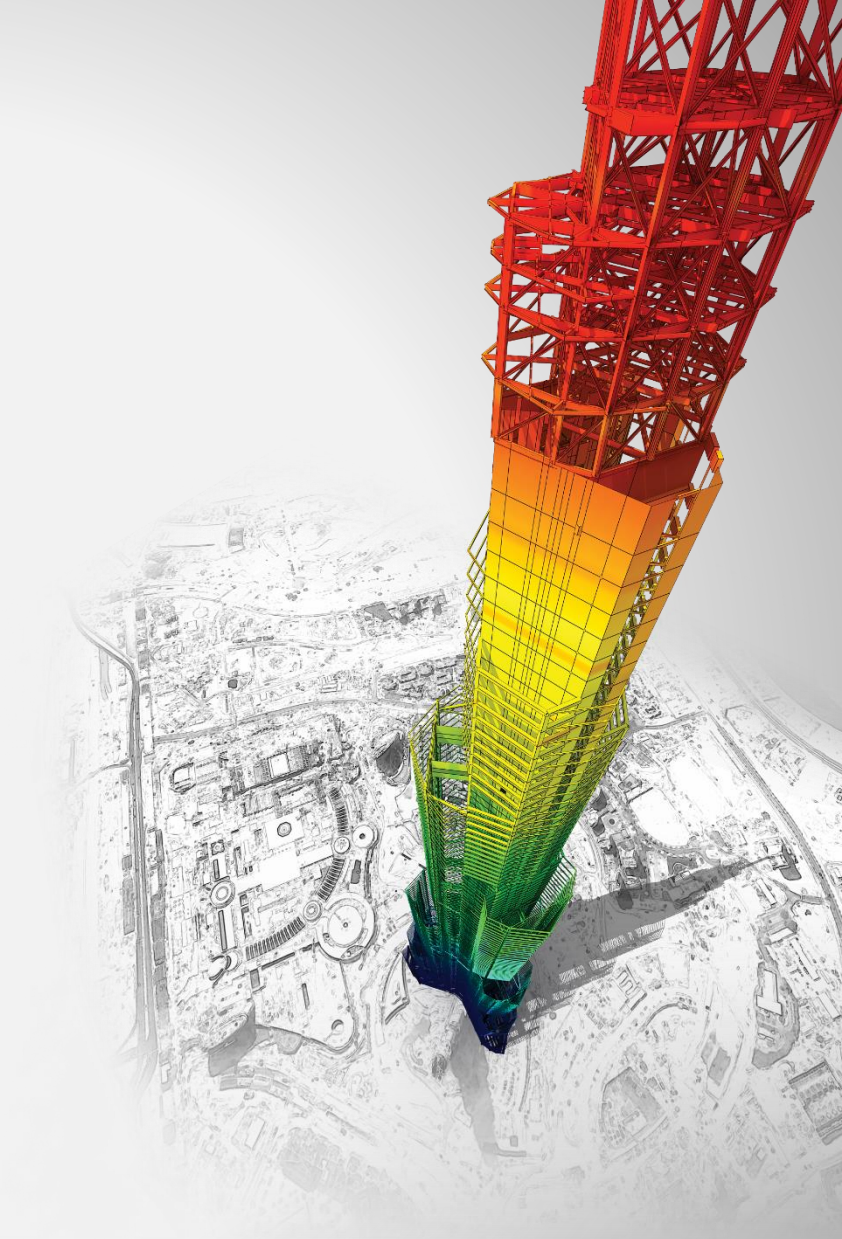


Release Note

Release Date : Feb. 2016

Product Ver. : Gen 2016 (v2.1) and Design+ 2016 (v1.3)



DESIGN OF General Structures

Integrated Design System for Building and General Structures

Enhancements

■ midas Gen

3

- (1) Improvement in RC Column Design/Checking
- (2) Cold-formed Steel Code Checking as per EN1993-1-3:2006
- (3) RC beam Torsion Design/Checking as per ACI318-11/08
- (4) Limiting Minimum Section Size for ACI318-11/08
- (5) Displaying Von Mises & Maximum Shear Stress Contour in Model View
- (6) Material Nonlinear Analysis with Beam Elements
- (7) Material nonlinear analysis of a layer in plate elements
- (8) Triple Friction Pendulum Isolator
- (9) Plotting Tangential Displacements for Erected Structures (Stage/Step real displacement)
- (10) New Section and Material Database
- (11) Nodal Coordinate Table in UCS
- (12) Improvement on Plate Local Axis
- (13) Improvement on Soil Pressure

■ midas Design+

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- (1) Bolt Connection Design/Checking as per EN1993-1-1:2005
- (2) Isolated Footing Design/Checking as per EN1992-1-1:2004



1. Improvement in RC Column Design/Checking

- In concrete columns design/checking, shear verification results can now be displayed not only the critical end position among i-end and j-end but also the middle of the member.
- This feature is very useful to verify the design results as per special seismic provision since different stirrup spacing should be assigned between critical position and middle position. This affects the following design code: Eurocode2, Eurocode8, NTC, ACI318, BS8110, CSA-A23.3, TWN-USD, IS456, AIJ-WSD, KCI-USD, KSCE-USD, AIK-USD, AIK-WSD, GB50010

■ Design > RC Design > Concrete Code Design > Column Design

Eurocode2:04 RC-Column Design Result Dialog

Code : Eurocode2:04,NTC2008 Unit : kN , m

Sorted by ☒ Member ☐ Property

Primary Sorting Option ☐ SECT ☒ MEMB

MEMB	SE	Section	fck	f _{yk}	LC	N _{Ed}	M _{Ed}	Ast	V-Rebar	LC	V _{Ed} .end	Rat-V.end	Asw-H.e	H-Rebar.end
SECT	L	Bc Hc	Height	f _{yw}	B	Rat-N	Rat-M			B	V _{Ed} .mid	Rat-V.mid	Asw-H.m	H-Rebar.mid
2	<input type="checkbox"/>	40x30	25000.0	450000	1	106.654	67.5018	0.0016	14-4-P12	1	33.7427	0.451	0.0016	2-P10 @90
2	<input type="checkbox"/>	0.400 0.300	3.0000	450000	1	0.806	0.814			1	33.7427	0.446	0.0011	2-P10 @140
3	<input type="checkbox"/>	40x30	25000.0	450000	1	106.654	67.5018	0.0016	14-4-P12	1	33.7427	0.451	0.0016	2-P10 @90
2	<input type="checkbox"/>	0.400 0.300	3.0000	450000	1	0.806	0.814			1	33.7427	0.446	0.0011	2-P10 @140
5	<input type="checkbox"/>	40x30	25000.0	450000	1	106.654	67.5018	0.0016	14-4-P12	1	33.7427	0.451	0.0016	2-P10 @90
2	<input type="checkbox"/>	0.400 0.300	3.0000	450000	1	0.806	0.814			1	33.7427	0.446	0.0011	2-P10 @140
6	<input type="checkbox"/>	40x30	25000.0	450000	1	106.654	67.5018	0.0016	14-4-P12	1	33.7427	0.451	0.0016	2-P10 @90
2	<input type="checkbox"/>	0.400 0.300	3.0000	450000	1	0.806	0.814			1	33.7427	0.446	0.0011	2-P10 @140

Column Design Result Dialog Box

5. Shear Force Capacity Check (End)

Applied Shear Strength V_{Ed} = 33.7427 kN (Load Combination : 1)
 Shear Ratio by Conc V_{Ed}/V_{Rdc} = 33.7427 / 74.8066 = 0.451
 Shear Ratio by (V_{Rds}; V_{Rdmax}) V_{Ed}/V_{Rds} = 33.7427 / 154.565 = 0.218
 Shear Ratio V_{Ed}/V_{Rd} = 0.451 < 1.000 O.K
 (Asw-H_{req} = 0.00165 m² / m, 2-P10 @90)

6. Shear Force Capacity Check (Middle)

Applied Shear Strength V_{Ed} = 33.7427 kN (Load Combination : 1)
 Shear Ratio by Conc V_{Ed}/V_{Rdc} = 33.7427 / 75.5941 = 0.446
 Shear Ratio by (V_{Rds}; V_{Rdmax}) V_{Ed}/V_{Rds} = 33.7427 / 99.3634 = 0.340
 Shear Ratio V_{Ed}/V_{Rd} = 0.446 < 1.000 O.K
 (Asw-H_{req} = 0.00110 m² / m, 2-P10 @140)

Graphic Report

111111 - CALCULATE SHEAR CAPACITY ABOUT MAJOR AXIS

(). Compute design parameters.

- Gamma_c = 1.50 (for Fundamental or Earthquakes).
- Alpha_{cc} = 1.00 (Default or User Defined).
- f_{cd} = Alpha_{cc} * f_{ck} / Gamma_c = 16666.667 kPa.
- Gamma_s = 1.15 (for Fundamental or Earthquakes).
- f_{yd} = f_{yk} / Gamma_s = 391304.348 kPa.
- Gamma_s = 1.15 (for Fundamental or Earthquakes).
- f_{yd} = f_{yk} / Gamma_s = 391304.348 kPa.
- Gamma_{rd} = 1.10

(). Compute concrete shear capacity in local-z direction.

- Applied axial force : N_{Ed} = 112.954 kN.
- Applied moment : M_{Edy} = 15.871 kN-m.
- Applied shear force : V_{Edz} = 33.743 kN.
- b_w = 0.400 m.
- d = 0.250 m.

(). Compute maximum spacing of ties/spirals.

- S_{max} = MIN[12*0.8d, Hc, Bc, 250 mm] = 0.144 m.

(). Calculate shear strength of concrete.

- k = MIN[1.0, SQRT(200/d), 2.0] = 1.8944 (by d unit is mm).
- A_{cv} = 0.10000 m².
- A_{sl} = A_{st} / 2 = 0.00079 m².

Detail Report

Modify Column Rebar Data

SECT Name Bar ☐ Create Sub Section

2 40x30 In

Element List : 3 5 6

Column/Brace Property

	Rebar		Data	
	Numbers			
Main	4	P12		
Rows	2			
Corner	2	P12		
Ties/ Spirals	End(I & J)	y	2	P10 @ 100
	z	2		
	Center(M)	y	2	P10 @ 250
	z	2		

☒ Same Ties/Spirals Rebar Space at End and Center

Add/Replace Delete Close

Modify Column Rebar Data

- In Concrete Design Result dialog box, shear reinforce results can be displayed for the middle position as well as the critical results between i-end and j-end.
- Stirrup spacing of middle position as well as critical position can be separately exported into midas Dshop European version for column drawings.

■ **Design > RC Design > Concrete Code Design > Column Design**

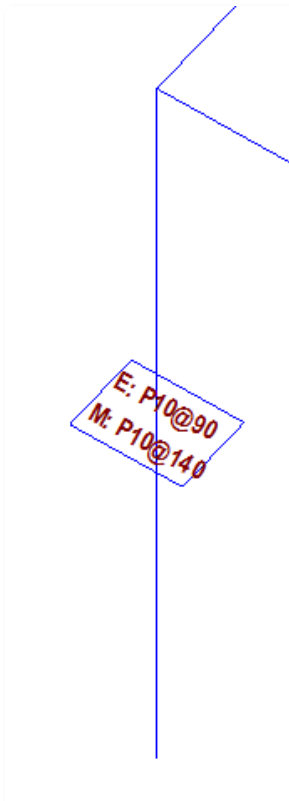
Design Results

Concrete Design Result

Load Cases/Combinations
ALL COMBINATION

Ratio by Components
☐ Axial
☐ Shear-y ☐ Shear-z
☐ Bend-y ☐ Bend-z
☒ Combined

Type of Display
☐ Contour ☐ Legend
☐ Values
☒ Reinforcement
☒ Rebar ☐ Area ☐ Ratio
 Display
☐ Beam ☒ Column
☐ Brace ☐ Wall
 Output Component
☐ Ratio of Axial Stress
☐ Main Rebar
☒ Shear Reinforcement
 Column Section Size
 Scale Factor 1
 Value Option
 Decimal Pt. 2 ☐ Exp.
 Output Section Location (Beam)
☐ I ☐ Center ☐ J
☒ Max ☐ All
 Apply Close



Concrete Design Results

Eurocode2:04 RC-Column Design Result Dialog

Code : Eurocode2:04.NTC2008 Unit : kN , mm Primary Sorting Option
 Sorted by ☒ Member ☐ Property

MEMB	SE	Section	fck	fyk	LC	N _{Ed}	M _{Ed}	As _t	V-Rebar	LC	V _{Ed} end	Rat-V end	Asw-H e	H-Rebar end
SECT	L	Bc Hc	Height	fyw	B	Rat-N	Rat-M			B	V _{Ed} mid	Rat-V mid	Asw-H m	H-Rebar mid
2		40x30	0.02500	0.45000	1	106.654	67501.8	1582.0	14-4-P12	1	33.7427	0.451	1645.8	2-P10 @90
2		400.0 300.0	3000.0	0.45000	1	0.806	0.814			1	33.7427	0.446	1097.2	2-P10 @140
3		40x30	0.02500	0.45000	1	106.654	67501.8	1582.0	14-4-P12	1	33.7427	0.451	1645.8	2-P10 @90
3		400.0 300.0	3000.0	0.45000	1	0.806	0.814			1	33.7427	0.446	1097.2	2-P10 @140
5		40x30	0.02500	0.45000	1	106.654	67501.8	1582.0	14-4-P12	1	33.7427	0.451	1645.8	2-P10 @90
5		400.0 300.0	3000.0	0.45000	1	0.806	0.814			1	33.7427	0.446	1097.2	2-P10 @140
6		40x30	0.02500	0.45000	1	106.654	67501.8	1582.0	14-4-P12	1	33.7427	0.451	1645.8	2-P10 @90
6		400.0 300.0	3000.0	0.45000	1	0.806	0.814			1	33.7427	0.446	1097.2	2-P10 @140

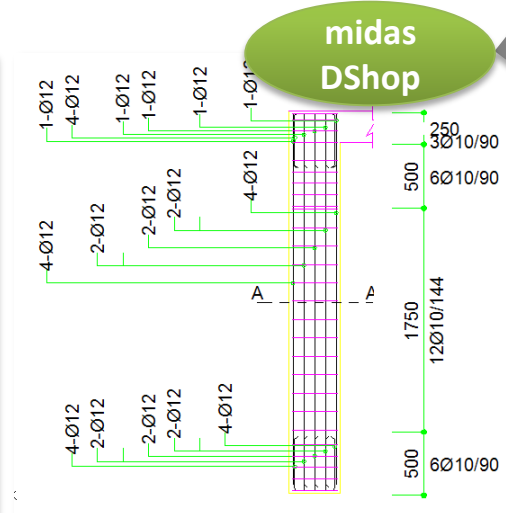
- ✓ Critical stirrup spacing between two ends
- ✓ Stirrup spacing at middle position
- ✓ Critical length

Modify Column Rebars

Member Group Mark M02

Section Location	Joint	End-J	Middle	End-I
Section				
BxD	400x300			
Main Bars	X 2 \varnothing 12	-	452.0	452.0
Y 3 \varnothing 12	-	678.0	678.0	-
Cor 4 \varnothing 12	-	452.0	452.0	-
Joint	X 3 \varnothing 10 90	-	-	2633.3
Y 3 \varnothing 10 90	-	-	-	2633.3
End-J	X 3 \varnothing 10 144	500	1645.8	2633.3
Y 3 \varnothing 10 144	-	-	1645.8	2633.3
Middle	X 3 \varnothing 10 90	-	-	1645.8
Y 3 \varnothing 10 90	-	-	-	1645.8
End-I	X 3 \varnothing 10 90	500	1645.8	2633.3
Y 3 \varnothing 10 90	-	-	1645.8	2633.3

☒ Show Sect. ☐ Secondary Seismic Element
 Apply to Member Apply to Group Close



2. Cold-formed Steel Code Checking as per EN1993-1-3:2006

- Cold-formed lipped channel and upright section can be verified as per EN1993-1-3:2006. Iteration option to refine reduction factor for buckling of lipped channel is provided as per the clause 5.5.3.2(3).
- For cold-formed section, metallic coating thickness and type of forming can be specified by the user in Section Option dialog box.
- For lipped channel, effective section properties can be automatically calculated. Calculated values can be checked in Effective Section Properties table. For user type upright section for which the section dimension is specified by the user, effective section property need to be entered by the user directly.

■ Design > Cold formed Steel Design

1. Design Information

Design Code : Eurocode3-1-3:2006

Unit System : N, mm

Member No : 661

Material : S275 (No.1)
($F_y = 275000$, $E_s = 210000000$)

Section Name : LC-250x75x25x4.5 (No.7)
(Rolled : LC-250x75x25x4.5)

Member Length : 3.00000

2. Member Forces

Axial Force	$F_{xx} = -5.5235$ (LCB: 1, POS:J)	Depth	0.25000	Thickness	0.00450
Bending Moments	$M_y = 0.10527$, $M_z = -0.0124$	Width	0.07500	Rounding	0.00900
End Moments	$M_{yi} = -0.5013$, $M_{yj} = 0.47494$ (for Lb)	Lip Depth	0.02500		
	$M_{yi} = -0.5013$, $M_{yj} = 0.47494$ (for Ly)	Area	0.00189	A_{zz}	0.00100
	$M_{zi} = 0.05794$, $M_{zj} = -0.0562$ (for Lz)	I_{yy}	0.01211	I_{zz}	0.00084
Shear Forces	$F_{yy} = 0.03906$ (LCB: 1, POS:I)	I_{yy}	0.00002	I_{zz}	0.00000
	$F_{zz} = -0.3254$ (LCB: 1, POS:I)	I_{yy}	0.00042	I_{zz}	0.12500
		I_{yy}	0.00014	I_{zz}	0.00002
		I_{yy}	0.09440	I_{zz}	0.02620

3. Design Parameters

Unbraced Lengths : $L_y = 3.00000$, $L_z = 3.00000$, $L_b = 3.00000$

Effective Length Factors : $K_y = 1.00$, $K_z = 1.00$

Moment Factor / Bending Coefficient : $C_{my} = 0.22$, $C_{mz} = 0.21$, $C_b = 2.30$

4. Checking Results

Slenderness Ratio : $\lambda_{L/r} = 116.6 < 120.0$ (LCB: 1) 0.K

Axial Strength : $P_u/P_a = 5.523/147.545 = 0.037 < 1.000$ 0.K

Bending Strength : $M_{uy}/M_{ay} = 0.1053/19.2144 = 0.005 < 1.000$ 0.K

$M_{uz}/M_{az} = 0.01237/3.69707 = 0.003 < 1.000$ 0.K

Combined Strength (Compression+Bending)

Tendon Effective Force Graph

• Design Scope of Lipped Channel

✓ Effective section properties

✓ Resistance of Cross Section

- Axial resistance
- Shear resistance
- Combined shear, axial and bending moment

✓ Buckling Resistance

- Flexure buckling
- Lateral torsional buckling

✓ Serviceability Limit State

- Deflection

- Bending moment resistance
- Combined axial and bending

- Torsional buckling
- Compression and bending buckling

• Design Scope of Upright Section

✓ Resistance of Cross Section

- Axial resistance
- Combined axial and bending

✓ Buckling Resistance

- Flexure buckling
- Lateral torsional buckling

- Bending moment resistance

- Torsional buckling
- Compression and bending buckling

3. RC beam Torsion Design/Checking as per ACI318-11/08

- In RC Code Design and Code Checking, torsion design has been newly added as per ACI318-11/08. The user can select the option if torsion verification is included or not in Concrete Design Code dialog box.

Design > RC Design > Design Code > ACI318-11/08

Concrete Design Code

Design Code : **ACI318-11**

☐ Apply Special Provisions for Seismic Design

☒ Torsion Design

Torsion Reduction Factor for Beam : **1**

Moment Redistribution Factor for Beam : **1**

OK **Close**

ACI318-08 RC-Beam Design Result Dialog

Code : ACI318-08 Unit : kN , m Primary Sorting Option

Sorted by ☒ Member ☐ Property

☐ SECT ☒ MEMB

MEMB	SECT	Span	Section	fc	fy	PO	N(-)	LC	AsTop	Rebar	P(+)	LC	AsBot	Rebar	Vu	Tu	LC	AsVT	Stirrup	Tu	LC	AsL
			Bc bf	Hc hf	fys																	
1		Beam	27579.0	I	219.588	11	0.0011	3-#7	83.2476	7	0.0006	3-#7	102.539	0.36054	11	0.0004	2-#3 @254	0.87075	14	0.0000		
3		Beam	0.508	0.609	413686	M	52.0820	31	0.0003	3-#7	84.7632	2	0.0006	3-#7	78.5357	0.51744	7	0.0000	2-#3 @254	0.87075	14	0.0000
7.9248		Beam	0.000	0.000	413686	J	225.682	7	0.0012	3-#7	66.8997	11	0.0004	3-#7	106.314	0.51744	7	0.0004	2-#3 @254	0.87075	14	0.0000
2		Beam	27579.0	I	219.894	11	0.0011	3-#7	64.0636	7	0.0004	3-#7	102.435	0.40139	11	0.0004	2-#3 @254	0.67393	9	0.0000		
3		Beam	0.508	0.609	413686	M	46.9473	31	0.0003	3-#7	78.3261	2	0.0005	3-#7	74.6563	0.40139	11	0.0000	2-#3 @254	0.67393	9	0.0000
7.9248		Beam	0.000	0.000	413686	J	216.779	7	0.0011	3-#7	66.1782	11	0.0004	3-#7	101.589	0.49157	7	0.0004	2-#3 @254	0.67393	9	0.0000
3		Beam	27579.0	I	218.133	11	0.0011	3-#7	65.8461	7	0.0004	3-#7	102.040	0.00882	11	0.0004	2-#3 @254	0.20533	14	0.0000		
3		Beam	0.508	0.609	413686	M	47.0384	27	0.0003	3-#7	78.6164	2	0.0005	3-#7	74.4740	0.12156	7	0.0000	2-#3 @254	0.20533	14	0.0000
7.9248		Beam	0.000	0.000	413686	J	218.942	7	0.0011	3-#7	65.3912	11	0.0004	3-#7	102.253	0.12156	7	0.0004	2-#3 @254	0.20533	14	0.0000
4		Beam	27579.0	I	218.345	11	0.0011	3-#7	65.7079	7	0.0004	3-#7	102.079	0.02249	11	0.0004	2-#3 @254	0.18831	14	0.0000		
3		Beam	0.508	0.609	413686	M	47.0648	27	0.0003	3-#7	78.5252	2	0.0005	3-#7	74.4518	0.09534	7	0.0000	2-#3 @254	0.18831	14	0.0000
7.9248		Beam	0.000	0.000	413686	J	218.949	7	0.0011	3-#7	65.4090	11	0.0004	3-#7	102.230	0.09534	7	0.0004	2-#3 @254	0.18831	14	0.0000
5		Beam	27579.0	I	218.083	11	0.0011	3-#7	65.8145	7	0.0004	3-#7	102.053	0.04346	11	0.0004	2-#3 @254	0.17156	34	0.0000		
3		Beam	0.508	0.609	413686	M	47.0149	27	0.0003	3-#7	78.6701	2	0.0005	3-#7	74.4542	0.06757	7	0.0000	2-#3 @254	0.17156	34	0.0000
7.9248		Beam	0.000	0.000	413686	J	218.857	7	0.0011	3-#7	65.5192	11	0.0004	3-#7	102.233	0.06757	7	0.0004	2-#3 @254	0.17156	34	0.0000

☐ Connect Model View

Option for Detail Print Position

☒ End I ☐ Mid ☐ End J

Result View Option

☒ All ☐ OK ☐ NG

Design Result Dialog Box

MIDAS/Text Editor - [App2.rcs]

File Edit View Window Help

```

00226 ( ). Check torsion to neglect torsion effects.
00227 - Tu = 1.9305 kN-m.
00228 - phi = 0.75
00229 - Acp = 0.0750 m^2.
00230 - pcpc = 1.1000 m.
00231 - Tu_lim = phi*(SQRT(fc)*(Acp^2/pcpc)) = 1.6724 kN-m.
00232 - Tu > Tu_lim ----> Consider torsion effects.
00233
00234 ( ). Compute required shear reinforcement.
00235 - Applied spacing s = MIN[ d/2, 24 in ] = 0.118 m.
00236
00237 ( ). Check cross section limit.
00238 - phi = 0.7190 m.
00239 - Aoh = 0.0317 m^2.
00240 - Aoh = 0.05*Aoh = 0.0269 m^2.
00241 - phi = 0.75
00242 - v1 = SQRT((Vu/(bw*d))^2 + (Tu*(phi/(1.7*Aoh^2)))^2) = 878.4735 KPa.
00243 - v2 = phi*(Vc/(bw*d) + 8.0*SQRT(fc)) = 3270.4716 KPa.
00244 - v1 < v2 ----> Section is good.
00245
00246 ( ). Compute required torsional transverse reinforcement. (Avt = 7.0968e-005 m^2.)
00247 - Tu = 1.9305 kN-m. (LCB = 1)
00248 - theta = 45.0000
00249 - Atreq = Tu/(2*(phi*(Aoh*(fyt/fy)+(cot(theta)))^2) = 0.0001 m^2/m.
00250 - Avreq = (Vu*(phi*(Vc)/(phi*(fyt/fy) + cot(theta))) / (phi*(fyt/fy) + cot(theta)) = 0.0000 m^2/m.
00251 - Avt = Av + 2At
00252 - Avtmin = MAX[ 0.75*SQRT(fc)*bw/fys, 50*bw/fys ] = 0.0002 m^2/m.
00253 - Avtreq = MAX[ Avtmin, Avreq+2*Atreq ] = 0.0002 m^2/m.
00254 - Maximum spacing smax = MIN[ phi/8, 12in ] = 0.0899 m.
00255 - Calculate spacing s1 = 2*Avt/Avtreq = 0.6143 m.
00256 - Applied spacing s = MIN[ smax, s1, smaxV ] = 0.0899 m.
00257
00258
00259
00260 -----
00261 midas Gen - RC-Beam Design [ ACI318-08 ] Gen 2016
00262 -----
00263 ( ). Compute required torsional longitudinal reinforcement.
00264 - Tu = 1.9305 kN-m.
00265 - theta = 45.0000
00266 - Alreq = (At/s)*phi*(fyt/fy)+(fyt/fy)*(cot(theta))^2 = 8.3057e-005 m^2.
00267 - Almin = 5.0*SQRT(fc)*Acp/fy - (At/s)*phi*(fyt/fy) = 0.0003 m^2.
00268 - At/s = 25.0*bw/fyt = 0.0001 m^2/m.
00269 - Calculate Al = MAX[Alreq, Almin] = 0.0003 m^2.
00270 - Maximum spacing slmax = 0.3048 m.
00271 - Calculate spacing s1 = 0.0577 m.
00272 - Applied spacing s1 = MIN[slmax, s1] = 0.0577 m.
00273
00274

```

Ready Ln 266 / 273, Col 125 NUM

Detail Report

4. Limiting Minimum Section Size for ACI318-11/08

- Using Limiting Minimum Section Size function, the user can choose whether to apply the minimum section size requirements provided in the design codes or not. All boxes are checked as the default setting.
- NSCP2010 states in section 421.6.1.1 that, "The shortest cross sectional dimension, measured on a straight line passing through the geometric centroid, shall not be less than 300mm except for buildings or structures regulated by NSCP Volume III (Housing Code) and BP 220." This allows the engineers following this design standard to use smaller section dimensions for projects like, housing projects, etc.
- In previous versions, in order to design the sections having section size less than the prescribed minimum section size limits the users had to transfer the design forces to midas Design+ or use excel sheets. In the new version, user can uncheck the box for minimum section size limits so that the program will not apply these limits for RC structural design as per ACI 318-08 and ACI 318-11.

■ Design > Concrete Design Parameter > Limiting Minimum Section Size

*.midas Gen - RC-COLUMN Analysis/Design Program.

*.PROJECT :
 *.DESIGN CODE : ACI318-08, *.UNIT SYSTEM : kN, mm
 (Note. Nonhomogenous equation in the code are written in U.S. Customary units in the report)
 *.MEMBER : Member Type = COLUMN, MEMB = 82, LCB = 2, POS = J

*.DESCRIPTION OF COLUMN DATA (iSEC = 1) : Edge Column
 Section Type : Rectangular with Ties (RT)
 Section Height (HTc) = 4876.800 mm.
 Section Depth (Hc) = 250.000 mm.
 Section Width (Bc) = 250.000 mm.
 Concrete Cover to C.O.R. (do) = 63.500 mm.
 Concrete Strength (fc) = 0.028 kN/mm².
 Modulus of Elasticity (Ec) = 24.856 kN/mm².
 Main Rebar Strength (fy) = 0.414 kN/mm².
 Ties/Spirals Strength (fys) = 0.276 kN/mm².
 Modulus of Elasticity (Es) = 199.948 kN/mm².

*.DESCRIPTION OF APPLIED FACTORS FOR DESIGN/CHECKING.
 Live Load Reduction Factor = 0.880 (Axial)

Special Provisions For Seismic Design : Special Moment Frames.

- Seismic Scale Up Factor for Shear (a1) = 1.000
- Seismic Scale Up Factor for Shear (a2) = 1.000
- Applied Scale Up Factor for Shear = MAX[Shear by a1, Shear by a2]

*.REBAR PATTERN = RT - 4 - 2 - P20 Unit : mm.

i	dyl	dzi	Rebar	Asi
1	-61.500	-61.500	1-P20	314.16000
2	-61.500	61.500	1-P20	314.16000
3	61.500	61.500	1-P20	314.16000
4	61.500	-61.500	1-P20	314.16000

Member Types Supporting Limiting Minimum Section Size Limits

Limiting Minimum Section Size

Design Code : ACI318-08

Consider Minimum Section Size Limits

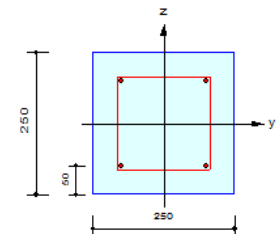
☒ Beam ☒ Column ☒ Brace

☒ Wall

OK Close

Design Condition

Design Code : ACI318-08 UNIT SYSTEM : kN, mm
 Member Number : 74 (PM), 59 (Shear)
 Material Data : fc = 0.027579, fy = 0.413686, fys = 0.27579 kN/mm²
 Column Height : 4876.8 mm
 Section Property : Edge Column (No : 1)
 Rebar Pattern : 4 - 2 - P20 Ast = 1256.64 mm² (Rhost = 0.020)

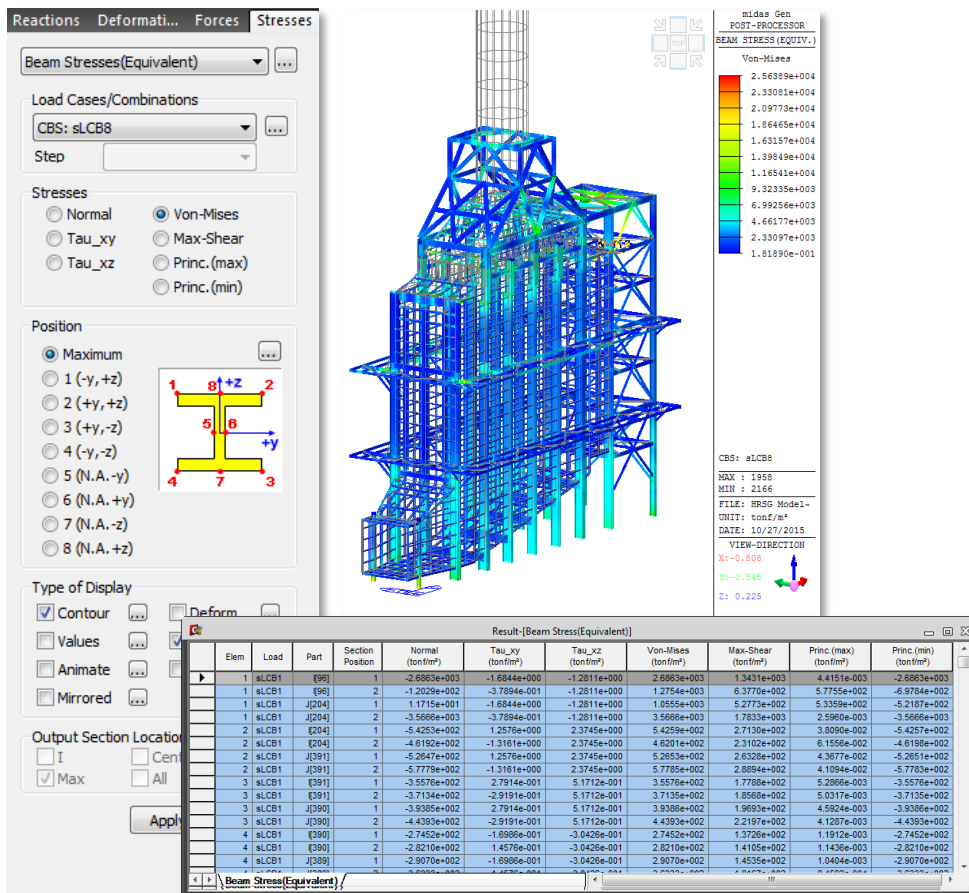


Design Results for smaller section size

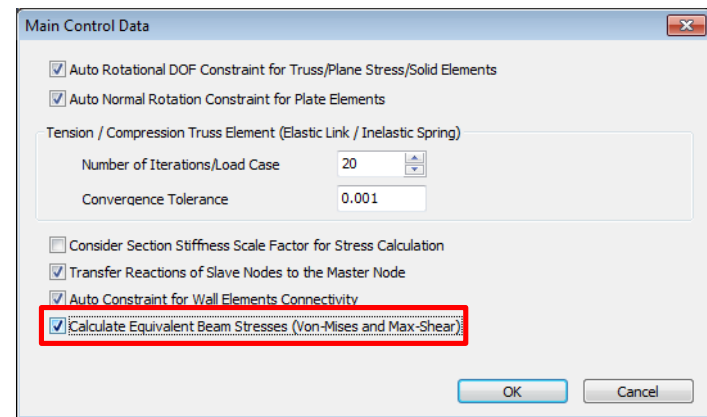
5. Displaying Von Mises & Maximum Shear Stress Contour in Model View

- Von-mises or Tresca stresses can now be verified for beam elements. In the previous version, beam stress contour was provided for normal and shear stress only. In order to check Von-mises or Tresca stress, Beam Detail Analysis function was used which allow the user to check equivalent stress for each element one by one. In the new version, entire equivalent stress distribution can be verified using stress contour. This feature is extremely useful to verify the stress of irregular shape steel structure.

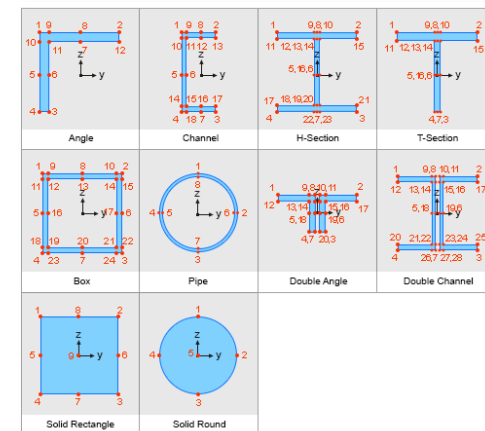
Result > Stresses > Beam Stresses (Equivalent)



Beam Stresses (Equivalent) Contour and Table



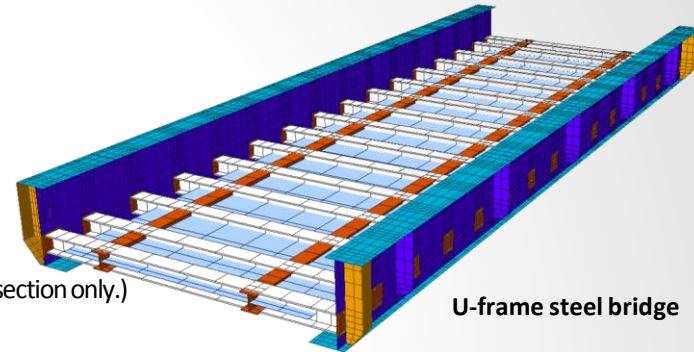
Main Control Data



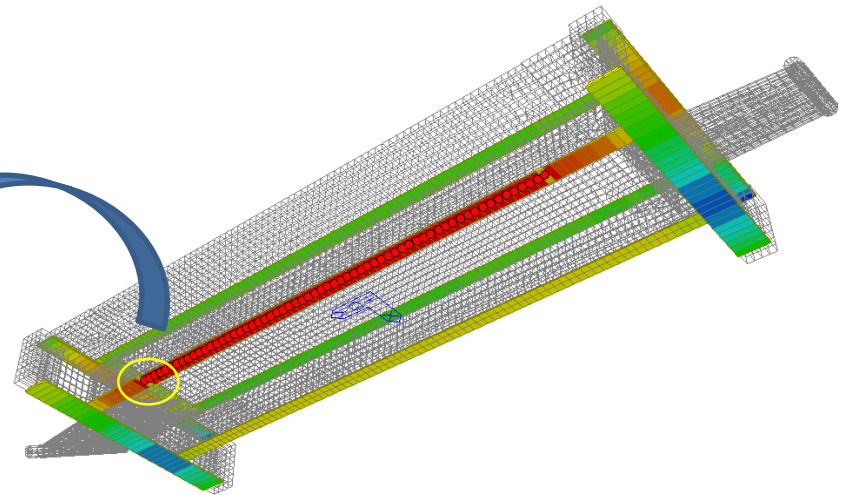
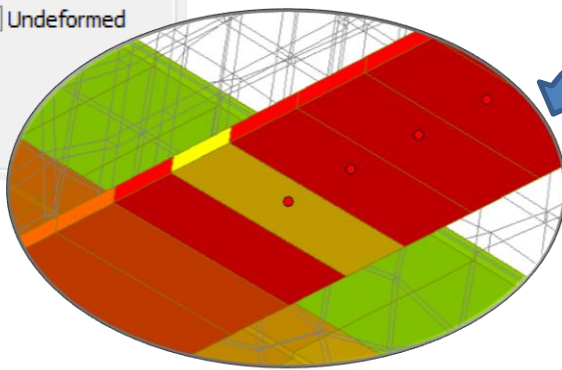
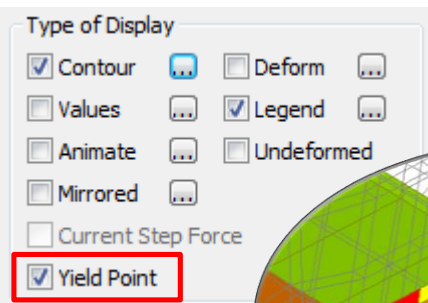
Applicable Section Shape and Stress Points

6. Material Nonlinear Analysis with Beam Elements

- Stress resultant beam model is introduced to apply beam elements in the material nonlinear analysis. Thus, not only plate elements but also beam elements can be used for the analysis in which both geometric nonlinear effect and material nonlinear effect need to be taken into account. This feature would be useful for the nonlinear stability analysis of U-frame steel bridges which are often simulated using both beam elements and plate elements to represent cross beams and main girders, respectively. The previous version could not solve this type of model.
- The von Mises yield criterion is used as the basis of the model.
- The stress-strain curve is linear elastic/perfectly plastic (i.e. zero hardening).
- Plastic axial force and plastic bending moment about major axis and minor axis are only calculated.
- The coupled effect between axial force and moment is not considered.
- Non-composite steel section is only supported. (Channel, I-Section, T-Section, Box, Pipe, Rectangle, Round section only.)



- Properties > Plastic Material > von-Mises**
- Results > Forces > Beam Forces/Moments**



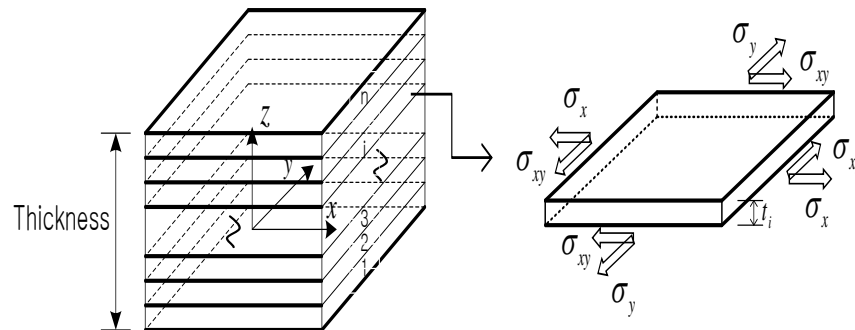
Plastic axial hinges in the beam elements

7. Material nonlinear analysis of a layer in plate elements

- Algorithm of material nonlinear analysis of a layer of plate element is updated from 3-dimensional condition base (five stress components and zero transverse normal stress and strain) to plane stress condition base (three in-plane stress and zero transverse normal stress and non-zero transverse normal strain).
Assumption of zero transverse normal strain of previous algorithm has some restrain on the in-plane deformation in a layer. Therefore, stiffness of a layer could be over estimated in the previous version.
- Due to this change, the results of material nonlinear analysis in this version may be a bit different from the previous versions depending on the model.

- **Properties > Plastic Material**
- **Analysis > Analysis Control > Nonlinear Analysis**

Layered model of a plate for material nonlinearity



Constitutive relation : stress resultant vs. strains

Membrane & Bending

$$\begin{Bmatrix} N_x \\ N_y \\ N_{xy} \\ M_x \\ M_y \\ M_{xy} \end{Bmatrix} = \begin{bmatrix} A_{11} & A_{12} & A_{16} & B_{11} & B_{12} & B_{16} \\ A_{12} & A_{22} & A_{26} & B_{12} & B_{22} & B_{26} \\ A_{16} & A_{26} & A_{66} & B_{16} & B_{26} & B_{66} \\ B_{11} & B_{12} & B_{16} & D_{11} & D_{12} & D_{16} \\ B_{12} & B_{22} & B_{26} & D_{12} & D_{22} & D_{26} \\ B_{16} & B_{26} & B_{66} & D_{16} & D_{26} & D_{66} \end{bmatrix} \begin{Bmatrix} \epsilon_x^0 \\ \epsilon_y^0 \\ \epsilon_{xy}^0 \\ \kappa_x \\ \kappa_y \\ \kappa_{xy} \end{Bmatrix}$$

Integration through thickness using simpson rule

$$(A_{ij}, B_{ij}, D_{ij}) = \int_{-h/2}^{h/2} Q_{ij}^{(k)} (1, z, z^2) dz$$

Shear

$$\begin{Bmatrix} V_{xz} \\ V_{yz} \end{Bmatrix} = \begin{bmatrix} 5/6 Gt & \\ & 5/6 Gt \end{bmatrix} \begin{Bmatrix} \gamma_{xz} \\ \gamma_{yz} \end{Bmatrix} \quad (G = \text{Shear modulus, } t = \text{thickness})$$

7. Material nonlinear analysis of a layer in plate elements (continued)

Update material elasto-plastic behavior in a layer

Previous version : 3-dimensional base

$$\{\sigma_{xx} \quad \sigma_{yy} \quad \sigma_{xy} \quad \sigma_{xz} \quad \sigma_{yz}, \sigma_{zz} = \varepsilon_{zz} = 0\}$$

Plate

$$\begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \sigma_{xy} \\ \sigma_{xz} \\ \sigma_{yz} \end{Bmatrix} = \frac{E}{(1-\nu^2)} \begin{bmatrix} 1 & \nu & & & \\ \nu & 1 & & & \\ & & \frac{(1-\nu)}{2} & & \\ & & & \frac{(1-\nu)}{2\kappa} & \\ & & & & \frac{(1-\nu)}{2\kappa} \end{bmatrix} \begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \\ \gamma_{xz} \\ \gamma_{yz} \end{Bmatrix} \quad \left(\kappa = \frac{6}{5}, \sigma_{zz} = 0, \varepsilon_{zz} = 0 \right)$$

Updated version : plane stress base

$$\{\sigma_{xx} \quad \sigma_{yy} \quad \sigma_{xy}, \sigma_{zz} = 0, \varepsilon_{zz} \neq 0\}$$

Plane Stress condition

$$\begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \sigma_{xy} \end{Bmatrix} = \frac{E}{(1-\nu^2)} \begin{bmatrix} 1 & \nu & \\ \nu & 1 & \\ & & \frac{1-\nu}{2} \end{bmatrix} \begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \end{Bmatrix}$$

Using integration algorithm for a Axisymmetric condition with added strain

Axisymmetric condition

$$\begin{Bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \sigma_{xy} \\ \sigma_{\theta\theta} \end{Bmatrix} = \frac{E}{(1+\nu)(1-2\nu)} \begin{bmatrix} 1-\nu & \nu & & \\ \nu & 1-\nu & & \\ & & \frac{1-2\nu}{2} & \\ & & & 1-\nu \end{bmatrix} \begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \\ \varepsilon_{\theta\theta} \end{Bmatrix}$$

$$\text{Added strain } \varepsilon_{\theta\theta}^{e\text{ }tr} = \varepsilon_{\theta\theta}^{e\text{ }tr} - \frac{\sigma_{\theta\theta}}{D_{44}} \quad \left(D_{44} = \frac{E(1-\nu)}{(1+\nu)(1-2\nu)} \right)$$

Iteration for required Condition $\sigma_{\theta\theta} = 0$

- Computational method for plasticity – theory and applications Ch. 9 (DRJ Owen 2008)
- Structural analysis of laminated anisotropic plates (James M. Whitney 1987)

8. Triple Friction Pendulum Isolator

- The Triple Friction Pendulum Isolator (TFPI) is now implemented. The TFPI exhibits multiple changes in stiffness and strength with increasing amplitude of displacement. It is known that the TFPI offers better seismic performance, lower bearing costs, and lower construction costs as compared to conventional seismic isolation technology. The properties of each of the bearing's three pendulums are chosen to become sequentially active at different earthquake strengths. As the ground motions become stronger, the bearing displacements increase. At greater displacements, the effective pendulum length and effective damping increase, resulting in lower seismic forces and bearing displacements.

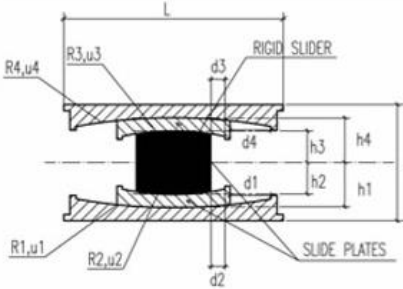
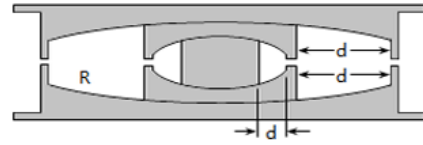
▪ **Boundary > Link > General Link > General Link Properties**

Shear Property of Triple Friction Pendulum Isolator System

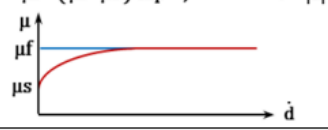
Nonlinear Properties

☒ Symmetric of Outer Surface

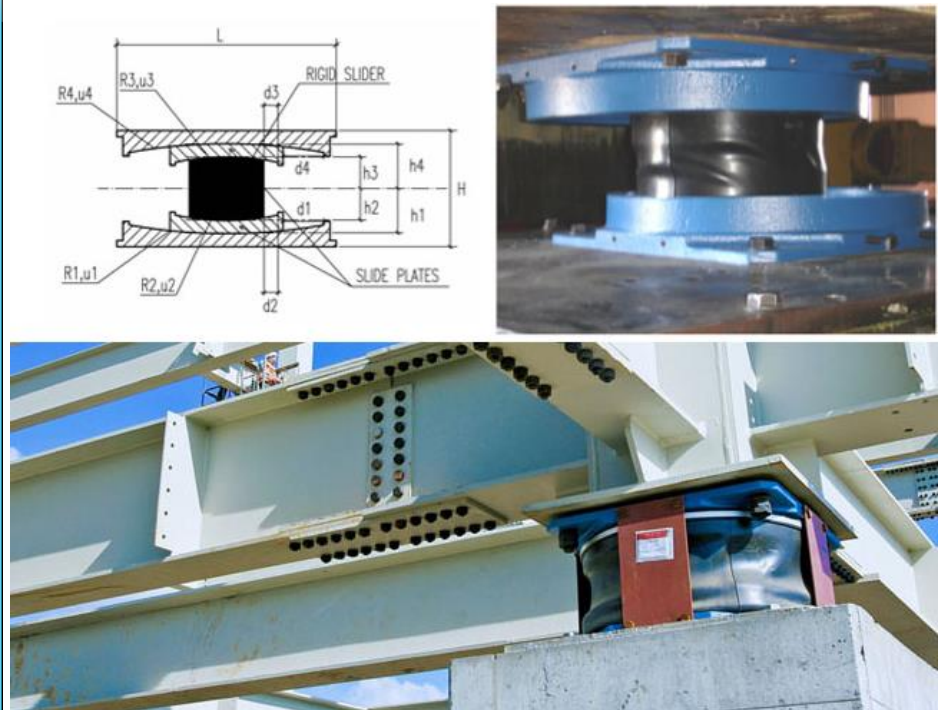
	Outer Top	Outer Bottom	Inner Top	Inner Bottom	
Stiffness (k)	4000	4000	4000	4000	kN/m
Frictional Coefficient, Slow (us)	0.06	0.04	0.02	0.02	
Frictional Coefficient, Fast (uf)	0.06	0.04	0.02	0.02	
Rate Parameter (r)	1	1	1	1	sec/m
Radius of Sliding Surface (R)	0.5	0.5	0.05	0.05	m
Stop Distance (d)	0.06	0.06	0.02	0.02	m

$\mu = \mu_f - (\mu_f - \mu_s) \exp(-rv); \quad v = |\dot{d}|$



OK Cancel

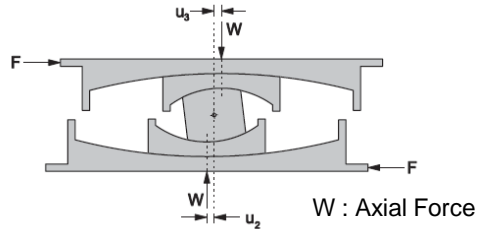


Triple Pendulum Bearing

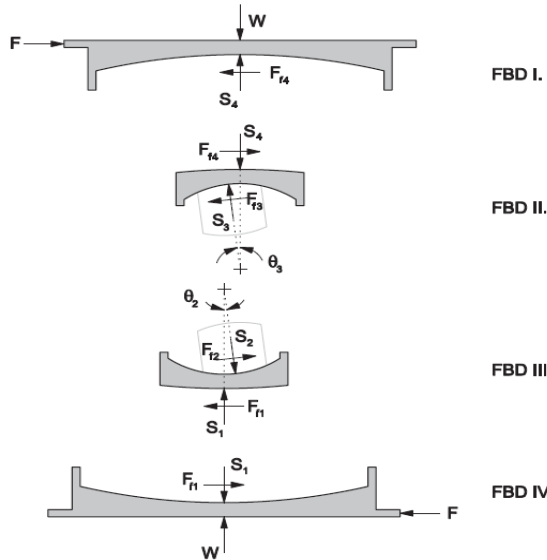
8. Triple Friction Pendulum Isolator (continued)

Behavior of Triple Friction Pendulum Isolator (Sliding Regime I)

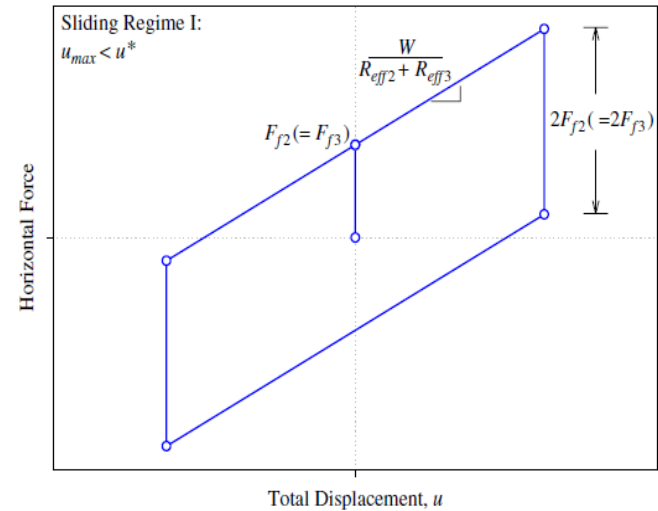
• Displaced shape



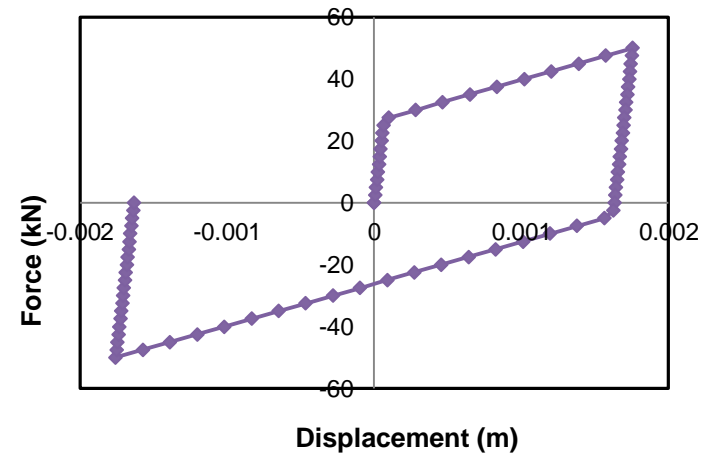
• Free body diagrams of the triple FP



Sliding occurs on surface 2 and 3 only.
Motion has not yet been initiated on surfaces 1 and 4.



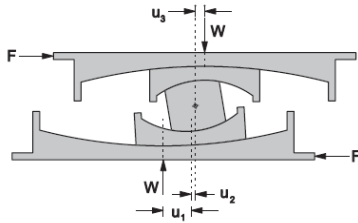
Force-Displacement



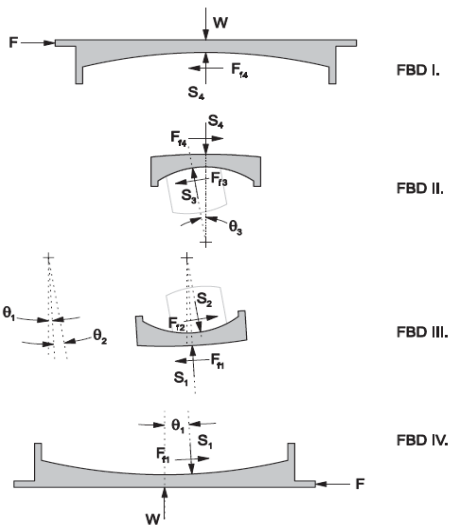
8. Triple Friction Pendulum Isolator (continued)

Behavior of Triple Friction Pendulum Isolator (Sliding Regime II)

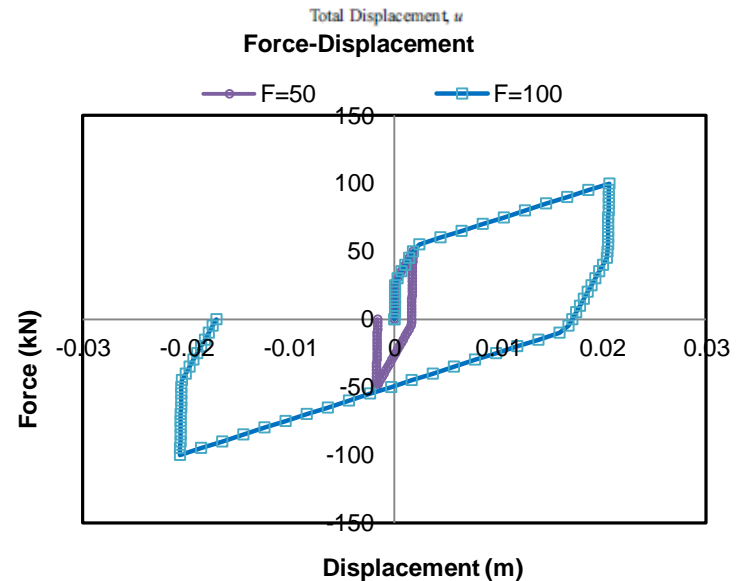
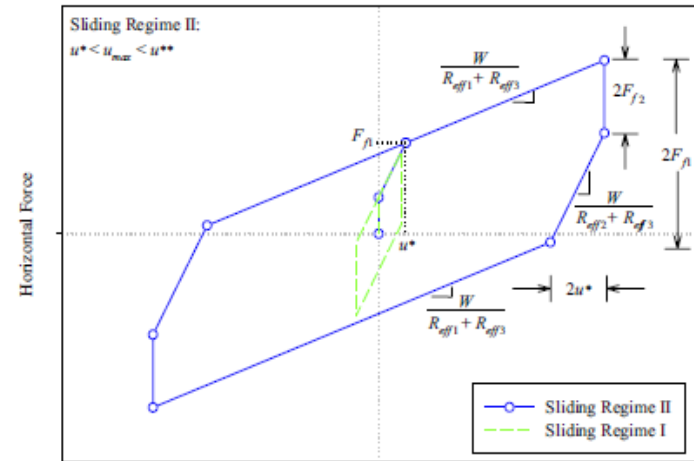
• Displaced shape



• Free body diagrams of the triple FP

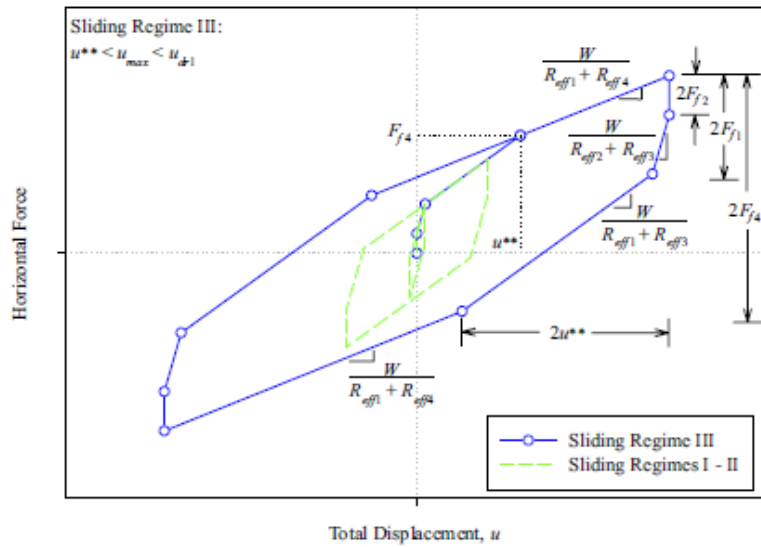


Sliding occurs on surface 1 and 3.
Motion has not yet been initiated on surface 4, and there is constant displacement on surface 2.



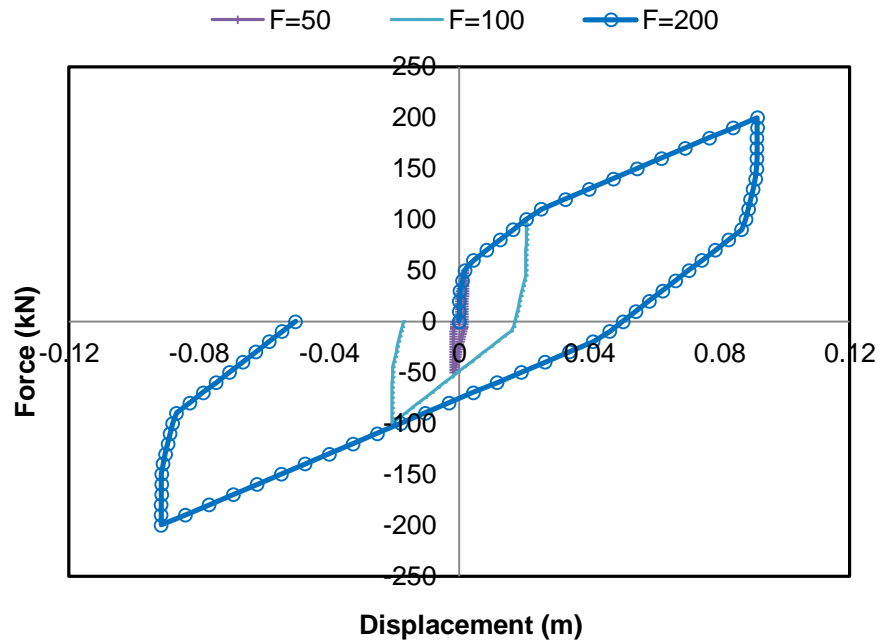
8. Triple Friction Pendulum Isolator (continued)

Behavior of Triple Friction Pendulum Isolator (Sliding Regime III)



Sliding stop on surface 3 and starts on surface 4.
 Sliding on surface 1 and 4.

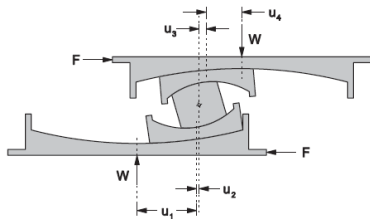
Force-Displacement



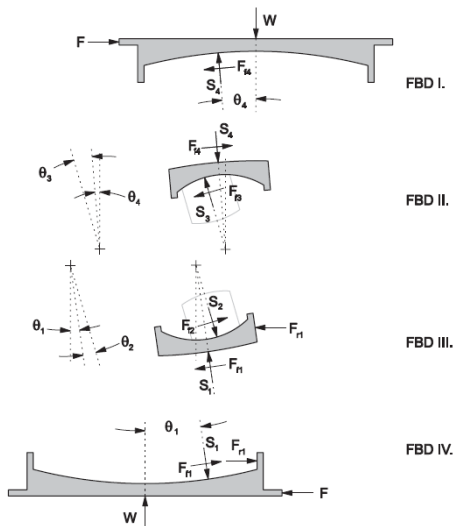
8. Triple Friction Pendulum Isolator (continued)

Behavior of Triple Friction Pendulum Isolator (Sliding Regime IV)

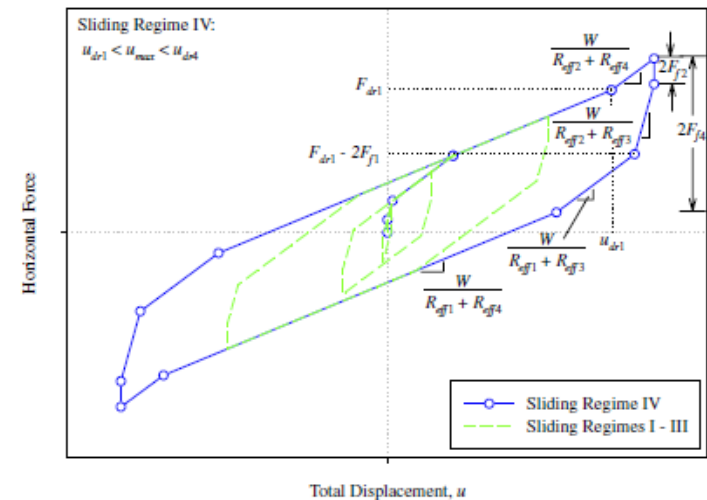
• Displaced shape



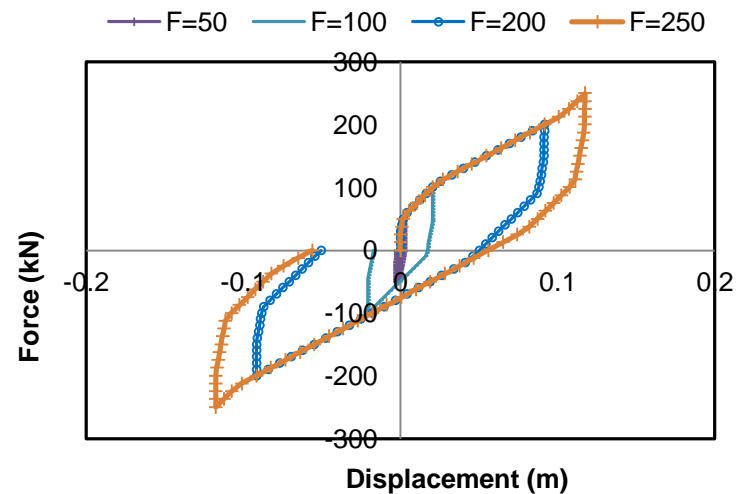
• Free body diagrams of the triple FP



The slider is on the displacement restrainer on surface 1.
Sliding occurs on surface 2 and 4, and the displacement on surface 3 remains constant.

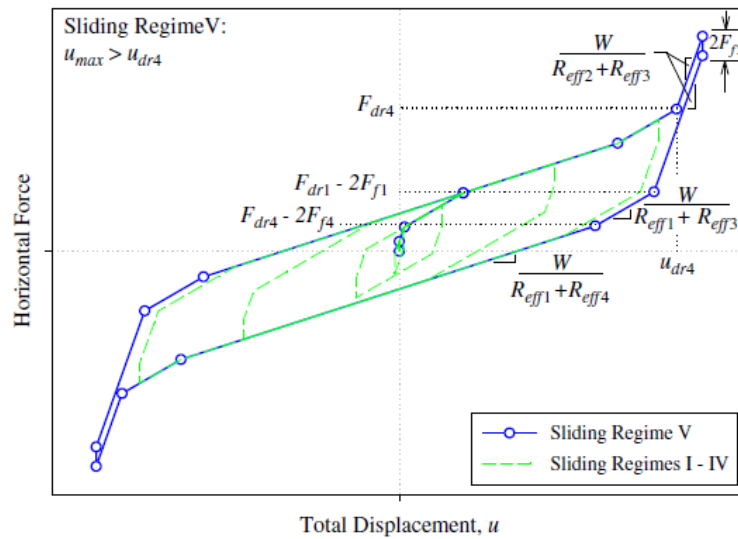


Force-Displacement

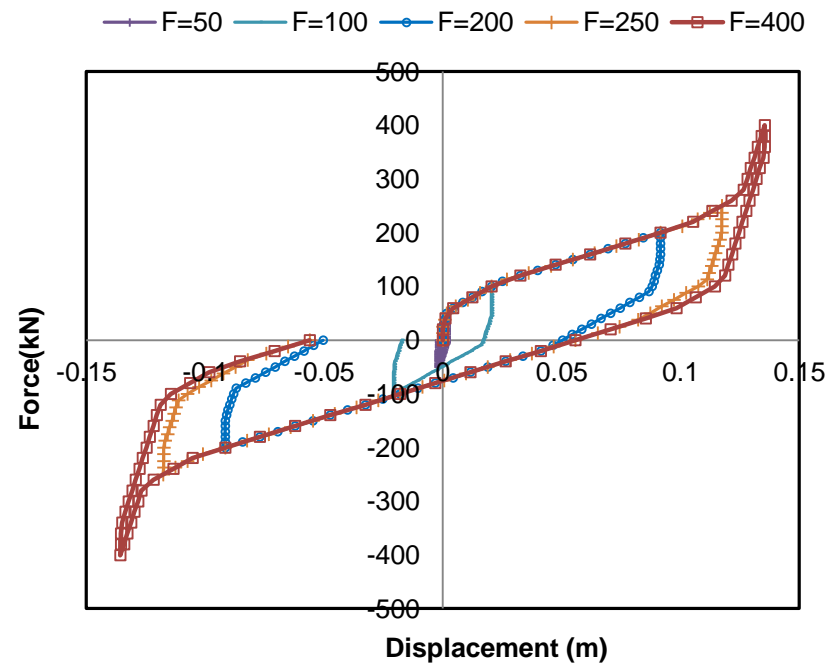


8. Triple Friction Pendulum Isolator (continued)

Behavior of Triple Friction Pendulum Isolator (Sliding Regime V)

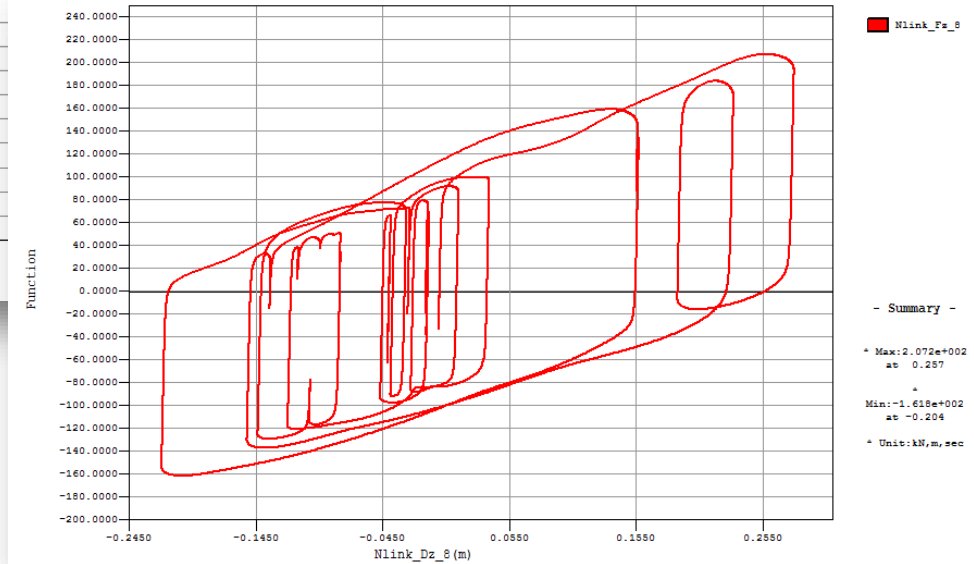
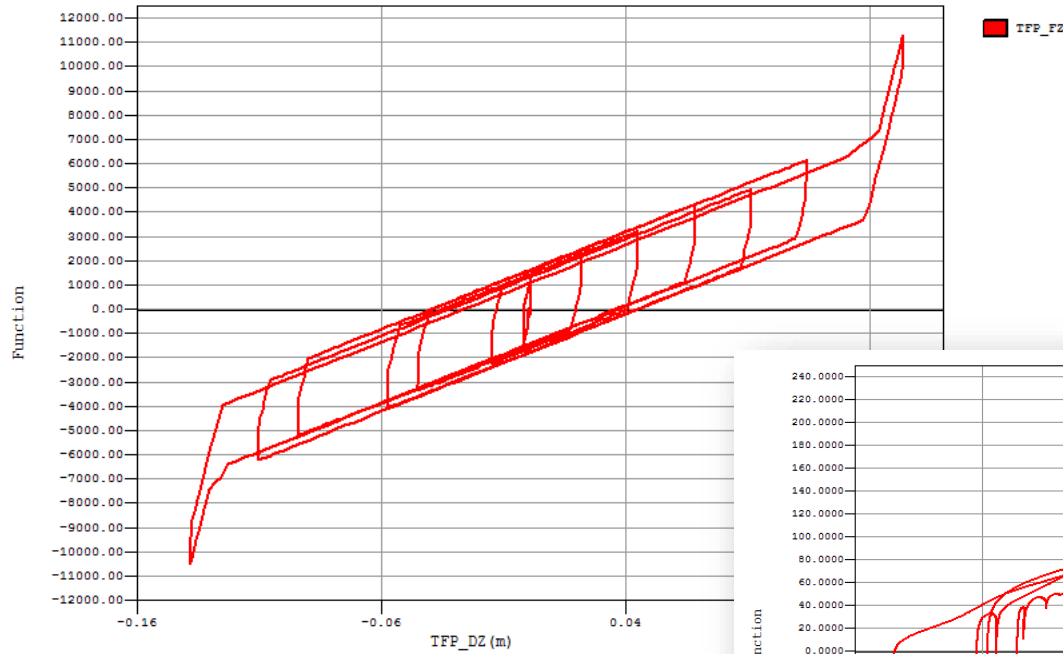


Force-Displacement



8. Triple Friction Pendulum Isolator (continued)

TFP Shear Force-Displacement history under ground acceleration

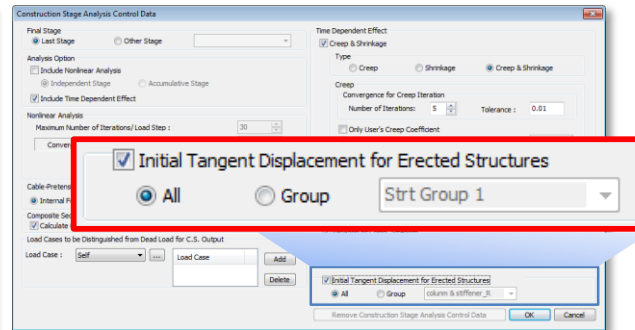
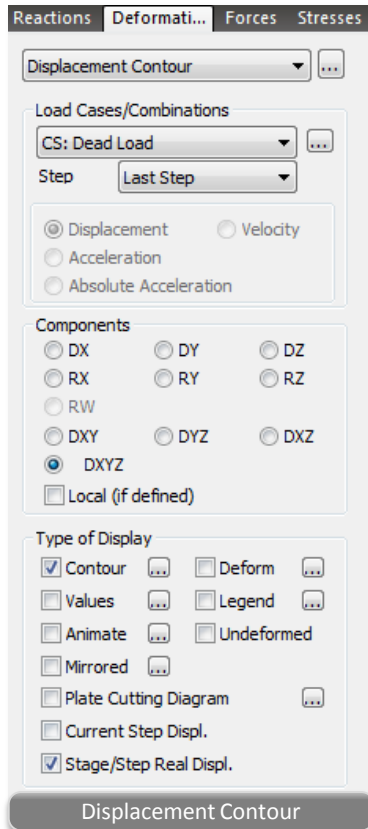


9. Plotting Tangential Displacements for Erected Structures (Stage/Step real displacement)

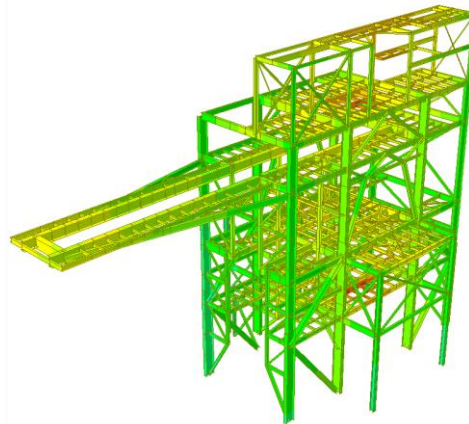
- Real displacements of the elements which will be created in the next stage considering the rotational angle of nodes resulting from each current stage can be calculated. This function can be used for fabrication campers for structural steel and precast concrete members.
- In order to calculate real displacements, "Initial Tangent Displacement for Erected Structures" option must be checked on in Construction Stage Analysis Control dialog box. This function cannot be used with Include Nonlinear Analysis option.

■ **Analysis > Construction Stage Analysis Control**

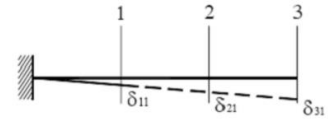
■ **Results > Deformations > Deformed Shape / Displacement Contour**



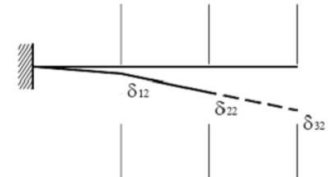
Construction Stage Analysis Control



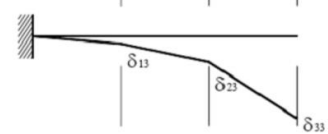
Current Step Displacement
at Stage 1



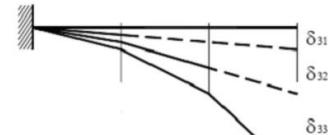
Current Step Displacement
at Stage 2



Current Step Displacement
at Stage 3



Accumulated Displacement



Legend: $\delta(a),(b)$: Displacement at the point (a), stage (b)

Real disp. at the point 1: $\delta_{11} + \delta_{12} + \delta_{13}$

Real disp. at the point 2: $\delta_{21} + \delta_{22} + \delta_{23}$

Real disp. at the point 3: $\delta_{31} + \delta_{32} + \delta_{33}$

Net disp. at the point 1: $\delta_{11} + \delta_{12} + \delta_{13}$

Net disp. at the point 2: $\delta_{22} + \delta_{23}$

Net disp. at the point 3: δ_{33}

10. New Section and Material Database

- Cold-formed Channel, Pipe, Box and Upright section DB as per UNI (Italian standard) and SS (Singaporean Standard) has been newly implemented.
- Steel section DB as per ICHA (Chilean standard) has been added for Angle, Double Angle, Star Battered Angle, I-shape, Channel, Double Channel and Lipped channel.
- Cold-formed material DB as per EN10326, EN 10149-2 and EN 10149-3 has been newly implemented.

▪ **Properties > Section Properties**

▪ **Properties > Material Properties**

Section Data

DB/User | Value | SRC | Combined | Tapered | Composite

Section ID: 1

Name: LC-20X15X1.2

DB: UNI

Sect. Name: S80M

Get Data from Single Angle

DB Name: AISC10(US)

Sect. Name:

H	0.0845	m
B	0.08	m
tw	0.002	m
Hw1	0.055	m
Hw2	0.02	m
B1	0.0353	m
B2	0.0094	m
B3	0.031	m
Bf3	0.01	m
d	0.01	m

UNI Upright Section

Section Data

DB/User | Value | SRC | Combined | Tapered | Composite

Section ID: 1

Name: LC 150x65x20x2.3

DB: SS

Sect. Name: LC 150x65x20x2.3

Get Data from Single Angle

DB Name: AISC10(US)

Sect. Name:

Cold Formed Section Option

Number of Section:

Combine Type:

H	0.15	m
B	0.065	m
tw	0.0023	m
r	0.0035	m
d	0.02	m

SS Cold Formed Channel

Section Data

DB/User | Value | SRC | Combined | Tapered | Composite

Section ID: 60

Name: TL 20X82.9X8

DB: ICHA

Sect. Name: TL 20X82.9X8

Get Data from Single Angle

DB Name: AISC10(US)

Sect. Name:

Built-Up Section

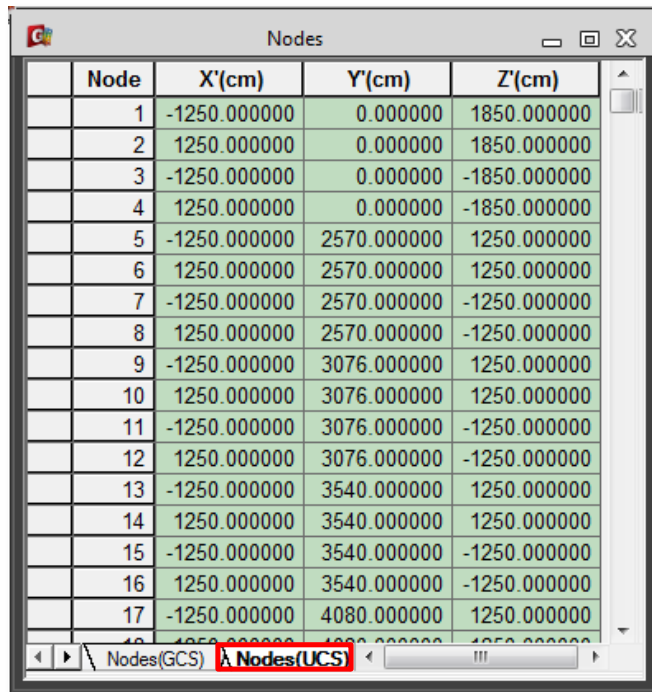
H	0.2	m
B	0.3	m
tw	0.014	m
tf	0.014	m
C	0.08	m

ICHA Double Angle

11. Nodal Coordinate Table in UCS

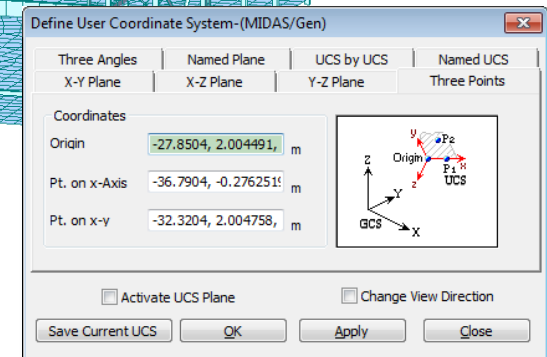
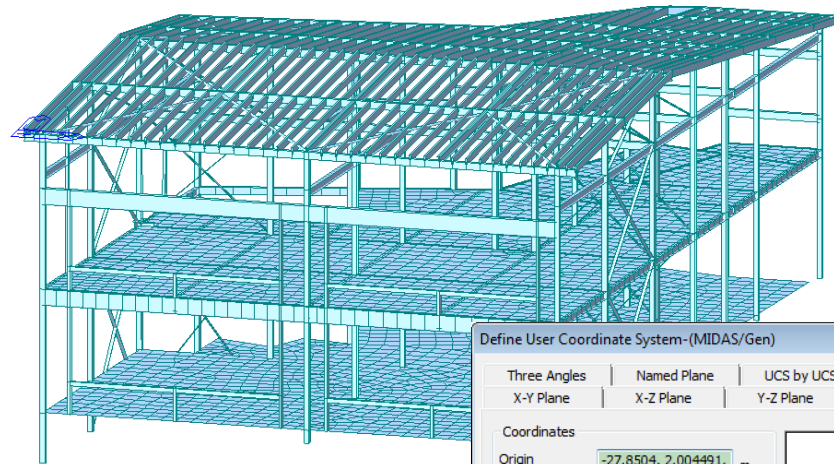
- Nodal coordinates can now be checked and modified in the User Coordinate System. This feature is useful to check or modify nodal coordinates in inclined slab or rotated plan in Global XY plane.
- Spreadsheet format node table is compatible with MS Excel to copy, paste and modify the data. The table can be inserted into Dynamic Report.

Node/Element > Nodes Table



Node	X'(cm)	Y'(cm)	Z'(cm)
1	-1250.000000	0.000000	1850.000000
2	1250.000000	0.000000	1850.000000
3	-1250.000000	0.000000	-1850.000000
4	1250.000000	0.000000	-1850.000000
5	-1250.000000	2570.000000	1250.000000
6	1250.000000	2570.000000	1250.000000
7	-1250.000000	2570.000000	-1250.000000
8	1250.000000	2570.000000	-1250.000000
9	-1250.000000	3076.000000	1250.000000
10	1250.000000	3076.000000	1250.000000
11	-1250.000000	3076.000000	-1250.000000
12	1250.000000	3076.000000	-1250.000000
13	-1250.000000	3540.000000	1250.000000
14	1250.000000	3540.000000	1250.000000
15	-1250.000000	3540.000000	-1250.000000
16	1250.000000	3540.000000	-1250.000000
17	-1250.000000	4080.000000	1250.000000

Node Table in User Coordinate System



Define User Coordinate System - (MIDAS/Gen)

Three Angles | Named Plane | **UCS by UCS** | Named UCS

X-Y Plane | X-Z Plane | Y-Z Plane | Three Points

Coordinates

Origin: -27.8504, 2.004491, m

Pt. on x-Axis: -36.7904, -0.276251, m

Pt. on x-y: -32.3204, 2.004758, m

☒ Activate UCS Plane ☐ Change View Direction

Save Current UCS OK Apply Close

User Coordinate System for Inclined Plane

12. Improvement on Plate Local Axis

- Using Plate Local Axis function, local axis of plate element can be aligned along with global axis or cylindrical axis ($\pm X$, $\pm Y$, $\pm Z$, $\pm R$, $\pm TH$) for checking results. This function is useful for unstructured meshes or cylindrical structure.
- In the previous version, there was no way to delete the defined local axis. In the new version, Add/Replace or Delete option can be used to re-define or delete the pre-defined plate local axis.

- **Design > Steel Code Checking**
- **Design > Steel Optimal Design**

Plate Local Axis

Plate Local Axis

Local Axis

☒ Add/Replace ☐ Delete

Element Type

Plate

Local Axis

☒ Local-x ☐ Local-y

Direction

☒ Coordinate Dir. : +Z

Origin Point

cm

☐ Ref. Vector

0, 0, 0 cm

Apply Close

Plate Local Axis

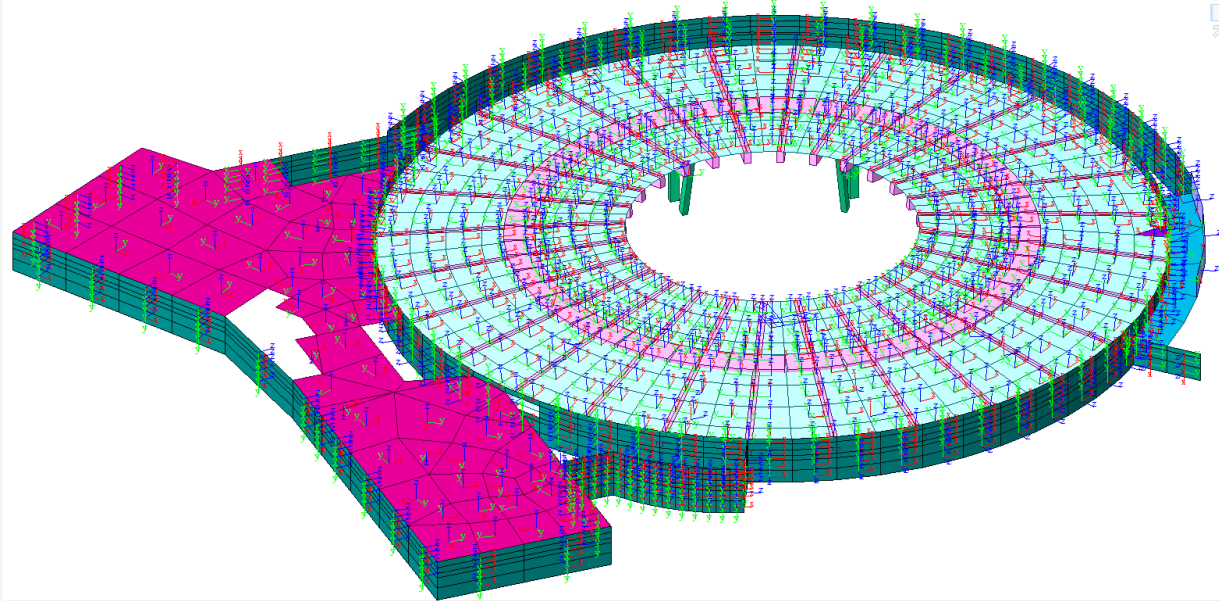


Plate Local Axis for Round Shape Slab

13. Improvement on Soil Pressure

- Soil pressure contours were provided on the beam, plate or solid elements representing subgrade beam, mat foundation or retaining wall. In the new version, following improvements have been made:
 - In case of inclined mat foundation, projection area can be considered. In the previous version, soil pressure was identically calculated for inclined foundation when the soil spring was assigned along with Global Coordinate System.
 - In the previous version, soil pressure was incorrectly calculated when surface spring supports were entered more than twice for vertical spring and horizontal spring separately. In the new version, soil pressure and effective area by directions (Kx, Ky, Kz) are now separately stored.
 - Effective area to calculate soil pressure was initialized as zero when soil stiffness is changed in Point Spring Support Table. It is now corrected calculated.
 - In the new version, Modulus of Subgrade values can be checked and modified in Surface Spring Support table for compression-only type springs.

Results > Reactions > Soil Pressure

Reactions Deformati... Forces Stresses

Soil Pressure

Load Cases/Combinations
CBmax: SLU-vx

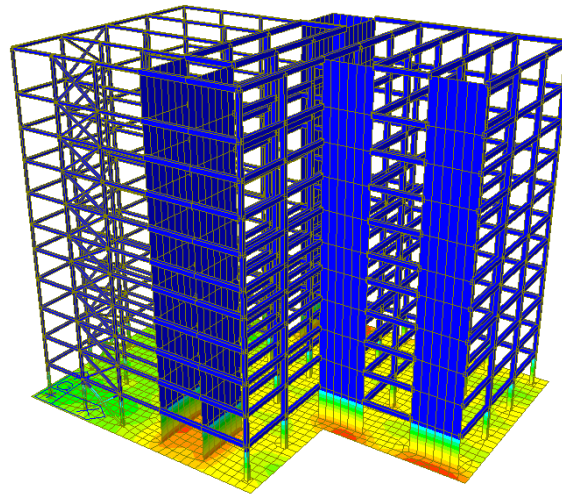
Step

Components
☐ PX ☐ PY ☒ PZ
☐ Local (if defined)

Type of Display
☒ Contour ☐ Deform
☐ Values ☒ Legend
☐ Animate ☐ Undeformed
☐ Mirrored

Apply Close

Soil Pressure



Soil Pressure Contour

Element	Type	Distributed Type	Local Axis	Face	Edge	Width (m)	Spring Type	Modulus of Subgrade	Group
1	PLATE	Planar(Face)		Face #			Comp-Only	1000.00	Default
2	PLATE	Planar(Face)		Face #			Comp-Only	1000.00	Default
3	PLATE	Planar(Face)		Face #			Linear	1000.00	Default
4	PLATE	Planar(Face)		Face #			Comp-Only	1000.00	Default
5	PLATE	Planar(Face)		Face #			Comp-Only	1000.00	Default
6	PLATE	Planar(Face)		Face #			Linear	1000.00	Default
7	PLATE	Planar(Face)		Face #			Comp-Only	1000.00	Default
8	PLATE	Planar(Face)		Face #			Comp-Only	1000.00	Default

Surface Spring Support Table

Node	Type	SDx (kN/m)	SDy (kN/m)	SDz (kN/m)	SRx (kN)	SRy (kN)	SRz (kN)	Damp	KX (kN/m²)	KY (kN/m²)	KZ (kN/m²)	Direction	Multi-Line
1426	Linear	85946.890	85946.890	17189.378	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1427	Linear	83459.726	83459.726	16691.945	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1428	Linear	83364.590	83364.590	16672.918	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1429	Linear	83306.076	83306.076	16661.215	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1430	Linear	83220.490	83220.490	16644.098	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1431	Linear	83287.994	83287.994	16657.598	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1432	Linear	92114.633	92114.633	18422.926	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1433	Linear	95801.480	95801.480	19160.296	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1434	Linear	95908.652	95908.652	19181.730	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1435	Linear	94793.280	94793.280	18958.656	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1436	Linear	89472.003	89472.003	17894.400	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1437	Linear	95021.533	95021.533	19004.306	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm
1438	Linear	95644.721	95644.721	19128.944	0.00	0.00	0.00		97910.67	97910.67	19582.13	Dx(+)	Unsymm

Point Spring Support Table

1. Bolt Connection Design/Checking as per EN1993-1-1:2005

- Following type of bolt connection can be verified as per EN1993-1-1:2005: Fin Plate (Beam and Beam connection), Fin Plate (Beam and Column connection, End Plate (Beam and Beam connection), End Plate (Beam and Column connection), Column Splice (Bearing connection).
- Once the design/checking is completed, midas Design+ provides member list, drawing and quantity table.

Tools > Design+ > Steel > Bolt Connection

General

Member Name: BC01

Apply this Member to: Dwg & Report

Connection Type: **Fin Plate - Beam to Beam**

Type: Fin Plate - Beam to Beam
Fin Plate - Beam to Column
End Plate - Beam to Beam
End Plate - Beam to Column
Column Splice - Bearing

Material: H Section
Shape: W36X170

Supporting Member: H Section
Position: Flange
Shape: W36X170

Level / Gap: 5.00 mm
Dif. of level: 15.00 mm

Force: 30.00 % Strength Design
No. of supported beam: 1

Axial: 3000.00 kN
Shear (v): 100.00 kN
Shear (y2): 100.00 kN
Depth (hp2): 3.00 mm

Welding: S355
Leq of Length: 6.00 mm

Bolt

Material: F10T
Name: M20
Type: Ordinary
Spacing: 60.00 mm
Extension: 40.00 mm
Gap: 10.00 mm

Web

No. per Side: 2
Thickness: 6 mm

Flange

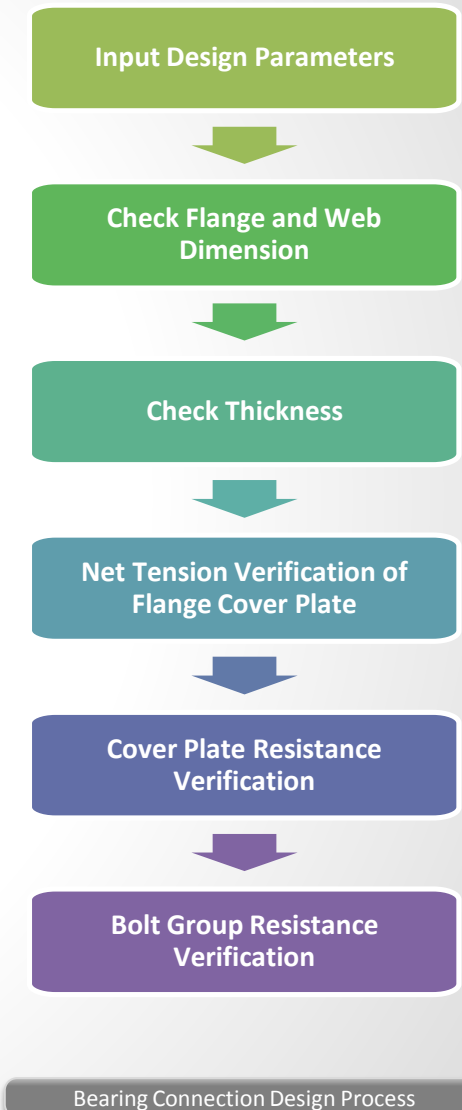
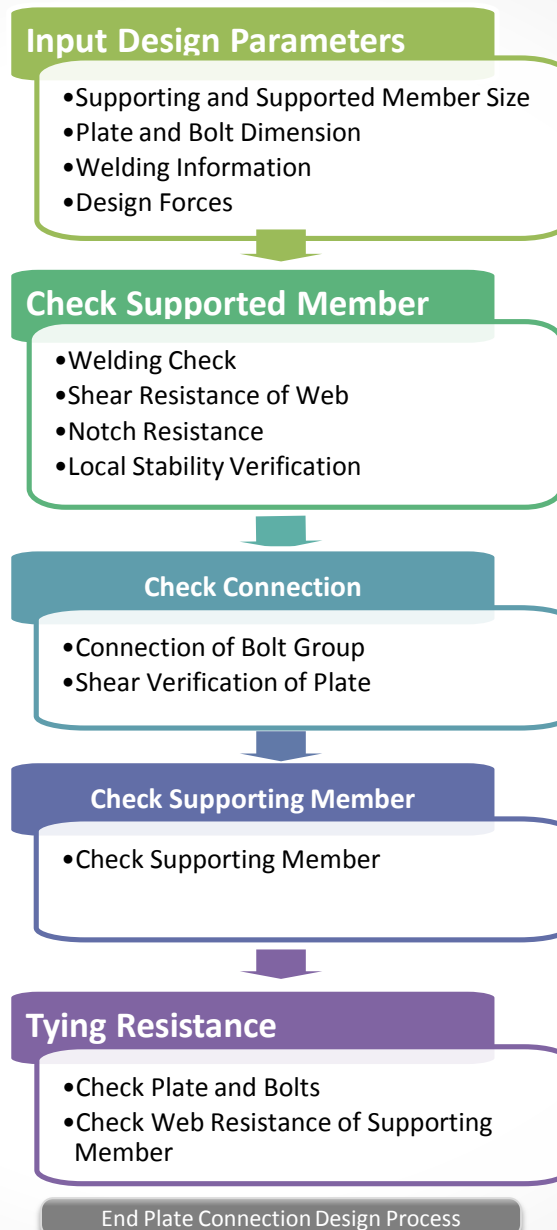
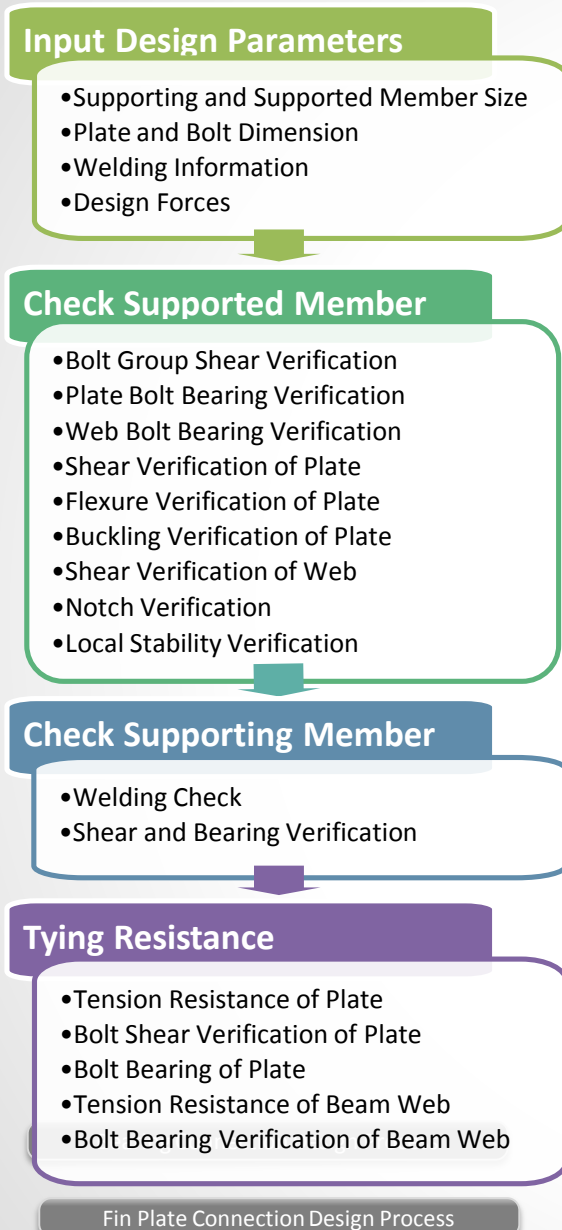
No. per Side: 2
Thickness: 6 mm

End / Fin Plate

No. per Side: 2
Thickness: 6 mm

Quantity

Name	Thick (mm)	Direction X		Concrete (m³)	Quantity per Unit Length			Total (kN)	
		Rebar 1 (mm)	Rebar 2 (mm)		Rebar 1 (kN)	Rebar 2 (kN)	Sum (kN)		
F01	700	#8@450	-	0.700	0.087	0.000	0.087	0.087	0.173
08H800x400x14	700	#8@450	-	0.700	0.087	0.000	0.087	0.087	0.173
0H300x300x10x	700	#8@450	-	0.700	0.087	0.000	0.087	0.087	0.173
08H800x600x14	700	#8@450	-	0.700	0.087	0.000	0.087	0.087	0.173
08H800x400x14	700	#8@450	-	0.700	0.087	0.000	0.087	0.087	0.173
0H300x300x10x	700	#8@450	-	0.700	0.087	0.000	0.087	0.087	0.173
08H800x600x14	700	#8@450	-	0.700	0.087	0.000	0.087	0.087	0.173
08H800x400x14	700	#8@450	-	0.700	0.087	0.000	0.087	0.087	0.173



2. Isolated Footing Design/Checking as per EN1992-1-1:2004

- Isolated mat and pile foundation can be verified as per EN1992-1-1:2004.
- Once the design/checking is completed, midas Design+ provides member list, drawing and quantity table.

Tools > Design+ > RC > Footing

General
Member Name: OBH800x400x14
Apply this Member to: Dwg & Report

Material
Concrete: 25 MPa
Main Bar: 400 MPa

Design Load
N.Ed: 0.00 kN
M.Edx: 0.00 kN.m
M.Edy: 0.00 kN.m
Load Combinations (6) ...

Surcharge Load
Surface Load: 0.00 kN/m²
Weight Density: 18.00 kN/m³
Height: 0.00 m

Footing
Type: Isolated (Pile)
Depth: Isolated (Mat)
Cover: Isolated (Pile)

Member List

CHK	Member Name	Fck (MPa)	Fy (MPa)	N.Ed,s (kN)	M.Edx,s (kN.m)	M.Edy,s (kN.m)	N.Ed (kN)	M.Edx (kN.m)	M.Edy (kN.m)	Fck (MPa)	Fy (MPa)
	F01	25.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	400.00
	OBH300x300x10	25.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	400.00
	OBH800x600x1	25.00	400.00	0.00	0.00	0.00	-351.26	0.00	0.00	25.00	400.00
	OBH800x400x1	25.00	400.00	0.00	0.00	0.00	-300.80	0.00	0.00	25.00	400.00
	OBH300x300x10	25.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	400.00
	OBH800x600x1	25.00	400.00	0.00	0.00	0.00	-358.57	0.00	0.00	25.00	400.00
	OBH800x400x1	25.00	400.00	0.00	0.00	0.00	-47.06	0.00	0.00	25.00	400.00

RC FOOTING LIST

NAME	TYP.	THK.	Lx	Ly	Cx	Cy	X1	Y1	X2	Y2	SOIL CAPA.	REMARK
F01	A	700	3000	3000	500	500	2450	2450	100.00	-		

