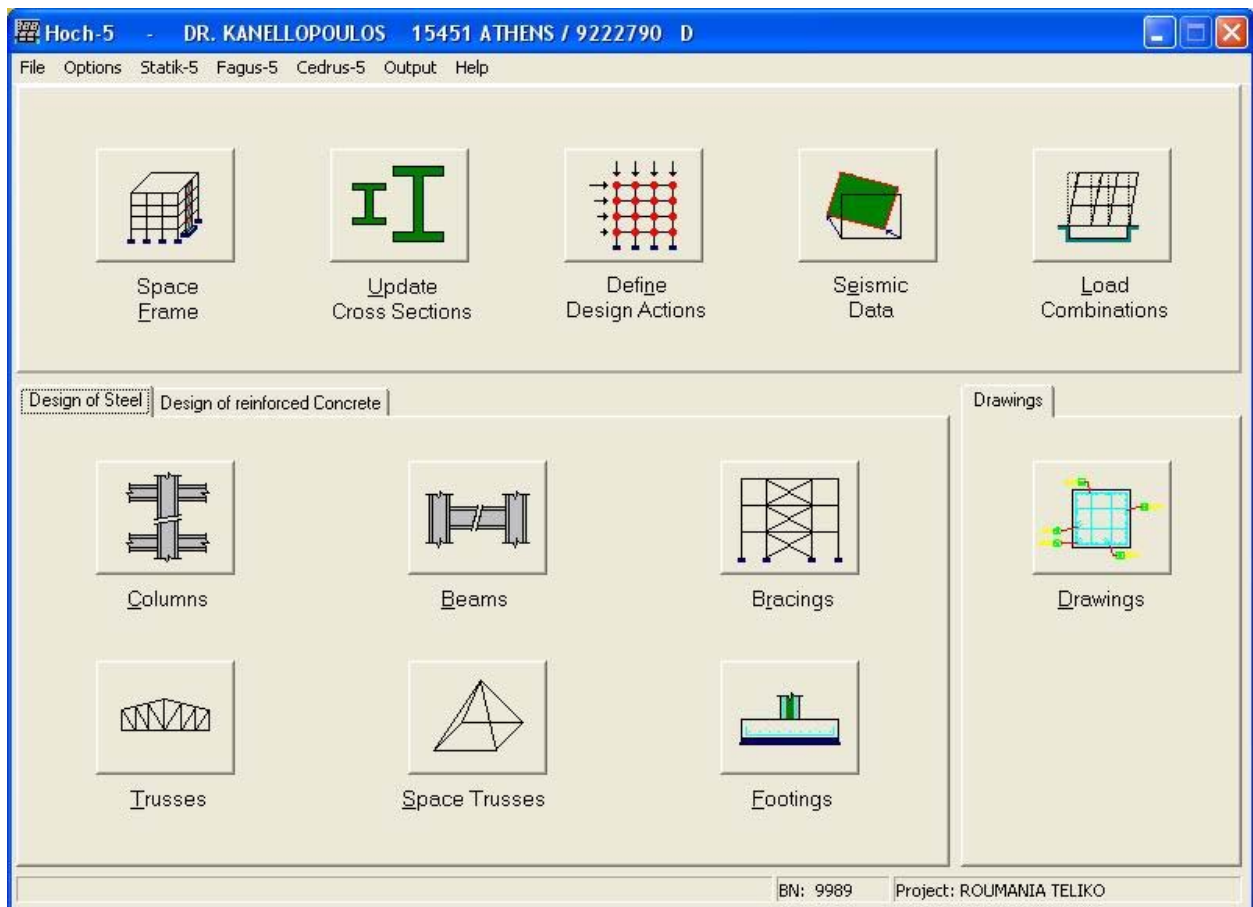


# STAHL-5

## Static and Seismic design of Steel Structures

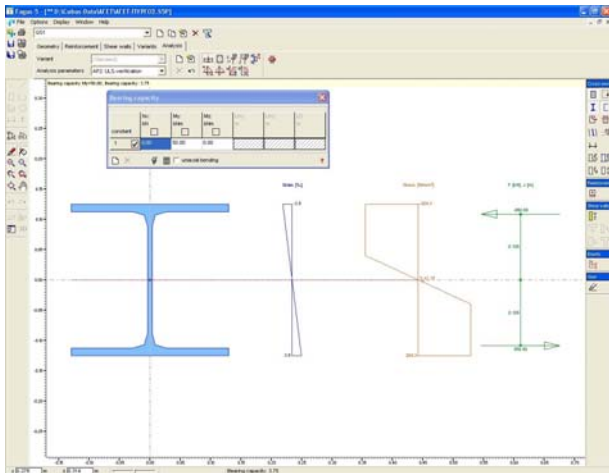
- Pre-and postprocessor of STATIK-5
- Steel profiles from the database of FAGUS-5
- User defined built-up sections (double L sections etc)
- User defined I or H welded sections
- Area, line and point loads on load surfaces
- Equivalent static and dynamic modal analysis
- Seismic displacements and rotations verification
- Seismic loads and masses generation
- Automatic combinations of various actions (gravity, snow, wind loads, crane loads, etc)
- Design of every cross section type according to Eurocode 3 for:
  - Shear
  - Biaxial bending with axial force
  - Flexural buckling
  - Lateral - torsional buckling
- Hollow section joint design according to Annex-K of Eurocode 3
- Interfaces for CAD programs



## Cross section checks

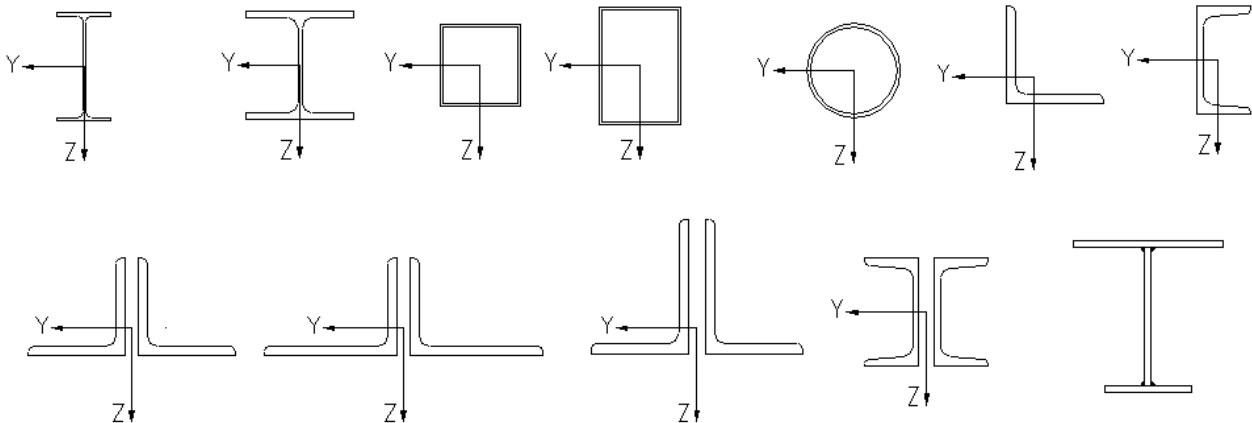
### Cross section classification

- Full plastic calculation and determination of the neutral axis using the algorithm of FAGUS-5
- Support for Class 4 sections
  - Calculation of the effective cross section properties
  - Eccentricities and additional moments due to asymmetry



### Steel profiles

- Support for the rolled steel sections of the FAGUS-5 library
- I and H steel profiles: IPE, IPE<sub>0</sub>, IPE<sub>V</sub>, HEAA, HEA, HEB, HEM, DIL, HER, HHD, HP, HX
- Hollow sections: RHS, TPS, MSH, CHS, ROR, RGL, RGM, RGS
- Equal and unequal leg angles (LNP)
- UNP and UAP sections



## Build-up sections

- Double L sections with equal and unequal legs
- Double UNP or UAP sections
- User defined welded built-up sections using the graphical interface of FAGUS-5

### Cross-section-level checks

- Shear
- Biaxial bending with axial force

### Member-level checks

- Flexural buckling
- Lateral-torsional buckling
- Accurate determination of the parameters  $k_y$ ,  $k_z$ ,  $k_{LT}$  taking into account the bending moment diagrams
- Especially for angle sections: calculation of the strength reduction due to the eccentricity of the connection (for welded and bolted connections)

### Hollow section joint checks

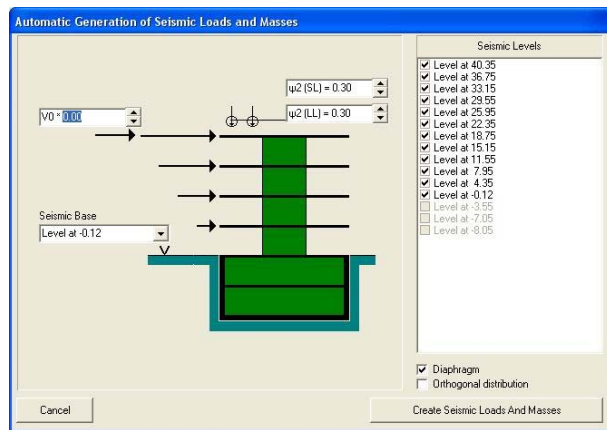
- Automatic recognition of the joint type and design according to Annex K of Eurocode 3
- Constructional details
- CAD interface

### General

- Graphical representation of all the checks in the STATIK-5 environment
- Optional calculation of the first adequate section

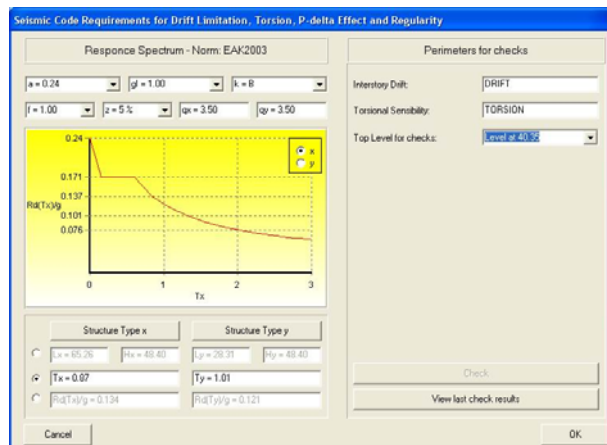
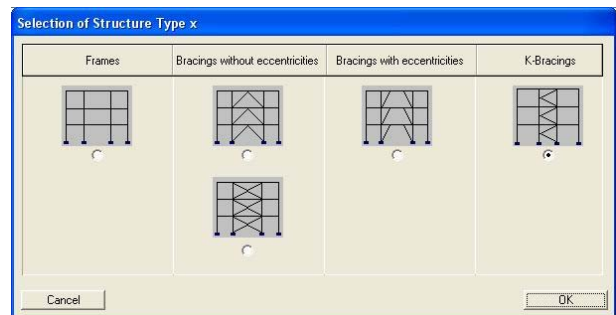
## Equivalent Seismic Static Loading and Masses

- Definition of the level of the seismic base
- Reduction of variable (live) loads according to the code
- Unitary triangular loading with an optional concentrated load on the top, as well as unitary loading of accidental eccentricity to avoid the repetition of the analysis in case of changing the seismic parameters
- Dynamic multi-modal analysis with 6 degrees of freedom per joint and optional effective mass in x, y or z direction
- Second order solution (when required)



## Seismic Displacements and Storeys Rotation Verification

- Vibration periods based on dynamic analysis or according to simplified formulae
- Optional direct input of seismic factors
- Direct control of elastic response spectrum for any combination of parameters
- Input of the contour of each floor for the verification of the angular deformation of the masonry infills and the accidental mass eccentricity
- Automatic calculation of the torsional sensitivity of the storey
- Factor  $\theta$  for p- $\Delta$  effects
- EAK, EC8, SIA or arbitrary spectrum

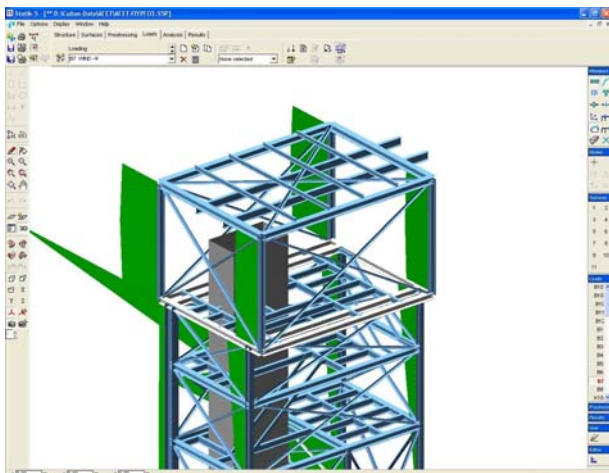
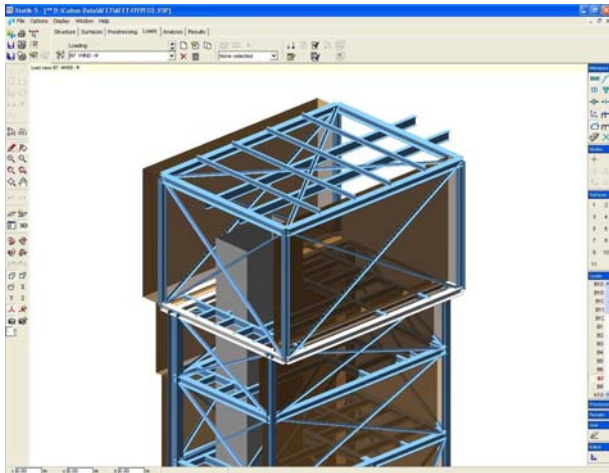
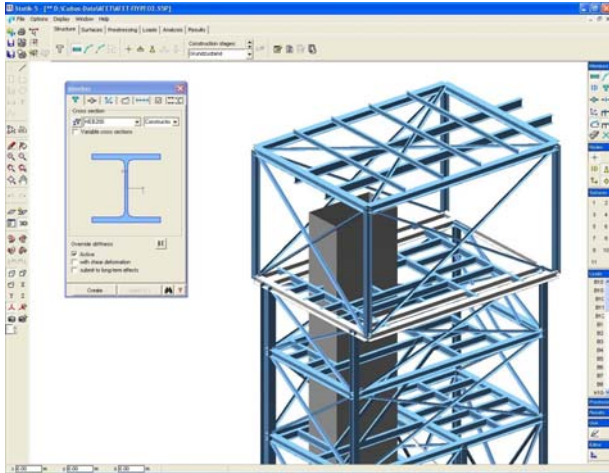


## Method of Dynamic Modal Analysis

- Definition of seismic excitation directions
- Combination of modes for each direction of seismic excitation, based on code's or arbitrary spectrum, with calculation of the ratio of the participating mass
- Superposition for each direction and for all probable seismic directions with various statistical algorithms (SRSS, CQC, summation of absolute values)
- Calculation of the probable maxima of the internal moments and forces, deformations and support reactions)
- Option to apply different damping ratio for each mode

## Design of trusses

- Graphic input of the trusses, the purlins and of all the bracing systems
- Grouping of the trusses through a special management menu
- Cross section grouping
- Design for any combination of actions
- Automatic calculation of the buckling lengths
- Optional direct input of the buckling lengths

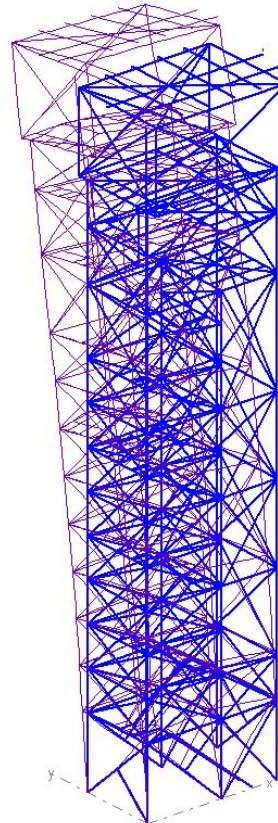


- Design for:
  - Shear
  - Biaxial bending with axial force
  - Flexural buckling
  - Lateral torsional buckling
- Optional automatic calculation of the first adequate section and update of the input files
- Graphical representation of the check results
- Purlin checks in graphical form

## Column design

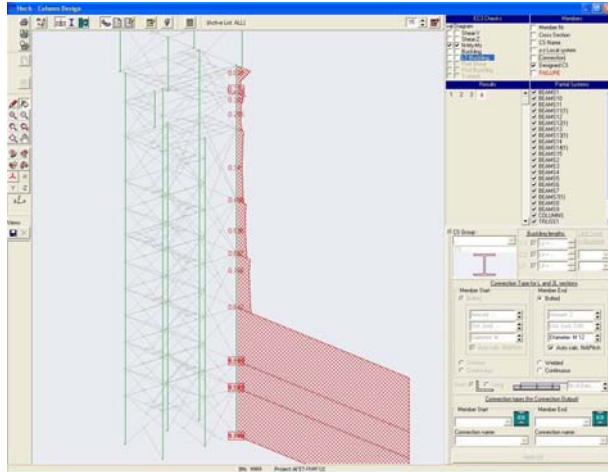
### User utilities

- Automatic identification of the continuity of columns from storey to storey
- Cross section grouping
- Grouping through a specific management menu
- Automatic calculation of the buckling lengths in both local directions
- Optional direct input of the buckling lengths
- Frame stability:
  - Frame imperfection in all directions
  - Solution using 2<sup>nd</sup> order theory
- Graphical representations of the beams connected to each column in both local directions



## Design

- Design for basic and seismic actions
- Automatic calculation of the first adequate section and update of the input files
- Design for:
  - Shear
  - Biaxial bending with axial force
  - Flexural buckling
  - Lateral torsional buckling



## Results

- Graphical representation of the check results
- Text files with all the necessary checks and references to the equations of Eurocode 3

## Bracing systems design

### User utilities

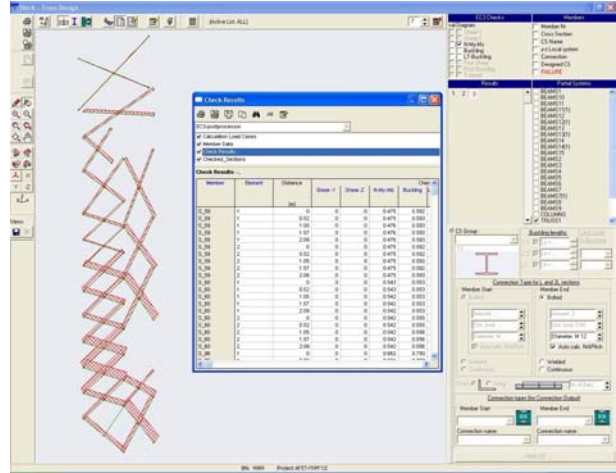
- Grouping of the bracing systems through a special management menu
- Cross section grouping
- Automatic calculation of the buckling lengths
- Optional direct input of the buckling lengths
- Frame stability checks using frame imperfections in all directions

## Design

- Design for basic and seismic actions
- Automatic calculation of the first adequate section and update of the input files
- Design for:
  - Shear
  - Biaxial bending with axial force
  - Flexural buckling
  - Lateral torsional buckling

## Results

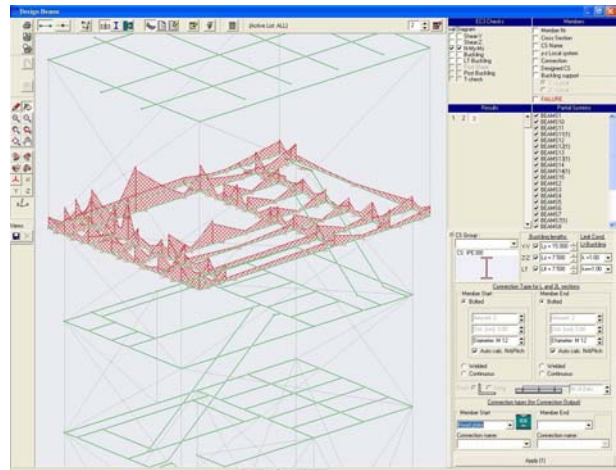
- Graphical representation of the check results
- Text files with all the necessary checks and references to the equations of Eurocode 3



## Beam design

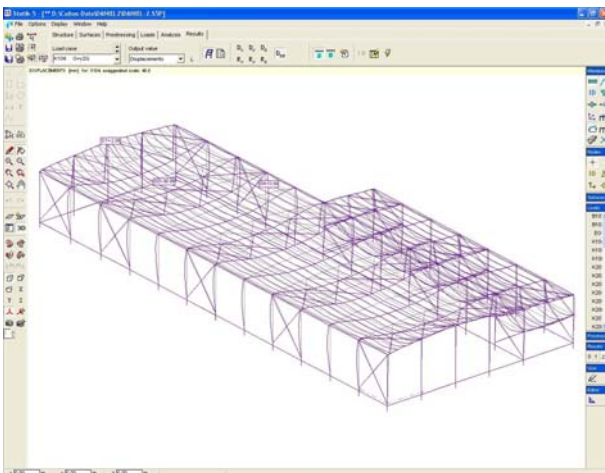
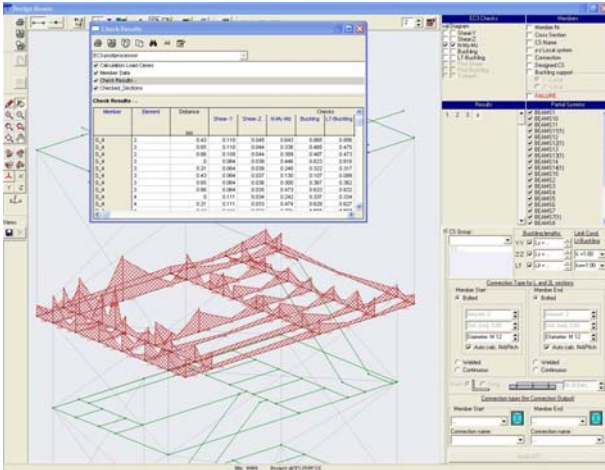
### User utilities

- Automatic identification of the continuity of beams and of the faces of vertical members
- Grouping of continuous beams through a special management menu
- Cross section grouping
- Automatic calculation of the buckling lengths
- Optional direct input of the buckling lengths
- Lateral torsional buckling:
  - Graphical input of the lateral support points
  - Graphical input of the parameters  $k$  and  $k_w$
  - automatic calculation of the parameters  $C_1$ ,  $C_2$ ,  $C_3$  from the bending moments diagram



## Design

- Design for basic and seismic actions
- Automatic calculation of the first adequate section and update of the input files
- Design for:
  - Shear
  - Biaxial bending with axial force
  - Flexural buckling
  - Lateral torsional buckling



## Results

- Graphical representation of the check results
- Text files with all the necessary checks and references to the equations of Eurocode 3

