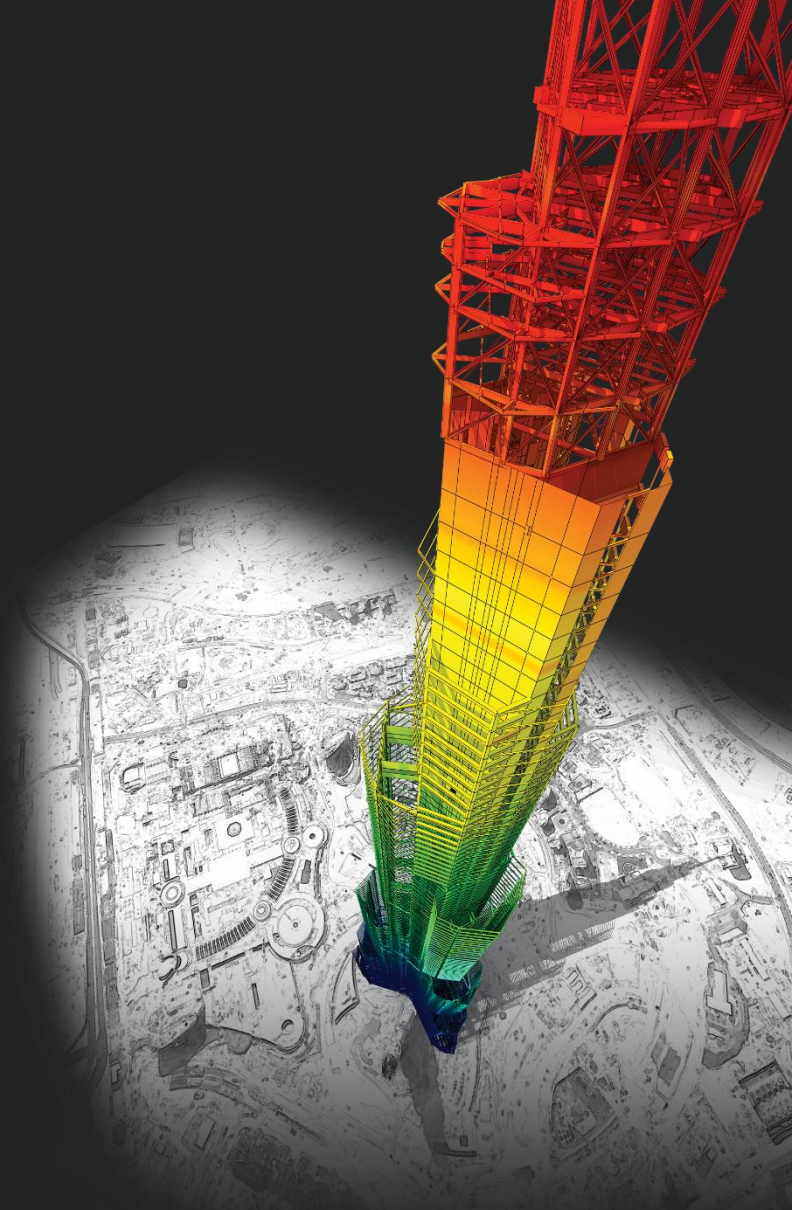


Release Note

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*

1) Addition of Philippines RC Code(NSCP2015)	4
2) Addition of Philippines Load Combinations	5
3) Addition of Philippines Rebar DB(PNS 49)	7
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- *midas Design+*

1) Add Composite Beam Design as per Eurocode	10
2) Design report generation by user defined unit	13

midas **Gen**

1. Addition of Philippines RC Code(NSCP2015)

Add Philippines Code (NSCP 2015) of RC Design

Concrete Design Code

Concrete Design Code

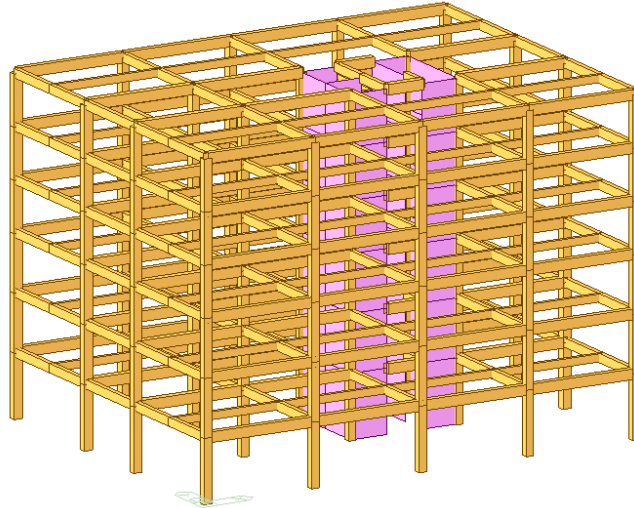
Design Code : NSCP 2015

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 Update by Code



Graphic Report

Preview Window

No. 106 Print Print All Close Save

1. Design Condition

Design Code NSCP 2015 UNIT SYSTEM : N, mm
 Member Number 47 (PM, 254 (Shear))
 Material Data f_c = 21, f_y = 520, f_{ys} = 420 MPa
 Column Height 5000 mm
 Section Property CI (No. 109)
 Rebar Pattern 28 - 8 - D20
 Ast = 8796.48 mm² (rat = 0.024)

2. Axial and Moments Capacity

Load Combination : 7 (Pos.)
 Concentric-Max. Axial Load gF_h-max = 5638439 N
 P_u / gF_h = 5488410 / 5508976 = 0.996 < 1.000 O.K.
 Moment Ratio Mc / gM_h = 171030406 / 302964334 = 0.564 < 1.000 O.K.
 M_y / gM_h = -20119186 / 37177614 = -0.541 < 1.000 O.K.
 M_z / gM_h = -16684388 / 300705566 = 0.555 < 1.000 O.K.

P-M Interaction Diagram

Detail Report

MIDAS/Text Editor - [Design model.rcs]

File Edit View Window Help

AS1 = Cross-section area of the i-th reinforcement (mm²)
 Fsi = Tensile strength of the i-th reinforcement (N)
 dci = Distance from the center of the section to the i-th reinforcement in the element local z-axis (mm)
 M_{yp1} = Flexural strength about the element local y-axis in the i-th reinforcement (N-mm)
 M_{zp1} = Flexural strength about the element local z-axis in the i-th reinforcement (N-mm)

3. Shear Capacity

[END]
 Applied Shear Force (Vu) 32297.12 N
 Design Shear Strength (phi-c*Vc) 30873.262 N
 Shear Ratio 0.072233395
 As-H_req 233.97 mm²

[MIDDLE]
 Applied Shear Force (Vu) 32297.12 N
 Design Shear Strength (phi-c*Vc) 30873.262 N
 Shear Ratio 0.072233395
 As-H_req 233.97 mm²

Midas Gen - RC-Column Design [NSCP 2015] Gen 2021

- () Compute nominal capacity(P_n/M_n) of Balanced Condition.
 - P_b = C_c * P_s = 290421.08 N-m.
 - M_n = M_{ny} + M_{nz} = 67603041.50 N-m-m.
 - M_z = M_{z1} + M_{z2} = 91547944.46 N-m-m.
 - M_n = SQR(M_n² + M_z²) = 1.14e+09 N-m-m.
- () Compute actual eccentricity with balanced eccentricity.
 - Balanced eccentricity : e_b = M_n/P_n = 309.545 mm.
 - Minimum eccentricity : e_{min} (not defined) = 0.000 mm.
 - Actual eccentricity : e_{act} = M_n/P_n = 75.416 mm.
 - e_{min} < e_{act} < e_b ->-> Compression controls.
- * Final analysis with searched neutral axis.

() Search for neutral axis..... Unit : N, mm
 -- P-R calculation method : Keep P constant

Iter	c	Phi*Ph	Pu	Ratio
1-1st	429.929	226769.06	211605.562	50.177
2-1st	420.751	226729.31	211605.562	51.782
3-1st	415.406	221520.65	211605.562	59.394
4-1st	417.924	229919.45	211605.562	81.277
5-1st	416.617	2227491.08	211605.562	59.511

() Compute capacity of compression stress block.
 - s = Beta1*c = 346.173 mm.
 - A_{cb} = 133085.412 mm².
 - O_{cb} = 151.878 mm.
 - A_s = 15.446 mm².
 - C_c = 0.85*fc*A_{cb} = 39262.95 N-m-m.
 - M_{ny} = C_c*O_{cb} = 46121005.54 N-m-m.
 - M_z = C_c*O_z = 46457570.01 N-m-m.

() Compute capacity of reinforcement.

i	dci	esi	fsi	Asi	Fsi	dci	M _{yp1}	dci	M _{zp1}
1	907.651	-0.002916	-520.00	804.250	-402125.00	-295.000	1.19e+09	-245.000	96520255.00
2	647.706	-0.001694	-335.81	804.250	-267699.80	-0.000	-0.00	-245.000	65676561.63
3	407.751	-0.001824	-512.45	804.250	-404445.23	-295.000	24209723.05	-245.000	20169980.59
4	76.634	0.002482	436.50	804.250	394462.59	295.000	1.16e+09	245.000	96468202.57
5	325.573	0.001501	260.15	804.250	209226.29	295.000	0.00	245.000	51520181.24
6	395.504	0.001163	236.89	804.250	229818.88	-295.000	-2070624.24	245.000	58722130.30

where,
 dci = Distance from the section's neutral axis to the i-th reinforcement (mm).
 esi = Strain in the i-th reinforcement.
 fsi = Stress in the i-th reinforcement (N/mm²).
 Asi = Cross-sectional area of the i-th reinforcement (mm²).

Ready [Ln 275 / 582, Col 75] NUM

Design Result Table

NSCP 2015 RC-Column Design Result Dialog

Code : NSCP 2015 Unit : N, mm Primary Sorting Option

Sorted by Member Property

SECT MEMB

MEMB	SECT	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
41		C4	30.0000	500.000		2209716	1.8E+08				347846	0.735	612.50	2-D10 @160
406		600.0 700.0	5000.0	400.000	7	0.997	0.268	4398.2	14-5-D20	12	347846	0.832	612.50	2-D10 @250
42		C3	30.0000	500.000		3364048	1.9E+08				382372	0.761	612.50	2-D10 @160
306		600.0 700.0	5000.0	400.000	3	0.999	0.278	4398.2	14-4-D20	12	382372	0.854	612.50	2-D10 @250
43		C3	30.0000	500.000		3363816	1.9E+08				383456	0.762	612.50	2-D10 @160
306		600.0 700.0	5000.0	400.000	7	0.999	0.278	4398.2	14-4-D20	12	383456	0.856	612.50	2-D10 @250
44		C4	30.0000	500.000		2204971	1.8E+08				347269	0.734	612.50	2-D10 @160
406		600.0 700.0	5000.0	400.000	3	0.996	0.269	4398.2	14-5-D20	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

Automatic Generation of Load Combinations

Option
 Add Replace

Code Selection
 Steel Concrete SRC
 Cold Formed Steel Footing
 Aluminum

Design Code : NSCP 2015

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

Factor	Load Case	Add
1,000	RX	
1,000	RY	

Consider Lateral Soil Pressure Factor
 Load Factor : 1.6

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

Consider Orthogonal Effect

100 : 30 Rule
 SRSS(Square-Root-of-Sum-of-Squares)

Generate Additional Load Combinations
 for Special Seismic Load
 for Vertical Seismic Forces

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

Consider Redundancy Factor r:
 Load Factor : 1

Consider Live Load Reduction Factor f1:

For Steel Design

Automatic Generation of Load Combinations

Option
 Add Replace

Code Selection
 Steel Concrete SRC
 Cold Formed Steel Footing
 Aluminum

Design Code : NSCP 2015

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

Factor	Load Case	Add
1,000	RX	
1,000	RY	

Consider Lateral Soil Pressure Factor
 Load Factor : 0.9

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

Consider Orthogonal Effect

100 : 30 Rule
 SRSS(Square-Root-of-Sum-of-Squares)

Generate Additional Load Combinations
 for Special Seismic Load
 for Vertical Seismic Forces

Consider Redundancy Factor r:
 Load Factor : 1.0

Consider Live Load Reduction Factor f1:

For Footing Design

Automatic Generation of Load Combinations

Option
 Add Replace

Code Selection
 Steel Concrete SRC
 Cold Formed Steel Footing
 Aluminum

Design Code : NSCP 2015

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

Factor	Load Case	Add
1,000	RX	
1,000	RY	

Consider Lateral Soil Pressure Factor
 Load Factor : 1.6

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

Consider Orthogonal Effect

100 : 30 Rule
 SRSS(Square-Root-of-Sum-of-Squares)

Generate Additional Load Combinations
 for Special Seismic Load
 for Vertical Seismic Forces

Consider Redundancy Factor r:
 Load Factor : 1

Consider Live Load Reduction Factor f1:

2. Addition of Philippines Load Combinations

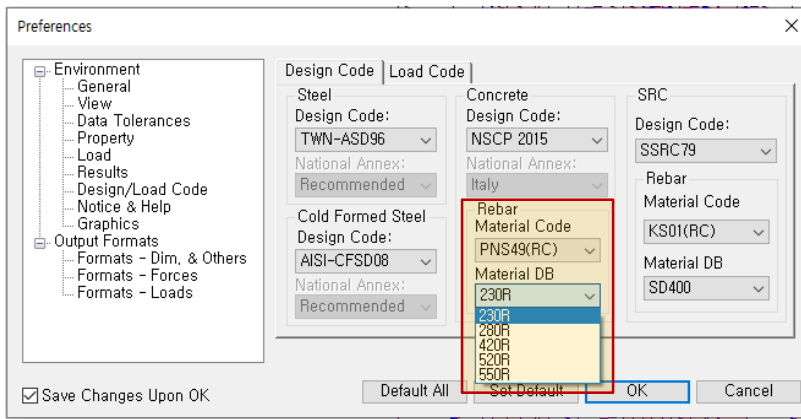
Add Philippines Load combinations as per NSCP2015

Prevision	Load factors and combinations	Remark
Strength Load Combinations as per 203.3.1	1.4 (D+F)	<ul style="list-style-type: none"> 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 ($=\rho E_h + E_v$) Em : maximum effect of horizontal and vertical earth-quake force ($=\Omega_0 E_h$)
	1.2(D+F+T) + 1.6(L+H) + 0.5(Lr or R)	
	1.2D + 1.6(Lr or R) + ($f_1 L$ or 0.5W)	
	1.2D ± 1.0W + $f_1 L$ + 0.5(Lr or R)	
	1.2D ± 1.0E + $f_1 L$	
	0.9D ± 1.0W + 1.6H	
	0.9D ± 1.0E + 1.6H	
Allowable stress Load Combinations as per 203.4.1	D + F	- Alternate load combinations as per 203.4.2 is auto-generated in footing design for serviceability verification.
	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)]	<ul style="list-style-type: none"> -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)
	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 + $f_1 L$ + 1.0Em	
	0.9D ± 1.0Em	

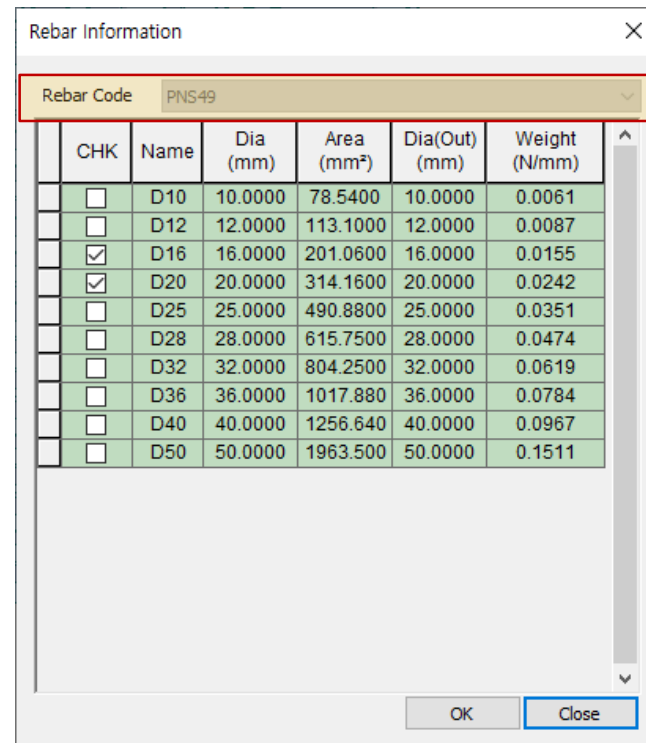
3. Addition of Philippines Rebar DB(PNS 49)

Add Rebar DB and material as per PNS49

Set Rebar Material



Rebar DB as per PNS49 & Design rebar setting



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

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.

The screenshot shows the MIDAS Start Page interface. At the top right, there are links for "Contact us" and "MIDAS Account". The main heading is "Welcome to MIDAS". Below this, there are three prominent buttons: "Go to MIDAS Customer Online Support" (blue), "Go to midas Structure" (purple), and "Go to Download Center(new Gen Installer&patch)" (orange). Underneath, a "Recent" section displays a list of projects with their names, file paths, and timestamps. A hamburger menu icon is visible on the right side of the "Recent" section.

Recent		
New Project	+	
Sample RC model-1	D:\00.2021년\해외 건축기술 성장리포트\컨텐츠 제작\Steel + desig...	2021-08-20 17:43:09
7-DOF_BOX	C:\Users\hyw1005\Downloads\7-DOF_BOX.mgb	2021-08-23 15:35:50
masonry pushover_cLBC2	C:\Users\hyw1005\Downloads\masonry pushover_cLBC2.mgb	2021-05-24 16:50:01
Sample steel model	D:\00.2021년\해외 건축기술 성장리포트\컨텐츠 제작\Steel + desig...	2021-08-24 20:58:43
App7_EC3 design_final model	D:\00.2021년\해외 건축기술 성장리포트\컨텐츠 제작\Steel + desig...	2021-08-02 15:30:09
masonry pushover	C:\Users\hyw1005\Downloads\masonry pushover.mgb	2021-05-24 08:20:50
GSD_RC Column	C:\Users\hyw1005\Downloads\GSD_RC Column.mgb	2021-07-16 17:20:34

midas **Design+**

1. Composite beam design as per Eurocode

Support composite beam design as per Eurocode 4: 04

1 Select SRC>Composite Beam

2 Define Design Code & module

Design Code : Eurocode4:04

Composite Beam

Steel beam at construction stage (Mmax, 5.000m)

1. Calculation Summary

(1) Moment Resistance

Category	Value	Criteria	Ratio	Note
Major Axis (kN-m)	10.98	360	0.0305	

(2) Shear Resistance

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

(3) Combined Ratio

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

(4) Buckling Resistance

Category	Value	Criteria	Ratio	Note
Lateral Torsional Buckling Resistance (kN-m)	10.98	360	0.0305	

2. Classification

Flange	Web	Section
Class 1	Class 1	Class 1

3. Moment Resistance

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

[Calculation Summary (Moment Resistance)]

Check Items	Major Axis (X)	Minor Axis (Y)
W_{pl}	1,308,000mm ³	-
M_{u}	360kN-m	-
M_{Ed} / M_{u}	0.0305	-

4. Shear Resistance

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

[Calculation Summary (Shear Resistance)]

Check Items	Major Axis (X)	Minor Axis (Y)
V_{Ed}	0.00	0.00
$V_{Rd,s}$	0.00	0.00
$V_{Ed} / V_{Rd,s}$	0.00	0.00

1. Composite beam design as per Eurocode

Procedure of Composite Beam Design

Define Section

Section | Slab | Deck | Load

Material

H-Beam Fe430

Shear Connector Fe360

Concrete 24 MPa

Rebar 413.7 MPa

Section

Shape H Section

Use DB IPE400

H	400.00	mm
B	180.00	mm
tw	8.60	mm
tf	13.50	mm
r	21.00	mm

Span & Support

Use Support

Span 10.00 m

Spacing 3.00 m

Unbraced Length 1.00 m

Define Slab information

Section | Slab | Deck | Load

Slab

Thickness 150.00 mm

T-Shape Half T-Shape

Rebar

Consider Rebar

Cover 20.00 mm

Top P10 @ 450

Bottom P10 @ 450

Shear Connector

Headed Stud

Type M19

Columns 1

Spacing 300.00 mm

Length 100.00 mm

Define Deck information

Section | Slab | Deck | Load

Deck Plate

Use Deck Plate Prop. ...

User Defined

Section DPL-50.8x303x116x182x1.2

Hr	50.80	mm
Sr	303.00	mm
Br0	116.00	mm
Br1	182.00	mm
t	1.20	mm

Direction Perpendicular to Beam

Define Loads

Section | Slab | Deck | Load

Design Load

Live Load 5 kN/m²

Finishing Load 1.2 kN/m²

Construction Load 1.5 kN/m²

Consider Self Weight

Consider Concentrated Load ...

Step 1.

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

Step 2.

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

Step 3.

Define deck plate information and deck directions.

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)]

Check moment resistance

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

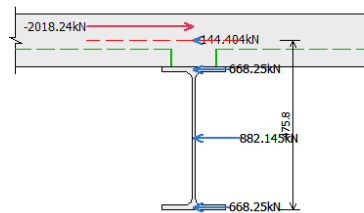
- Plastic N.A. = 476mm
- Coordinate of Plastic N.A. : in Concrete Slab

(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			$M_{pl,Rd} = 698\text{kN}\cdot\text{m}$

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



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

3. Check shear resistance

[Calculation Summary (Shear Resistance)]

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
- $A_{v,y} = \eta h_w t_w = 4,273\text{mm}^2$
- $V_{d,y,Rd} = A_{v,y} (f_y \sqrt{3}) / \gamma_{M0} = 678\text{kN}$
- $V_{d,y,Rd} / V_{d,y,Rd} = 0.000 < 1.000$

4. Check Longitudinal Shear Resistance

[Calculation Summary (Check Longitudinal Shear Resistance)]

Check Longitudinal Shear Resistance

(1) Check requirement for stud

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

[Check size]

- $d = 19.00\text{mm}$, $16.00\text{mm} \leq d \leq 25.00\text{mm}$
- $n_{st} = 100\text{mm}$
- $n_{st} / d = 5.263 > 3.000$

[Check material]

- $f_u = 360\text{MPa} \leq 500\text{MPa}$

(2) Calculate longitudinal shear force

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

- $N_{t,Rd} = 243\text{kN}$
- $N_{t,z} = 4,080\text{kN}$
- $M_{pl,Rd} = 698\text{kN}\cdot\text{m}$
- $M_{pl,Rd} = 83.96\text{kN}\cdot\text{m}$
- $V_{d,Rd} = (N_{t,z} - N_{t,Rd}) \frac{M_{pl,Rd} - M_{pl,Rd}}{M_{pl,Rd} - M_{pl,Rd}} = 914\text{kN}$
- $V_{d,Rd} = V_{d,Rd} / L_w = 457\text{kN/m}$

(3) Calculate design shear resistance of headed stud

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

- $\alpha = 1.000$
- $n_{st} / d = 5.263$
- $P_{Rd,1} = \frac{0.8 f_u \pi d^2 / 4}{\gamma_v} = 65.33\text{kN/stud}$
- $P_{Rd,2} = 0.29 \alpha d^2 \frac{(f_{tk} E_{cm})^{1/2}}{\gamma_v} = 72.46\text{kN/stud}$
- $P_{Rd} = \min [P_{Rd,1}, P_{Rd,2}] = 65.33\text{kN/stud}$
- $V_{d,Rd} = \frac{P_{Rd} N}{s} = 871\text{kN/m}$

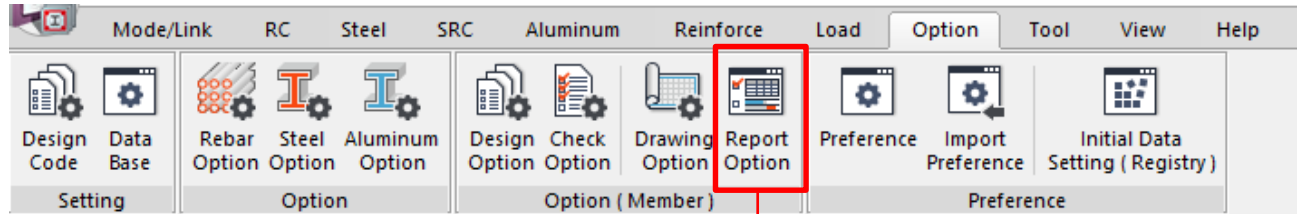
(4) Check Longitudinal Shear Resistance

- $V_{d,Rd} / V_{d,Rd} = 0.525 < 1.000$

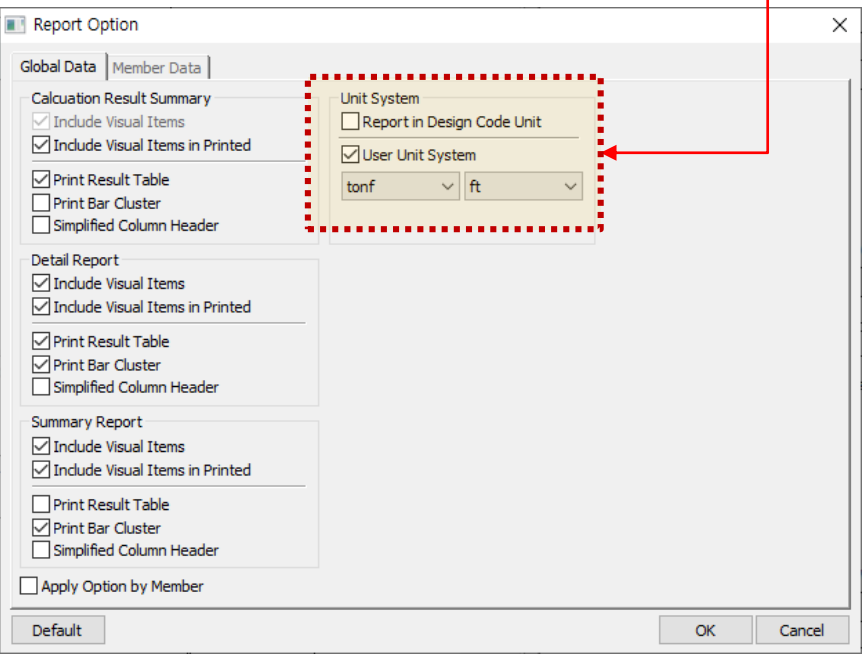
✘ Serviceability check including vibration check is not provided in Design+2021 v3.1

2. Design report generation by user defined unit

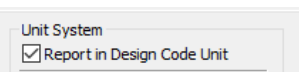
The unit system of Design report can be changed by user defined.



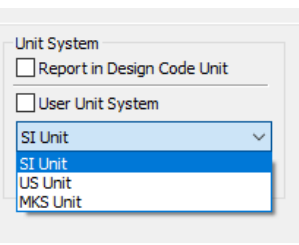
Define Option



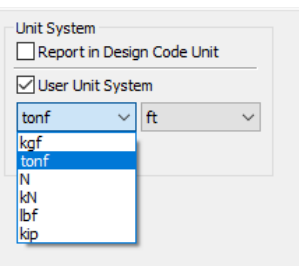
Select unit system in report



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

Unit System

Report in Design Code Unit

User Unit System

SI Unit

1. General Information

Design Code	Unit System	F_{yk}	F_{yk}	F_{yk}
Eurocode2:04	N,mm	24.00N/mm ²	400N/mm ²	400N/mm ²

2. Length & Factor

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

Case 2

Unit System

Report in Design Code Unit

User Unit System

US Unit

1. General Information

Design Code	Unit System	F_{yk}	F_{yk}	F_{yk}
Eurocode2:04	N,mm	3.481kip/in ²	58.02kip/in ²	58.02kip/in ²

[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}	σ_{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

Unit System

Report in Design Code Unit

User Unit System

tonf ft

1. General Information

Design Code	Unit System	F_{yk}	F_{yk}	F_{yk}
Eurocode2:04	N,mm	227tonf/ft ²	3,789tonf/ft ²	3,789tonf/ft ²

[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}	σ_{ef}
1.640 x 1.640 ft	1.000	1.000	11.48ft	11.48ft	1.500	1.150	0.850	1.000