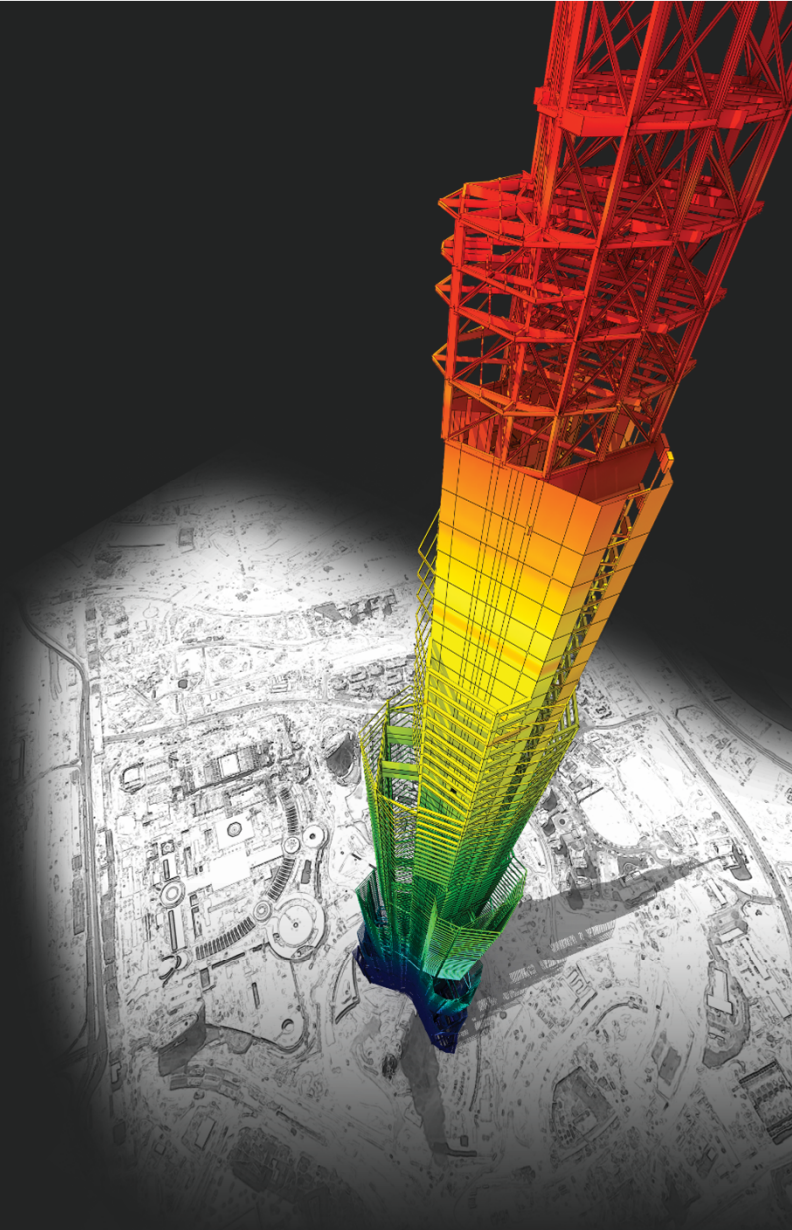


Release Note

Release Date : December. 2020

Product Ver. : midas Gen 2021 (v1.1) and Design+2021(v1.1)



DESIGN OF General Structures

Integrated Design System for Building and General Structures

midas **Gen**

Enhancements

- *midas Gen*

1) Improvement of Non-dissipative design speed	4
2) Improvement of Non-dissipative element as per NTC2018	5
3) NTC2018 limits the shear force for design	7
4) Concrete design result of elastic strength load combination	9
5) Add option of pushover Hinge Model as per EC 8 :2004	10
6) Add irregularity reduction factors in table as per NSR-10	11
7) Improvement of wind pressure function	12
8) Add rebar material code DB (U.S Imperial rebar)	13
9) Improvement of concrete shear strength in SMF	14
10) Add element type of Beam End Offsets function	15
11) Add Static earth pressure function	16
12) Elastic link graphic result in pushover analysis	17
13) Debonded Length of Pretensioned Beam	18
14) Revit 2021 interface	19

- *midas Design+*

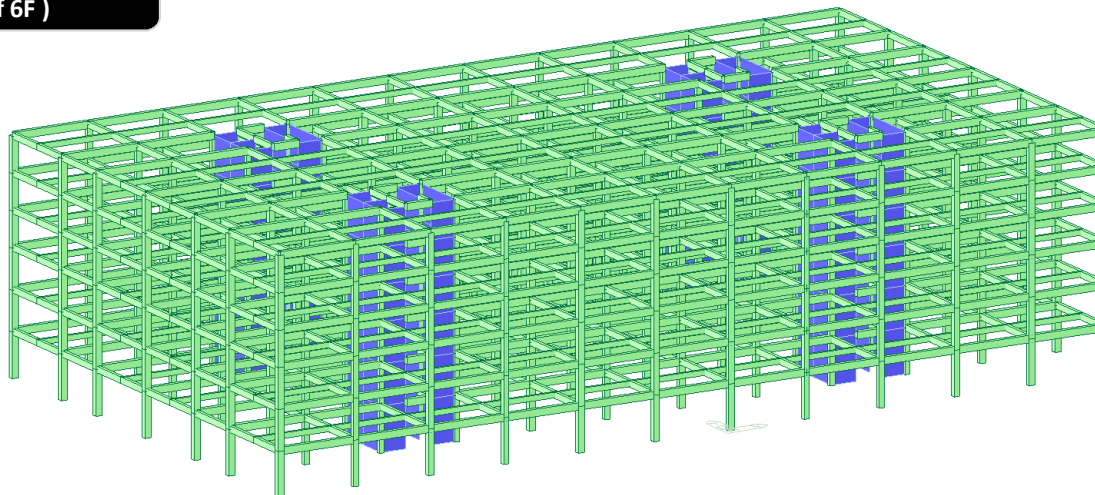
1) Support on excel report output	21
2) SRC column module adding steel shape(box/pipe)	23
3) Midas link option	25
4) Add Combined Footing Design as per Eurocode	28
5) Reporting speed for MS word format	31

1. Improvement of design speed for Non-dissipative elements

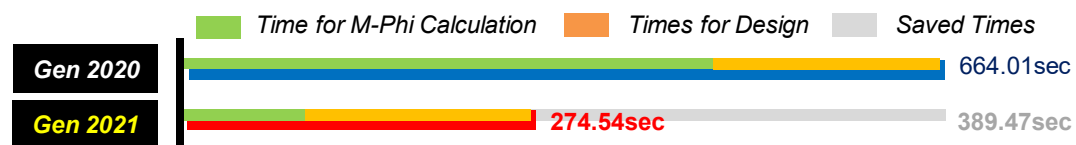
- Reduction of design time by optimizing m -phi calculation and improving the output algorithm

Example Model (RC structure of 6F)

- ✓ Beam/Column : 1,974 Elements
- ✓ Wall : 216 Elements
- ✓ Load Combination : 100



[Total ND Design Time : Gen 2020 vs Gen 2021(New Version)]



60% reduction in design time

2. Improvement of Non-dissipative Design as per NTC2018

Non-dissipative in flexural & Shear design – Design Table

- Output of separated results for ULS except seismic action) and ELS with seismic modified by q for non-dissipative elements

Ultimate Strength Check (LC_A) in graphic design

* LC_A : Load combination to check ULS(Ultimate Limit State) except seismic loads

Code : Eurocode2:04,NTC2018 Unit : kN , m Primary Sorting Option

Sorted by

☒ Member

☐ Property

Results

☒ Strength

☐ Serviceability

☐ Elastic

☐ SECT

☒ MEMB

MEMB	SE L	Section		fck	fyk	CHK	LC B	V-Rebar	N_Rdmax	Uc	N_Ed	M_Edy	M_Edz	V_Rdc.end	V_Rds.end	V_Rdc.mid	V_Rds.mid	LC B	V_Ed.end	Rat-V.end	Ash.req
SECT	Bc	Hc	Height	fyw	Rat-Uc					Rat-N	Rat-My	Rat-Mz	Rat-Vc.end	Rat-Vs.end	Rat-Vc.mid	Rat-Vs.mid	V_Ed.mid		Rat-V.mid	Rat-J	
373		P30x60		25000.0	450000	MV	19	14-5-P16	3611.27	0.000	114.887	267.411	67.9358	115.741	131.478	116.749	131.478	35	135.439	1.030	0.00000
1	<input checked="" type="checkbox"/>	0.300	0.600	3.2000	450000					0.000	0.998	1.083	1.090	1.170	1.030	1.160	1.030	35	135.439	1.030	0.000

Elastic Strength Check (LC_E) in graphic design

* LC_E : Load combination to check ELS(Elastic Limit State)

Code : Eurocode2:04,NTC2018 Unit : kN , m Primary Sorting Option

Sorted by

☒ Member

☐ Property

Results

☐ Strength

☐ Serviceability

☒ Elastic

☐ SECT

☒ MEMB

MEMB	SE	Section	fck	fyk	CHK	Seis. Class	LC B	M.Edy	M.Edz	Rat-My	Rat-Co	V_Rdc.end	V_Rds.end	V_Rdc.mid	V_Rds.mid	LC B	V_Ed.end	Rat-V.end	Ash.req
SECT	L	Bc Hc	Height	fyw				M'.ydy	M'.ydz	Rat-Mz	m	Rat-Vc.end	Rat-Vs.end	Rat-Vc.mid	Rat-Vs.mid		V_Ed.mid	Rat-V.mid	Rat-J
373		P30x60	25000.0	450000	OK	N.D.	51	214.132	54.2597	0.849	0.987	106.276	131.478	105.268	131.478	43	105.100	0.989	0.00000
1	<input checked="" type="checkbox"/>	0.300 0.600	3.2000	450000				252.227	107.695	0.504		0.989	0.799	0.998	0.799	43	105.100	0.998	0.000

Serviceability Check (LC_S) in graphic design

* LC_S : Load combination to check SLS(Serviceability Limit State)

Sorted by

☒ Member

☐ Property

Results

☐ Strength

☒ Serviceability

☐ Elastic

☐ SECT

☒ MEMB

MEMB	SE	Section		fck	fyk	CHK	Stress Control								
SECT	L	Bc	Hc	Height	fyw		LC	sig-ct	sig-cta	LC	sig-cc	sig-cca	LC	sig-s	sig-sa
373		P30x60		25000.0	450000	OK									
1	<input checked="" type="checkbox"/>	0.300	0.600	3.2000	450000			0.00000	2564.96	70	1134.84	15000.0	-	0.00000	0.00000

2. Improvement of Non-dissipative Design as per NTC2018

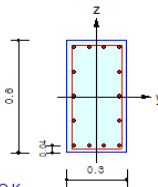
Non-dissipative in flexural & Shear design : Graphic report

- Output a design results for ULS, ELS and SLS separately in design reports.

Design result for ULS(Ultimate Limit State)

1. Design Condition

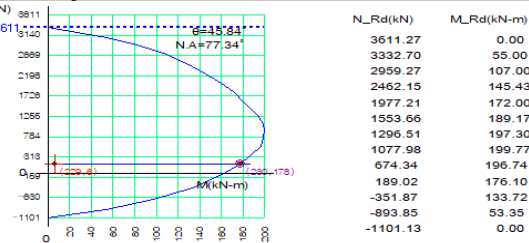
Design Code : Eurocode2:04 & NTC2018 UNIT SYSTEM : kN, m
 Member Number : 373
 Material Data : fck = 25000, fyk = 450000, fyw = 450000 KPa
 Column Height : 3.2 m
 Section Property : P30x60 (No : 1)
 Rebar Pattern : 14 - 5 - P16 Ast = 0.002814 m² (pst = 0.016)



2. Axial and Moments Capacity

Load Combination : 1 (I)
 Concentric Max. Axial Load N_Rdmax = 3611.27 kN
 Axial Load Ratio N_Ed / N_Rd = 229.268 / 229.761 = 0.998 < 1.000 O K
 Moment Ratio M_Ed / M_Rd = 6.48468 / 178.003 = 0.036 < 1.000 O K
 M_Ed / M_Rdy = 4.58536 / 124.006 = 0.037 < 1.000 O K
 M_Edz / M_Rdz = 4.58536 / 127.702 = 0.036 < 1.000 O K

M-N Interaction Diagram



3. Shear Capacity

[END] y : 1 (J) z : 1 (J)
 Applied Shear Force (V_Ed) 1.81597 kN 0.31087 kN
 V_Ed / V_Rdc 1.81597 / 126.642 = 0.014 0.31087 / 118.248 = 0.003
 V_Ed / V_Rds 1.81597 / 61.0435 = 0.030 0.31087 / 131.478 = 0.002
 V_Ed / V_Rdmax 1.81597 / 497.250 = 0.004 0.31087 / 535.500 = 0.001
 Shear Ratio 0.014 < 1.000 O K 0.003 < 1.000 O K
 Asw-H_use 0.00067 m²/m, 2-P8 @150 0.00067 m²/m, 2-P8 @150

[MIDDLE] y : 1 (1/2) z : 1 (1/2)
 Applied Shear Force (V_Ed) 1.81597 kN 0.31087 kN
 V_Ed / V_Rdc 1.81597 / 127.858 = 0.014 0.31087 / 119.558 = 0.003
 V_Ed / V_Rds 1.81597 / 61.0435 = 0.030 0.31087 / 131.478 = 0.002
 V_Ed / V_Rdmax 1.81597 / 497.250 = 0.004 0.31087 / 535.500 = 0.001
 Shear Ratio 0.014 < 1.000 O K 0.003 < 1.000 O K
 Asw-H_use 0.00067 m²/m, 2-P8 @150 0.00067 m²/m, 2-P8 @150

Design result for ELS(Elastic Limit State)

4. Elastic Bending Moment Capacity

	y : 2 (I)	z : 2 (I)
Moment (MEd)	81.7143 kN-m	21.7915 kN-m
Elastic Strength (M_yd)	254.437 kN-m	118.530 kN-m
Check Ratio	0.321 < 1.000 O K	0.184 < 1.000 O K
Check Combined Ratio (sqrt((M_Edy/M_ydy)^2 + (M_Edz/M_ydz)^2))	0.370 < 1.000 O K	

5. Elastic Shear Capacity

[END] y : 2 (J) z : 2 (J)
 Applied Shear Force (V_Ed) 12.1481 kN 40.1526 kN
 V_Ed / V_Rdc 12.1481 / 120.093 = 0.101 40.1526 / 111.195 = 0.361
 V_Ed / V_Rds 12.1481 / 61.0435 = 0.199 40.1526 / 131.478 = 0.305
 V_Ed / V_Rdmax 12.1481 / 497.250 = 0.024 40.1526 / 535.500 = 0.075
 Shear Ratio 0.101 < 1.000 O K 0.361 < 1.000 O K
 Asw-H_use 0.00067 m²/m, 2-P8 @150 0.00067 m²/m, 2-P8 @150

[MIDDLE] y : 2 (1/2) z : 2 (1/2)
 Applied Shear Force (V_Ed) 12.1481 kN 40.1526 kN
 V_Ed / V_Rdc 12.1481 / 121.029 = 0.100 40.1526 / 112.203 = 0.358
 V_Ed / V_Rds 12.1481 / 61.0435 = 0.199 40.1526 / 131.478 = 0.305
 V_Ed / V_Rdmax 12.1481 / 497.250 = 0.024 40.1526 / 535.500 = 0.075
 Shear Ratio 0.100 < 1.000 O K 0.358 < 1.000 O K
 Asw-H_use 0.00067 m²/m, 2-P8 @150 0.00067 m²/m, 2-P8 @150

Design result for SLS(Serviceability Limit State)

6. Serviceability : Stress Limit Check

	Load Combination	Stress(s)	Allowable Stress(sa)	Stress Ratio(s/sa)
Concrete (Tensile)	-	0.00	2564.96	0.0000
Concrete (Compression)	3(C)	1095.15	15000.00	0.0730
	-	0.00	0.00	*****
Rebar	-	0.00	0.00	*****
Check Linear Creep	*****	*****	*****	*****

3. Improvement for Shear design as per NTC2018

Design Shear force of primary elements according to NTC 2018

- When calculating a design shear force for primary elements, member force can be limited by a resistance demand for ELS load combinations.

7.2.2. CRITERI GENERALI DI PROGETTAZIONE DEI SISTEMI STRUTTURALI

PROGETTAZIONE IN CAPACITÀ E FATTORI DI SOVRARESISTENZA

La domanda di resistenza valutata con i criteri della progettazione in capacità può essere assunta non superiore alla domanda di resistenza valutata per il caso di comportamento strutturale non dissipativo.

Le strutture di fondazione e i relativi elementi strutturali devono essere progettati sulla base della domanda ad essi trasmessa dalla struttura sovrastante (si veda § 7.2.5) attribuendo loro comportamento strutturale non dissipativo, indipendentemente dal comportamento attribuito alla struttura su di essi gravante.

Design report (Detail)

[[[*]]] CALCULATE DATA OF SPECIAL PROVISIONS FOR SEISMIC DESIGN.

(). Design parameters.

- . fyk = 450000.00000 KPa.
- . phi = 1.0

(). Bending strength for design shear force.

- . MeI+ = 66.455 kN-m. (I, Clockwise)
- . MeJ- = 96.206 kN-m. (J, Clockwise)
- . MeI- = 96.206 kN-m. (I, Counter-Clockwise)
- . MeJ+ = 66.455 kN-m. (J, Counter-Clockwise)

(). Calculate design shear force according to special provisions for seismic design.

- . Alpha1 = 1.0000
- . Span = 4.3000 m.
- . VzG = -10.004 kN. (by Gravity-Direction Load).
- . Clockwise
 VeI1_CW = VzG + Alpha1*(MeI+ + MeJ-)/Span = 27.824 kN.
 VeI2_CW = VzG - Alpha1*(MeI+ + MeJ-)/Span = -47.832 kN.
 VeI_CW = MAX[|VeI1_CW|, |VeI2_CW|] = 47.832 kN.
- . Counter-Clockwise
 VeI1_CCW = VzG + Alpha1*(MeI- + MeJ+)/Span = 27.824 kN.
 VeI2_CCW = VzG - Alpha1*(MeI- + MeJ+)/Span = -47.832 kN.
 VeI_CCW = MAX[|VeI1_CCW|, |VeI2_CCW|] = 47.832 kN.
- . VeI(M) = MAX[|VeI_CW|, |VeI_CCW|] = 47.832 kN. (by Moment Strength).
- . VeI(E) = 17.186 kN. (by Elastic Load Combination).
- . VeI = MIN[VeI(M), VeI(E)] = 17.186 kN.
- . VzOrg = -18.902 kN. (by Strength Load Combination).
- . V_Ed = MAX[|VzOrg|, VeI] = 18.902 kN.

VzOrig = Design shear force by ULS load combination

VeI(M) = Design shear force by flexural strength of member.

VeI(E) = Design shear force by ELS load combination.

V_Ed = Max [VzOrig, Min[VeI(M), VeI(E)]]

The resistance demand evaluated with the capacity design criteria can be assumed not higher than the resistance demand evaluated for the case of non dissipative structural behavior.

3. Improvement for Shear design as per NTC2018

Design Shear force of primary elements according to NTC 2018

- When calculating a design shear force for primary elements, member force can be limited by a resistance demand for ELS load combinations.

Design Setting

☐ Seismic Design Parameter

☒ Beam-Column Joint Design
Gamma_{rd}

☒ Confined Joint ☒ Not Confined Joint

Strong Column Weak Beam
SUM(M_{Rc}) > * SUM(M_{Rb})

☐ Consider strong column-weak beam on last floor

Select Ductility Class
☒ CD'A' (High Ductility) ☐ Non-Dissipative (Low Ductility)
☐ CD'B' (Medium Ductility)

Design Method of Non-Dissipative Member
☒ M-C curve
☐ Approximate Method : * M_{Rd}

Non-Dissipative Member ...

Secondary Seismic Member ...

Shear Force for Design
Gamma_{rd}
Beam Column Wall

☒ Consider for Shear Wall alpha_s max

☒ Consider V_{ed} of elastic strength Load combination for primary members

Friction Coefficient for Wall Sliding :

Option is added.

Check off option

=====
[[[+]]] CALCULATE DATA OF SPECIAL PROVISIONS FOR SEISMIC DESIGN.
=====

```
( ). Design parameters.
-. fyk = 450000.00000 KPa.
-. phi = 1.0

( ). Bending strength for design shear force.
-. MeI+ = 66.455 kN-m. ( (I, Clockwise) )
-. MeJ- = 96.206 kN-m. ( (J, Clockwise) )
-. MeI- = 96.206 kN-m. ( (I, Counter-Clockwise) )
-. MeJ+ = 66.455 kN-m. ( (J, Counter-Clockwise) )

( ). Calculate design shear force according to special provisions for seismic design.
-. AlphaI = 1.0000
-. Span = 4.3000 m.
-. VzG = -10.004 kN. (by Gravity-Direction Load).
-. Clockwise
  VeI1_CW = VzG + AlphaI*(MeI+ + MeJ-)/Span = 27.824 kN.
  VeI2_CW = VzG - AlphaI*(MeI+ + MeJ-)/Span = -47.832 kN.
  VeI_CW = MAX[ |VeI1_CW|, |VeI2_CW| ] = 47.832 kN.
-. Counter-Clockwise
  VeI1_CCW = VzG + AlphaI*(MeI- + MeJ+)/Span = 27.824 kN.
  VeI2_CCW = VzG - AlphaI*(MeI- + MeJ+)/Span = -47.832 kN.
  VeI_CCW = MAX[ |VeI1_CCW|, |VeI2_CCW| ] = 47.832 kN.
-. VeI = MAX[ |VeI_CW|, |VeI_CCW| ] = 47.832 kN.
-. VzOrg = -18.902 kN. (by Strength Load Combination).
-. V_Ed = MAX[ |VzOrg|, VeI ] = 47.832 kN.
```

$$\rightarrow V_{Ed} = \text{Max} [VzOrig, VeI(M)]$$

VzG = Design shear force by load combination with only gravity loads.

VeI(M) = Design shear force by flexural strength of member.

VeI(E) = Design shear force by ELS load combination.

Check on option

=====
[[[+]]] CALCULATE DATA OF SPECIAL PROVISIONS FOR SEISMIC DESIGN.
=====

```
( ). Design parameters.
-. fyk = 450000.00000 KPa.
-. phi = 1.0

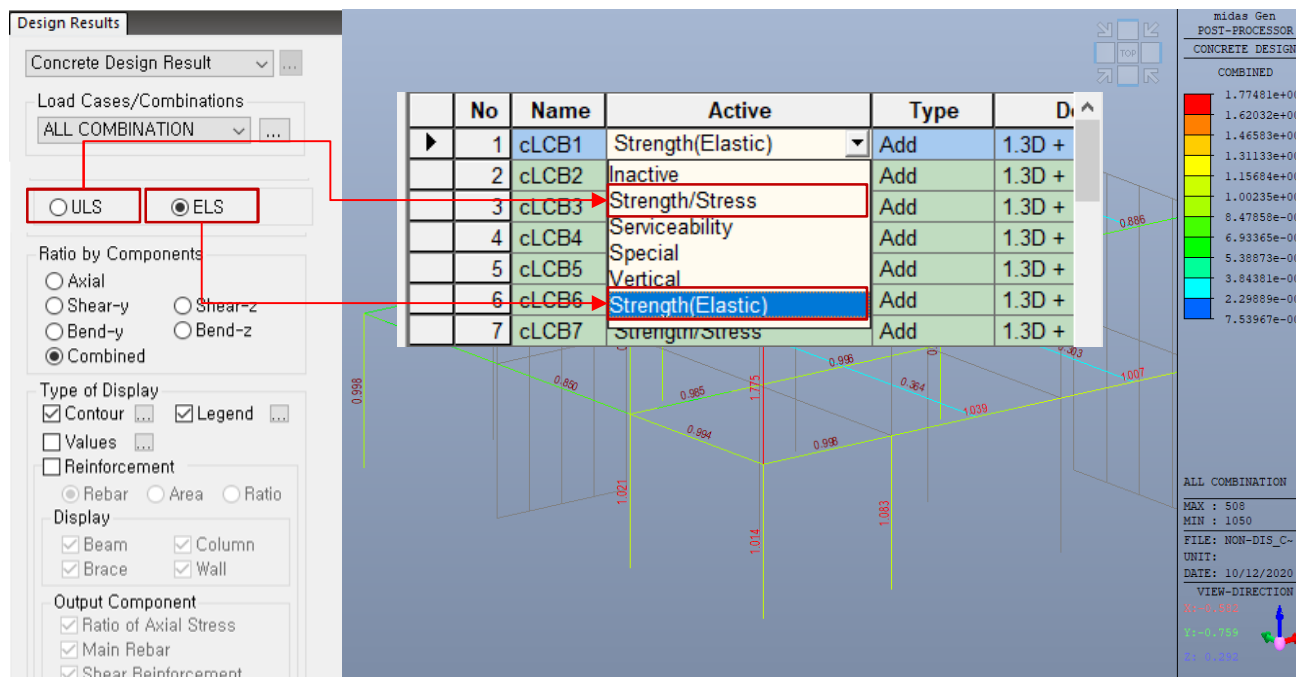
( ). Bending strength for design shear force.
-. MeI+ = 66.455 kN-m. ( (I, Clockwise) )
-. MeJ- = 96.206 kN-m. ( (J, Clockwise) )
-. MeI- = 96.206 kN-m. ( (I, Counter-Clockwise) )
-. MeJ+ = 66.455 kN-m. ( (J, Counter-Clockwise) )

( ). Calculate design shear force according to special provisions for seismic design.
-. AlphaI = 1.0000
-. Span = 4.3000 m.
-. VzG = -10.004 kN. (by Gravity-Direction Load).
-. Clockwise
  VeI1_CW = VzG + AlphaI*(MeI+ + MeJ-)/Span = 27.824 kN.
  VeI2_CW = VzG - AlphaI*(MeI+ + MeJ-)/Span = -47.832 kN.
  VeI_CW = MAX[ |VeI1_CW|, |VeI2_CW| ] = 47.832 kN.
-. Counter-Clockwise
  VeI1_CCW = VzG + AlphaI*(MeI- + MeJ+)/Span = 27.824 kN.
  VeI2_CCW = VzG - AlphaI*(MeI- + MeJ+)/Span = -47.832 kN.
  VeI_CCW = MAX[ |VeI1_CCW|, |VeI2_CCW| ] = 47.832 kN.
-. VeI(M) = MAX[ |VeI_CW|, |VeI_CCW| ] = 47.832 kN. (by Moment Strength).
-. VeI(E) = 17.186 kN. (by Elastic Load Combination).
-. VeI = MIN[ VeI(M), VeI(E) ] = 17.186 kN.
-. VzOrg = -18.902 kN. (by Strength Load Combination).
-. V_Ed = MAX[ |VzOrg|, VeI ] = 18.902 kN.
```

$$\rightarrow V_{Ed} = \text{Max} [VzOrig, \text{Min}[VeI(M), VeI(E)]]$$

4. Concrete design result for ELS load combination

Add Graphic result for ELS Load combination.

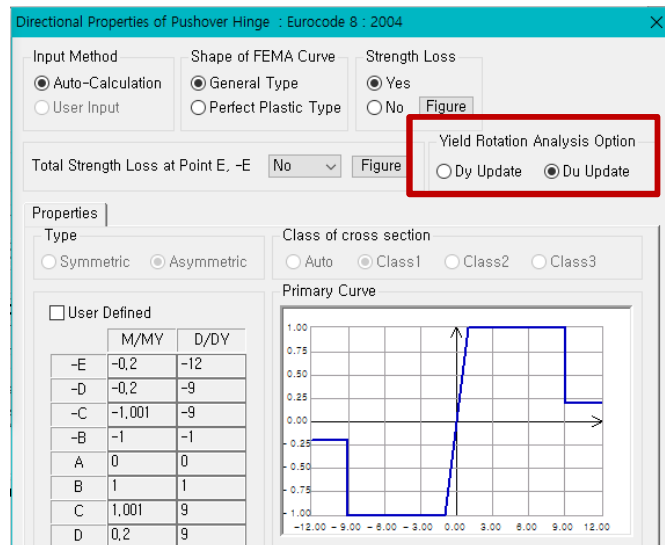


- ✓ ULS : Load combinations assigned to "Strength/Stress" type in Load combination dialog box
- ✓ ELS : Load combinations assigned to "Strength(Elastic)" type in Load combination dialog box

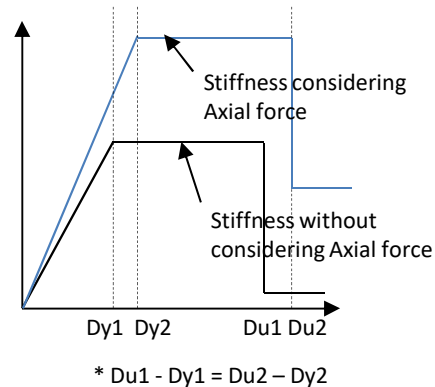
5. Improved Hinge Curve Model as per EC 8 :2004

New hinge curve model as per Eurocode 8 :2004

- Add a hinge curve with "Du update" type

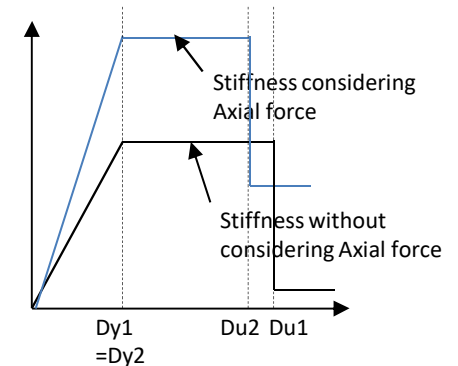


Dy Update (supporting in old version)



Stiffness and Dy are changed by axial force Under PMM or PM type.

Du Update (Add to Gen2021 newly)



Stiffness and Du are changed by axial force Under PMM or PM type

✓ Note

[Calculation of Du (= θu, Ultimate Rotation)]

$$\theta_{um} = \frac{1}{\gamma_{cl}} 0,016 \cdot (0,3^v) \left[\frac{\max(0,0; \omega)}{\max(0,0; \omega)} f_c \right]^{0,225} \left(\min \left(9; \frac{L_v}{h} \right) \right)^{0,35} \left(\frac{\sigma_{ys} f_{yw}}{f_c} \right) (1,25^{100 \rho_d})$$

[Calculation of Dy (= θy, Yielding Rotation)]

$$\theta_y = k \times \varepsilon_y \div \text{Depth of element}$$

* εy : Yielding strain at tensile face

hinge type	rectangular section			circular section	
	column	beam	wall	column	beam
none	2.1	1.7	2	2.25	-
PM ePMM	2.1	1.7	2	2.25	-

Displacement based Seismic Design of Structures- pg 165

Priestley, Calvi, Kowalsky

6. Irregularity reduction factors as per NSR-10

- Results > Results Tables > Story> Stiffness Irregularity Check, Capacity Irregularity Check, and Mass Irregularity Check

Output reduction factors (Phi_p) ←

Stiffness Irregularity Check

		Story Stiffness				Upper Story Stiffness	Upper 3 Story Stiffness(Avg.)	Remark	Phi_p
		(m)	(m)	(m)	(kN)	0.6K (Upper)	0.7K (Upper)		
Ey	12F	46.00	4.00	-0.0000	0.00	-	0.00	0.00	1.0
Ey	11F	42.00	4.00	-0.0000	0.00	-	-199998.58	-133332.39	0.8
Ey	10F	38.00	4.00	-0.0000	0.00	-	-264205.86	-309469.62	0.8
Ey	9F	34.00	4.00	-0.0000	0.00	-	-339744.66	-357310.71	0.8
Ey	8F	30.00	4.00	-0.0000	0.00	-	-406558.07	-449114.93	0.8
Ey	7F	26.00	4.00	-0.0000	0.00	-	-776743.33	-592295.69	0.8
Ey	6F	22.00	4.00	0.0000	0.00	1830963.85	-4291921.05	-2129253.18	1.0
Ey	5F	18.00	4.00	0.0000	0.00	1511336.03	1098578.31	-1543922.36	1.0
Ey	4F	14.00	4.00	0.0000	0.00	1154767.03	906801.62	-889210.44	1.0
Ey	3F	9.50	4.50	0.0000	0.00	3028926.91	692860.22	1049315.61	1.0
Ey	2F	5.00	4.50	-0.0000	0.00	-	1817356.15	2120248.84	1.0
Ey	1F	0.00	5.00	-0.0000	0.00	-	-688215.48	708555.90	0.8

Stiffness Irregularity(X) / Stiffness Irregularity(Y) /

Capacity Irregularity Check

Capacity Irregularity Check										Shear	Story Shear Strength Ratio1	Remark1	Phi_p1	Angle2 (deg)	Story Shear Strength2 (kN)	Upper Story Shear Strength2 (kN)	Story Shear Strength Ratio2	Remark2	Phi_p2
				(kN)	(kN)														
12F	46.00	4.00	0.00	8786.5611	0.0000	0.0000	Regular	1.0	90.00	8552.2528	0.0000	0.0000	Regular	1.0					
11F	42.00	4.00	0.00	8786.5611	8786.5611	1.0000	Regular	1.0	90.00	8552.2528	8552.2528	1.0000	Regular	1.0					
10F	38.00	4.00	0.00	8786.5611	8786.5611	1.0000	Regular	1.0	90.00	8552.2528	8552.2528	1.0000	Regular	1.0					
9F	34.00	4.00	0.00	10218.4451	8786.5611	1.1630	Regular	1.0	90.00	9984.1368	8552.2528	1.1674	Regular	1.0					
8F	30.00	4.00	0.00	10218.4451	10218.4451	1.0000	Regular	1.0	90.00	9984.1368	9984.1368	1.0000	Regular	1.0					
7F	26.00	4.00	0.00	10478.7876	10218.4451	1.0255	Regular	1.0	90.00	10244.4793	9984.1368	1.0261	Regular	1.0					
6F	22.00	4.00	0.00	10478.7876	10478.7876	1.0000	Regular	1.0	90.00	10244.4793	10244.4793	1.0000	Regular	1.0					
5F	18.00	4.00	0.00	12821.8706	10478.7876	1.2236	Regular	1.0	90.00	12587.5623	10244.4793	1.2287	Regular	1.0					
4F	14.00	4.00	0.00	12821.8706	12821.8706	1.0000	Regular	1.0	90.00	12587.5623	12587.5623	1.0000	Regular	1.0					
3F	9.50	4.50	0.00	15392.7533	12821.8706	1.2005	Regular	1.0	90.00	15158.4450	12587.5623	1.2042	Regular	1.0					
2F	5.00	4.50	0.00	15392.7533	15392.7533	1.0000	Regular	1.0	90.00	15158.4450	15158.4450	1.0000	Regular	1.0					
1F	0.00	5.00	0.00	17484.7772	15392.7533	1.1359	Regular	1.0	90.00	17841.7063	15158.4450	1.1770	Regular	1.0					

Capacity Irregularity /

Mass Irregularity Check

		Adjacent Story Mass				Story Mass Ratio	Remark	Phi_p
		1.5M(Upper) (kN/g)	1.5M(Lower) (kN/g)	1.5M(Upper) (kN/g)	1.5M(Lower) (kN/g)			
Ex	Roof	50.00	0.00	333.843	0.000	0.545	Regular	1.0
Ex	12F	46.00	0.00	408.152	500.764	0.115	Regular	1.0
Ex	11F	42.00	4.00	408.152	612.228	0.667	Regular	1.0
Ex	10F	38.00	4.00	416.600	612.228	0.673	Regular	1.0
Ex	9F	34.00	4.00	425.049	624.901	0.680	Regular	1.0
Ex	8F	30.00	4.00	426.585	637.573	0.669	Regular	1.0
Ex	7F	26.00	4.00	428.121	639.878	0.669	Regular	1.0
Ex	6F	22.00	4.00	441.946	642.182	0.688	Regular	1.0
Ex	5F	18.00	4.00	455.771	662.919	0.688	Regular	1.0
Ex	4F	14.00	4.00	485.101	683.657	0.710	Regular	1.0
Ex	3F	9.50	4.50	514.431	727.651	0.707	Regular	1.0
Ex	2F	5.00	4.50	534.832	771.646	0.693	Regular	1.0
Ex	1F	0.00	5.00	147.850	802.248	0.184	Regular	1.0

Mass Irregularity(X) / Mass Irregularity(Y) /

✓ Note

According to Table A.3-7 in NSR-10, Gen is reporting Reduction factor, ϕ in seismic design forces to account for Irregularity check

1.Stiffness Irregularity(Soft Story) Check

- Regular Structures $\phi_a = 1.0$
- Irregular Structures $\phi_a = 0.9$
- Extreme Irregular Structures $\phi_a = 0.8$

Tipo 1aA — Piso flexible $\phi_a = 0.9$ 0.60 Rígidex $K_D \leq$ Rígidex $K_C < 0.70$ Rígidex K_D	F E D C B A
Tipo 1bA — Piso flexible extremo $\phi_a = 0.8$ Rígidex $K_C < 0.60$ Rígidex K_D Rígidex $K_C < 0.70$ ($K_D + K_B + K_T$) / 3	F E D C B A

2.Capacity Irregularity (Weak Story) check

- Regular Structures $\phi_a = 1.0$
- Irregular Structures $\phi_a = 0.9$
- Extreme Irregular Structures $\phi_a = 0.8$

Tipo 5aA — Piso débil $\phi_a = 0.9$ 0.65 Resist. Piso C \leq Resist. Piso B < 0.80 Resist. Piso C	F E D C B A
Tipo 5bA — Piso débil extremo $\phi_a = 0.8$ Resistencia Piso B < 0.65 Resistencia Piso C	F E D C B A

3.Mass irregularity Check

- Regular Structures $\phi_a = 1.0$
- Irregular Structures $\phi_a = 1.0$

Tipo 2A — Distribución masa — $\phi_a = 0.9$ $m_B > 1.50 m_E$ $m_D > 1.50 m_C$	F E D C B A
--	----------------------------

7. Improvement of wind pressure function

Input of wind pressure by table editing

- Wind Pressure generated by equation can be edited in table and updated to the model.

Gen 2020

Add/Modify/Show Wind Pressure Function

Function
Function Name : Test
Coordinate System : Rectangular
Equation : $Z+0.1$
(Example : $0.7+Z \cdot \cos(\text{TH})+R$)
Description :
Table Show Option
Fixed Axis : X, Y Unit : m, [deg]
Z Start : 0 End : 6.01 Increment : 0.601
Fix Coordinates X 0 Y 0
Calculate

	X (m)	Y (m)	Z (m)	Wind Pressure (kN/m ²)
1	0	0	0	0
2	0	0	0.601	0.0601
3	0	0	1.202	0.1202
4	0	0	1.803	0.1803
5	0	0	2.404	0.2404
6	0	0	3.005	0.3005
7	0	0	3.606	0.3606
8	0	0	4.207	0.4207
9	0	0	4.808	0.4808
10	0	0	5.409	0.5409
11	0	0	6.01	0.601

Inactive

OK Cancel

Gen 2021 v1.1 (New version)

Add/Modify/Show Wind Pressure Function

Function
Function Name : Test
Coordinate System : Rectangular
Equation : $Z+0.1$
(Example : $0.7+Z \cdot \cos(\text{TH})+R$)
Description :
Table Show Option
Fixed Axis : X, Y Unit : m, [deg]
Z Start : 0 End : 6.01 Increment : 0.601
Fix Coordinates X 0 Y 0
Calculate

	X (m)	Y (m)	Z (m)	Wind Pressure (kN/m ²)
1	0	0	0	0
2	0	0	0.601	0.1
3	0	0	1.202	0.3
4	0	0	1.803	0.6
5	0	0	2.404	0.4
6	0	0	3.005	0.3005
7	0	0	3.606	0.3606
8	0	0	4.207	0.4207
9	0	0	4.808	0.4808
10	0	0	5.409	0.5409
11	0	0	6.01	0.601

OK Cancel

When editing the table values, wind pressure is modified automatically.

8. Renewal of Rebar Information Dialog Box

- Provide rebar information for diameter, area, and weight in dialog box
- Add #2 and #12 rebar in U.S Customary (U.S Imperial) DB

Gen 2020

ASTM	BS/EN	UNI	IS	GB	CSA	SS	GOST	AS/NZS
<input type="checkbox"/> #3	<input type="checkbox"/> P5	<input type="checkbox"/> P4	<input type="checkbox"/> P6	<input type="checkbox"/> d4	<input type="checkbox"/> 10M	<input type="checkbox"/> H5	<input type="checkbox"/> d6	<input type="checkbox"/> D6
<input checked="" type="checkbox"/> #4	<input type="checkbox"/> P6	<input type="checkbox"/> P5	<input type="checkbox"/> P8	<input type="checkbox"/> d5	<input type="checkbox"/> 15M	<input type="checkbox"/> H6	<input type="checkbox"/> d8	<input type="checkbox"/> D8
<input checked="" type="checkbox"/> #5	<input type="checkbox"/> P7	<input type="checkbox"/> P6	<input type="checkbox"/> P10	<input type="checkbox"/> d6	<input type="checkbox"/> 20M	<input type="checkbox"/> H7	<input type="checkbox"/> d10	<input type="checkbox"/> D10
<input checked="" type="checkbox"/> #6	<input type="checkbox"/> P8	<input type="checkbox"/> P8	<input type="checkbox"/> P12	<input type="checkbox"/> d8	<input type="checkbox"/> 25M	<input type="checkbox"/> H8	<input type="checkbox"/> d12	<input type="checkbox"/> D12
<input checked="" type="checkbox"/> #7	<input type="checkbox"/> P9	<input type="checkbox"/> P10	<input type="checkbox"/> P16	<input type="checkbox"/> d10	<input type="checkbox"/> 30M	<input type="checkbox"/> H9	<input type="checkbox"/> d14	<input type="checkbox"/> D16
<input type="checkbox"/> #8	<input type="checkbox"/> P10	<input type="checkbox"/> P12	<input type="checkbox"/> P18	<input type="checkbox"/> d12	<input type="checkbox"/> 35M	<input type="checkbox"/> H10	<input type="checkbox"/> d16	<input type="checkbox"/> D20
<input type="checkbox"/> #9	<input type="checkbox"/> P11	<input type="checkbox"/> P14	<input type="checkbox"/> P20	<input type="checkbox"/> d14	<input type="checkbox"/> 45M	<input type="checkbox"/> H11	<input type="checkbox"/> d18	<input type="checkbox"/> D22
<input type="checkbox"/> #10	<input type="checkbox"/> P12	<input type="checkbox"/> P16	<input type="checkbox"/> P22	<input type="checkbox"/> d16	<input type="checkbox"/> 55M	<input type="checkbox"/> H12	<input type="checkbox"/> d20	<input type="checkbox"/> D24
<input type="checkbox"/> #11	<input type="checkbox"/> P13	<input type="checkbox"/> P18	<input type="checkbox"/> P25	<input type="checkbox"/> d18		<input type="checkbox"/> H13	<input type="checkbox"/> d22	<input type="checkbox"/> D25
<input type="checkbox"/> #14	<input type="checkbox"/> P16	<input type="checkbox"/> P20	<input type="checkbox"/> P28	<input type="checkbox"/> d20		<input type="checkbox"/> H16	<input type="checkbox"/> d25	<input type="checkbox"/> D28
<input type="checkbox"/> #18	<input type="checkbox"/> P20	<input type="checkbox"/> P22	<input type="checkbox"/> P32	<input type="checkbox"/> d22		<input type="checkbox"/> H20	<input type="checkbox"/> d28	<input type="checkbox"/> D32
	<input type="checkbox"/> P25	<input type="checkbox"/> P24	<input type="checkbox"/> P36	<input type="checkbox"/> d25		<input type="checkbox"/> H25	<input type="checkbox"/> d32	<input type="checkbox"/> D36
	<input type="checkbox"/> P32	<input type="checkbox"/> P26	<input type="checkbox"/> P40	<input type="checkbox"/> d28		<input type="checkbox"/> H32	<input type="checkbox"/> d36	<input type="checkbox"/> D40
	<input type="checkbox"/> P40	<input type="checkbox"/> P30		<input type="checkbox"/> d32		<input type="checkbox"/> H40	<input type="checkbox"/> d40	
		<input type="checkbox"/> P32		<input type="checkbox"/> d36				
		<input type="checkbox"/> P36		<input type="checkbox"/> d40				
		<input type="checkbox"/> P40						

OK Close

Provide only the feature to select rebar size.

Gen 2021 v1.1 (New version)

Rebar Information

Rebar Code: **US CUSTOMARY(US)**

CHK	Name	Dia (in)	Area (in²)	Dia(Out) (in)	Weight (lb/ft)
<input type="checkbox"/>	#2	0.2500	0.0500	0.2500	0.0139
<input type="checkbox"/>	#3	0.3750	0.1100	0.3750	0.0313
<input type="checkbox"/>	#4	0.5000	0.2000	0.5000	0.0557
<input checked="" type="checkbox"/>	#5	0.6250	0.3100	0.6250	0.0869
<input checked="" type="checkbox"/>	#6	0.7500	0.4400	0.7500	0.1252
<input checked="" type="checkbox"/>	#7	0.8750	0.6000	0.8750	0.1703
<input type="checkbox"/>	#8	1.0000	0.7900	1.0000	0.2225
<input type="checkbox"/>	#9	1.1280	1.0000	1.1280	0.2833
<input type="checkbox"/>	#10	1.2700	1.2700	1.2700	0.3586
<input type="checkbox"/>	#11	1.4100	1.5600	1.4100	0.4427
<input type="checkbox"/>	#12	1.5000	1.7600	1.5000	0.5387
<input type="checkbox"/>	#14	1.6930	2.2500	1.6930	0.6375
<input type="checkbox"/>	#18	2.2570	4.0000	2.2570	1.1333

OK Close

Add #2 and #12 rebar in U.S Customary(U.S) code

In addition, provide the detail information for Rebar DB

9. Improvement of concrete shear strength in SMF as per ACI

Reduction factor (R) for V_c is not used in mid-span of member.
 - ' $V_c=0$ ' is considered only both ends of the member.

Concrete Design Code

Design Code : ACI318M-14

☐ Check Beam Deflection

☒ Apply Special Provisions for Seismic Design

☒ Seismic Design Parameter

Select Frame Type

☒ Special Moment Frames

☐ Intermediate Moment Frames

☐ Ordinary Moment Frames

☐ Consider strong column-weak beam on last floor

Shear Wall Type

☐ Special RC Structural Wall

Boundary Element Method

☒ Displacement Based Method

Deflection Amplification Factor (Cd) 4.50

Important Factor (Ie) 1.20

☐ Stress Based Method

Shear for Design

$R \cdot V_c (a1 \cdot \text{SUM}(M_{pr})/L > \max(Ve1, Ve2)/2) , R = 0$

Method

☒ MAX(Ve1, Ve2) ☐ MIN(Ve1, Ve2) ☐ Ve1 ☐ Ve2

Ve1 , $V_g + a1 \cdot \text{SUM}(M_{pr})/L$, a1 = 1

Ve2 , $V_g + a2 \cdot V_{eq}$ (Beam) , a2 = 1

Ve2 , $V_g + a2 \cdot V_{eq}$ (Column) , a2 = 1

Gen 2020

3. Design for Shear

	y : 8 (J)	z : 8 (J)
[END]		
Applied Shear Force (Vu)	40.5926 tonf	20.4299 tonf
Design Shear Strength ($\phi V_c + \phi V_s$)	0.00000 + 62.4078 = 62.4078 tonf	0.00000 + 62.4078 = 62.4078 tonf
Shear Ratio	0.650 < 1.000 O.K	0.327 < 1.000 O.K
As-H_req	0.00330 m ² /m, 4-D13 @100	0.00166 m ² /m, 4-D13 @100
[MIDDLE]		
y : 8 (1/2)		z : 8 (1/2)
Applied Shear Force (Vu)	40.5926 tonf	20.4299 tonf
Design Shear Strength ($\phi V_c + \phi V_s$)	0.00000 + 41.6052 = 41.6052 tonf	0.00000 + 41.6052 = 41.6052 tonf
Shear Ratio	0.976 < 1.000 O.K	0.491 < 1.000 O.K
As-H_req	0.00330 m ² /m, 4-D13 @150	0.00166 m ² /m, 4-D13 @150

Gen 2021 v1.1 (New version)

3. Design for Shear

	y : 8 (J)	z : 8 (J)
[END]		
Applied Shear Force (Vu)	40.5926 tonf	20.4299 tonf
Design Shear Strength ($\phi V_c + \phi V_s$)	0.00000 + 62.4078 = 62.4078 tonf	0.00000 + 62.4078 = 62.4078 tonf
Shear Ratio	0.650 < 1.000 O.K	0.327 < 1.000 O.K
As-H_req	0.00330 m ² /m, 4-D13 @100	0.00166 m ² /m, 4-D13 @100
[MIDDLE]		
y : 10 (1/2)		z : 3 (1/2)
Applied Shear Force (Vu)	50.2696 tonf	36.5179 tonf
Design Shear Strength ($\phi V_c + \phi V_s$)	33.0322 + 41.6052 = 74.6374 tonf	32.0340 + 41.6052 = 73.6392 tonf
Shear Ratio	0.674 < 1.000 O.K	0.496 < 1.000 O.K
As-H_req	0.00140 m ² /m, 4-D13 @150	0.00083 m ² /m, 4-D13 @150

→ V_c in Design = $R \cdot V_c$

✓ Note

Seismic provision in ACI 318M-19

18.6.4 Transverse reinforcement

18.6.4.1 Hoops shall be provided in the following regions of a beam:

- (a) Over a length equal to twice the beam depth measured from the face of the supporting column toward midspan, at both ends of the beam
- (b) Over lengths equal to twice the beam depth on both sides of a section where flexural yielding is likely to occur as a result of lateral displacements beyond the elastic range of behavior.

18.6.5 Shear strength

18.6.5.1 Design forces—The design shear force V_e shall be calculated from consideration of the forces on the portion of the beam between faces of the joints. It shall be assumed that moments of opposite sign corresponding to probable flexural strength, M_{pr} , act at the joint faces and that the beam is loaded with the factored tributary gravity load along its span.

18.6.5.2 Transverse reinforcement—Transverse reinforcement over the lengths identified in 18.6.4.1 shall be designed to resist shear assuming $V_c = 0$ when both (a) and (b) occur:

- (a) The earthquake-induced shear force calculated in accordance with 18.6.5.1 represents at least one-half of the maximum required shear strength within those lengths.
- (b) The factored axial compressive force P_u including earthquake effects is less than $A_g f_c' / 20$.

10. Beam End Offset for Asymmetric setting

Add element type (Asymmetric)

- Set a beam end offset by each direction.

Gen 2020

Type: Element

RGDi: 45 cm

RGDj: 60 cm

Gen 2021 v1.1 (New version)

Type: Element(ASYMI)

RGDyi: 45 cm

RGDzi: 60 cm

RGDyj: 45 cm

RGDzj: 60 cm

MidAS/Gen v20.0.0.0 - Boundary

Tree Menu: Node, Element, Boundary, Mass, Load

Beam End Offsets

Boundary Group Name: Default

Options: ☒ Add/Replace ☐ Delete

Beam Offset

Type: Element(ASYMI)

RGDyi(Mzi): 45 cm

RGDzi(Myi): 60 cm

RGDyj(Mzj): 45 cm

RGDzj(Myj): 60 cm

Apply Close

Start Page MIDAS/Gen Beam Offset

Element	RGDxi (cm)	RGDyi(Mzi) (cm)	RGDzi(Myi) (cm)	RGDxj (cm)	RGDyj(Mzj) (cm)	RGDzj(Myj) (cm)	Group
1	0.00	45.00	60.00	0.00	45.00	60.00	Default
*							

RGDyi(Mzi)=45.000, RGDzi(Myi)=60.000
RGDyj(Mzj)=45.000, RGDzj(Myj)=60.000

11. Static earth pressure function

Add static earth pressure of function type.

- When editing the table values, earth pressure shape in the model is modified automatically.

Load > Static Loads > Lateral > **Earth Pressure > Static Earth Pressure**

Static Earth Pressure

Load Case Name : HsX(+) ...

Option
☒ Add/Replace ☐ Delete

Direction : X-Y
 Angle : 0 [deg]
 Inner Pt : 0, 0, 0 m
 Scale Factor : 1

Static Earth Pressure Type
☒ Earth Pressure at Rest
☐ Active Earth Pressure

Static Earth Pressure Parameters
 Surcharge Load : 0 kN/m²
 Water Level : 0 m

Parameters of Soil Properties :
 Soil-1 ...

Selection : ☐ Group ☒ Element
 Loading Area Group Name : Default ...

Element Type
☒ Frame ☐ Planar

Elements Defining Loading Area :
 ...

Static Earth Pressure Profile...

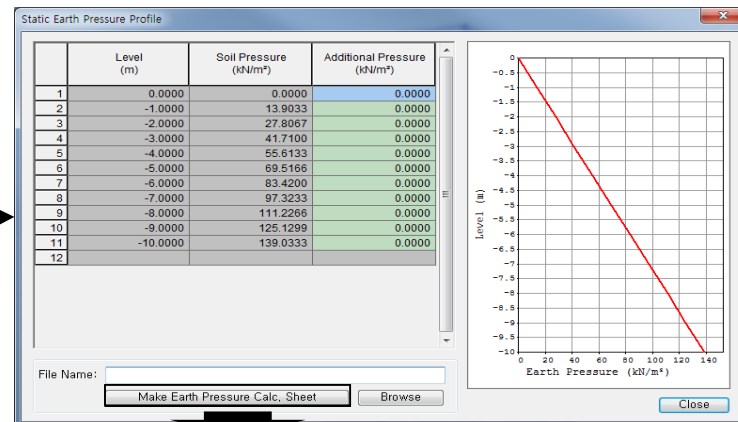
Set Load Case & Direction

Set Earth pressure type,
Surcharge load, and water level

Select the function for Soil
Properties

Set Loading Area

Check a loading curve by level



Calculating Sheet

Surcharge Load : s = 0.000 kN/m²
 Ground Level : GL = 0.000 m
 Water Level : WL = 0.000 m

Coefficient of Earth Pressure at Rest : $K_0 = 1 - \sin(\Phi)$
 [Jaky's formula]
 Soil Stress Friction Angle : $\Phi = (12 + N) \cdot 0.5 + 15$ [deg]
 [Dunham]

Soil Density : GAMMA = Density of Soil Property
 Water Density : GAMMA.w = 9.807 kN/m³
 Scale Factor : SF = 1.000

Earth Pressure at Level z : $p_z = K_0 \cdot s + K_0 \cdot (\text{GAMMA} \cdot z - \text{GAMMA.w} \cdot (\text{WL} - z)) + \text{GAMMA.w} \cdot (\text{WL} - z)$

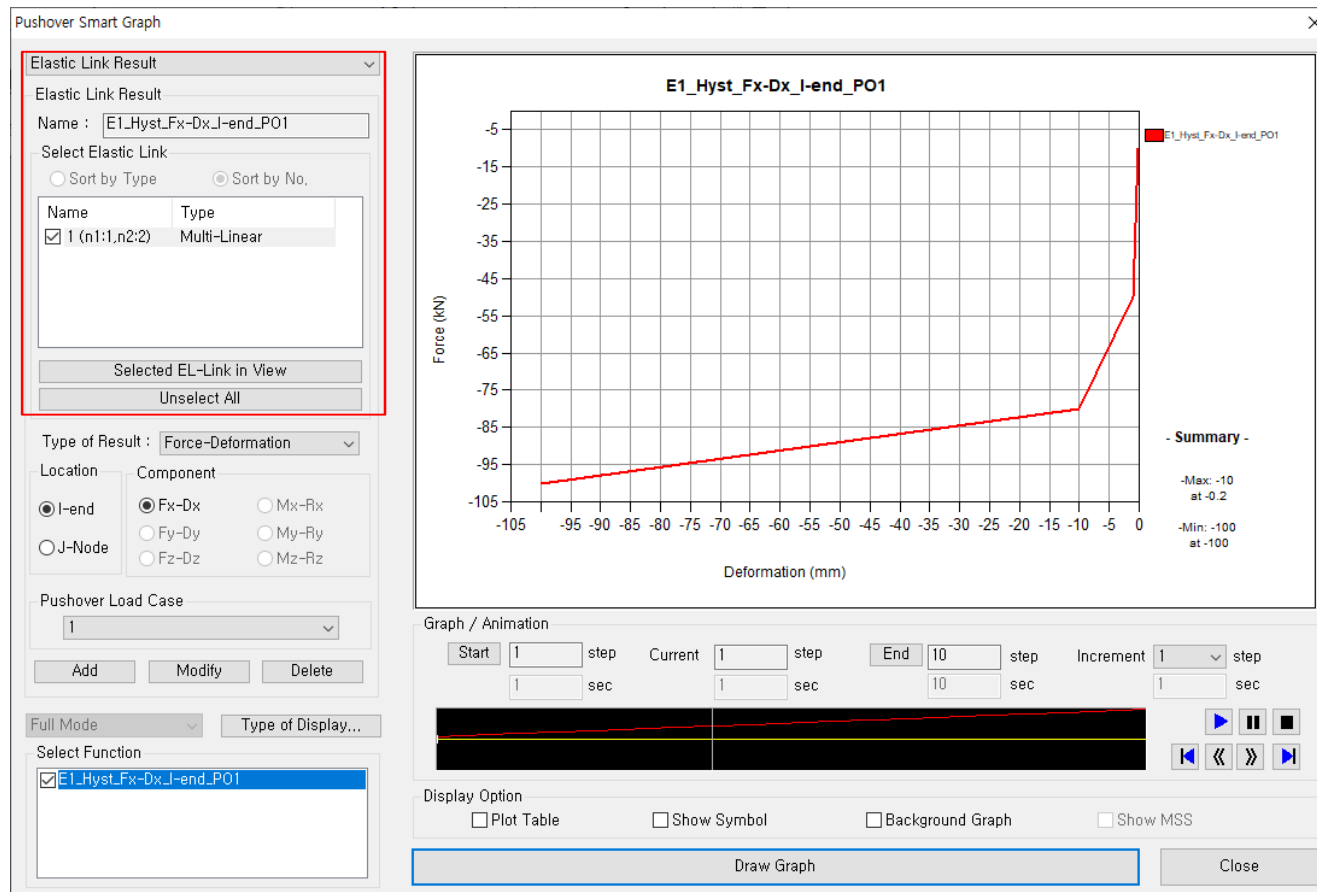
(). STATIC EARTH PRESSURE PROFILE

LEVEL (m)	PHI (deg)	K0	GAMMA (kN/m ³)	GAMMA.w (kN/m ³)	p(z) (kN/m ²)	ADD. p(z) (kN/m ²)
0.000	30.000	0.500	18.000	9.807	0.000	0.000
-1.000	30.000	0.500	18.000	9.807	13.903	0.000
-2.000	30.000	0.500	18.000	9.807	27.807	0.000
-3.000	30.000	0.500	18.000	9.807	41.710	0.000
-4.000	30.000	0.500	18.000	9.807	55.613	0.000
-5.000	30.000	0.500	18.000	9.807	69.517	0.000
-6.000	30.000	0.500	18.000	9.807	83.420	0.000
-7.000	30.000	0.500	18.000	9.807	97.323	0.000
-8.000	30.000	0.500	18.000	9.807	111.227	0.000
-9.000	30.000	0.500	18.000	9.807	125.130	0.000
-10.000	30.000	0.500	18.000	9.807	139.033	0.000

12. Elastic link graphic result in pushover analysis

Add graphic output of the elastic link (multi-linear type) in pushover analysis

Pushover > > Pushover Results > Pushover Smart Graph > **Elastic Link Graph**



Select Elastic Link

All elastic links assigned to the model are displayed in the list.

For same type, multiple selections are possible.

Type of Result

1. **[Force-Deformation]** : Force/Deform.
2. **[Force]** : Force / Time
3. **[Deformation]** : Deformation/Time

Location/Component

1. **Location** : Output position of elements
2. **Component** : Stress-Deform/ Moment-Rotation angle In element axis.

Graph/Animation

The animation function checks the results in a specific section.

It can be checked in conjunction with the table results

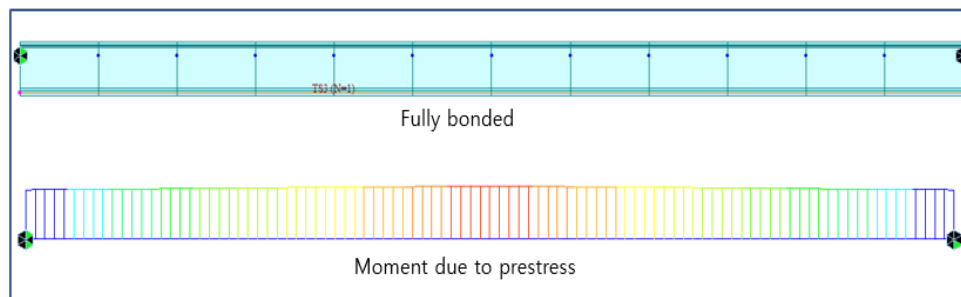
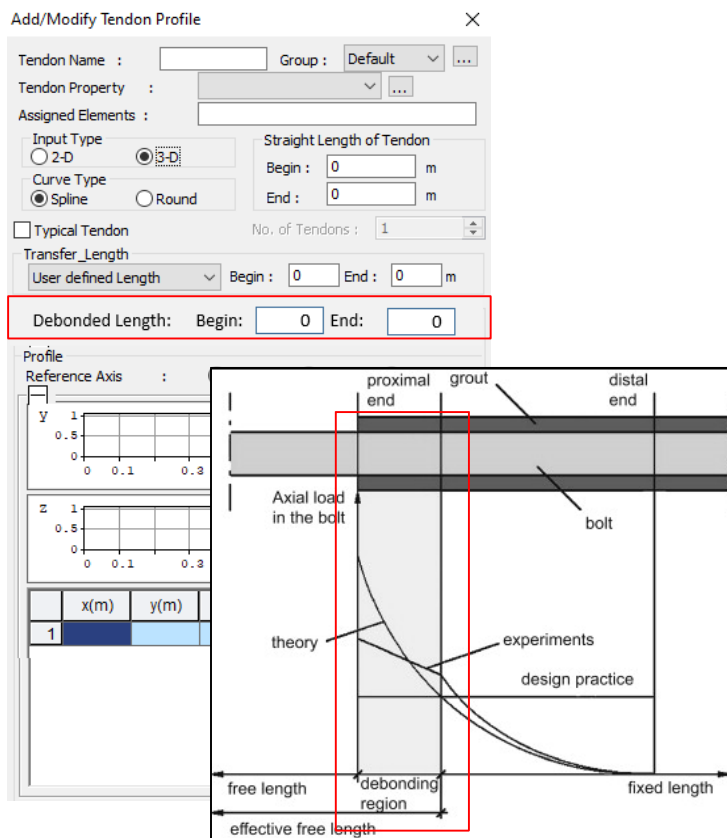
Display Option

After checking each item, click the [Graph] button to apply it to the graph.

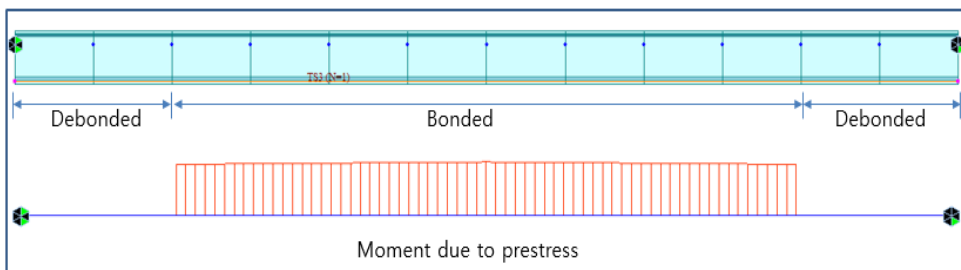
13. Debonded Length of Pretensioned Beam

- Debonded length of pretensioned beam can be directly defined when creating strands from the 'Tendon Profile' dialog box.
- Define the actual whole length of strand including debonded parts at both ends and then enter the lengths for debonded parts.

Load > Temp./Prestress > Prestress Loads > **Tendon Profile**



When debonded length has 0, Tendon Primary Moment Diagram

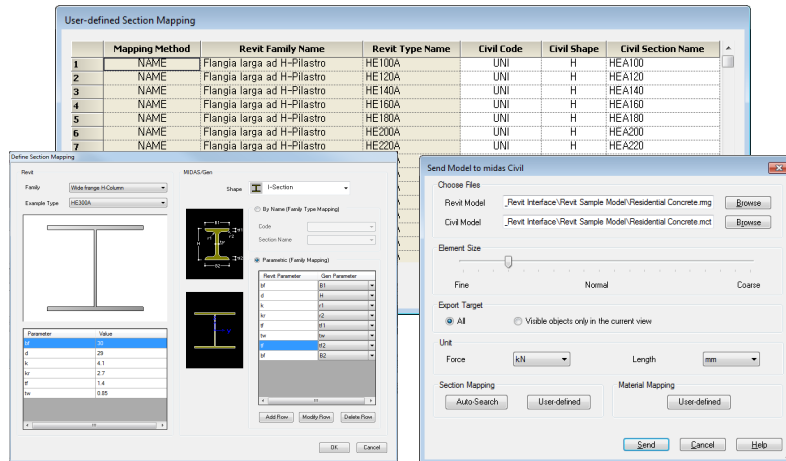


When debonded length has Non-Zero, Tendon Primary Moment Diagram

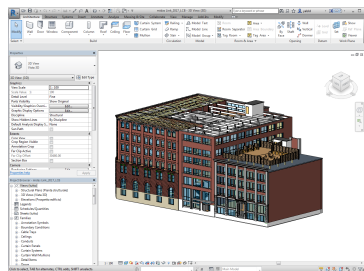
14. Revit 2021 Interface

Gen-Revit Link

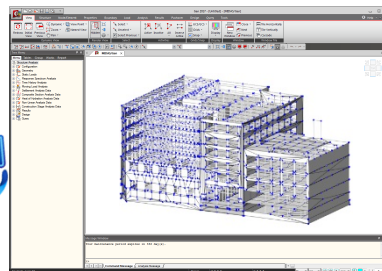
- File > Import > **midas Gen MGT File**
- File > Export > **midas Gen MGT File**



Send Model to midas Gen



Revit 2021



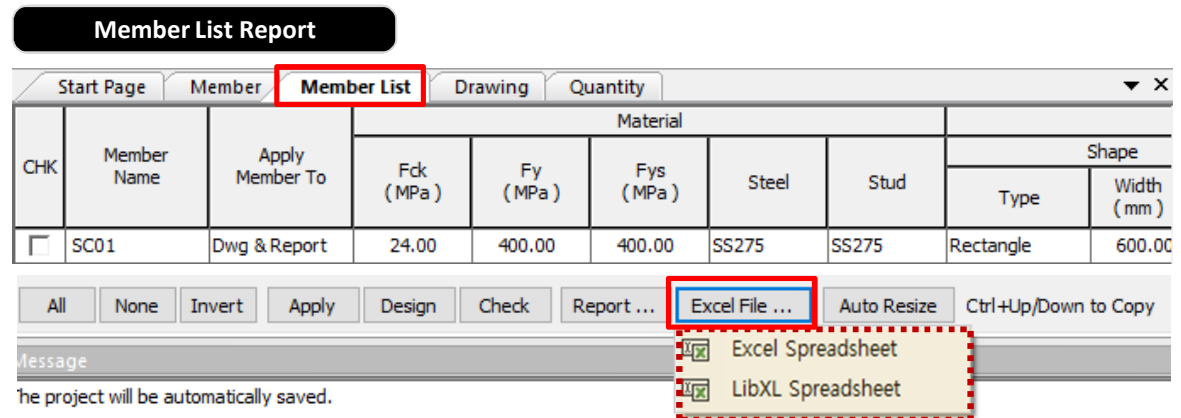
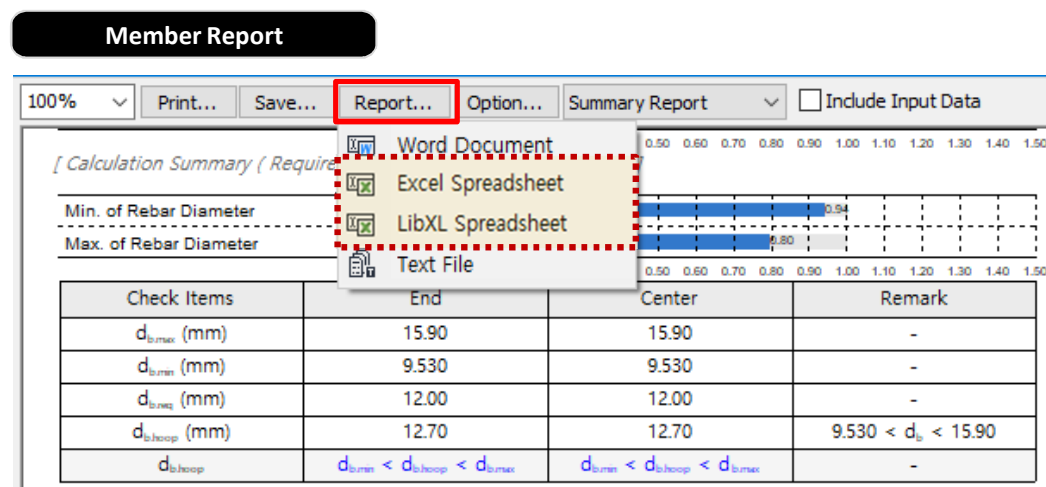
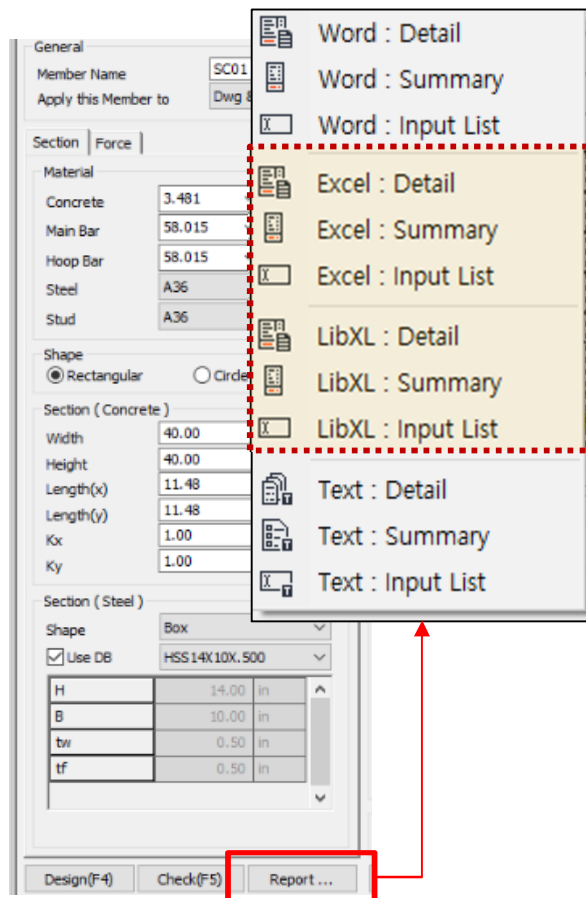
Gen 2021 v1.1 (New version)

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

midas ***Design+***

1. Report of Excel format

Generate a report of excel format.



1. Report of Excel format

Excel Report

- Provides high-quality output
- All functions of Excel can be used.

(5) Calculate the Horizontal Ground Reaction Force Coefficient $\left(\frac{K_H}{\text{Layer}^2}\right)$

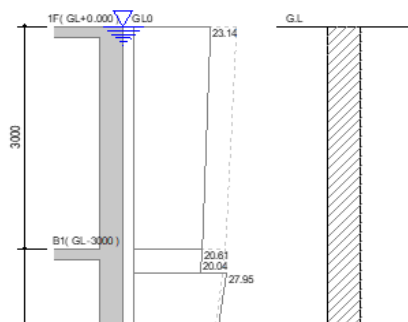
$$K_{H1} = \frac{4,082 \text{ kN}}{\text{m}^2}$$

$$K_{H2} = \frac{5,695 \text{ kN}}{\text{m}^2}$$

$$K_{H3} = \frac{8,770 \text{ kN}}{\text{m}^2}$$

(6) Calculate Displacement of Ground (Load Combination Factor is applied.)

H (m)	u(z) (mm)	u(z)-u(z)B (mm)	KH (kN/m ² /m)	p(z) (kN/m ²)	p(z) / R (kN/m ²)
0.000	14.17	14.17	4,082	57.84	23.14
3.000	12.62	12.62	4,082	51.54	20.61
3.333	12.27	12.27	4,082	50.09	20.04
3.333	12.27	12.27	5,695	69.88	27.95
6.000	8.329	8.329	5,695	47.43	18.97
6.667	7.085	7.085	5,695	40.35	16.14
6.667	7.085	7.085	8,770	62.13	24.85
9.000	2.217	2.217	8,770	19.44	7.776
10.00	0.000	0.000	8,770	0.000	0.000



LibXL Report

- Very fast output generation speed
- Expression in the same format as Text Report

(2) Calculate the Acceleration Response Spectrum (Sa)

- Fa = 1.120
- Fv = 0.840
- SDS = 2.5 S Fa x 2 / 3 = 0.373
- SD1 = S Fv x 2 / 3 = 0.112
- T0 = 0.2 SD1 / SDS = 0.0600 sec.
- TS = SD1 / SDS = 0.300 sec.
- TL = 5.000 sec.
- Sa = 2.746m/s²

(3) Calculate the Acceleration Response Spectrum of Base Rock (Sv)

- Sv = Sa / ω0 = 0.175m/s

(4) Calculate the Horizontal Ground Reaction Force Coefficient (KH / Layer 1)

- KH1 = 4,082kN/m²/m
- KH2 = 5,695kN/m²/m
- KH3 = 8,770kN/m²/m

(5) Calculate the Horizontal Ground Reaction Force Coefficient (KH / Layer 2)

- KH1 = 4,082kN/m²/m
- KH2 = 5,695kN/m²/m
- KH3 = 8,770kN/m²/m

(6) Calculate Displacement of Ground (Load Combination Factor is applied.)

H (m)	u(z) (mm)	u(z)-u(z)B (mm)	KH (kN/m ² /m)	p(z) (kN/m ²)	p(z) / R (kN/m ²)
0.000	14.17	14.17	4,082	57.84	23.14
3.000	12.62	12.62	4,082	51.54	20.61
3.333	12.27	12.27	4,082	50.09	20.04
3.333	12.27	12.27	5,695	69.88	27.95
6.000	8.329	8.329	5,695	47.43	18.97
6.667	7.085	7.085	5,695	40.35	16.14
6.667	7.085	7.085	8,770	62.13	24.85
9.000	2.217	2.217	8,770	19.44	7.776
10.00	0.000	0.000	8,770	0.000	0.000



2. SRC column module with box and pipe shape

- Applied Design Code : AISC-LRFD16(M),10(M)
- Applied Steel Shape : H section, **Box**, **Pipe**

1. Calculation Summary

(1) Requirement for Material

Category	Value	Criteria	Ratio
Min. of Concrete Strength (MPa)	24.00	21.00	0.875
Max. of Concrete Strength (MPa)	24.00	69.00	0.348
Max. of Steel Strength (MPa)	248	525	0.473
Max. of Rebar Strength (MPa)	400	550	0.727

(2) Moment Magnification Factor

Category	Value	Criteria	Ratio
Moment Magnification Factor (X)	1.000	1.400	0.714
Moment Magnification Factor (Y)	1.000	1.400	0.714

(3) Design Parameter

Category	Value	Criteria	Ratio
Min. of Rebar Area	0.00593	0.00400	0.675
Max. of Rebar Area	0.00593	0.0400	0.148
Min. of Steel Area	0.0131	0.0100	0.766
Space of Main Rebar (mm)	52.70	40.00	0.759

(4) Moment Capacity

Category	Value	Criteria	Ratio
Axial Capacity (kN)	222	25,956	0.0114
Moment Capacity (X) (kN-m)	2.260	264	0.0114
Moment Capacity (Y) (kN-m)	2.260	256	0.0114
Moment Capacity (kN-m)	3.196	368	0.0116

(5) Shear Capacity (End)

Category	Value	Criteria	Ratio
Rebar Spacing (X) (mm)	150	400	0.375
Rebar Spacing (Y) (mm)	150	400	0.375
Shear Capacity (X) (kN)	0.000	856	0.000
Shear Capacity (Y) (kN)	0.000	1,109	0.000

Added Box and Pipe shape

2. SRC column module with box and pipe shape

Example

Section | Force

Material

Concrete 24 MPa

Main Bar 400 MPa

Hoop Bar 400 MPa

Steel SS275

Stud SS275

Shape

☒ Rectangular ☐ Circle

Section (Concrete)

Width 600.00 mm

Height 600.00 mm

Length(x) 3.50 m

Length(y) 3.50 m

Kx 1.00

Ky 1.00

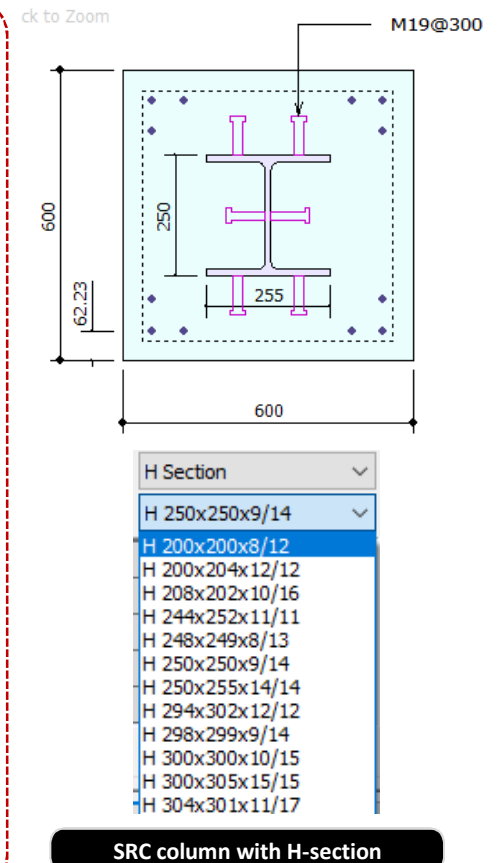
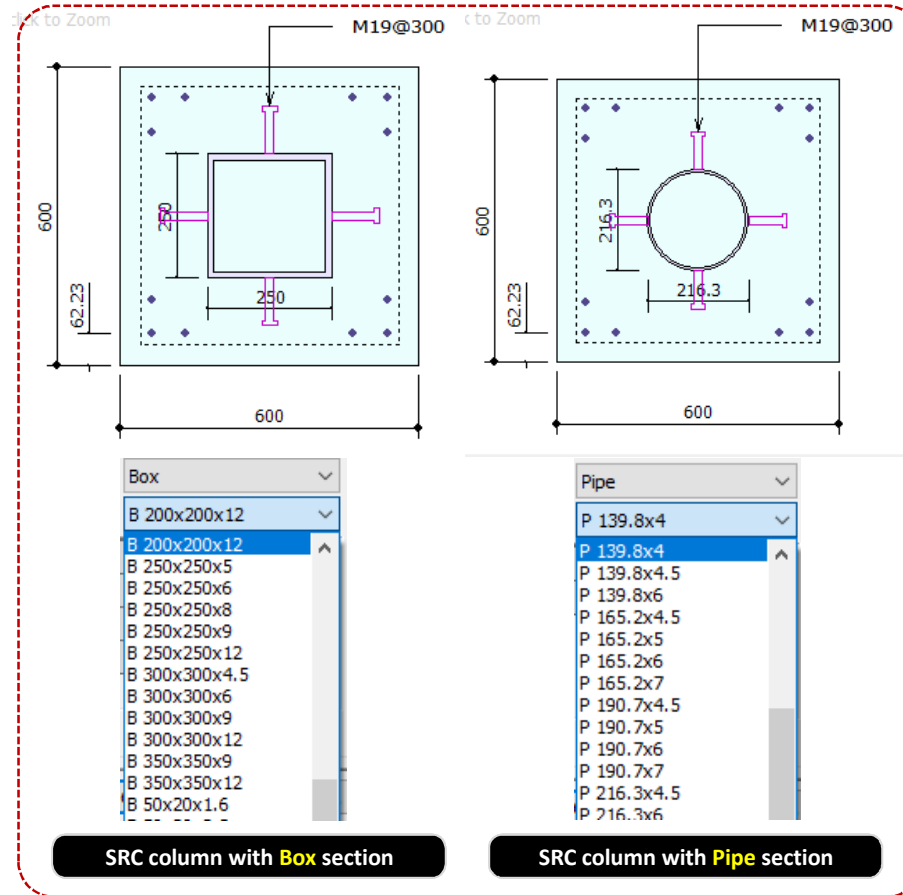
Section (Steel)

Shape **Box**

☒ Use DB

B 250x250x12

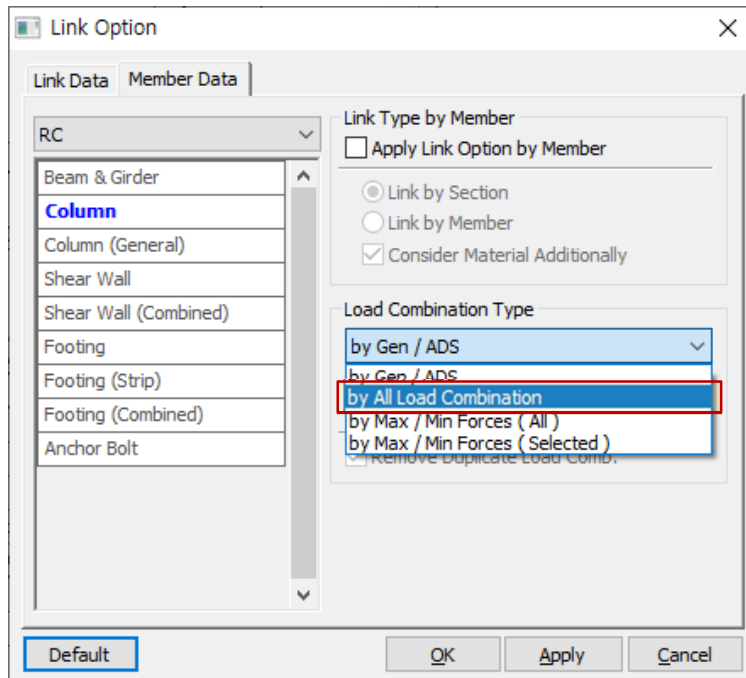
H	250.00	mm
B	250.00	mm
tw	12.00	mm
tf	12.00	mm



3. Midas link Option

- Add “by all combination” type in load combination type.

Link Option > **Member Data**



- Supporting linkage feature for all combinations created in Gen

[by All Load Combination] Support List

- ✓ **RC**
 - Column / General Section Column
 - Shear Wall / Combined Wall
 - Footing (Isolated/Combined/Strip)
 - Anchor Bolt
- ✓ **Steel**
 - Beam / Column
 - Bolt Connection (EC3)
 - Moment Connection(KSSC, AISC, EC3)
 - Baseplate / Embedded Plate
 - Web Opening
 - Welding
- ✓ **SRC**
 - Column
 - CFT Column
- ✓ **Aluminum**
 - Beam / Column
 - General Section Beam / Column
- ✓ **Reinforce**
 - Reinforced Beam
 - Reinforced Column

3. Midas link Option

Example for "by All Combination" Type

1. Generate a load combinations and select a column.

2. Set Load Combination Type to by All Load Combination
in Link Option> Member Data> Column tab.

3. Check Member No. and import Design information of members.

4. Check Member List in RC tree menu.

Load Combinations

No	Name	Active	Type	Description
1	WINDC	Inactive	Add	WX
2	WINDC	Inactive	Add	WY
3	cLCB3	Strengt	Add	1.4(D)
4	cLCB4	Strengt	Add	1.2(D) + 1.6(L)
5	cLCB5	Strengt	Add	1.2(D) + 1.3WINDCOM
6	cLCB6	Strengt	Add	1.2(D) + 1.3WINDCOM
7	cLCB7	Strengt	Add	1.2(D) - 1.3WINDCOMB
8	cLCB8	Strengt	Add	1.2(D) - 1.3WINDCOMB
9	cLCB9	Strengt	Add	1.2(D) + 1.0(1.0(1.13)(R
10	cLCB10	Strengt	Add	1.2(D) + 1.0(1.0(1.13)(R
11	cLCB11	Strengt	Add	1.2(D) + 1.0(1.0(1.13)(R
12	cLCB12	Strengt	Add	1.2(D) + 1.0(1.0(1.13)(R
13	cLCB13	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
14	cLCB14	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
15	cLCB15	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
16	cLCB16	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
17	cLCB17	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
18	cLCB18	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
19	cLCB19	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
20	cLCB20	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
21	cLCB21	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R
22	cLCB22	Strengt	Add	1.2(D) + 1.0(1.0(1.54)(R

Link Option

Link Data Member Data

RC

Beam & Girder

Column

Column (General)

Shear Wall

Shear Wall (Combined)

Footing

Footing (Strip)

Footing (Combined)

Anchor Bolt

Link Type by Member

☐ Apply Link Option by Member

☐ Link by Section

☐ Link by Member

☒ Consider Material Additionally

Load Combination Type

by All Load Combination

☐ P ☐ Mx ☐ My ☐ Vx ☐ Vy

☒ Remove Duplicate Load Comb.

Default OK Apply Cancel

RC Design Procedure

Option

RC : KDS 41 30 : 2018

Live Load : KDS2018

Rebar Code : KS/JIS

Design Option (Member)

Drawing Option (Member)

Report Option

Preference

Slab

Beam

Column (1)

5~6C1(600)

Column (General)

Shear Wall

Shear Wall (Combined)

Footing

Footing (Combined)

Footing (Strip)

Basement Wall (1)

RW01

Buttress

Stair

Corbel/Bracket

Retaining Wall

Anchor Bolt

Beam Table

Slab Table

Batch Wall

3. Midas link Option

Example for "by All Combination" Type

General
Member Name: 5~6C1(600)
Apply this Member to: Dwg & Report

Material
Concrete: 24 MPa
Main Bar: 400 MPa
Hoop Bar: 400 MPa
☐ Light Weight Concrete
Factor: 1

Shape
☒ Rectangle ☐ Circle

Section
Width: 800.00 mm
Height: 800.00 mm
Length(x): 4.00 m
Length(y): 4.00 m
Kx: 1.00
Ky: 1.00

Axial Force & Moment
Axial: 4597.39 kN
☐ Apply to Shear Check
Moment(x): 67.72 kN.m
Moment(y): 121.24 kN.m

Shear Force
Axial(x): 3097.68 kN
Shear(x): 148.31 kN
Axial(y): 2251.17 kN
Shear(y): -269.08 kN

Coefficient / Factor
Cmx: 0.850
Cmy: 0.850
Cz: 0.709

Design Option
☐ User Define Reinforcement
Min. Ratio: 0.000
Max. Ratio: 0.000

Seismic Design
☐ Apply Special Provisions
☒ SMF ☐ IMF ☐ OMF
☐ Apply Pilotis Provisions, KDS #1 17 00
☐ Apply Pilotis Guideline, MOLTA

Tie Bar
☐ Apply to Shear
Material: 400
Rebar: D10

Double click to Zoom

100% Print... Save... Report... Option... Summary Report ☐ Include Input Data

1. Calculation Summary
(1) Check Magnified Moment

Load Combinations

SN	CHK	NAME	Pu (kN)	Mux (kN.m)	Muy (kN.m)	Vux (kN)	Vuy (kN)	Cmx	Cmy	βdhs	Description
PM	✓	d.CB4(600-I)	4597.39	67.72	121.24	62.03	34.96	0.850	0.850	0.709	1.2(D) + 1.6(L)
Vux	✓	d.CB13(679-J)	3097.68	55.56	-18.87	148.31	108.95	0.850	0.850	0.794	1.2(D) + 1.0(1.5-4)(RY(RS)+RY(ES))+1.0(L)
Vuy	✓	d.CB25(678-J)	2251.17	-26.17	29.29	-66.82	-269.08	0.850	0.850	0.806	1.2(D) - 1.0(1.0(1.13)(RX(RS)+RX(ES))+1.0(L)
1	✓	d.CB3(600-I)	2618.42	-146.31	-46.49	-22.71	-78.36	0.850	0.850	1.000	1.4(D)
2	✓	d.CB3(600-J)	2534.06	167.13	44.36	-22.71	-78.36	0.850	0.850	1.000	1.4(D)
3	✓	d.CB4(600-I)	3083.45	-189.37	-66.44	-32.39	-101.31	0.850	0.850	0.728	1.2(D) + 1.6(L)
4	✓	d.CB4(600-J)	3011.15	215.88	63.13	-32.39	-101.31	0.850	0.850	0.721	1.2(D) + 1.6(L)
5	✓	d.CB5(600-I)	2828.00	-96.99	-59.83	-29.78	-52.45	0.850	0.850	0.811	1.2(D) + 1.3WINDCOMB1 + 1.0(L)
6	✓	d.CB5(600-J)	2755.70	112.83	59.29	-29.78	-52.45	0.850	0.850	0.806	1.2(D) + 1.3WINDCOMB1 + 1.0(L)
7	✓	d.CB6(600-I)	2723.82	-154.22	-107.49	-54.50	-82.79	0.850	0.850	0.811	1.2(D) + 1.3WINDCOMB2 + 1.0(L)
8	✓	d.CB6(600-J)	2651.51	176.94	110.49	-54.50	-82.79	0.850	0.850	0.806	1.2(D) + 1.3WINDCOMB2 + 1.0(L)
9	✓	d.CB7(600-I)	2709.58	-233.77	-53.10	-25.31	-124.56	0.850	0.850	0.811	1.2(D) - 1.3WINDCOMB1 + 1.0(L)
10	✓	d.CB7(600-J)	2637.28	264.47	48.14	-25.31	-124.56	0.850	0.850	0.806	1.2(D) - 1.3WINDCOMB1 + 1.0(L)
11	✓	d.CB8(600-I)	2813.77	-176.54	-5.44	-0.60	-94.22	0.850	0.850	0.811	1.2(D) - 1.3WINDCOMB2 + 1.0(L)
12	✓	d.CB8(600-J)	2741.46	200.35	-3.06	-0.60	-94.22	0.850	0.850	0.806	1.2(D) - 1.3WINDCOMB2 + 1.0(L)
13	✓	d.CB9(600-I)	2480.41	70.59	-3.62	0.68	34.75	0.850	0.850	0.811	1.2(D) + 1.0(1.0(1.13)(RX(RS)+RX(ES))+1.0(L)
14	✓	d.CB9(600-J)	2408.10	428.32	85.61	0.68	34.75	0.850	0.850	0.806	1.2(D) + 1.0(1.0(1.13)(RX(RS)+RX(ES))+1.0(L)
15	✓	d.CB10(600-I)	2458.49	55.38	-22.95	-11.56	26.57	0.850	0.850	0.811	1.2(D) + 1.0(1.0(1.13)(RX(RS)-RX(ES))+1.0(L)
16	✓	d.CB10(600-J)	2386.19	445.83	115.20	-11.56	26.57	0.850	0.850	0.806	1.2(D) + 1.0(1.0(1.13)(RX(RS)-RX(ES))+1.0(L)
17	✓	d.CB11(600-I)	2558.56	47.81	-73.87	-37.26	23.09	0.850	0.850	0.811	1.2(D) + 1.0(1.0(1.13)(RX(RS)+RX(ES))-1.0(L)

5. Click "Load Combinations" button.

6. Check a load combination name and end position of member before design/check.

* In the case of RC columns, member forces of I and J-end per load combination are imported.
Recommended to check the design position.

4. Combined footing design as per Eurocode

Support combined footing design as per Eurocode 2: 04

Mode/Link RC Steel SRC Aluminum Reinforce Load Option Tool View Help

Slab Beam Column Shear Wall Footing Basement Wall Stair Corbel / Bracket Anchor Bolt Beam Table Slab Table Batch Wall

Smart Design Option Building Data Setting Run Smart Design (All) Batch Wall

WorkBar

Add new member

System RC

Type Footing (Combined)

Name

Option... Add

Keep Sect. & Bar Data

RC Design Procedure

Option

Design Code : Eurocode2:04

Live Load : IBC2012

Rebar Code : ASTM

Design Option (Member)

Drawing Option (Member)

Report Option

Preference

Slab

Beam

Column

Column (General)

Shear Wall

Shear Wall (Combined)

Footing

Footing (Combined) (1)

Footing (Strip)

Basement Wall

Buttress

Stair

Corbel / Bracket

Retaining Wall

Anchor Bolt

Beam Table

Slab Table

Batch Wall

Member Name F01

Apply this Member to Dwg & Report

Section Load Column

Material Concrete 25 MPa

Main Bar 400 MPa

Footing

Depth 500.00 mm

Width 3.00 m

Cover 80.00 mm

Ext. (Left) 1.00 m

Ext. (Right) 1.00 m

Soil Bearing 100.00 kPa

Double click to Zoom

Plan + Section

Item to Display

Text Size 12

Bar Arrangement (X-Dir.)

Rebar Position : Cantilever (R.)

Items

Bottom (mm) #7 @ 150.00

Max. Spacing(mm) #7 @ 400

Moment (kN.m/m) 0.007

Eff. Width(mm) 3000

Bar Arrangement (Y-Dir.)

Rebar Position : C01

Items

Bottom(mm) #7 @ 150.00

Max. Spacing(mm) #7 @ 400

Moment (kN.m/m) 6.608

Eff. Width(mm) 887

Display Option

Item to Display

Text Size 12

Bar Arrangement (X-Dir.)

Rebar Position : Cantilever (R.)

Items

Bottom (mm) #7 @ 150.00

Max. Spacing(mm) #7 @ 400

Moment (kN.m/m) 0.007

Eff. Width(mm) 3000

Bar Arrangement (Y-Dir.)

Rebar Position : C01

Items

Bottom(mm) #7 @ 150.00

Max. Spacing(mm) #7 @ 400

Moment (kN.m/m) 6.608

Eff. Width(mm) 887

Design(F4) Check(F5) Report... Apply(F3)

Ready

User SI Unit English

Report

100% Print... Save... Report... Option... Summary Report Include Input Data

1. Calculation Summary

(1) Soil Capacity

Category	Value	Criteria	Ratio	Note
Soil Capacity* (KPa)	27.77	100.00	0.278	$q_{s,max} / f_c$

* The value is based on service load

(2) Shear Capacity

Category	Value	Criteria	Ratio	Note
One Way Shear-X (kN)	72.59	1,046	0.0694	V_{Ed} / V_{Rd1}
Two Way Shear (MPa)	0.127	0.431	0.296	V_{Ed} / V_{Rd2}

(3) Moment Capacity

Category	Value	Criteria	Ratio	Note
Moment-X Direction (kN-m)	-17.98	359	0.0500	M_{Ed} / M_{Rd1}
Moment-Y Direction (kN-m)	6.573	112	0.0589	M_{Ed} / M_{Rd2}

(4) Rebar

Category	Value	Criteria	Ratio	Note
Check Space-X (mm)	150	400	0.375	$s_{x,Ed} < s_{x,max}$
Check Space-Y (mm)	150	400	0.375	$s_{y,Ed} < s_{y,max}$
Check Area-X($A_{s,Ed} < A_{s,max}$) (mm ²)	2,581	20,000	0.129	$A_{s,Ed} < A_{s,max}$
Check Area-X($A_{s,Ed} > A_{s,min}$) (mm ²)	2,581	645	0.250	$A_{s,Ed} > A_{s,min}$
Check Area-X($A_{s,Ed} > A_{s,min}$) (mm ²)	2,581	129	0.0500	$A_{s,Ed} > A_{s,min}$
Check Area-Y($A_{s,Ed} < A_{s,max}$) (mm ²)	860	20,000	0.0430	$A_{s,Ed} < A_{s,max}$
Check Area-Y($A_{s,Ed} > A_{s,min}$) (mm ²)	860	645	0.749	$A_{s,Ed} > A_{s,min}$
Check Area-Y($A_{s,Ed} > A_{s,min}$) (mm ²)	860	50.63	0.0589	$A_{s,Ed} > A_{s,min}$

** Values will not be displayed, if overturning occurs

2. Check Soil Capacity (Unit : KPa)

Check Items	Calculated	Criteria	Ratio
Soil Capacity	27.77	100.00	0.278
$q_{s,max}$	28.77	-	-
$q_{s,min}$	28.77	-	-

3. Check 1Way Shear Capacity (Unit : kN)

Check Items	Calculated	Criteria	Ratio
One Way Shear-X	72.59	1,046	0.0694

4. Check 2Way Shear Capacity (Unit : MPa)

Check Items	Calculated	Criteria	Ratio
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4. Combined footing design as per Eurocode

Procedure of Combined Footing Design

Define Section

Section	Load	Column
Material		
Concrete	<input type="text" value="25"/> MPa	
Main Bar	<input type="text" value="400"/> MPa	
Footing		
Depth	<input type="text" value="500.00"/> mm	
Width	<input type="text" value="3.00"/> m	
Cover	<input type="text" value="80.00"/> mm	
Ext. (Left)	<input type="text" value="1.00"/> m	
Ext. (Right)	<input type="text" value="1.00"/> m	
Soil Bearing	<input type="text" value="100.00"/> KPa	

Step 1.
Define concrete, rebar material,
soil bearing
and footing element information.

Define Load

Section	Load	Column
Design Load		
Surface Load	<input type="text" value="5.00"/> KPa	
Weight Density	<input type="text" value="18.00"/> kN/m ³	
Height	<input type="text" value="0.50"/> m	
<input checked="" type="checkbox"/> Include Self-Weight <input checked="" type="checkbox"/> Include Surcharge Load		
Load Factor		
Dead Load	<input type="text" value="1.000"/>	
Live Load	<input type="text" value="1.000"/>	
Shear Offset Information		
SN	Offset Factor	
1	0.25	
2	0.50	
3	0.75	
4	1.00	
5	1.25	
6	1.50	
7	1.75	
8	2.00	
		Sort Add Insert Delete

Step 2.
Define Load Data.
(Design load, factor, shear offset
information)

Define column information

Section	Load	Column
Load Combinations		
<input type="checkbox"/> Apply SLS Load Combination <input type="checkbox"/> Apply ULS Load Combination		
Select Column		
C01		Add
C01		Insert
C02		Delete
Column Data...		
Column Section		
<input checked="" type="radio"/> Rectangle <input type="radio"/> Circle		
Cx	<input type="text" value="500.00"/> mm	
Cy	<input type="text" value="500.00"/> mm	
Span	<input type="text" value="-"/> m	
Position	<input type="text" value="Internal"/>	
Service Load		
N.Ed,s	<input type="text" value="15.00"/> kN	
Load Combinations (1) ...		
Factored Load		
N.Ed	<input type="text" value="22.50"/> kN	
Load Combinations (1) ...		
Check Load Combinations		

Step 3.
Define column element
and applied load information.

Define Rebar Arrangement

Bar Arrangement (X-Dir.)			
Rebar Position : <input type="text" value="C01"/>			
	Items		
Bottom (mm)	#7	@	150.00
Max. Spacing(mm)	#7	@	400
Moment (kN.m/m)	14.38		
Eff. Width(mm)	3000		

Step 4.
Define Bar arrangement layout & spacing

4. Combined footing design as per Eurocode

Summary design report

3. Check 1Way Shear Capacity (Unit : kN)

Check Items	Calculated	Criteria	Ratio
One Way Shear-X	72.59	1,046	0.0694

4. Check 2Way Shear Capacity (Unit : MPa)

Check Items	Calculated	Criteria	Ratio
Two Way Shear-Column Face	0.184	3.825	0.0480
Two Way Shear-UserD	0.107	0.431	0.248
Two Way Shear-2D	0.0193	0.431	0.0447
Two Way Shear	0.107	0.431	0.248

5. Check Moment Capacity (Unit : kN-m/m)

Check Items	Calculated	Criteria	Ratio
Moment-X Direction(Cantilever)	0.0140	359	0.0000391
Moment-X Direction(Column)	14.38	359	0.0400
Moment-X Direction(Span)	-17.98	359	0.0500
Moment-X Direction	-17.98	359	0.0500
Moment-Y Direction	6.573	112	0.0589

Detail design report

3. Check One-Way Shear (Direction X)

(1) Calculate ratio of shear capacity

Column	D _{eff} (mm)	k	ρ	V _{Rd,1} (kN)	V _{Rd,2} (kN)	V _{Ed} (kN)	V _{Rd,max} (kN)	Ratio	Remark
C01	409	1.699	0.00631	1,046	793	72.59	1,046	0.0694	OK
C02	409	1.699	0.00631	1,046	793	72.59	1,046	0.0694	OK

- $k = \min [1 + \sqrt{200/d}, 2.0] = 1.699$
- $\rho_1 = \min [A_{st} / b_w d, 0.02] = 0.00631$
- $C_{Rd,c} = 0.18 / \gamma_c = 0.120$
- $V_{Rd,1} = [C_{Rd,c} k (100 \rho_1 f_{tk})^{1/3} + k_1 \sigma_{cp}] b_w d = 1,046 \text{ kN}$
- $V_{Rd,2} = [0.035 k^{3/2} f_{ck}^{1/2} + k_1 \sigma_{cp}] b_w d = 793 \text{ kN}$
- $V_{Rd} = V_{Rd,c} = 1,046 \text{ kN}$
- $V_{Ed} = 72.59 \text{ kN}$
- $V_{Ed} / V_{Rd} = 0.0694 \rightarrow \text{O.K.}$

4. Check Two-Way Shear

(1) Calculate Shear at Face of Column

Column	Position	Offset (mm)	U (mm)	β	k	V _{Ed} (MPa)	V _{Rd,max} (MPa)	Ratio	Remark
C01	Interior	0.000	2,000	6.497	0.000	0.184	3.825	0.0480	OK
C02	Interior	0.000	2,000	6.497	0.000	0.183	3.825	0.0478	OK

- $U = 2,000 \text{ mm}$
- $a = (\frac{a_x}{b_y})^2, \quad b = (\frac{a_y}{b_x})^2$
- $\beta = 1 + 1.8 \sqrt{a+b} = 6.497$
- $V_{Ed} = \frac{\beta N_{Ed}}{U d} = 0.184 \text{ MPa}$
- $f_{ctd} = \alpha_{ct} f_{ctk} / \gamma_c = 0.000 \text{ MPa}$

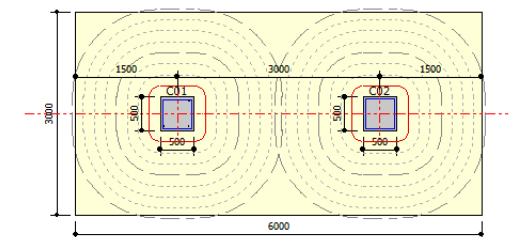
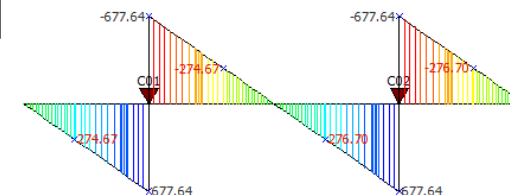
5. Calculate moment capacity

(1) Calculate moment capacity (Direction X)

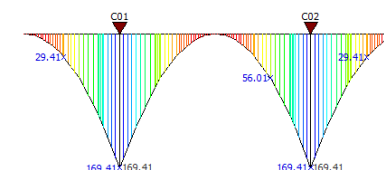
Position	Top/Bottom	f _{cd} (MPa)	z (mm)	A _s (mm ²)	M _{Ed} (kN-m/m)	M _{Rd} (kN-m/m)	Ratio	Remark
Cantilever(L)	Bottom	348	400	2,581	0.0140	359	0.0000391	OK
Colm (C01)	Bottom	348	400	2,581	14.38	359	0.0400	OK
Span (C01-C02)	Top	348	400	2,581	-17.98	359	0.0500	OK
Colm (C02)	Bottom	348	400	2,581	14.38	359	0.0400	OK
Cantilever(R)	Bottom	348	400	2,581	0.00746	359	0.0000208	OK

- $M_{Rd} = f_{yd} A_s z$

Diagram



(2) Bending Moment Diagram (Direction X)











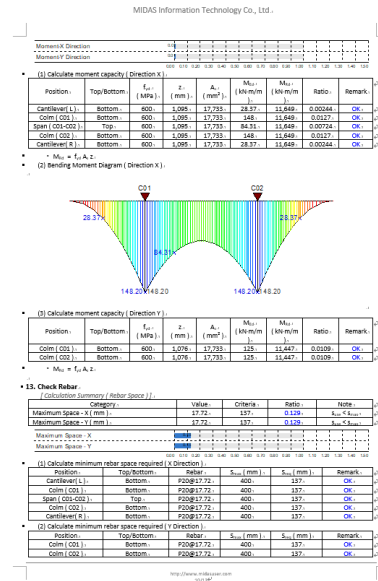
5. Reporting speed for MS word format

- *Reporting time for MS word format has been reduced by improving algorithm.*

Example Model (RC structure of 6F)

- ✓ National Code : Eurocode2:04
- ✓ Module: Combined Footing Design
- ✓ Report Page : 13 EA

	Word : Detail
	Word : Summary
	Word : Input List
	Excel : Detail
	Excel : Summary
	Excel : Input List
	LibXL : Detail
	LibXL : Summary

[illegible][illegible]

[Reporting Time : Design+ 2020 vs Design+ 2021 (New Version)]

Design+ 2020**Design+ 2021**

0.41sec

■ 28.66 sec

99% reduction in reporting time