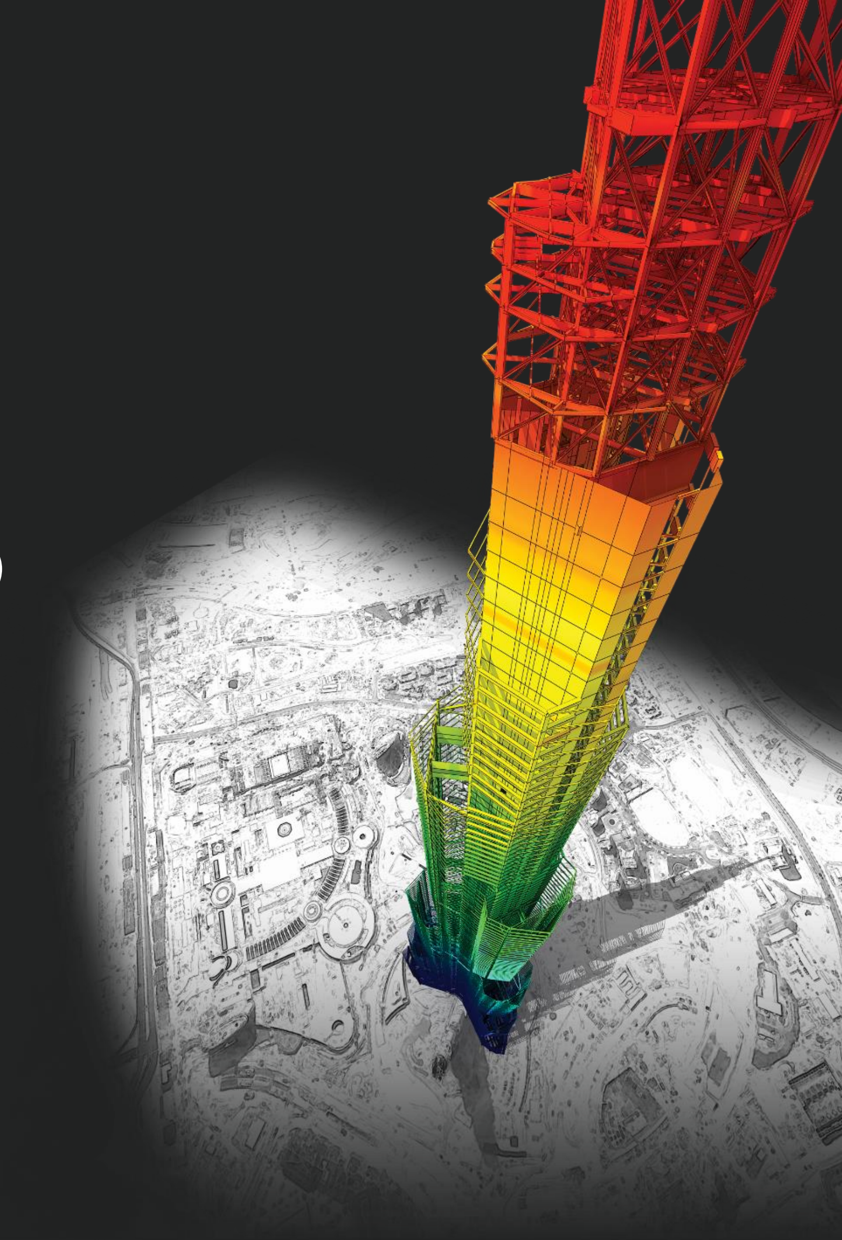
Release Note

Release Date : Sep. 2021

Product Ver. : midas Gen 2021 (v3.1) and Design+2021(v3.1)



DESIGN OF General Structures

Integrated Design System for Building and General Structures

Enhancements

• midas Gen

• midas Design+

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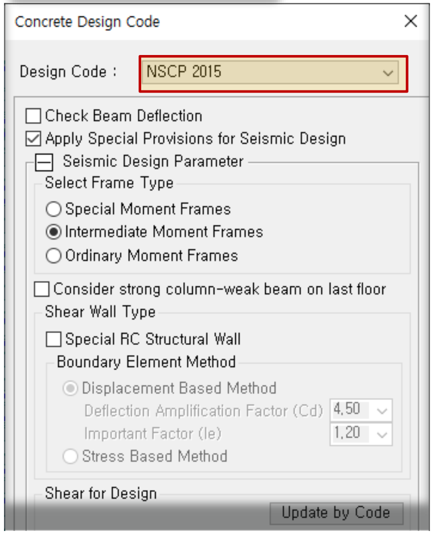
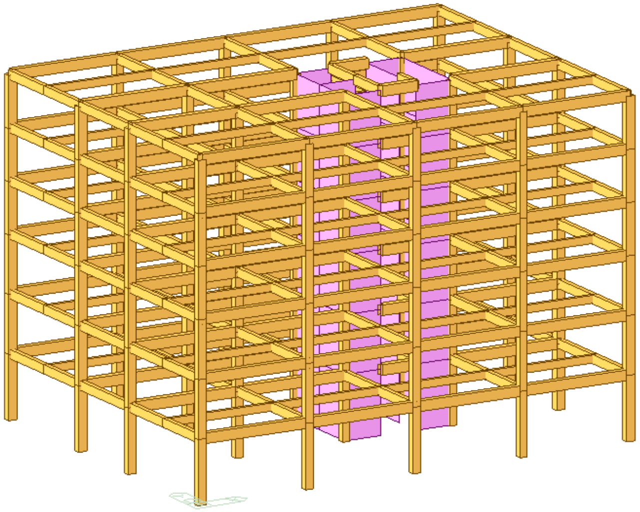
midas Gen

1. Addition of Philippines RC Code(NSCP2015)

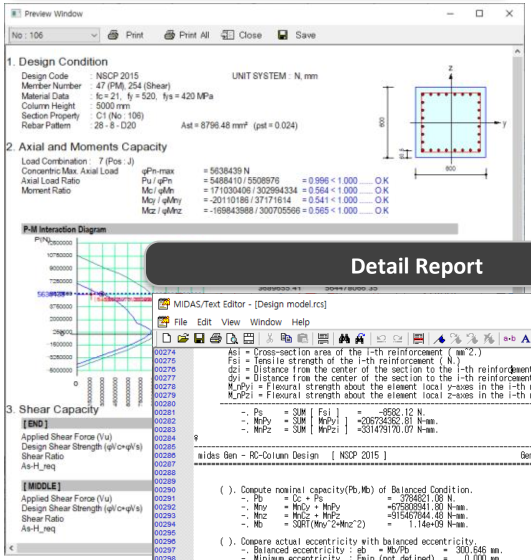
Add Philippines Code (NSCP 2015) of RC Design

Concrete Design Code

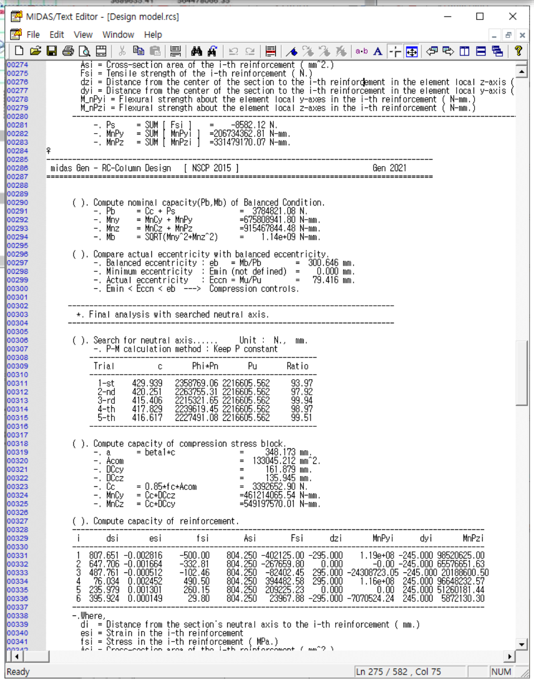




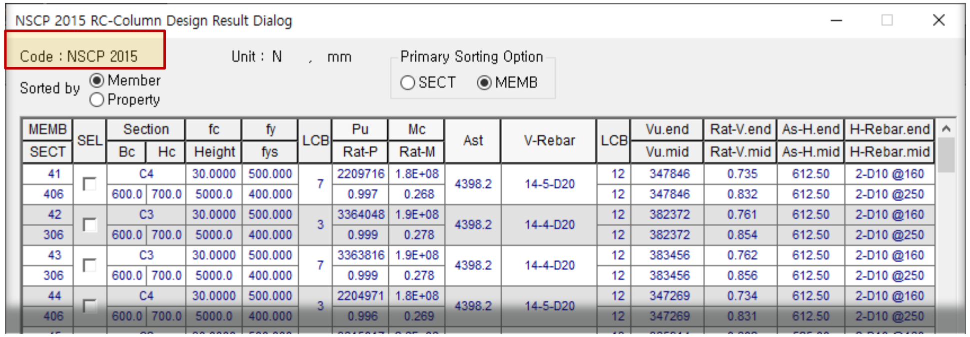
Graphic Report



Detail Report



Design Result Table



NSCP 2015 RC-Column Design Result Dialog

Code : NSCP 2015 Unit : N , mm

Sorted by: ◉ Member ○ Property

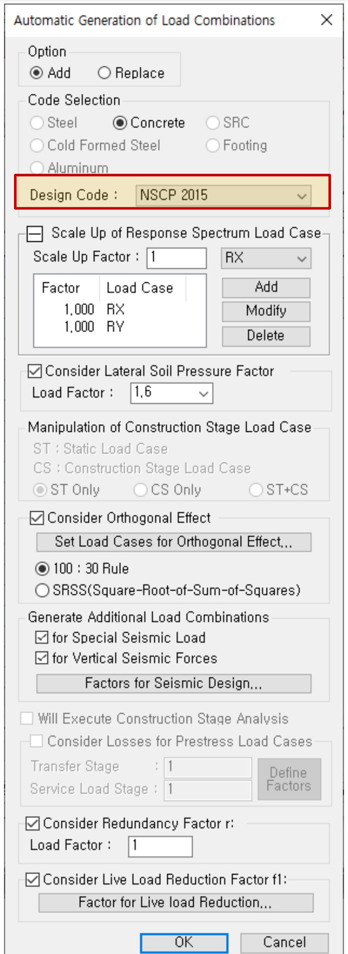
Primary Sorting Option: ○ SECT ◉ MEMB

MEMB / SECT	SEL	Section / Bc	Hc	fc / Height	fy / fys	LCB	Pu / Rat-P	Mc / Rat-M	Ast	V-Rebar	LCB	Vu.end / Vu.mid	Rat-V.end / Rat-V.mid	As-H.end / As-H.mid	H-Rebar.end / H-Rebar.mid
41	☐	C4		30.0000	500.000	7	2209716	1.8E+08	4398.2	14-5-D20	12	347846	0.735	612.50	2-D10 @160
406		600.0	700.0	5000.0	400.000		0.997	0.268			12	347846	0.832	612.50	2-D10 @250
42	☐	C3		30.0000	500.000	3	3364048	1.9E+08	4398.2	14-4-D20	12	382372	0.761	612.50	2-D10 @160
306		600.0	700.0	5000.0	400.000		0.999	0.278			12	382372	0.854	612.50	2-D10 @250
43	☐	C3		30.0000	500.000	7	3363816	1.9E+08	4398.2	14-4-D20	12	383456	0.762	612.50	2-D10 @160
306		600.0	700.0	5000.0	400.000		0.999	0.278			12	383456	0.856	612.50	2-D10 @250
44	☐	C4		30.0000	500.000	3	2204971	1.8E+08	4398.2	14-5-D20	12	347269	0.734	612.50	2-D10 @160
406		600.0	700.0	5000.0	400.000		0.996	0.269			12	347269	0.831	612.50	2-D10 @250

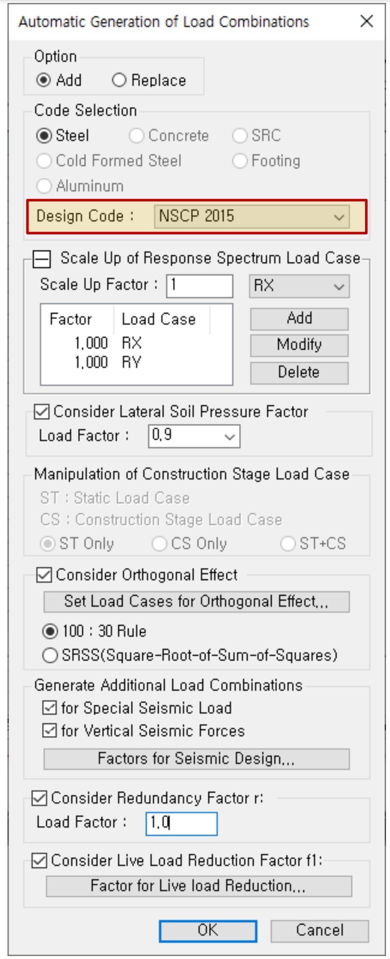
2. Addition of Philippines Load Combinations

Add Philippines Load combinations as per NSCP2015

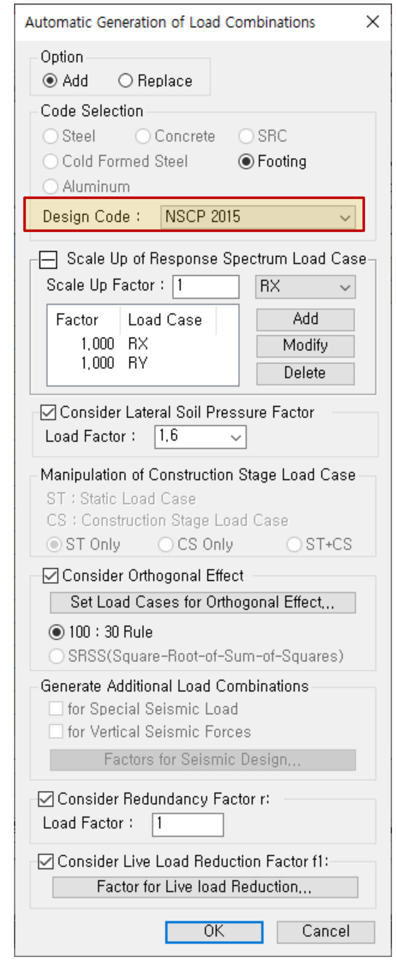
For Concrete Design



For Steel Design



For Footing Design



2. Addition of Philippines Load Combinations

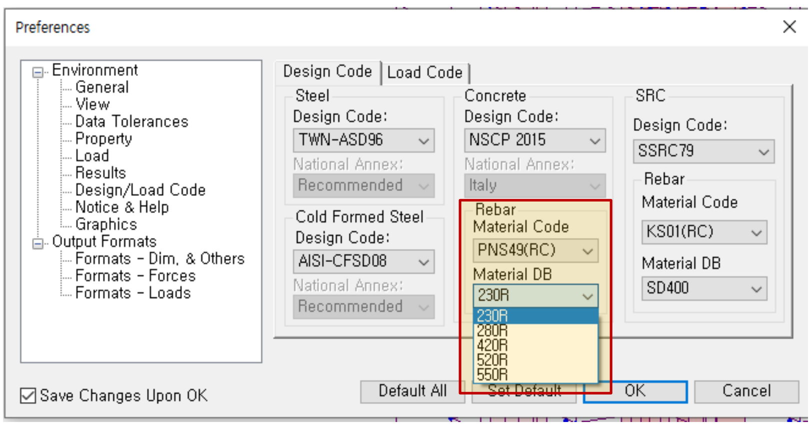
Add Philippines Load combinations as per NSCP2015

Prevision	**Load factors and combinations**	**Remark**
Strength Load Combinations as per 203.3.1	1.4 (D+F)	• D : Dead Load • F : Fluid Load • T : Temperature Load • H : Lateral pressure load of soil and water in soil • L : Live load • Lr : Roof live load • R : Rain load • W : Wind load • E : Earthquake load (=ρEh + Ev) • Em : maximum effect of horizontal and vertical earth-quake force (=Ω_0Eh) - Alternate load combinations as per 203.4.2 is auto-generated in footing design for serviceability verification. • *f*1 : Live load reduction factor *-1.0 :* for floors in places of public assembly, for live loads in excess of 4.8kPa, and for garage live loads, or *- 0.5* : for other live loads • ρ : Redundancy factor as per equation 208-20 • Ω_0 : Seismic force amplification factor as set forth in Section.4.10.1 • Eh : Horizontal earthquake load • Ev : Vertical earthquake load (not provided in Gen2021 v3.1)
	1.2(D+F+T) +1.6(L+H) + 0.5(Lr or R)	
	1.2D +1.6(Lr or R) + (*f*1L or 0.5W)	
	1.2D ± 1.0W + *f*1L +0.5(Lr or R)	
	1.2D ± 1.0E + *f*1L	
	0.9D ± 1.0W + 1.6H	
	0.9D ± 1.0E + 1.6H	
Allowable stress Load Combinations as per 203.4.1	D + F	
	D + H + F + L + T	
	D + H + F + (Lr or R)	
	D + H + F + 0.75[L+T(Lr or R)]	
	D + H + F ± (0.6W or E / 1.4)	
Alternate load combinations as per 203.4.2	D + H + F + 0.75[L + Lr(0.6W or E/1.4)]	
	0.6D ± 0.6W + H	
	0.6D ± E/1.4 + H	
	D + L + (Lr or R)	
	D + L ± 0.6W	
	D + L ± E/1.4	
Special load combinations as per 203.5	1.2D + *f*1L +1.0Em	
	0.9D ± 1.0Em	

3. Addition of Philippines Rebar DB(PNS 49)

Add Rebar DB and material as per PNS49

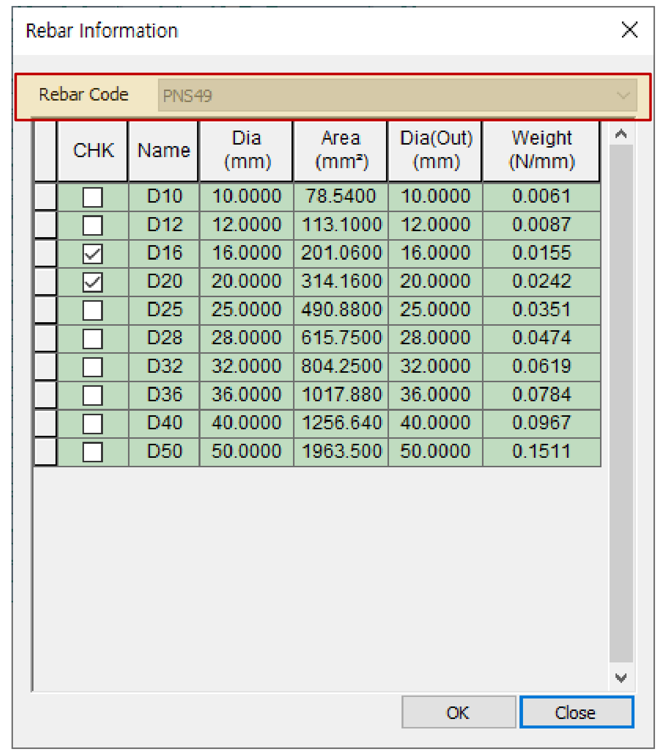
Set Rebar Material



Rebar strength as per PNS49

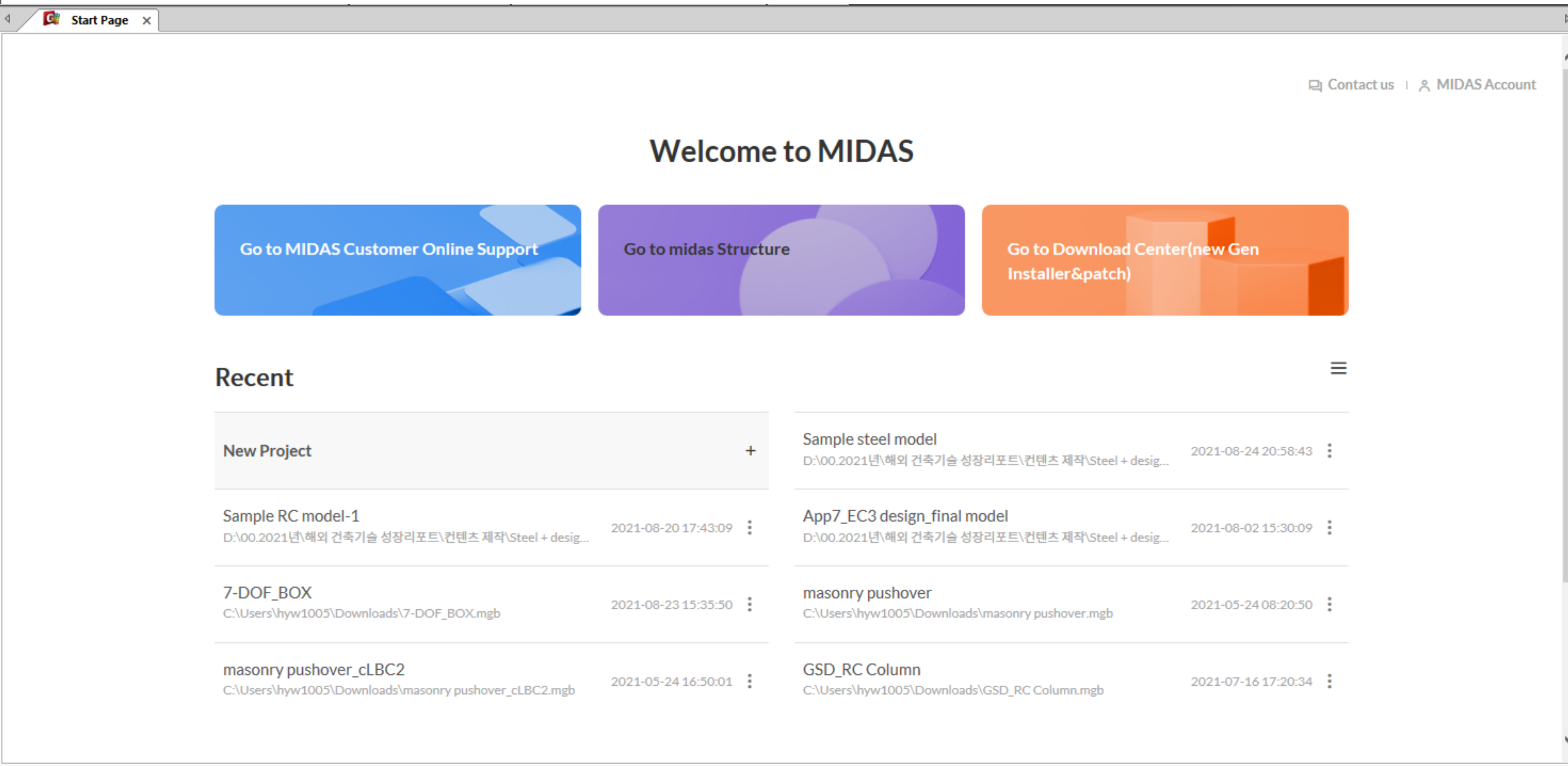
	Tensile Strength Fu (Mpa)	Yield Strength Fy (Mpa)
230R	390	230
280R	480	280
420R	620	420
520R	690	520
550R	725	550

Rebar DB as per PNS49 & Design rebar setting



4. Improvement of Start page

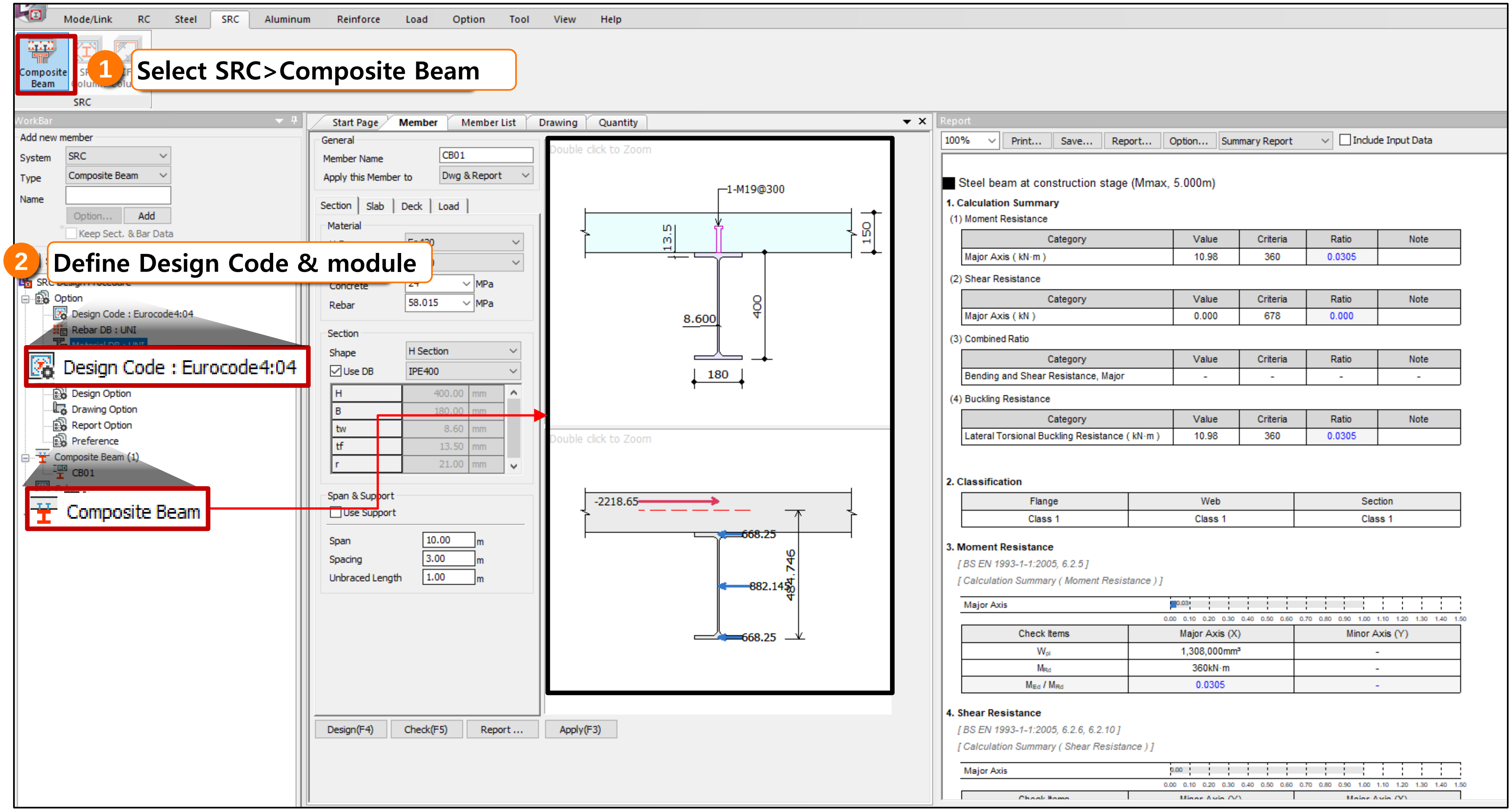
-You can see the latest news of midas program in banner.
-Recently used projects can be opened by clicking on the list.



midas Design+

1. Composite beam design as per Eurocode

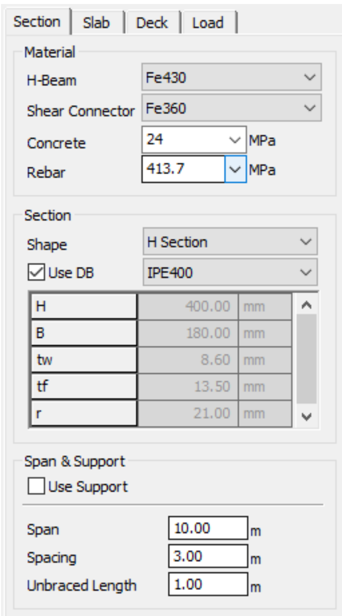
Support composite beam design as per Eurocode 4: 04



1. Composite beam design as per Eurocode

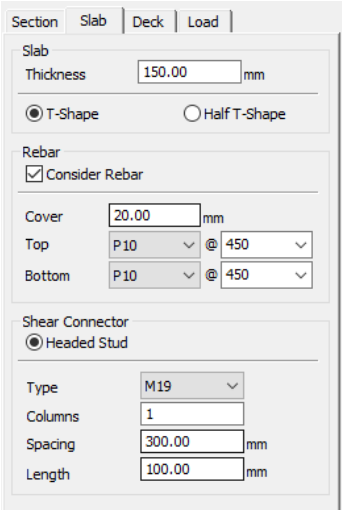
Procedure of Composite Beam Design

Define Section



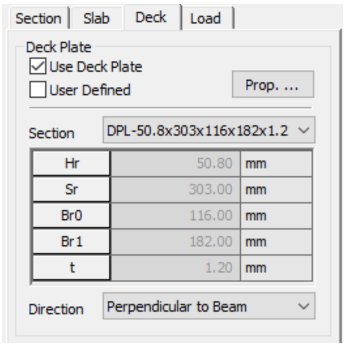
Step 1.
Define material properties & sections of H-beam/Shear connector /Concrete/rebar
And input the beam's span/spacing/unbraced length.

Define Slab information



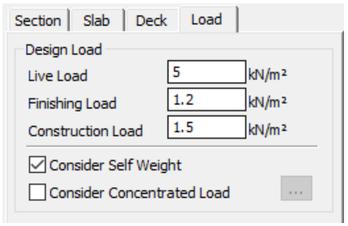
Step 2.
Define Slab information.
(Thickness,rebar, shear connector type)

Define Deck information



Step 3.
Define deck plate information and deck directions.

Define Loads



Step 4.
Define design loads.
Input construction load for constructions stage, and
Live load & finishing load for normal stage.

1. Composite beam design as per Eurocode

Summary & Detail design report in Composite beams

Summary design report

■ Steel beam at construction stage (Mmax, 4.000m)

1. Calculation Summary

(1) Moment Resistance

Category	Value	Criteria	Ratio
Major Axis (kN·m)	61.03	360	0.170

(2) Shear Resistance

Category	Value	Criteria	Ratio
Major Axis (kN)	0.000	678	0.000

(3) Combined Ratio

Category	Value	Criteria	Ratio
Bending and Shear Resistance, Major	-	-	-

(4) Buckling Resistance

Category	Value	Criteria	Ratio
Lateral Torsional Buckling Resistance (kN·m)	61.03	360	0.170

■ Composite beam at normal stage (Mmax, 4.000m)

1. Calculation Summary

(1) Bending resistance

Category	Value	Criteria	Ratio
Bending resistance (kN·m)	230	698	0.330

(2) Check vertical shear resistance

Category	Value	Criteria	Ratio
Vertical shear resistance (kN)	0.000	678	0.000

(3) Check Longitudinal Shear Resistance

Category	Value	Criteria	Ratio
Longitudinal shear resistance (kN/m)	457	871	0.525

Detail design report

2. Check bending resistance

[Calculation Summary (Bending resistance)]

Category	Value	Criteria	Ratio	Note
		698	0.330	

Check moment resistance

[BS EN 1993-1-1:2005, 6.2.5]

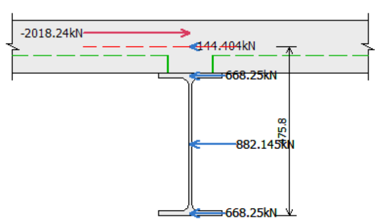
- Plastic N.A. = 476mm
- Coordinate of Plastic N.A. : in Concrete Slab

(2) Calculation for moment capacity of section

[BS EN 1994-1-1:2004, 6.2.1.2 (1)]

Part	Axial Comp. Capacity (kN)	Arm Length (mm)	Moment Capacity (kN·m)
Concrete Slab	-2,018	42.67	86.11
Concrete Slab	0.000	20.27	0.000
Reinforcing Steel	-	-	-
Reinforcing Steel	144	0.000	0.000
Steel Top Flange	668	82.55	55.16
Steel Web	882	276	243
Steel Bottom Flange	668	469	313
Total			$M_{pl,Rd}$ = 698kN·m

[The sign of moment capacity is determined by the direction of the moment regardless of the direction of the force.]



Condition	Equation for M_{Rd}	Value
$x_{pl} \le 0.15h$	$\beta M_{pl,Rd}$	698kN·m

3. Check shear resistance

[Calculation Summary (Shear Resistance)]

Category	Value	Criteria	Ratio	Note
		678	0.000	

Check shear resistance

(1) Calculate shear resistance about major axis (y)

[BS EN 1993-1-1:2005, 6.2.6, 6.2.10]

- No required to check shear buckling
- $A_{vy} = \eta h_w t_w$ = 4,273mm²
- $V_{c,y,Rd} = A_{vx} (f_y \sqrt{3}) / \gamma_{m0}$ = 678kN
- $V_{y,Ed} / V_{c,y,Rd}$ = 0.000 < 1.000

4. Check Longitudinal Shear Resistance

[Calculation Summary (Check Longitudinal Shear Resistance)]

Category	Value	Criteria	Ratio	Note

Check Longitudinal Shear Resistance

(1) Check requirement for stud

[BS EN 1994-1-1:2004, 6.6.3.1]

[Check size]

- d = 19.00mm, 16.00mm ≤ d ≤ 25.00mm
- h_{sc} = 100mm
- h_{sc} / d = 5.263 > 3.000

[Check material]

- f_u = 360MPa ≤ 500MPa

(2) Calculate longitudinal shear force

[BS EN 1994-1-1:2004, 6.6.3.1]

- $n = E_a / E_{cm}$ = 6.734
- $N_{c,el}$ = 243kN
- $N_{c,f}$ = 4,080kN
- $M_{pl,Rd}$ = 698kN·m
- $M_{el,Rd}$ = 83.96kN·m
- $V_{L,Ed} = (N_{c,f} - N_{c,el}) \dfrac{M_{Ed} - M_{el,Rd}}{M_{pl,Rd} - M_{el,Rd}}$ = 914kN
- $v_{L,Ed} = V_{L,Ed} / L_v$ = 457kN/m

(3) Calculate design shear resistance of headed stud

[BS EN 1994-1-1:2004, 6.6.3.1]

- α = 1.000
- h_{sc} / d = 5.263
- $P_{Rd,1} = \dfrac{0.8 f_u \pi d^2 / 4}{\gamma_v}$ = 65.33kN/stud
- $P_{Rd,2} = 0.29 \alpha d^2 \dfrac{(f_{ck} E_{cm})^{1/2}}{\gamma_v}$ = 72.46kN/stud
- $P_{Rd} = \min [P_{Rd,1} , P_{Rd,2}]$ = 65.33kN/stud
- $v_{L,Rd} = \dfrac{P_{Rd} N}{s_c}$ = 871kN/m

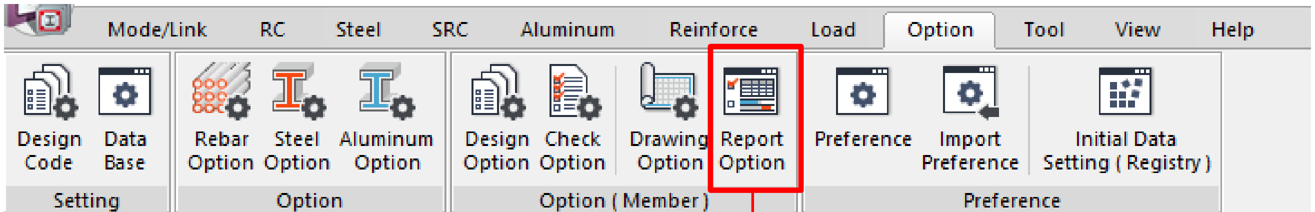
(4) Check Longitudinal Shear Resistance

- $v_{L,Ed} / v_{L,Rd}$ = 0.525 < 1.000

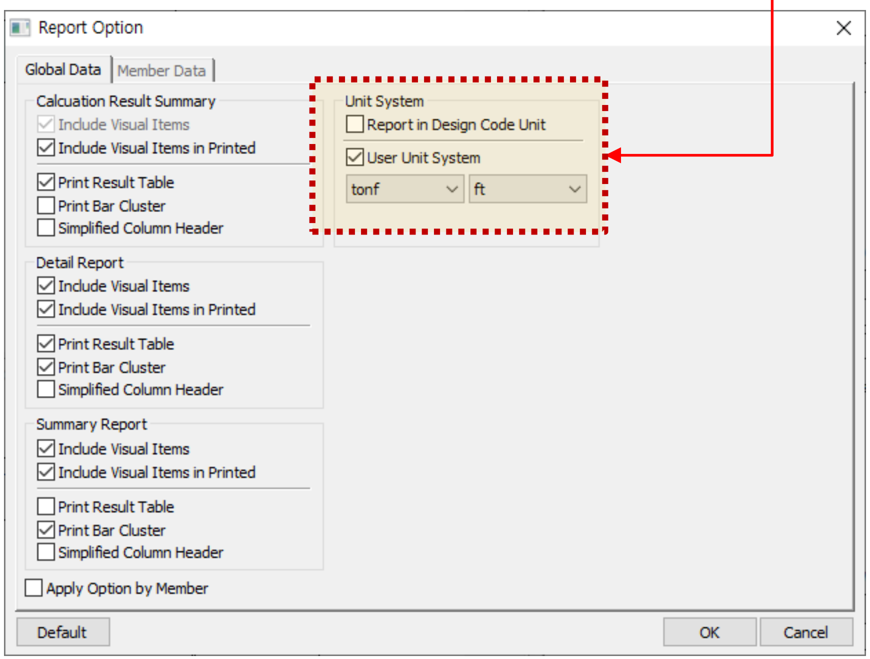
※ Serviceability check including vibration check is not provided in Design+2021 v3.1

2. Design report generation by user defined unit

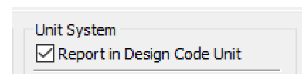
The unit system of Design report can be changed by user defined.



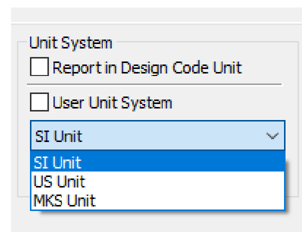
Define Option



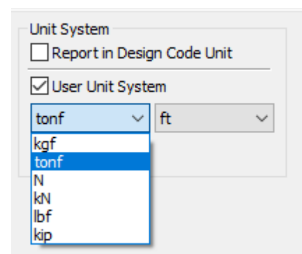
Select unit system in report



Case 1.
Report in Design code unit.



Case 2.
Report in International system of Units(SI) or US or MKS units

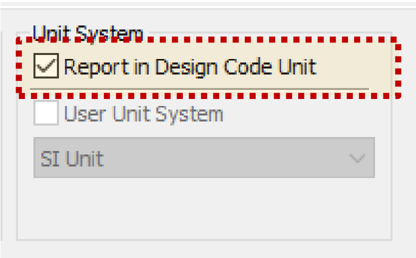


Case 3.
Report in user defined unit system

2. Design report generation by user defined unit

The unit system of Design report can be changed by user defined.

Case 1



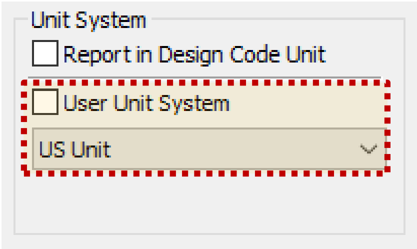
1. General Information

Design Code	Unit System	F_{ck}	F_y	F_{ys}
Eurocode2:04	N,mm	24.00N/mm²	400N/mm²	400N/mm²

2. Length & Factor

Section	K_x	K_y	L_x	L_y	γ_c	γ_s	α_{cc}	$\varnothing_{ef}$
500 x 500 mm	1.000	1.000	3.500m	3.500m	1.500	1.150	0.850	1.000

Case 2



1. General Information

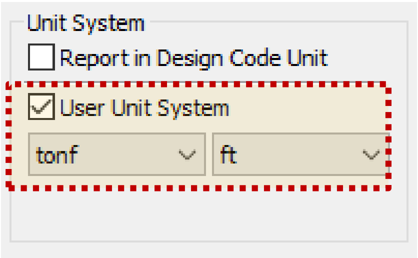
Design Code	Unit System	F_{ck}	F_y	F_{ys}
Eurocode2:04	N,mm	3.481kip/in²	58.02kip/in²	58.02kip/in²

[User defined unit system is applied. (US Unit System : lbf, in)]

2. Length & Factor

Section	K_x	K_y	L_x	L_y	γ_c	γ_s	α_{cc}	$\varnothing_{ef}$
19.69 x 19.69 in	1.000	1.000	11.48ft	11.48ft	1.500	1.150	0.850	1.000

Case 3



1. General Information

Design Code	Unit System	F_{ck}	F_y	F_{ys}
Eurocode2:04	N,mm	227tonf/ft²	3,789tonf/ft²	3,789tonf/ft²

[User defined unit system is applied. (Unit System : tonf, ft)]

2. Length & Factor

Section	K_x	K_y	L_x	L_y	γ_c	γ_s	α_{cc}	$\varnothing_{ef}$
1.640 x 1.640 ft	1.000	1.000	11.48ft	11.48ft	1.500	1.150	0.850	1.000