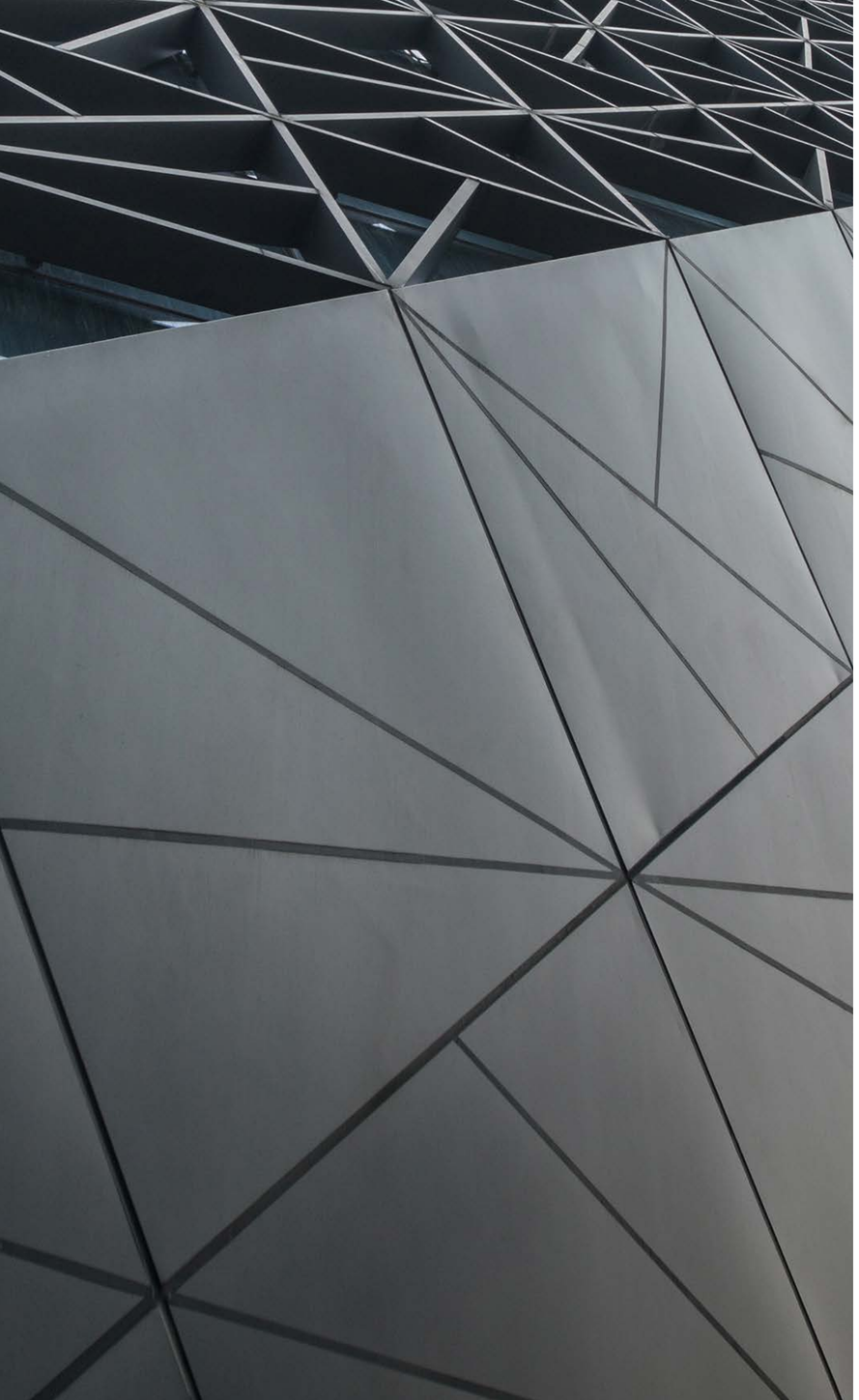

AXISVM

AXISVM X7
NEW FEATURES

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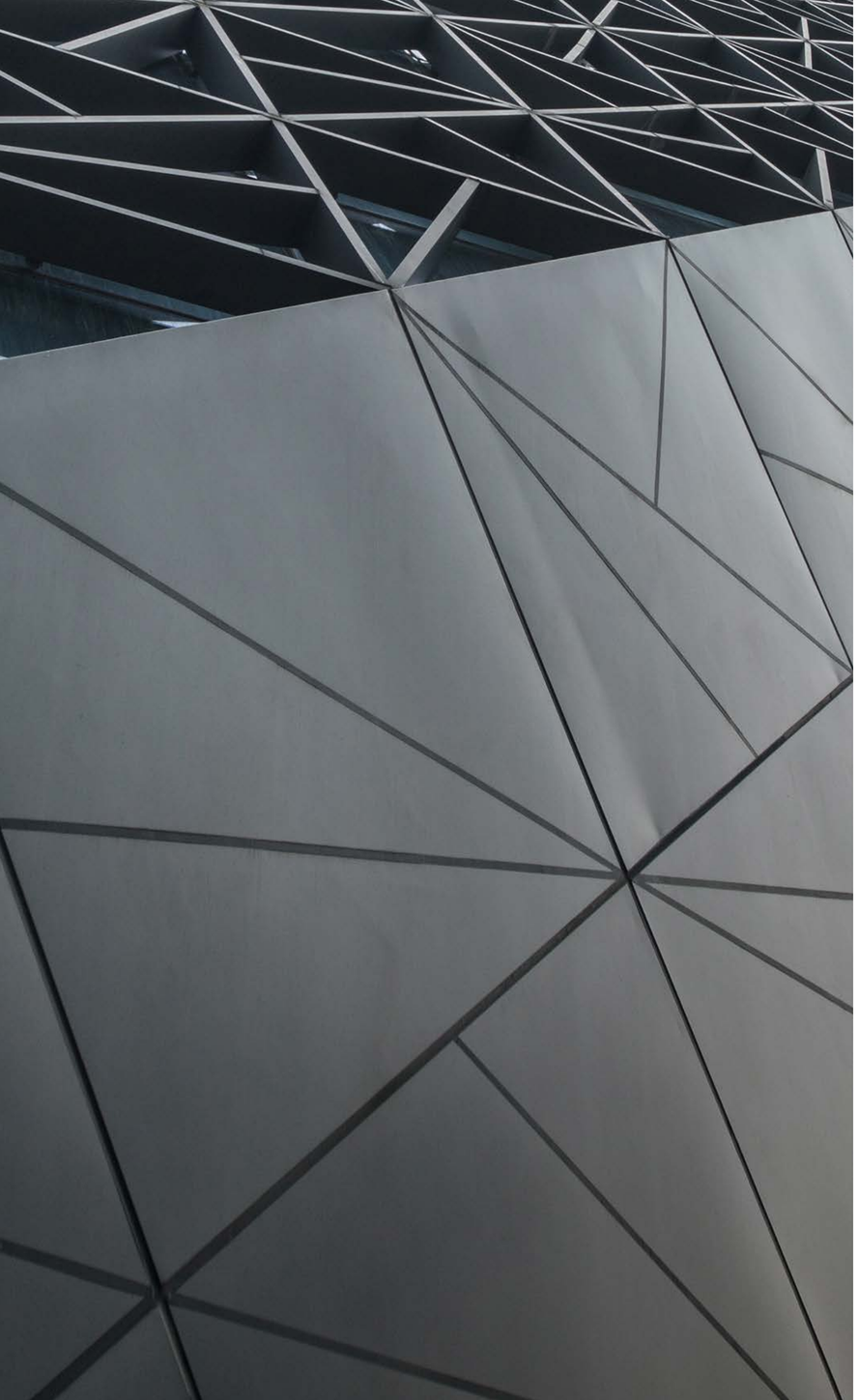
AXISVM

WHAT IS NEW in AXISVM X7?

- NEW MODULES
- NEW FEATURES IN EXISTING MODULES
- NEW FEATURES IN BIM
- NEW FEATURES IN THE BASIC PACKAGES



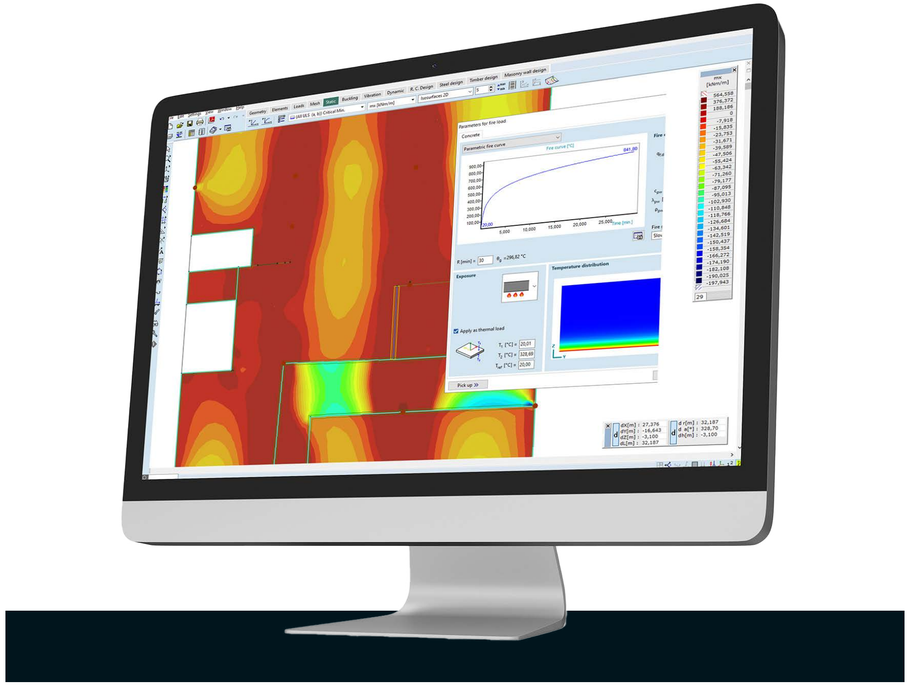
AXISVM

NEW MODULES

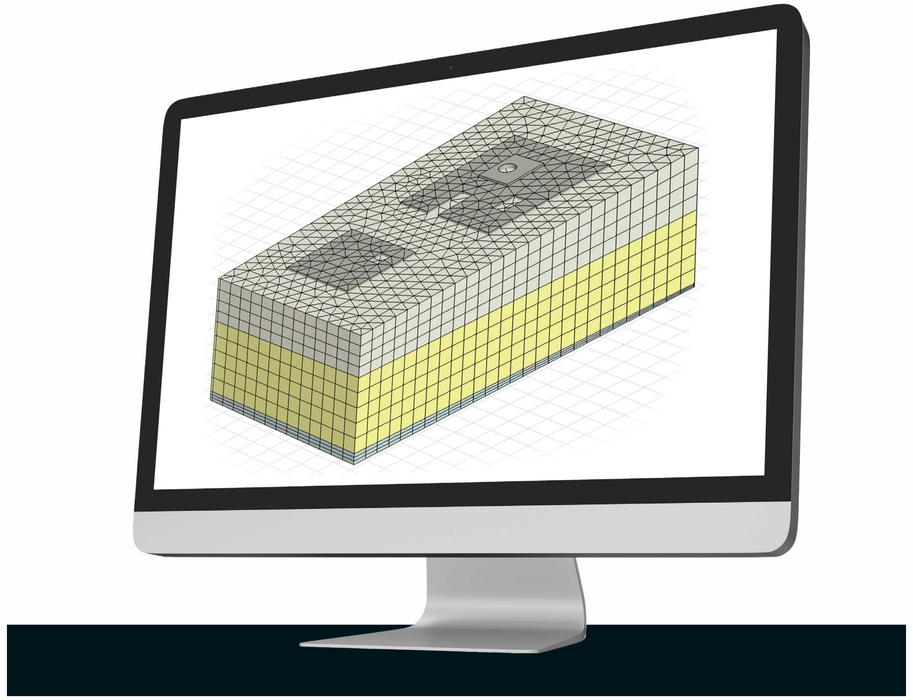
AXISVM

NEW MODULES

NEW RC8-S MODULE

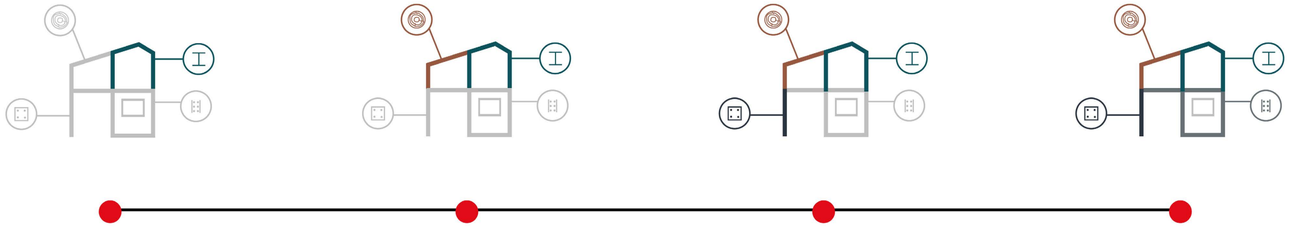


NEW SOIL MODULE



AXISVM

NEW RC8-S MODULE

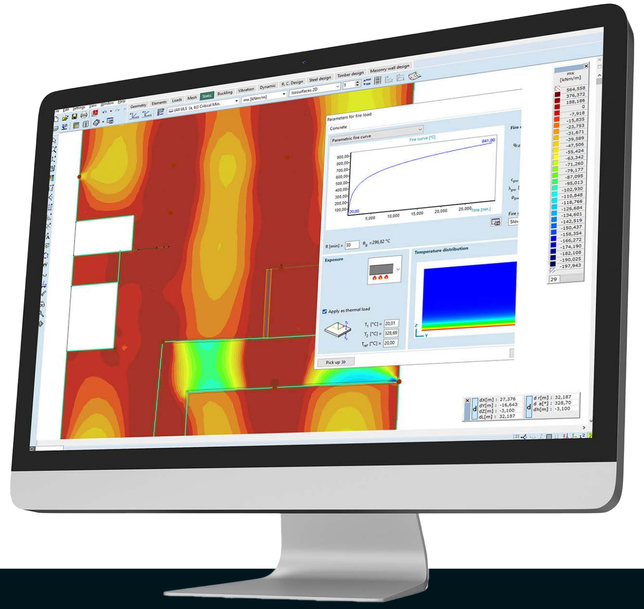


SD8 MODULE
Structural fire design of steel structures

TD8 MODULE
Structural fire design of timber structures

RC8-B MODULE
Structural fire design of RC columns and beams

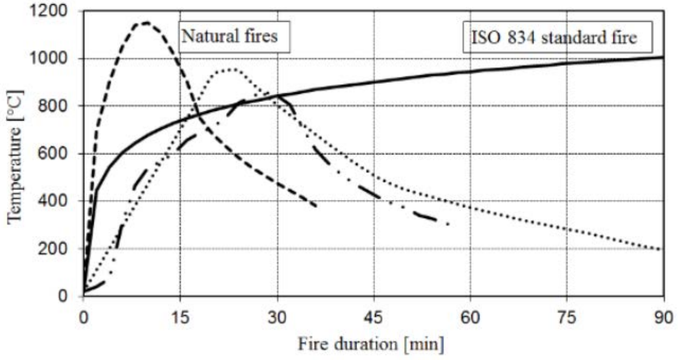
RC8-S MODULE
Structural fire design of RC surfaces

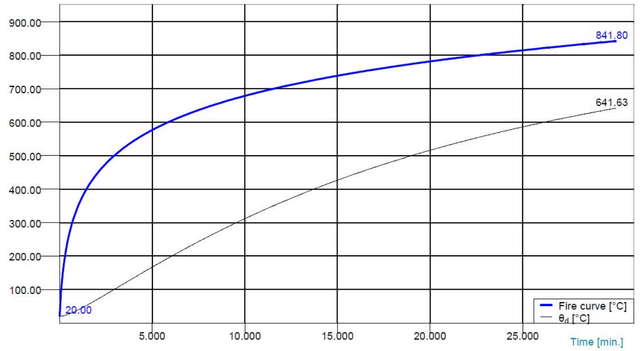


AXISVM

NEW RC8-S MODULE

- numerous fire curves
- custom fire curve
- analytical determination of steel temperature and charring depth
- manual entry of section factor, shadow factor and steel temperature

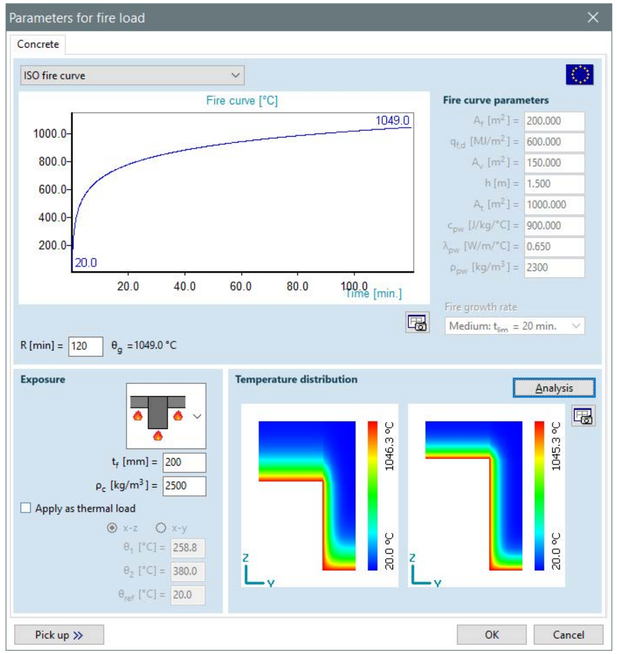




AXISVM

NEW RC8-S MODULE

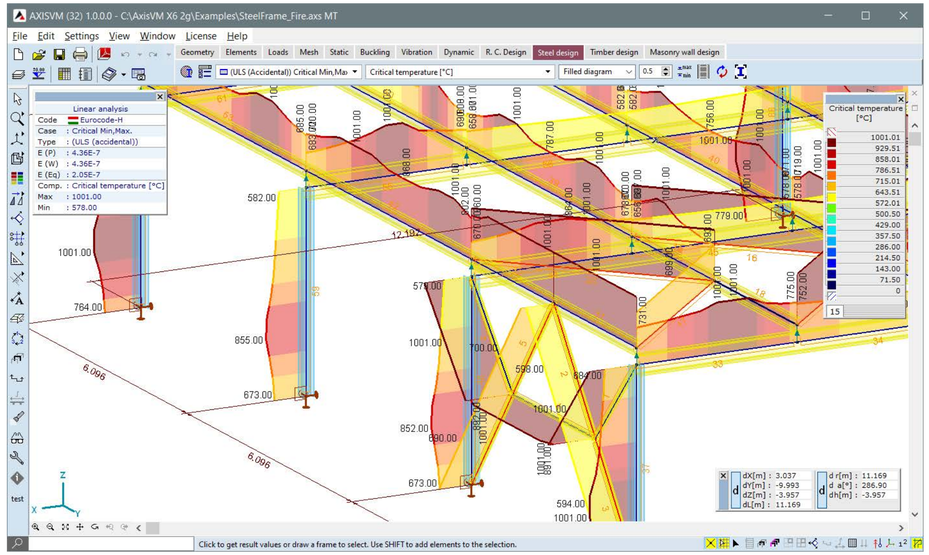
- complex 2D temperature distribution analysis by solving heat transfer problem
- calculation of critical temperature along the members, graphical and tabular documentation of critical temperature for intumescent painting



AXISVM

NEW RC8-S MODULE

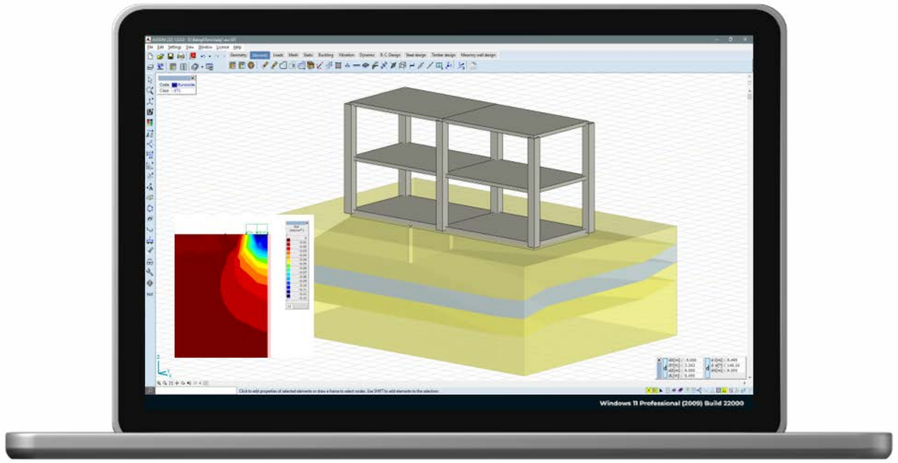
- SD8, TD8 and RC8-B are capable to handle members with variable cross-sections
- fire design of slabs or shells with variable thickness is also possible with RC8-S



AXISVM

NEW SOIL MODULE

- better approximation of the boundary conditions of the structure
- analyse and investigate
  - stresses and deformations in the soil
  - the effect of soil deformation on the structure

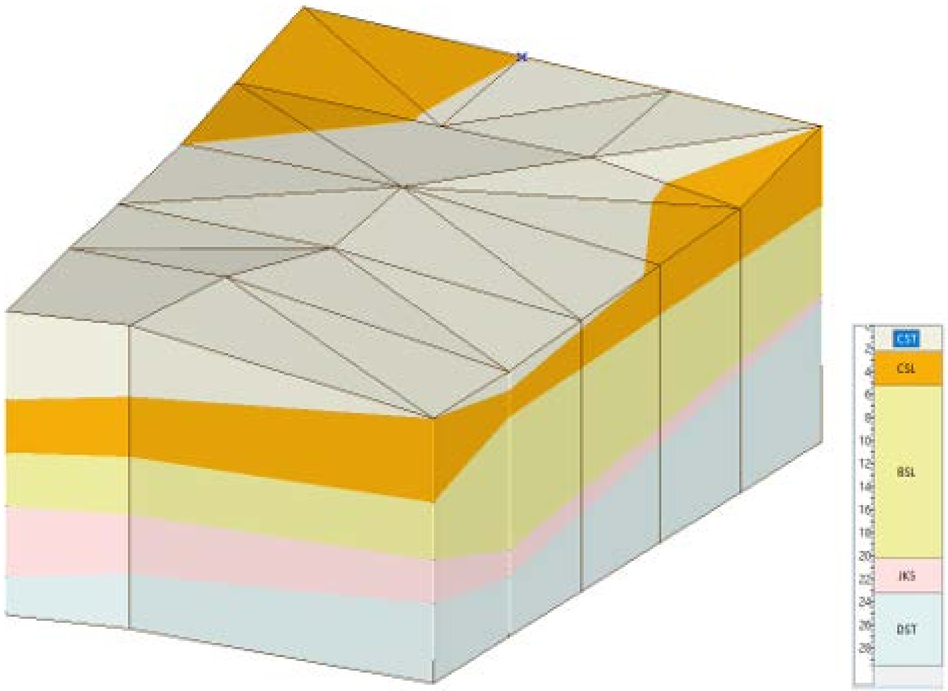


AXISVM

NEW SOIL MODULE

Terrain model based on borehole samples

- 3D information set containing
  - Soil profiles
  - Soil profile locations

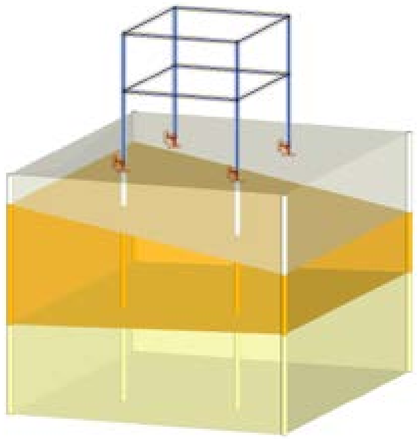


AXISVM

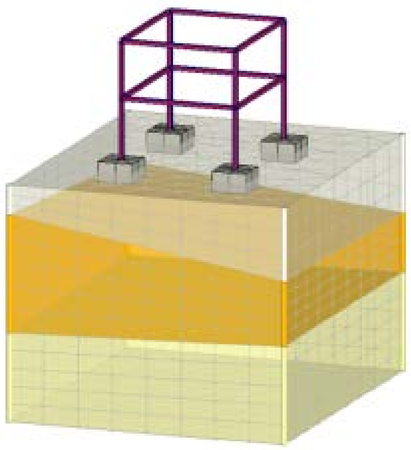
NEW SOIL MODULE

Approaches of modelling of interaction

- 1D/2D Winkler support stiffnesses calculated based on the terrain model



- coupled model with 3D soil model, built up using the real subsoil profiles and properties based on the terrain model

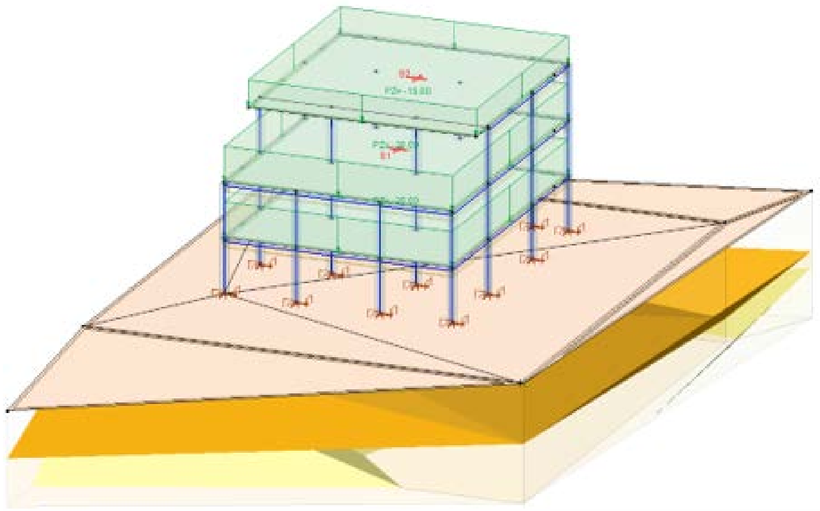


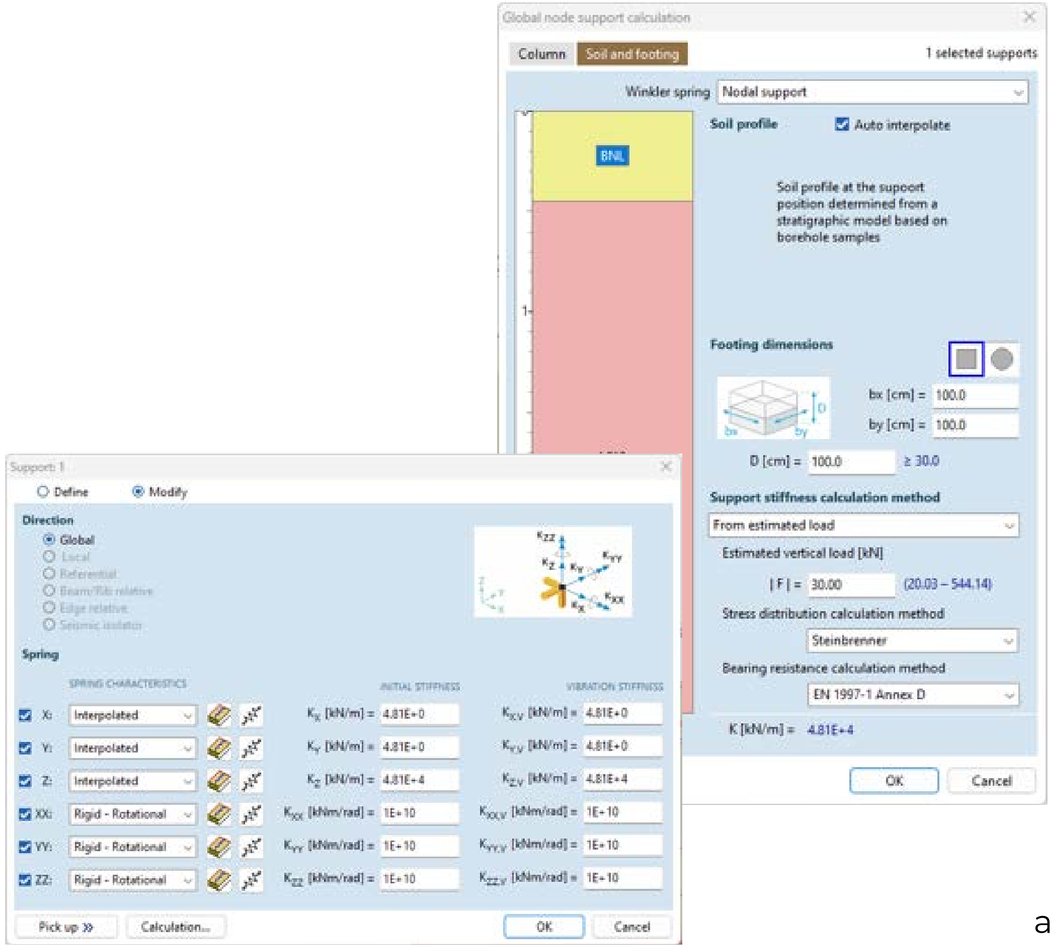
AXISVM

NEW SOIL MODULE

Approaches of modelling of interaction

- 1D/2D Winkler support stiffnesses calculated based on the terrain model under individual points



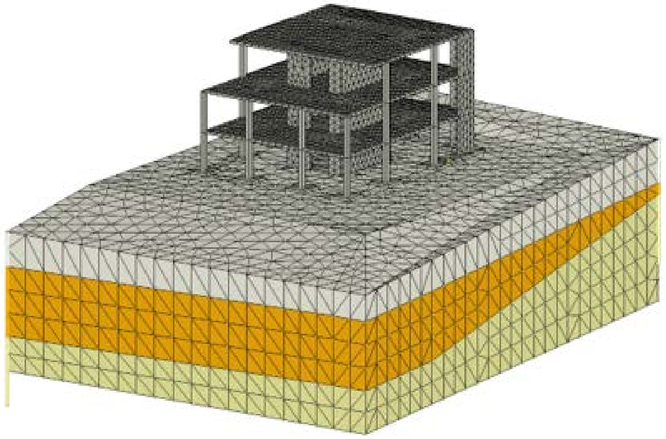


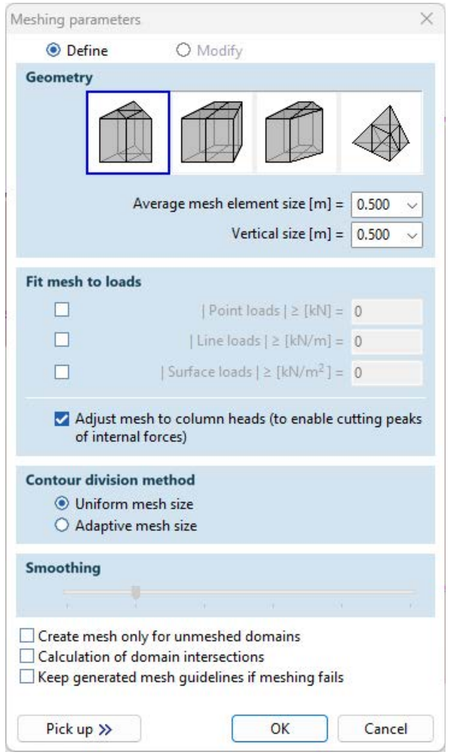
AXISVM

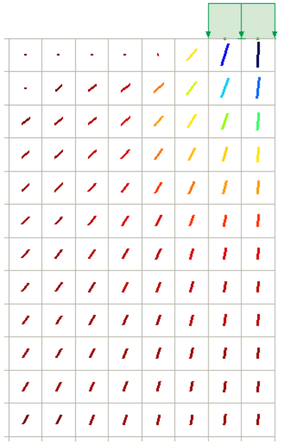
NEW SOIL MODULE

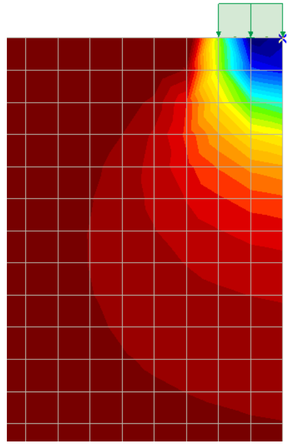
Approaches of modelling of interaction

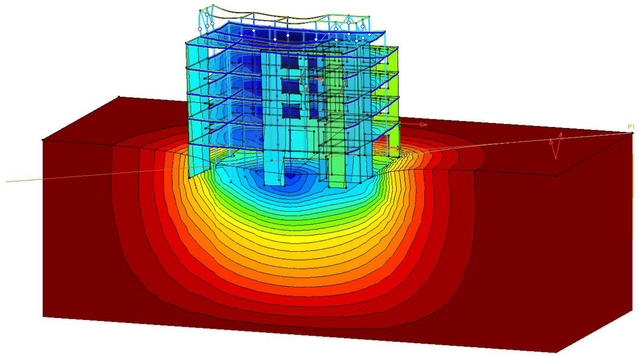
- coupled model with 3D soil model, built up using the real subsoil profiles and properties based on the terrain model

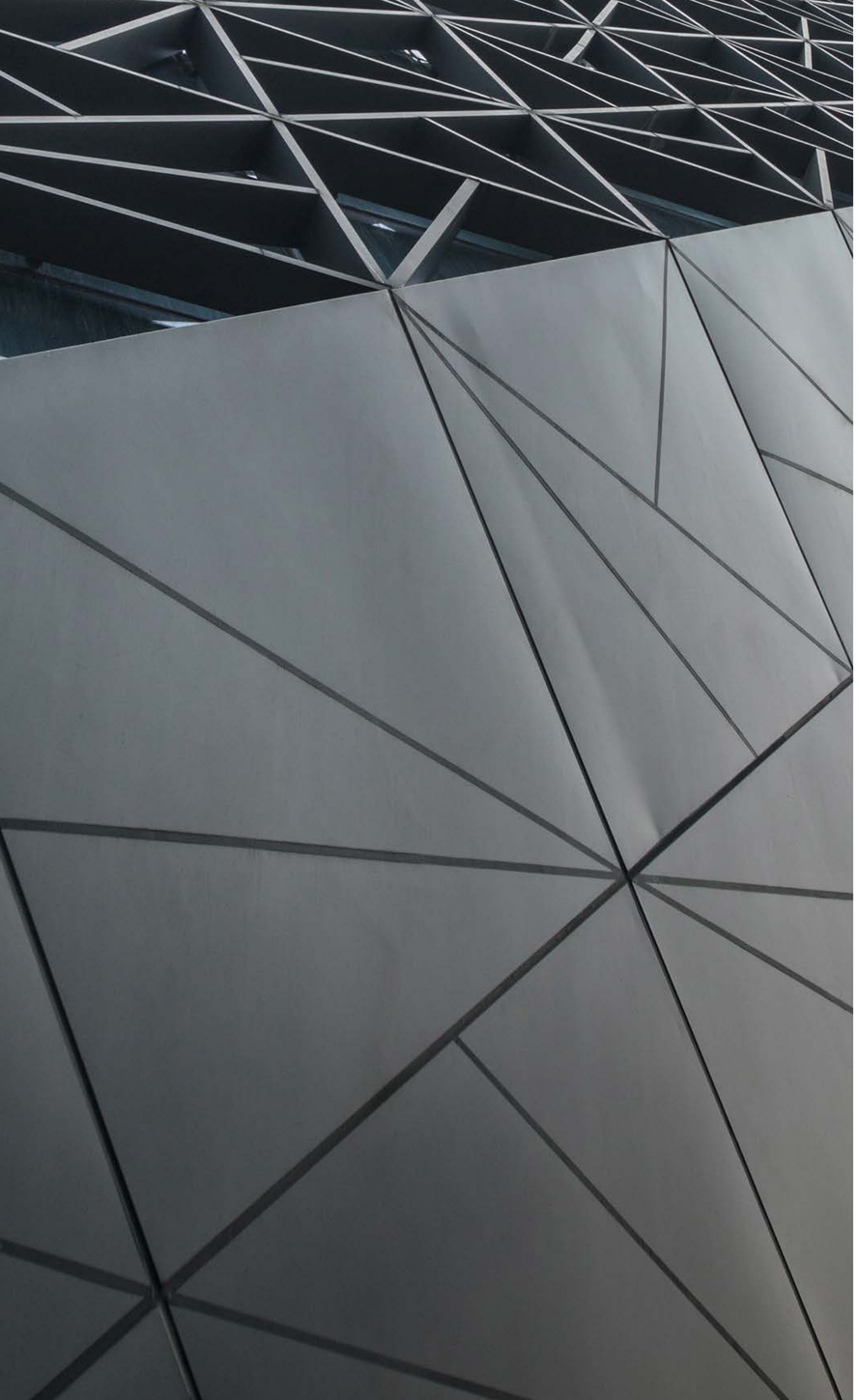












AXISVM

NEW FEATURES IN EXISTING MODULES

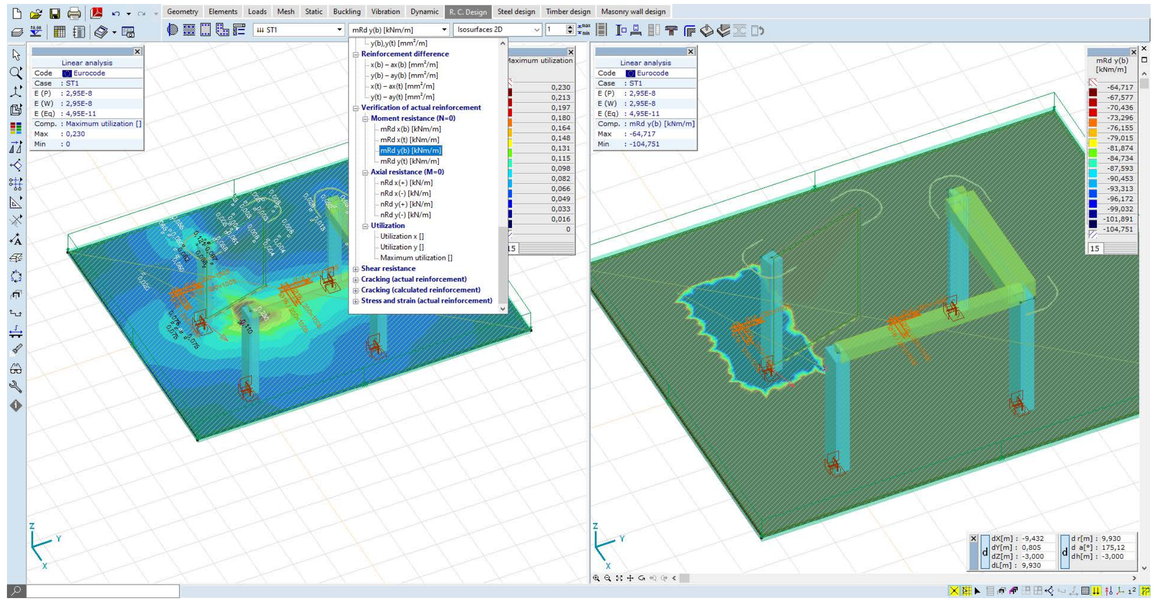
AXISVM

NEW FEATURES IN EXISTING MODULES

RC1 MODULE

Utilization of result components for the actual reinforcement

The utilization of the actual reinforcement is determined based on the capacity curve of the cross-section.



AXISVM

NEW FEATURES IN EXISTING MODULES

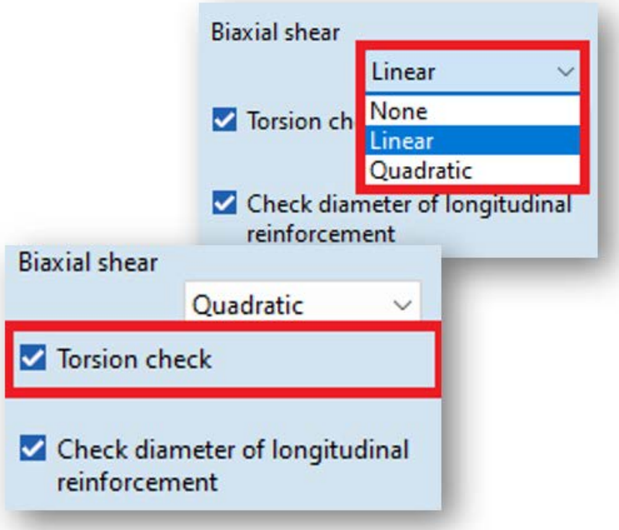
RC2 MODULE

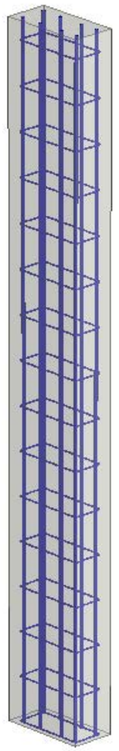
Optional consideration of torsion in the design of RC columns

In the design of reinforced concrete columns, the check for torsion can be switched on/off.

Enhanced shear check of reinforced concrete columns

The biaxial shear check can be disabled in the verification of the RC columns. In addition to the linear summation, a parabolic relationship can also be used for verification.





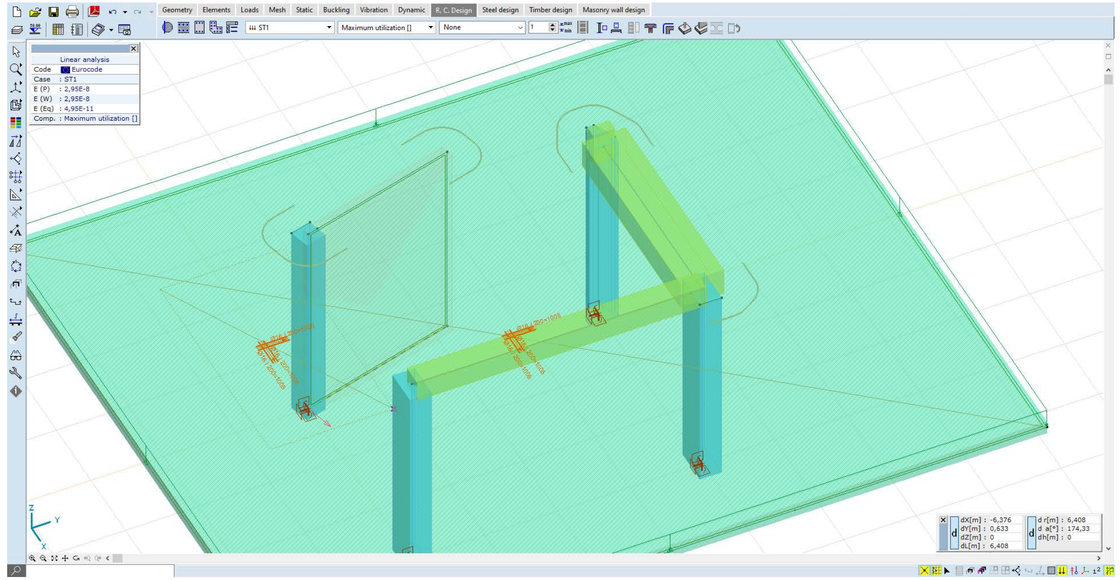
AXISVM

NEW FEATURES IN EXISTING MODULES

RC3 MODULE

Punching check considering connecting ribs

The punching check is also available for columns with connecting ribs.



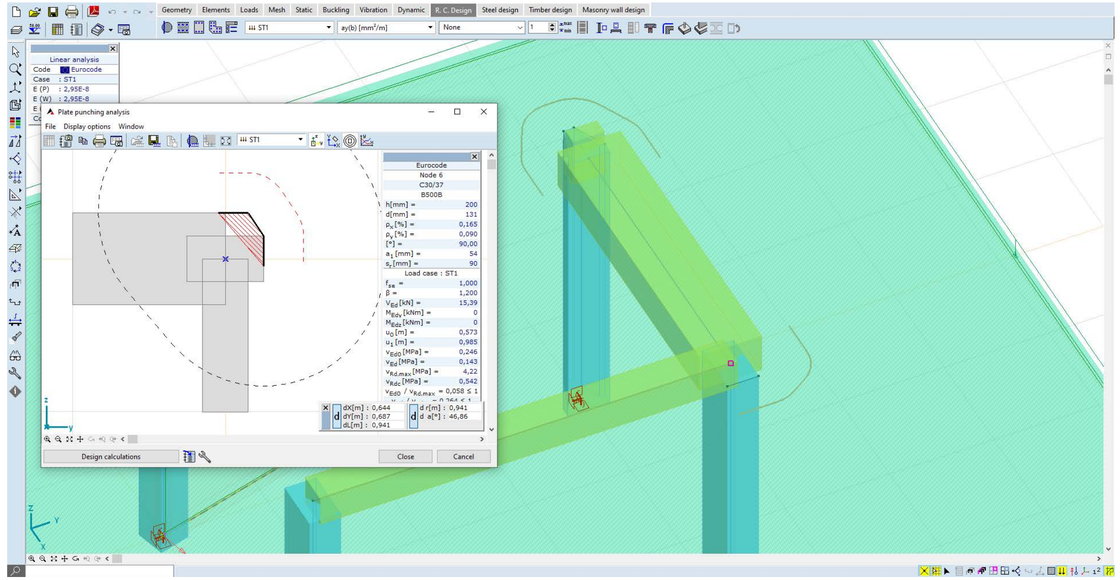
AXISVM

NEW FEATURES IN EXISTING MODULES

RC3 MODULE

Punching check of column reinforced wall ends/corners

The punching check of wall ends/corners can be performed even if a column is connected to the wall end/corners.



AXISVM

NEW FEATURES IN EXISTING MODULES

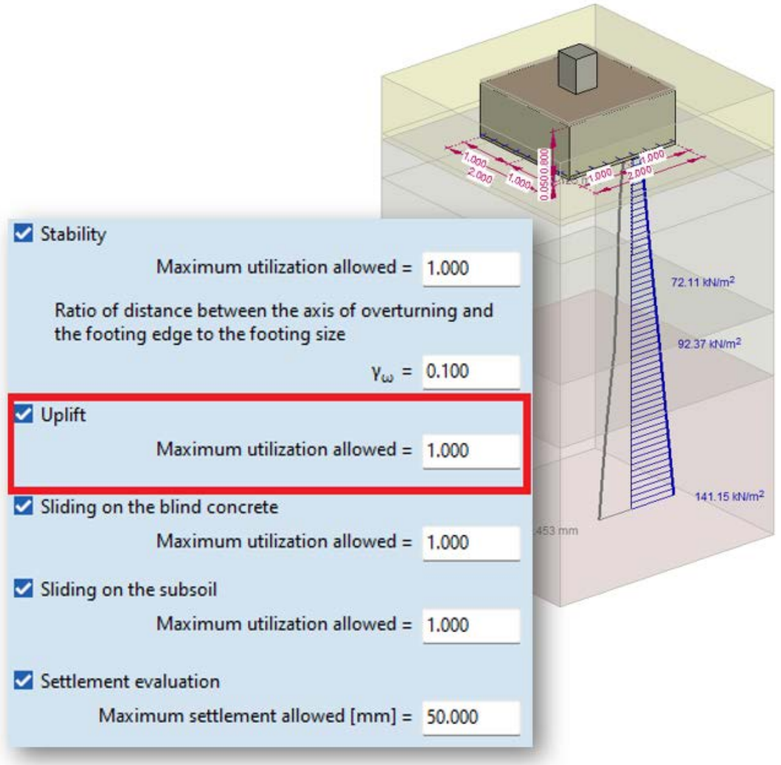
RC4 MODULE

Additional options for the design of footings

The range of verifications taken into account in the design of footings has been extended. The footings can be designed based on a specified set of verifications.

Verification of footings against uplift

If an upward force acts on the footing, the program checks whether the self-weight of the footing counterbalances the corresponding external force.



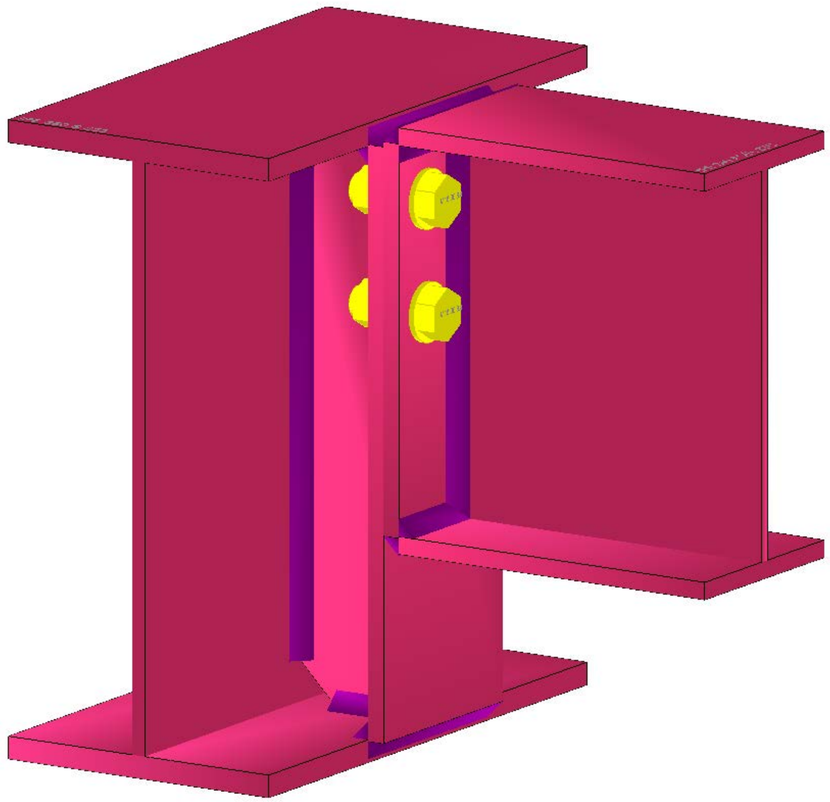
AXISVM

NEW FEATURES IN EXISTING MODULES

SC1 MODULE

Moment-resisting beam joint with end plate

Beam-to-beam connection with end plate joints. Detailed design calculation is available on request.



AXISVM

NEW FEATURES IN EXISTING MODULES

SC1 MODULE

Moment-resisting beam-column joint

Moment-resisting beam-column joints with an optional diagonal welded plate. Detailed design calculation is available on request.

AXISVM

NEW FEATURES IN EXISTING MODULES

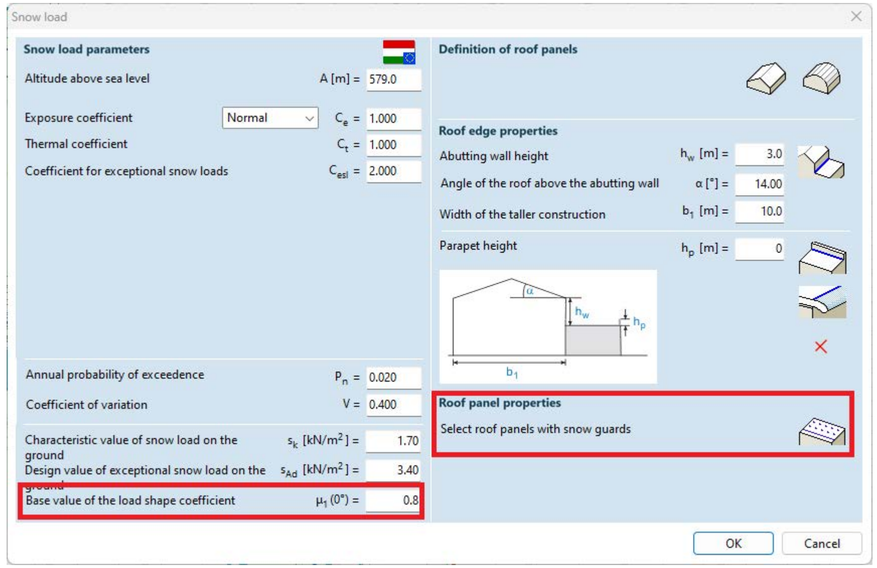
SWG MODULE

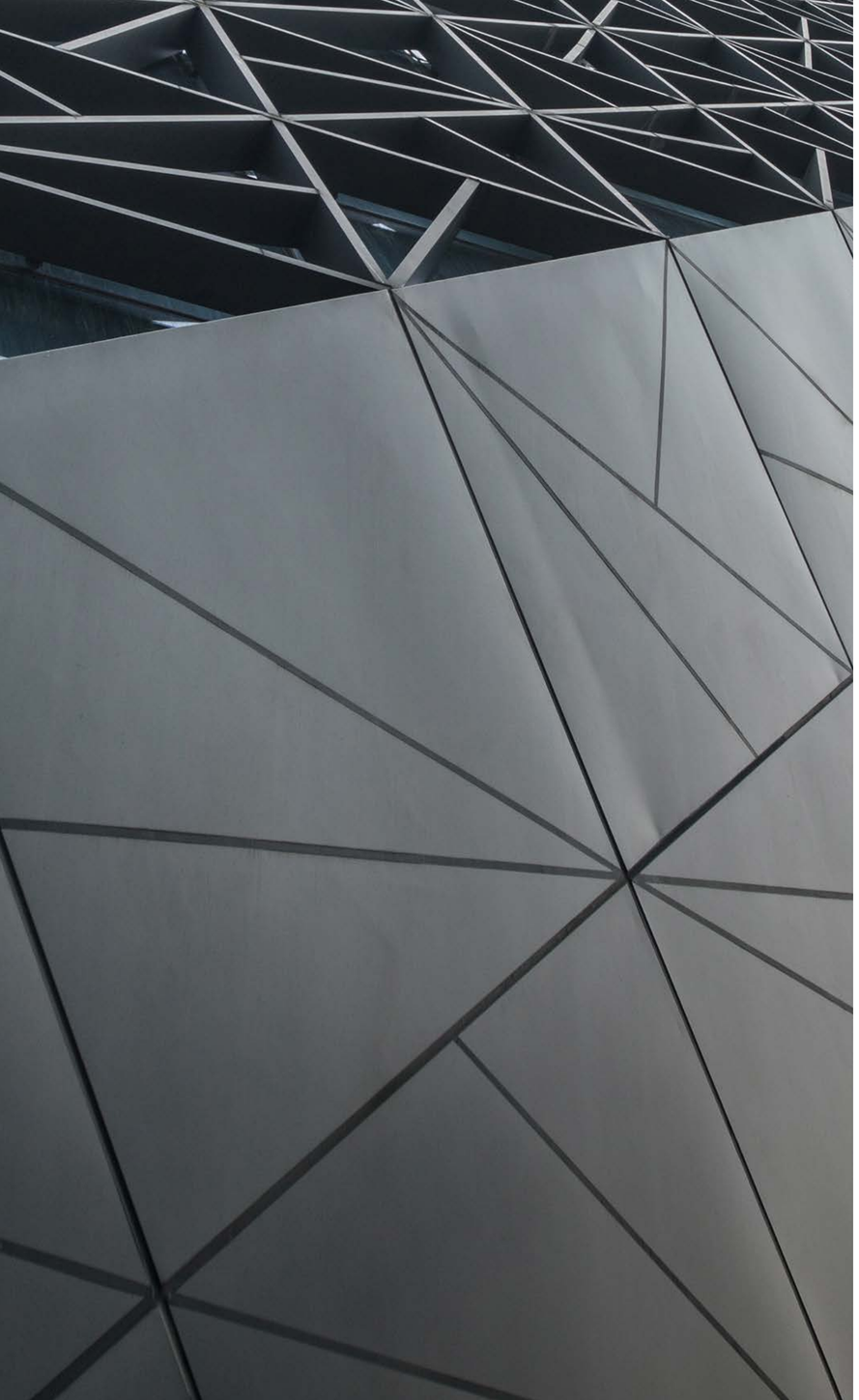
Custom setting of μ1 snow load shape coefficient

The snow load shape coefficient μ1 can be modified for flat and mono-pitch roofs.

Roof panels with snow guards

Snow guards can be assigned to roof panels, with the exception of cylindrical roofs.





AXISVM

NEW FEATURES IN BIM

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AXISVM

NEW FEATURES IN BIM

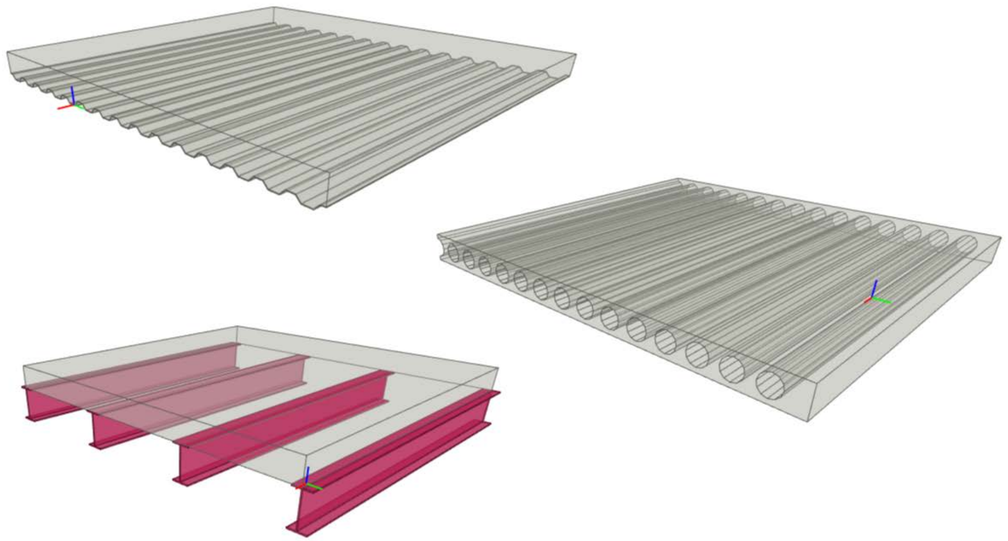
IFC

Additional import options

New options are available for importing an IFC model: Overwrite, Add, Update.

Export of special domains

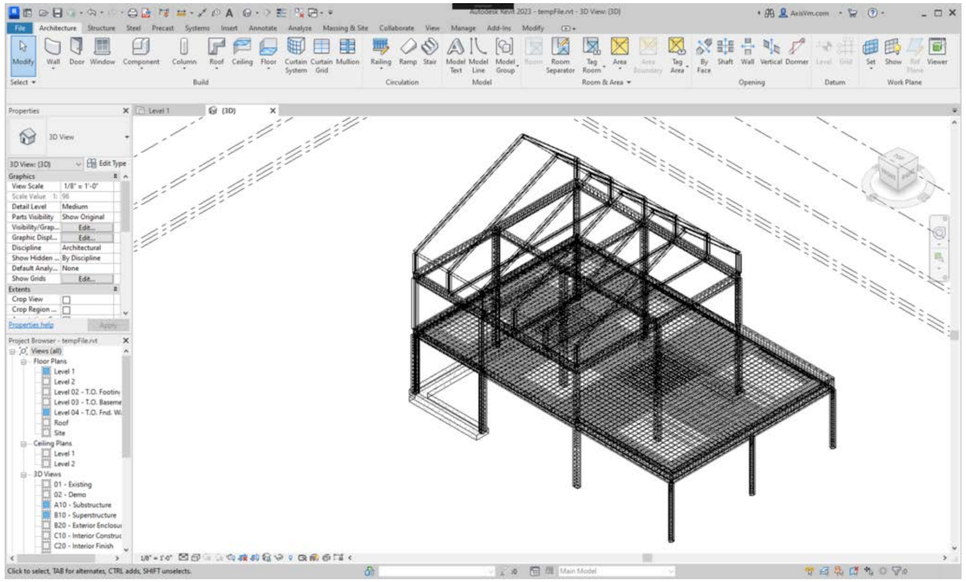
The IFC export option is available for ribbed, hollow core, composite ribbed, and trapezoidal steel deck slab domains.



AXISVM

NEW FEATURES IN BIM

REVIT - AXISVM



Support of Revit 2023

The supported file versions have been extended with Revit 2023.
AXISVM transfers the model data using the API interface of Revit (Revit 2019 or a newer version is required).

Export of actual reinforcement to Revit 2022 and 2023

With the enhanced transfer the following data and elements are exported:

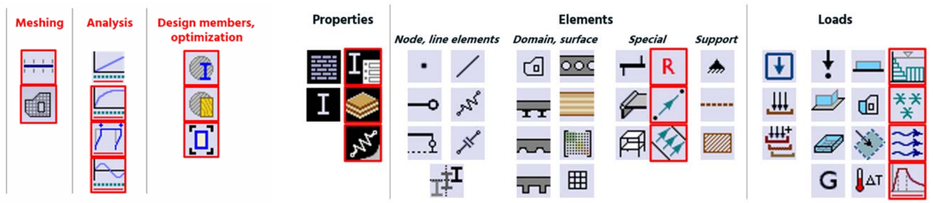
- Beam elements with their material and cross-section properties
- domains with their material properties
- supports
- actual reinforcements
- the analytical model

AXISVM

NEW FEATURES IN BIM

RHINO/GRASSHOPPER

New interface for V6.0 Rhino/Grasshopper



New features and options

- component for definition of parametric cross-sections
- XLAM domain, references, and component to define spring characteristics
- node-to-node and line-to-line link elements
- additional load options (seismic, snow, wind, fluid, support displacement...)
- launching AXISVM analysis from Grasshopper (linear and nonlinear static, vibration, buckling, and seismic analysis)
- creating steel members
- creating timber members
- optimizing the cross-section of steel and timber members
- certain result components can be

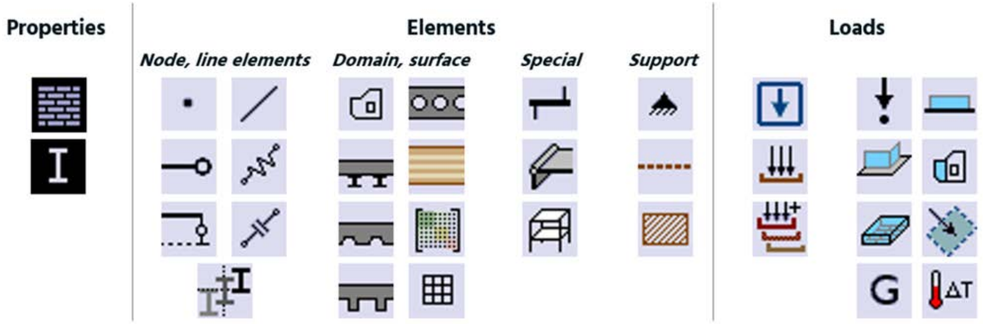
AXISVM

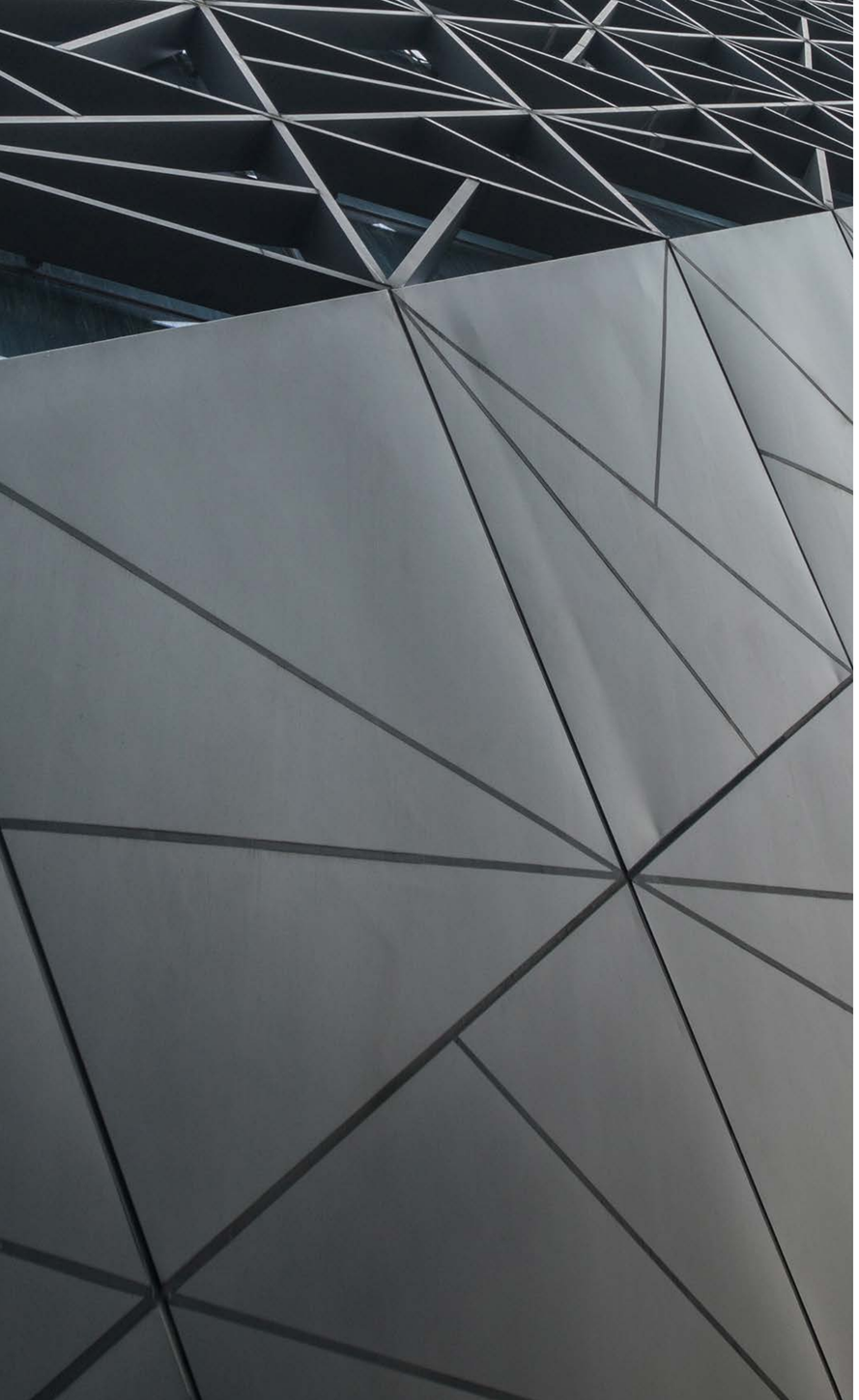
NEW FEATURES IN BIM

REVIT/DYNAMO

New interface for V3.0 Revit/Dynamo

The components available in the new interface support all AXISVM element and load types.





AXISVM

NEW FEATURES IN THE BASIC PACKAGES

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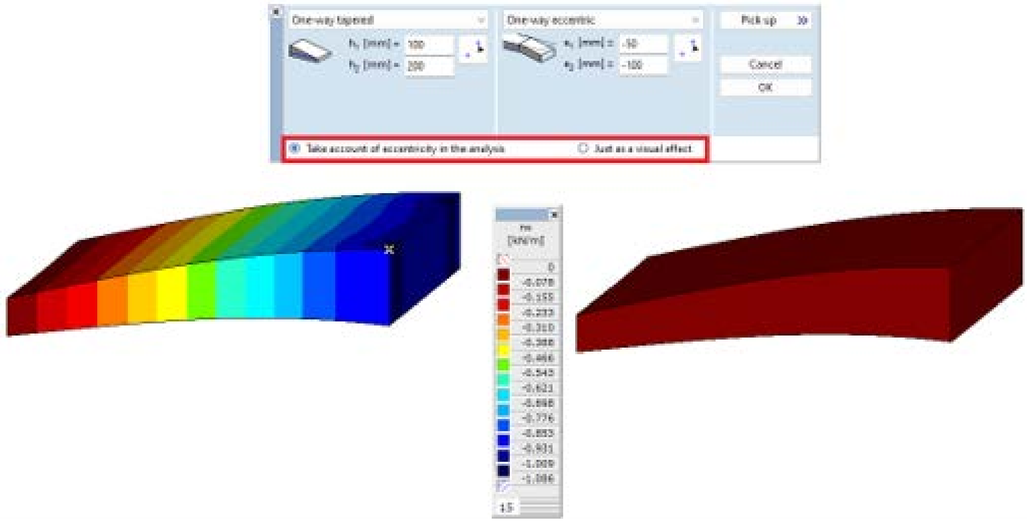
AXISVM

NEW FEATURES IN EXISTING MODULES

ELEMENTS

Additional option for domain eccentricities

When setting the eccentricities assigned to domains, the user can specify whether they should be taken into account in the calculation or only included in the drawing as a visual effect.



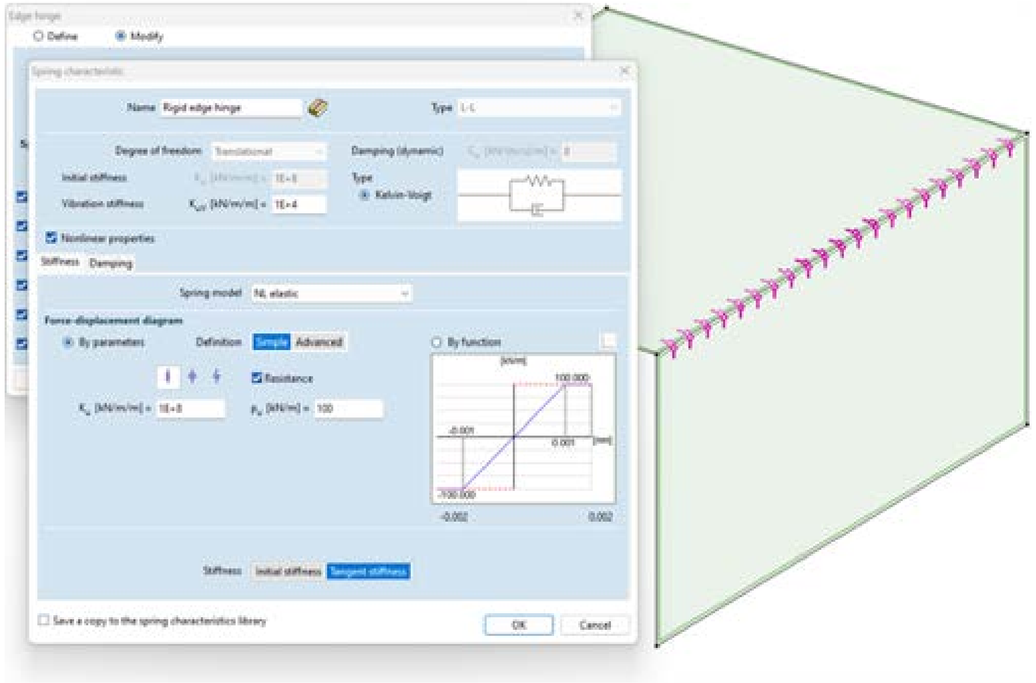
AXISVM

NEW FEATURES IN EXISTING MODULES

ELEMENTS

Spring characteristics of edge hinges

Allows for the definition of edge hinges with spring characteristics, different static and vibration stiffness, and complex/complex nonlinear behaviour modelling



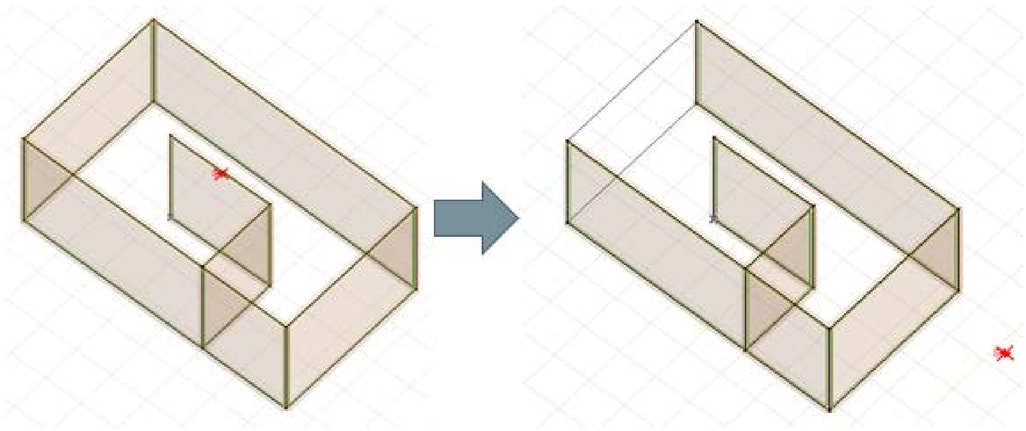
AXISVM

NEW FEATURES IN EXISTING MODULES

MODELLING

Automatic calculation of the shear center of the structure

The program automatically calculates the shear center of the storeys, which are displayed when the model is built.



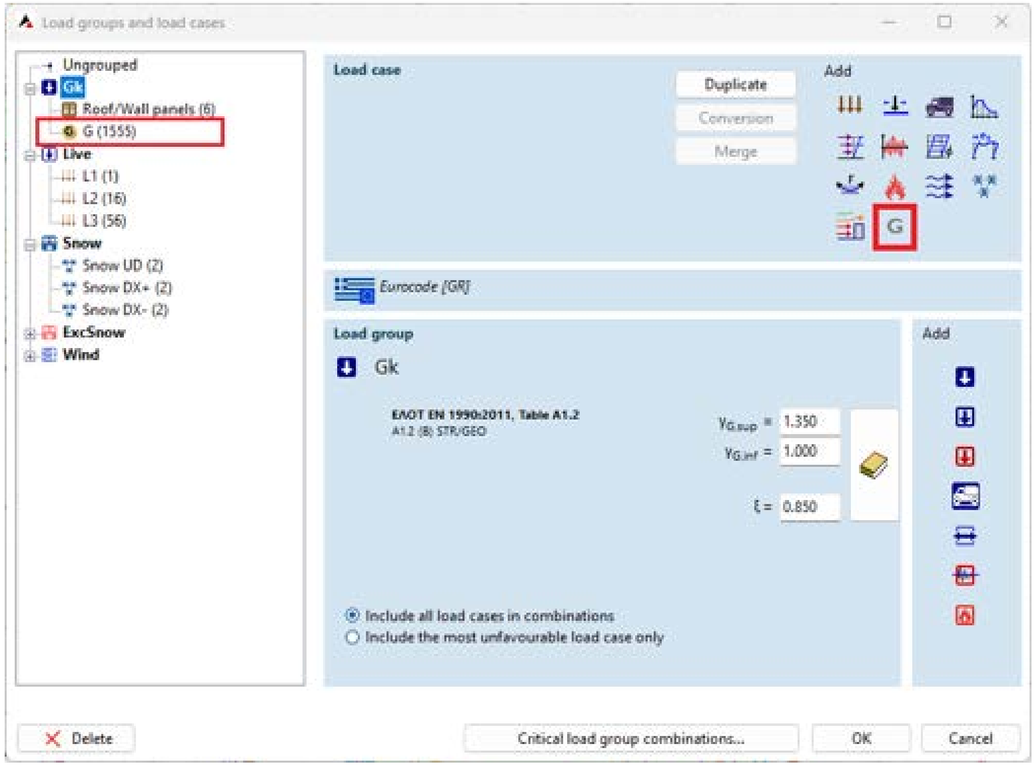
AXISVM

NEW FEATURES IN EXISTING MODULES

LOADS

Automatic self-weight load case

A new self-weight load case is available, which automatically includes the self-weight load of all structural elements in the model.



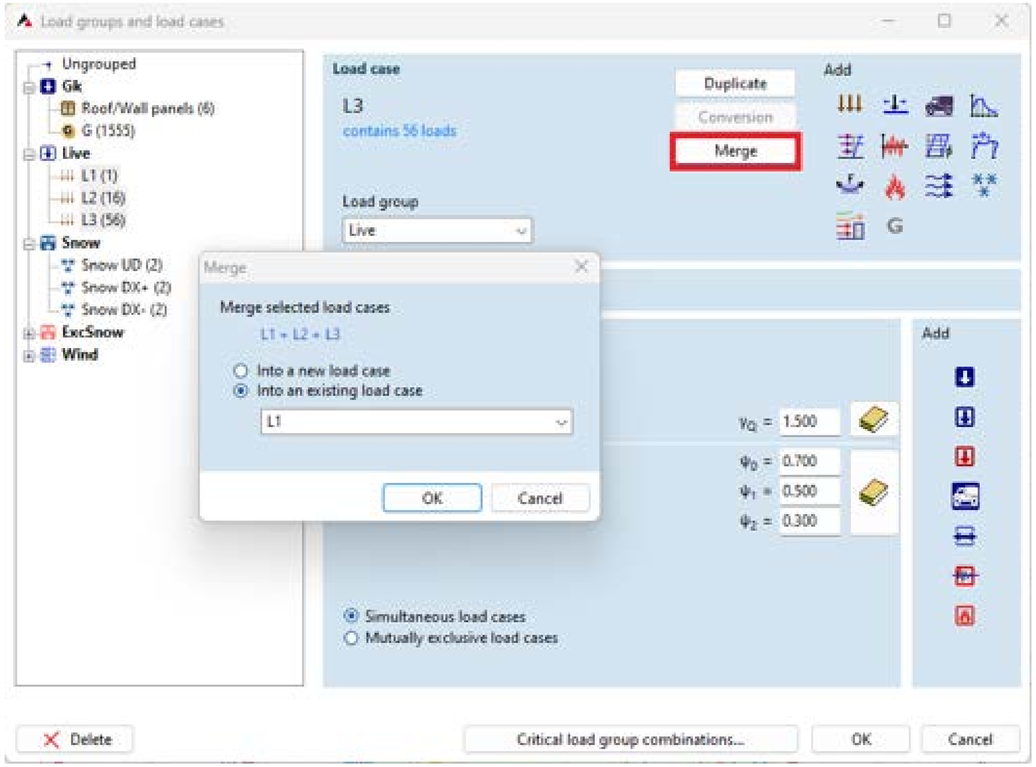
AXISVM

NEW FEATURES IN EXISTING MODULES

LOADS

Merging loads

Allows for merging separate load cases into one load case (in a load group).



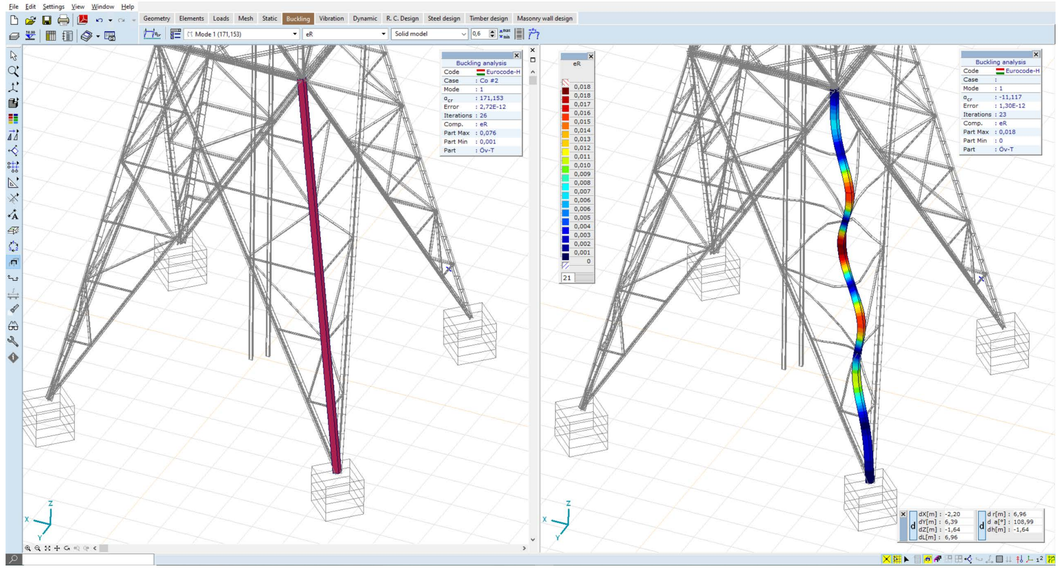
AXISVM

NEW FEATURES IN EXISTING MODULES

BUCKLING

Buckling analysis for selected model parts

Program calculates the buckling modes of the selected elements of the structure.
The entire model is involved in the calculation, but elements outside the analysed parts act only as elastic supports.



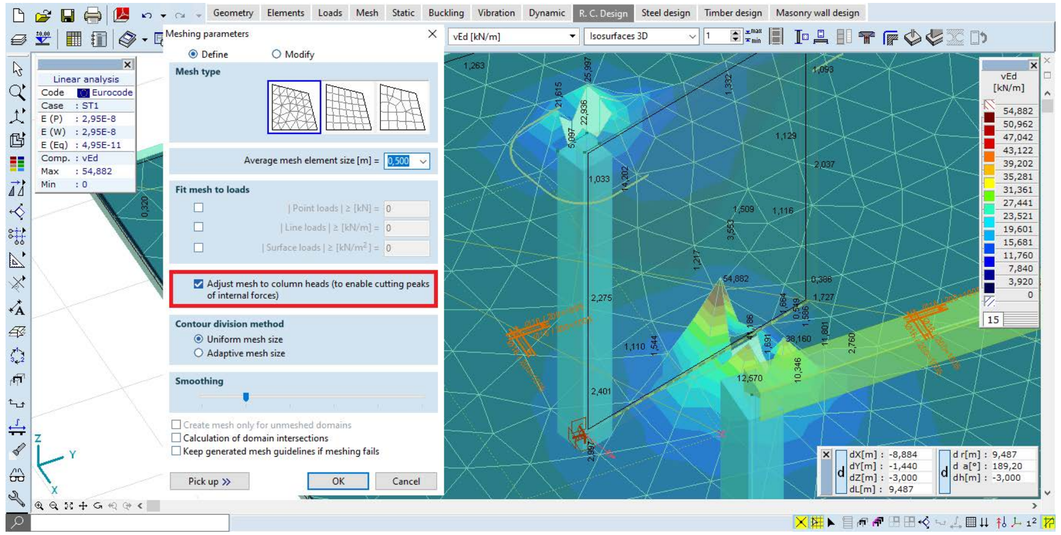
AXISVM

NEW FEATURES IN EXISTING MODULES

RC DESIGN

Cutting of shear force peaks over columns

The program cuts the shear force peak above the columns when displaying the stresses of the surface elements.



AXISVM

NEW FEATURES IN EXISTING MODULES

DOCUMENTATION

Documentation of material and cross-section data

The documentation of the material and cross-section is refreshed in a new, clear structure and is available in the Report maker when creating PDF files or printing.

Parametric Z section

A parametric Z section is available in the cross-section editor

Materials

1 **S 235**

Type: Steel SIA 26x (Swiss), SN EN 10025 Linear

Material
Contour

$E = 210000\ N/mm^2$
$\nu = 0{,}30$
$\alpha_T = 1E\text{-}5\ 1/°C$
$\rho = 7850\ kg/m^3$

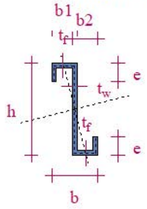
$f_y = 235{,}00\ N/mm^2$
$f_u = 360{,}00\ N/mm^2$
$f_y^* = 215{,}00\ N/mm^2$
$f_y^* = 340{,}00\ N/mm^2$

Name: Material name; **Type:** Type of material; **Model:** Material model; $\mathbf{E_x}$**:** Young's modulus of elasticity in local x direction; $\mathbf{E_y}$**:** Young's modulus of elasticity in local y direction; **ν:** Poisson's ratio; $\boldsymbol{\alpha_T}$**:** Thermal expansion coefficient; **ρ:** Density; **Material:** Material color; **Contour:** Material outline color;

Cross-sections

1 **S 100**

Process: Cold-formed Shape: S S.p.: 7



$h = 100{,}0\ mm$
$b = 50{,}0\ mm$
$tw = 5{,}0\ mm$
$tf = 5{,}0\ mm$

$Ax = 875{,}00\ mm^2$
$Ay = 183{,}76\ mm^2$
$Az = 466{,}56\ mm^2$
$Ix = 7358{,}2\ mm^4$
$Iy = 1138542{,}0\ mm^4$
$Iz = 129322{,}9\ mm^4$
$Iyz = -273515{,}6\ mm^4$
$I_1 = 1207902{,}0\ mm^4$
$I_2 = 59962{,}4\ mm^4$
$\alpha = 14{,}23\ °$
$I\omega = 2{,}3472E{+}8\ mm^6$

$i_y = 36{,}1\ mm$
$i_z = 12{,}2\ mm$
$Hy = 50{,}0\ mm$
$Hz = 100{,}0\ mm$
$y_G = 25{,}0\ mm$
$z_G = 50{,}0\ mm$
$\beta_w = -1074{,}1\ mm$

Name: Cross-section name; **Process:** Manufacturing process; **h:** Cross-section height; **b:** Cross-section width; **tw:** Web thickness; **tf:** Flange thickness; $\mathbf{r_1}$, $\mathbf{r_2}$, $\mathbf{r_3}$**:** Rounding radius; **Ax:** Cross-section area; **Ay, Az:** Shear area; **Ix:** Torsional inertia; **Iy, Iz:** Flexural inertia; **Iyz:** Centrifugal inertia; $\mathbf{I_1}$, $\mathbf{I_2}$**:** Principal flexural inertia; **α:** Principal directions; **Iω:** Warping constant; $\mathbf{W_{1,el,f}}$, $\mathbf{W_{1,el,b}}$, $\mathbf{W_{2,el,f}}$, $\mathbf{W_{2,el,b}}$**:** Elastic section modulus; $\mathbf{W_{1,pl}}$, $\mathbf{W_{2,pl}}$**:** Plastic section modulus; $\mathbf{i_y}$, $\mathbf{i_z}$**:** Radius of inertia; **Hy:** Dimension in local y direction; **Hz:** Dimension in local z direction; $\mathbf{y_G}$**:** y coordinate of the center of gravity; $\mathbf{z_G}$**:** z coordinate of the center of gravity; $\mathbf{y_s}$**:** y coordinate of the shear (torsion) center relative to the center of gravity; $\mathbf{z_s}$**:** z coordinate of the shear (torsion) center relative to the center of gravity; $\boldsymbol{\beta_y}$, $\boldsymbol{\beta_z}$, $\boldsymbol{\beta_w}$**:** Wagner's coefficient; **S.p.:** Stress calculation points;

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NEW FEATURES IN EXISTING MODULES

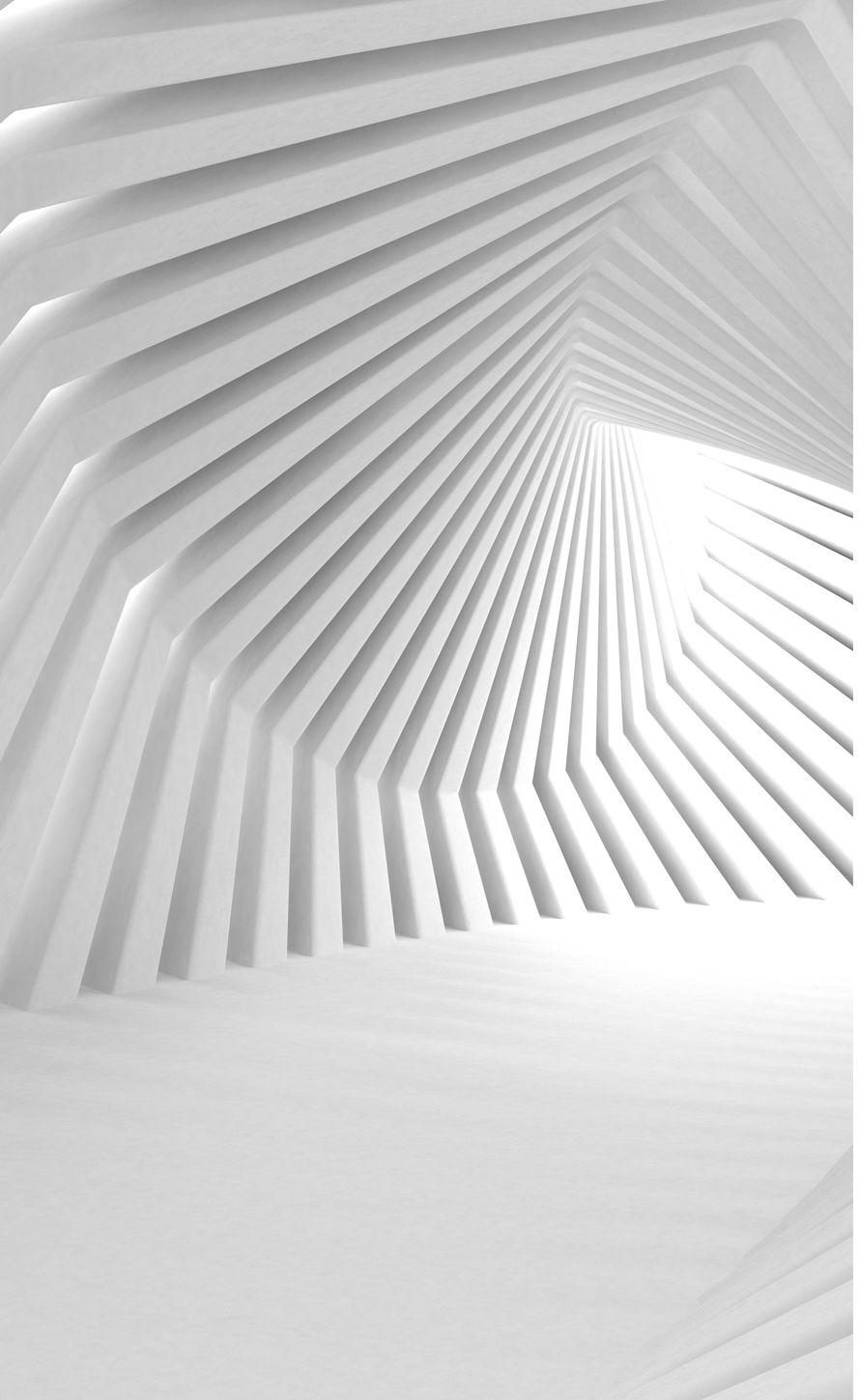
ANALYSIS

Analysis parameters in the Tables

The initial parameters of the nonlinear/vibration/ dynamic analysis performed are summarized in the Tables.

Analysis parameters [Vibration I., Live]

Name	Parameters
Analysis:	Vibration (1st order)
Load case:	Live
Solution control	
Number of mode shapes:	9
Convergence criteria	
Maximum iterations:	30
Eigenvalue convergence:	1E-10
Eigenvector convergence:	1E-5
Stiffness reduction for response spectrum analysis:	Original stiffness
Use increased support stiffness:	—
Convert slabs to diaphragms:	—
Masses:	Convert loads to masses
Concentrated masses:	—
Convert concentrated masses to loads:	—
Include mass components:	X, Y, Z
Mass matrix type:	Diagonal
Masses taken into account:	All masses



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