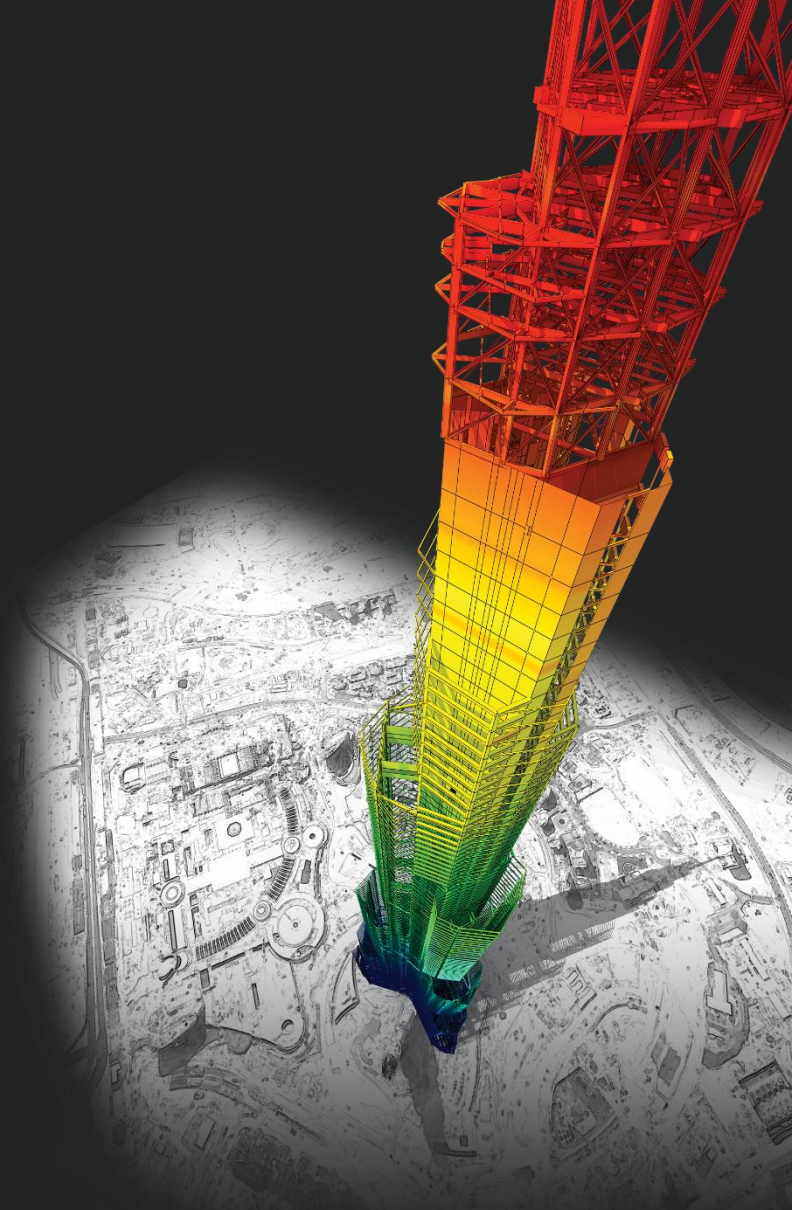


Release Note

Release Date : May. 2022

Product Ver. : midas Gen 2022 (v2.1) and Design+2022(v1.2)



DESIGN OF General Structures

Integrated Design System for Building and General Structures

Enhancements

- **midas Gen**

1. New Taiwanese RC Code : TWN-USD111	4
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3. Fixes and Improvement	10

↓ Go to **FREE TRIAL**

↓ **INSTALLER** DOWNLOAD

midas **Gen**

1. New Taiwanese RC Code : TWN-USD111

Added TWN-USD111 Code for RC Design

Concrete Design Code

Concrete Design Code

Design Code : **TWN-USD111**

Apply Special Provisions for Seismic Design
 Consider strong column-weak beam on last floor

Shear for Design Update by Code

$R^*Vc(a1 \cdot \sum(Mpr)/L) > \max(Vu1, Vu2)/2$, R = 0

Method
 MAX(Vu1, Vu2) MIN(Vu1, Vu2) Vu1 Vu2

$Vu1, Vg + a1 \cdot \sum(Mpr)/L$, a1 = 1
 $Vu2, Vg + a2 \cdot \sum(Veq)$, a2 = 2

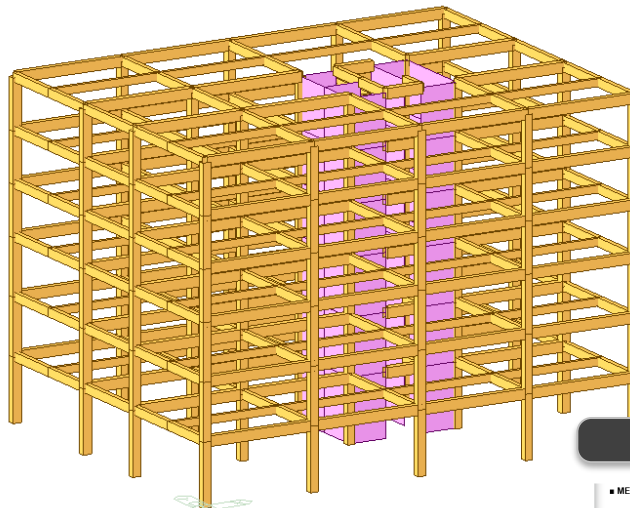
SCWB Design/Checking Method
 Design Strength Nominal Strength

Torsion Design

Torsion Reduction Factor for Beam : 1

Moment Redistribution Factor for Beam : 1

P-M Curve Calculation Method



Graphic Report

Preview Window

No : 101

1. Design Condition

Design Code : TWN-USD111 UNIT SYSTEM : kgf, cm
 Member Number : 55 (PM, 55 (Shear))
 Material Data : fc = 244.732, fy = 4078.86, fys = 4078.86 kgf/cm²
 Column Height : 500 cm
 Section Property : C1 (No : 101)
 Rebar Pattern : 34-9-D22 Ast = 131.58 cm² (pst = 0.010)

2. Axial and Moments Capacity

Load Combination : 2 (Pos. I)
 Concentric Max. Axial Load qPn-max = 1671079 kgf
 Axial Load Ratio Pu / qPn = 1303920 / 1671079 = 0.780 < 1.000 ... O.K
 Moment Ratio Mcr / qPn = 591559 / 1585104 = 0.628 < 1.000 ... O.K
 Mcy / qMny = 780813 / 1215883 = 0.628 < 1.000 ... O.K
 Mzr / qMnz = 836127 / 1018988 = 0.628 < 1.000 ... O.K

P-M Interaction Diagram

Detail Report

MEMBER NAME : C1 (Section ID : 101, Element No.55)

1. Member Information

1) Design Code : TWN-USD111
 2) Section Property : C1 (ID : 101)
 3) Material : $f_c = 244.732 \text{ kgf/cm}^2$, $f_y = 4078.86 \text{ kgf/cm}^2$, $f_{ys} = 4078.86 \text{ kgf/cm}^2$
 $E_c = 187.728 \text{ g/cm}^2$, $E_s = 204.000 \text{ kgf/cm}^2$
 4) Length : L = 500cm
 5) Reinforcement Data

2. Axial moment capacity (End, 0.00R)

LCB : cGB2, 1.2 (D) + 1.6 (L)

qPn / qPn : 1303.920cm² / 1671.08cm² = 0.780 OK
 Mcr / qPn : 591.559cm / 1585.104cm = 0.628 OK
 Mcy / qMny : 636.91cm² / 1013.0cm² = 0.628 OK
 Mzr / qMnz : 836.127cm² / 1585.104cm² = 0.628 OK
 Pmax / Pnom : Pmax = 0.01000 * Pnom = 0.01000 * 0.03000 = 0.03000 OK

3) Check slenderness ratio about major axis
 $K_c = 1.00$
 $L_c = 500.00cm$
 $r_c = 23.1 \text{ cm} = 39.20cm$
 $\lambda_c = \frac{L_c}{r_c} = 12.81$
 (Braced Single curvature)
 $\lambda_{c,lim} = 34 - 12 = 22.0$
 $\lambda_c < \lambda_{c,lim}$ - Not Slender

4) Compute member end moments about minor axis
 $M_{DLS} = 2.37 \text{ tonfm}$, $M_{DLS} = 4.23 \text{ tonfm}$ (For Dead Load)
 $M_{DLS} = 6.86 \text{ tonfm}$, $M_{DLS} = 9.54 \text{ tonfm}$ (For Gravity Load)
 $M_{DLS} = 6.86 \text{ tonfm}$, $M_{DLS} = -9.54 \text{ tonfm}$

5) Check slenderness ratio about minor axis
 $K_c = 1.00$
 $L_c = 500.00cm$
 $r_c = 23.1 \text{ cm} = 39.20cm$
 $\lambda_c = \frac{L_c}{r_c} = 12.81$

Design Result Table

TWN-USD111 RC-Column Design Result Dialog

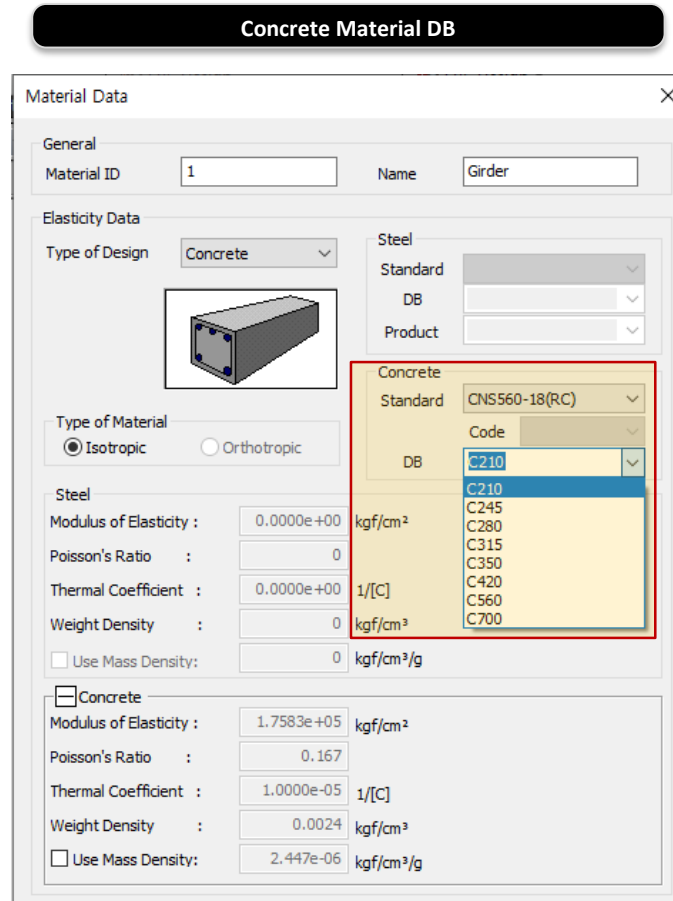
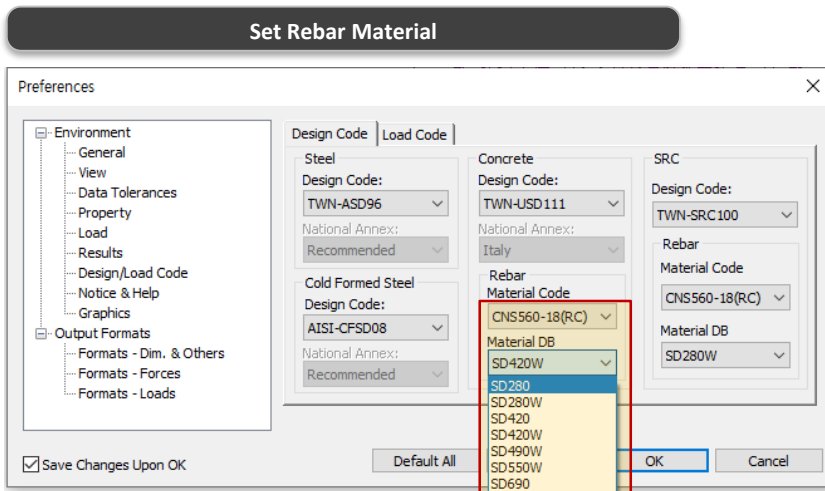
Code : TWN-USD111 Unit : kgf , cm Primary Sorting Option

Sorted by Member Property

MEMB SECT	SEL	Section	fc	fy	LCB	Pu	Mc	Ast	V-Rebar	LCB	Vu.end	Rat-V.end	As-H.end	H-Rebar.end
		Bc Hc	Height	fys		Rat-P	Rat-M				Vu.mid	Rat-V.mid	As-H.mid	H-Rebar.mid
0		C1	244.732	4078.86	2	1303920	991559	131.58	34-9-D22	44	12895.4	0.102	0.0000	2-D10 @350
101		100.0 130.0	500.0	4078.86		0.780	0.626			44	12895.4	0.102	0.0000	2-D10 @350
0		C1	244.732	4078.86	2	1163569	2640129	123.84	32-10-D22	43	25098.9	0.282	0.0000	2-D10 @350
102		100.0 120.0	450.0	4078.86		0.752	0.619			43	25098.9	0.280	0.0000	2-D10 @350
0		C1	244.732	4078.86	2	916370	1145891	100.62	26-8-D22	59	21040.9	0.226	0.0000	2-D10 @350
103		100.0 100.0	400.0	2800.00		0.714	0.579			59	21040.9	0.225	0.0000	2-D10 @350
0		C1	420.000	4200.00	2	704123	1221249	85.140	22-8-D22	59	21265.7	0.303	0.0000	2-D10 @350

1.New Taiwanese RC Code : TWN-USD111

Added Concrete/Rebar DB and Material as per CNS560-18



Rebar strength as per CNS560-18

	Yield Strength Fy (kgf/cm ²)
SD280	2,800
SD280W	2,800
SD420	4,200
SD420W	4,200
SD490W	5,000
SD550W	5,600
SD690	7,000

1.New Taiwanese RC Code : TWN-USD111

Added TWN-USD111 Load Combinations

For Concrete Design

Automatic Generation of Load Combinations

Option
 Add Replace

Code Selection
 Steel Concrete SRC
 Cold Formed Steel Footing
 Aluminum

Design Code : **TWN-USD111**

Scale Up of Response Spectrum Load Cases
 Scale Up Factor : 1 RX

Factor	Load Case	Add	Modify	Delete
1.130	RX			
1.540	RY			

Manipulation of Construction Stage Load Case
 ST : Static Load Case
 CS : Construction Stage Load Case
 ST Only CS Only ST+CS

Consider Orthogonal Effect
 Set Load Cases for Orthogonal Effect...
 100 : 30 Rule
 SRSS(Square-Root-of-Sum-of-Squares)

Generate Additional Load Combinations
 for Special Seismic Load
 for Vertical Seismic Forces
 Factors for Seismic Design...

Will Execute Construction Stage Analysis
 Consider Losses for Prestress Load Cases
 Transfer Stage : 1 Define Factors
 Service Load Stage : 1

OK Cancel

Table 5.3.1 Load Combinations

Provision	Load factors and combinations	Remark
Strength Load Combinations	1.4 D	<ul style="list-style-type: none"> D : Dead load L : Live load Lr : Roof live load S : Snow load R : Rain load W : Wind load E : Earthquake load
	1.2D+1.6L + 0.5(Lr or S or R)	
	1.2D +1.6(Lr or S or R) + (1.0L or 0.8W)	
	1.2D ± 1.6W + 1.0L +0.5(Lr or S or R)	
	1.2D ± 1.0E + 1.0L +0.2S	
	0.9D ± 1.6W	
	0.9D ± 1.0E	

Load Combinations

General | Steel Design | Concrete Design | SRC Design | Cold Formed Steel Design | Footing Design | Aluminum Design

Load Combination List

No	Name	Active	Type	Description
1	cLCB1	Stren	Add	1.4D
2	cLCB2	Stren	Add	1.2(D) + 1.6(L) + 0.5LR
3	cLCB3	Stren	Add	1.2D + 1.6LR + 1.0L
4	cLCB4	Stren	Add	1.2D + 1.6LR + 0.8WX
5	cLCB5	Stren	Add	1.2D + 1.6LR + 0.8WY
6	cLCB6	Stren	Add	1.2D + 1.6LR - 0.8WX
7	cLCB7	Stren	Add	1.2D + 1.6LR - 0.8WY
8	cLCB8	Stren	Add	1.2D + 1.6WX + 1.0L + 0.5LR
9	cLCB9	Stren	Add	1.2D + 1.6WY + 1.0L + 0.5LR
10	cLCB10	Stren	Add	1.2D - 1.6WX + 1.0L + 0.5LR
11	cLCB11	Stren	Add	1.2D - 1.6WY + 1.0L + 0.5LR
12	cLCB12	Stren	Add	1.2D + 1.0EX + 1.0L
13	cLCB13	Stren	Add	1.2D + 1.0EY + 1.0L
14	cLCB14	Stren	Add	1.2D - 1.0EX + 1.0L
15	cLCB15	Stren	Add	1.2D - 1.0EY + 1.0L
16	cLCB16	Stren	Add	0.9D + 1.6WX
17	cLCB17	Stren	Add	0.9D + 1.6WY
18	cLCB18	Stren	Add	0.9D - 1.6WX
19	cLCB19	Stren	Add	0.9D - 1.6WY
20	cLCB20	Stren	Add	0.9D + 1.0EX

Load Cases and Factors

LoadCase	Factor
DL(ST)	1.2000
WX(ST)	1.6000
LL(ST)	1.0000
LR(ST)	0.5000
*	

1.New Taiwanese RC Code : TWN-USD111

Design > RC Design Code > TWN-USD111 ,When Apply Special Provision for Seismic Design checked

SCWB Design/Checking Method

1)

2)

Use Tips

Add options for SCWB Design /Checking method

- 1) Can ignore the k1 factor. In this case k1 is considered as 1.0
- 2) Define the reduction factor of column, Φ_c factor. If 'Nominal Strength' is selected, reduction factor will be used

Reference Code

[Design Strength Method]

1)

$$M_{c,T} = \left(\frac{6}{5}\right) (\phi_b M_{nb,L} + \phi_b M_{nb,R}) * k1 * \left(\frac{M_{ce,T}}{M_{ce,T} + M_{ce,B}}\right)$$

[Nominal Strength Method]

$$M_{c,T} = \left(\frac{6}{5}\right) (M_{nb,L} + M_{nb,R}) * k1 * \left(\frac{M_{ce,T}}{M_{ce,T} + M_{ce,B}}\right) * \Phi_c$$

1)

2)

Check the interaction for biaxial shear

Check the interaction for biaxial shear

Use Tips

Added options for Biaxial Shear Strength for columns

The interaction of one-way shear forces acting along the orthogonal axes needs to be considered as per TWN-USD111 (same as ACI 318-19). The provision 22.5.1.11 states that : "if shear ratio is more than 0.5 by each directions, Eq.(22.5.1.11) shall be satisfied."

Biaxial shear strength was not considered in the previous code. Added an option to check the interaction of shear force ratio.

Reference Code

22.5.1.11 若 $\frac{V_{u,x}}{\phi V_{n,x}} > 0.5$ 且 $\frac{V_{u,y}}{\phi V_{n,y}} > 0.5$, 則應符合式 (22.5.1.11) 。 From TWN-USD111

$$\frac{V_{u,x}}{\phi V_{n,x}} + \frac{V_{u,y}}{\phi V_{n,y}} \leq 1.5 \tag{22.5.1.11}$$

22.5.1.11 If $\frac{v_{u,x}}{\phi v_{n,x}} > 0.5$ and $\frac{v_{u,y}}{\phi v_{n,y}} > 0.5$ then Eq. From ACI318-19

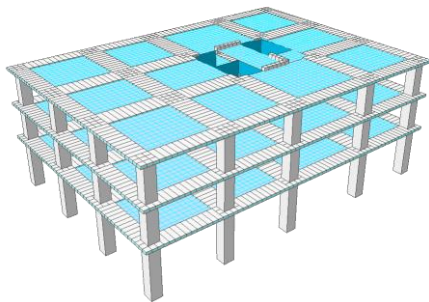
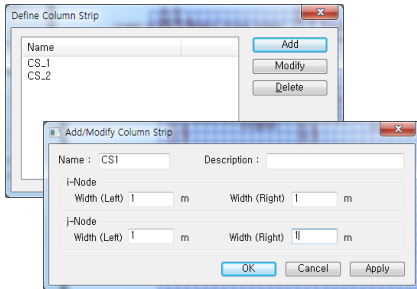
(22.5.1.11) shall be satisfied.

$$\frac{v_{u,x}}{\phi v_{n,x}} + \frac{v_{u,y}}{\phi v_{n,y}} \leq 1.5 \tag{22.5.1.11}$$

2. Column Strip Design & Checking : KDS 41 30 : 2018 (Korean Code)

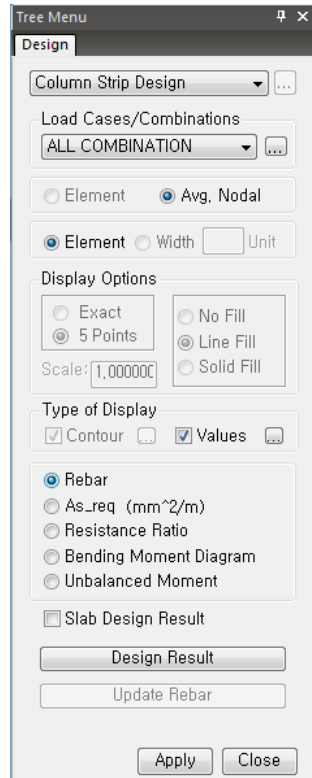
Produce the Column Strip Design / Checking results considering the unbalanced moment as per KDS

Define Column Strip

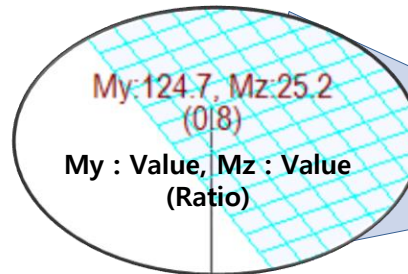
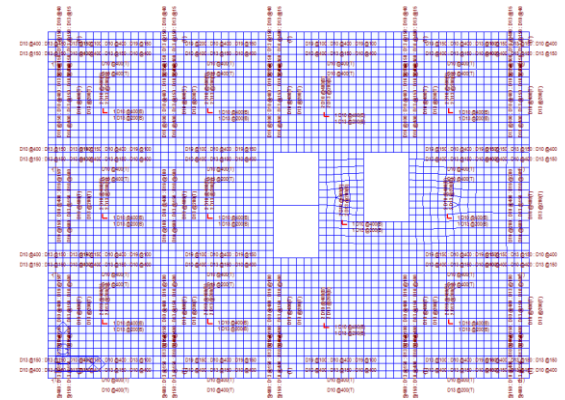


Check the defined strip area

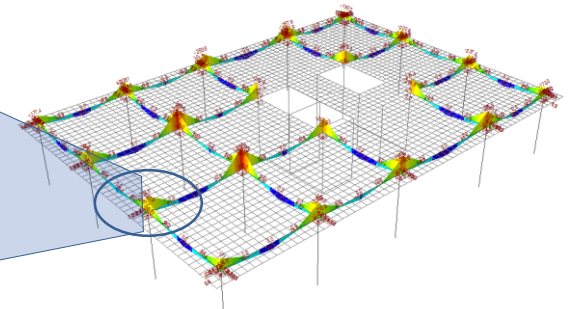
Column Strip Design



Rebar design result



Strength ratio to unbalance moment by KDS code



Strip Design Force

Accurate and quick design results can be secured through strip design considering the unbalance moment.

2. Column Strip Design & Checking : KDS 41 30 : 2018 (Korean Code)

Supports automatic calculation of effective beam width method by Grossman's and Choi & Song's formula.

Add/Modify Effective Beam Width

Add/Modify Effective Beam

Name : EB1 Description :

i-Node
Width (Left) 1.17851311 m Width (Right) 1.17851311 m

j-Node
Width (Left) 1.17851311 m Width (Right) 1.17851311 m

OK Cancel Apply

Create Effective Beam

Tree Menu

Create Effective Beam

Create Effective Beam

Start Number

Node Number : 1

Element Number : 1

Effective Beam Name

EB1

Material

No.	Name
1	1: C30

Nodal Connectivity

Intersect: Node Elem

Apply Close

Design Analysis Control

Design Analysis Control

Effective Beam Analysis

Stiffness Control

EBWM FEM

OK Cancel

Calculation of Effective Width

Method : Choi and Song

Span
#1 : 4.45 m #2 : 5.15 m
#3 : 0.5 m

Column Size
C1 : 0.45 m C2 : 1.35 m

Location of Effective Beam
Interior

Joint
Rigid Bar

Calculate

2.955

OK Cancel

Choi and Song's Formula

Calculation of Effective Width

Method : Grossman

Span
#1 : 4.45 m #2 : 5.15 m
#3 : 0.5 m

Column Size
C1 : 0.45 m C2 : 1.35 m

Slab Thickness
Cc : 0.02 m h : 0.25 m

Location of Effective Beam
Interior

Location of Column Support
Interior KFP : 0

Lateral Drift
Hs/400 Kd : 0
α : 0

Calculate

2.35702621722846

OK Cancel

Grossman's Formula

Quick & efficient workflow with automatic calculation of effective beam widths.

Other major improvements and bug fixes are as follows.

Thank you very much for your interest and participation in program improvement.

[midas Gen 2022 v2.1] Fixes and Improvements

- [RS Design spectrum] DPT.1301/1302-61 enabled regardless of this country code option
- [SCWB Design/Checking Method] Improvement of design strength method calculation method of ACI series
- [Wall Design Result] NTC2018>Wall : Improved so that wall ID + Story / Wall ID (WID) outputs the same Asw-H result
- [RC Two way shear] Improved to find the punching shear parameter by adjusting the tolerance at the intersection with the element side
- [midas GSD] Modified so that the load combination of the linked Gen is loaded the same from GSD
- [RC column] Correction of As_H requirement(Horizontal reinforcement) of column according to unit conversion in graphic report
- [EC3 Cold Formed Design] For cross-sections that are symmetrical about the y - y axis, apply the Ncr calculation formula according to Eq.6.35