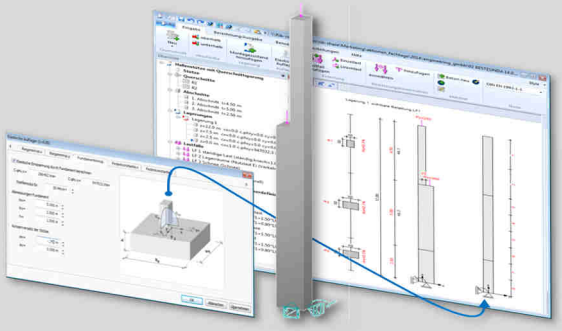
# Product information **RIBTEC Systeme GmbH**

Product information as of 07.2026

## BEST

| | |
|---|---|
| BEST Basic Module | Structural concrete column base module |
| BEST Extension | Material gradation, haunges, deformations |
| BEST Structural fire design | Enhanced Zone Method |
| BEST Prestressing | Prestressed concrete columns |
| BEST Steel column | Structural steel column |



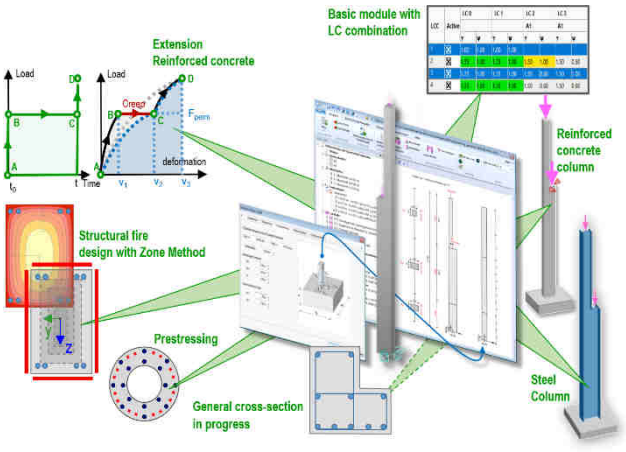
### Building concrete and steel column incl. extensions and structural fire design

- **Column design according to DIN, EN (2010-12) with NA for DE, AT, SK/CZ and UK**
- **Calculation according to the theory of the 1st & 2nd order taking into account effective stiffness in the cracked state**
- **Biaxial bending with normal force and shear**
- **Standard cross-section for rectangular, U-, H-, full-circle and circular ring as well as optional prestressing**
- **Configurable and verifiable output list**
- **Program and list configuration, as well as separate language selection for input and output**

**BEST reinforced concrete column is a program for the verification of single- or multi-storey reinforced concrete columns in the limit state of the load-bearing capacity due to structural deformations (buckling safety verification and design) with a graphic-interactive working environment for input and output. The calculation is generally carried out on a two-axis basis according to the theory of the 1st and 2nd order, taking into account the cracked state. BEST is particularly suitable when it comes to demanding nonlinear calculations and economical column design.**


Tel: +49 2203 29069 41
E-Mail: sales@ribtec.de
www.ribtec-systeme.de

RIBTEC Systeme GmbH
Managing Director: Mike Richter
Headquarter Cologne, Local Court Cologne HRB 120061

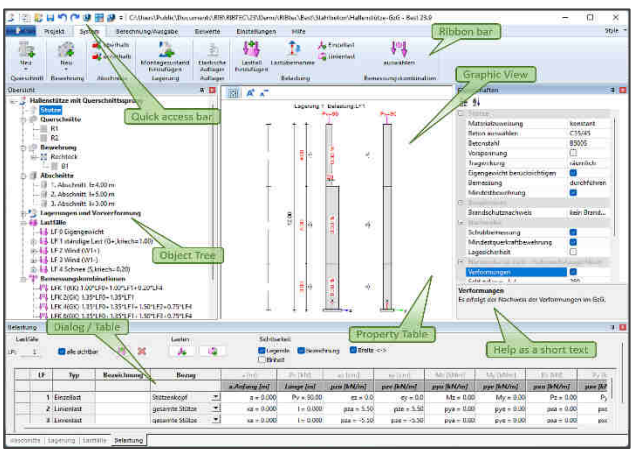

### Fast solution of complex engineering tasks

Slender reinforced concrete columns under biaxial bending stress with compressive force in the limit state of the load-bearing capacity due to structural deformations are among the most complicated calculations in concrete construction. The stiffness changes caused by cracking are realistically taken into account. The calculation is materially and geometrically nonlinear. BEST is considered a reference program for economical column design. The program has a modern and efficient working environment and thus meets the requirements of clear and fast application, even for complex tasks.

### System modeling for standard applications

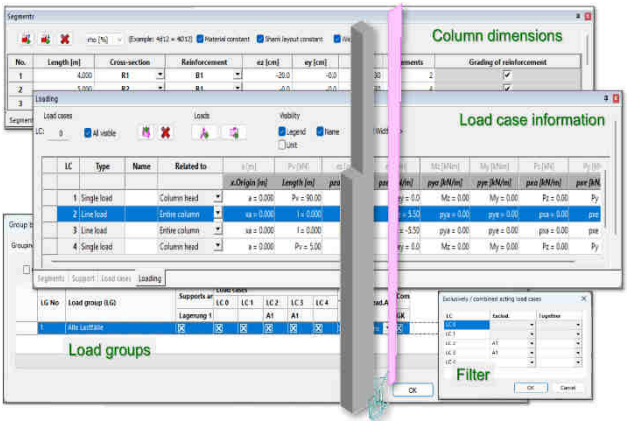
BEST can be used to design multi-storey columns and slender cantilever columns for hall structures as well as column systems with attached pendulum columns. In detail, the following models can be mapped with the standard version:

- Rectangular, circular and circular ring as well as U and I cross-sections with constant progression
- Standard cross-sections can be graded floor by floor and arranged eccentrically
- Use of normal-strength and high-strength concretes
- Investigation of different static systems (assembly and final state) in a closed calculation process



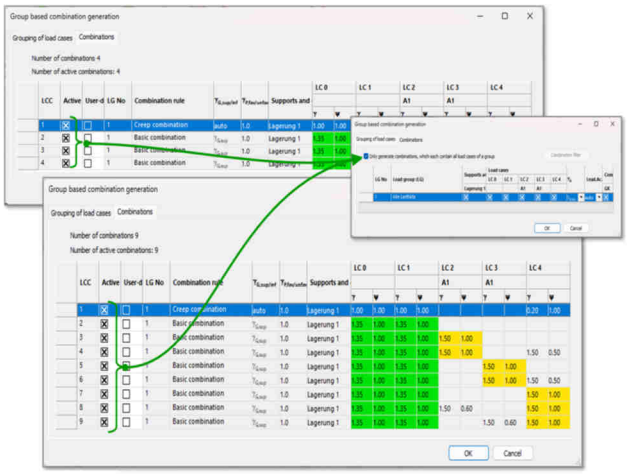
# Product information

- Reinforcement can remain constant along the column or be graded as desired
- Reinforcement can be arranged as recirculating or corner reinforcement
- Bearings can be rigid or elastic and can be specified using calculation assistants
- Automatic combination formation of all possible load combinations such as basic combinations, extraordinary combinations, earthquake or fire combinations
- Automatic formation of the continuous load combination for the calculation of creep deformation
- Automatic calculation of the pre-deformation or specification of the pre-deformation in relation to the buckling figure or in the form of an imbalance
- Positional security combinations are generated user-defined
- Design is carried out according to EN 1992-1-1:2010-12 and the corresponding NA for DE, AT, SK/CZ and UK




## Types of load

The load consists of centric or eccentric point loads as well as linearly variable line loads. The associated partial safety and combination coefficients are defined by selecting load case attributes. The coefficients are editable.



## Combination of actions

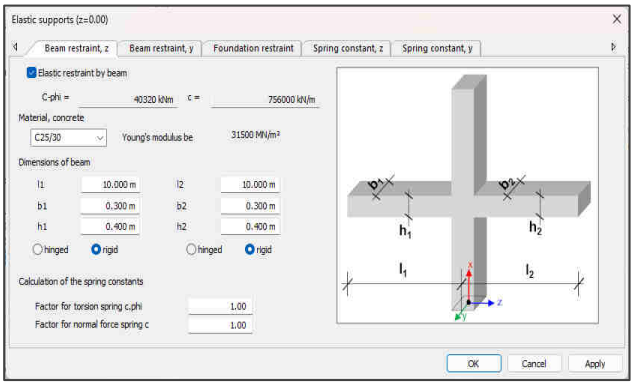
The combination is formed automatically on the basis of the types of impact. Any possible combination of actions (basic combinations, extraordinary or earthquake combinations or fire combination or positional safety combination) can be selected as a design combination for the load-bearing capacity verification. The creep-generating continuous load combination for the determination of creep deformations is automatically defined and cannot be selected.

## Assembly states

Especially in precast construction, different bearing states can be taken into account for assembly states and final state.

## Creep

Creep is applied at the cross-sectional level as an additional stretch.




## Support conditions

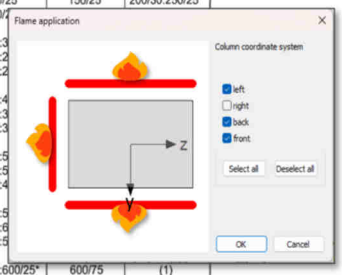
Any number of bearings are possible in both or just one direction. The bearing can be provided with spring constants for each direction.

## Tabular fire protection verification

The simplified fire protection verification is carried out according to the tabular procedure in accordance with EN 1992-1-2:2010-12, Eq. 5.7. However, these methods are only valid for non-movable, rotationally clamped columns. The program offers two alternative options:

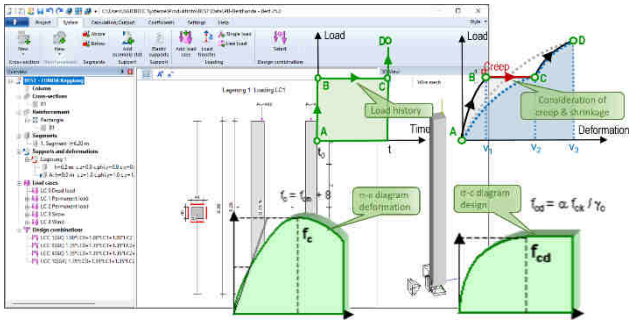
**Table 5.2b: Minimum column dimensions and axis distances for reinforced concrete columns with a rectangular or circular section.**

| Standard fire resistance | Mechanical reinforcement ratio $\omega$ | Minimum dimensions (mm). Column width $b_{min}$/axis distance $a$ | | | |
|---|---|---|---|---|---|
| | | $n$ = 0,15 | $n$ = 0,3 | $n$ = 0,5 | $n$ = 0,7 |
| 1 | 2 | 3 | 4 | 5 | 6 |
| R 30 | 0,100 | 150/25* | 150/25* | 200/30:250/25* | 300/30:350/25* |
| | 0,500 | 150/25* | 150/25* | 150/25* | 200/30:250/25* |
| | 1,000 | 150/25* | 150/ | | |
| R 60 | 0,100 | 150/30:200/25* | 200/40:3 | | |
| | 0,500 | 150/25* | 150/35:2 | | |
| | 1,000 | 150/25* | 150/30:2 | | |
| R 90 | 0,100 | 200/40:250/25* | 300/40:4 | | |
| | 0,500 | 150/35:200/25* | 200/45:3 | | |
| | 1,000 | 200/25* | 200/40:3 | | |
| R 120 | 0,100 | 250/50:350/25* | 400/50:5 | | |
| | 0,500 | 200/45:300/25* | 300/45:5 | | |
| | 1,000 | 200/40:250/25* | 250/50:4 | | |
| R 180 | 0,100 | 400/50:500/25* | 500/60:5 | | |
| | 0,500 | 300/45:450/25* | 450/50:6 | | |
| | 1,000 | 300/35:400/25* | 450/50:5 | | |
| R 240 | 0,100 | 500/60:550/25* | 550/40:600/25* | 600/75 | (1) |
| | 0,500 | 450/45:500/25* | 550/55:600/25* | 600/70 | (1) |
| | 1,000 | 400/45:500/25* | 500/40:600/30 | 600/60 | (1) |




**Method 1:** *Fire protection verification* for the maximum possible fire resistance class; i.e. starting e.g. from R180, the R-class is reduced floor by floor until the existing cross-section dimensions are greater than or equal to the minimum cross-section width, the reinforcement remains unchanged.

**Method 2:** During *structural fire design,* a fire protection verification is carried out for a certain fire resistance class. In the event of non-compliance with the fire protection conditions, the reinforcement is iteratively increased until they are met.

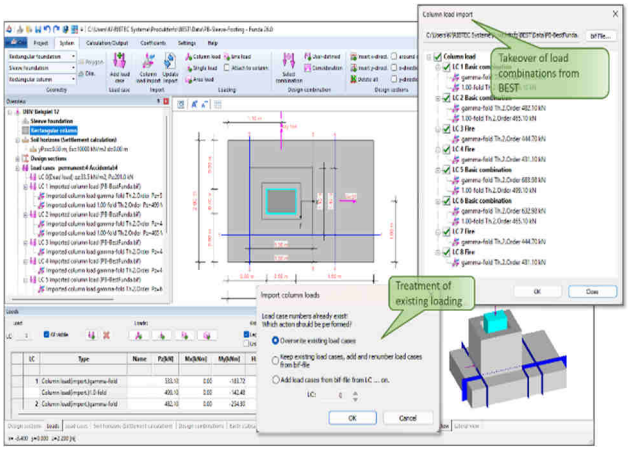



## Proof of stability

BEST works with a nonlinear analysis with exact integration of the stiffness in the cracked state. The transition from the stress problem to the stability problem is captured in an optimal way with this approach.

## Load forwarding

The loads determined by BEST at the base of the column can be transferred as a direct load input to the FUNDA program for the design of the foundation. Both the characteristic values GEO-2, the design values STR/GEO and positional safety values EQU are automatically determined taking into account the 1st and 2nd order theory.




## Complete verification

In the continuous verification system, the partial safety and combination coefficients are automatically calculated for each load case attribute. The design combinations can be freely defined or generated automatically. The following evidence is provided:

- Limit states of bearing capacity for biaxial bending with Compressive Force in the cracked state under consideration of effective stiffness
- Automatic superposition for the extreme stress conditions per assembly state
- Strain analysis in the limit state of the load-bearing capacity
- Design for permanent and extraordinary design situations or earthquake situations
- Strain analysis under working load

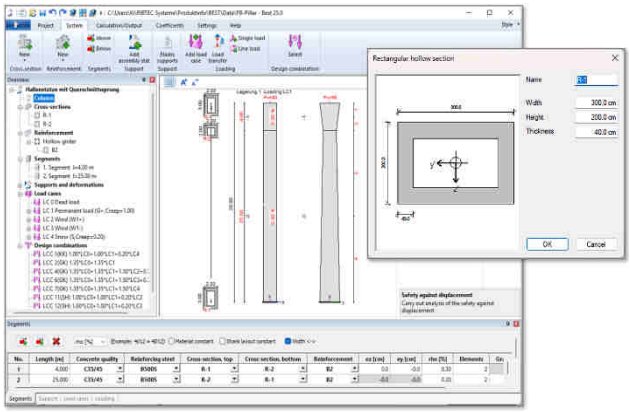
## Reinforcement arrangement and output

The reinforcement can be graded in the longitudinal direction as desired. The reinforcement is output at all section boundaries with a subsequent summation of the entire longitudinal reinforcement. At the same time, a shear design is also carried out over the column length.

## Service extension (BEST Extension)

With this extension, the column application will be equipped with additional high-end functions:

- Linearly variable cross-section, e.g. for a tapered mast or pier geometry
- Arbitrary reinforcement distribution, even with targeted reinforcement specification
- Material gradation
- Sectional and storey-by-storey structural fire design
- High-strength reinforcing steels (e.g. SAS 670) with time-dependent creep rearrangement
- Tapered cross-sectional courses
- Deformation verification in the SLS

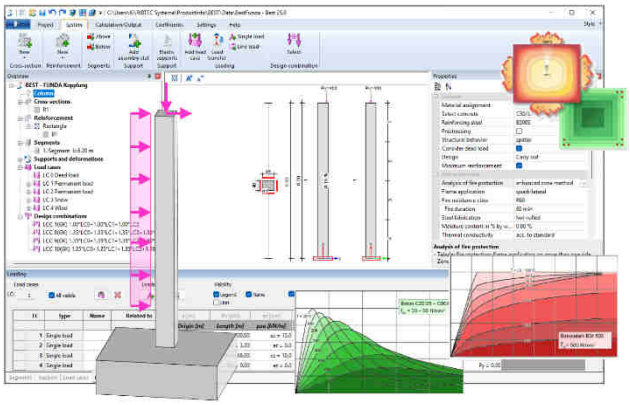


## Prestressed concrete columns (BEST Prestressing)

The consideration of post-tensioning with immediate bonding – also in sections with tendon coupling – can be defined by specifying material characteristics and pre- straining. This option is used in most cases for masts made of high-strength spun concrete with a linearly variable shaft.

## Structural fire design (BEST Structural fire design)

The extended zone method is a simplified calculation method for slender reinforced concrete columns under high temperature loads. This method requires a standard fire load according to the unit temperature time curve (ETK) depending on the duration of the fire. Usually, the exposure times of the fire resistance classes R30 to R240 are used for this purpose.

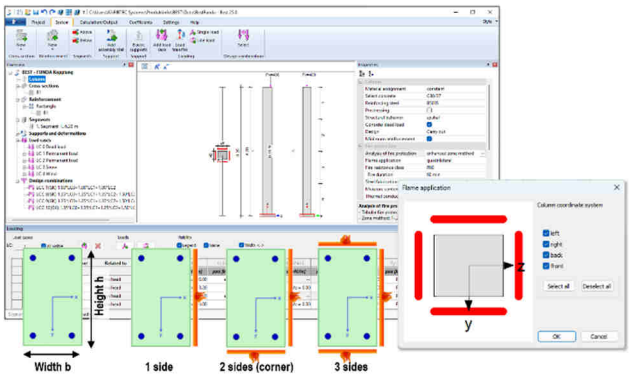


### Verifications at the current level of standards

The basis is the further developed zone method according to Achenbach on the basis of EN 1992-1-2:2010-12 and in the recommendations of the German NA. In the verification

# Product information

method, the load-bearing capacity of the component is reduced under high-temperature stress by applying both the component cross-section and the material strengths depending on the temperature.




Due to the reduction of the concrete cross-section, the outer concrete areas exposed to fire and essentially worn down are not taken into account in the load-bearing capacity determination. The load-bearing capacity design is carried out taking into account the temperature with the methods for the design at normal temperature. The proof is made up of 3 parts:

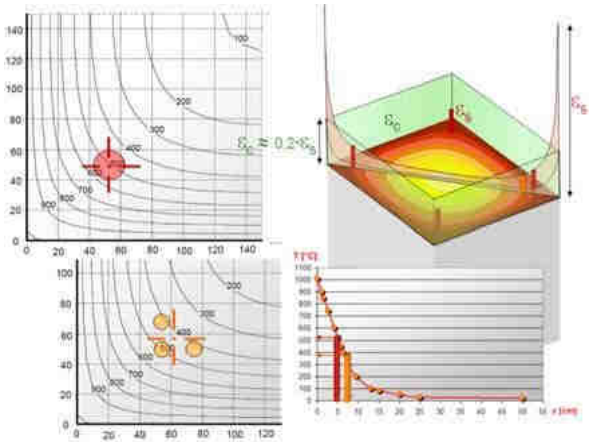
- Thermal analysis
- Thermal deformations
- Mechanical analysis

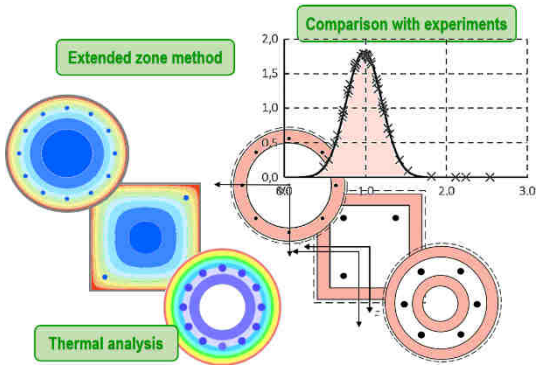
### Thermal analysis

Thermal analysis deals with transient heat transfer as a result of hot gas influence on or in the structural member. For this purpose, the temperature distribution is calculated numerically in a gridded cross-section - depending on the time every 2 seconds. When determining the steel temperatures, the given center distance of the reinforcement is assumed.

### Consideration of thermal deformations

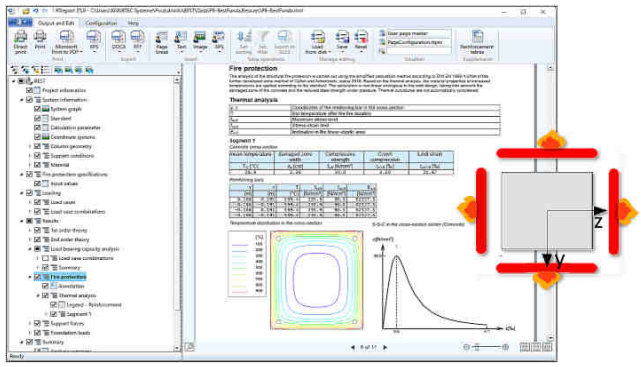
Due to the different temperature distribution in the cross-section and the different changes in length of concrete and steel under high-temperature stress, constraints arise in the component that lead to additional normal stresses in the longitudinal direction of the column in the case of an obstruction of expansion. The thermal extension is automatically taken into account.





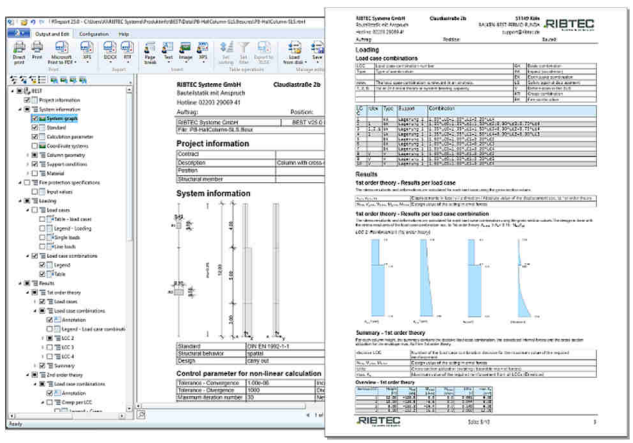

### Mechanical analysis

In the zone method, the load-bearing capacity is verified at the reduced cross-section depending on the temperature curve in the component and the type of flame exposure, both geometrically and materially non-linear. In contrast to cold design, only one stress-strain curve is used under high-temperature stress in the ‘exceptional design situation fire’. Not only the strength parameters, but also the curves of the material characteristics depend on the high-temperature exposure.



### Configurable results list (Basic module)

The output control for the results list is multi-level. The output of input values, internal forces, deformations, etc. can be controlled globally. A preview function allows you to review the entire document. The list output with the included graphics can be finally configured by making the appropriate selections in the table of contents. This configuration is retained even after the data is saved and can be used as a template if desired.



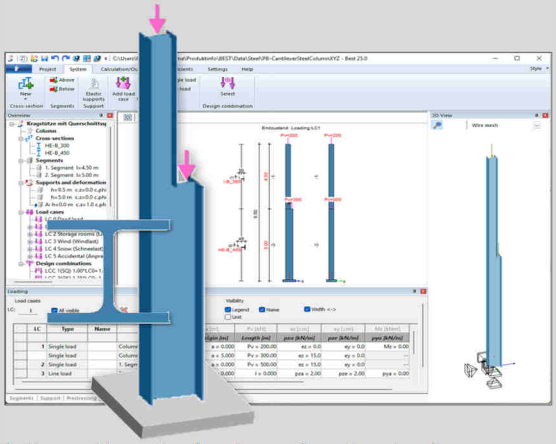
For verification purposes, the results can be displayed in a clear format on the system using a corresponding results display, in addition to the complete output list with graphics.

# BEST – Module Steel column

BEST – Structural column  Additional module: Steel column

## Design of steel columns for standard cross-sections

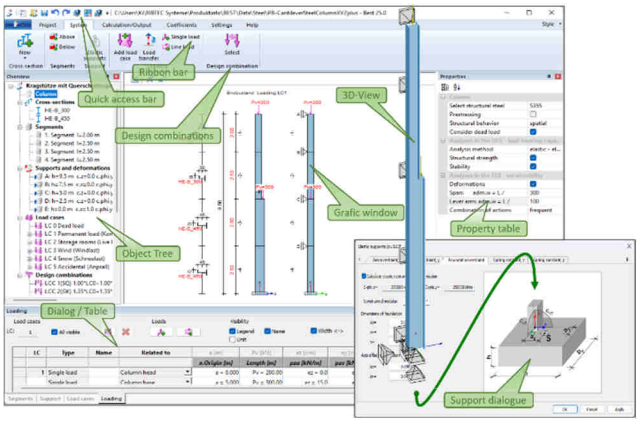
- **Verification according to DIN and EN 1993-1-1:2010-12 with NAs for DE, AT, SK/CZ & UK**
- **Modelling of multi-storey columns with arbitrarily stepped cross-sections**
- **Use of welded and rolled profiles for I-, rectangular hollow or tube cross-sections**
- **Determination of the pre-deformation affine to the buckling figure per load combination**
- **Calculation according to the 1st and 2nd order theory, taking imperfections into account.**
- **Stability verification for flexural buckling or flexural torsional buckling**
- **Proof EE & EP for biaxial bending with normal force**
- **Program and list configuration as well as separate language selection for input and output**



**With the option steel column for standard cross-sections, single- or multi-storey steel columns can be verified in the ULS and SLS according to the 1st and 2nd order theory and with consideration of imperfections. The working environment allows an efficient input of system and load, including automatic generation of load combinations. The non-linear calculation can be performed on one or two axes. The output of the results is configured via a preview option and printed as a list with graphics.**

Tel: +49 2203 29069 41
E-Mail: sales@ribtec.de
www.ribtec-systeme.de

RIBTEC Systeme GmbH
Managing Director: Mike Richter
Headquarter Cologne, Local Court Cologne HRB 120061




## Fast solution for complex engineering tasks

The non-linear analysis of general steel columns under biaxial bending stress with compressive force and the verification in the ultimate limit state of load-bearing capacity, taking into account the relevant pre-deformations, are among the demanding tasks of steel construction. With the Steel Column for Standard Cross-Sections option, single- or multi-storey steel columns can be verified in Windows® in the ultimate limit state and serviceability limit state according to first and second order theory, taking into account imperfections.

The graphical interactive working environment allows efficient input of the system and load with automatic generation of load case combinations. Non-linear calculation can be performed either uniaxially or biaxially. The output of the results can be configured as desired using a preview option and output as a list with graphics.

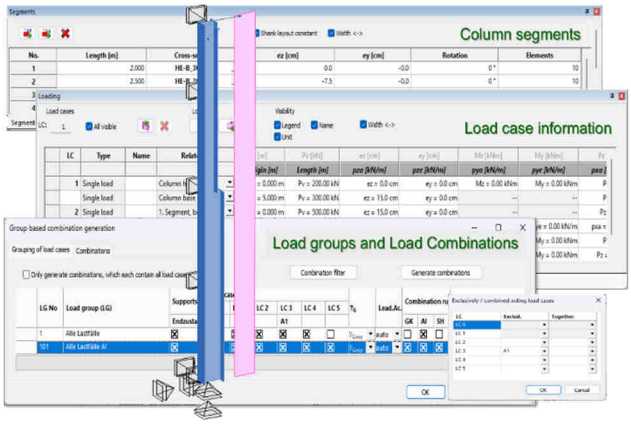
## System modelling for standard applications

With **BEST Steel Column**, multi-storey columns and slender cantilever columns for hall structures can be designed in the same way as column systems for multi-storey floor columns. Specifically, the following models can be represented with the Steel Column program option:

- Use of welded and rolled profiles for I-sections as well as rectangular hollow sections and pipe cross-sections
- Standard cross-sections can be graded by storey and arranged eccentrically
- Bearings can be rigid or elastic and can be specified using calculation assistants
- Automatic formation of all possible load combinations such as basic combinations, exceptional combinations and earthquake combinations
- Automatic calculation of pre-deformation curves for each load case combination with the option of specifying pre-deformation in line with the buckling figure
- Position safety and serviceability combinations are generated by the user

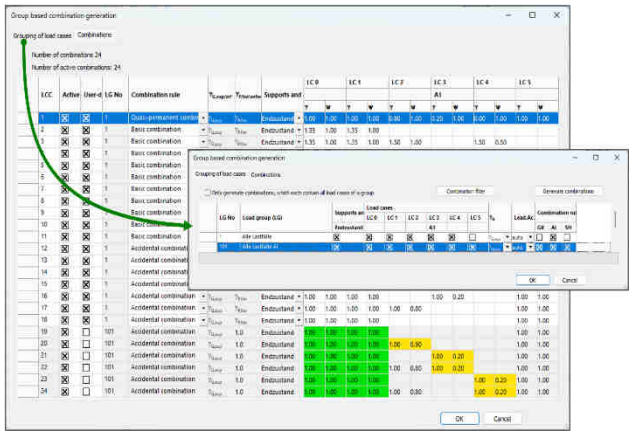
# Product information

- The verifications are carried out either in accordance with DIN or EN with NAs for DE, AT, SK/CZ and UK.




## Load types

The load consists of centric or eccentric point loads as well as linearly variable line loads. The associated partial safety and combination coefficients are defined by selecting load case attributes. The coefficients are editable.



## Action combinations

The combinations are formed automatically based on the action types. Any possible action combination (basic combination, exceptional combination or earthquake combination) can be selected as the design combination for the load-bearing capacity check.

## Support conditions

Any number of supports are possible in both directions or in just one direction. The support can be assigned spring constants for each direction. A comprehensive wizard is available for the practical determination of spring constants (e.g. for foundation restraints).

## Stability verification

**BEST Steel column** works with a fully geometrically nonlinear FE analysis. By coupling bending and torsion, stability failure in the form of buckling and lateral-torsional buckling is detected.

The ideal branch loads are determined for each load case combination. The imperfections are applied in accordance with the buckling configuration. With these specifications, the stability verification is carried out according to the equivalent imperfection method in accordance with EN 1993-1-1:2010-12, 5.2.2(7a), taking into account stability failure due to bending buckling or bending-torsional buckling for each load case combination.

## Load transfer

The support reactions determined by **BEST Steel Column** at the base of the column can be transferred as direct load input to the FUNDA program for foundation design. The characteristic values GEO-2, the design values STR/GEO and the positional safety values EQU are automatically determined, taking into account the 1st and 2nd order theory.

## Complete verification

In the continuous verification, the partial safety factors and combination factors are automatically applied for each load case attribute. The design combinations can be freely defined or automatically generated. The following verifications are performed:

- Elastic-elastic (EE) and elastic-plastic (EP) limit states of load-bearing capacity for biaxial bending with normal force per verification section
- Limit states of serviceability with deformation verification for each load combination
- Automatic superposition for extreme stress states
- Design for permanent and exceptional design situations or earthquake situations

The output of the verification results is presented in tabular form for the internal forces, stresses, utilisation, deformations and support forces, separated according to first and second order theory.

The evaluation of the steel structure verifications includes both the results from the elastic-elastic and elastic-plastic verifications, provided that the latter was performed, at maximum utilisation. The results list shows the results for the elastic and plastic load-bearing capacity separately.

## Configurable results list

The output control for the results list is multi-level. The output of input values, cross-sections, deformations, etc. with associated graphics can be compiled as a minimal, short, long or detailed list, as required. A preview function allows the document to be reviewed before printing. The list output with the included graphics can be finally configured using the corresponding markings in the table of contents. This configuration is retained even after the data is saved and can be used as a template if desired.