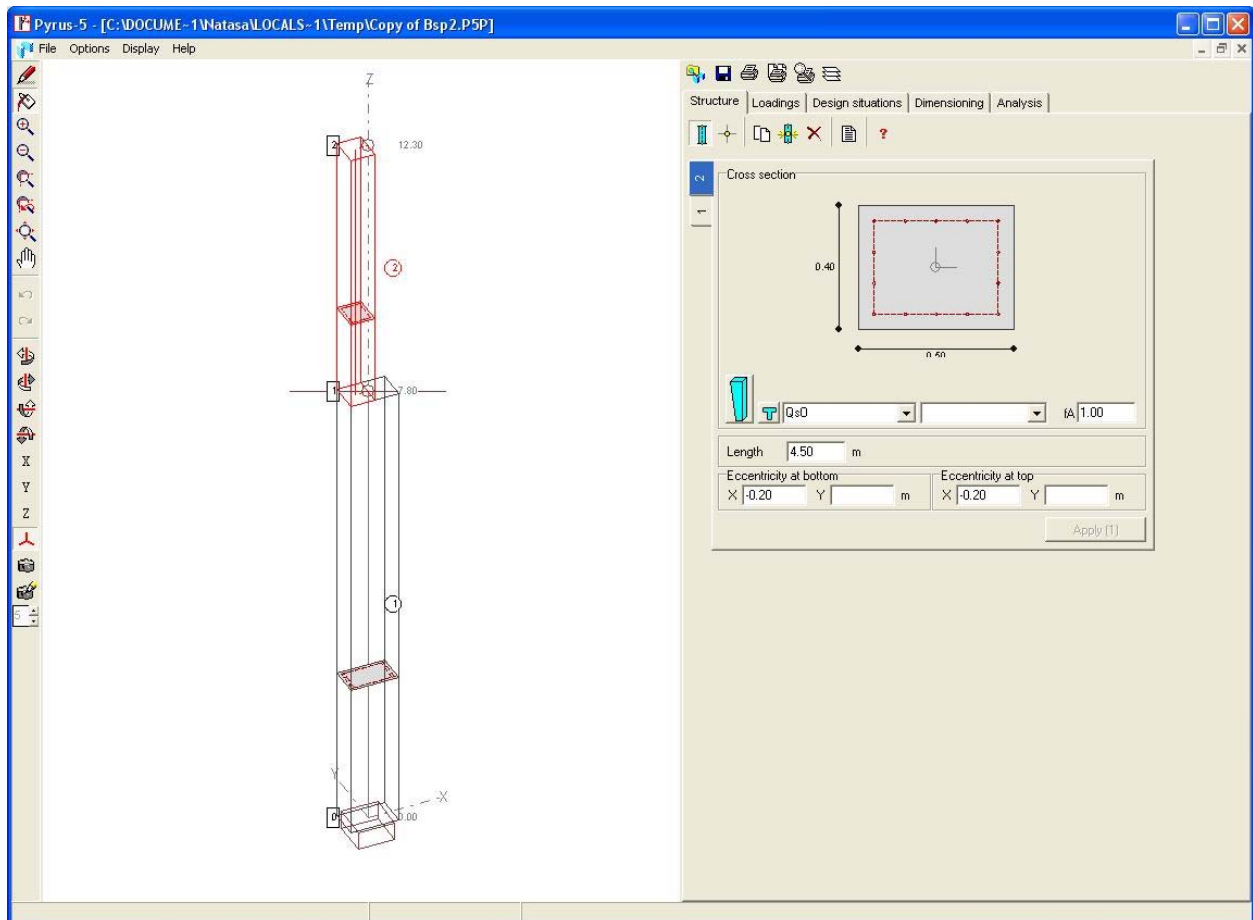


# PYRUS - 5

## Reinforced concrete columns

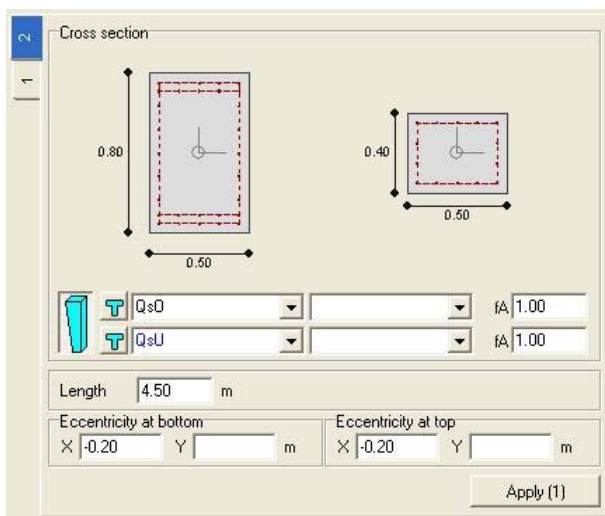
### Design and Verification



PYRUS-5 is a program for the nonlinear dimensioning and analysis of reinforced concrete columns. It allows the analysis of relatively simple columns (e.g. in buildings) as well as complex multi column systems with constant or varying cross sections, eccentric members connections and intermediate supports under uniaxial or biaxial bending. The calculation is performed in cracked state (nonlinear material-diagrams) in deformed position (2nd order theory).

## Structure

- Arbitrary “continuous beam” with axial force under biaxial bending
- Member axes with arbitrary eccentricity to the column axis
- Arbitrary support conditions at the ends of the column as well as at intermediate points
- Elastic supports
- Cross-section piecewise constant or linear varying
- Various ways of definition of initial deformation, also automatically in function of the loading



## Cross sections

- Additionally to a series of parametric standard cross sections, arbitrary sections defined in FAGUS-5 can be used

## Reinforcement

- Arbitrary layers of non-prestressed and prestressed reinforcements, defined as fixed or dimensionable layers

## Loadings

- Separate consideration of loading parts for permanent and variable loads
- Concentrated vertical forces with eccentricity
- Concentrated horizontal forces and moments
- Constant or linear distributed loads
- Prescribed displacements and rotations

## Design situations / Service states

- Definition of one or more design situations (or service states) for one column
- Design situations content a loading case, an initial deformation, the creep parameters and the definition of the limit state

## Calculations

- Dimensioning of the non-prestressed reinforcement for the limit states of ultimate load capacity and serviceability
- Verification of the ultimate load capacity and results (displacements, section forces, stresses) due to a load case and an initial deformation for a column with given reinforcement after 1st or 2nd order theory
- Verification of the serviceability: maximum allowable deformation for different conditions (for ex. max allowable tensile stresses in steel)

## Long term effects

- Consideration of creep for a predefined part of the permanent loads



ANALYSIS DS 1 (Ultimate load)

Overview ULTIMATE LOAD ANALYSIS

Design situation: Design/Kurzzeit  
 Ultimate load factor  $\gamma_s$ : 0.34  
 Obtained limit state: System instability  
 Number of finite elements: 10  
 Equilibrium tolerance for forces: 0.01337 [kN]  
 Equilibrium tolerance for moments: 0.00582 [kNm]

Analysis Parameters "AP3: Nicht-Schuttgrössenermittlung", Code: Swisscode

ID	c	s	p	a	$\epsilon_{s,lim}$	$\epsilon_{s,lim}$	$\epsilon_{s,lim}$	$\sigma_{s,lim}$	$\gamma_s$	$\gamma_s$	$\gamma_s$	$\gamma_s$	$\alpha$	$\phi$	PTI	$\nu$
AP3	4.0	1	2	1	-3.0	-3.0	5.0	1.50	1.15	1.15	1.05	45.00	2.00	1	1	0

Reinforcement Total = 117.19 kg

Level Z [m]	$A_{s,net}$ [mm <sup>2</sup> ]	$A_{s,net} + A_{s,cr}$ [mm <sup>2</sup> ]	$\rho_{s,net}$ [%]	$A_{s,cr}$ [mm <sup>2</sup> ]
12.30	0	704	1.000	0
7.80	129.81	120.36	-0.78	-14.85
10.05	108.21	103.74	-0.17	-14.89
0.93	67.74	67.46	0.54	-14.10
7.80	70.73	72.05	1.37	13.09
6.50	54.47	55.21	1.72	12.79
5.20	36.71	36.99	1.98	12.87
3.90	24.15	24.14	2.82	10.81
2.60	11.90	11.81	1.75	8.17
1.30	3.33	3.28	1.10	4.74
0	0	0	0	0

Displacements (without initial deformations)

Level Z [m]	DX [mm]	DY [mm]	DZ [mm]	RFX [kN*1000]	RFY [kN*1000]	RfZ [kN*1000]
12.30	191.72	127.08	-1.29	-14.88	18.52	-0.14
11.18	129.81	120.36	-0.78	-14.85	19.40	-0.15
10.05	108.21	103.74	-0.17	-14.89	18.83	-0.16
0.93	67.74	67.46	0.54	-14.10	17.10	-0.16
7.80	70.73	72.05	1.37	-13.09	12.61	-0.15
6.50	54.47	55.21	1.72	-12.79	12.37	-0.15
5.20	36.71	36.99	1.98	-12.87	11.78	-0.15
3.90	24.15	24.14	2.82	-10.81	10.47	-0.15
2.60	11.90	11.81	1.75	-8.18	8.17	-0.13
1.30	3.33	3.28	1.10	-4.74	4.78	-0.09
0	0	0	0	0	0	0

## General

- The functions of PYRUS-5 are concentrated on a single menu, registered as “Structure”, “Loads”, “Design situations” and “Results”

## Interfaces

- Compatible to the cross-section program FAGUS-5, whose basic module is included in PYRUS-5 for the description of cross-sections
- Export of all numerical and graphical data into other Windows applications (clipboard, Word, Excel etc.)

## Print Manager (Cubus Viewer)

- Editable preview of all output data: Changing print order, scales, colors, visibility
- User-defined page layout ( page format, company logo, texts, borders etc.)
- Colour printers are supported

## Project Manager (Cubus Explorer)

- Project explorer with Windows-Explorer functionality
- Additional functions for project archiving, compression and decompression
- Graphical preview of projects