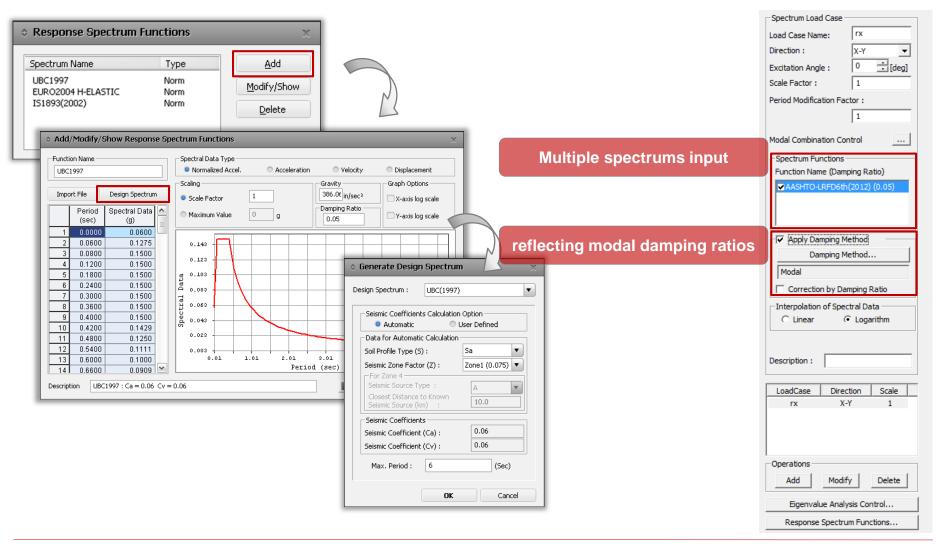
Pushover Analysis – Evaluation of Structure by Design Spectrum



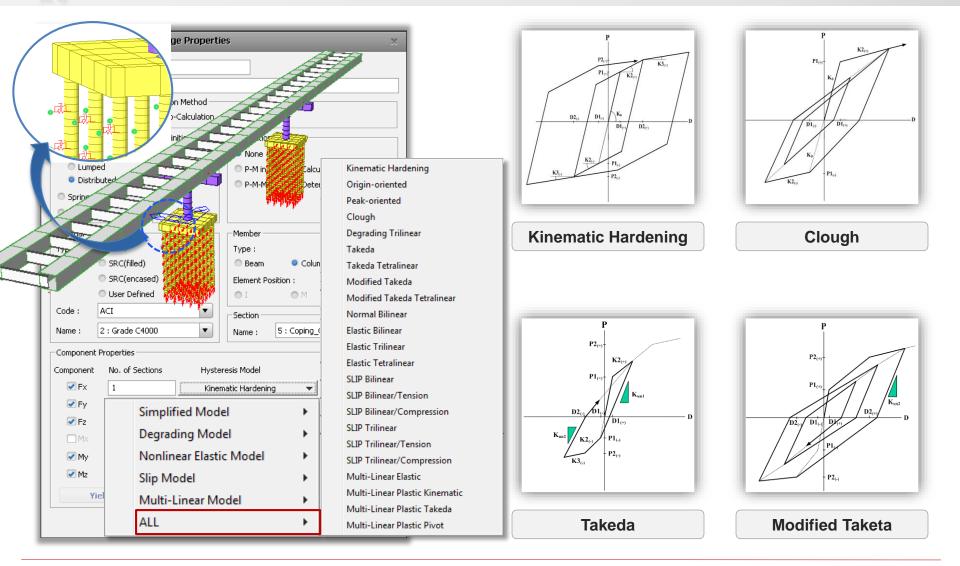




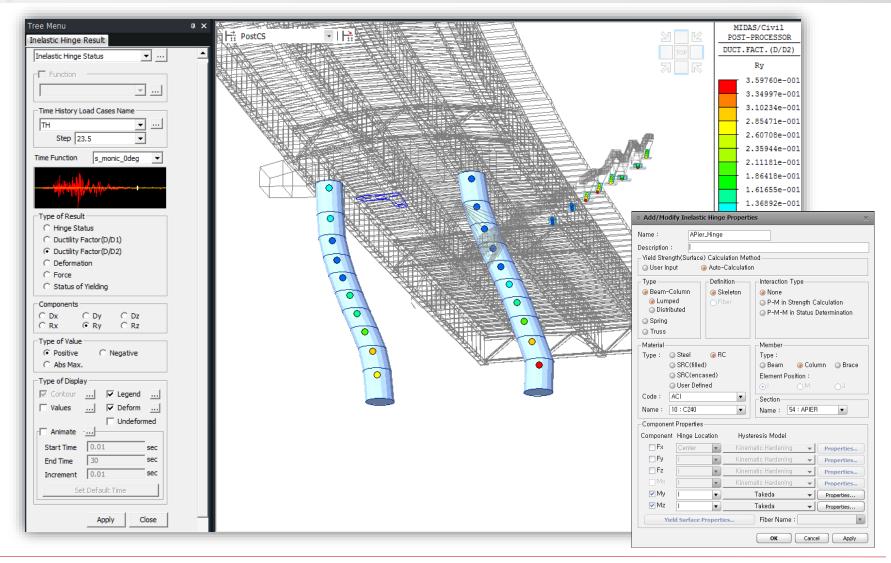






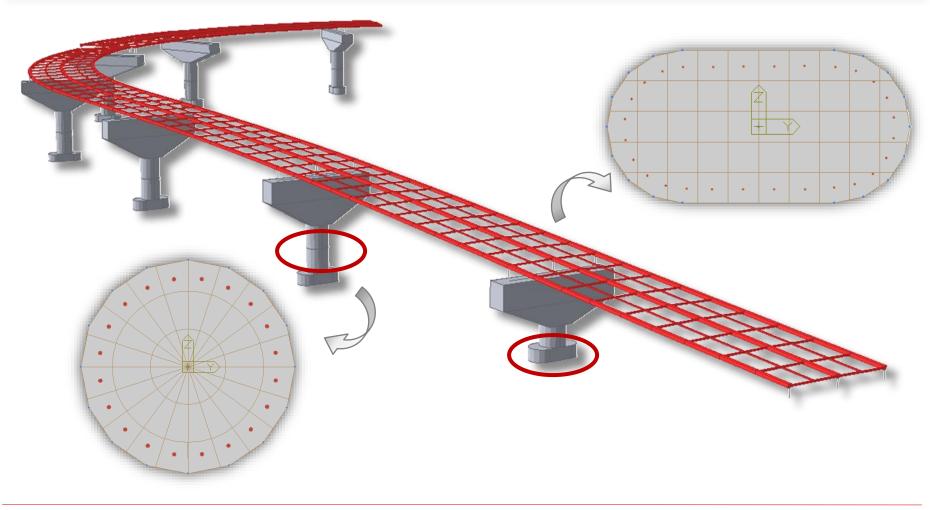




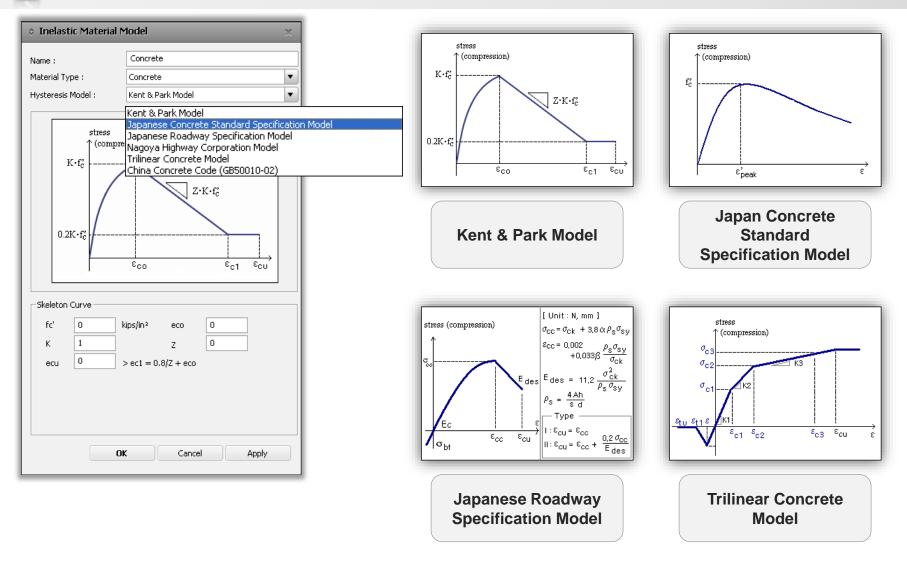


midas Civil

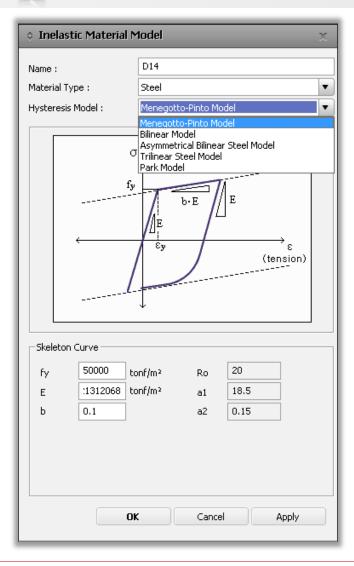
Inelastic dynamic analysis using Fiber Model

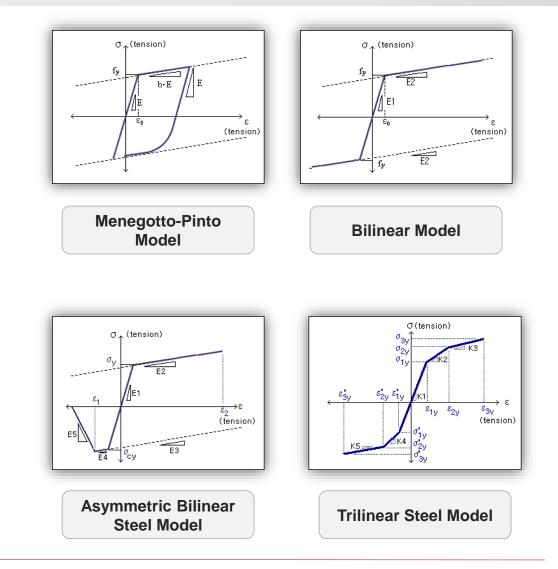


Inelastic dynamic analysis using Fiber Model – Defining hysteretic model of concrete



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



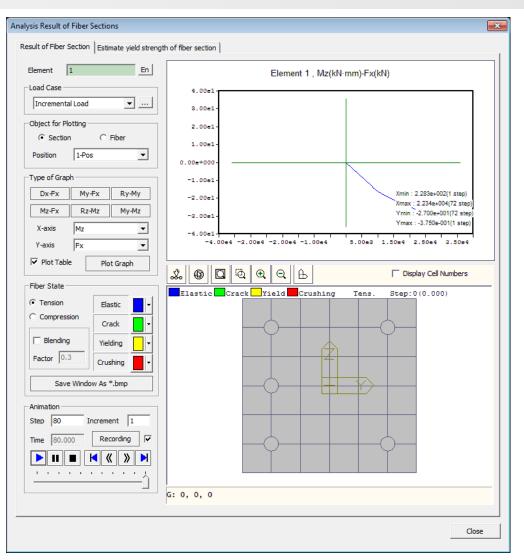


midas **Civil**

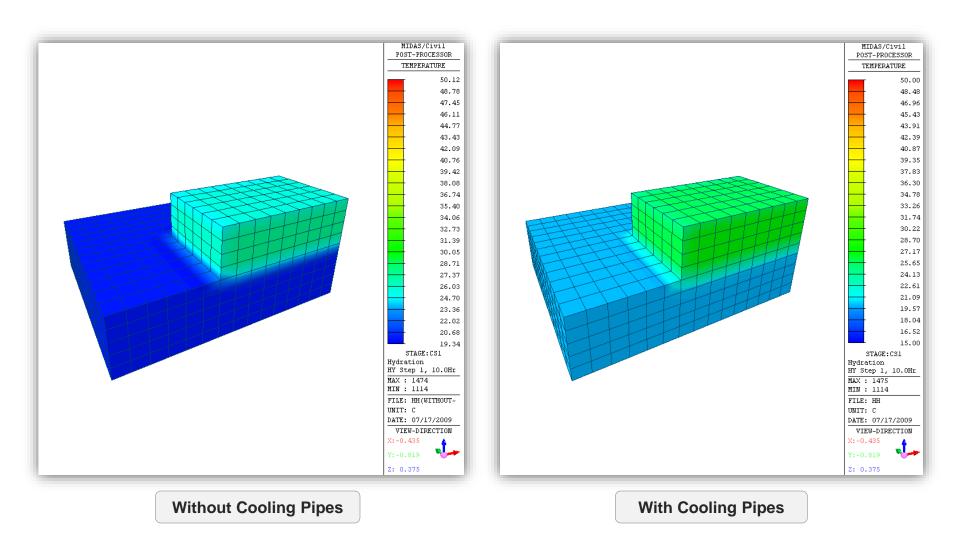
Inelastic dynamic analysis using Fiber Model – Section division for Fiber Model definition

Fiber Division of Section	×
Name : Column_FBR Section Name : 1: Column Image:	Fiber Material Property Type 1 Concrete Type 2 DIA_12.7_BAR Type 3 DIA_9.53_BAR Type 6 Concrete Create Fiber Create Rebar
	Type : Point Type : Point Material ID : Type1 Center Point(y, z) : 0,0 mm Area : Center Point(y, z) 0,0 mm Area • 0,0 mm Area • •
	Create Delete Undo Redo
	Apply OK Close

Inelastic dynamic analysis using Fiber Model – Fiber Cell Result Plotting

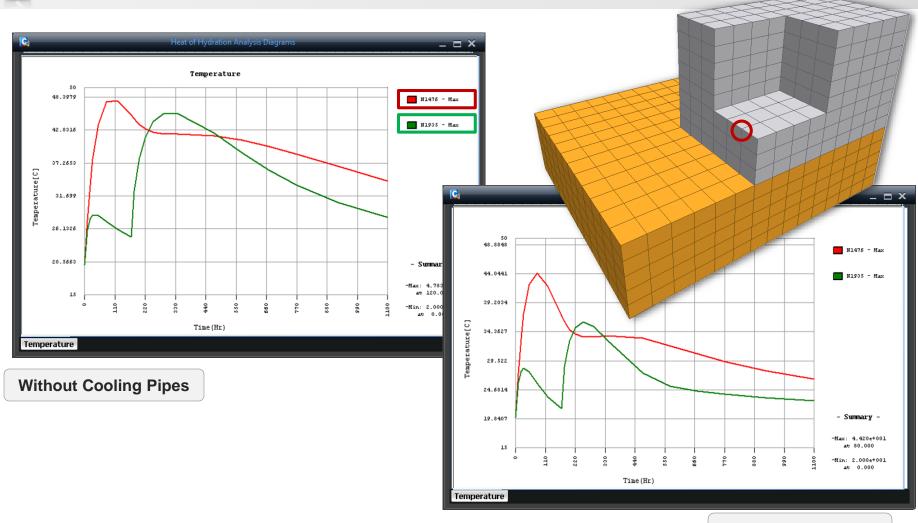


Temperature Contour with / without Cooling Pipes



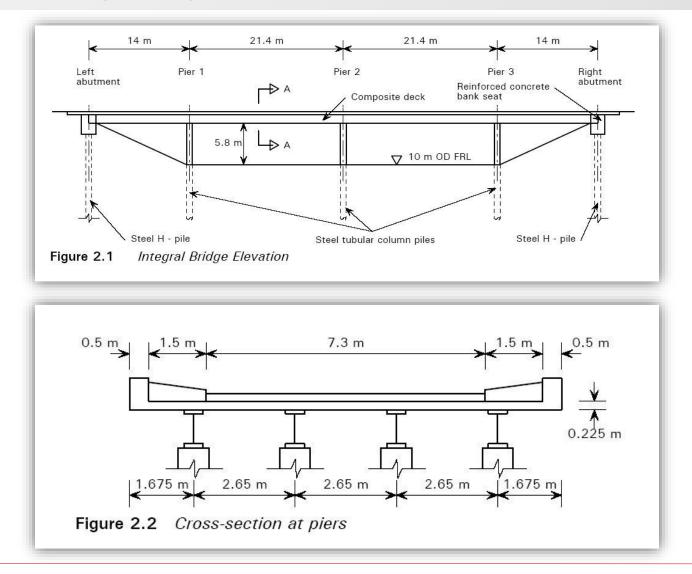
midas Civil

Time History Curve For Temperature Difference Between Inside and Outside

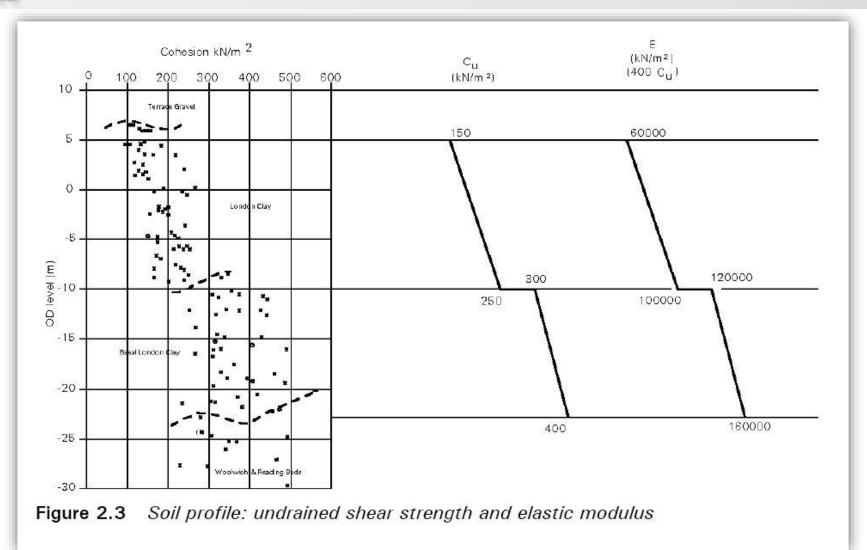


With Cooling Pipes

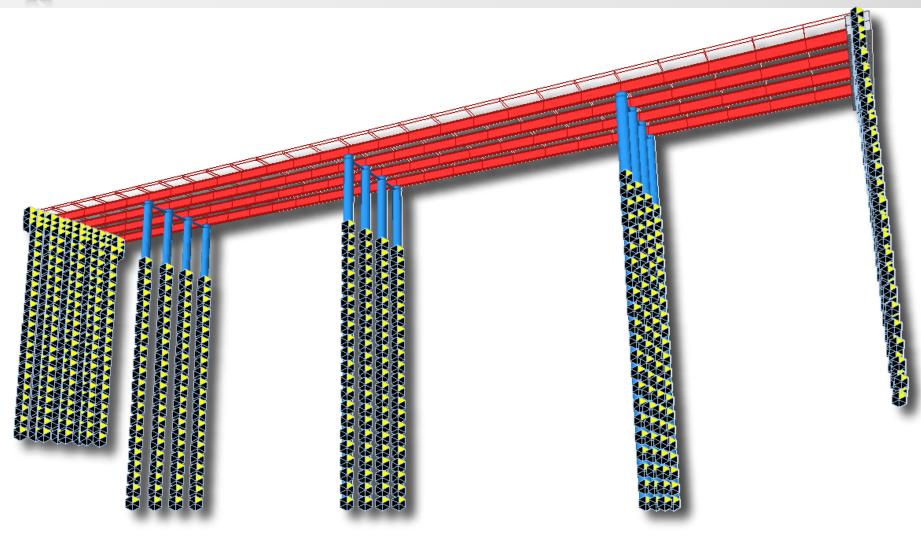
Multi-span integral bridge example – Elevation & Cross-section at piers



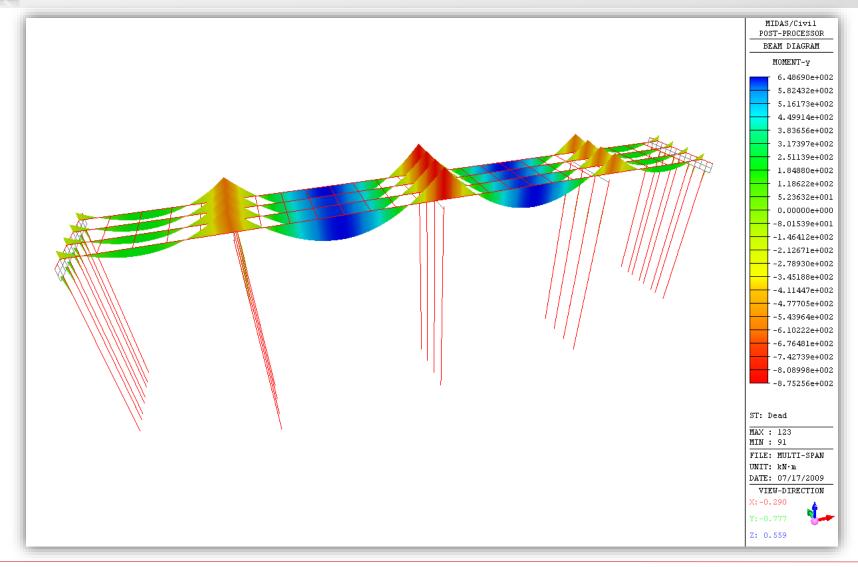
Multi-span integral bridge example – Soil profile



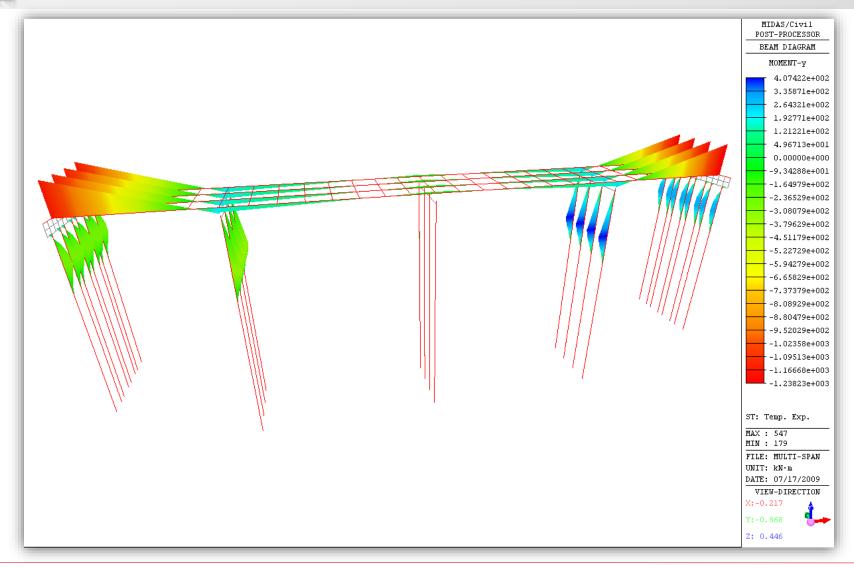




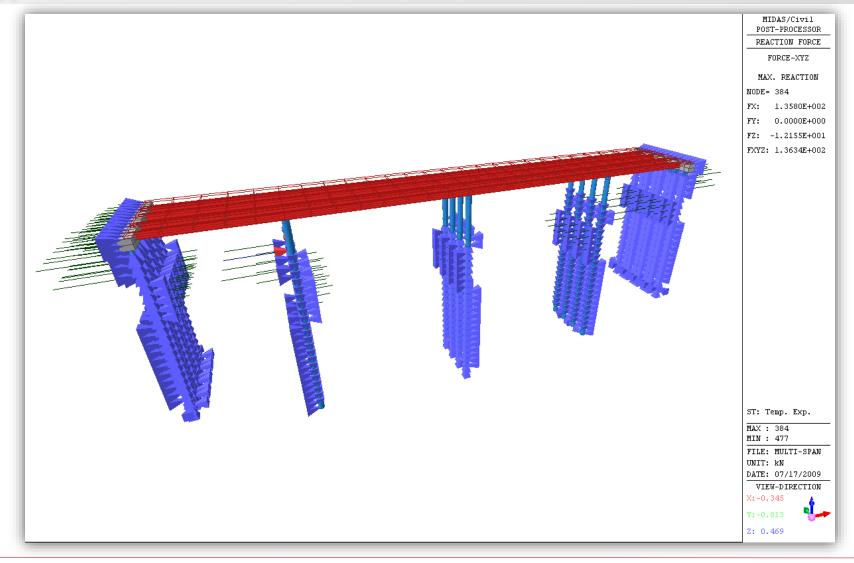
Multi-span integral bridge example – Moment Diagram (Dead Load)



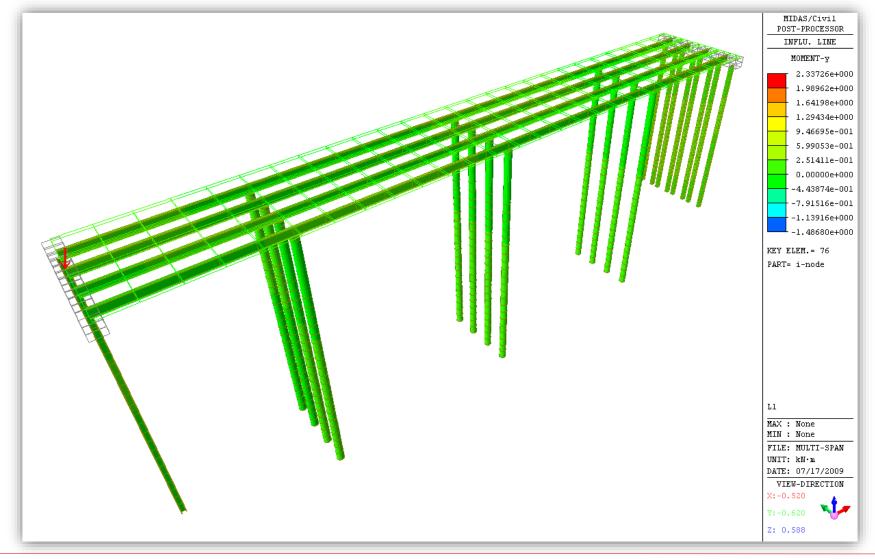




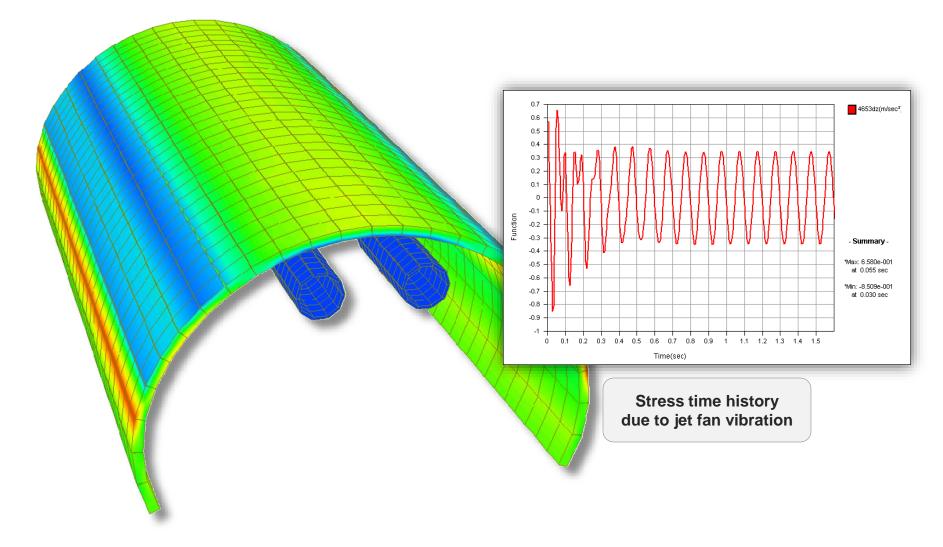
Multi-span integral bridge example – Reactions (Thermal expansion)



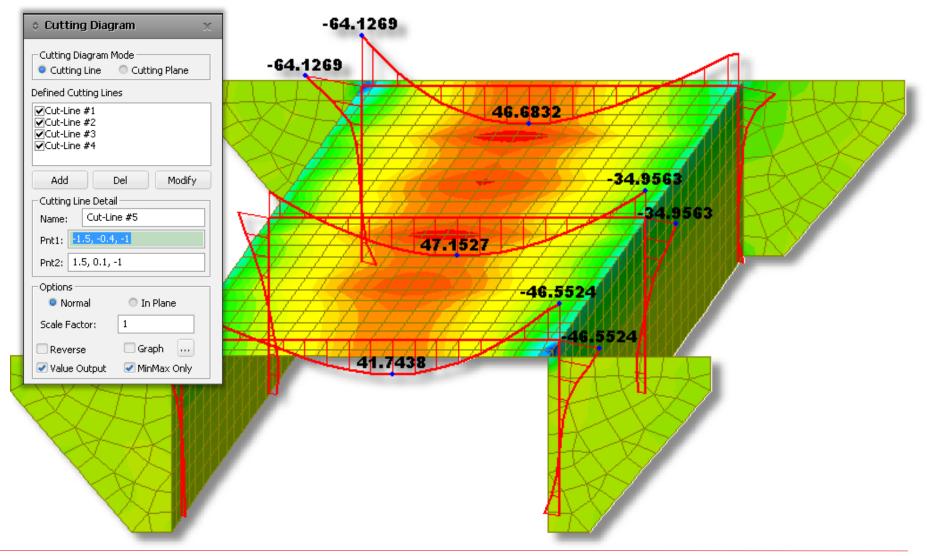
Multi-span integral bridge example – Influence Line



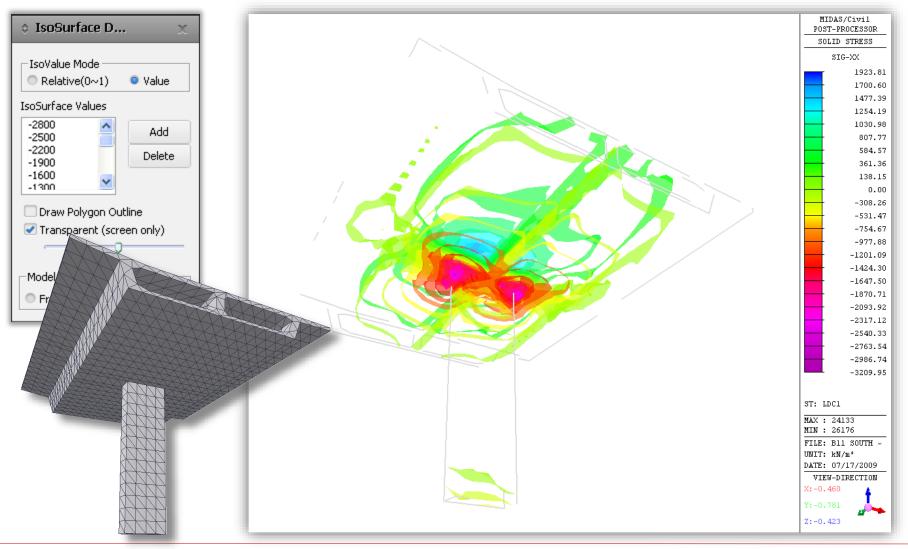




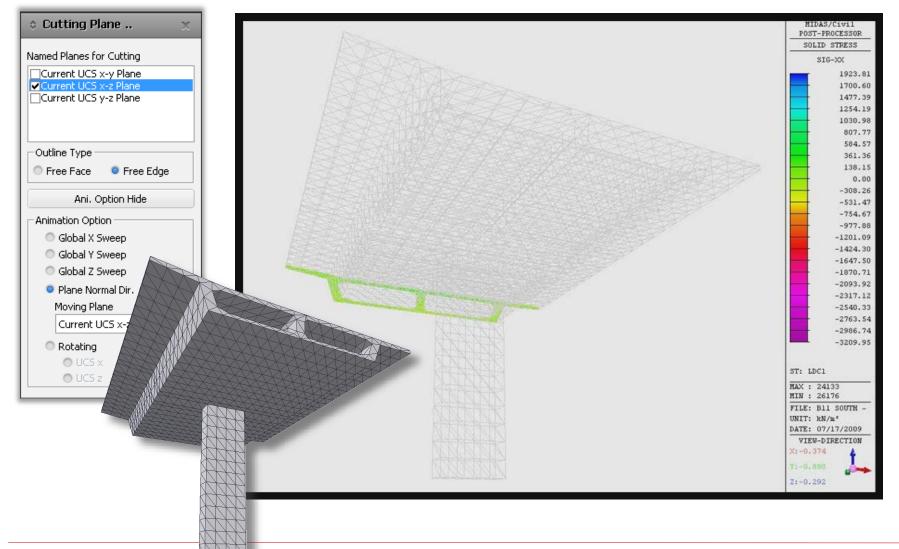




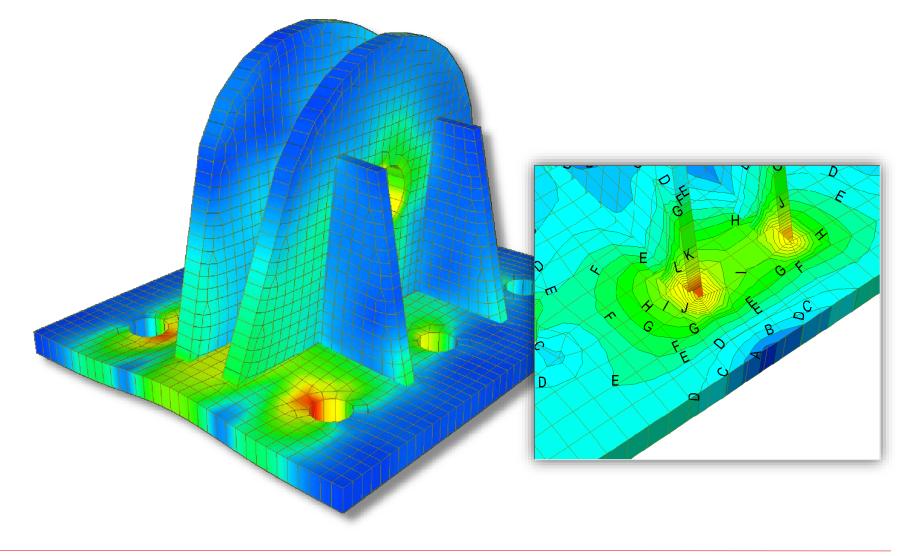
Solid Stresses – Iso Surface

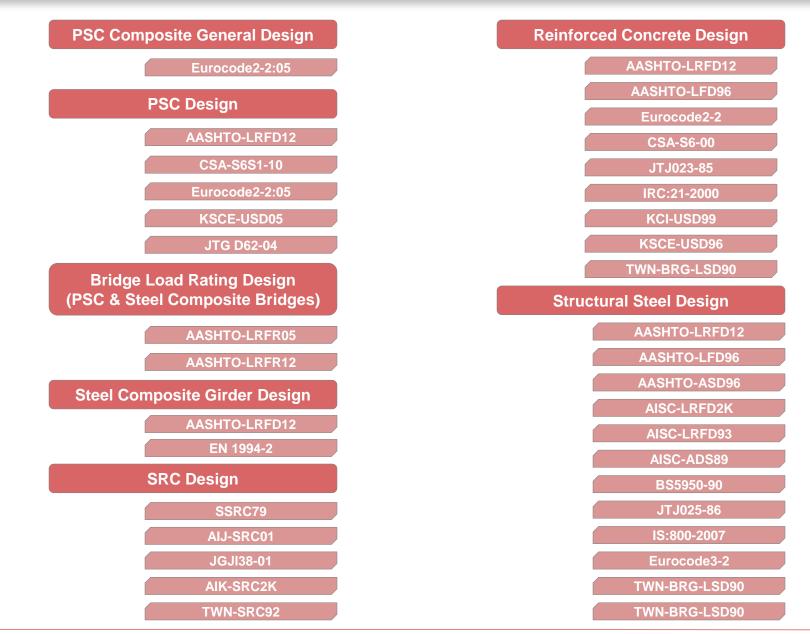


Solid Stress – Cutting plane



Von Mises Stresses + Deformed Shape + Contour Annotation







PSC Design Parameters	
Design Code : Eurocode2-2:05 National Annex : Recommended Input Parameters Design Parameters (Ultimate limit states) Moment resistance O Consider tendons in tensile zone O Consider all tendons	
Shear resistance Strut angle for shear resistance : 45 (Degree)	Modify Design Parameters X Eurocode2-2:05 / Recommended
Cement Class User Input Data Class R (s=0.20) Modify design parameters Output parameters Modify design parameters Ultimate limit states Serviceability limit states Image: Ultimate bending resistance Stress for cross section at a construction stage Image: Shear resistance Stress for cross section at service loads Image: Torsional resistance Principal stress at a construction stage Image: Torsional resistance Image: Cross section at a construction stage Image: Torsional resistance Image: Cross section at a construction stage Image: Torsional resistance Image: Cross section at service loads Image: Torsional resistance Image: Cross section at service loads Image: Torsional resistance Image: Cross section at service loads Image: Torsional resistance Image: Cross section at service loads Image: Torsional resistance Image: Cross section at service loads Image: Torsional resistance Image: Cross section at service loads Image: Torsional resistance Image: Cross section at service loads Image: Torsional resistance Image: Cross section at service loads Image: Torsional resistance Image: Crosc control	Partial factors for materials (Ultimate limit states) Persistent & Transient Concrete : 1.5 Reinforcing steel : 1.15 Prestressing steel : 1.15 Prestressing steel : 1.15 Partial factors for materials (Serviceability limit states) Concrete : 1 Partial factors for materials (Serviceability limit states) Concrete : 1 Reinforcing/Prestressing steel : Concrete : 1 Reinforcing/Prestressing steel : Coefficient for long term effects Alpha cc : 0.85 Alpha cc : 0.85 Stress limitation Concrete k1 : 0.6 k3 : 0.8
Select All	Prestressing steel k1: 0.8 k2: 0.9 k5: 0.75 k8: 0.85 Reducing factor for Principal stress Select Tendon / Bridge / Construction types Comp.: 1 Tens.: 1 Comp.: 1
	Crack width k3: 3.4 k4: 0.425 Select PSC Design Results OK Cancel

R

FB

R

FB

R

R

F

Aps

(in²)

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

32.6778

M Ed/M Rd

-1.1786

2.9141

-1.1786

2.9142

-0.9464

3.1612

-0.6730

0.8751

-0.1502

0.8603

-0.1501

0.8603

0.0000

0.8150

0.0000

0.8150

0.0000

0.7393

0.0000

0.7393

0.0000

0.6482

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

Design

Situations

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 Positive/ LCom Elem Part Negative Name Principal stress at a constru 35 J[36] Negative cLCB10 Persistent & Principal stress at service k 35 J[36] Positive cLCB9 Persistent & 36 cLCB10 Persistent & [36] Negative Check crack width at servi Persistent & 36 [36] Positive cLCB9 36 J[37] cLCB10 Negative Persistent & 36 J[37] Positive cl CB9 Persistent & 44 [[44]] cLCB10 Negative Persistent & 44 [44] Positive cLCB9 Persistent & 44 J[45] cLCB10 Persistent & Negative 44 J[45] cLCB9 Persistent & Positive 45 [45] Negative cLCB10 Persistent & 45 [45] cLCB9 Positive Persistent & 45 J[46] cLCB10 Negative Persistent & 45 J[46] Positive cLCB9 Persistent & 46 [46] Negative cLCB10 Persistent & 46 [[46] Positive cLCB9 Persistent & 46 J[47] Negative cLCB10 Persistent & 46 J[47] Positive cLCB9 Persistent & 47 [47] cLCB10 Persistent & Negative 47 [47] Positive cLCB9 Persistent & 47 J[48] Negative cLCB10 Persistent &

> 47 J[48] Check Flexure Strength /

Positive

cLCB9

•

M Ed

(in-kips)

-727548.8406

448736.2408

-727531.6994

448753.3821

-564857.8570

552612.9710

-82015.9135

579644.4440

-18289.4529

569853.0878

-18285.0452

569857.4956

539835.7499

539842.1750

489719.0262

489726.9210

425374.7217

0.0000

0.0000

0.0000

0.0000

0.0000

CHK

NG

NG

NG

NG

OK

NG

OK

0K

OK

OK

OK

OK

OK

Туре

FX-MAX

FX-MIN

FX-MAX

FX-MIN

FX-MAX

FX-MIN

FX-MAX

FX-MAX

FX-MIN

FX-MIN

FX-MIN

FX-MIN

FX-MAX

FX-MAX

FX-MIN

FX-MAX

FX-MIN

FX-MIN

FX-MAX

FX-MIN

FX-MAX

Persistent &

FX-MAX

M Rd

(in kips)

617303.8212

153988.0178

617303.8212

153987.8989

596845.4910

174810.4167

121863.0029

662370.1349

121793.2747

662392.4015

121793.2580

662392.4015

121735.8175

662375.4224

121735.7927

662375.4224

121641.3761

662392.6544

121641.3401

662392.6544

126959.9135

656211.5547

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

Check Flexure Strength	
------------------------	--

Check Shear Strength...

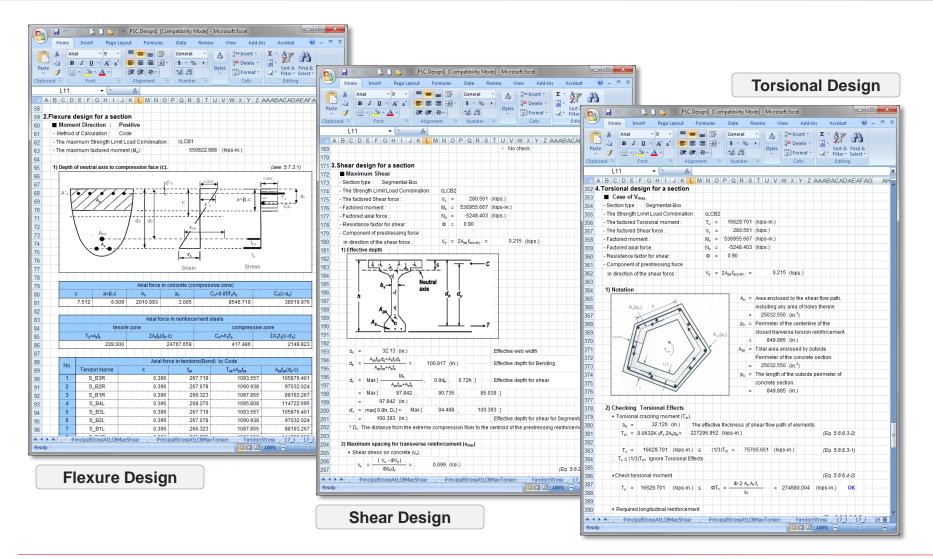
Check Combined Shear and Torsion Strength...

Check stress for cross section at a construction stage...

Check tensile stress for Prestressing tendons...

	Check stress for cross		Elem	Part	Comp./Tens.	Stage	снк	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)
5	Principal stress at a co						01/	· ·		· ·		· ·			
F 3	Principal stress at serv		/	[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
	Check crack width at		8	I [8]	Compression	CS1	ОК	2.8913	5.4731	2.8913	5.4731	2.8913	5.4731	5.4731	20.6843
_			8	J[9]	Compression	CS1	ОК	2.9134	5.2773	2.9134	5.2773	2.9134	5.2773	5.2773	20.6843
			15	[15]	Compression	CS2	ОК	3.9705	1.5415	3.9705	1.5415	3.9705	1.5415	3.9705	20.6843
			15	J[16]	Compression	CS1	ОК	4.4448	0.9699	4.4448	0.9699	4.4448	0.9699	4.4448	20.6843
			16	[[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	[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	ОК	4.3706	2.6322	4.3706	2.6322	4.3706	2.6322	4.3706	20.6843
			27	[27]	Compression	CS4	ОК	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	[35]	Compression	CS3	ОК	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	[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	ОК	4.3814	-0.0559	4.3814	-0.0559	4.3814	-0.0559	4.3814	20.6843
			44	[44]	Compression	CS3	ОК	3.2333	5.0838	3.2333	5.0838	3.2333	5.0838	5.0838	20.6843
			44	J[45]	Compression	CS3	ОК	3.3320	4.7690	3.3320	4.7690	3.3320	4.7690	4.7690	20.6843
			45	[45]	Compression	CS3	ОК	3.3320	4.7690	3.3320	4.7690	3.3320	4.7690	4.7690	20.6843
			45	J[46]	Compression	CS3	ок	3.2928	4.6669	3.2928	4.6669	3.2928	4.6669	4.6669	20.6843
			46	[46]	Compression	CS3	ок	3.2928	4.6669	3.2928	4.6669	3.2928	4.6669	4.6669	20.6843
			46	J[47]	Compression	CS3	ОК	3.1152	4.7712	3.1152	4.7712	3.1152	4.7712	4.7712	20.6843
			47	[47]	Compression	CS3	ОК	3.1152	4.7712	3.1152	4.7712	3.1152	4.7712	4.7712	20.6843
	[•	Check	stress fo	r cross section	at a const	ruction s								

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





© PSC Design Parameters	X	THE REAL PROPERTY OF THE PROPE
Design Code : AASHTO-LRFD12		
Input Paramaters Tendon Type Low Relaxation Tendons Stress Relieved Tendons Prestressing Bars Exposure Factor for Crack Width Class I (1.0) Class II (0.75)	Corrosive Condition Severe Moderate/Mild Flexural Strength Code Strain Compatibility Construction Type Segmental Non-Segmental	
User I Output Paramaters At Construction Stage/Service Loads Stress by Construction Stage Stress by Service Load Combinations Stress in Prestressing Tendons Principal Stress by Construction Stage	At Factored Loads	
 Principal Stress by Service Load Combinations (Max Shear) Principal Stress by Service Load Combinations (Max Torsion) 		Select Tendon / Bridge / Construction types
✓ Crack Check	Select All Unselect All	
	OK Cancel	Select PSC Design Results

FMAX

FBR

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... FT Stage OK (kgf/cm2) Check Flexure Strength... Stage2 OK Check Shear Strength... Stage3 OK OK Stage1 Check Combined Shear and Torsion Strength... Stage3 OK 25 [[15] Max Stage1 OK 25 [[15] Min OK Stage3 25 J[16] Max OK Stage2 25 J[16] Min OK Stage3 Max OK 26 [[16] Stage2 26 [[16] Min Stage3 OK OK 26 J[17] Max Stage2 NG 26 J[17] Min Stage3 27 [[17] OK Max Stage2 NG 27 [[17] Min Stage3 27 J[18] Max OK Stage2 NG 27 J[18] Min Stage3 OK 28 [[18] Max Stage2 NG 28 [[18] Min Stage3 OK 28 J[19] Max Stage2 28 J[19] Min NG Stage3 OK 29 [[19] Max Stage2 NG 29 [[19] Min Stage3

(kgf/cm2) (kgf/cm2) (kgf/cm2) (kgf/cm2) (kgf/cm²) (kgf/cm²) (kgf/cm2) 33.2877 37.4631 33,2810 37.4598 33.2944 37.4665 37.4665 103.3513 29.5953 23.4831 29.5892 23.4800 29.6014 23.4862 23.4800 0.0000 34.6419 35.5895 34.6479 35,5925 34.6359 35.5864 35.5925 103.3513 32.2258 18.4206 32.2312 18.4233 32.2205 18.4178 18.4178 0.0000 34.6396 35.5880 34.6361 35.5862 34.6430 35.5897 35.5897 103.3513 32.2241 18.4196 32.2209 18.4180 32.2272 18.4212 18.4180 0.0000 41.6702 22.0575 41.6730 22.0589 41.6673 22.0560 41.6730 103.3513 38.7243 7.7609 38.7269 7.7622 38.7217 7.7595 7.7595 0.0000 41.6697 22.0574 41.6676 22.0563 41.6718 22.0585 41.6718 103.3513 38.7238 7.7608 38.7219 7.7598 38.7257 7.7617 7.7598 0.0000 46.9418 13.3211 46.9437 13.3220 46.9398 13.3201 46.9437 103.3513 44.0550 -0.6673 44.0567 -0.6664 44.0532 -0.6682 -0.6682 46.9416 13.3212 46.9401 13.3204 46.9431 13.3219 46.9431 103.3513 44.0548 -0.6673 44.0534 -0.6680 44.0562 -0.6666 -0.6680 49,9338 8.2220 49.9350 8.2226 49.9325 8.2214 49.9350 103.3513 47.0774 -5.5517 47.0786 -5.5511 47.0763 -5.5523 -5.5523 0.0000 49.9336 8.2220 49,9341 8.2225 49.9341 8.2222 49.9332 103.3513 -5.5515 -5.5517 47.0777 -5.5517 47.0773 47.0769 -5.5513 0.0000 50.8826 6.3179 50.8826 6.3179 50.8825 6.3179 50.8826 103.3513 48.0345 -7.3566 48.0345 -7.3566 48.0345 -7.3566 -7.3566 0.0000 50.8826 6.3179 50.8826 6.3179 50.8825 6.3179 50.8826 103.3513 48.0345 -7.3566 48.0345 -7.3566 48.0345 -7.3566 -7.3566 0.0000 OK 49.9336 8.2222 49.9332 8.2220 49.9341 8.2224 49.9341 103.3513 29 J[20] Max Stage2 NG 47.0773 -5.5517 -5.5513 29 J[20] Min Stage3 -5.5515 47.0769 47.0777 -5.5517 0.0000 . Check stress for cross section at a construction stage / 4 .

FTL

FBL

FTR

FB

٠

ALW

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

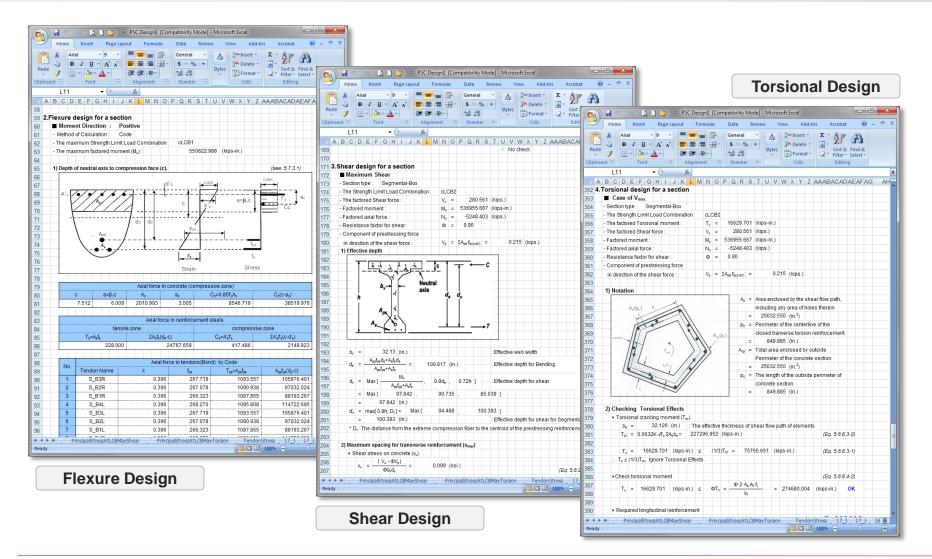
Check stress for cross section at a construction stage... Check tensile stress for Prestressing tendons... Check stress for cross section at service loads... Principal stress at a construction stage...

Principal stress at service loads (at the maximum shear force)...

Principal stress at service loads (at the maximum torsion)...

	Tension reinforcement				LCom Name	Туре	СНК	Vu (kgf)	Mu (kgf⋅cmn)	VN (kgf)	Phi	Vc 🔺 (kgf)
					CB4	50	01/		-163.1357	0.7287	0.0000	
	Check Flexure Strength				CB4 CB1		OK	-1.3038 -2.3691	-163.1357	0.7287	0.9000	0.7287
					CB4	-	OK	-2.5836	-76,5243	0.7287	0.9000	0.7287
	Check Shear Strength				CB4 CB1	-	OK	-2.5656	-76.5243	0.7287	0.9000	0.7287
	Check Combined Shear and To	rsion Strength			CB4	-	OK	-2.5843	-76.5287	0.7287	0.9000	0.7287
-		25 [[1		Min	cLCB1	-	OK	-2.5645	-76.5267	0.7287	0.9000	0.7287
		25 J		Max	cLCB1	-	OK	-2.5644	53.0203	0.7474	0.9000	0.7474
				Min	cLCB4	-	OK	-2.3044	108,7505	0.7474	0.9000	0.7474
		25 J[and a state of the	Max	cLCB1	-	OK	-2.5646	53.0183	0.7474	0.9000	0.7474
		26 [[1		Min	cLCB4	-	OK	-2.3646	108,7485	0.7474	0.9000	0.7474
		26 ([1				-	OK					000000000000000000000000000000000000000
		26 J(Max	cLCB4	•		-1.6905	154.1742	0.7696	0.9000	0.7696
		26 J[Min	cLCB1	-	OK	-2.1166	234.6677	0.7696	0.9000	0.7696
		27 ([1		Max	cLCB4	-	OK	-1.6906	154.1727	0.7696	0.9000	0.7696
		27 [[1	and a second second	Min	cLCB1	-	OK	-2.1166	234.6662	0.7696	0.9000	0.7696
		27 J[Max	cLCB4	-	OK	-0.7966	213.1669	0.7849	0.9000	0.7849
		27 J[Min	cLCB1	-	OK	-1.0096	308.5186	0.7849	0.9000	0.7849
		28 [[1		Max	cLCB4	-	OK	-0.7967	213.1651	0.7849	0.9000	0.7849
		28 [[1		Min	cLCB1	-	OK	-1.0097	308.5169	0.7849	0.9000	0.7849
		28 J[Max	cLCB4	- 1	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 (1	19]	Max	cLCB1	-	OK	-0.0001	333.9048	0.7908	0.9000	0.7908
		29 [[1	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 S	hear 9	Strength /				•				•

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



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

Define User Defined Vehicular Load	Define Moving Load Case
C Truck/Lane C Train Load C Permit Truck	Load Case Name : Permit vehicle
Vehicular Load Properties Vehicular Load Name : Permit Load	Description : Permit Vehicle
Impact Factor : 0	✓ Load Case for Permit Vehicle
Center Axle1 Axle2 Axle3 of Vehicle Axle Axle2 Axle3 Axle1 T = P2 T = P2	Permit Vehicle Vehicle Permit Load Ref. Lane Lane 1
Eccentricity Wheel $\begin{array}{c c} \hline \\ \hline $	Eccentricity 30 in
Center of Ref. Lane	Scale Factor 1
Type of Axle	
Name a1 a2 a2 a2	OK
Symmetric Vehicle Delete	
P1 D1 P2 D2 P3 D3 P4 D4 P5 D	Permit
	Vehicle
Type of Axle VS Spacing (in) P1 (kips) D1 (in) P2 (kips) D2 (in) P3 (kips)	Venicie
1 a1 □ 0.00 50.00 12.00 2 a1 □ 60.00 50.00 12.00	
3 a2 60.00 50.00 12.00 50.00 24.00 .4 a2 I 72.00 50.00 12.00 50.00 24.00	
User Defined	

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

	Rating Design Code	
	Define Rating Case	Static Load Combination
	Rating Parameter	Service Limit State
	Rating Group Setting	Load Type max min DC 1.00 1.00 Description Self(ST)
K	Rating Material	DW 1.00 1.00 Temperature 1.00
	Rating Design	T. Gradient 1.00 Secondary 1.00 Permanent 1.00
	Rating Design Result Tables	User Defined 1.00 * Modify Concrete Materials
	Rating Result Diagram	Material List
		ID Name fc[fck]R Main-bar Sub-bar 1 Grade CS000 5 Grade 60 Grade 60
		Live Load Combination Live Load Factors for Rati Primary Vehicle MVL 1(MV) Adjacent Vehicle MVL 1(MV) Name of Rating Case RC1_Service Description Concrete Material Selection Name Limit State Description Name Limit State Description Rc1_Service Specified Compressive Strength (fc]fck) : Specified Compressive Strength (fc]fck) : 5 kips/in ² Rebar Selection Code : ASTM(RC) Grade of Main Rebar : Grade 60 Fy : 60 kips/in ² Grade of Sub-Rebar : Grade 60 Fys : 60 kips/in ²
		Modify Close

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	oup	Elem,	Part	Comp./ Tens,	Rating Case	Rating Factor	Check
Shear Strength		1	l[1]	Comp	J RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	82,5240	OK
Concrete Stress Data			I[1]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	14,4539	
Concrete Diress Data			1[2]	· · ·	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Max)	-32420,46	
Prestressing Steel Tension Data			1[2]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Max)	-10719,08	
Flexural Capacity Demand Ratio			1[4]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-41,1026	
riexural Capacity Demand Ratio			1[4]	· · · ·	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-77,2487	
Shear Strength Data			1[5]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-37,1217	NG
ISpa		4	1[5]	Tens,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-67,7637	NG
Spa	n1	5	1[6]	Comp,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-31,6631	NG
Spa	n1	5	1[6]	Tens,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-56,9274	NG
Spa	n1	6	1[7]	Comp,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-25,4320	NG
Spa	n1	6	1[7]	Tens,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-45,4712	NG
Spa	n1 👘	7	1[8]	Comp,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-18,5434	NG
Spa	n1		1[8]	Tens,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-33,4260	NG
Spa	n1 👘		1[9]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-11,5097	NG
Spa	n1		1[9]	Tens,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-21,2385	NG
Spa	n1		I[10]	Comp,	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx+Max)	-5,0862	
Spa	n1		I[10]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	-9,2084	
Spa			1[11]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Max)	-2,7640	
Spa			1[11]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Max)	-3,0265	
Spa			1[12]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Max)	-16,0392	
Spa			1[12]		RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Max)	-8,9621	
Spa	n2	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 Summa Rating Result Summa										
	Concrete Stress										
	Prestressing Steel Te	nsion									
	Flexural Rating Data.			Part	Positive/ Negative	Rating Case	LRFD Resistance	System Factor	Condition Factor	Rating Factor	Check
	Shear Strength				-		Factor	4 0000		4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<u></u>
	Commenter Charles Darks				Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1,0000	1,0000		108820106	
	Concrete Stress Data				Positive Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1,0000 0,9925	1,0000		370818082 1,5720	
	Prestressing Steel Te	nsion Data.			Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_ -	0,9925	1,0000	1,0000	1,5720	-
		1.5.11			Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1,0000	1,0000	1,0000	133,9091	ОК
	Flexural Capacity Der	nand Ratio.		-	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1,0000	1,0000		8,1854	
	Shear Strength Data.				Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1,0000			44,4400	
_	-	Spani	4 1[5]		Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	1,0000	1,0000		4,0846	
		Span1	5 [6]		Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	18,3760	ОК
		Span1	5 [6]		Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	3,4979	ОК
		Span1	6 [[7]		Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	9,2998	ОК
		Span1	6 [[7]		Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	3,4362	ОК
		Span1	7 [8]		Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	9,3545	ОК
		Span1	7 [8]		Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	3,4687	ОК
		Span1	8 [9]		Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	13,6455	ОК
		Span1	8 [9]		Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	3,6914	
		Span1	9 1(10		Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	18,9540	ОК
		Span1	9 1(10	-	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9980	1,0000	1,0000	4,8790	
		Span1	10 I[11	-	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9908	1,0000		22,8478	
		Span1	10 1[11	-	Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9908	1,0000		10,5122	
		Span1	11 1[12		Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9925	1,0000		10,8853	
		Span1	11 1[12		Positive	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9925	1,0000		25,0889	
		Span2	12 [[13	3]	Negative	RC1_Strength_DC(MAX)_DW(MAX)_T(+)_	0,9925	1,0000	1,0000	3,6223	ок

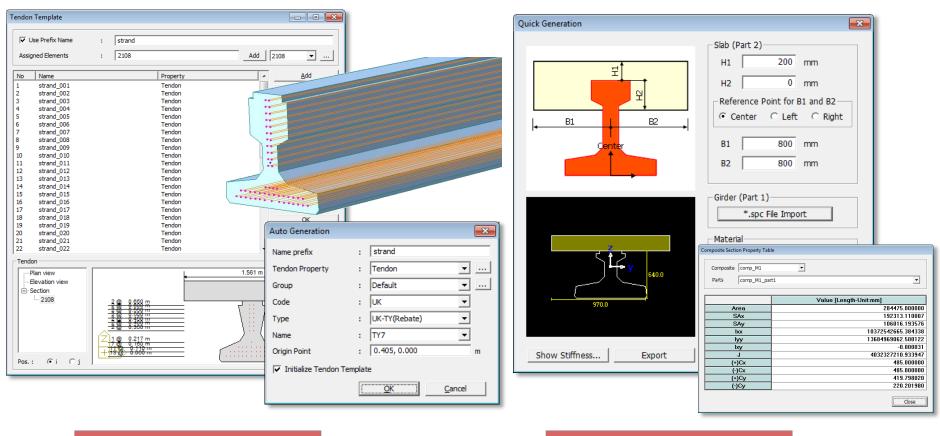
Bridge Load Rating Design as per AASHTO LRFR – Shear Strength Results

Rating Result Summary of Service. Rating Result Summary of Strength										
Concrete Stress Prestressing Steel Tension Flexural Rating Data		oup	Elem,	Part	Rating Case	LRFD Resistance Factor	System Factor	Condition Factor	Rating Factor	Check
Shear Strength				I[1] I[2]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M		1,0000	1,0000 1,0000	-1,3436 -2,1092	
Concrete Stress Data			4	I[4] I[5]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M		1,0000 1,0000		-2,6095 -1,2378	NG
Prestressing Steel Tension Data			6	I[6] I[7]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000	1,0000	1,1188 5,1356	ок
Flexural Capacity Demand Ratio			8	I[8] I[9]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000	1,0000	1,4943 -1,0947	NG
Shear Strength Data	Spani		10	I(10) I(11)	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000	1,0000	-2,5213 -11,0867	NG
	Span1 Span2		12	I[12] I[13]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000	1,0000	-2,1379 -1,4133	NG
	Span2 Span2		14	I[14] I[15]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M		1,0000 1,0000		-3,7990 -2,2241	NG
	Span2 Span2		16	I[16] I[17]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000	1,0000	-1,0790 0,5556	NG
	Span2 Span2		18	I[18] I[19]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000		3,0244 3,0225	ок
	Span2 Span2		20	I[20] I[21]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000	1,0000	0,8440 -0,6488	NG
	Span1 Span1		22	I[22] I[23]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000	1,0000	-8,6783 0,4312	NG
	Span1 Span1		24	I[24] I[25]	RC1_Strength_DC(MAX)_DW(M RC1_Strength_DC(MAX)_DW(M	0,9000	1,0000 1,0000		-3,1678 -43,2161	NG
	Span2		25	1[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 Rating Result Summary of							
Concrete Stress							
Prestressing Steel Tensic Flexural Rating Data	n	p	Elem,	Part	Tendon	Rating Case	Rating Factor
Shear Strength		_	1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Max)	-
				1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fx-Min)	235360984
Concrete Stress Data				1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fy-Max)	-
				1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fy-Min)	235360984
Prestressing Steel Tensic	n Data		1	I[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fz-Max)	-
Flexural Capacity Deman	d Diatio			1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Fz-Min)	235360984
Plexural Capacity Demain				1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Mx-Max)	-
Shear Strength Data				1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(+)_A,V(Mx-Min)	235360984
-	Spani		1	1[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	1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A,V(My-Min)	235360984
	Span1			1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A,V(Mz-Max)	-
	Span1			1[1]	Tendon1	RC1_Service_DC(MAX)_DW(MAX)_T(-)_A,V(Mz-Min)	235360984

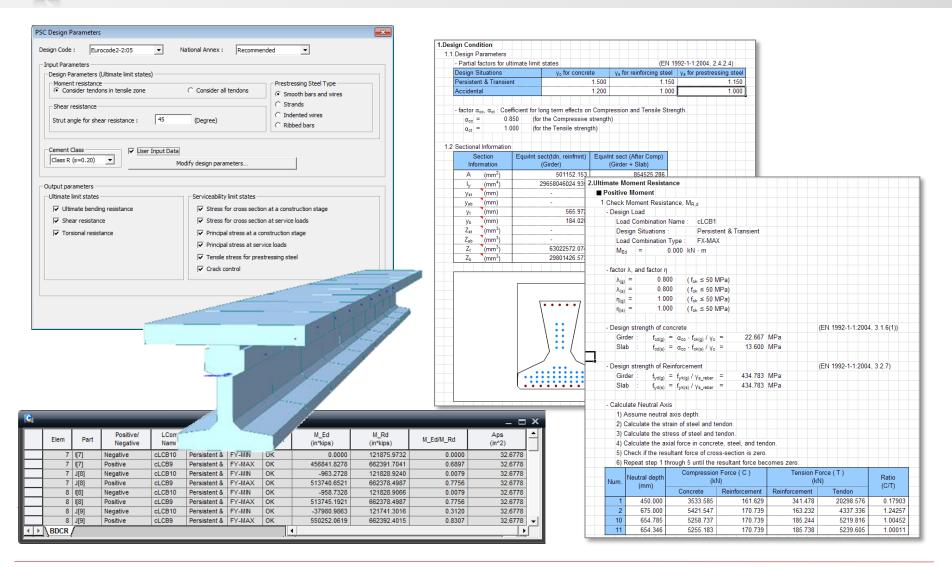




Tendon template wizard

Quick generation of PSC composite section

Composite PC Girder Design as per EN1992-2



Composite Girder Design as per EN1994-2

Composite Steel Girder Design Parameters	X	
Code : EN 1994-2		
Partial Factor		
Concrete(Gamma C)	1.5	
Reinforcing Steel(Gamma S)	1.15	
Structural Steel(Gamma M0)	1	
Structural Steel(Gamma M1)	1.1	
Shear Resistance of a Headed Stud(Gamma V)	1.25	
Equivalent Constant Amplitude Stress Range(Gamma	1 Ff) 1	
Fatique Strength(Gamma Mf)	1	
Fatique Strength of Studs in Shear(Gamma Mf,s)	1	
Stress in Structural Steel(Gamma M,ser)	1	
Damage equivalence factors(for Resistance to fatigue	e)	
Design life of the bridge in year(t_Ld)	120	
Stress Limitation		
k1: 0.6 k2: 0.45	k3: 0.8	
☐ Shear Resistance Reduction Factor of Stud Connecto	r (for SLS)	
ks : 0.75		
Ultimate Limit States	Serviceability Limit State	
Bending Resistance	✓ Stress Limitaion	
Resistance to Vertical Shear	✓ Longitudinal Shear (SLS)	
Resistance to Lateral-torsional Buckling		Enter the Partial Factors
Resistance to Transverse force		
Resistance to Longitudinal Shear		
✓ Resistance to Fatigue		
	OK Cancel	Select the desired Ultimate Limit Stress

8 9

Composite Girder Design as per EN1994-2



Resistance to Vertical Shear...

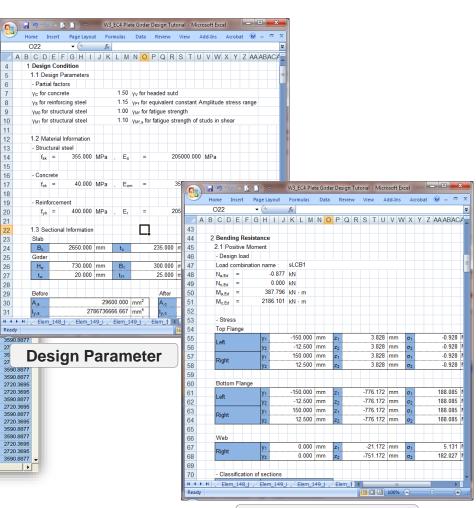
Resistance to Lateral-Torsional Buckling...

Resistance to Transverse Force...

Resistance to Longitudinal Shear...

Resistance to Fatigue...

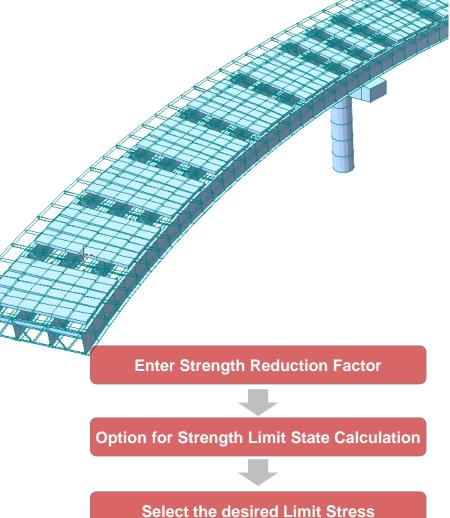
	Elem	Position	Lcom	Туре	Top Class	Bot Class	Web Class	Sect. Class	N_Ed (kN)	M_Ed (kN-m)	∀_Ed (kN)	Vpl,Rd (kN)	
·	6	(1)	sLCB1	-	1	1	1	1	0.6259	1.1904	-176.7416	3949.9765	
	6	J[40]	sLCB1	-	1	1	1	1	0.6259	12321.4707	-114.4802	3949.9765	
	7	[2]	sLCB1	-	1	1	1	1	1.0510	2438.9203	-350.1550	3949.9765	
	7	J[52]	sLCB1	-	1	1	1	1	1.0510	1177.7102	-287.8936	3949.9765	
	8	[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	[[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	[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	[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	
	23	[29]	sLCB1	-	1	1	1	1	-0.8744	2872.4051	-378.1429	3949.9765	
	23	J[66]	sLCB1	-	1	1	1	1	-0.8744	1571.0681	-315.8815	3949.9765	
	25	1[30]	sLCB1	-	1	1	1	1	-0.5756	2311.5367	-327.6890	3949.9765	
	25	J[78]	sLCB1	-	1	1	1	1	-0.5756	1198.6262	-265.4276	3949.9765	
	27	[25]	sLCB1	-	1	1	3	2	-0.5756	0.8506	-175.3563	3949.9765	
	27	J[44]	sLCB1	-	1	1	1	1	-0.5756	82859.6707	-113.0949	3949.9765	
	28	[32]	sLCB1	-	1	1	1	1	-0.8744	2310.7684	-352.5907	3949.9765	
	28	J[56]	sLCB1	-	1	1	1	1	-0.8744	1104.9284	-290.3293	3949.9765	
	31	[33]	sLCB1	-	1	1	1	1	-0.8767	2871.7074	-378.4419	3949.9765	
	31	J[68]	sLCB1	-	1	1	1	1	-0.8767	1569.8547	-316.1805	3949.9765	
	33	[34]	sLCB1	-	1	1	1	1	-0.5644	2313.7997	-328.7311	3949.9765	
	33	J[80]	sLCB1	-	1	1	1	1	-0.5644	1199.0975	-266.4697	3949.9765	
	34	[27]	sLCB1	-	1	1	1	1	0.5141	0.9795	-176.3204	3949.9765	
	34	J[100]	sLCB1	-	1	1	1	1	0.5141	17894.7928	-69.7468	3949.9765	
1	35	[36]	sLCB1	-	1	1	1	1	0.7001	2429.5396	-356.7345	3949.9765	
1	35	J[106]	sLCB1	-	1	1	1	1	0.7001	354.0095	-247.2050	3949.9765	



Flexural Resistance

Composite Girder Design as per AASHTO LRFD 12

	date by Code
Strength Resistance Factor	0.95
Resistance factor for yielding (Phi y)	
Resistance factor for fracture(Phi u)	0.8
Resistance factor for axial comp.(Phi c)	0.9
Resistance factor for flexure (Phi f)	1
Resistance factor for shear(Phi v)	1
Resistance factor for shear connector(Phi se)	0.85
Resistance factor for bearing(Phi b)	1
 ✓ Appendix A6 for Negative Flexure Resistance / NonCompact Sections ✓ Mn<1.3RhMy in Positive Flexure and Compact 	
✓ Post-buckling Tension-field Action for Shear R	
Design Parameters ✓ Strength Limit State-Flexure	
Strength Limit State-Shear	
Service Limit State	
Constructibility	
I Constructibility I Fatigue Limit State	



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

Modify Composite Material	on Manager					
	-					
Material List	inforcements 🗨		🔊 🕒 👯 Grid : 🛛 5	in	I Snap	Longitudinal Reinforcement Shear Reinforcement
ID Name Steel Concrete Main-bar Sub-bar						Same Rebar Data at i & j-end
	get Section & Element					Coordinate Centroid Ceff-Bottom Guide Line :
	1:G1-D					I J
	1 2:G1-E 1 3:G1-F			• • • • • • •	•••••	туре
	1 4 : G2-F					C Point C Line C Arc
Composite Material Selection	1 5 : G2-E 1 6 : G2-D					C Circle C Poly Line
Steel Material Selection	T 7:G3-D					Input Method A O Input Method B
Code : ASTM09(S)	1 8 : G3-E 1 9 : G4-D			• • • • • • • • • • • •		Ref. Y Centroid V 0 in
Hybrid Factor						Ref. Z Top Z 0 in Num 0
Grade : A709-50W	—					Spacing 0 in
Es : 29000 k						Dia #3 💌
Fy : 50 Grade : A709-50W -						Part Part 2
Es : 29000 kips/in ² Fu : 70	kips/in²					
Fy : 50 kips/in ²						Reference for Tapered Section Ref. Y Left Ref. Z Top
						As 4.4 in ²
Concrete Material Selection —						As n+ Add Modify Delete
Code : ASTM(RC) Flange(Bot)					(
Specified Compressive Strength Grade : A709-50W 💌			Shear Connector	▼	Stiffener Ty	/pe
Reinforcement Selection Es : 29000 kips/in ² Fu : 70	kips/in²		Option			-8
Code : ASTM(RC) Fy : 50 kips/in ²			Add/Replace	C Delete		
Grade of Main Rebar : Grad						Transverse Stiffener
Grade of Sub-Rebar : Grad		G1-D	Both end parts(i & j) have the same	The second se	 One stiffener
Web			III			C Two stiffener
Grade : A709-36						2 Fy 36 kips/in ²
Es : 29000 kips/in2 Fu : 58	kips/in²		Category C'	-		
Fy : 36 kips/in ²			Pitch 6	in		2 - 0 V
			Height 6	in		H 70 in
			Dia 1	in		B 5 in
ок	Close		Fu 59	kips/in²		
			Spacing Shear Conn	ector		
			10	in		
			Num. of Shear Conn	ector		OK Cancel
			2			OK Cancel
					-	

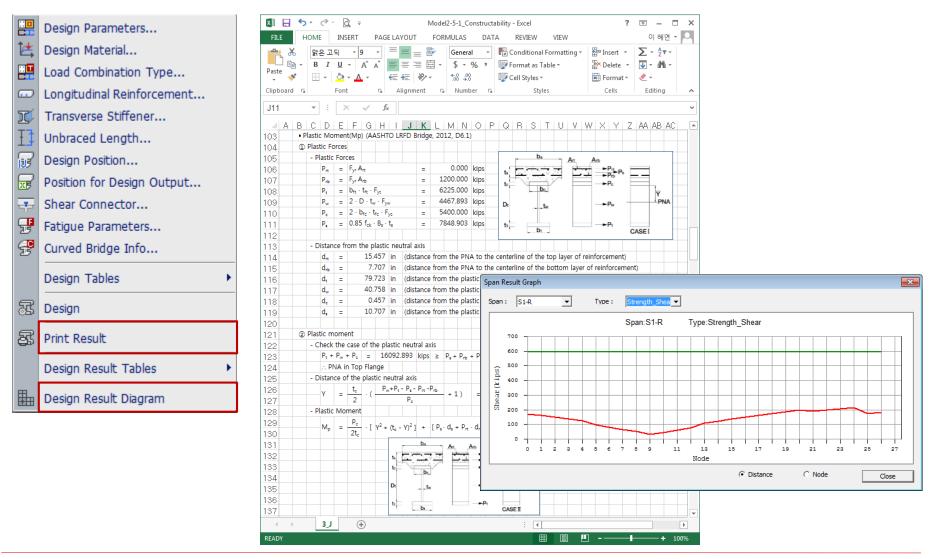
Composite Girder Design as per AASHTO LRFD 12 *Design Force/Moment*

					Desig	n Force/Moment						_ = =
				Moment(My)			Moment(N	lz)			Shear	
Elem	Part	Lcom	Dead(Before) (in·kips)	Dead(After) (in·kips)	Short Term (in·kips)	Dead(Before) (in·kips)	Dead(Aft (in · kips	· ·	Short Term (in·kips)	Dead(Before) (kips)	Dead(After) (kips)	Short Term (kips)
100	1 [[359]	scLCB5(mi	11372.1953	215.9833	-1147.9232	-21.0406	1661	.9515	-454.0037	89.5496	-1.7216	-8.1399
100	1 [[359]	scLCB6(all	11372.1953	215.9833	4337.6076	-21.0406	1661	.9515	118.2416	89.5496	-1.7216	36.2508
100	1 [359]	scLCB6(m	11372.1953	215.9833	4337.6076	-21.0406	1661	.9515	118.2416	89.5496	-1.7216	36.2508
100	1 [359]	scLCB6(mi	11372.1953	215.9833	-706.4143	-21.0406	1661	.9515	-279.3869	89.5496	-1.7216	-5.0091
100	1 [359]	scLCB7	11372.1953	215.9833	-0.0000	-21.0406	1661	.9515	-0.0000	89.5496	-1.7216	0.0000
100	2 [121]	scLCB5(mi	21112.3313	388.7998	-1967.4026	-54.7506	-565	.5808	-322.3600	77.4806	-3.8906	-8.0396
100	2 [121]	scLCB6(all	21112.3313	388.7998	8449.2946	-54.7506	-565	.5808	-198.3754	77.4806	-3.8906	36.1811
100	2 [[121]	scLCB6(m	21112.3313	388.7998	8449.2946	-54.7506	-565	5808	115.0004	77.4806	-3.8906	36.1811
100	2 [[121]	scLCB6(mi	21112.3313	388.7998	-1210.7093	-54.7506	-565	.5808	-198.3754	77.4806	-3.8906	-4.9475
100	2 [121]	scLCB7	21112.3313	388.7998	0.0000	-54.7506	-565	.5808	0.0000	77.4806	-3.8906	-0.0000
100	3 [358]	scLCB5(mi	24331.8039	380.7455	-2460.6182	-44.8875	355	.4202	-272.5318	51.6313	-1.3899	-8.4942
100	3 [358]	scLCB6(all	24331.8039	380.7455	10292.4052	-44.8875	355	.4202	142.5760	51.6313	-1.3899	32.8944
100	3 [358]	scLCB6(m	24331.8039	380.7455	10292.4052	-44.8875	355	.4202	142.5760	51.6313	-1.3899	32.8944
100	3 [358]	scLCB6(mi	24331.8039	380.7455	-1514.2266	-44.8875	355	.4202	-167.7119	51.6313	-1.3899	-5.2272
100	3 [358]	scLCB7	24331.8039	380.7455	-0.0000	-44.8875	355	.4202	0.0000	51.6313	-1.3899	0.0000
100	4 [120]	scLCB5(mi	27167.0964	337.5685	-2901.0175	26 2401	215	1152	196 1579	45 5064	2 4277	9 5005
100	4 [120]	scLCB6(all	27167.0964	337.5685	12024.528 L	oad Combinations						
100	4 [120]	scLCB6(m	27167.0964	337.5685	12024.528	General Steel Design	Concrete Design	SRC Design	Composite Steel Gird	ler Design		
100	4 [120]	scLCB6(mi	27167.0964	337.5685	-1785.241	-Load Combination List		orce beaight			-Load Cases and Factors	s
100	4 [120]	scLCB7	27167.0964	337.5685	0.000			_				
100	5 [357]	scLCB5(mi	29645.0781	143.1069	-3304.339		me Active	Туре	Descr	·	LoadCa	
100	5 [357]	scLCB6(all	29645.0781	143.1069	13506.446			Add	Strength-I:1.75M	C D C D	MVL(MV)	▼ 1.
100	5 [357]	scLCB6(m	29645.0781	143.1069	13506.446			Add	Strength-II:1.35		Dead Load(C	
100		scLCB6(mi	29645.0781	143.1069	-2033.439			Add	Strength-IV:1.50		SIDL(CS)	1.
	C #20771		200.45.0704	442 4000	0.000			Add Add	Service-I:1.00M		Creep Second Shrinkage Se	
Desi	gn Force	/Moment /						Add	Service-II:1.30M Service-III:0.80N	· · · · · · ·	*	cona U
							CB6 Servi CB7 Servi	Add	Service-III.0.000 Service-IV:1.00(
							CB8 Servi	Add	Fatigue-I:1.50M			
								Add	Fatigue-II:0.75N			
						*	000	, tau	- augue inerroit			
										=E		

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

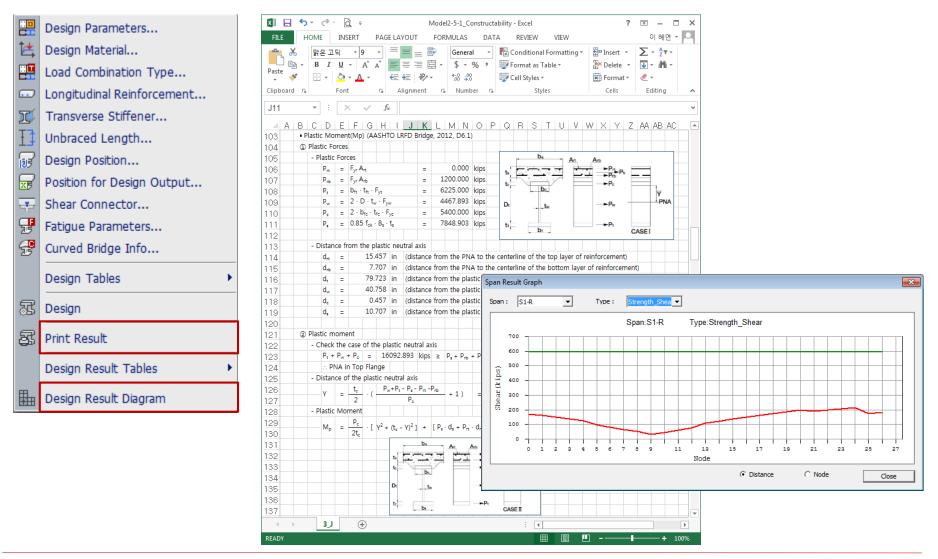
												<u> </u>	an Check	2.4	_	_		_									
												sp	an check	ng										_ = = >	×		
1 1	Positive/Ne		Strengt	th Limit(Fle:	xure)			Streng	gth Limit(Shear)						Service Lim	it					F	atigue Limit			4	
Span	gative	Elem	part	Lcom	Mu/Mr	CHK Eler	n part	Lcom	Vu/Vr	do b	t It	As	СНК Е	em part	Lcom	tcw Ratio	tof Ratio	tft Ratio	СНК	Elem	part	Lcom	Gamma(Delt a_f) Ratio		/cf Ratio CH	Elem	
S1-L	Neg	1028	[[11]	scLCB1	0.9595	DK 102	6 [109]	scLCB1	0.4516	ок ок	сок	ОК	OK 1	28 [[11]	scLCB5	0.4594	0.4836	0.4076	ОК	1028	[11]	scLCB8	0.7863	0.0000 0.4	4286 OK	1028	
S1-L	Pos	1009			0.5734 (OK 102	6 [109]	scLCB1	0.4516	OK OK	юк	ОК	OK 1	09 J[118]	scLCB5	-	0.2945	0.4905	ОК	1028	[11]	scLCB8	0.7863	0.0000 0.4	4286 OK	1009 J	
S1-R	Neg	1029	J[11]	scLCB1	0.7534 (OK 103	1 J[66]	scLCB1	0.3564	OK OK	СОК	ОК	OK 1	29 J[11]	scLCB5	0.3837	0.4039	0.3461	ок	1054	[7]	scLCB8	0.0008	0.0000 0.3	3258 OK	1029	
S1-R	Pos	1045	J[59]	scLCB1	0.4849 (OK 103	1 J[66]	scLCB1	0.3564	OK OK	СОК	OK	OK 1	45 J[59]	scLCB5	-	0.2262	0.3849	OK	1054	[7]	scLCB8	0.0008	0.0000 0.3	3258 OK	1046 J	
S2-L		2028	[[10]	scLCB1		IG 202				OK OK		ОК		28 [[10]		0.6031	0.6349		OK	2028	[10]						
S2-L		2009	J[104]	scLCB1		OK 202				OK OK		ОК		09 J[104]	scLCB5	-	0.2071	0.4666		2028	[[10]	7	Span C	heckin	g		
S2-R	-	2029	J[10]	scLCB1		OK 202			0.6095	OK OK		ОК		29 J[10]		0.5615	0.5910	0.4875		2054	[6]	-					
S2-R		2046		scLCB1		DK 202		scLCB1						46 J[283]	scLCB5		0.1590	0.4058		2054	[6]		T				
\$3-L		3028	[9]	scLCB1		IG 302				OK OK		OK		28 [[9]		0.6366	0.6063	0.4410		3028	[9]	9	Total (neckin	ig		
S3-L S3-R		3010 3029	J[327] J[9]	scLCB1 scLCB1	0.4447 0	OK 302		scLCB1 (0.3825	OK OK		OK OK		09 [[327] 29 J[9]	scLCB5 scLCB5		0.1026	0.4215		3028 3054	[9]						-
S3-R S3-R	-	3029				JK 302 DK 302				OK OK				46 J[270]	scLCB5		0.6157	0.4431		3054	(5) (5)	- 🖵	Streng	th Limi	it Sta	te(Flexu	ure).
53-R S4-L		4028	J[270] [[8]			DK 302			0.3691			OK		46 J[270] 28 [[8]		0.6052	0.1047	0.4211		4028	(5)		-				-
54-L S4-L		4020			0.3537 (scLCB1						10 [75]	scLCB5		0.1100	0.4305		4028	[8]	- 🖵	Streng	th Limi	it Stai	te(Shea	ar)
S4-L S4-R		4029	J[8]	scLCB1		OK 402					_	OK		29 J[8]		0.6443	0.6350	0.4805		4054	[2]	- 25	o ci ci i g				
S4-R	-	4046			0.3613			scLCB1						52 [[19]	scLCB4		0.0493	0.3687		4054	[2]	: 🖵	Service	Limit	State		
												1				1							Service		June		
																						7	Fatioue	Limit	State		
																									JLALE		
	pan /													•													
Check Sp	pan /													•			_		-			_					
Check Sp	pan /		_	_	_	_	_	_	-	-	-	-	_		-	-	-	-	-	_		7				 (ure)	
Check Sp	pan /			_	_		_	_				To	tal Check		-							7	Constr	uctibilit	y(Flex	(ure)	
Check Sp	pan /			Streng	th Limit/Els	exure)	_	Strend	th Limit/S	(hear)		To	_		Service	+ Limit					Eatique	- 		uctibilit	y(Flex	(ure)	
	Positive		снк	Streng	th Limit(Fle	xure)		Strengt	th Limit(S	Shear)		To	_		Service	: Limit	_			6	Fatigue	7	Constr	uctibilit	y(Flex	(ure)	
Check Sp	Positive		снк	Streng		xure)	Lcom	Strengt Vu/phi\	Ī	Shear) bt		To t	_			Limit tcf Ratio	tt	ft Ratio	Lcor	n Ga	Fatigue mma(Dell Ratio	7	Construction	uctibilit uctibilit	y(Flex y(She	kure) ear)	
Elem pai	art Positive gative				Mu/		Lcom	Vu/phi\	Ī	bt		t	tal Check Lcom	ing					Lcon	n	mma(Delt Ratio	5	Constr	uctibilit uctibilit	y(Flex y(She	kure) ear)	
Elem par 1015 J[11	art Positive gative 15] Pos	e		Lcom	Mu/	phiMn		Vu/phi\	Vn			To t OK OK	tal Check	ing	atio	tcf Ratio		ft Ratio 0.2752		n :88	mma(Delt	5	Constru- Constru- Shear	uctibilit uctibilit Connec	y(Flex y(She ctor	kure) ear)	
Elem par 1015 J[11 1016 I[114	art Positive gative 15] Pos 4] Neg	е ОК		Lcom	Mu/j	phiMn	scLCB	Vu/phi\ I 0 I 0	Vn .2752	bt	:	t OK	tal Check Lcom	ing	atio -	tcf Ratio	8		scLC	n 288 288	mma(Delt Ratio		Construction	uctibilit uctibilit Connec	y(Flex y(She ctor	kure) ear)	
Elem par 1015 J[11	Art Positive gative 15] Pos 4] Neg 4] Pos	e OK OK		Lcom scLCB1	Mu/j	ohiMn 0.3823	scLCB scLCB	Vu/phi/ I 0 I 0	Vn .2752 .3168	bt OK	[[t OK OK	tal Check Lcom scLCB5	ing	atio - -	tcf Ratio 0.201	8	0.2752	scL0 scL0	n 288 288 288	mma(Delt Ratio 0.4 0.4		Constru- Constru- Shear	uctibilit uctibilit Connec	cy(Flex cy(She ctor Stiffer	kure) ear)	
Elem pai 1015 J[11 1016 I[114 1016 I[114	Art Positive gative 15] Pos 4] Neg 4] Pos 52] Neg	e OK OK OK		Lcom scLCB1	Mu/j	ohiMn 0.3823	scLCB scLCB scLCB	Vu/phi/ I 0 I 0 I 0 I 0	/n .2752 .3168 .3168	bt OK OK		t OK OK OK	tal Check Lcom scLCB5	ing	atio - - -	tcf Ratio 0.201	8 - 9 -	0.2752	scLC scLC scLC	n 288 288 288 288	mma(Dell Ratio 0.4 0.4 0.4		Constru Constru Shear Longitu	uctibilit uctibilit Connec udinal S	cy(Flex cy(She ctor Stiffer	kure) ear) her	
Elem pai 1015 J[11 1016 I[114 1016 I[114 1016 J[35	art Positive gative 15] Pos 4] Neg 4] Pos 52] Neg 52] Pos	e 0K 0K 0K 0K		Lcom scLCB1 scLCB1	Mu/j	ohiMn 0.3823 - 0.2986 -	scLCB scLCB scLCB scLCB	Vu/phi/ I 0 I 0 I 0 I 0 I 0	/n .2752 .3168 .3168 .2981	OK OK OK		t OK OK OK OK	tal Check Lcom scLCB5 scLCB5	tcw Ri	atio - - -	tcf Ratio 0.201 0.125	8 - - - - 6	0.2752 - 0.2304 -	scL0 scL0 scL0 scL0	n 288 288 288 288 288 288	mma(Dell Ratio 0.4 0.4 0.4 0.4 0.4		Constru Constru Shear Longitu	uctibilit uctibilit Connec udinal S	y(Flex y(She ctor Stiffer	ear)	
Elem par 1015 J[11 1016 [[114 1016 [[114 1016 J[35 1016 J[35	art Positive gative 15] Pos 4] Neg 4] Pos 52] Neg 52] Pos 1] Neg	e 0K 0K 0K 0K 0K		Lcom scLCB1 scLCB1	Mu/ 	ohiMn 0.3823 - 0.2986 -	scLCB scLCB scLCB scLCB scLCB	Vu/phi/ 1 0 1 0 1 0 1 0 1 0 1 0 1 0	/n .2752 .3168 .3168 .2981 .2981	bt OK OK OK		t OK OK OK OK	tal Check Lcom scLCBS scLCBS	tcw Ri		tcf Ratio 0.201 0.125	8 - 9 - 6 13	0.2752 - 0.2304 - 0.2617	scLC scLC scLC scLC scLC	n 288 288 288 288 288 288 288	mma(Dell Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4	25 25 25 25 274 274	Constru Constru Shear Longitu 0.3862 0.3862	uctibilit uctibilit Connec udinal S	y(Flex y(She ctor Stiffer	ear)	1
Elem par 1015 J[11 1016 [[114 1016 [[114 1016 J[35 1017 [[351	Positive. gative 15] Pos 4] Neg 4] Pos 52] Pos 1] Neg 1] Pos	e 0K 0K 0K 0K 0K 0K 0K		Lcom scLCB1 scLCB1 scLCB1 scLCB1	Mu/j	ohiMn 0.3823 - 0.2986 - 0.3412 - 0.2193 -	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phiv I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0	vn .2752 .3168 .3168 .2981 .2981 .3461 .3461 .3274			t OK OK OK OK OK	tal Check Lcom scLCBS scLCBS scLCBS scLCBS	tcw Ri		tcf Ratio 0.201 0.125 0.165 0.010 0.083	8 - - - - - 3 - - - - - - - -	0.2752 - 0.2304 - 0.2617 0.0555 0.1569 -	scL0 scL0 scL0 scL0 scL0 scL0 scL0 scL0	n 288 288 288 288 288 288 288 288 288 28	mma(Delt Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	274 274 274 275 274 274 275 274 275 275 2828	Constru- Constru- Shear Longitu 0.3862 0.3862 0.4403 0.4403 0.4403	uctibilit uctibilit Connec udinal S CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4	cy(Flex cy(She ctor Stiffer	ear)	1
Elem pai 1015 J[11 1016 [[114 1016 []114 1016 J[35 1016 J[35 1017 [[351 1017 [[351	Positive gative 15] Pos 4] Pos 52] Neg 52] Pos 1] Pos 14] Neg	e OK OK OK OK OK OK OK		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/ - - - - -	ohiMn 0.3823 - 0.2986 - 0.3412 - 0.2193 - 0.2193 - 0.3111	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phiv I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0	Vn .2752 .3168 .3168 .2981 .2981 .3461 .3461 .3274 .3274	bt Ок Ок Ок Ок Ок		t OK OK OK OK OK OK OK OK	tal Check Lcom scLCBS scLCBS scLCBS scLCBS scLCBS	tcw Ri	atio	tcf Ratio 0.201 0.125 0.165 0.010 0.083 0.126	8 - - - - - - - - - - - - -	0.2752 - 0.2304 - 0.2617 0.0555 0.1569 - 0.2346	scL0 scL0 scL0 scL0 scL0 scL0 scL0 scL0	n (388 (388 (388 (388 (388 (388 (388 (38	mma (Delt Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	274 274 274 295 295 828 828	Constru- Constru- Shear (Longitu 0.3862 0.4403 0.4403 0.4178	uctibilit Connec udinal S CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4	cy(Flex cy(She ctor Stiffer	ear) ear) 0.0000 0.2487 0.0000 0.1343 0.1343	
Elem pai 1015 J[11 1016 [114 1016 [114 1016 J]35 1016 J]35 1017 [355] 1017 [351 1017 J[11 1017 J[11 1018 [113]	Positive gative 15] Pos 4] Pos 52] Pos 11] Pos 11] Pos 14] Pos 3] Neg	e OK OK OK OK OK OK OK OK		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/ Mu/	ohiMn 0.3823 - 0.2986 - 0.3412 - 0.2193 - 0.2193 - 0.3111 0.0537	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phi/ 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	Vn .2752 .3168 .3168 .2981 .2981 .3461 .3274 .3274 .3274	bt ОК ОК ОК ОК ОК ОК		t OK OK OK OK OK OK OK OK OK	tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5	tcw Ri		tcf Ratio 0.201 0.125 0.165 0.010 0.083 0.126 0.033	8 - - - - - - - - - - - - -	0.2752 - 0.2304 - 0.2617 0.0555 0.1569 - 0.2346 0.0100	scL0 scL0 scL0 scL0 scL0 scL0 scL0 scL0	n (288 (288 (288 (288 (288 (288 (288 (28	mma (Delt Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	25 25 25 274 295 225 295 828 828 828 828 828	Constru- Constru- Shear Longitu 0.3862 0.403 0.4403 0.4403 0.4478 0.4478	uctibilit uctibilit Connec udinal S CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS2	y(Flex y(She ctor Stiffer	ear) ear) 0.0000 0.2487 0.0000 0.1343 0.0000 0.1938 0.0000	
Elem pai 1015 J[11 1016 [114 1016 [114 1016]]35 1017 [351 1017 [351 1017 [351 1017 [315] 1017 J[11 1017 J[11 1018 [113]	Positive.gative [5] Pos [4] Pos [5] Pos [4] Pos [5] Pos [1] Neg [1] Pos [1] Pos [1] Pos [1] Pos [1] Pos [2] Pos	e OK OK OK OK OK OK OK OK OK		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/ Mu/	ohiMn 0.3823 - 0.2986 - 0.3412 - 0.2193 - 0.2193 - 0.3111	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phi/ Vu/phi/ 0 0 0 0 0 0 0 0 0 0 0 0 0	Vn .2752 .3168 .3168 .2981 .2981 .3461 .3461 .3274 .3274 .3687 .3687	bt ОК ОК ОК ОК ОК ОК	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	t OK OK OK OK OK OK OK OK OK OK	tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5	tcw Ri		tof Ratio 0.201 0.125 0.165 0.011 0.083 0.0126 0.033 0.033	8 9 - - 6 3 3 - - 11 2 6 - - - - - - - - - - - - -	0.2752 - 0.2304 - 0.2617 0.0555 0.1569 - 0.2346 0.0100 0.0569	scL0 scL0 scL0 scL0 scL0 scL0 scL0 scL0	n 288 288 288 288 288 288 288 288 288 28	mma (Dell Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	274 274 274 295 228 828 828 787 787	Constr Constr Shear Longiti 0.3862 0.3862 0.3862 0.4403 0.4403 0.4478 0.4478 0.4678	uctibilit Connec udinal S CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4	y(Flex y(She ctor Stiffer	ear) Per 0.0000 0.1343 0.0000 0.1343 0.0000 0.13938 0.0000 0.13938 0.0000	
Elem pai 1015 J[11 1016 [[114 1016 [[135 1016 J[35 1017 [[351 1017 J[11 1017 J[11 1017 J[11 1018 J[13 1018 J[13	rt Positive. gative 15] Pos 4] Pos 22] Pos 22] Pos 1] Pos 22] Pos 1] Pos 1] Pos 3] Neg 3] Pos 3] Pos 3] Pos	e OK OK OK OK OK OK OK OK OK OK		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/ Mu/	0.3823 0.2986 - 0.3412 - 0.3412 - 0.3111 0.0537 0.1335	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phil Vu/phil 0 0 0 0 0 0 1 1 0 1 1 0 1 0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1	Vn .2752 .3168 .3168 .2981 .2981 .2981 .3461 .3461 .3274 .3274 .3687 .3687 .3500			t ОК ОК ОК ОК ОК ОК ОК ОК ОК ОК ОК	tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5	tcw Ri	atio	tof Ratio 0.201 0.125 0.166 0.010 0.083 0.0126 0.033 0.033 0.010	8	0.2752 - 0.2304 - 0.2617 0.0555 0.1569 - 0.2346 0.0100 0.0569 0.0554	scL0 scL0 scL0 scL0 scL0 scL0 scL0 scL0	n 288 288 288 288 288 288 288 288 288 28	mma (Delt Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	274 274 275 295 828 828 828 828 828 828 828 828 828 82	Constru- Constru- Shear Uongitu 0.3862 0.4403 0.4403 0.4478 0.4478 0.4478 0.4478	uctibilit uctibilit Connec udinal S CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS2 CS4 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4	y(Flex y(She ctor Stiffer	ear) ear) 0.0000 1.2487 0.0000 1.1343 0.0000 0.1938 0.0000 0.0000	
Elem pai 1015 J(11 1016 (114 1016 (114 1016 J(35 1017 (351 1017 (351 1017 J(11 1018 (113 1018 J(13 1018 J(35 1018 J(35	Positive gative 15] Pos 14] Pos 13] Pos 14] Pos 15] Pos 16] Pos 17] Pos 18] Pos 19] Pos 11] Pos 12] Pos 13] Pos 13] Pos 13] Pos	e 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/)	0.3823 	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phiN I 0 0 0 1 0 0 1 0 1 0 0 1 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	Vn .2752 .3168 .3168 .2981 .2981 .2981 .3461 .3274 .3274 .3274 .3687 .3500 .3500			t ОК ОК ОК ОК ОК ОК ОК ОК ОК ОК ОК ОК	tal Check Lcom scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS	tcw Ri	atio	tof Ratio 0.201 0.122 0.163 0.011 0.083 0.033 0.031 0.011 0.083	8 - - - - - - - - - - - - - - - - - - -	0.2752 - 0.2304 - 0.2617 0.0555 0.1569 - - 0.2346 0.0100 0.0569 0.0554 0.0554 0.1639	scL0 scL0 scL0 scL0 scL0 scL0 scL0 scL0	n 288 288 288 288 288 288 288 288 288 28	mma (Delt Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	274 274 274 274 295 828 828 828 787 787 787 787 311 311	Constru- Constru- Shear Longitu 0.3862 0.3862 0.403 0.4403 0.4403 0.4408 0.4454	uctibilit Connec udinal S CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4	ctor	ear) ear) ear) 20000 1343 20000 1343 20000 1343 20000 1343 20000 1343 20000 21343	
Elem pai 1015 J(11 1016 (114 1016 (114 1016 (114 1016 J(35 1017 J(35 1017 J(35 1017 J(11 1017 J(11 1017 J(11 1018 (113 1018 (113 1018 J(35 1018 J(35 1018 J(35) 1018 J(35) 1017 J(35) 1018 J(35)	Positive.gative [5] Pos [4] Pos [5] Pos [6] Pos [7] Neg [8] Pos [1] Pos [1] Pos [1] Pos [3] Pos [3] <t< td=""><td>e 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K</td><td></td><td>Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1</td><td>Mu/; Mu/; -<!--</td--><td>0.3823 0.2986 0.2986 - 0.3412 - 0.2193 - 0.3111 0.0537 0.1335 - 0.2299 0.1085</td><td>scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB</td><td>Vu/phiN 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0</td><td>Vn .2752 .3168 .3168 .2981 .2981 .2981 .3461 .3274 .3274 .3274 .3687 .3687 .3500 .3500 .3783</td><td></td><td></td><td>t OK OK OK OK OK OK OK OK OK OK OK</td><td>tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5</td><td>tcw Ri</td><td></td><td>tof Ratio 0.201 0.125 0.165 0.011 0.085 0.012 0.033 0.033 0.011 0.085 0.065</td><td>8 - - - - - - - - - - - - -</td><td>0.2752 - 0.2304 - 0.2617 0.0555 0.1569 - 0.2346 0.0100 0.0569 0.0554 0.1639 0.0303</td><td>scl0 scl0 scl0 scl0 scl0 scl0 scl0 scl0</td><td>n 288 288 288 288 288 288 288 288 288 2</td><td>mma(Delf Ratio 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4</td><td>274 274 274 274 295 295 828 828 828 828 828 828 828 828 828 82</td><td>Constr Constr Shear Longiti 0.3862 0.3862 0.403 0.4403 0.4403 0.4478 0.4478 0.4678 0.4678 0.4678 0.4678</td><td>uctibilit uctibilit Connec udinal S CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS2 CS4 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2</td><td>y(Flex y(She ctor Stiffer</td><td>ear) ear) 00000 02487 00000 02487 00000 01343 00000 00000 00000 01343 00000 01343 00000</td><td></td></td></t<>	e 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/; Mu/; - </td <td>0.3823 0.2986 0.2986 - 0.3412 - 0.2193 - 0.3111 0.0537 0.1335 - 0.2299 0.1085</td> <td>scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB</td> <td>Vu/phiN 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0</td> <td>Vn .2752 .3168 .3168 .2981 .2981 .2981 .3461 .3274 .3274 .3274 .3687 .3687 .3500 .3500 .3783</td> <td></td> <td></td> <td>t OK OK OK OK OK OK OK OK OK OK OK</td> <td>tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5</td> <td>tcw Ri</td> <td></td> <td>tof Ratio 0.201 0.125 0.165 0.011 0.085 0.012 0.033 0.033 0.011 0.085 0.065</td> <td>8 - - - - - - - - - - - - -</td> <td>0.2752 - 0.2304 - 0.2617 0.0555 0.1569 - 0.2346 0.0100 0.0569 0.0554 0.1639 0.0303</td> <td>scl0 scl0 scl0 scl0 scl0 scl0 scl0 scl0</td> <td>n 288 288 288 288 288 288 288 288 288 2</td> <td>mma(Delf Ratio 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4</td> <td>274 274 274 274 295 295 828 828 828 828 828 828 828 828 828 82</td> <td>Constr Constr Shear Longiti 0.3862 0.3862 0.403 0.4403 0.4403 0.4478 0.4478 0.4678 0.4678 0.4678 0.4678</td> <td>uctibilit uctibilit Connec udinal S CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS2 CS4 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2</td> <td>y(Flex y(She ctor Stiffer</td> <td>ear) ear) 00000 02487 00000 02487 00000 01343 00000 00000 00000 01343 00000 01343 00000</td> <td></td>	0.3823 0.2986 0.2986 - 0.3412 - 0.2193 - 0.3111 0.0537 0.1335 - 0.2299 0.1085	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phiN 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	Vn .2752 .3168 .3168 .2981 .2981 .2981 .3461 .3274 .3274 .3274 .3687 .3687 .3500 .3500 .3783			t OK OK OK OK OK OK OK OK OK OK OK	tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5	tcw Ri		tof Ratio 0.201 0.125 0.165 0.011 0.085 0.012 0.033 0.033 0.011 0.085 0.065	8 - - - - - - - - - - - - -	0.2752 - 0.2304 - 0.2617 0.0555 0.1569 - 0.2346 0.0100 0.0569 0.0554 0.1639 0.0303	scl0 scl0 scl0 scl0 scl0 scl0 scl0 scl0	n 288 288 288 288 288 288 288 288 288 2	mma(Delf Ratio 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	274 274 274 274 295 295 828 828 828 828 828 828 828 828 828 82	Constr Constr Shear Longiti 0.3862 0.3862 0.403 0.4403 0.4403 0.4478 0.4478 0.4678 0.4678 0.4678 0.4678	uctibilit uctibilit Connec udinal S CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS4 CS2 CS2 CS4 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2 CS2	y(Flex y(She ctor Stiffer	ear) ear) 00000 02487 00000 02487 00000 01343 00000 00000 00000 01343 00000 01343 00000	
Elem pai 1015 J[11 1016 [114 1016 [115 1016]J35 1017 [351 1017 [351 1017 [351 1017 [351 1017 [351 1017 [351 1017 [351 1018]J35 1018 J[35 1018 J[35 1019 [350	Positive. gative 15] Pos 4] Neg 4] Pos 52] Neg 52] Pos 11] Pos 33] Neg 34] Neg 35] Neg 36] Neg 37] Neg 38] Pos 39] Neg 30] Neg 31] Neg 33] Neg 34] Neg 35] Neg 36] Neg 37] Neg 38] Neg 39] Neg 30] <td< td=""><td>e 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K</td><td></td><td>Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1</td><td>Mu/) Mu/) Mu/)</td><td>0.3823 0.2986 - 0.3412 - 0.2193 - 0.3111 0.0537 0.1335 - 0.2299 0.1085 0.0777</td><td>scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB</td><td>Vu/phN Vu/phN Vu/phN Vu/phN 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>Vn 2752 3168 3168 2981 2981 3461 3274 3274 3687 3687 3500 3500 3783 3783</td><td></td><td></td><td>t OK OK OK OK OK OK OK OK OK OK</td><td>tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5</td><td>ing</td><td>atio</td><td>tof Ratio 0.20* 0.125 0.165 0.010 0.085 0.022 0.035 0.035 0.011 0.085 0.065 0.005</td><td>8 - - - - - - - - - - - - -</td><td>0.2752 </td><td>scl0 scl0 scl0 scl0 scl0 scl0 scl0 scl0</td><td>n</td><td>mma(Delf Ratio 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4</td><td>295 295 295 295 295 311 311 311 131</td><td>Constru- Constru- Shear 0.3862 0.3862 0.4403 0.4403 0.4478 0.4478 0.4478 0.4478 0.4478 0.4454 0.4454 0.4748</td><td>uctibilit Connec udinal S CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS</td><td>y(Flex y(She ctor Stiffer</td><td>ear) ear</td><td></td></td<>	e 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K 0K		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/) Mu/) Mu/)	0.3823 0.2986 - 0.3412 - 0.2193 - 0.3111 0.0537 0.1335 - 0.2299 0.1085 0.0777	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phN Vu/phN Vu/phN Vu/phN 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Vn 2752 3168 3168 2981 2981 3461 3274 3274 3687 3687 3500 3500 3783 3783			t OK OK OK OK OK OK OK OK OK OK	tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5	ing	atio	tof Ratio 0.20* 0.125 0.165 0.010 0.085 0.022 0.035 0.035 0.011 0.085 0.065 0.005	8 - - - - - - - - - - - - -	0.2752 	scl0 scl0 scl0 scl0 scl0 scl0 scl0 scl0	n	mma(Delf Ratio 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	295 295 295 295 295 311 311 311 131	Constru- Constru- Shear 0.3862 0.3862 0.4403 0.4403 0.4478 0.4478 0.4478 0.4478 0.4478 0.4454 0.4454 0.4748	uctibilit Connec udinal S CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS	y(Flex y(She ctor Stiffer	ear) ear	
Elem pai 1015 J(11 1016 (114 1016 (114 1016 J35 1017 (355 1017 (355 1017 (355 1017 J11 1017 J(11 1018 J(135 1018 J(35 1019 (355 1019 (355	Positive. rt Positive. 151 Pos 41 Pos 42 Neg 43 Pos 512 Pos 511 Pos 512 Pos 511 Pos 513 Neg 01 Pos	e OK OK OK OK OK OK OK OK OK OK OK OK		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/ -	0.3823 	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phN Vu/phN 0 0 0 0 0 0 0 0 0 0 0 0 0	Vn .2752 .3168 .3168 .2981 .2981 .3461 .3461 .3274 .3274 .3687 .3687 .3687 .3500 .3783 .3595			t OK OK OK OK OK OK OK OK OK OK	tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5	ing	atio	tof Ratio 0.201 0.125 0.165 0.010 0.085 0.126 0.033 0.033 0.033 0.041 0.083 0.003 0.003	8 99 - - 66 - 33 - - - - - - - - - - - - -	0.2752 - 0.2304 - 0.0555 - 0.0555 - 0.2346 0.0100 0.0554 0.0554 0.0554 0.0639 0.0303 0.0404	scL0	n 288 288 288 288 288 288 288 2	mma(Dell Ratio	274 295 295 828 828 828 828 787 787 311 311 131 131 131	Constru- Constru- Shear Longitu 0.3862 0.4403 0.4403 0.4403 0.4478 0.4678 0.4678 0.4678 0.4454 0.4454 0.4454 0.4748 0.4523	uctibilit Connec udinal S CS2 CS4 CS4 CS2 CS4 CS2 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4	y(Flex y(She ctor Stiffer	ear) ear) ear) 20000 22487 00000 11343 00000 11343 00000 11343 00000 11343 00000 0002 0002 0002 0002 0002 0002 0002 0002 0002 0002 0002 0002 0002 0002 0002 0002 0000 000	
Elem pai 1015 J(11 1016 (114 1016 (114 1016 (114 1016 (114 1016 (113 1017 (351 1017 (351 1017 (351 1017 J(11 1017 J(11 1018 J(13 1018 J(13 1018 J(13 1018 J(13 1019 J(11) 1019 J(11) 1019 J(11) 1019 J(11)	Positive art Positive [5] Pos 4] Pos 32] Neg 52] Neg 11] Pos 12] Pos 13] Pos 3] Pos	e OK OK OK OK OK OK OK OK OK OK OK OK		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/ I -	0.3823 0.2986 0.2986 - 0.2193 - 0.2193 - 0.3111 - 0.0537 0.1335 - 0.2299 0.1085 0.0777 0.0535 0.1345	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phN Vu/phN Vu/phN Vu/phN 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Vn .2752 .3168 .3168 .2981 .2981 .3461 .3461 .3461 .3274 .3687 .3500 .3500 .3783 .3783 .3595 .3595		2 2	t OK OK OK OK OK OK OK OK OK OK	tal Check Lcom scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS scLCBS	tcw Ri	atio	tof Ratio 0.201 0.125 0.165 0.011 0.085 0.012 0.033 0.011 0.085 0.011 0.085 0.011 0.085 0.001 0.085 0.001 0.003 0.003	8 - - - 66 - 33 - 13 - 14 - 15 - 16 - 17 - 18 - 19 - 66 - 15 - 13 -	0.2752 - 0.2304 - 0.2617 0.0555 - 0.2346 0.01609 0.0554 0.0554 0.0303 0.0404 0.0098 0.0555	scL0 scL0	n 288 288 288 288 288 288 288 288 288 28	mma(Delt Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	274 2274 2275 2275 2295 828 828 828 787 787 311 131 1131 1131 1131 1131 11	Constru- Constru- Shear Longitu 0.3862 0.3862 0.403 0.4403 0.4403 0.4408 0.4408 0.4478 0.4678 0.4678 0.4678 0.4678 0.4454 0.4454 0.4454 0.4454 0.4454 0.4523 0.4523	uctibilit Connec udinal S CS2 CS4 CS4 CS2 CS4 CS4 CS4 CS2 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4	y(Flex y(She ctor Stiffer	ear) Per 22487 0.0000 11343 0.0000 1.1343 0.0000 0.0702 0.0000 1.1343 0.0000 0.0702 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	
Elem pai 1015 J(11 1016 (114 1016 (114 1016 J35 1016 (355 1017 (355 1017 (355 1017 J11 1017 J(11 1018 J135 1018 J(35 1019 (355 1019 (355	Positive gative 151 Pos 141 Pos 152 Neg 1532 Neg 154 Pos 155 Pos 151 Pos 151 Pos 152 Neg 11 Pos 12 Pos 131 Pos 151 Pos 151 Pos 151 Pos 131 Pos 132 Pos	e OK OK OK OK OK OK OK OK OK OK OK OK		Lcom scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1 scLCB1	Mu/ I -	0.3823 	scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB scLCB	Vu/phN Vu/phN Vu/phN Vu/phN 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Vn .2752 .3168 .3168 .2981 .2981 .3461 .3461 .3274 .3274 .3687 .3687 .3687 .3500 .3783 .3595		2 2	t OK OK OK OK OK OK OK OK OK OK	tal Check Lcom scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5 scLCB5	tcw Ri	atio	tof Ratio 0.201 0.125 0.165 0.010 0.085 0.126 0.033 0.033 0.033 0.041 0.083 0.003 0.003	8 - - - 66 - 33 - 13 - 14 - 15 - 16 - 17 - 18 - 19 - 66 - 15 - 13 -	0.2752 - 0.2304 - 0.0555 - 0.0555 - 0.2346 0.0100 0.0554 0.0554 0.0554 0.0639 0.0303 0.0404	scL0	n 288 288 288 288 288 288 288 288 288 28	mma(Delt Ratio 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4	274 295 295 828 828 828 828 787 787 311 311 131 131 131	Constru- Constru- Shear Longitu 0.3862 0.4403 0.4403 0.4403 0.4478 0.4678 0.4678 0.4678 0.4454 0.4454 0.4454 0.4748 0.4523	uctibilit Connec udinal S CS2 CS4 CS4 CS2 CS4 CS2 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4 CS4	y(Flex y(She ctor Stiffer	ear) ear) ear) 20000 22487 00000 11343 00000 11343 00000 11343 00000 11343 00000 00072 00000 00072 00000	

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



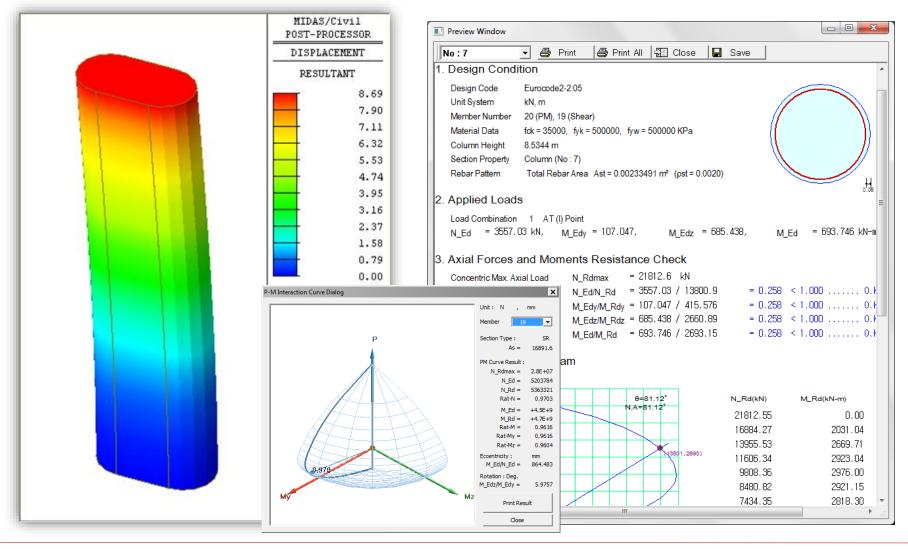
midas Civil

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



midas Civil

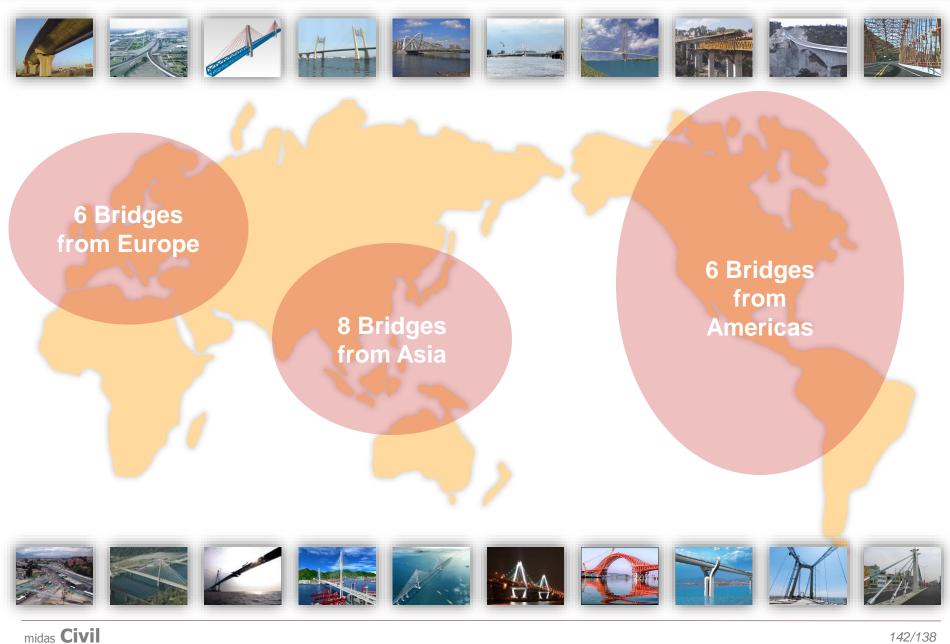
Reinforced Concrete Design as per Eurocode2-2:05 – Design Report



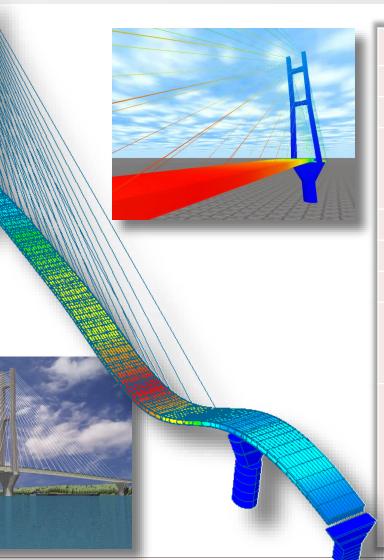
Project Applications

20 Bridge Project Applications selected worldwide

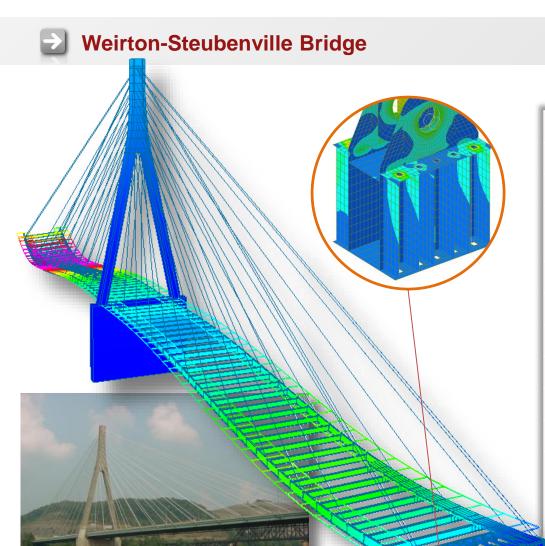
Bridging Your Innovations to Realities







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



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

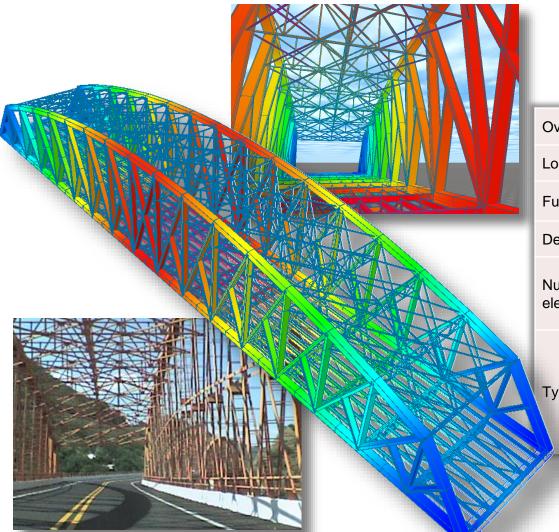




Overall bridge length	191 m
Location	Durango
Function/usage	Roadway Bridge
Designer	TRIADA SA de CV
Number of elements and element types used	Beam: 63 Tendon Profile: 64
Type of analysis	Construction Stage Analysis with Time-Dependent Effects Response Spectrum Analysis Eigen Value Analysis Vehicle Load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

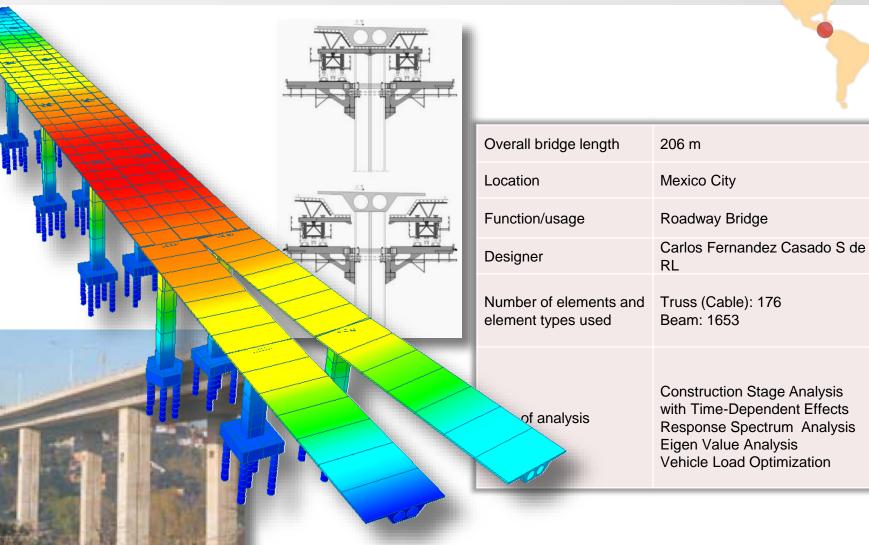


El Marquéz Bridge

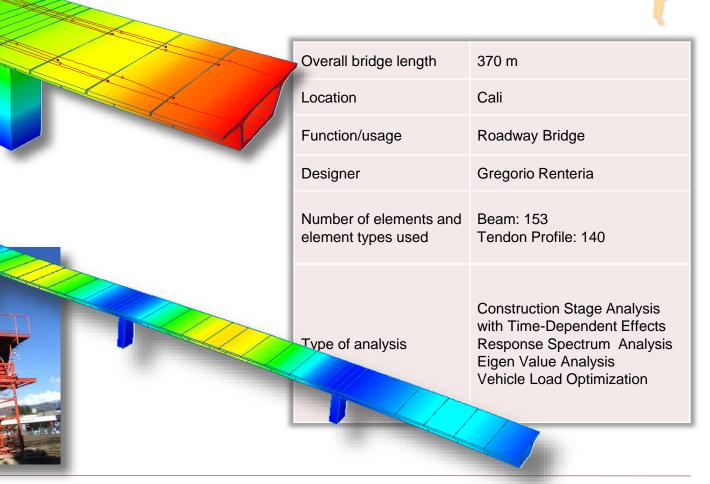


Overall bridge length	102 m
Location	Michoacán
Function/usage	Roadway Bridge
Designer	COPECSA de CV
Number of elements and element types used	Beam: 2224
Type of analysis	Response Spectrum Analysis Eigen Value Analysis Vehicle Load Optimization

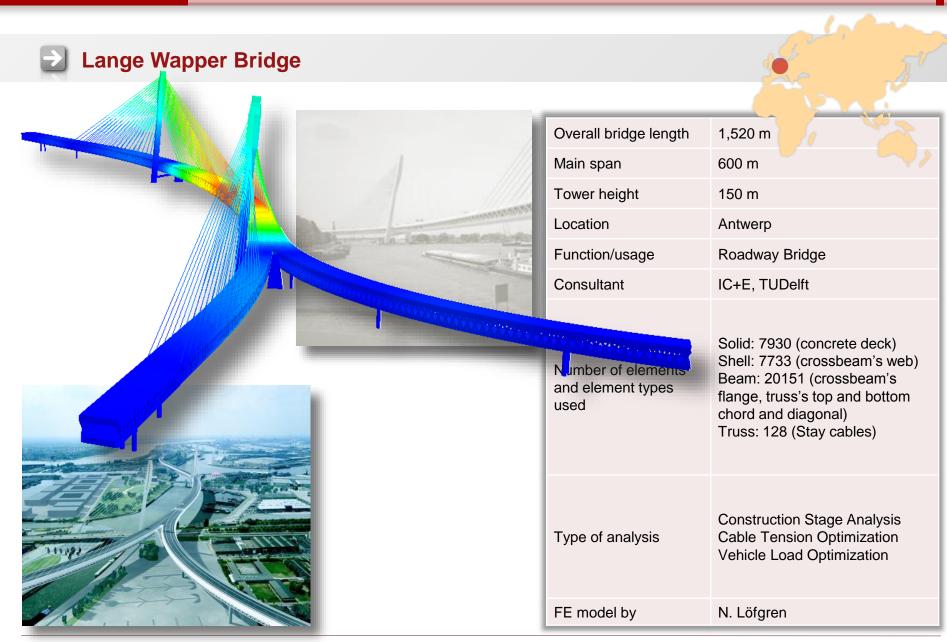








Bridging Your Innovations to Realities



400 m

200 m

Railway Bridge

Static Analysis

A. Steenbrink

75 m (60 m above the deck)

Movares Nederland BV

Truss: 56 (Stay cables)

Beam: 582 (Deck and Tower)

Vehicle Load Optimization

Time History Analysis

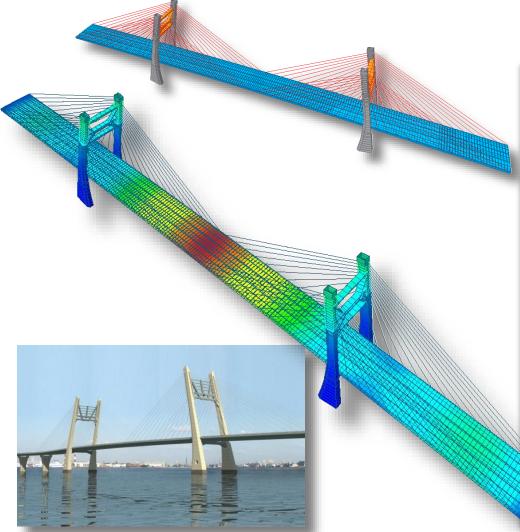
TU Delft / Movares Research Project on Train-Structure Interaction

	Overall bridge length
NEW TAX	Main span
	Tower height
-	Function/usage
	Consultant
	Number of elements and element types used
	type of analysis
	FE model by

midas (Civ	il
---------	-----	----



Korabelny Farvater Bridge



	T /
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

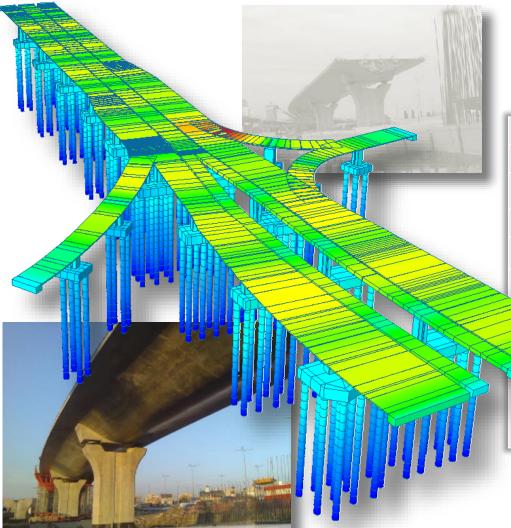
Overall bridge
Main span
Tower height
Location
Function/usage
Contractor
Designer
Year of comple
Cost of constru
Number of eler and element ty
Type of analysi

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

Bridging Your Innovations to Realities

€

Basarab viaduct Bridge



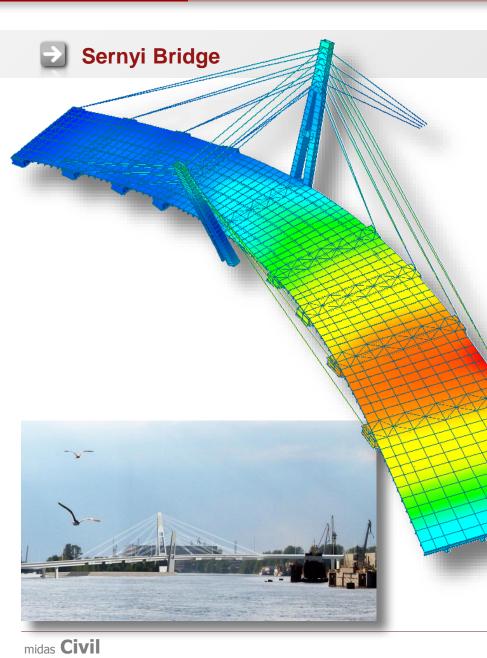


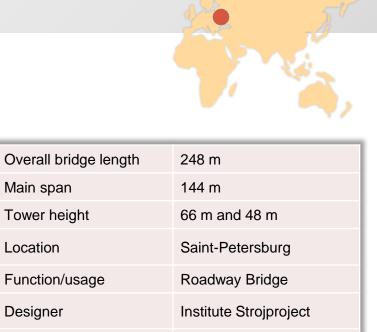
Overall bridge length	1478.5 m
Main span	125 m
Location	Bucharest
Function/usage	Roadway / Tramway Bridge
Designer	C&T Enginreering Srl
Number of elements and ment types used	Beam: 3073 Plate: 549
Type of analysis	Nonlinear dynamic time history analysis with Lead Rubber Bearing Isolators (LRB) and Viscous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

Project Applications

20 Bridge Project Applications selected worldwide

Bridging Your Innovations to Realities





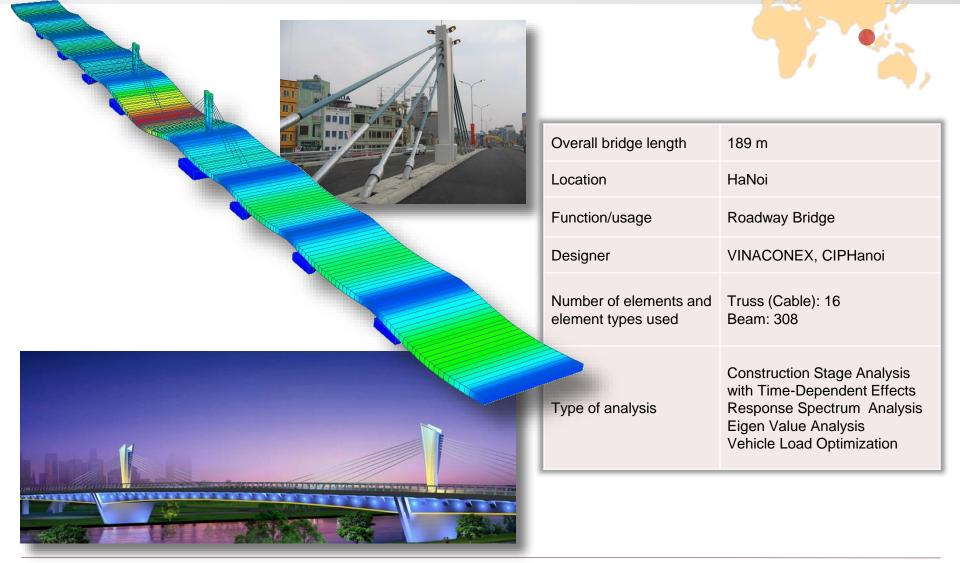
Function/usage	Roadway Bridge
Designer	Institute Strojproject
Year of completion	Under design
Cost of construction	\$ 50 Million
Number of elements and element types used	Truss (Cable): 40 Beam: 1633 Shell: 926
Type of analysis	Static Analysis Vehicle Load Optimization

Main span

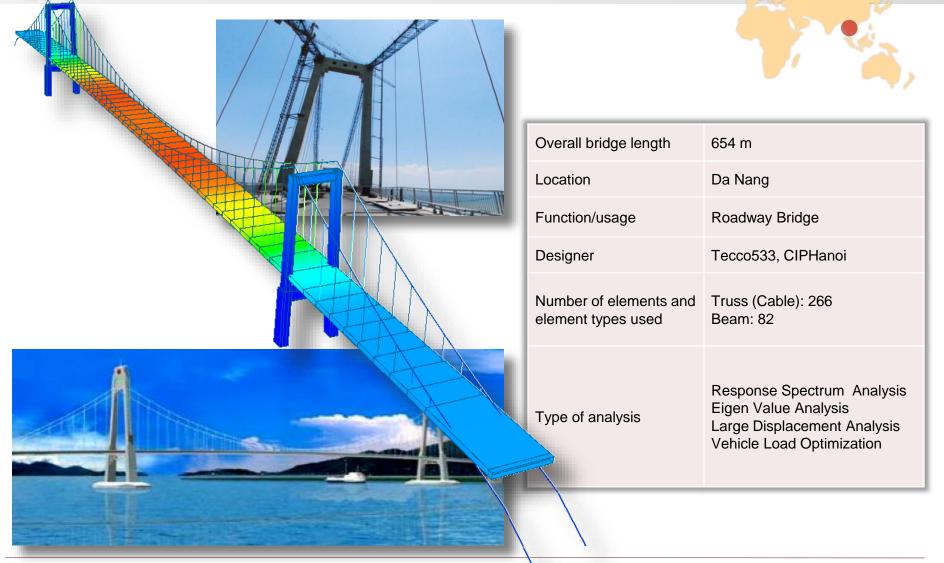
Location

Bridging Your Innovations to Realities









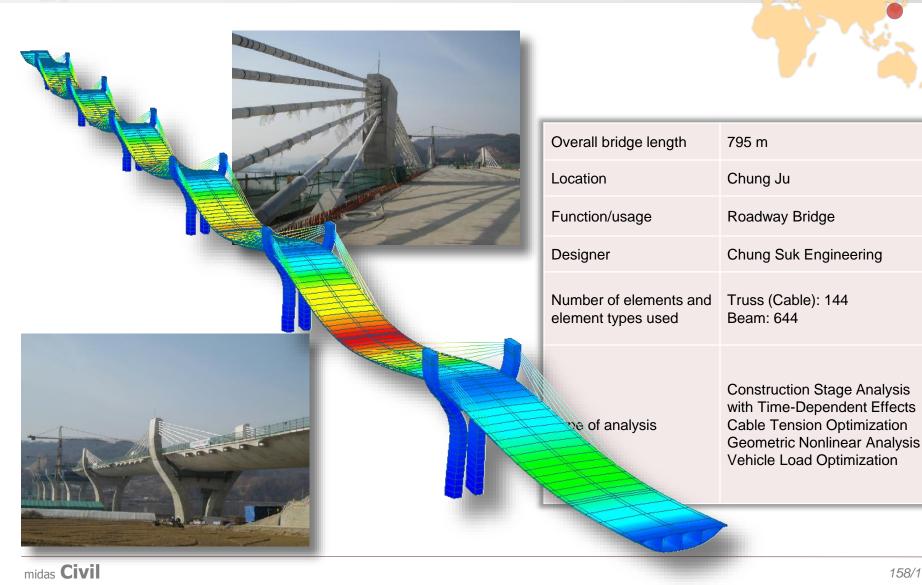


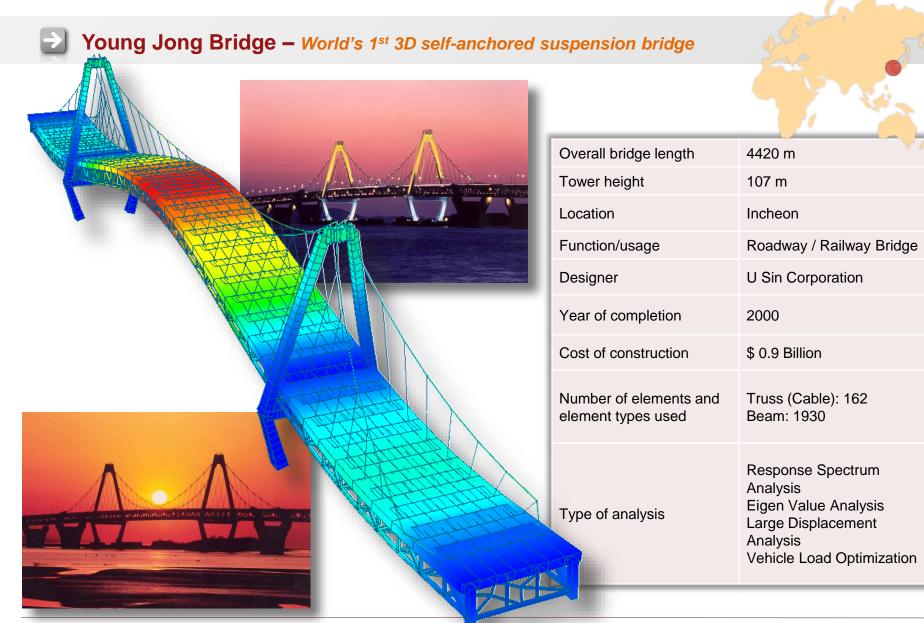


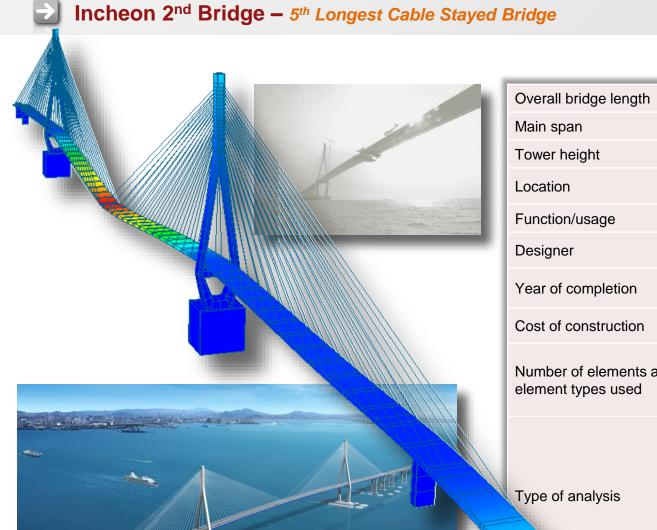
Overall bridge length	2559 m
Location	Seoul
Function/usage	Roadway Bridge
Designer	Sam An Engineering
Year of completion	2000
Cost of construction	\$ 0.2 Billion
Number of elements and element types used	Beam: 2603
Type of analysis	Eigen Value Analysis Response Spectrum Analysis Vehicle Load Optimization



Kum Ga Bridge – 7 Spans of Extradosed bridge



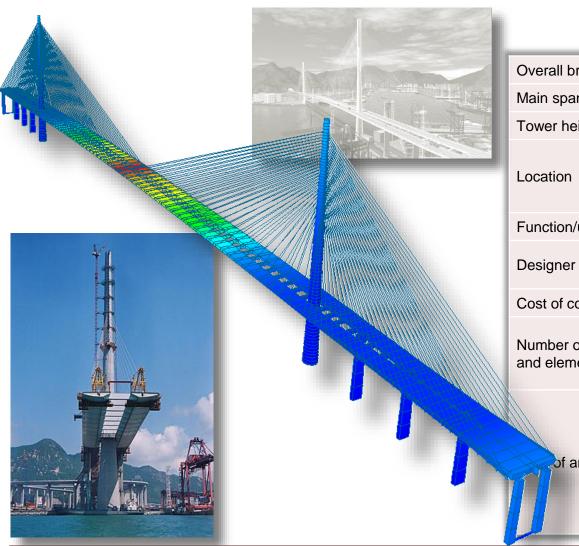




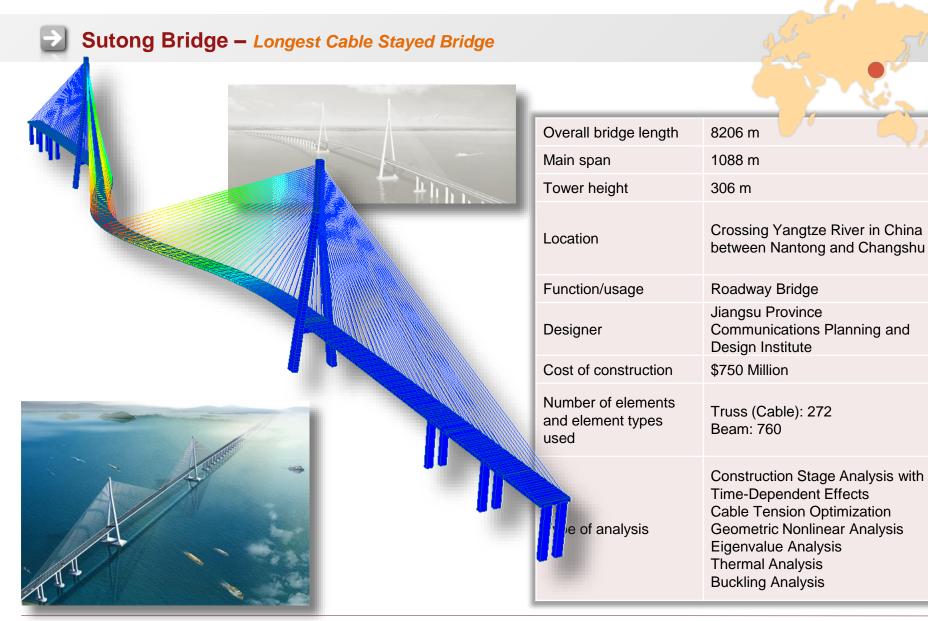
Overall bridge length	1480 m
Main span	800 m
Tower height	230 m
Location	Incheon
Function/usage	Roadway Bridge
Designer	Seoyeong Engineering and Chodai Co., Ltd
Year of completion	2009
Cost of construction	\$ 2.4 Billion
Number of elements and element types used	Truss (Cable): 176 Beam: 1653
Type of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

midas Civil

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





Russky Island Bridge – Longest Cable Stayed Bridge

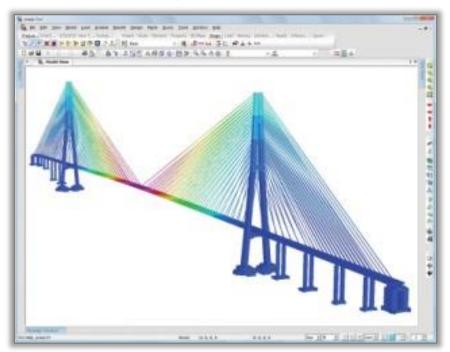




Russky Island Bridge (Russia)

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



Bridging Your Innovations to Realities - midas Civil