

Steel Cross-Sections QS+

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Basic Documentation – Overview

In addition to the individual program manuals, you will find basic explanations on the operation of the programs on our homepage www.friilo.com in the Campus-download-section.

Application options

The QS+ program is used to model thin-walled steel construction profiles of any composition.

Note: The verifications for the created/saved cross-sections can be carried out using the program Verification of Steel Cross-Sections SQN+ - see Interface for verification.

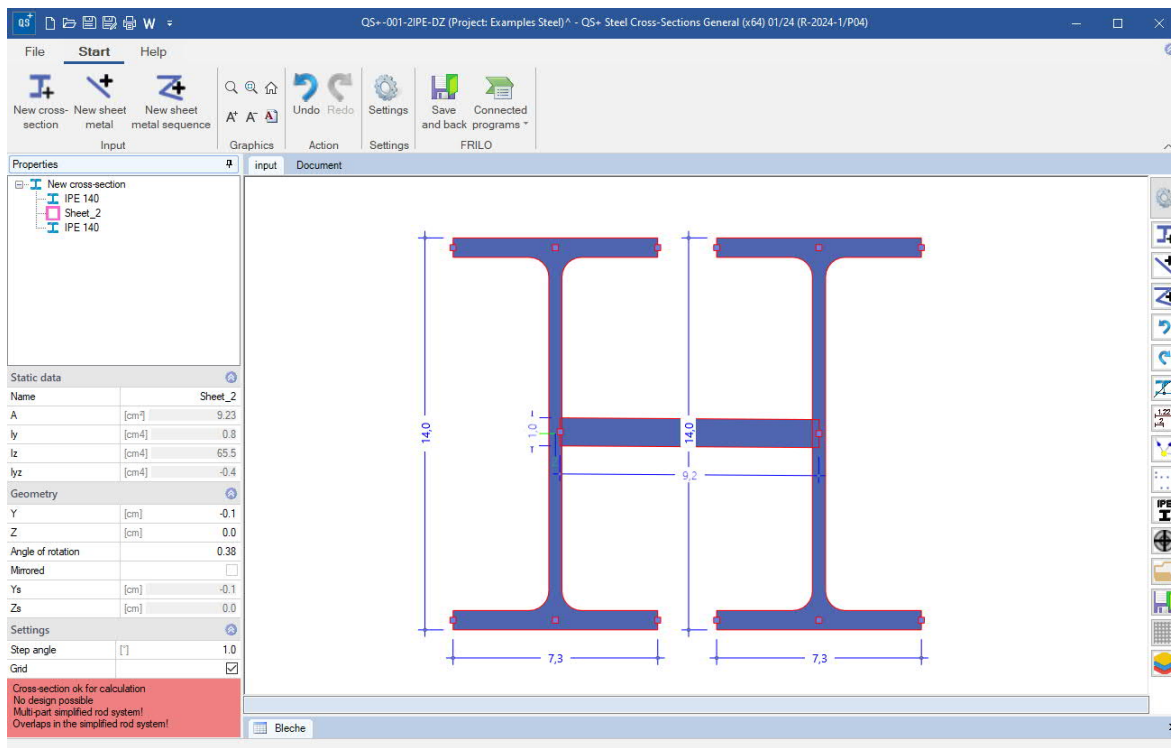
Cross-section selection

Standardized sections (DIN, ARBED) are available for selection in an XML file.

Single-symmetrical double-T sections, sheet metals and round steel are entered using the dimensions.

It is also possible to enter (select) and save self-defined channel, angle, hollow and thin-walled open sections (cross-section Q20).

Any cross-sections can be assembled from these sections. The input is made either in a table or using graphical functions.



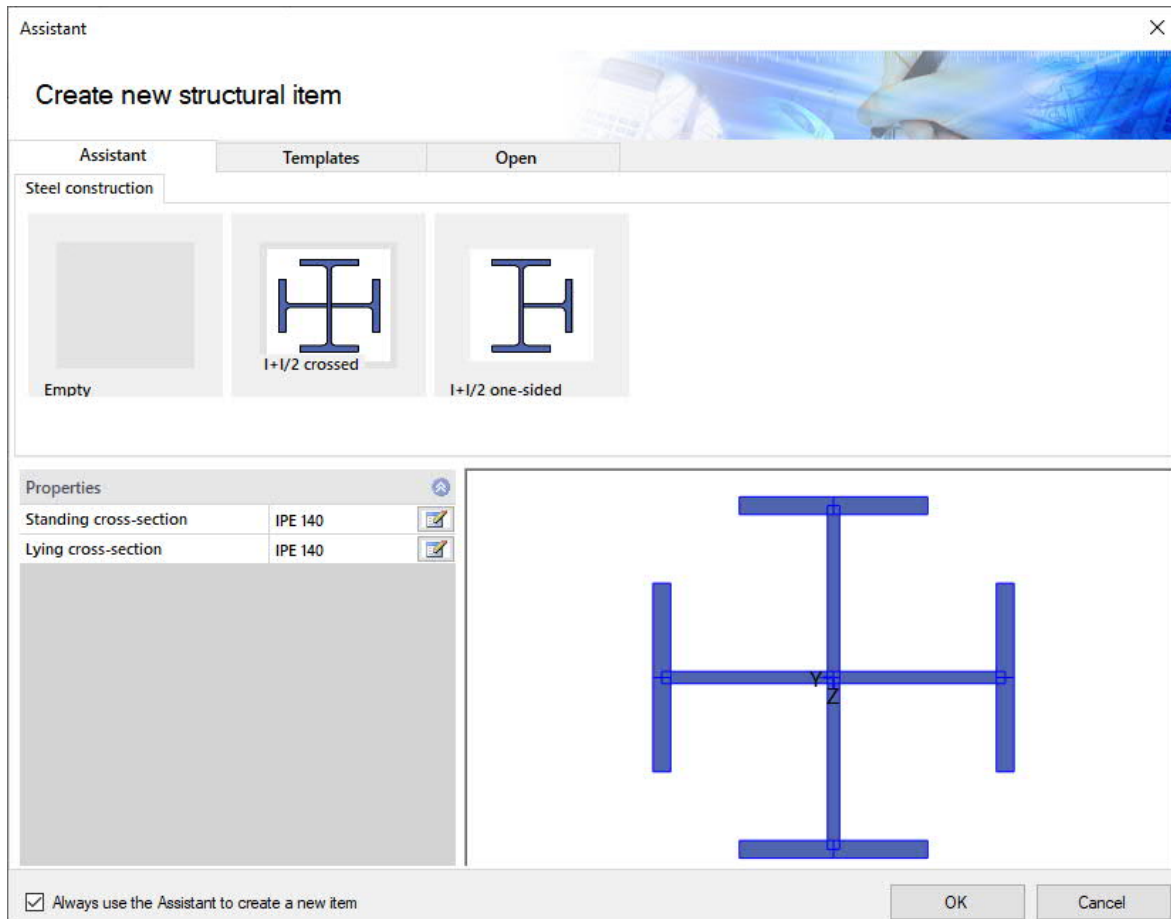
Cross-sectional input

The Assistant

The [Assistant](#) is displayed by default when creating a new item - it can also be switched off if necessary (option in the lower part of the window).

For quick input with just a few entries, the Assistant offers various simple composite cross-sections to choose from. These can then be easily modified and supplemented using the graphically interactive input.

You can also start with an "empty" item.

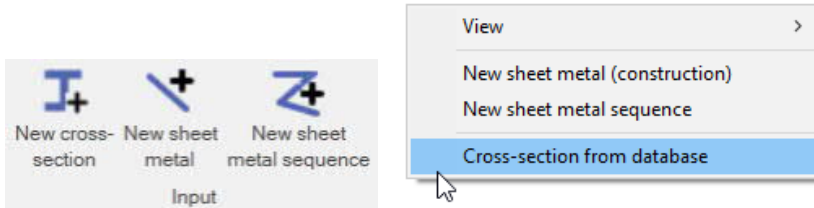


Entering/selecting cross-sections

You can access the input functions

- New cross-section,
- [New sheet metal](#) or
- [New sheet metal sequence](#)

via icons in the top ribbon (picture below left) or in the right [toolbar](#) (picture right) or via the "context-sensitive menu" (right mouse click on the surface of the graphics window, picture below right).



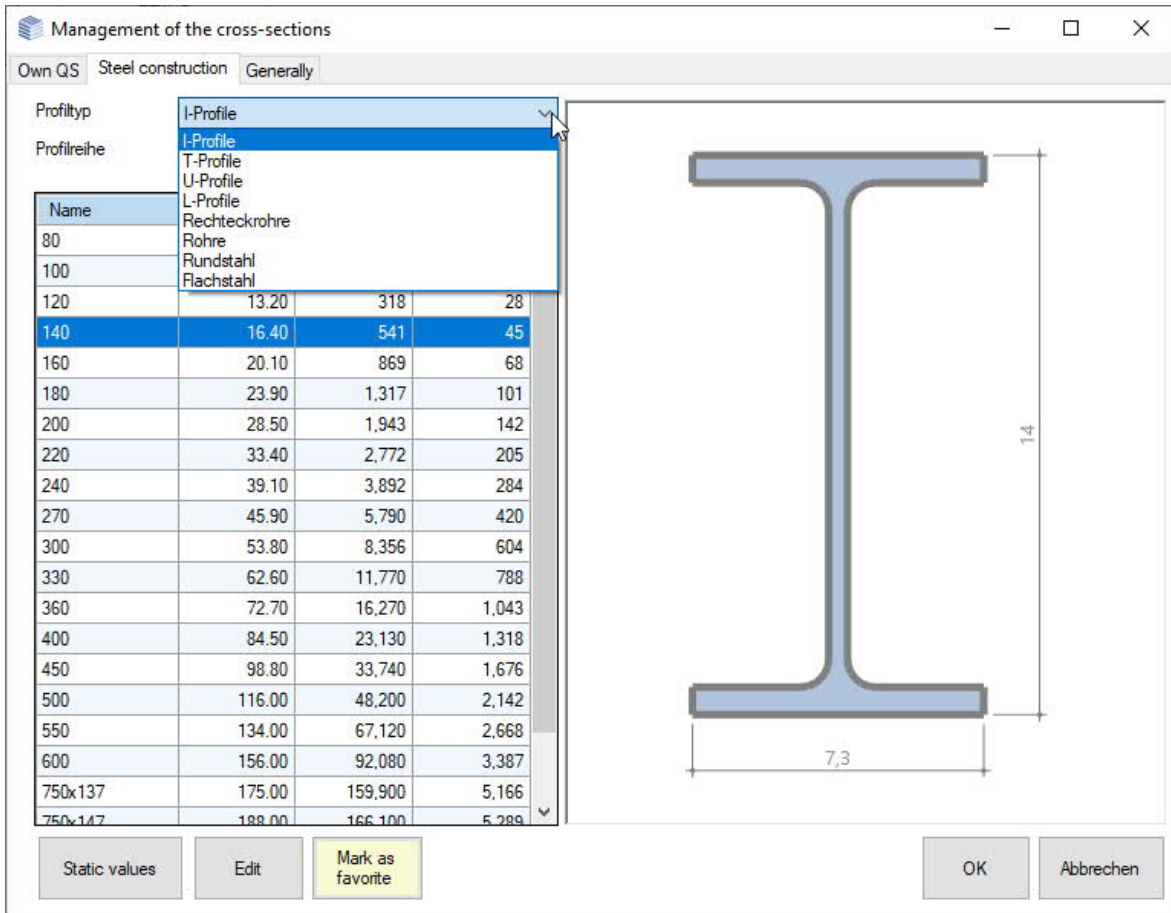
New cross-section / cross-section from database

You can use this function to select a section from the FRILO cross-section file.

Note: The cross-sections are stored as XML files in the FRILO installation directory in the *CssXml* folder.

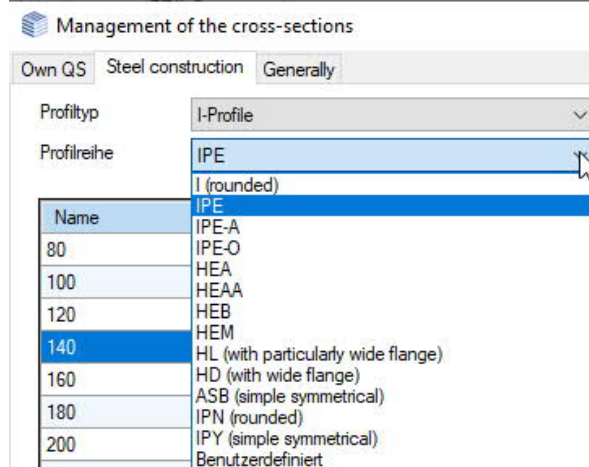
In the Cross-section management window (in the Steel Construction tab), first select the section type:

I- / T- / channel / L- section or rectangular pipes / pipes / round steel / flat steel.



The section series can then be selected - depending on the section type selected, the appropriate options are available.

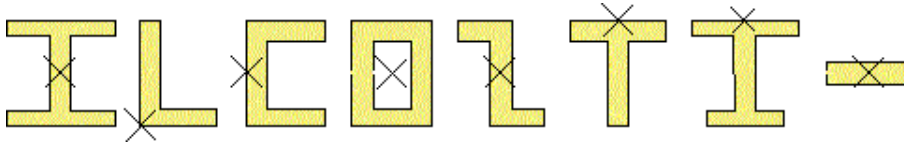
In the figure you can see the section series selection for I-sections as an example.



You can now select the desired cross-section from the section list displayed below and confirm with OK. The cross-section is now displayed in the graphics window and can be moved with the mouse. When the [grid is turned on](#), the graphic always snaps to the grid points when you move it. With a mouse click, the reference point of the cross-section is then positioned at the mouse pointer point on the graphic area.

Instead of graphical positioning using the mouse, the reference point of a cross-section can also be defined numerically using the Y/Z coordinates in the left menu.

The reference/positioning point is defined for each section type – see Fig.

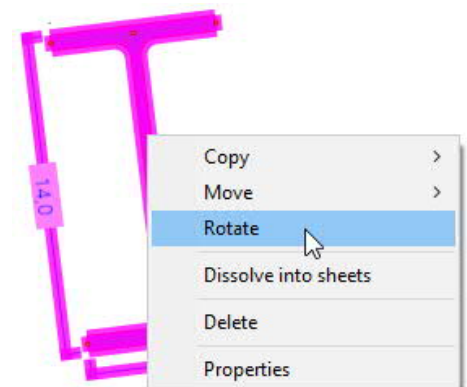


The static values can be displayed using the buttons below the list, the cross-section values can be adjusted via "Edit" before inserting them into the graphic interface if necessary. Furthermore, an edited cross-section can be saved as a "own cross-section" and is then available under the "Tab" Own CS" listed.

To make frequently used cross-sections quickly accessible, they can be marked as "favorites".

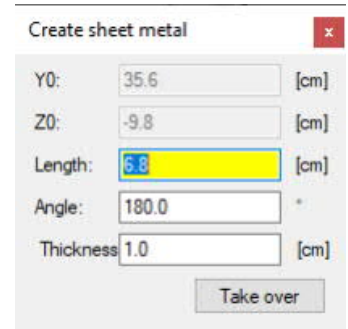
Rotation/Angle

After positioning, a cross-section can also be rotated. Mark the cross-section with a mouse click and enter a rotation angle in the left menu (positive counterclockwise) or select the "Rotate" function in the context menu (right mouse button), click on the section and rotate it with the mouse.



New sheet metal

Here you can directly click on the start and end points of the sheet metal (the cursor is displayed as a crosshair). The "Create sheet metal" dialog for the sheet metal dimensions, coordinates and angles is displayed, in which you can adjust the values. The sheet metal is then positioned by clicking on Accept.



Dialog box titled "Create sheet metal" with the following fields:

- Y0: 35.6 [cm]
- Z0: -9.8 [cm]
- Length: 6.8 [cm] (highlighted in yellow)
- Angle: 180.0 °
- Thickness: 1.0 [cm]

Buttons: "Take over"

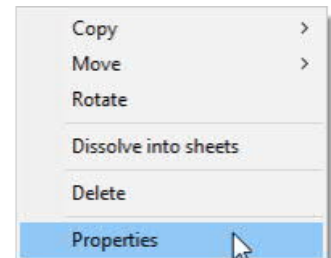
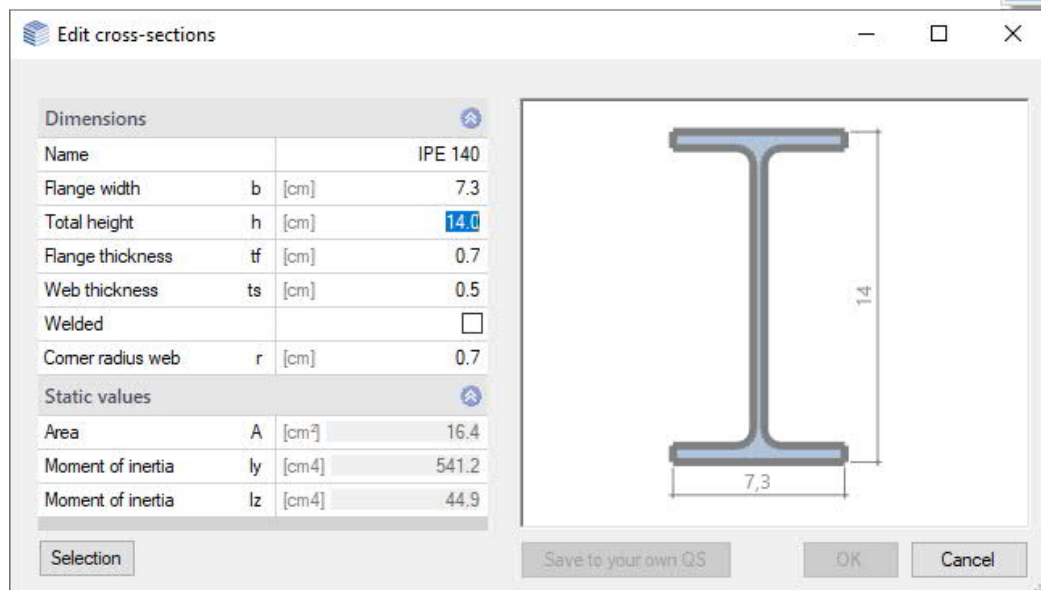
New sheet metal sequence

Here you can enter a "sheet metal polygon". Finish typing with the right mouse button.

Edit cross-sections

To change the parameters of a cross-section, open the Edit cross-sections dialog - either by double-clicking on the cross-section or using the context menu and properties.

Depending on the cross-section, the corresponding parameters for editing are displayed.

Dialog box titled "Edit cross-sections" showing parameters for an IPE 140 section:

Dimensions			
Name			IPE 140
Flange width	b [cm]		7.3
Total height	h [cm]		14.0
Flange thickness	tf [cm]		0.7
Web thickness	ts [cm]		0.5
Welded			<input type="checkbox"/>
Comer radius web	r [cm]		0.7
Static values			
Area	A [cm ²]		16.4
Moment of inertia	Iy [cm ⁴]		541.2
Moment of inertia	Iz [cm ⁴]		44.9

Buttons: "Selection", "Save to your own QS", "OK", "Cancel"

Diagram of an IPE 140 section with dimensions: flange width 7.3, total height 14.0.

Values in the left menu

You can also mark a cross-section by clicking with the mouse and change the associated parameters in the left menu.

Mirroring: Z and L sections can be mirrored on the x-axis - to do this click on the "mirrored" option.

Toolbar

You can use the configuration symbol (gear) to individually select (checkmark) which icons are displayed in the toolbar. By default, all icons are displayed.

Tip: [Tooltips](#) show the function of the individual icons.

Description (from top to bottom)

[New cross-section from database](#)

[New sheet metal](#)

[New sheet metal sequence](#)

Undo	The last action is undone.
Redo	Repeat the last action.
Contour/fictitious bar	Switching the display.
Dimensioning	Show or hide the dimensions.
Major principal axes	Show or hide the major principal axes.
Cross-section points	Show or hide the relevant cross-section points.
Names	Show or hide the cross-section names.
Centering	The entire cross-section is centered and zoomed.
Import	Import a cross-section as a *.css file (RSX) css=Cross-Section files.
Export	Save cross-section as *.css file.
Grids	Show or hide the grids (see below).
Auxiliary slides	Show or hide the auxiliary slides (e.g. imported DXF file).

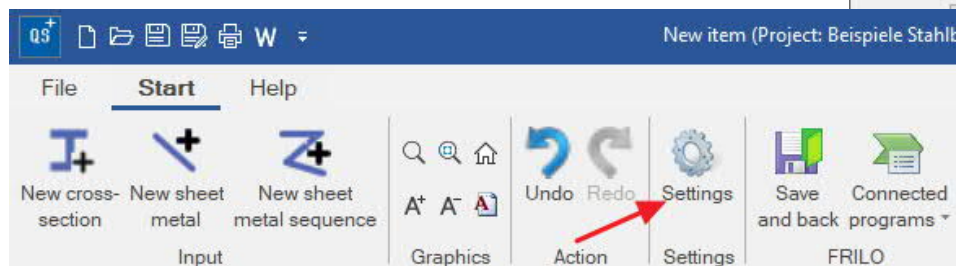
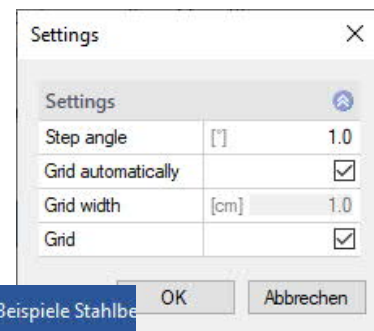


Settings – Grids

Use the gear icon in the top ribbon to access the grids settings.

A switched-on grid makes it easier to position the cross-sections precisely with the mouse.

In addition to the Y/Z grid, an angle can also be set in fixed increments.



Context menu

Depending on the cross-section selected, the context menu contains the appropriate functions, which are briefly explained here.

Note: Before calling a function, the respective cross-section must be marked/activated with a mouse click.

Copy/Move When copying via dialog, the number of copies and the offset distance for inserting the copies Dy/Dz can be specified. When copying with the mouse, you click on the surface and then position the displayed copy at the desired location with another mouse click. Moving works the same way.

Tip: You can undo the action using the undo icon.

Rotate/rotate(sheet metal) Rotate the cross-section with the mouse - the angle is displayed as you rotate.

Extend Sheet metals can be extended by specifying a delta L.

Divide Dividing a sheet metal into two equal elements.

Relocate A sheet metal end can be "relocated" to a different position using the mouse.

Dissolve into sheet metals The cross-section is dissolved into individual sheet metals.

Delete The cross-section/sheet metal is deleted.

Properties The values/properties of the cross-section are displayed and can be edited.

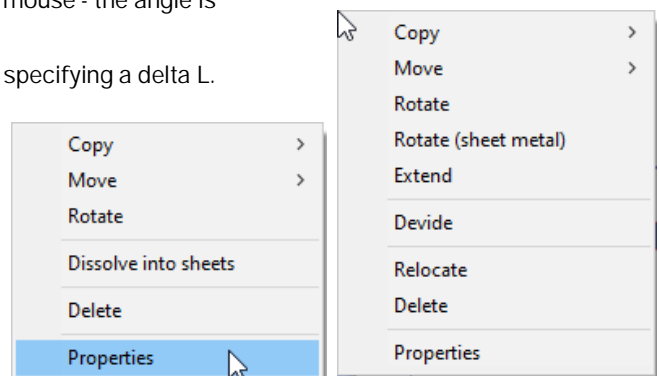


Fig.: Context menu for cross-sections from the database (left) and for sheet metals (right).

Left menu bar

The cross-sections entered are listed here and can be marked with a mouse click. The static and geometry values for the selected cross-section are displayed below. The values can also be edited here.

In addition, a cross-section can optionally be mirrored.

Interface for verification

The cross-section can be transferred to the program Verification of Steel Cross-Sections [SQN+](#) using the "Connected Programs" icon.

With SQN+, the cross-sectional verification of a steel cross-section in the ultimate limit state according to Eurocode 3 can be carried out.



Properties		
New cross-section		
IPE 140		
Sheet_2		
Sheet_3		
Static data		
Name		Sheet_3
A	[cm ²]	8.00
I _y	[cm ⁴]	0.7
I _z	[cm ⁴]	42.7
I _{yz}	[cm ⁴]	0.7
Geometry		
Y	[cm]	14.0
Z	[cm]	-6.1
Angle of rotation		179.00
Mirrored		<input type="checkbox"/>
Y _s	[cm]	14.0
Z _s	[cm]	-6.1
Settings		
Step angle	[°]	1.0
Grid		<input checked="" type="checkbox"/>