

CDS: Design of Sections

Overall description

CDS is a software able to verify or optimize rebar of reinforced or prestressed concrete sections. It is assumed that sections remain planar under bending with or without axial force thus complying with the Eurocodes.

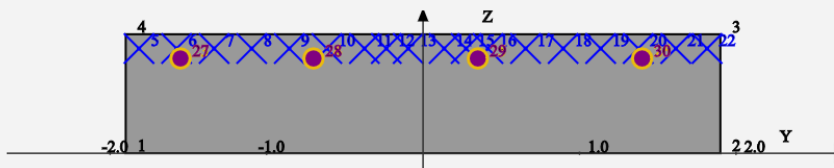
The user specifies material parameters for both concrete and steel by providing the environmental exposure, applied loading, and considered limit states. **Either the positions of longitudinal rebar are provided or their positions and amounts are optimized.**

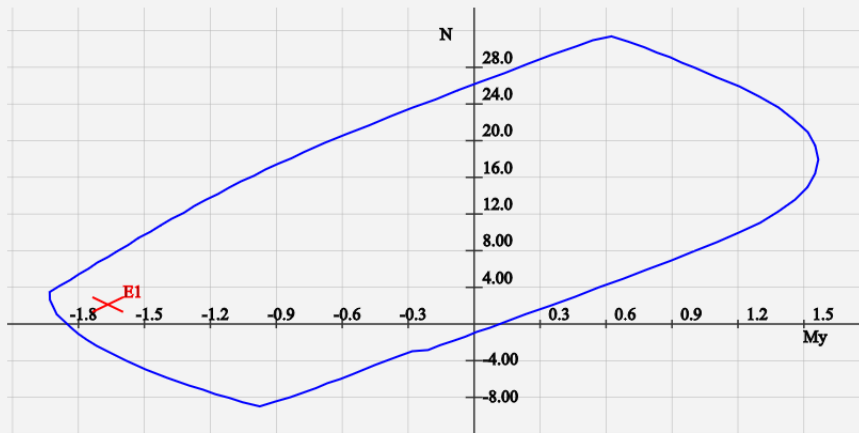
The software verifies or optimize steel rebars. It computes the mechanical characteristics of the section described as a Euler-Bernoulli beam and its center of mass. It returns the stress induced in the section, interaction diagrams between applied forces and data required to justify the integrity of materials. **Finally, it produces a computation report gathering data.**

1. CDS - Note de calcul

2. Section Precontrainte

2.1. Section : POUTRE_PRECONTRAINTE - poutre precontrainte rectangulaire





Technical Specifications

Model definition

Defining the geometry using command CONTOUR

- Dedicated geometry for RECTANGULAIRE, CIRCULAIRE, TUBE, TE (T), or I_SYMETRIQUE, I_NON_SYMETRIQUE, CAISSON, ...
- The perimeter can be defined by points, holes or prestressing sheaths can be added, positions and cross section area of prestressing cables can be specified.
- The diameter of steel longitudinal reinforcement can be prescribed as well as their placement on either a straight segment, an arc, a circle, a frame bed featuring a minimal cover.

Defining the materials

- The concrete is defined according to Eurocode 2, by specifying its characteristic compressive strength, cement type, whether silica fume is added or not, relative humidity and mean radius so as to account for creep for Serviceability Limit States. The design situation of concrete (persistent, accidental, seismic) is depicted and weights can be specified to combine persistent loads and transient loads, as well as the strain at peak stress, the nominal ultimate strain, the exponent of a parabolic stress-strain diagram.
- The behavior of steel is described by its tensile strength and its type (A/B/C). Whether the rebar are to be accounted for whenever compressed can be specified, simplified criteria related to fatigue or crack width can be computed and verified. For every design situations, the Young modulus and the maximal crack width can be provided. Default partial factors for steel can be modified for each SLS or ULS
- Prestressing steel is depicted by its conventional elastic limit, its characteristic strength and its type (TORON/FIL/BARRE). For every design situations, parameters such as partial factor can be tuned.

- A non-linear elastic brittle material can be defined by specifying its admissible strain range.

Loading the section and computation options

Defining loading configuration

- A (SLS/ uncracked SLS/ULS) limit state and a design situation defines the loading configuration. Each limit state is defined by a list of loads (permanent G, exploitation Q or already combined GQ), characterized by their induced axial force and bending moment with respect to a chosen fiber.
- Prestress can be total of hyperstatic, pretentionned or post-tensionned, specified on a cable-by-cable basis. A scalar describes how much prestressing participates to the balance of the section.

Choosing justification or optimisation

- The JUSTIFICATION command verifies whether the section withstands a collection of loads and reports eventual exceedence of limits of materials.
- The DIMENSIONNEMENT command search for an optimal set of positions and amounts of longitudinal rebars such that the section withstands a collection of loads. If areas or frame beds are specified, the amount and spacing are returned. The optimization can run on a specified list of authorized diameters.
- The INTERACTION command computes the interaction diagram between two componants of the loading, the third being set to a chosen value. The limit state and design situation are also depicted.

Contents of the computation report

The computation report is produced as an html page:

- Command EDITER MATERIAU reports input data about materials and their stress-strain curves for different design situations, for both SLS and ULS.
- Command EDITER SECTION print inputs and properties related to the section.
- For each call to DIMENSIONNEMENT, the optimal amount of rebar and their diameter are reported.
- For each call to JUSTIFICATION and for every load, the induced stress and strain are reported for rebars and prestressing cables, as well as extrema in the concrete beam.
- For each INTERACTION, the corresponding interaction diagram is reported.

Versions

Configuration/hardware

- Operating system : Compatible with Windows 10, 32 et 64bits,
Langages : French

- A USB dongle protecting the software is required.

Contacts

The protected version of CDS and the related documentation can be downloaded at :

<http://www.setra.fr/html/logicielsOA/LogicielsOA/CDS/cds.html>

Prices are available at :

<http://www.setra.fr/html/logicielsOA/LogicielsOA/tarifs.html>

Orders can be placed by filling the form available at :

<http://www.setra.fr/html/logicielsOA/LogicielsOA/commander.html>

If you have any questions, please contact :

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