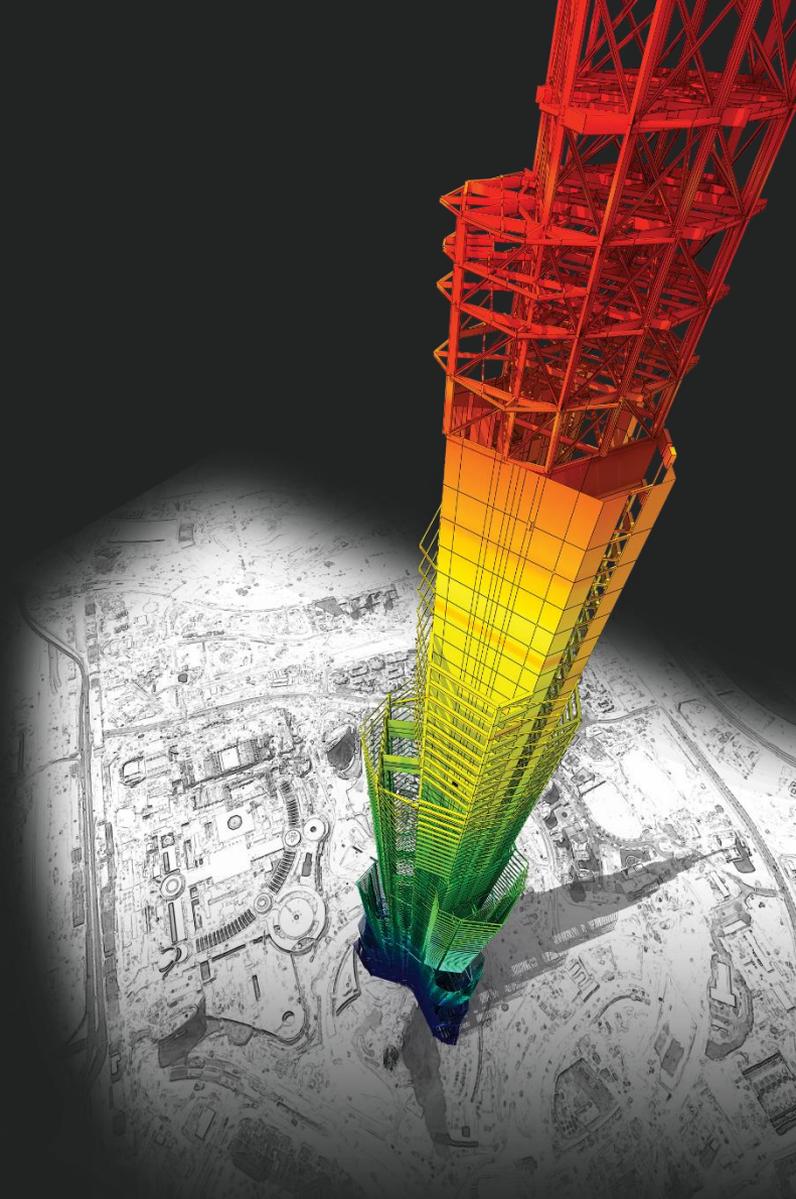


# Release Note

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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
- 4) Improvement of Start Page ..... 8

- *midas Design+*

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

↓ Go to **FREE TRIAL**

↓ **INSTALLER** DOWNLOAD

*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

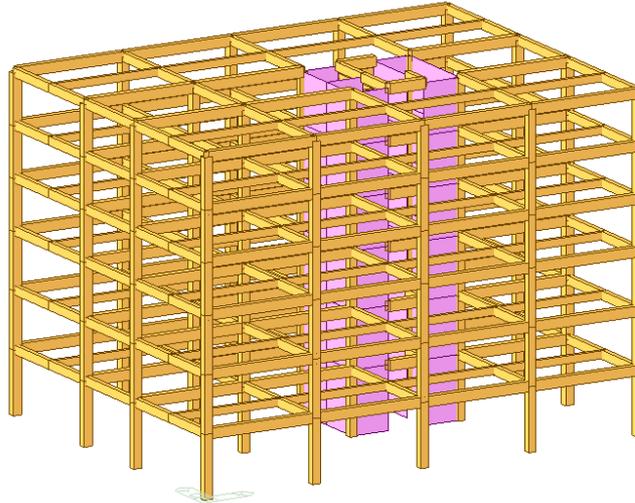
Deflection Amplification Factor (Cd) **4.50**

Important Factor (Ie) **1.20**

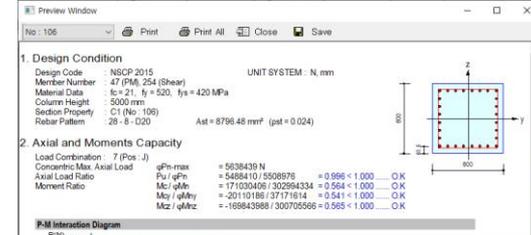
Stress Based Method

Shear for Design

Update by Code



### Graphic Report



### Detail Report

MIDAS/Text Editor - [Design model.rcs]

File Edit View Window Help

3. Shear Capacity

[END]

Applied Shear Force (Vu)

Design Shear Strength (phi-c\*Vn)

Shear Ratio

As-H\_req

[MIDDLE]

Applied Shear Force (Vu)

Design Shear Strength (phi-c\*Vn)

Shear Ratio

As-H\_req

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## 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	Modify	Delete
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  
 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

Consider Redundancy Factor r:  
 Load Factor : 1

Consider Live Load Reduction Factor f1:  
 Factor for Live load Reduction...

OK Cancel

**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	Modify	Delete
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  
 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...

Consider Redundancy Factor r:  
 Load Factor : 1.0

Consider Live Load Reduction Factor f1:  
 Factor for Live load Reduction...

OK Cancel

**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	Modify	Delete
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  
 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...

Consider Redundancy Factor r:  
 Load Factor : 1

Consider Live Load Reduction Factor f1:  
 Factor for Live load Reduction...

OK Cancel

## 2. Addition of Philippines Load Combinations

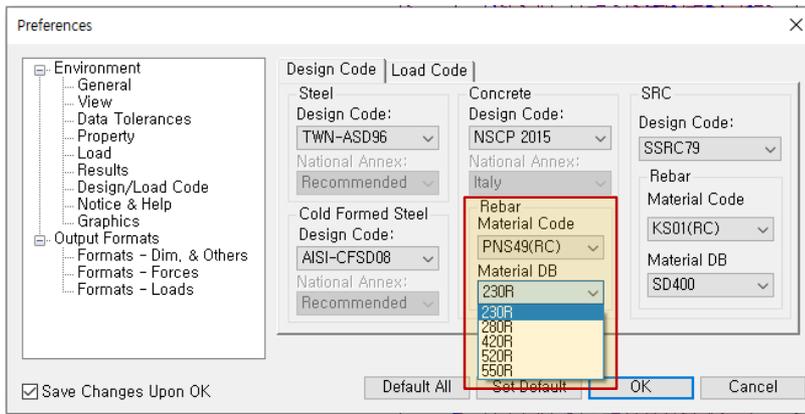
### Add Philippines Load combinations as per NSCP2015

Prevision	Load factors and combinations	Remark
<b>Strength Load Combinations as per 203.3.1</b>	1.4 (D+F)	<ul style="list-style-type: none"> <li>D : Dead Load</li> <li>F : Fluid Load</li> <li>T : Temperature Load</li> <li>H : Lateral pressure load of soil and water in soil</li> <li>L : Live load</li> <li>Lr : Roof live load</li> <li>R : Rain load</li> <li>W : Wind load</li> <li>E : Earthquake load (<math>=\rho E_h + E_v</math>)</li> <li>Em : maximum effect of horizontal and vertical earth-quake force (<math>=\Omega_0 E_h</math>)</li> </ul>
	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	
<b>Allowable stress Load Combinations as per 203.4.1</b>	D + F	<p>- Alternate load combinations as per 203.4.2 is auto-generated in footing design for serviceability verification.</p> <ul style="list-style-type: none"> <li><math>f_1</math> : Live load reduction factor</li> </ul>
	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)	
<b>Alternate load combinations as per 203.4.2</b>	D + H + F + 0.75[L + Lr(0.6W or E/1.4)]	<ul style="list-style-type: none"> <li>-1.0 : for floors in places of public assembly, for live loads in excess of 4.8kPa, and for garage live loads, or</li> <li>- 0.5 : for other live loads</li> <li><math>\rho</math> : Redundancy factor as per equation 208-20</li> <li><math>\Omega_0</math> : Seismic force amplification factor as set forth in Section.4.10.1</li> <li>Eh : Horizontal earthquake load</li> <li>Ev : Vertical earthquake load (not provided in Gen2021 v3.1)</li> </ul>
	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	
<b>Special load combinations as per 203.5</b>	1.2D + $f_1 L$ + 1.0Em	
	0.9D ± 1.0Em	

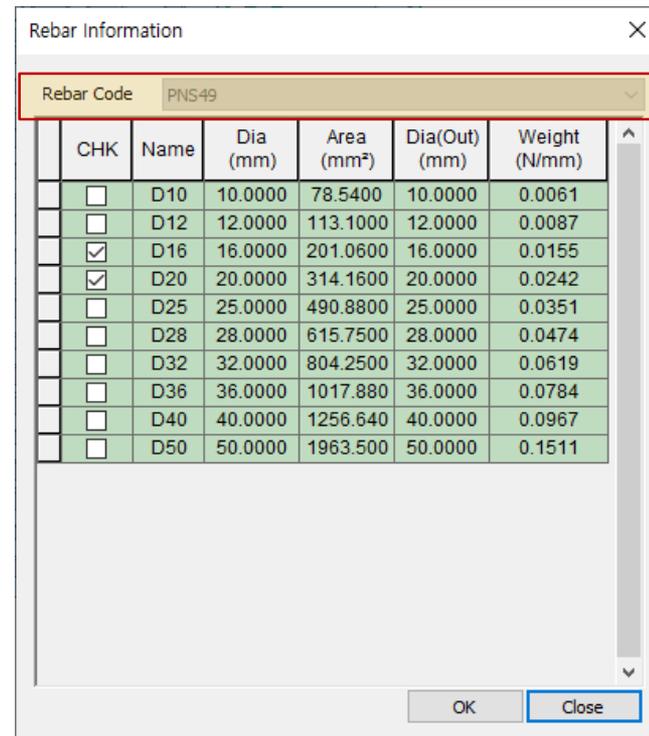
### 3. Addition of Philippines Rebar DB(PNS 49)

**Add Rebar DB and material as per PNS49**

**Set Rebar Material**



**Rebar DB as per PNS49 & Design rebar setting**

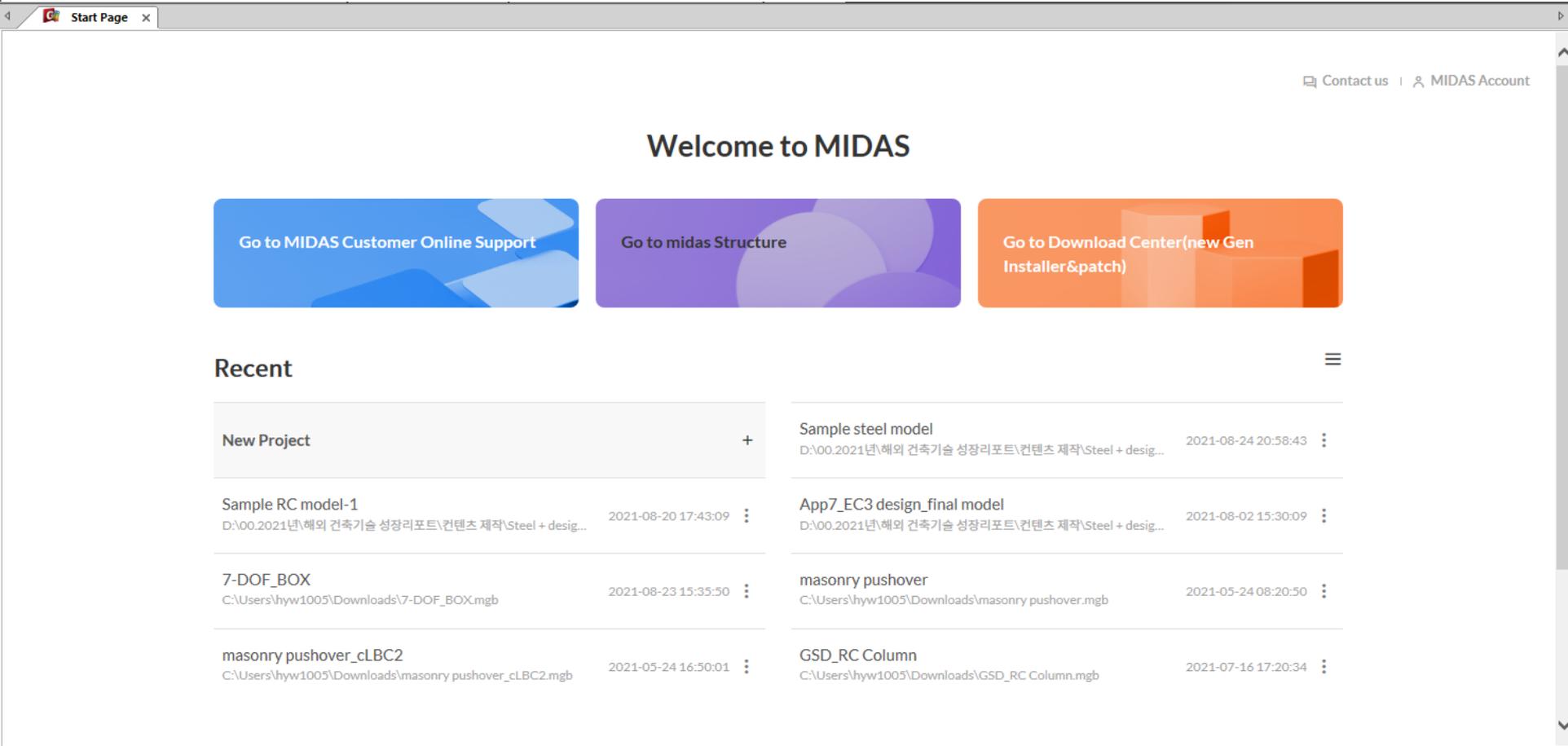


**Rebar strength as per PNS49**

	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.



*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 <sup>3</sup>	-
$M_{u}$	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
$V_{Rd}$	0.00	0.00
$V_{Ed} / V_{Rd}$	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/m<sup>2</sup>

Finishing Load 1.2 kN/m<sup>2</sup>

Construction Load 1.5 kN/m<sup>2</sup>

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 ]

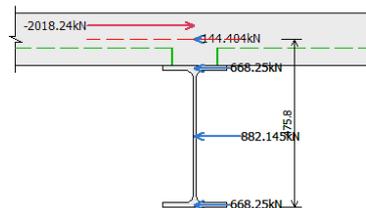
- Plastic N.A. = 476mm
- Coordinate of Plastic N.A. : in Concrete Slab

#### (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
- $A_{vy} = \eta_h \cdot t_w = 4.273\text{mm}^2$
- $V_{d,y,Rd} = A_{vy} \cdot (f_y \sqrt{3}) / \gamma_{M0} = 678\text{kN}$
- $V_{d,y,Rd} / V_{d,y,Rd} = 0.000 < 1.000$

#### 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 ]

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

###### (3) Calculate design shear resistance of headed stud

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

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

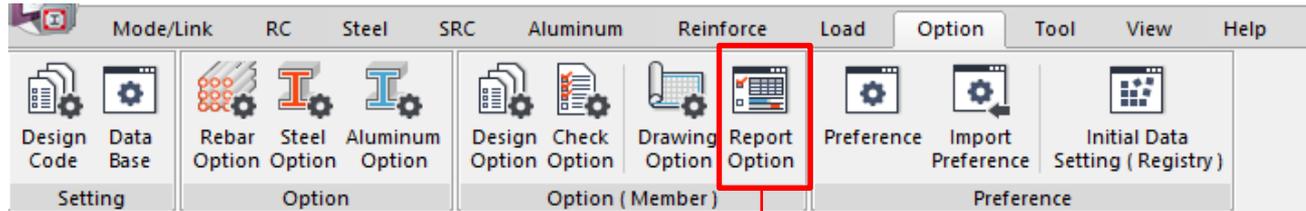
###### (4) Check Longitudinal Shear Resistance

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

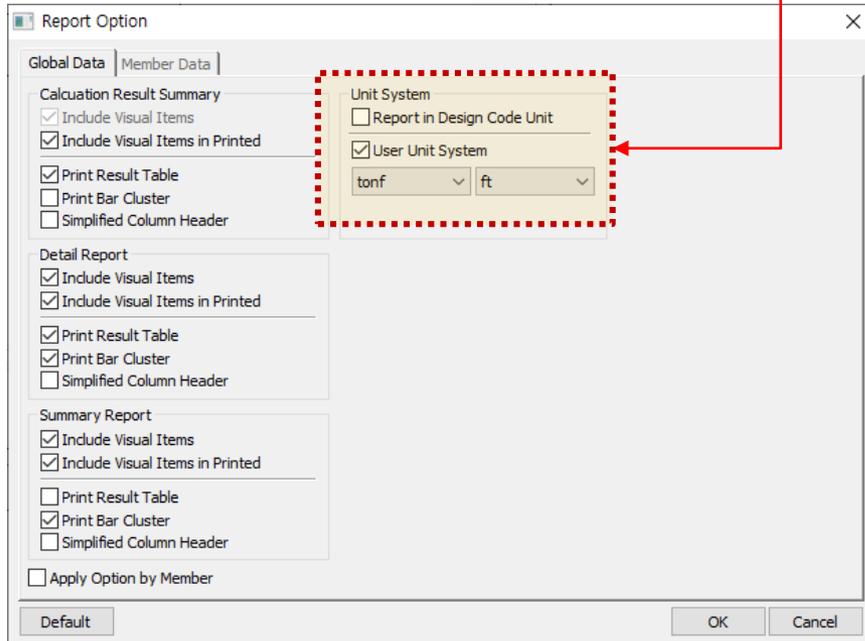
✘ Serviceability check including vibration check is not provided in Design+2021 v3.1

## 2. Design report generation by user defined unit

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



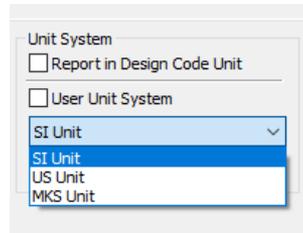
Define Option



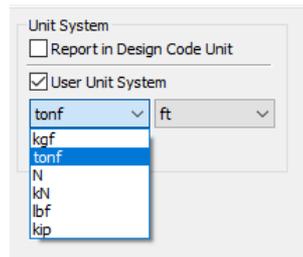
Select unit system in report



**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 <sup>2</sup>	400N/mm <sup>2</sup>	400N/mm <sup>2</sup>

#### 2. Length & Factor

Section	$K_x$	$K_y$	$L_x$	$L_y$	$\gamma_c$	$\gamma_s$	$\alpha_{cc}$	$\alpha_{ef}$
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 <sup>2</sup>	58.02kip/in <sup>2</sup>	58.02kip/in <sup>2</sup>

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

#### 2. Length & Factor

Section	$K_x$	$K_y$	$L_x$	$L_y$	$\gamma_c$	$\gamma_s$	$\alpha_{cc}$	$\alpha_{ef}$
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 <sup>2</sup>	3,789tonf/ft <sup>2</sup>	3,789tonf/ft <sup>2</sup>

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

#### 2. Length & Factor

Section	$K_x$	$K_y$	$L_x$	$L_y$	$\gamma_c$	$\gamma_s$	$\alpha_{cc}$	$\alpha_{ef}$
1.640 x 1.640 ft	1.000	1.000	11.48ft	11.48ft	1.500	1.150	0.850	1.000