FRILO Software
A NEMETSCHEK COMPANY

STX+ Stability Analysis for Steel

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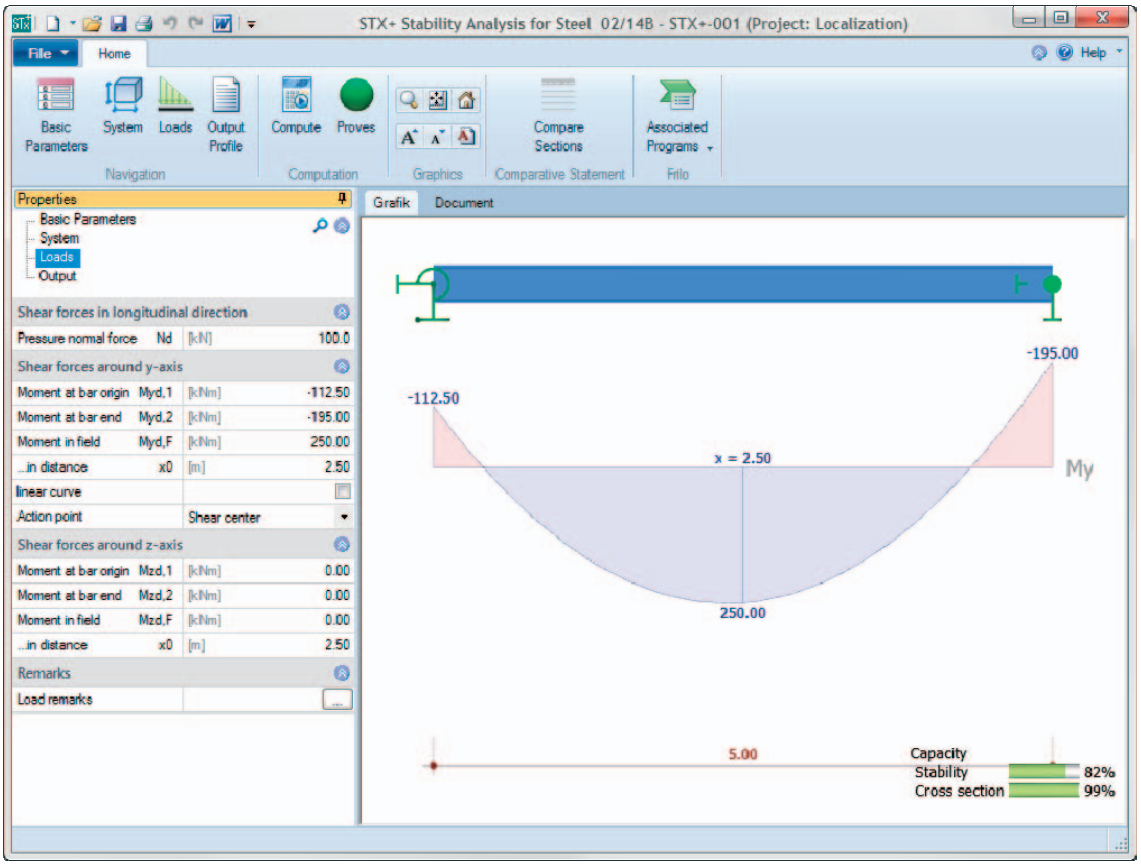


Frilo Application: STX+ - Stability Verification

Contents

Further information and descriptions are available in the relevant documentations:

FDC – Basic Operating Instructions	General instructions for the manipulation of the user interface
FDC – Menu items	General description of the typical menu items of Frilo software applications
FDC – Output and printing	Output and printing
FDC - Import and export	Interfaces to other applications (ASCII, RTF, DXF …)
FCC	Frilo.Control.Center - the easy-to-use administration module for projects and items
FDD	Frilo.Document.Designer - document management based on PDF
Frilo.System.Next	Installation, configuration, network, database

Application options

The STX+ application allows you to verify the stability of single-piece members with fork supports in accordance with EN 1993 (equivalent member method).

Optionally, you can put out either the elastic cross-section verifications on the stress level or the analysis of the plastic internal limit forces.

Systematic central compression, uniaxial bending with or without axial force and biaxial bending are the definable actions.

The stability verifications are limited to double-symmetrical cross sections.

Available standards

- DIN EN 1993
- ÖNORM EN 1993
- BS EN 1993

Note: *DIN EN 1993-1-1 does not specify any design rules for eccentrically loaded beams with U-channel section (i.e. not loaded in the centre of shear). These beams are not only under bending but also under systematic torsional loading.*

Data entry

Help texts and information on each parameter to be defined are an integral part of the user interface. Clicking in an input field displays a description of the corresponding value in the information area.

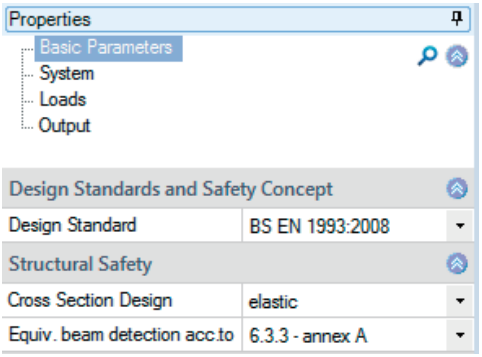
A general description of the user interface is available in the document:

- Basic operating instructions FDC-MFL_eng.pdf

Basic parameters

Standard and safety concept

Definition of the design standard and its national annex



Structural safety

Cross section design

plastic:
verification of the cross section in accordance with the theory of elasticity (stress analysis).

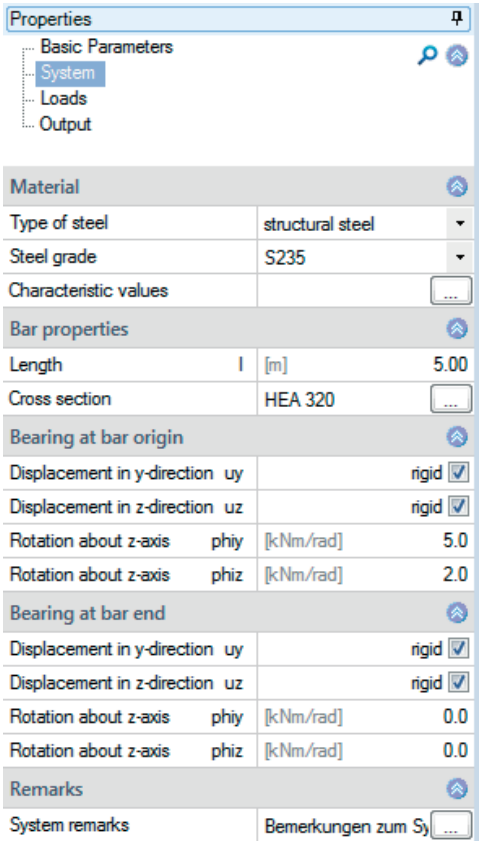
elastic:
verification of the cross section with utilisation of the plastic cross-sectional resistance (limit internal forces).

Equivalent member method as per

the calculation of the interaction factors for the component verification under compression and bending loads (eq. 6.61 and 6.62) is performed in accordance with Annex A or B of DIN EN 1993-1-1.

Structural system

In this section, you can define the material properties, the system dimensions and the support conditions.



Member properties

Length l specification of the length of the individual member

Cross section you can select among all standards shapes of the FRILO profile selection file such as double-symmetrical I-profiles (double T), rectangular pipes etc. Just click on the ... button.

You can find a description of the profile selection dialog in the document ▸ Select - edit cross section_eng.pdf

Supports

The specification of "0.0" defines a free support in the corresponding direction.

An elastic support is defined by specifying a spring stiffness in the corresponding direction.

The horizontal support at the front end of the member is always rigid.

Loading

All actions are specified as internal design forces.

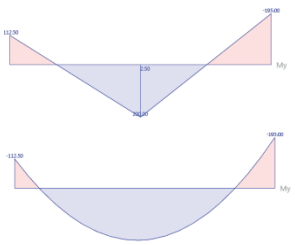
Nd axial force N_d - compressive force shall be defined with a positive sign.

Myd,1 design value of the internal moment about the y-axis at the front end of the member

Myd,1 design value of the internal moment about the y-axis at the rear end of the member

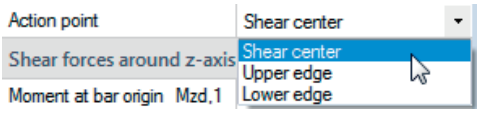
Myd,F design value of the internal moment about the y axis at point x0 in the span

Moment behaviour allows you to specify whether the moment behaviour is linear or parabola-shaped. If you do not define a span moment, the behaviour is always linear.



Shear forces in longitudinal direction			
Pressure normal force	Nd	[kN]	100.0
Shear forces around y-axis			
Moment at bar origin	Myd,1	[kNm]	-112.50
Moment at bar end	Myd,2	[kNm]	-195.00
Moment in field	Myd,F	[kNm]	250.00
...in distance	x0	[m]	2.50
linear curve			☐
Action point		Shear center	
Shear forces around z-axis			
Moment at bar origin	Mzd,1	[kNm]	0.00
Moment at bar end	Mzd,2	[kNm]	0.00
Moment in field	Mzd,F	[kNm]	0.00
...in distance	x0	[m]	2.50
Remarks			
Load remarks			...

Load application load application point of the transverse loading which is responsible for the span moment. The top edge of the cross section always runs in the negative x-direction, the bottom edge in the positive z-direction.

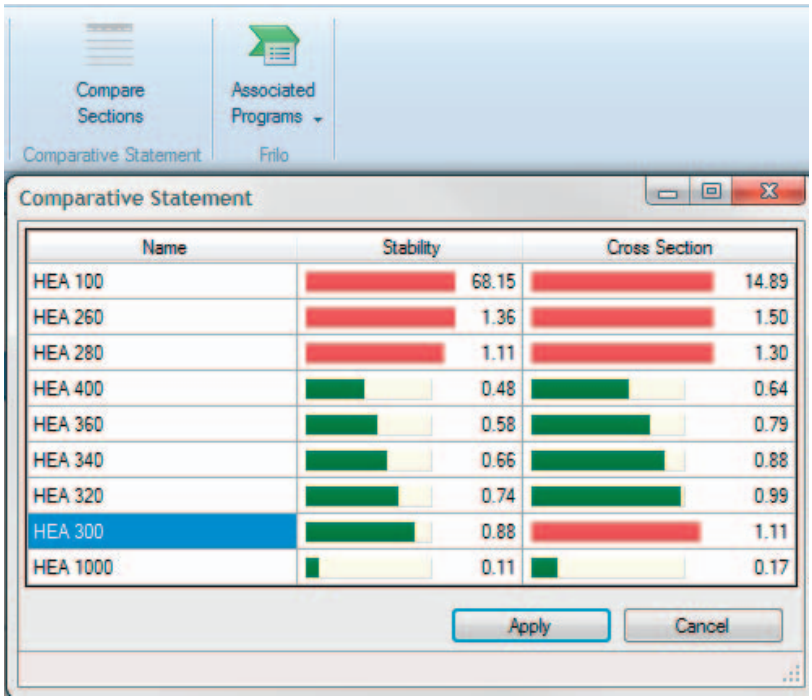


Mz... Moment behaviour M_d about z (at the front/rear end of the member, in the span, in accordance with Myd)

Comparative calculation of profile sections

Click on the "Compare profile" button to perform a comparative calculation with the next smaller/large profile of the series.

Click on one of the listed profiles to integrate it into the system.



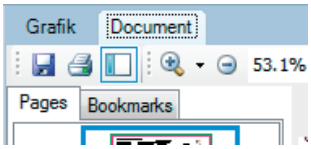
Output

A general description of the output options is available in the document:

- FDC - Output and printing_eng.pdf

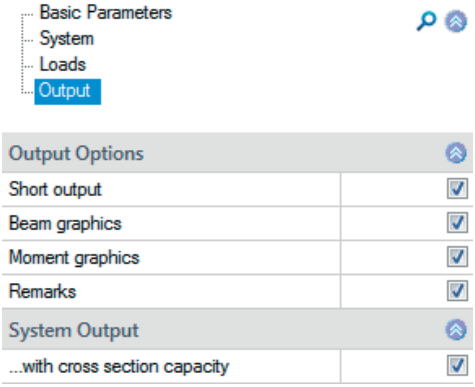
View selection

The Graph/Document tabs of the view selection allow you to toggle between the graphical representation in the GUI and the preview of the output document.



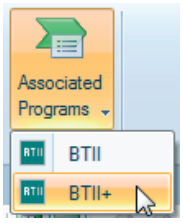
Output options

Output profile the dialog offers comprehensive options for the control of the output scope.



Transfer of the system and the loading

If you have a valid licence for the BTII application (2nd Order Buckling Torsion Analyses) you can transfer the structural system to BTII for further calculations. BTII allows the calculation of more complex systems with consideration of e.g. lateral supports.



Reference literature

DIN EN 1993-1-1, Eurocode 3: *Design of steel structures - Part 1 - 1: General rules and rules for buildings*, December 2010