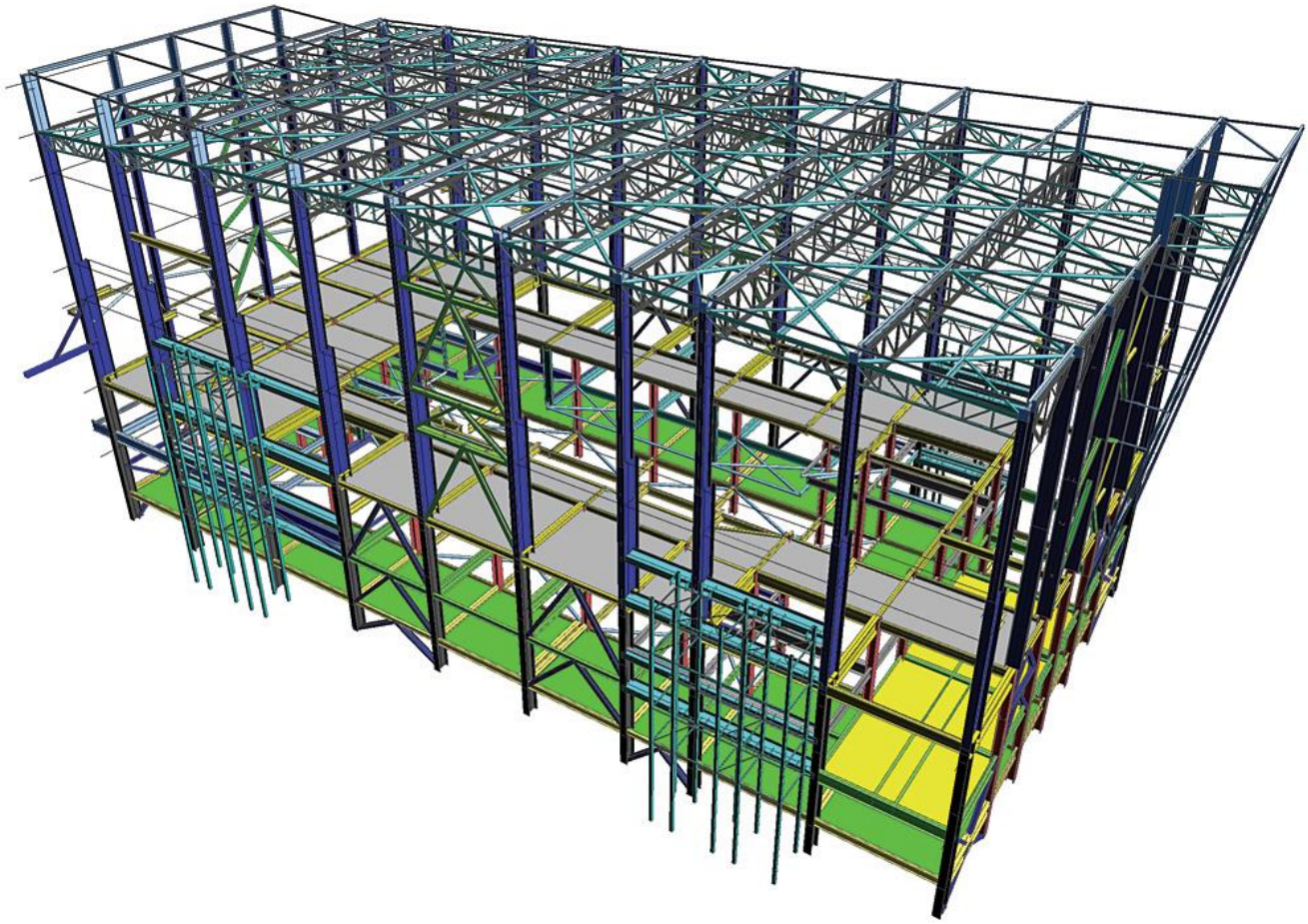
Steel Design with SCIA Engineer



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Process for calculation

1. New > Select New Project > Analysis > OK
2. Project data > Basic data > Material (Concrete, Steel)
   > Functionality > Dynamics (Seismic, General Dynamics)
   > Subsoil (Soil Interaction, Pad foundation check)
   > Stability
   > Climatic loads
   > Steel (Frame rigid connections, Frame pinned connections, Grid pinned connections, Bolted diagonal connections, Expert system, Connection monodrawings)
   > Structural model
   > Loads (Wind load, Snow load from EC1) > OK
3. Setup > Mesh
4. Setup > Solver
5. Setup > Concrete solver
6. Main > Structure > Modelling/Drawing > Import DWG, DXF, VRML97 or
   Main > Line grid and storeys > 3D Line grid or
   File > Import > IFC 2x3
7. Cross-sections
8. Storeys
9. Main > Structure > 1D member
   > 2D member
10. Layers (Για όλες τις διατομές και πλάκες ανά όροφο)
11. Main > Structure > Model data > Section on beam
12. Connect Members/nodes
13. Main > Structure > Model data > Support
14. Main > Structure > Model data > Hinge on beam (i.e change fix or/and fiz to free)
15. Load > 3D wind generator > OK
    > Add load cases > Run generator (16 load cases)
16. Connect Members/nodes
17. Check structure data
18. Main > Load Cases (Selfweight, Dead, Dead-Partitions, Dead-Roof, Live, 3D wind)
19. Main > Load Groups (Permanent, Dead-Partitions, Dead-Roof, Variable)
20. Main > Loads > Dead > Surface load > on 2D member
    > Live > Surface load > on 2D member
    > Dead-Partitions > Line force > on 2D member edge

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21. Mesh generation
22. Main > Dynamics > Mass groups (Selfweight, Dead, Live)
23. Main > Dynamics > Combination of mass groups (Add All > OK)
    > For ''Dead'' and ''Live'' loads below surface (also with ground floor) are NOT added to the ''Combination of mass groups'' because masses bellow ground surface are NOT calculated.

    > For ''Live'' loads for seismic combination above ground (0+) > Used Coeff. = 0.3 (Auto)

    > Code: $\Psi_{Ei} = \varphi \times \psi_{2i} = 0.3$ (Residential $\varphi = 1$, $\psi_2 = 0.3$) - Table A1.1 + A1.2(B) (CYS)

24. Libraries > Loads > Seismic spectrums (q-factor for steel)
    > Period
    > Eurocode
    > Code parameters > AgR*γi, q factor, Subsoil, Spectrum (Type 1), Direction.
25. Load > 3D wind generator > OK
    > Add load cases > Run generator (16 load cases)
26. Main > Load Groups (Together, Seismic)
27. Main > Load Cases (Seismic > Dynamic > Seismicity > CQC)
28. Main > Combinations (live load coeff=0.3 only for seismic combination)
    > ULS with wind, SLS, Seismic X (0.3Y), Seismic Y (0.3X)
29. Main > Stability combinations (Selfweight, Dead, Live)
30. Main > Result classes > TOTAL (ULS, Seismicity)
    > DYN (Seismicity)
    > GEO (ULS Set B, ULS Set C)
    > SERV (SLS-Char, SLS-Quasi)
31. Properties > Buckling data
    > Properties > Graphical input of system lengths
32. Analysis > Modal
33. Main > Results (Modal Participation factors Wxi, Wyi, Wzi_R > 0.90)
34. Main > Load Cases (Predominant mode > Mode shape per seismic direction from Results > Participation mass)
35. Analysis > Test of input data (Δημιουργεί τις σωστές μάζες ανά μέλος που έχει Line force)
36. Calculation > Batch analysis (Linear, Modal, Stability)

Solver setup > Use IRS in case of 2 storeys or more

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37. Main > Results
38. View > New animation window > Play

39. Main > Steel > Steel slenderness
> Properties > Selection field > Standard
> Values > Lam y (Λυγηρότητα στον y)
> Extreme > No > Refresh

Αλλάξτε μόνο τα Values για Ly και ly και πιέστε Refresh
> Properties > Ly > Refresh
> Properties > ly > Refresh

40. Main > Steel > Beams > Member check data > ULS check > Check (Preview για πίνακα)
41. Main > Steel > Connections (for IPE, HEA, SHS, RHS > Bolts, Welds, Stiffeners, Flanges,…)
42. Main > Steel > Connections
> Properties > Update stiffness (√)
43. Analysis > Batch analysis (Linear, Modal, Stability)
44. Main > Results
45. In case of high Unity, Section and Stability checks you may need to add LTB restraints and Member buckling data for steel members

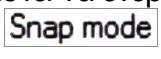
Concrete foundation

46. Remove supports
47. Main > Structure > 2D member (Wall=Shell, Slab=Plate)
48. Main > Structure > Model data > Support > surface (el. foundation)
49. Main > Structure > Model data > Property Modifiers 1D (0.5)
    For 1D members below ground (0 <) change ''Mass factor'' to 0*.
50. Main > Structure > Model data > Property Modifiers 2D (0.5)
    For 2D members below ground (0<) change ''Mass factor'' to 0*.

* ''Mass factor'' has to be zero (0) because foundations and basements have no movement because according to codes they are non-sway members.

51. Libraries > Load > Seismic spectrums (q-factor for concrete)
52. Connect Members/nodes
53. Check structure data
54. Analysis > Batch analysis (Linear, Modal, Stability)
55. Main > Results > Beams > Internal forces on beam
    > Properties > Rib/Integration strip (√)
56. Main > Results > 2D member
57. Main > Results > 2D member > Integration strip (Strip foundation)
58. Main > Concrete > 2D member > Member design > Member design ULS
    Properties > Use scale isolines
59. Main > Concrete > 2D member > Reinforcement 2D
60. Connect Members/nodes
61. Check structure data
62. Analysis > Test of input data
63. Analysis > Batch analysis (Linear, Modal, Stability)
64. Main > Results
65. Engineering Report for steel results
66. Engineering Report for concrete results

Για την γεωμετρία θα χρειαστεί να ενεργοποιήσετε:

- Snap mode  ή 
- View > Set view parameters > Set view parameters for all

Ακόμη και αν εισάγατε αρχείο CAD στον κάνναβο σας προτιμότερο θα ήταν να δημιουργήσετε και κάνναβο ‘’3D line grid’’.

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