



## MAIN FEATURES - Version v4.0

### • General

- Software developed for analysis and design of concrete structures:
  - > Plain concrete
  - > Concrete structures reinforced with conventional rebars
  - > Concrete structures reinforced with steel fibres
  - > Concrete structures with combined reinforcement (rebars + steel fibres)
- Integrated calculations for Ultimate Limit State and Serviceability Limit State verifications
- Full access to intermediate calculation parameters

### • Standards

- In accordance with European standards, namely:
  - > Eurocode 2 (EN 1992-1-1:2004)
  - > DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992-1-1/A1:2015-03
  - > DAfStb Stahlfaserbeton:2012-11
  - > EN 14651:2005

### • Languages

- **Software:** English and Portuguese
- **Output results:** English, French, Italian, Portuguese and Spanish

### • Structural Elements

- Rectangular cross-sections
- Type of structural elements:
  - > Solid slabs / Plates
  - > Beams
  - > Columns

### • Materials

- **Concrete**
  - > Definition with  $f_{cd}$  and  $\alpha_{cc}$
- **Steel rebars**
  - > Definition with  $f_{syd}$  and  $\varepsilon_{max}$
  - > Definition with No. of bars or with Rebar spacing

## - Steel fibres for concrete reinforcement

- > Definition with residual flexural tensile strength values ( $f_{R,1k} \dots f_{R,4k}$ ), for any type of steel fibre, in accordance with EN 14651:2005 standard, or
- > Definition using Dramix® fibres database (values provided by Bekaert):
  - Definition of the steel fibre (3D, 4D and 5D)
    - 3D 45/50 BL
    - 3D 65/35 BG
    - 3D 65/35 GG
    - 3D 65/60 BG
    - 3D 65/60 GG
    - 3D 80/60 BG
    - 3D 80/60 GG
    - 4D 65/35 BG
    - 4D 65/60 BG
    - 4D 65/60 BL
    - 4D 80/60 BG
    - 5D 65/60 BG
    - 5D 65/60 GG
  - Fibre dosage (available values of 20, 25, 30, 35 and 40 kg/m<sup>3</sup>) for concrete classes ranging from C20/25 to C50/60
  - Values are not available for all the possible combinations (concrete class / steel fibre type / fibre dosage); free updates of the fibres database are provided in the website for all software versions

## • Structural Verifications

### - Ultimate Limit States

- > Bending (with or without axial force)
  - Parabola-rectangle stress-strain diagrams
  - Calculation of  $M-N$  (or  $\mu-v$ ) interaction diagrams
  - Calculation of  $A_{s,min}$ ,  $A_{s,max}$  and rebar spacings
- > Shear
  - Calculation of  $A_{sw/s,min}$  and stirrup spacings
- > Punching shear
  - Soil-structure interaction (uniform  $\sigma$ , or Beam on Elastic Foundation)
  - Consideration of longitudinal rebars in both directions
  - Consideration of bending moments in both directions
  - Consideration of inclined loads
  - Analysis / verification of perimeters from  $0$  to  $2d$ , in all situations

- Calculation of critical perimeters when soil-structure interaction is considered
- Definition of a detailed rebar solution according to EN 1992-1-1 if punching reinforcement is necessary
- Calculation of  $A_{sw,min}$  and stirrup spacings if punching reinforcement is necessary

#### - Serviceability Limit States

- > Crack control (for a given  $M_k - N_k$  combination)
  - Definition of load duration
  - Definition of bond properties
  - Definition of concrete age
  - Definition of cement class
  - Calculation of deformations and stresses
  - Calculation of  $s_{r,max}$  and  $w_k$

#### • Output Results

- Output results produced automatically, in order to easily create technical reports
- All relevant calculation parameters included, as well as diagrams, graphs and figures
- Available in five languages

#### • File Management

- Input and output files are saved for each project / calculation with all the relevant data
- Fully compatible with previous versions of *DIACalc*®