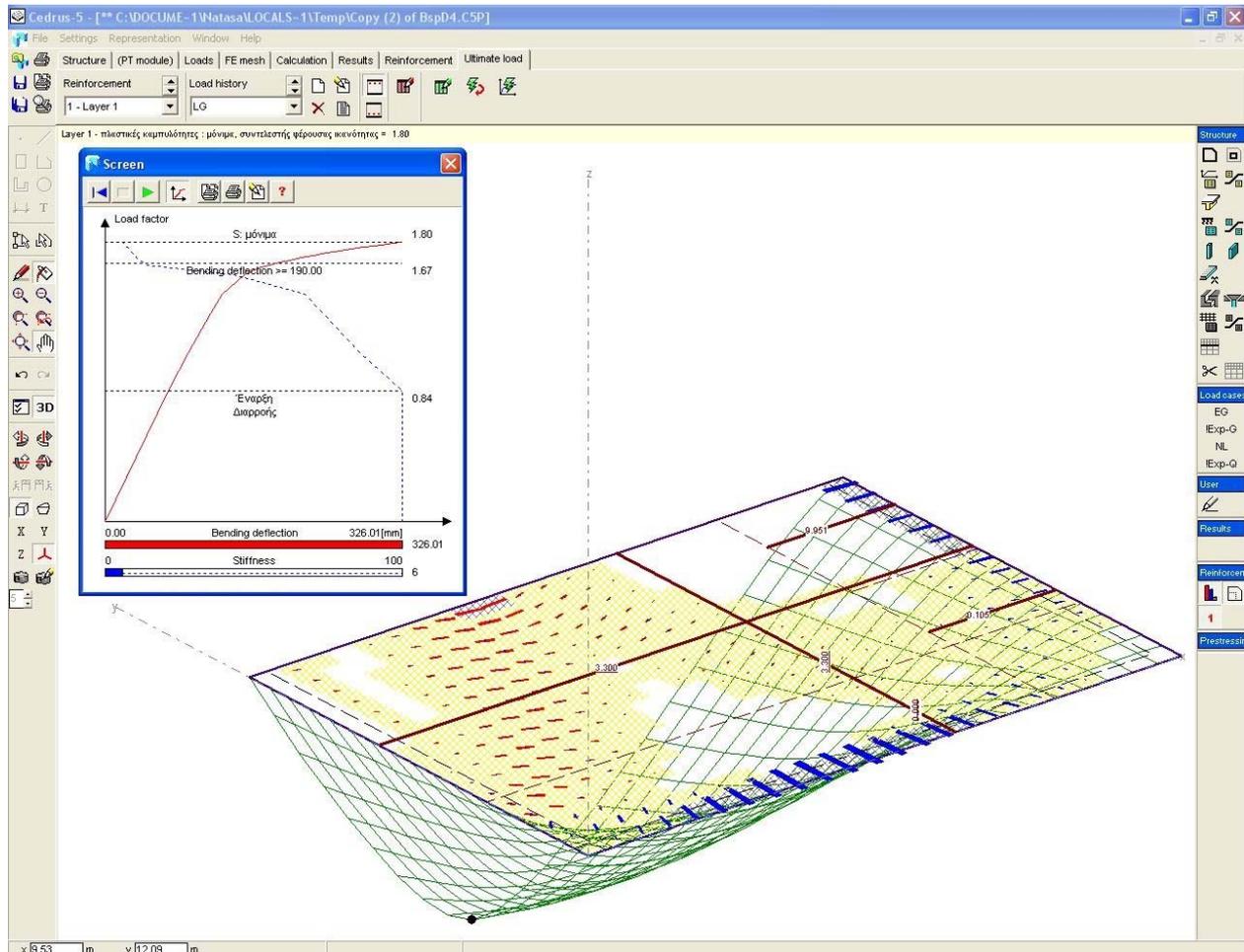


CEDRUS-5B/T

Reinforcement and Ultimate Load Analysis



In dimensioning problems goes the optional reinforcement module, compared to the basic module, one step ahead: The slab reinforcement is dimensioned directly in form of bars and meshes and designed. The resulting optimized and detailed layout of bending reinforcement can be transferred, for drawing purposes, to CAD - Systems.

In order to redefine the capacity of existing structures under variable loads the bearing capacity and the influence of possible strengthening measures have to be estimated. The optional ultimate load analysis module can answer those questions through realistic consideration of the plastic behaviour and estimation of the strength reserves

Reinforcement module

Input of reinforcement

- Definition of reinforcement fields (single bar and mesh layers) with predefined geometry and variable cross-section area
- Input of the reinforcement fields as parallelograms with bar and distribution direction or as arbitrary polygons
- Arbitrary bar direction (skew reinforcement is supported)
- A minimum reinforcement can be defined
- Separate input of upper and lower reinforcement
- Several reinforcement variants can be evaluated

Dimensioning

- Dimensioning for design loads after Code
- Dimensioning based on elastic moment envelopes
- Automatic search for optimal bar diameter and bar distance or mesh type from editable bar or mesh lists

Plastic optimized design

- Optimized plastic design under consideration of plastic moment redistribution
- Optimization on minimum steel weight
- Possibility of high reduction of reinforcement compared to the elastic solution
- Large flexibility during positioning of the reinforcement due to plastic design

Results

- Preconstructed reinforcement layout with bar and mesh reinforcement
- Elastic and plastic reinforcement moments

Interfaces with CAD

- Import of structure and reinforcement data
- Export of the constructed reinforcement

Module for ultimate load

Input of reinforcement

- Input of bar and mesh layers as reinforcement fields
- Selection of steel quality from editable material lists

Loading

- Definition of loadings as a serie of sequential load steps
- Load steps as a combination of arbitrary load cases

Material model

- Nonlinear moment - curvature relation
- Realistic material model with plastic flow and hardening
- Cracked, orthotropic stiffness
- Consideration of stiffening effect of concrete between the cracks

Calculation

- Nonlinear FE-calculation after the method of Newton - Raphson
- Interactive manipulation of the most important system parameters
- Control of the rotational capacity according to the codes (EC2, E-DIN 1045-1)
- Control of punching safety

Results

- Ultimate load factor
- Graphical representation of the plastic principal curvatures, crack concentration and deformations
- Representation of the dangerous zones (punching, exertion of the rotational capacity)

Further Cedrus-5 Options

- CAD Interface
- Prestressing
- Discs
- Dynamic