

**UPDATE-NEWS**  
**RELEASE**  
**2023-2**

# UPDATE-NEWS 2023-2

This summary comprises the most important improvements of the Release 2023-2.

Update News relating to former releases are available at

[www.frilo.eu](http://www.frilo.eu)

- ▶ Campus
- ▶ Download area + News & Updates
- ▶ [Update News](#)

## Update information referring to individual programs is available in the FRILO Control Center

If you have already installed the release, you will find the update information for each individual program in the FRILO Control Center under the „Programs“ tab by right-clicking on the respective program and then on „Info“.

## Webinars/Online Event for Release 2023-2

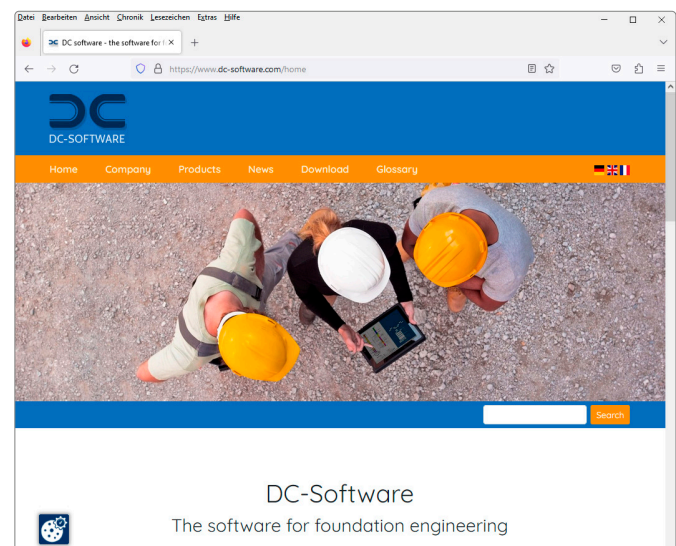
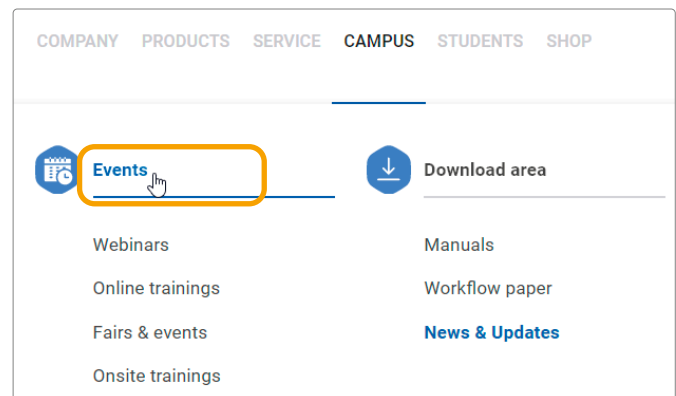
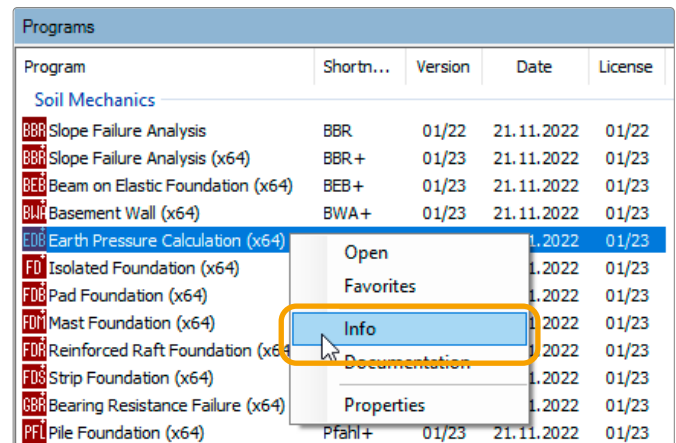
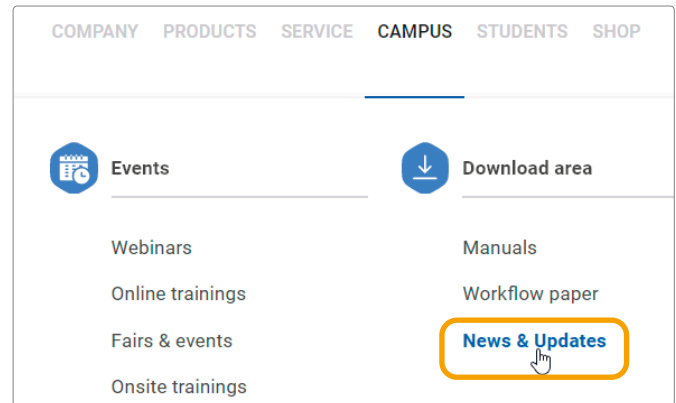
On 8 May 2023, the new release was also presented in an online event. We will upload a recording of the event (in German) on our YouTube channel. [YouTube-channel](#)  
Upcoming events: see [www.frilo.eu/event/](http://www.frilo.eu/event/)

## DC-Software

In 2022, we added the powerful solutions of DC-Software to our FRILO portfolio. Would you like to learn more about the software for foundation engineering and the numerous programmes for structural foundation design and soil mechanics? If so, you can find comprehensive information on our website [www.dc-software.com](http://www.dc-software.com).

## FRILO Insight

The FRILO newsletter „FRILO Insight“ with product reports, current information, technical articles as well as tips & tricks that make it easier for you to work efficiently with our solutions is now available at CAMPUS - Download area - [News & Updates](#).



In this section, we point out the most important improvements and new features of individual programs.

- Biaxial design DLT+/BTM+
- New functions in GEO and PLT
- Aluminium for stress verifications in RSX
- New functions in foundation engineering
- Various new functionalities
- Localisation and standards (including French)

## Reinforced Concrete Beams DLT+/BTM+

### Biaxial design as an add-on option

For the new Continuous Beam programme versions DLT+ and BTM+, a biaxial design feature including the reinforcement layout for reinforced concrete beams is now optionally available with an additional licence.

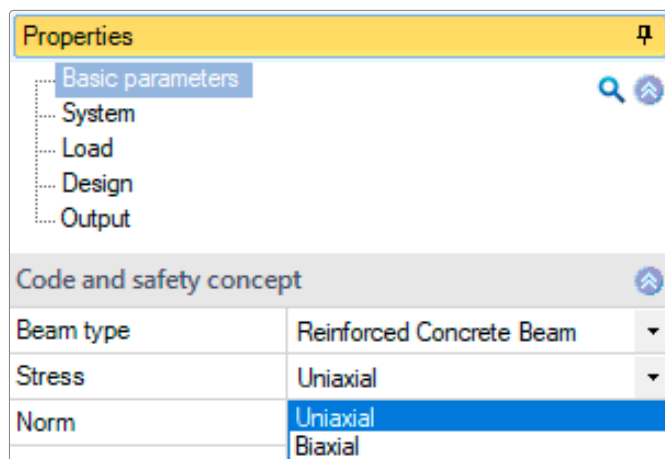


Fig.: Biaxial design can be selected with additional option

## GEO Building Model / Slabs by Finite Elements PLT

In the programmes GEO and PLT, you can call up the new Continuous Beam programme DLT+ for the design of beams. Furthermore, simultaneous editing of several beams and parapets is now available.

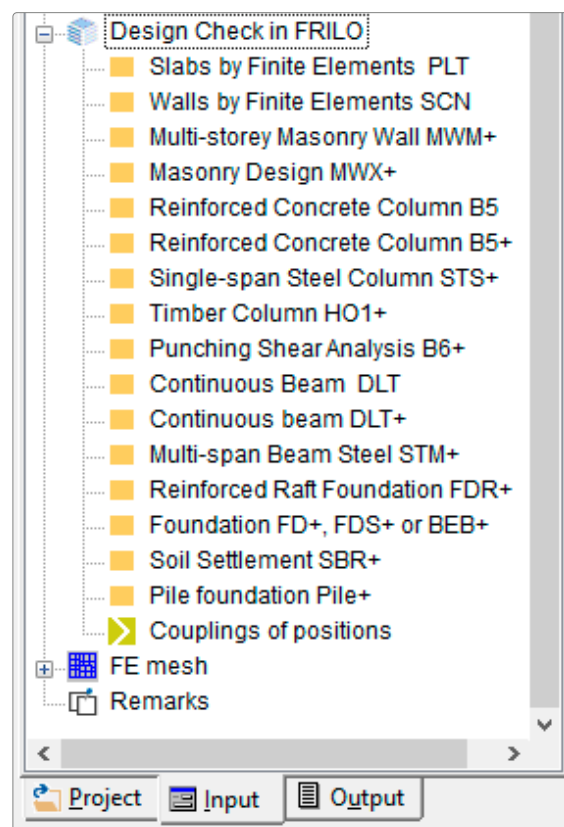


Fig.: The design interface to the new DLT+ programme was implemented in GEO and PLT

### GEO: Wall-type beams

To improve the accuracy of the data entry, wall-type beams can be inserted in the floor below as an auxiliary slide. In the OpenGL representation (3-D), you can now change the transparency of the upper floor slabs.

### PLT: Schöck-Isokorb

The implementation of the Schöck Isokorb® insulation elements was optimised in PLT. For example, the Schöck Isokorb® element type Q-P is now also available. In addition, various representation options have been improved in the user interface and in the output document.

## Framework RSX

### Aluminium material available for stress verifications

You can now perform stress verifications for the material 'aluminium' in the RSX programme. Furthermore, a transfer of the members with all their loads and properties to the Lateral Torsional Buckling Analysis programme BTII+ is available in combination with the German standard. We have also implemented numerous improvements for the data entry and the output.

## New functions in foundation engineering

### Earth Pressure Calculation EDB+

In EDB+, you can select and calculate the earth pressure types 'increased active earth pressure', 'spatial passive earth pressure' and 'earth pressure due to seismic action.'

### Cantilevered Retaining Wall WSM+

You can now model a slope at the valley side in WSM+. In addition, the number of possible load case combinations has been increased.

## Various new functionalities

### FRILO Control Center FCC

As a new feature, the user can set a project-specific output language: In addition to the global output language, a different output language can be set for the individual projects. The bookmarks in the print preview have been provided with a link to the corresponding position in the document and the dialogues for the search have been extended so that a targeted detailed search is possible, for example, for programme short cuts or deleted/existing projects and items.

### Document Designer FDD

An „Intelligent Title Page“ supports the automatic inclusion of project properties via the MS-Word template „Title Page with Macros.dotx“. In addition, the date format can now be selected in the page layout editor and an attachment (position, PDF, docx) can be added at the end of the document.

### Design of roofs

The following roof types were added:

- Free-standing single-pitch roof rafter
- Free-standing gable-roof rafter
- Braced purlin roof

Moreover, you can completely switch off the verification of the deflection at the cantilever and take PV systems into account on the hip and valley rafter roof.

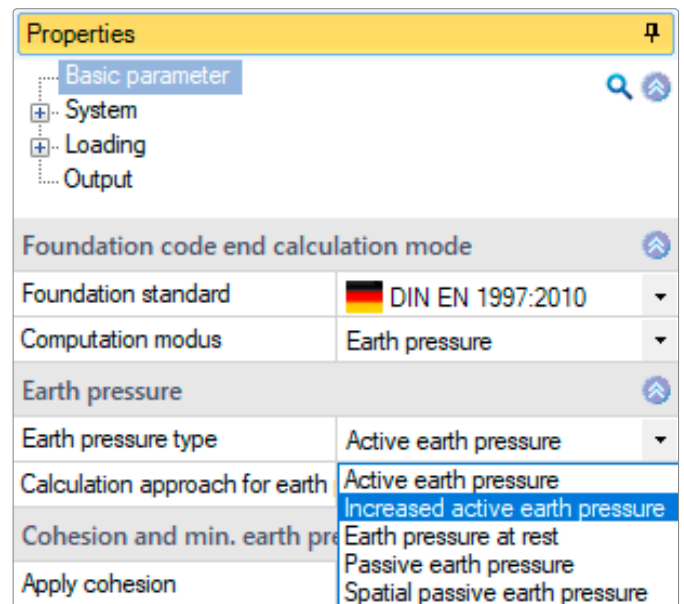


Fig.: Earth Pressure Calculation EDB+ with enhanced selection options

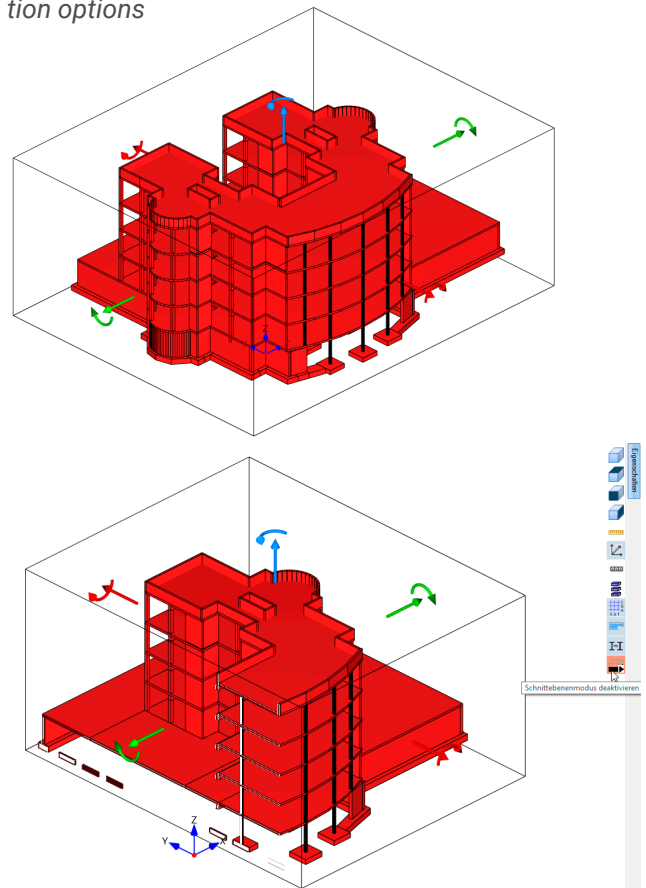


Fig.: View of a section through a building in FBC

### FRILO BIM-Connector® FBC

A new icon is available to launch a cutting plane function. It allows you to display any section inside the building and to visually check whether building components are on top of each other, for instance. Now you can enter the plaster loads separately for the exterior and interior faces of the walls, if required. Moreover, the function providing automatic connection has been optimised and the interfaces to SCIA Engineer have been significantly improved.

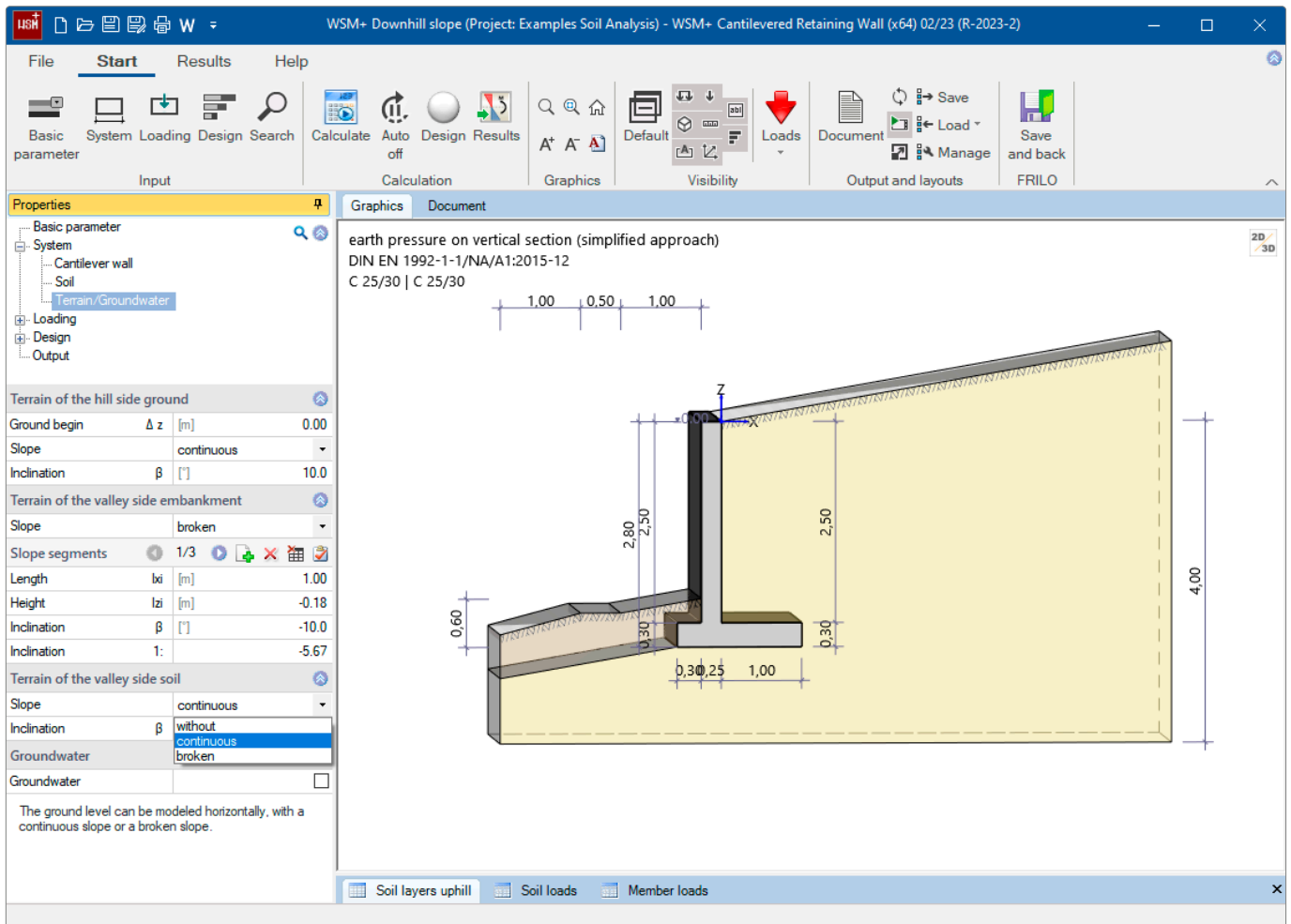
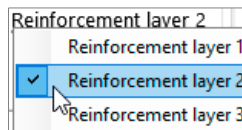


Fig.: Cantilevered Retaining Wall WSM+ with a slope on the valley side

### Reinforced Concrete Column B5+

In the Reinforced Concrete Column programme B5+, the use of multi-row reinforcement is now possible.



## Localisation and standards

### French Eurocode implemented in the foundation programmes

In the programmes FD+, FDS+, FDB+, FDM+, GBR+ and FDR+, the French standard for geotechnical verifications and reinforced concrete design is available as of this release. In addition, the FD+ programme is also optionally offered with a French interface and output.

### S9+/BTII+: Eurocode for Poland implemented

The Polish Eurocode PN EN 1993 was implemented in the programmes S9+ Crane Runway Girder and BTII+ Lateral Torsional Buckling Analysis.

### HNV+/HTB+: Eurocode for Poland and Great Britain implemented

In the Timber Beam programmes HNV+ (Mechanically Jointed Beams) and HTB+ (Cross Laminated Timber Beam) the Eurocodes PN EN 1995 (Poland) and BS EN 1995 (Great Britain) have been added.

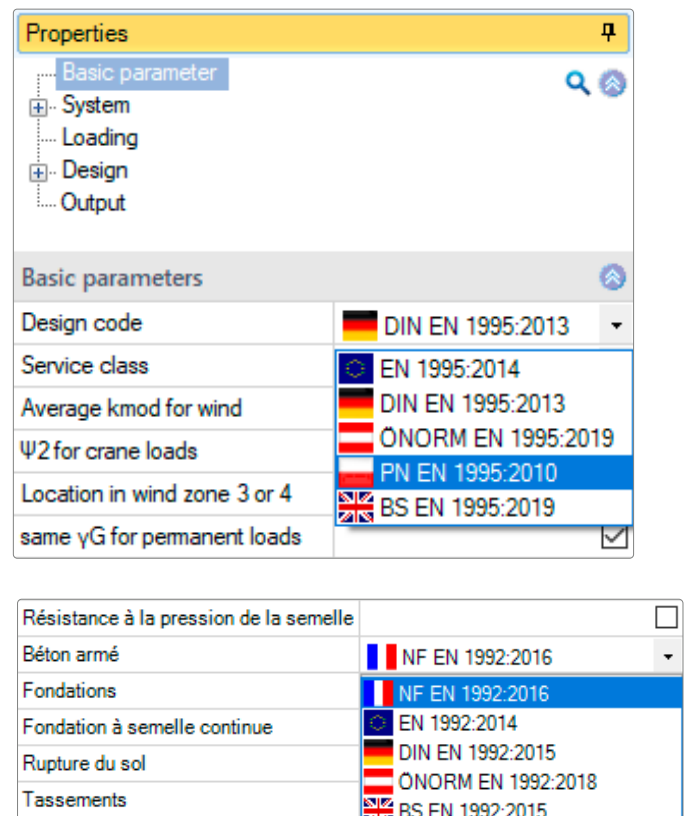



Fig.: Newly implemented standards and languages



The following is a list of the new programs in this release

- **Strut-and-Tie Model BSM+**
- **Concrete Cross-Section Design B2+**
- **Steel Cross-Section Design SQN+**
- **Timber Construction Details HO12+**

## Strut-and-Tie Model BSM+

The new BSM+ programme generates strut-and-tie models for the design of reinforced concrete components. Right-angled structures with any number of re-entrant corners as well as recesses can be calculated. In the first version of the programme, the focus is on generating stiffness-optimised strut-and-tie models with a given component geometry and load.

### Structural system

- Entry of right-angled structures
- Thin plates (walls) with openings
- Most variable concentrated supports with rigid or free supporting conditions

### Loads

- Vertical and horizontal loads from concentrated loads
- Internal conversion of line loads and trapezoidal loads into resulting concentrated loads

### Material

Concrete of all strength classes (C 12/15 to C 90/105) specified by the standard

### Standard

- DIN EN 1995:2013

### Basis of calculation

The basis of the calculation is a topology optimisation algorithm based on the so-called ground structure method. This method consists in finding a maximally stiff frame with as few members as possible.

### Verification and quality criteria

Verification of the following quality criteria in the determination process of the strut-and-tie model:

- Crossing compression struts - in this case the strut-and-tie model becomes invalid
- Verification of acute angles between compression and tension struts according to the strut-and-tie modelling theory by Schlaich/Schäfer

### Design

The first version enables the calculation and optimisation of strut-and-tie models in thin reinforced concrete plates. All member forces with the resulting horizontal and vertical load components can be put out.

## Concrete Cross-Section Design B2+

B2+ was newly developed and fitted with the PLUS user interface. B2+ is available in this release as a basic version (without non-metallic reinforcement and high-strength steel) for customers with a Software Service Agreement who hold a licence for Reinforced Concrete Design B2 version and for subscription customers.

B2+ can be used to design reinforced concrete cross-sections. You can design cross-sections for bending with longitudinal force and for shear force. Furthermore, you can perform crack width verifications and stress analyses or determine the effective stiffness.

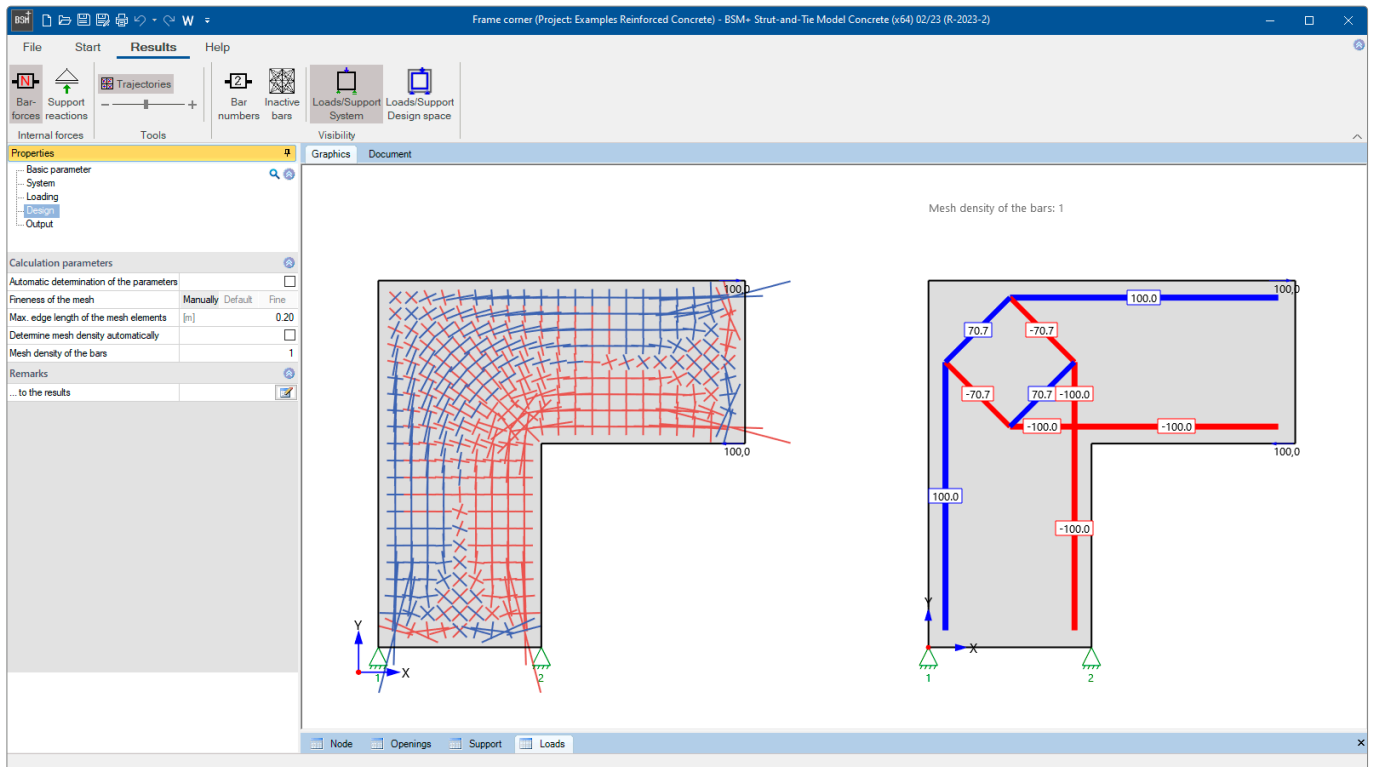


Fig.: BSM+ user interface, results graphic

### Relevant standards

- DIN EN 1992
- ÖNORM EN 1992
- BS EN 1992
- PN EN 1992
- EN 1992

### Structural systems

- Rectangular cross-section, uniaxial and biaxial
- T-beam, uniaxial
- Hollow box, biaxial
- Circular and annular cross-section, biaxial
- Layered cross-section, uniaxial

### Material

Concrete and lightweight concrete as well as user-defined entries

### Environmental conditions

Detailed input of the exposure classes and the resulting durability requirements (minimum concrete class, concrete cover and requirement class for the crack width verification)

### Cast-in-place complement

- Cast-in-place concrete complements can be entered for uniaxial cross-section types
- Freely definable height and width of the cast-in-place concrete supplement and free definition of the joint width
- Available joint finishing options are very smooth, smooth, rough and interlocked

- Optionally, an axial force perpendicular to the joint can be defined
- Selection options for the shear reinforcement (no lattice girders, only diagonal struts or with posts and diagonal struts)

### Design

Load-bearing capacity:

In the reinforced concrete design, the strain state leading to failure is determined for given internal forces with unknown reinforcement. For the bending design, the method with a given reinforcement ratio can be selected, and for uniaxial loading, the kd method is available in addition. Various design options are available. Optionally, tension stiffening can be considered in the determination of the effective stiffness. The state of strain in which the external and internal forces are in balance is sought after.

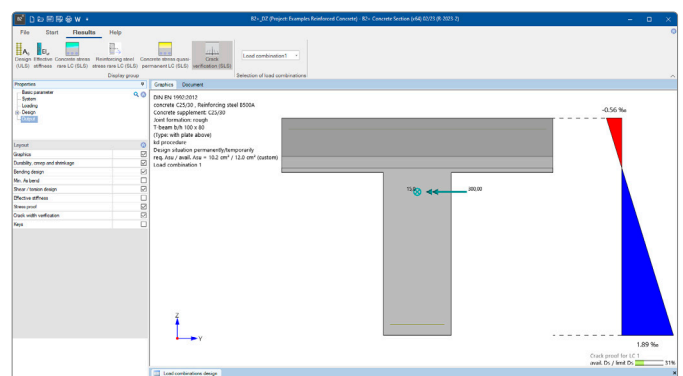


Fig.: B2+ user interface, results graphic

In the bending design, the user can optionally calculate the net cross-sectional area of the compression zone. The calculation can include several combinations of internal forces that are to be entered via a table.

**Serviceability:**

A crack-width verification can be performed in accordance with EN 1992-1-1. Based on the crack formula (Eq. 7.8), the maximum limit diameter, for which the permissible crack width is observed, is determined for an external load corresponding to the decisive action combination and for a selected reinforcement.

The programme determines a minimum reinforcement in accordance with 7.3.2 for imposed bending on top and bottom.

**Output**

- The user can define the desired scope of data to be put out via the options of the output profile.
- The cross-section, the reinforcement and the state of strain of the selected verification can be represented in the graphic view.

## Steel Cross-Section Design SQN+

SQN+ has been newly developed as a PLUS version of the former Steel Section Design programme ST7.

It performs verifications of steel cross-sections in the ultimate limit state. The verifications are based on Eurocode 3.

**Cross-sections**

You can select among I-sections, U-channel sections, T-sections, angular sections, C-sections, square, round and rectangular hollow sections, round steel and flat steel as standard shapes. The user can also define his/her own

sections of these types and store them. In addition, multi-part sheet metal cross-sections can be imported from the Thin-Walled Cross-Sections programme Q3.

**Loads**

- Design internal forces from normal force, moment ( $M_y$ ,  $M_z$ ), primary and secondary torsional moment ( $M_{xI}$ ,  $M_{xII}$ ), warping moment ( $M_w$ ) and shear force ( $V_y$ ,  $V_z$ ).
- It is possible to enter several combinations of design internal forces.

**Design**

The cross-section is verified in the ultimate limit state as per DIN EN 1993-1-1, 6.2.

According to DIN EN 1993-1-1, 5.5, the steel cross-section is classified in one of the cross-section classes 1 to 4 depending on the applying effects of actions and the c/t ratio of its cross-section parts under compression. The verification of the cross-section is determined by the classification. For the cross-sections classes 1 to 3, the verification can optionally be based on Equation 6.1 (stress resistance verification) and Equation 6.2 (utilisation of plastic load-bearing capacities in accordance with the cross-section class). The verification for cross-section class 4 is performed using the effective cross-sectional properties.

**Relevant standards**

- DIN EN 1993
- ÖNORM EN 1993
- BS EN 1993
- PN EN 1993
- DIN EN 1999

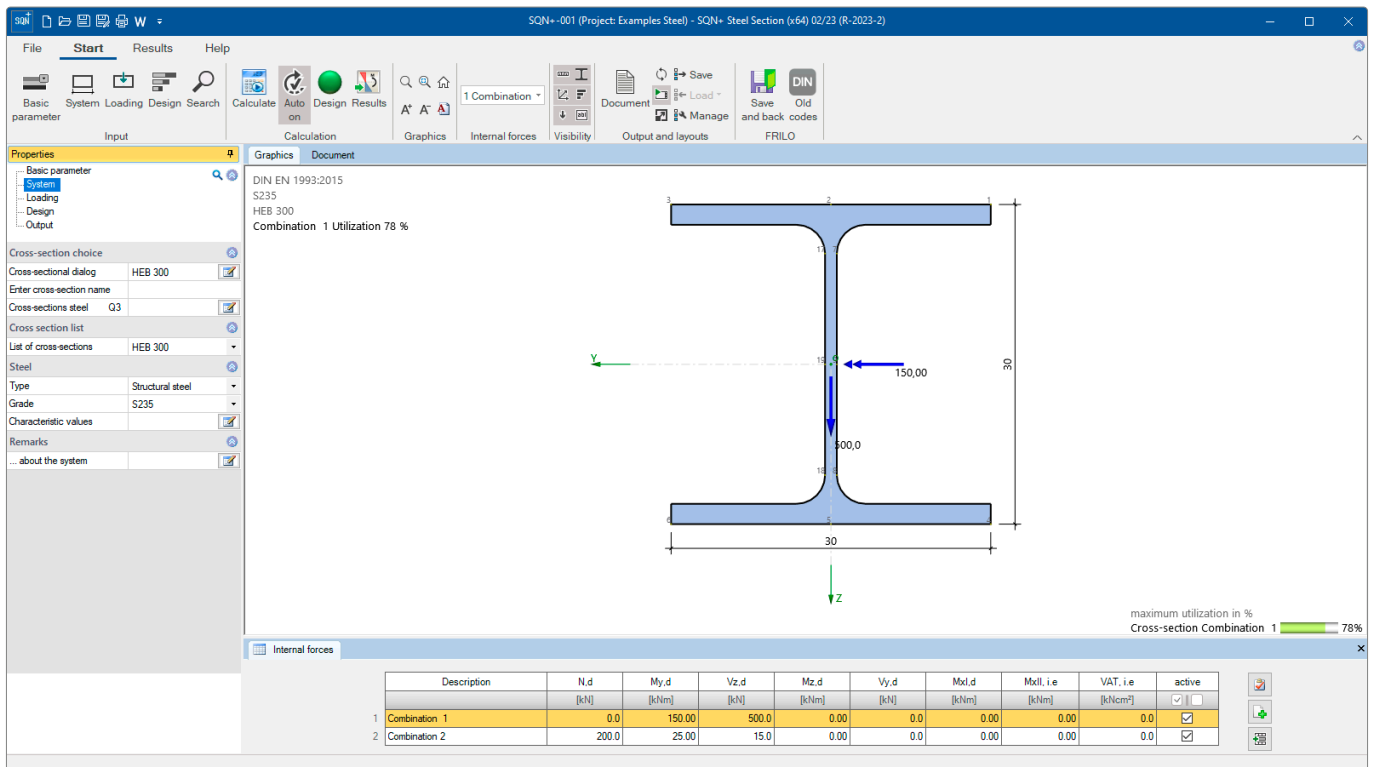


Fig.: The SQN+ user interface



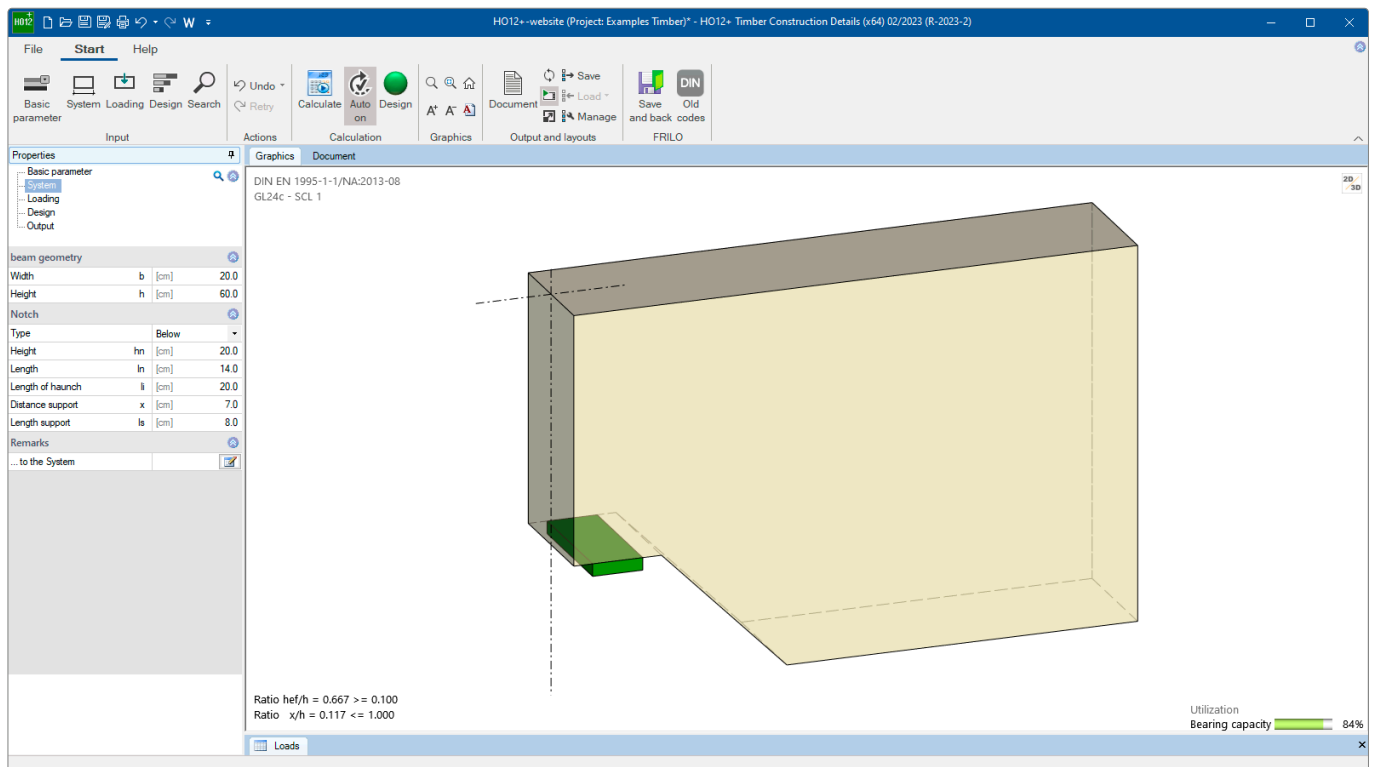


Fig.: The HO12+ user interface with a three-dimensional representation

## Timber Construction Details HO12+

The new developed version of the previous programme Timber Construction Details HO12 has been fitted with the PLUS interface and thus also offers an interactive graphical user interface.

HO12+ is suitable for the calculation and design of notches (solid timber and glulam) and openings (glulam) in timber beams. The user must enter the internal forces and dimensions required for the verifications. The verifications of the resisting tensile force, the residual cross-section and the reinforcement are performed.

### Structural systems

Notches:

- With/without reinforcement
- Notch on top or bottom
- Optionally with a haunch

Openings in beams:

- With/without reinforcement

### Loads

The design value of the shear force or the support reaction

### Fasteners/Reinforcement

- Butt straps
- Glued-in threaded rods
- Fully threaded screws
- SPAX screws

## Design

Verifications of beams with notches:

The verifications for beams with bottom notches, either with or without reinforcing butt straps of veneer plywood or for laminated timber beams, chamfered or notched on top, are performed according to the relevant standard. In addition to the reinforcements provided by the standard, glued-in threaded rods and self-tapping fully threaded screws (Spax screws / Z.9.1-519) are available. The Spax screws have a diameter of 8, 10 or 12 mm and a length between 200 and 600 mm.

Verifications of beams with openings:

Due to the changes in the cross-section of the beam, transverse tensile stresses act at the points of discontinuity and might quickly cause cracks in the timber beam. Thanks to the direct entry of the structural system, the loading and the cross-sections, the user can quickly and easily verify notches or openings and design possibly required reinforcements. Round or rectangular openings without or with reinforcement are verified.

### Relevant standards

- DIN EN 1995
- ÖNORM EN 1995

**FRILO**

A NEMETSCHKE COMPANY



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