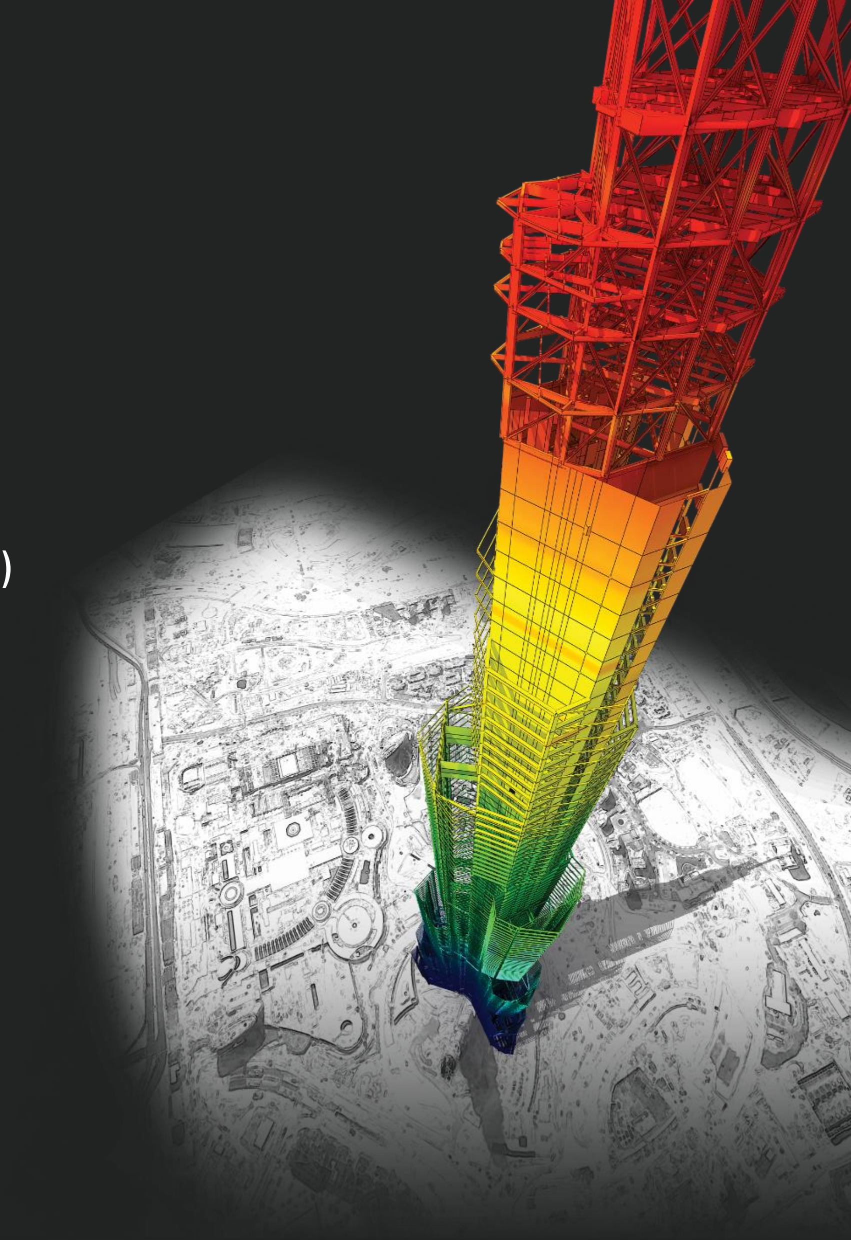
# Release Note

**Release Date : Mar. 2022**

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



*DESIGN OF General Structures*

*Integrated Design System for Building and General Structures*

# Enhancements

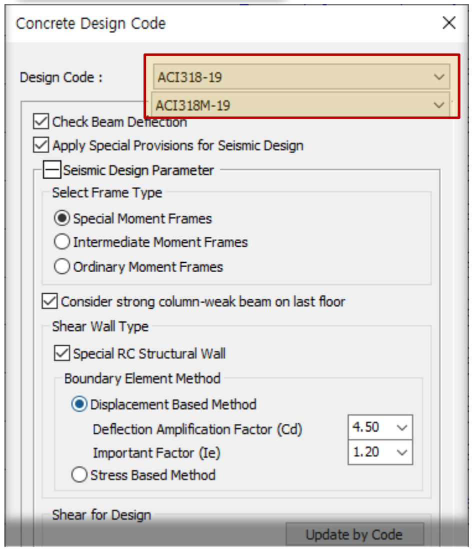
## • *midas Gen*

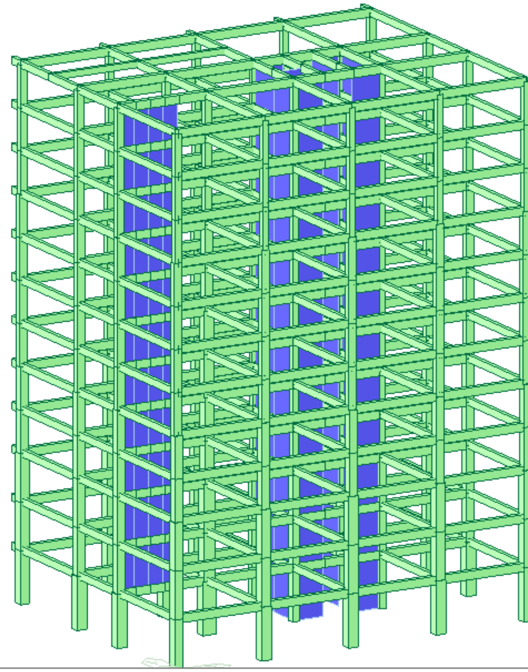
midas Gen

# 1. New American RC Code : ACI318-19 (US.SI)

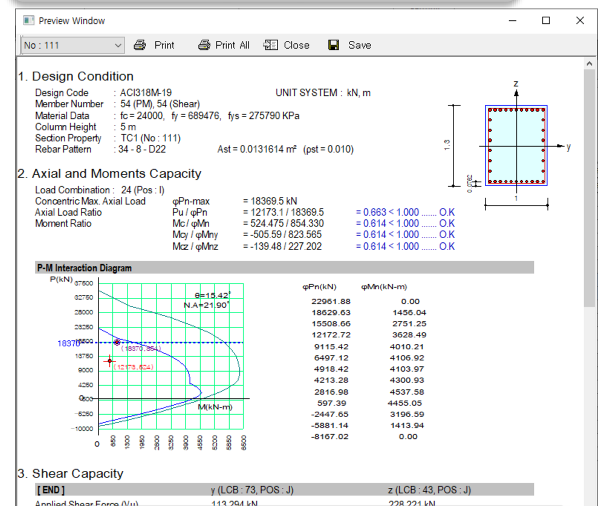
## *Add ACI318-19(US)/ACI318M-19(SI) Code for RC Design*

### Concrete Design Code

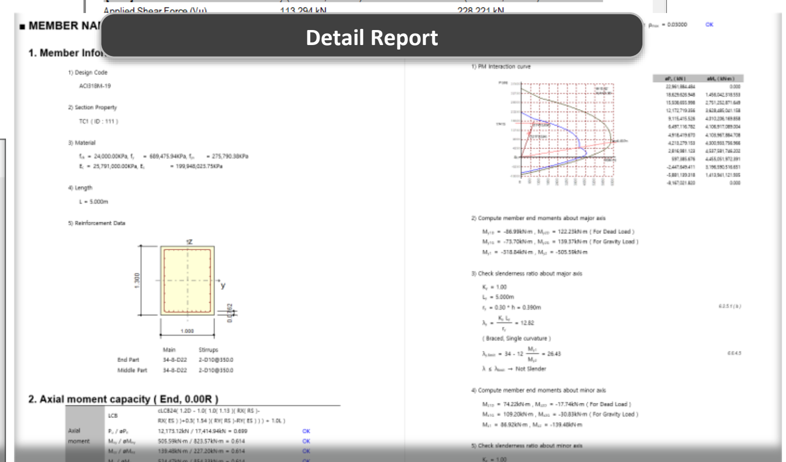


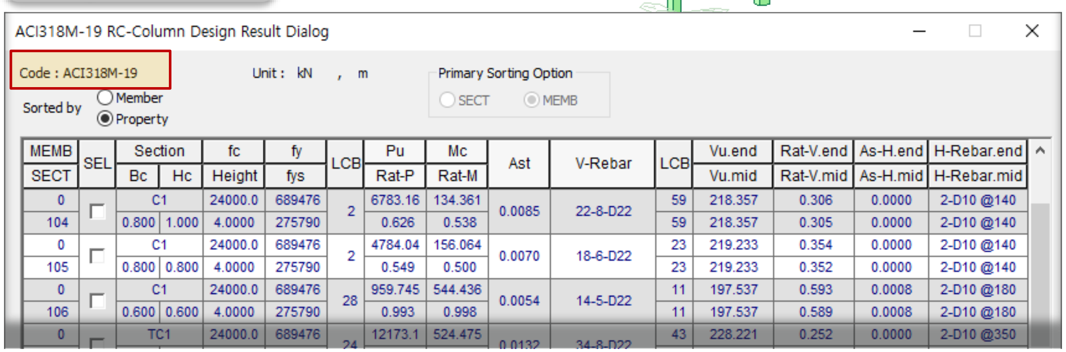
### Graphic Report




### Detail Report




### Design Result Table



ACI318M-19 RC-Column Design Result Dialog

Code : ACI318M-19 Unit : kN , m

Sorted by: Member / Property

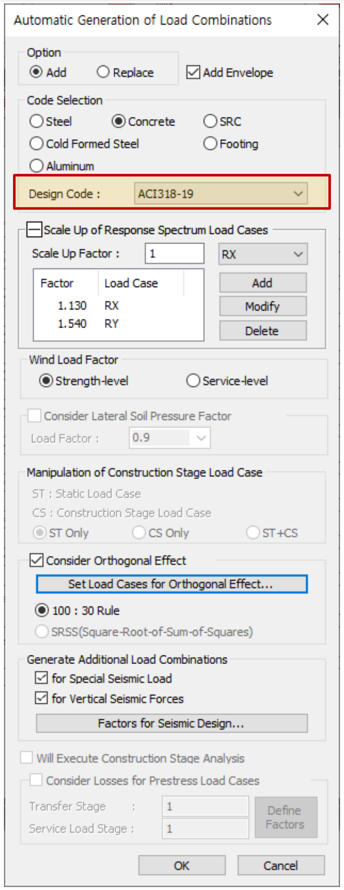
Primary Sorting Option: SECT / MEMB

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | C1 | | 24000.0 | 689476 | 2 | 6783.16 | 134.361 | 0.0085 | 22-8-D22 | 59 | 218.357 | 0.306 | 0.0000 | 2-D10 @140 |
| 104 | | 0.800 | 1.000 | 4.0000 | 275790 | | 0.626 | 0.538 | | | 59 | 218.357 | 0.305 | 0.0000 | 2-D10 @140 |
| 0 | | C1 | | 24000.0 | 689476 | 2 | 4784.04 | 156.064 | 0.0070 | 18-6-D22 | 23 | 219.233 | 0.354 | 0.0000 | 2-D10 @140 |
| 105 | | 0.800 | 0.800 | 4.0000 | 275790 | | 0.549 | 0.500 | | | 23 | 219.233 | 0.352 | 0.0000 | 2-D10 @140 |
| 0 | | C1 | | 24000.0 | 689476 | 28 | 959.745 | 544.436 | 0.0054 | 14-5-D22 | 11 | 197.537 | 0.593 | 0.0008 | 2-D10 @180 |
| 106 | | 0.600 | 0.600 | 4.0000 | 275790 | | 0.993 | 0.998 | | | 11 | 197.537 | 0.589 | 0.0008 | 2-D10 @180 |
| 0 | | TC1 | | 24000.0 | 689476 | 24 | 12173.1 | 524.475 | 0.0132 | 34-8-D22 | 43 | 228.221 | 0.252 | 0.0000 | 2-D10 @350 |

# 1. New American RC Code : ACI318-19 (US.SI)

## *Add ACI318-19 Load combinations*

**For Concrete Design**

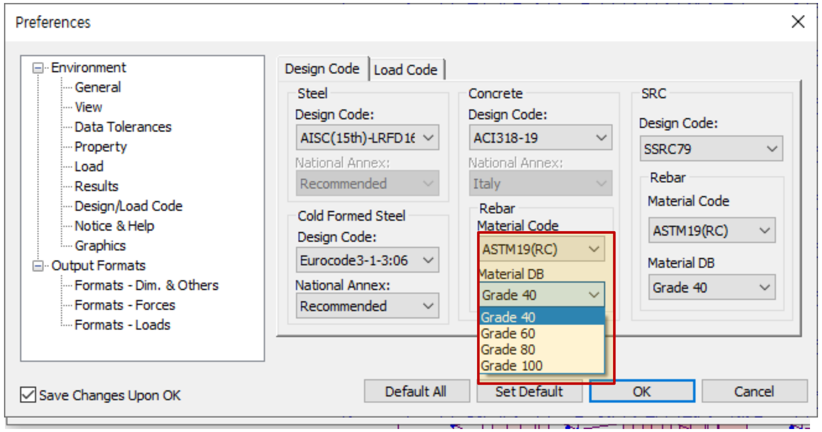



| Provision | **Load factors and combinations** | **Remark** |
|---|---|---|
| **Strength Load Combinations** | 1.4 (D+F) | • D : Dead Load<br>• F : Fluid Load<br>• T : Temperature Load<br>• H : Lateral pressure load of soil and water in soil<br>• L : Live load<br>• Lr : Roof live load<br>• R : Rain load<br>• W : Wind load<br>• E : Earthquake load (=Eh + Ev)<br>• Em : maximum effect of horizontal and vertical earth-quake force (=$\Omega_0$Eh)<br>• $\Omega_0$ : Seismic force amplification factor<br>• Eh : Horizontal earthquake load<br>• Ev : Vertical earthquake load (not provided in Gen2022 v1.1) |
| | 1.2(D+F+T) +1.6(L+H) + 0.5(Lr or R) | |
| | 1.2D +1.6(Lr or R) + (1.0L or 0.5W) | |
| | 1.2D ± 1.0W + 1.0L +0.5(Lr or R) | |
| | 1.2D ± 1.0E + 1.0L | |
| | 0.9D ± 1.0W + 1.6H | |
| | 0.9D ± 1.0E + 1.6H | |
| **Allowable stress Load Combinations** | 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) | |
| **Special load combinations** | 1.2D + 1.0L +1.0Em | |
| | 0.9D ± 1.0Em | |

# 1. New American RC Code : ACI318-19 (US.SI)

## *Add New Rebar DB and material as per ASTM19*

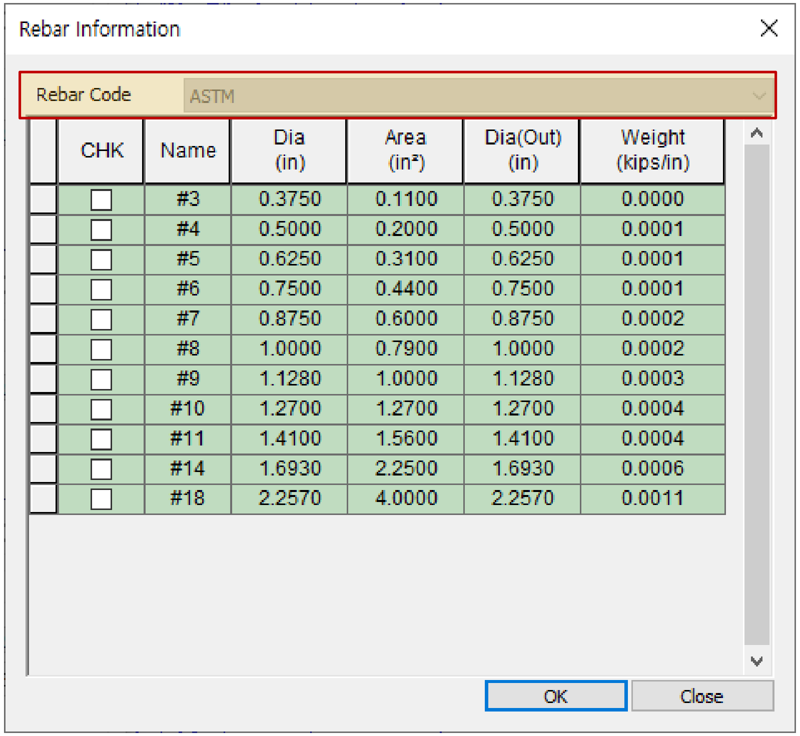
**Set Rebar Material**




**Rebar strength as per ASTM 19**

| | Tensile Strength Fu (psi) | Yield Strength Fy (psi) |
|---|---|---|
| Grade 40 | 60,000 | 40,000 |
| Grade 60 | 80,000 | 60,000 |
| Grade 80 | 100,000 | 80,000 |
| Grade 100 | 117,000 | 10,000 |

**Rebar DB as per ASTM19 & Design rebar setting**

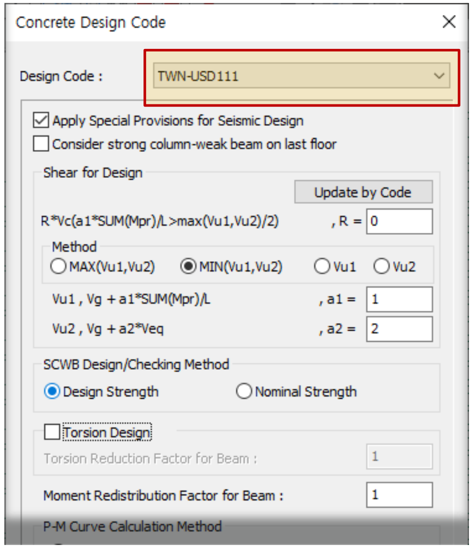


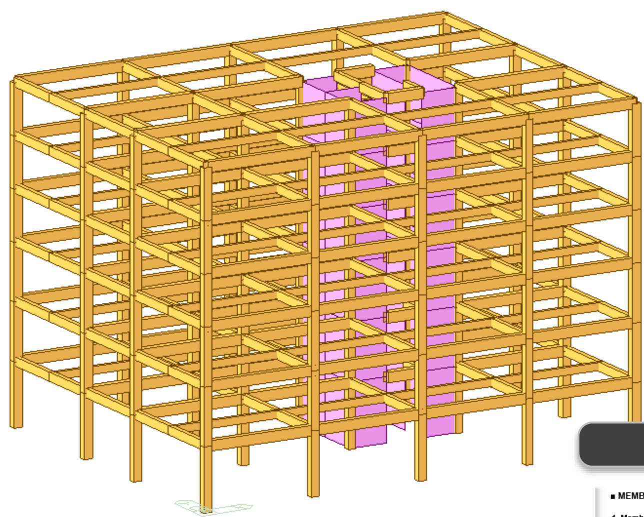

| CHK | Name | Dia (in) | Area (in²) | Dia(Out) (in) | Weight (kips/in) |
|---|---|---|---|---|---|
| | #3 | 0.3750 | 0.1100 | 0.3750 | 0.0000 |
| | #4 | 0.5000 | 0.2000 | 0.5000 | 0.0001 |
| | #5 | 0.6250 | 0.3100 | 0.6250 | 0.0001 |
| | #6 | 0.7500 | 0.4400 | 0.7500 | 0.0001 |
| | #7 | 0.8750 | 0.6000 | 0.8750 | 0.0002 |
| | #8 | 1.0000 | 0.7900 | 1.0000 | 0.0002 |
| | #9 | 1.1280 | 1.0000 | 1.1280 | 0.0003 |
| | #10 | 1.2700 | 1.2700 | 1.2700 | 0.0004 |
| | #11 | 1.4100 | 1.5600 | 1.4100 | 0.0004 |
| | #14 | 1.6930 | 2.2500 | 1.6930 | 0.0006 |
| | #18 | 2.2570 | 4.0000 | 2.2570 | 0.0011 |

# 2.New Taiwanese RC Code : TWN-USD111

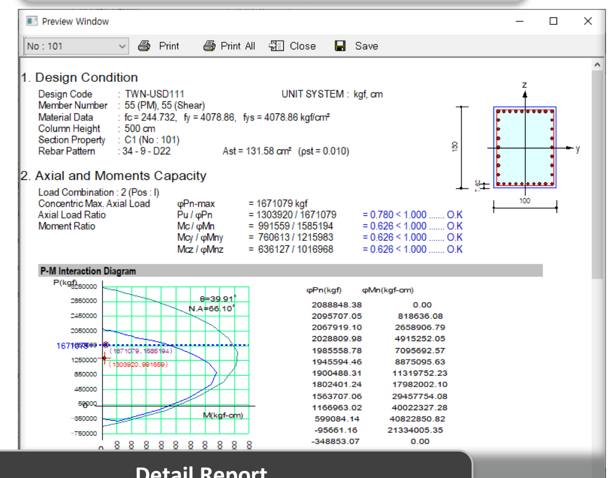
## Add TWN-USD111 Code for RC Design

### Concrete Design Code

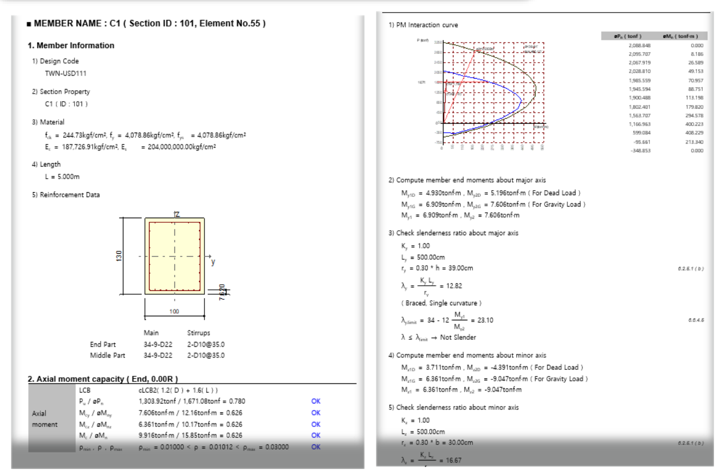


### Graphic Report




### Detail Report




### Design Result Table

TWN-USD111 RC-Column Design Result Dialog

Code : TWN-USD111

Unit : kgf , cm

Sorted by: Member / Property (selected)

Primary Sorting Option: SECT / MEMB

| MEMB / SECT | SEL | Section Bc | Section 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 500.00 | 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 | 450.00 | 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 | 400.00 | 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 |

# 2.New Taiwanese RC Code : TWN-USD111

## *Add TWN-USD111 Load combinations*

**For Concrete Design**

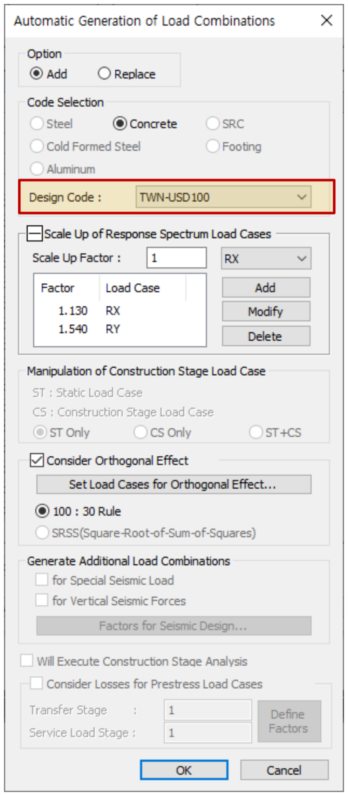


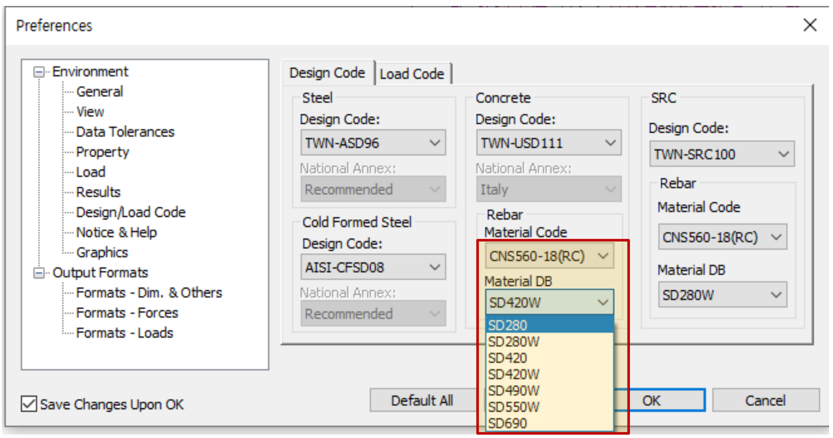

**Table 5.3.1 Load Combinations**

| Provision | **Load factors and combinations** | **Remark** |
|---|---|---|
| **Strength Load Combinations** | 1.4 D | • D : Dead load<br>• L : Live load<br>• Lr : Roof live load<br>• S : Snow load<br>• R : Rain load<br>• W : Wind load<br>• 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 | |

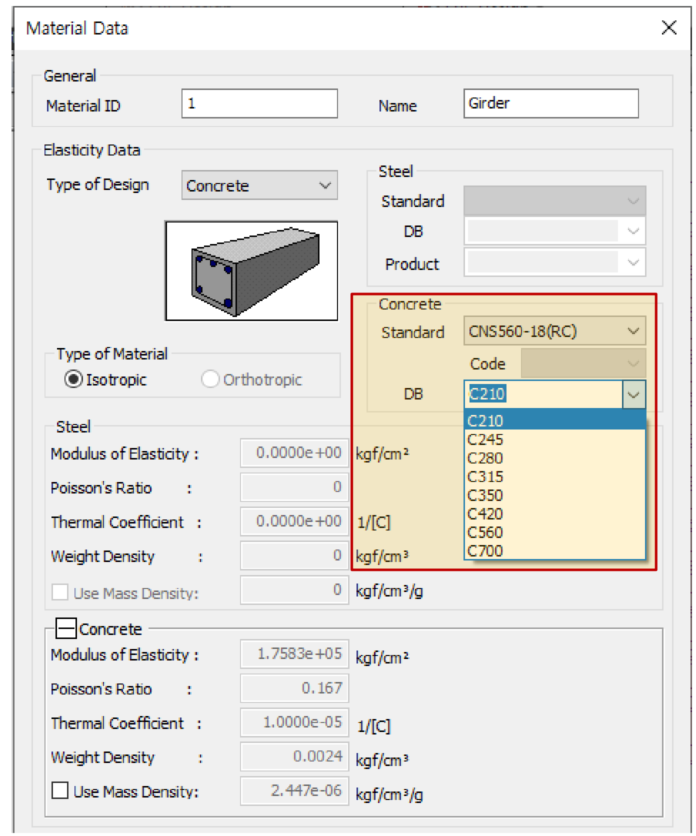
# 2.New Taiwanese RC Code : TWN-USD111

## *Add Concrete/Rebar DB and material as per CNS560-18*

### Set Rebar Material




### Concrete Material DB



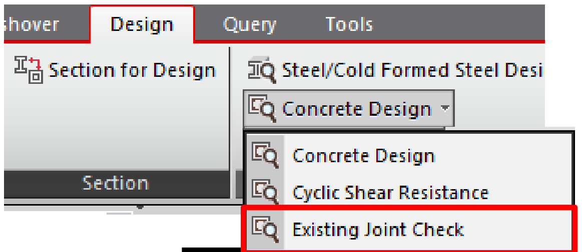

### Rebar strength as per CNS560-18

| | 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 |

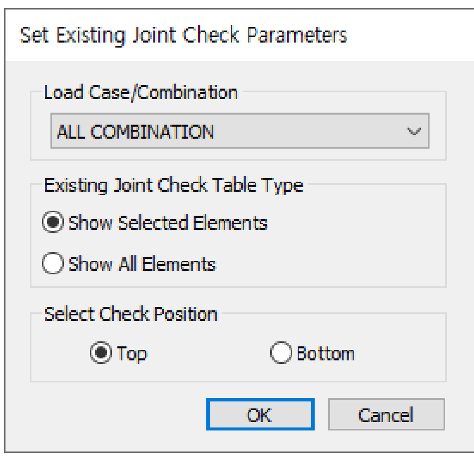
# 3. Beam-Column Joints check for Existing Building as per NTC2018

## *Beam-Column Joints Capacity check for existing building*

- *Design > result > Concrete Design > Existing Joint Check*




**Set Existing Joint Check Parameters**




**Result Table for Joint Capacity check for existing building**

| Elem | Position | Stress | Beam-Column Joint Check for Existing Building | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | y-axis | | | | z-axis | | | |
| | | | Load | Demand (N/mm²) | Capacity (N/mm²) | Remark | Load | Demand (N/mm²) | Capacity (N/mm²) | Remark |
| Check Position = Bottom | | | | | | | | | | |
| Press right mouse button and click 'Set Existing Joint Check Parameters' menu to change Load Case/Combination/Select Check Position | | | | | | | | | | |
| 81 | Bottom | Tensile | sism22 | 8.2225 | 1.5000 | NG | sism22 | 5.0651 | 1.5000 | NG |
| 81 | Bottom | Compressive | sism22 | 8.2471 | 12.5000 | OK | sism22 | 5.0942 | 12.5000 | OK |

**Demand : Joints Stress, $\sigma_{jt}$ and $\sigma_{jc}$**

**Capacity : by Equation below**

– per la resistenza a trazione: ***Tensile stress***

$$\sigma_{jt} = \left| \frac{N}{2A_j} - \sqrt{\left(\frac{N}{2A_j}\right)^2 + \left(\frac{V_j}{A_j}\right)^2} \right| \leq 0.3\sqrt{f_c}(f_c \; in \; MPa) \qquad [C8.7.2.11]$$

– per la resistenza a compressione: ***Compressive stress***

$$\sigma_{jc} = \frac{N}{2A_j} + \sqrt{\left(\frac{N}{2A_j}\right)^2 + \left(\frac{V_j}{A_j}\right)^2} \leq 0.5 f_c (f_c in MPa) \qquad [C8.7.2.12]$$

***Demand ≤ Capacity → O.K***

***Demand > Capacity → N.G.***

# 3. Beam-Column Joints check for Existing Building as per NTC2018

## *Beam-Column Joints check for existing building*

- *Design > result > Concrete Design > Existing Joint Check*

**Result Table for Beam-Column Joint check for Existing Building**

| | Elem | Position | Stress | Beam-Column Joint Check for Existing Building | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | y-axis | | | | z-axis | | | |
| | | | | Load | Demand (N/mm²) | Capacity (N/mm²) | Remark | Load | Demand (N/mm²) | Capacity (N/mm²) | Remark |
| | Check Position = Bottom | | | | | | | | | | |
| | Press right mouse button and click 'Set Existing Joint Check Parameters' menu to change Load Case/Combination/Select Check Position | | | | | | | | | | |
| ▶ | 81 | Bottom | Tensile | sism22 | 8.2225 | 1.5000 | NG | sism22 | 5.0651 | 1.5000 | NG |
| | 81 | Bottom | Compressive | sism22 | 8.2471 | 12.5000 | OK | sism22 | 5.0942 | 12.5000 | OK |

**✓ Use Tips**

1) ***This check option is activated only with NTC2018.***
2) ***If 'Apply Special Provision for Seismic Design' of concrete design code is active, this check option can't be activated.***
3) ***This check must be performed only for 'Not Confined Joint' as defined in § 7.4.4.3 of the NTC***
4) ***This check is 'existing structure review', so it is calculated using the beam reinforcement information entered by the user.***

**✓ Note**

***C8.7.2.3.5 Beam and Column for Existing Building as per CIRCOLARE NTC2018***

- *[Calculation & check of diagonal tensile stress for beam-column joint]*

$$\sigma_{jt} = \left| \frac{N}{2A_j} - \sqrt{\left(\frac{N}{2A_j}\right)^2 + \left(\frac{V_j}{A_j}\right)^2} \right| \leq 0.3\sqrt{f_c}(f_c \ in \ MPa) \qquad [C8.7.2.11]$$

- *[Calculation & check of diagonal compressive stress for beam-column joint]*

$$\sigma_{jc} = \frac{N}{2A_j} + \sqrt{\left(\frac{N}{2A_j}\right)^2 + \left(\frac{V_j}{A_j}\right)^2} \leq 0.5 f_c (f_c in MPa) \qquad [C8.7.2.12]$$

***Where,***
***1) N*** *: Axial force acting on the upper column (+ : compressive,-:tensile)*

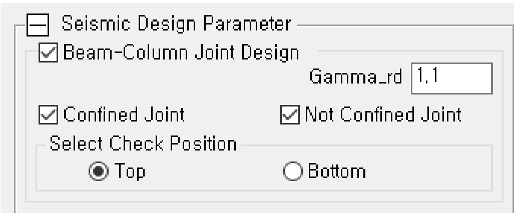
***2) Vj*** *: Total shear acting on the joint, obtained as a sum algebraic of the shear transmitted by the upper pillar and of the horizontal stresses transmitted by the upper parts of the beams*

***3)Aj : bj * hjc***
*where bj and hjc are defined in § 7.4.4.3.1 of the NTC*

# 4. Crack Control Check for RC Column as per EC2:04 & NTC

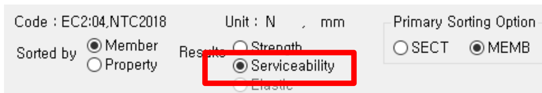
## *RC Column Crack Widths Check as per EC2:04 & NTC2018*

### *Set Beam-Column Joint Design Parameter*




### *Check the serviceability check*

***RC Column Check***




| MEMB / SECT | SEL | Section / Bc | Hc | fck / Height | fyk / fyw | CHK | Stress Control LCB | sig-ct | sig-cta | LCB | sig-cc | sig-cca | LCB | sig-s | sig-sa | Crack Control LCB | w_y | wa_y | LCB | w_z | wa_z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 913 | ☐ | C1 | | 24.0000 | 550.000 | NG# | 101 | 11.7624 | 2.49610 | 101 | 15.8097 | 14.4000 | 101 | 113.438 | 440.000 | 97 | 0.0687 | 0.3000 | 80 | 0.3729 | 0.3000 |
| 106 | | 600.0 | 600.0 | 4000.0 | 420.000 | | | | | | | | | | | | | | | | |

### *Graphic Result*

4. Serviceability : Stress Limit Check

| | Conc.(Tens.) | Conc.(Comp.) | Conc.(Comp.)(QP) | Rebar |
|---|---|---|---|---|
| Load Combination | 101(F) | 101(F) | 97(Q) | 101(F) |
| Stress(s) | -11.76 | 15.81 | 15.64 | 113.44 |
| Allowable Stress(sa) | 2.50 | 14.40 | 10.80 | 440.00 |
| Stress Ratio(s/sa) | Cracked Section | Cracked Section | Cracked Section | Cracked Section |
| Check Linear Creep | | | Non-linear Creep | |

***When cracked section,***

5. Serviceability : Crack Limit Check

| | y (LCB : 97, POS : J) | z (LCB : 80, POS : J) |
|---|---|---|
| Crack Width(w) | 0.06870 mm | 0.37293 mm |
| Allowable Crack Width(wa) | 0.30000 mm | 0.30000 mm |
| Check Ratio(w/wa) | 0.229 < 1.000 ...... O.K | 1.243 > 1.000 ...... N.G |

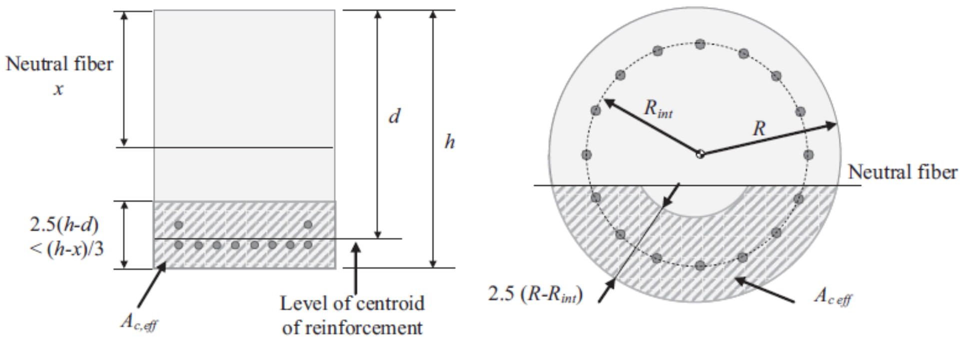
### *Detail Result*

```
==========================================================================================
  [[[*]]]   CHECK SERVICEABILITY CRACK LIMIT ABOUT MAJOR AXIS.
==========================================================================================

     ( ). Calculate crack width.
          [ EN 1992-1-1:2004 Clause 7.3.4 , Appendix B. ]
          ( LCB =   97,  POS = J )
          -. Pu        =   816411.88 N.
          -. Muy       =-191305395.40 N-mm.
          -. fcm       = fck+8(MPa)    =    32.00000 MPa.
          -. fctm      = 0.30*fck^(2/3)=     2.49610 MPa.(fck<=C50/60)
          -. fct.eff   = fctm (by 28 days).
          -. n         =    12.82603
          -. Sigma_s   =       64.662 MPa.
          -. kt        = 0.6 (for short term loading.).
          -. X         =   329.19948 mm.
          -. hc,ef     = MIN[ 2.5*(h-d), (h-X)/3, h/2 ] =    90.26684 mm.
          -. Ac.eff    = Bc*hc,ef              = 54160.10376 mm^2.
          -. Rho_p.eff= As/Ac.eff              =   0.0214
          -. Ecm       = 22[fcm/10]^0.3 *1000 =   31186.574 MPa. (by Table 3.1)
          -. Alpha_e   = Es/Ecm                =     6.41302
          -. (Eps_sm-Eps_cm) = (Sigma_s-kt*fct.eff/Rho_p.eff*(1+Alpha_e*Rho_p.eff))/Es
                       =  -0.000074
                        < 0.6*Sigma_s/Es =  0.000194
          -. (Eps_sm-Eps_cm) = 0.6*Sigma_s/Es =  0.000194

          -. Bond coefficient(k1)                 =   0.8000
          -. Strain distribution coefficient(k2) =   0.5000
          -. NAD Value (k3)                       =   3.4000
          -. NAD Value (k4)                       =   0.4250
          -. c         =    52.40000 mm.
          -. Phi       =    22.20000 mm.
          -. S_r.max   = k3*c + k1*k2*k4*Phi/Rho_p.eff =   354.16984 mm.

          -. wk        = S_r.max * ( Eps_sm-Eps_cm)    =     0.06870 mm.
             wk <  0.300 mm.   ---> O.K !
```

# 4. Crack Control Check for RC Column as per EC2:04 & NTC

## RC Column Crack Widths Check as per EC2:04 & NTC2018

**Calculating effective area of concrete in tension ,Ac,eff ,in program [ Rectangular and Circular Column]**




**✓ Note**

**Calculate crack width using the following formular as per EC2:04 and NTC**

$Wk = S_{r.max} ( \varepsilon_{sm} - \varepsilon_{cm} ) \le Wk,max$

**1. Determine $\varepsilon_{sm} - \varepsilon_{cm}$**

$$\varepsilon_{sm} - \varepsilon_{cm} = \frac{\sigma_s - k_t \dfrac{f_{ct,eff}}{\rho_{p,eff}}\left(1 + \alpha_e \rho_{p,eff}\right)}{E_s} \ge 0.6 \frac{\sigma_s}{E_s}$$

**2. Determine $S_{r.max}$**

$$s_{r.max} = k_3 c + \frac{k_1 k_2 k_4 \phi}{\rho_{p,eff}}$$

**✓ Use Tips**

1) ***The stress control for cracked section is performed on each axis in program, Also crack control is performed on each axis (y & z axis)***
2) ***In GSD, you can also check stress control for cracked section on bi-axis.***
3) ***For calculating effective area of concrete in tension for circular cross sections(Ac,eff), program use the proposal by Wiese et al (left side)***

***- For determing $\varepsilon_{sm} - \varepsilon_{cm}$***

*1) $\varepsilon_{sm}$ : The mean strain in the reinforcement under the relevant combination of loads, including the effect of imposed deformations and taking into account the effects of tensile stiffening.*
*2) $\varepsilon_{cm}$ : The mean strain in the concrete between cracks.*
*3) $\sigma_s$ :The stress in the tension reinforcement*
*4) $\alpha_e$ : Es / Ecm.*
*5) $K_t$ : factor dependent on duration of the load.*
*0.6 for short-term load, 0.4 for long-term load*
*6) $\rho_{p,eff}$ : As / Ac,eff*

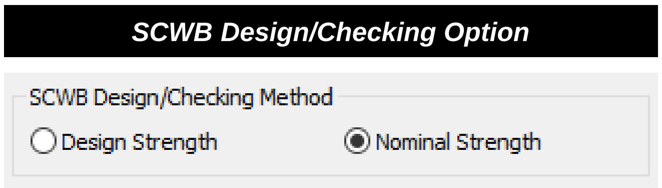
***- For determing $S_{r.max}$***

*1) $\phi$ :bar diameter. The program uses the $\phi$ of the outer layer.*
*2) c : cover to the longitudinal reinforcement.*
*3)k1 : A coefficient accounting the bond properties of rebar (0.8 for high bond bars)*
*4)k2 : Coefficient accounting for distribution of strain. (0.5 for bending)*
*5)k3 : 3.4 (recommended values)*
*6) k4 : 0.425(recommended values)*

# 5. SCWB Design/Checking Method Option as per ACI Series

## *Add Nominal Strength Method for design force calculation special provision for seismic design*

- *Design > RC Design> Design Code > SCWB Design/Checking Method*




**✓ Use Tips**

***1) The applied codes is ACI318-19,14(including M), NSR-10, NSCP2015***

***2) This option can be activated when***
***① ACI 318-19,14 , NSCP-2015: Special Moment Frames in Seismic Design Parameter***
***② NSR-10 : DES(Special Energy Dissipation) or DMO (Moderate Energy Dissipation) Class in Seismic Design Parameter***

**✓ Note**

***1.Column design moment as per options performing Ductile Design& Checking***

*[Design Strength Method]* ***Using the Design strength of beams,*** $\emptyset_b M_n$

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

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

*[Nominal Strength Method]* ***Using the nominal strength of beams,*** $M_n$

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

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

***2.SCWB Ratio Calculation as per options performing SCWB Design & Checking***

*[Design Strength Method]* ***Using the Design strength of beams and Column,*** $\emptyset_b M_{nb}$, $\emptyset_c M_{nc}$

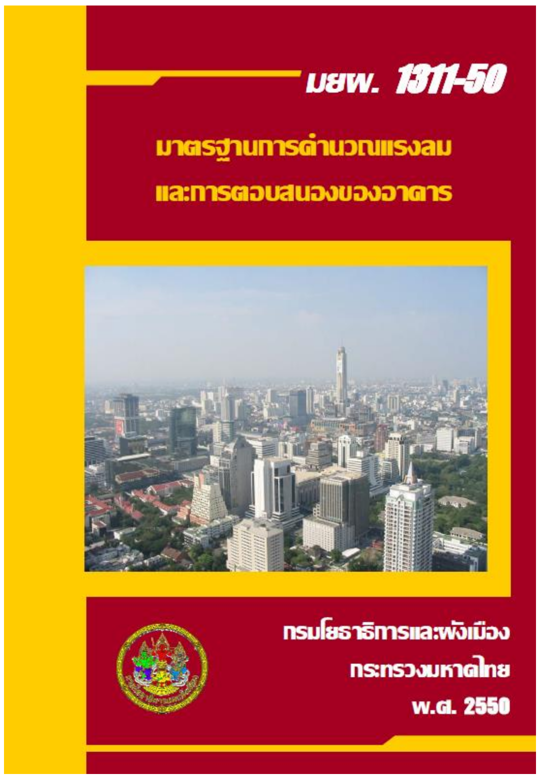
$$Ratio = \left(\frac{\emptyset_c M_{nc,T} + \emptyset_c M_{nc,B}}{\emptyset_b M_{nb,L} + \emptyset_b M_{nb,R}}\right)$$

*[Nominal Strength Method]* ***Using the nominal strength of beams&Column ,*** $M_{nb}$, $M_{nc}$

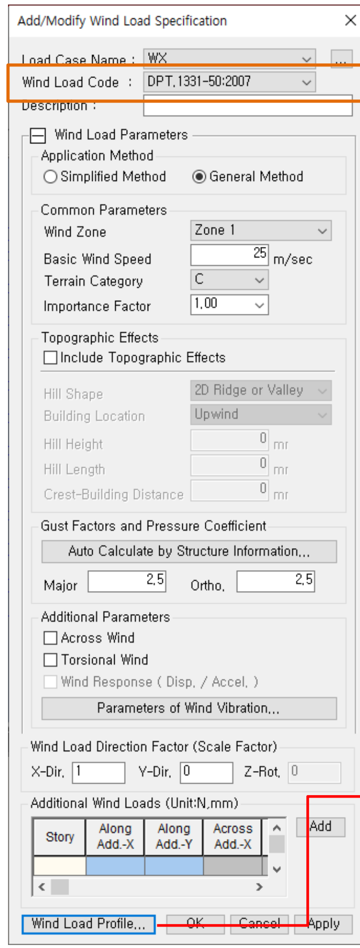
$$Ratio = \left(\frac{M_{nc,T} + M_{nc,B}}{M_{nb,L} + M_{nb,R}}\right)$$

# 6. Thailand Code : DPT (Wind and Seismic load)

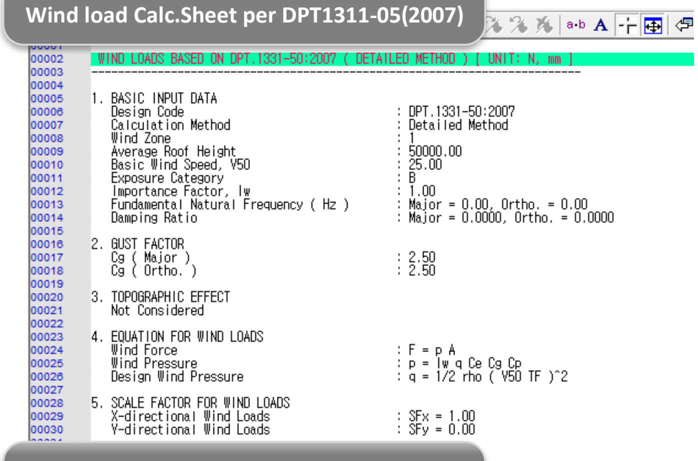
## *Add DPT.1311-50:2007(Wind Load)*



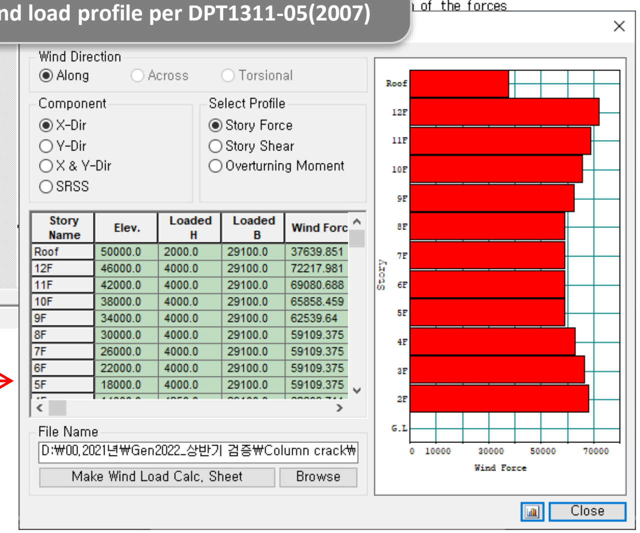

**Wind Load**




**Wind load Calc.Sheet per DPT1311-05(2007)**

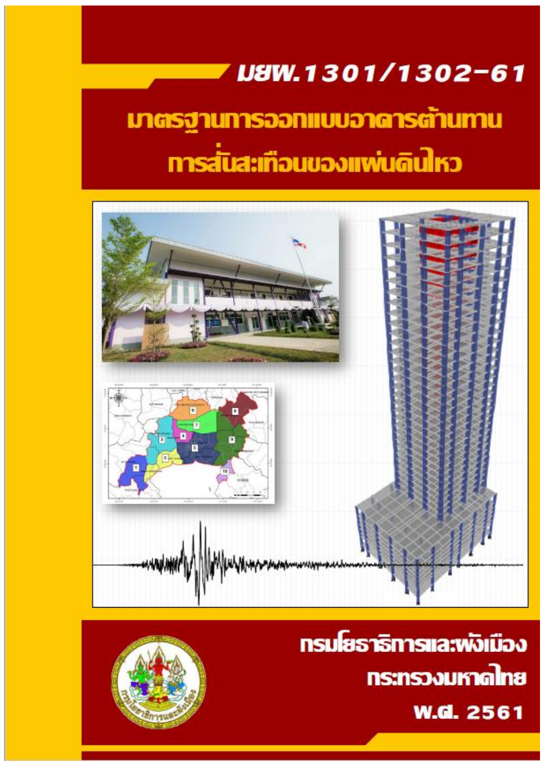



**Wind load profile per DPT1311-05(2007)**

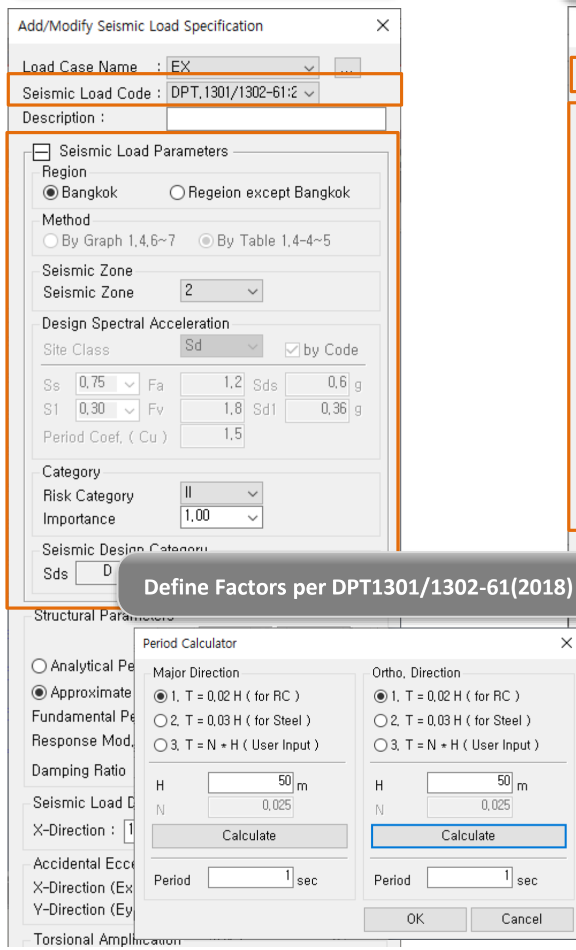


# 6. Thailand Code : DPT (Wind and Seismic load)

## *Add DPT.1301/1302-61:2018(Seismic Load)*

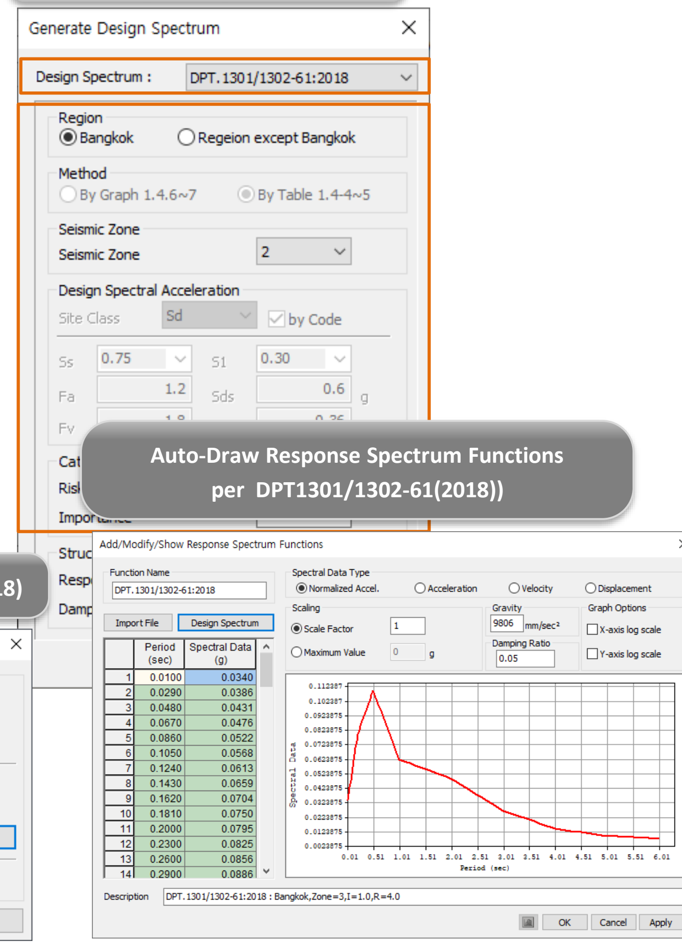



**Static seismic Load**




**Define Factors per DPT1301/1302-61(2018)**

**Response Spectrum**

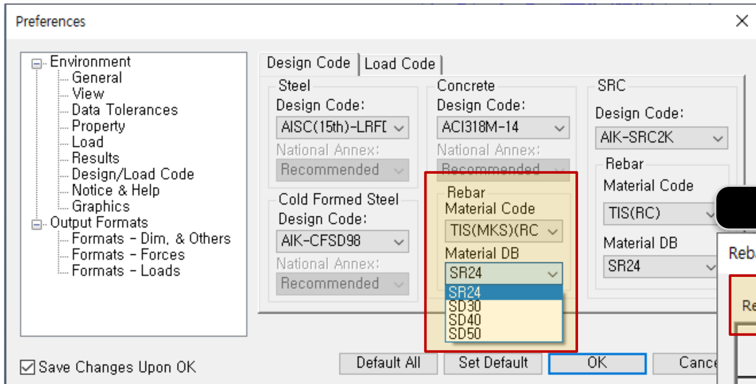



**Auto-Draw Response Spectrum Functions per DPT1301/1302-61(2018))**

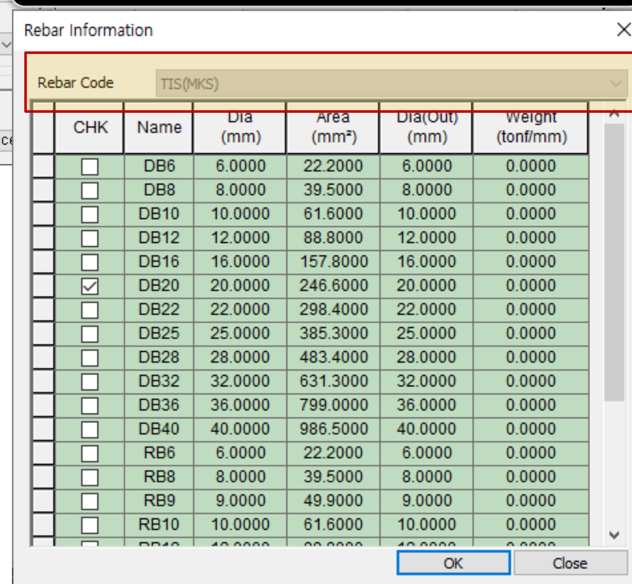
# 7. Addition of Thailand DB(TIS for SI,MKS)

## *Add Concrete/Rebar DB and material as per TIS(for SI,MKS Unit system)*

### Set Rebar Material



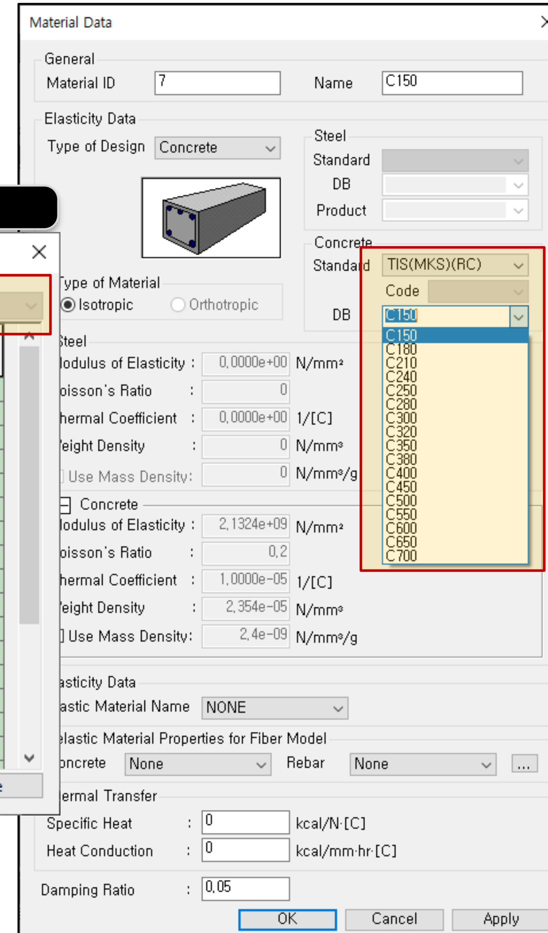

### Rebar DB as per TIS & Design rebar setting




### Rebar strength as per TIS

| | Tensile Strength Fu (MPa) | Yield Strength Fy (MPa) | Yield Strength Fy (KSC) |
|---|---|---|---|
| SR 24 | 385 | 235 | 2400 |
| SD 30 | 480 | 295 | 3000 |
| SD 40 | 560 | 390 | 4000 |
| SD 50 | 620 | 490 | 5000 |

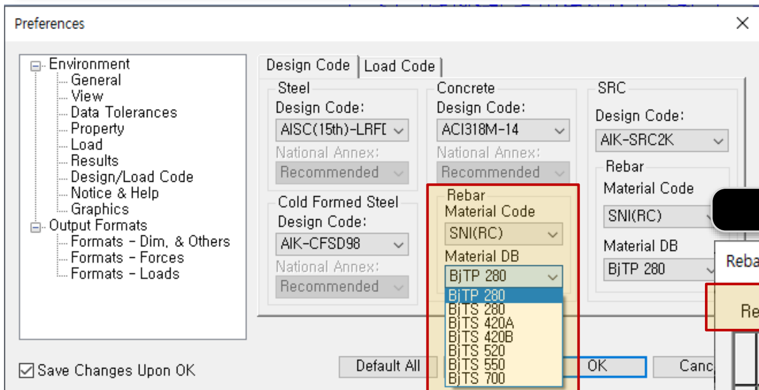
### Concrete strength as per TIS



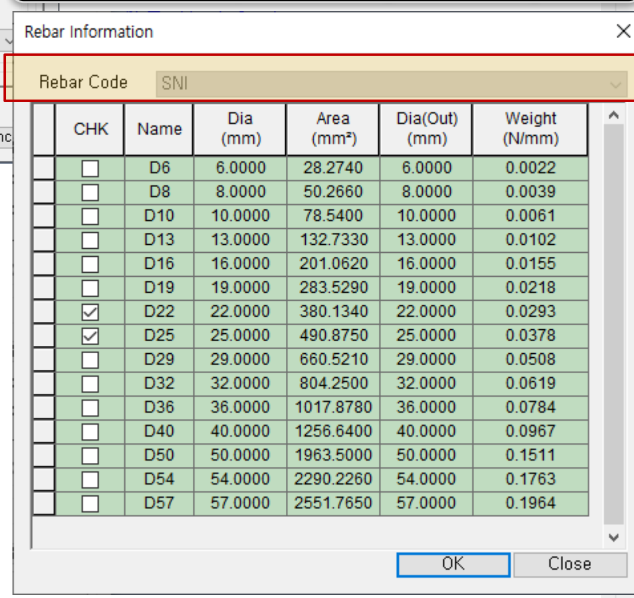
# 8. Addition of Indonesia DB(SNI)

## *Add Concrete/Rebar DB and material as per SNI*

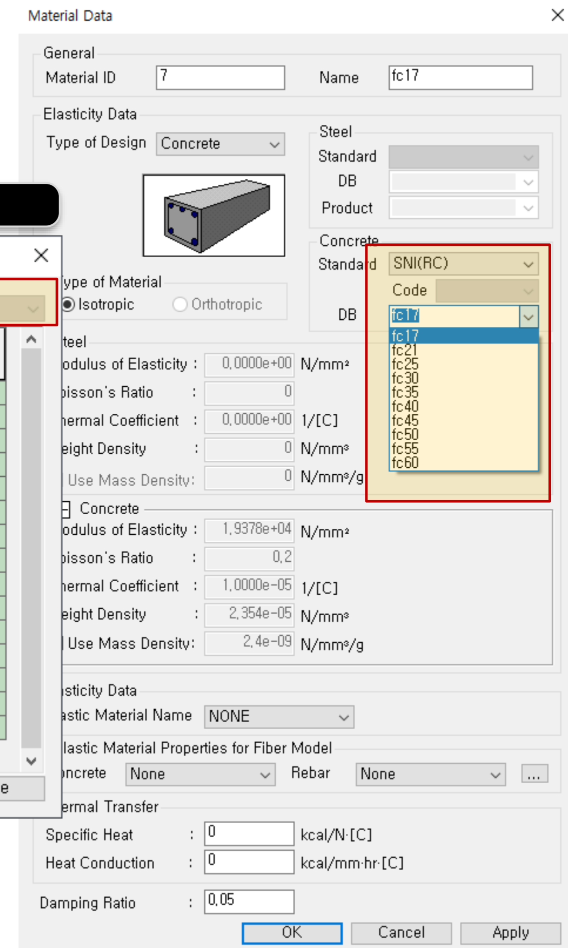
### Set Rebar Material




### Rebar DB as per SNI & Design rebar setting



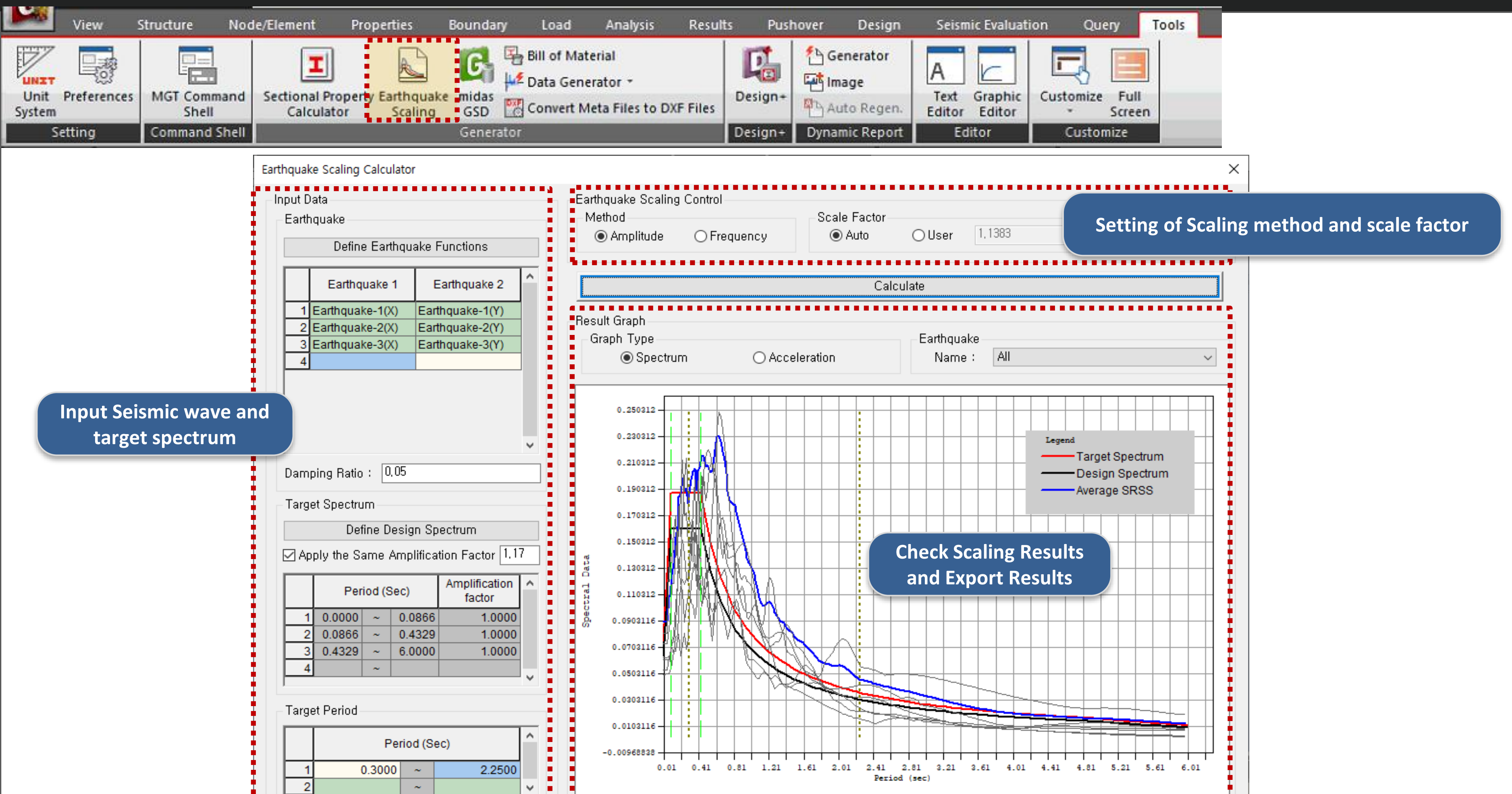

### Concrete strength as per SNI




### Rebar strength as per SNI

| Grade | Tensile Strength Fu (MPa) | Yield Strength Fy (MPa) |
|---|---|---|
| BjTP 280 | 350 | 280 |
| BjTS 280 | 350 | 280 |
| BjTS 420A | 525 | 420 |
| BjTS 420B | 525 | 420 |
| BjTS 520 | 650 | 520 |
| BjTS 550 | 687.5 | 550 |
| BjTS 700 | 805 | 700 |

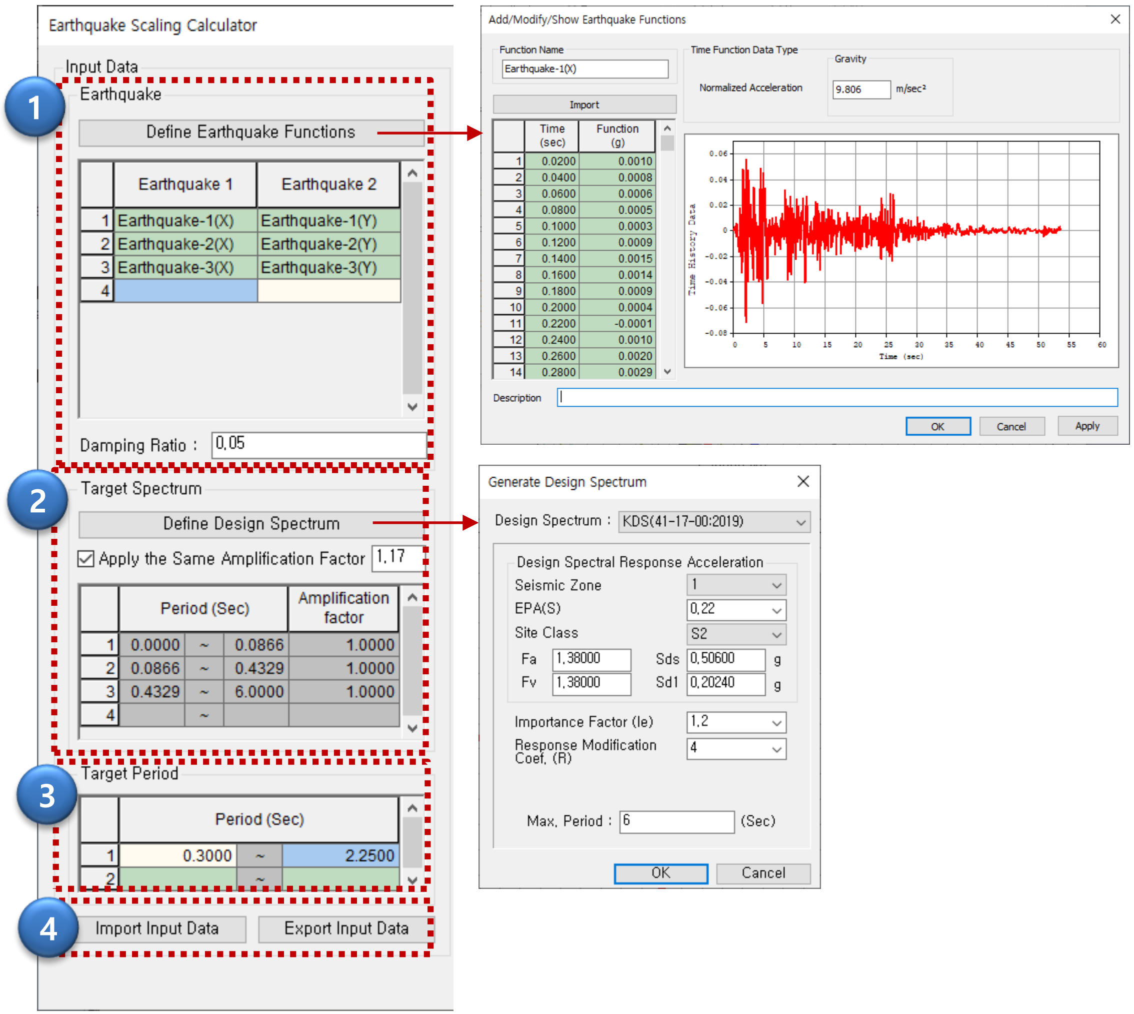
# 9. Earthquake Scaling Calculator




***-Function : Scaling so that the average of the SRSS spectrum of the input seismic wave is greater than or equal to the target spectrum for the target period***

# 9. Earthquake Scaling Calculator

## -Tools > Generator > Earthquake Scaling




1. ***Enter seismic wave information considering the conditions of the ground where the structure is located.***
   ***Import seismic waves saved as SGS files or copy and paste input data into Excel format.***

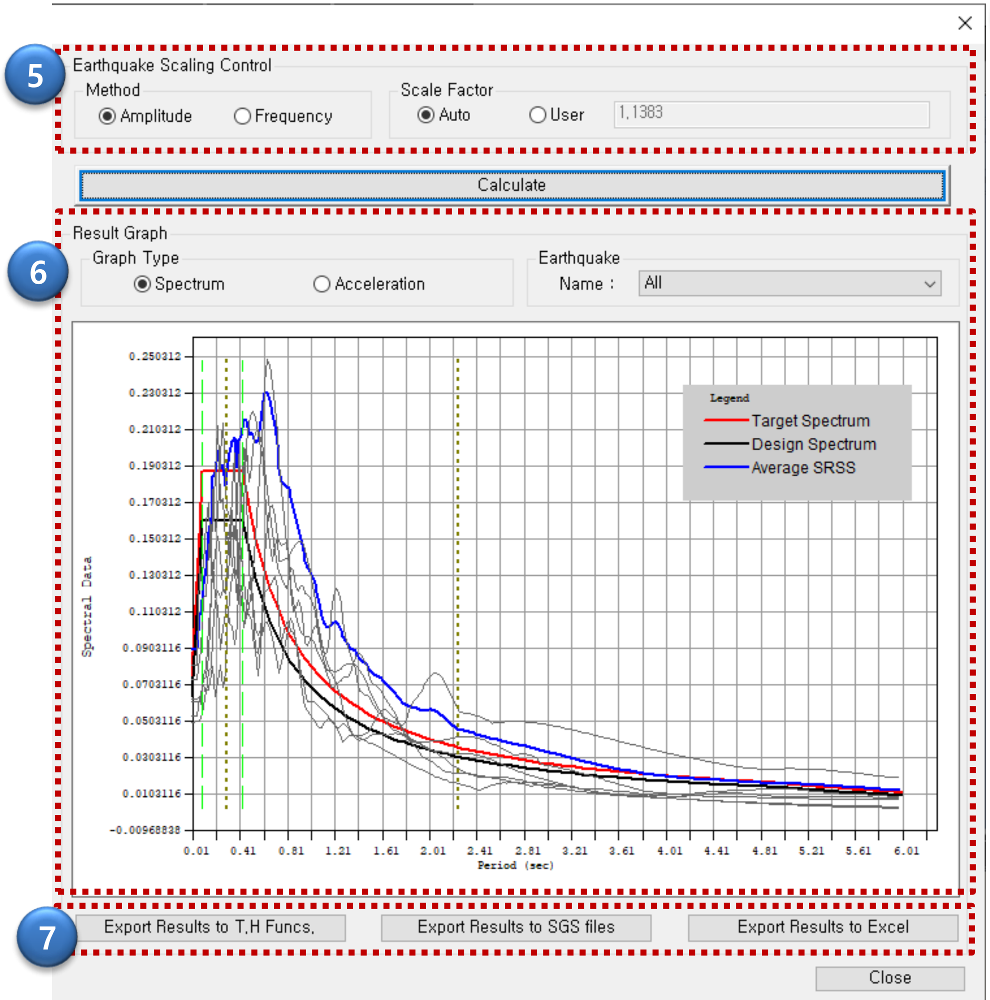
2. ***Set the design response spectrum according to the standard and input the magnification of the target spectrum.***
   ***When inputting the design response spectrum, a certain section of acceleration is automatically divided***

3. ***Set the scaling target period.***

4. ***Import and export input data as wzd files.***

# 9. Earthquake Scaling Calculator

## *-Tools > Generator > Earthquake Scaling*

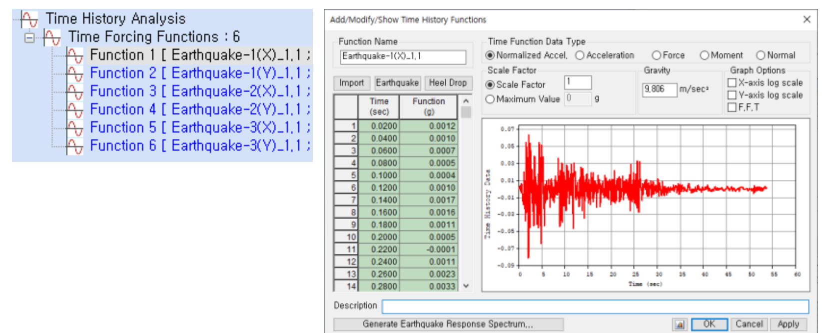



**5** ***Set the method and scale factor of earthquake scaling control.***

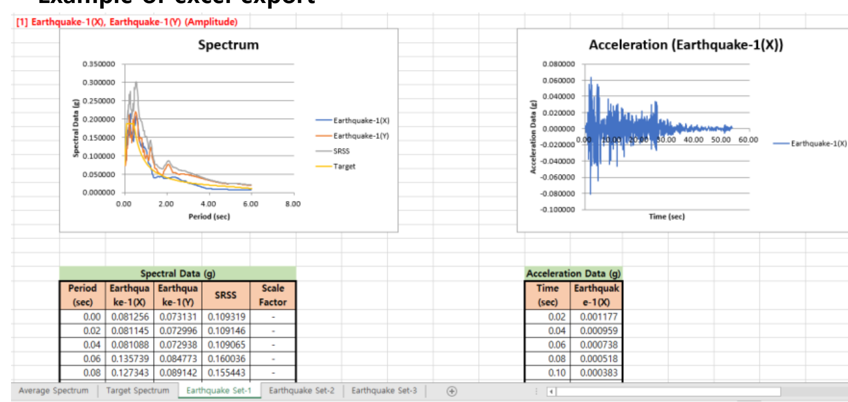
**6** ***Check the scaling results in spectrum and acceleration graphs.***

**7** ***The scaled seismic wave results can be exported as SGS files or time history functions, or saved as Excel files.***

- Example of **T.H function export**

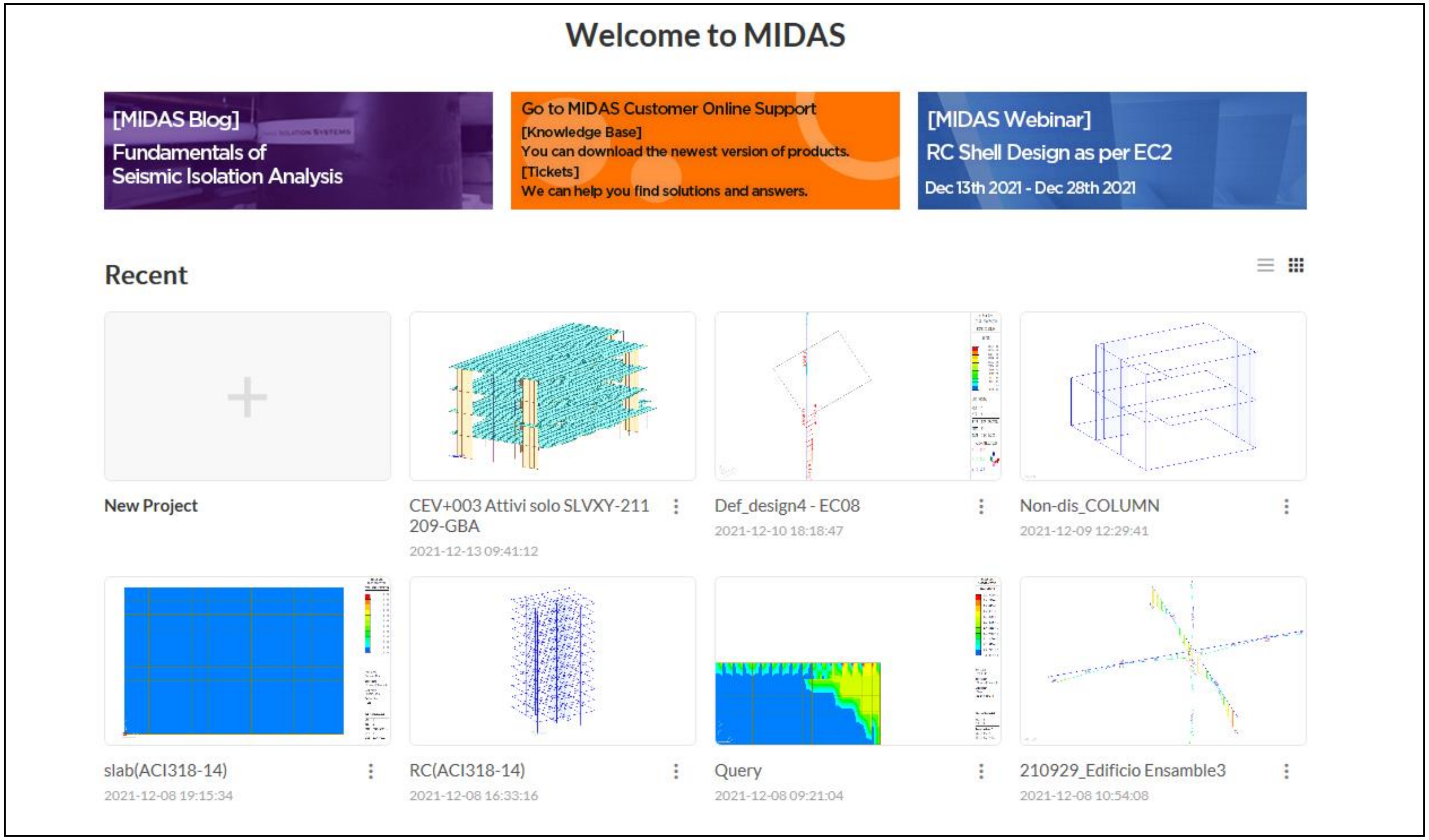



- **Example of excel export**



# 10. Preview function of Start Page

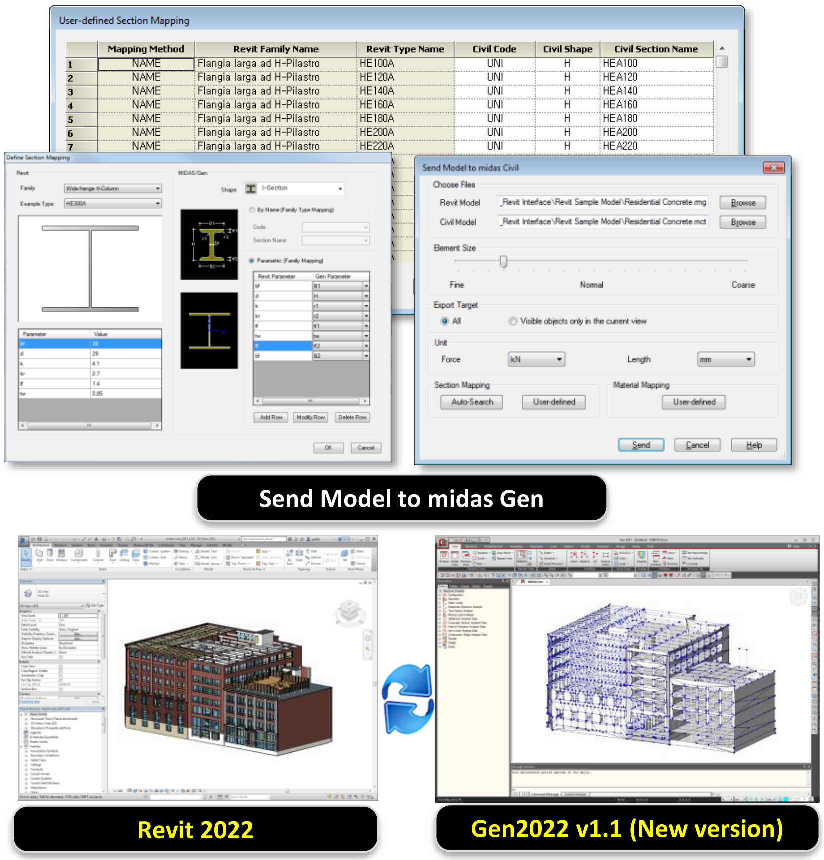
***-You can see the latest news of midas program in banner.***
***-Recent projects can be previewed and opened by clicking on the list.***



# 11. Revit 2022 Interface

## Gen-Revit Linker

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




| | 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 | Load Nature | > |
| | Load Case | > |
| | Load Combination | > |
| | Hosted Point Load | > |
| | Hosted Line Load | > |
| | Hosted Area Load | > |
| Other Parameters | Material | <> |
| | Level | > |