

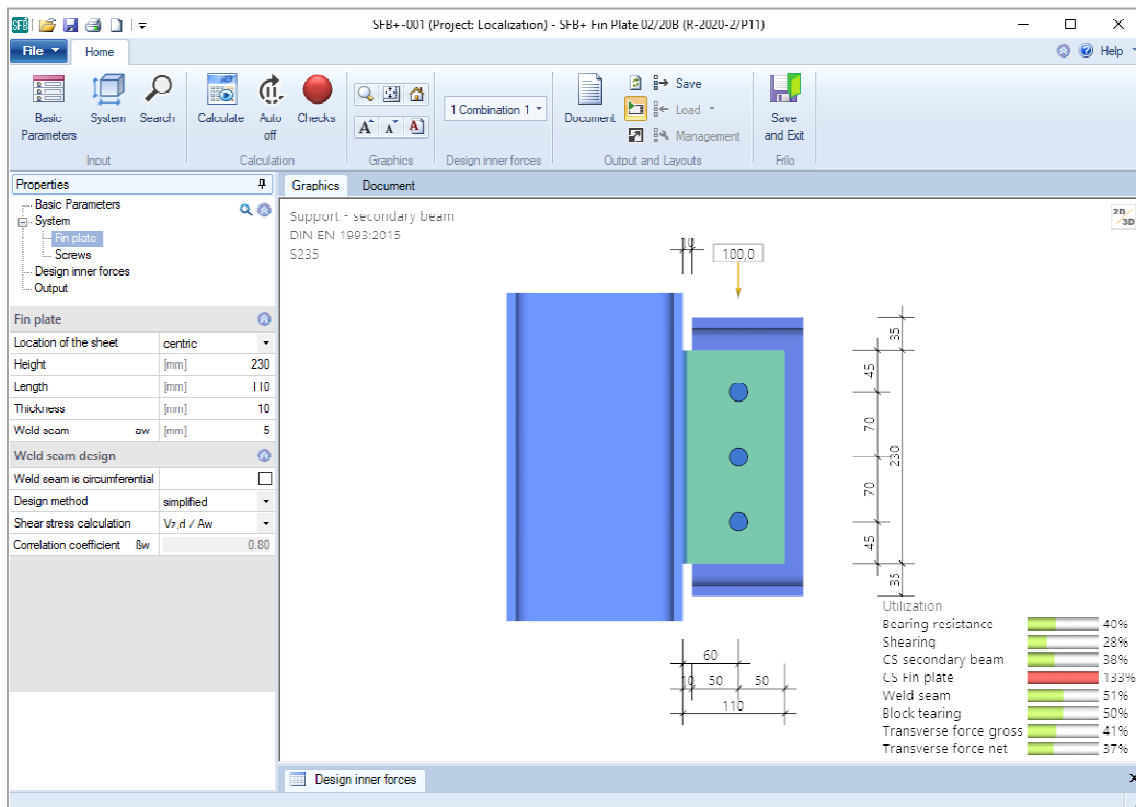
# SFB+ Fin Plate

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The screenshot displays the FRILO SFB+ software interface for a project titled "SFB+-001 (Project: Localization) - SFB+ Fin Plate 02/208 (R-2020-Z/PT1)". The interface includes a ribbon menu with tabs for File, Home, and Help. The ribbon contains various tool groups: Input (Basic Parameters, System, Search), Calculation (Calculate, Auto off, Checks), Graphics, Design inner forces (1 Combination 1), Output and Layouts (Document, Save, Load, Management), and Frilo (Save and Exit).

The main workspace shows a 3D model of a fin plate connection. The fin plate is highlighted in green, and the secondary beam is highlighted in blue. A force of 100.0 is applied to the secondary beam. The model is annotated with dimensions: a total height of 230 mm, with 45 mm sections at the top and bottom, and 70 mm sections between the three holes. The holes are spaced 50 mm apart, with a 10 mm margin from the left edge. The total length of the fin plate is 110 mm.

The Properties panel on the left shows the following settings for the "Fin plate":

Property	Value
Location of the sheet	centric
Height [mm]	230
Length [mm]	110
Thickness [mm]	10
Weld seam $z_w$ [mm]	5
<b>Weld seam design</b>	
Weld seam is circumferential	<input type="checkbox"/>
Design method	simplified
Shear stress calculation	$V_x \cdot d / A_w$
Correlation coefficient $\beta_w$	0.80

The Utilization table on the right shows the following values:

Utilization	Value
Bearing resistance	40%
Shearing	28%
CS secondary beam	38%
CS Fin plate	133%
Weld seam	51%
Block tearing	50%
Transverse force gross	41%
Transverse force net	37%

The bottom status bar indicates "Design inner forces".

# SFB+ Fin Plate

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### Basic Documentation – Overview

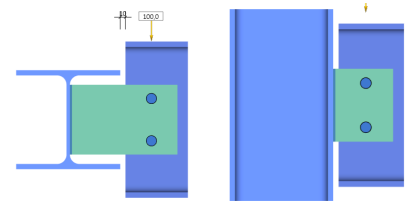
In addition to the individual program manuals, you will find basic explanations on the operation of the programs on our homepage [www.frilo.com](http://www.frilo.com) ▶ Support ▶ Articles/Information ▶ Basic operating instructions.

## Application options

With the new SFB+ program, all necessary verifications for fin plate connections can be performed.

### Connection types

- Steel beams to steel columns
- Steel beams to secondary beams



### Profile types

The permissible profile types for columns, principal and secondary beams are I-shaped profiles that are connected by means of a fin plate.

### Notch

In the case of beam-to-beam connections, the secondary beam to be connected can optionally have a notch at the top, bottom or on both sides or not have a notch.

### Loads

Depending on the selected design model – i. e. connection either flexurally rigid at the centre of gravity in the bolt pattern or at the weld seam – transverse forces, normal forces and bending moments can be entered.

The existing loads, which always refer to the centre of gravity of the bolt pattern, are entered as design internal forces.

### Output

The output is compact and presents all performed verifications in a well-structured and reviewable form.

### Available standards

- DIN EN 1993
- ÖNORM EN 1993

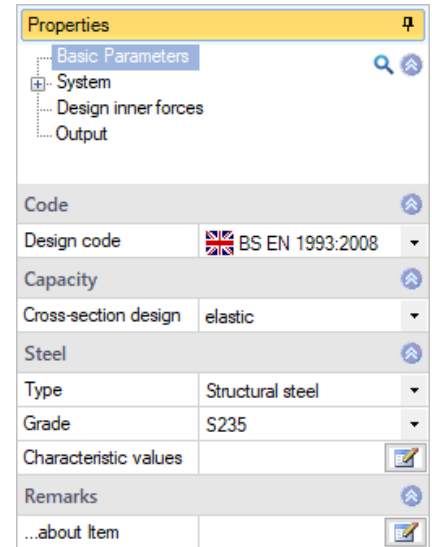
## Data entry

### Basic parameters

Select the standard and the material.

#### Load-bearing capacity

The cross-sectional design can be based on the elastic or plastic method.




### Structural system

**Joint type** beam – secondary beam or support – secondary beam

**Flexurally rigid** select, whether the connection is flexurally rigid at the weld seam or in the centre of gravity of the bolt pattern (then no moment)

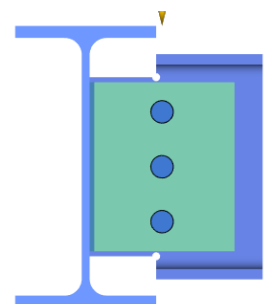
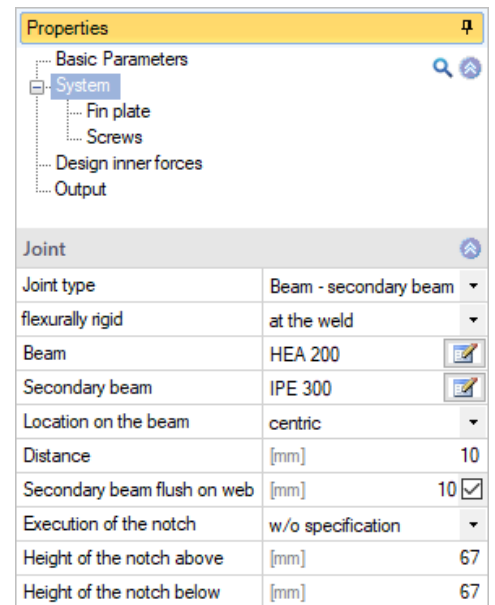
Cross-section selection for beams/secondary beams

Click on the Edit button  to access the dialog for the [selection of the cross-section](#).

**Location on the beam** with the connection type “beam – secondary beam”, the secondary beam can be positioned at the top, centre or bottom in relation to the beam.

**Distance** distance between the outer edge of the beam flange and the secondary beam.

**Secondary beam flush with the web** positioning with slight distance of the secondary beam from the web. You can enter the distance to the left of the (marked) option. If you enter "0" here, the data-entry fields for a notch are displayed. This notch can be defined with flame cut or with bore hole.



## Fin plate

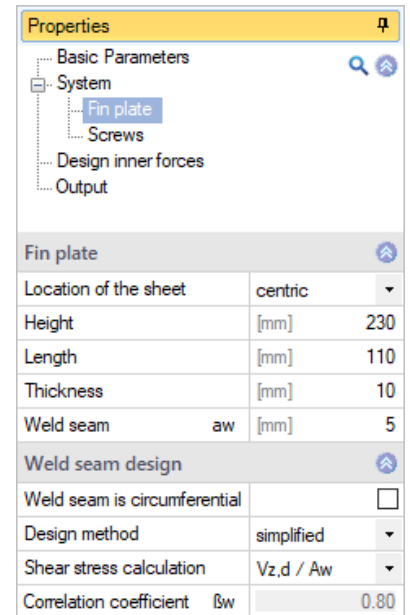
Location of the plate      position of the plate on the secondary beam:  
flush at the top or bottom or in the middle. The  
position is shown accordingly on the graphic screen.

Moreover, you can enter the dimensions of the plate and the weld seam thickness. The weld seam can optionally be circumferential.

You can choose between the simplified and the directional design method.

For shear stress calculation, the following options are available

- $V_{z,ed} / A_w$
- $V_{z,ed} / A_{z,w}$
- Parabolic tau line



Fin plate		
Location of the sheet	centric	
Height	[mm]	230
Length	[mm]	110
Thickness	[mm]	10
Weld seam	aw [mm]	5
Weld seam design		
Weld seam is circumferential		<input type="checkbox"/>
Design method	simplified	
Shear stress calculation	$V_{z,d} / A_w$	
Correlation coefficient	$\beta_w$	0.80

## Screws

Various selection lists are available for selecting the bolts (designation, strength class, black bolts, fit bolts, thread in shear joint, shank in shear joint, hole diameter).

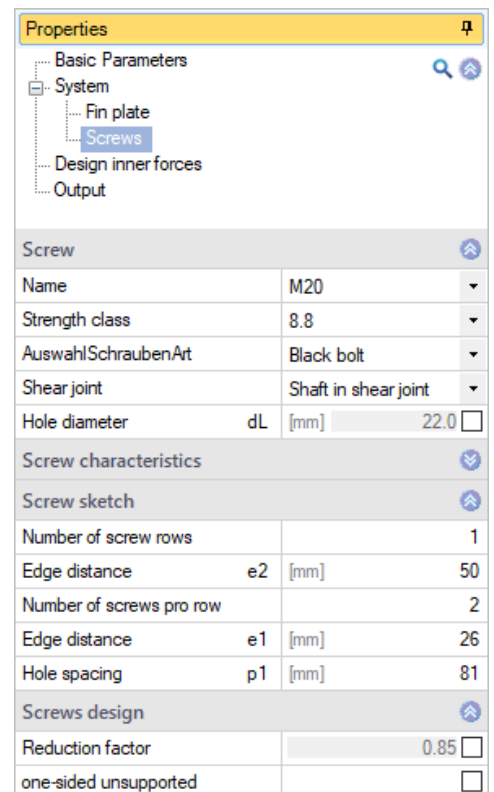
Shear joint      indicates whether the thread or shank of the bolt is in the shear joint.

The bolt values can be displayed (folded out) if required.

You can define the bolt pattern by entering the number of bolt rows, the distance to the edges (at least 20 mm), the number of bolts per row and the hole spacing.

For the bolt design, a reduction factor as per EN 1993-1-8:3.6.1.(3) can be selected (otherwise fully load bearing).

Optionally, the connection can be single-shear and unsupported.

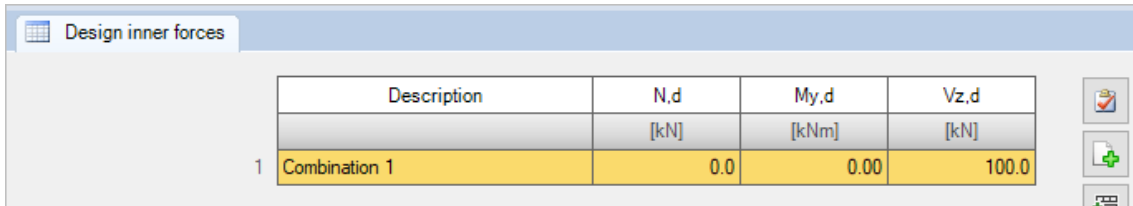


Screw		
Name		M20
Strength class		8.8
AuswahlSchraubenArt		Black bolt
Shear joint		Shaft in shear joint
Hole diameter	dL [mm]	22.0
Screw characteristics		
Number of screw rows		1
Edge distance	e2 [mm]	50
Number of screws pro row		2
Edge distance	e1 [mm]	26
Hole spacing	p1 [mm]	81
Screws design		
Reduction factor		0.85
one-sided unsupported		<input type="checkbox"/>

### Design internal forces

Click on the table icon or use the tab below the graphic to display the table. Here you can enter a designation,  $N_d$ ,  $M_{y,d}$  and  $V_{z,d}$ .

You can create additional table rows using the + icon.



The screenshot shows a software window titled "Design inner forces" with a table icon in the top-left corner. The table has four columns: "Description", "N,d", "My,d", and "Vz,d". The units for these columns are "[kN]", "[kNm]", and "[kN]" respectively. The first row is highlighted in yellow and contains the following data:

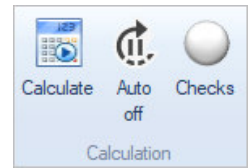
	Description	N,d [kN]	My,d [kNm]	Vz,d [kN]
1	Combination 1	0.0	0.00	100.0

On the right side of the table, there are three icons: a printer icon, a plus sign icon for adding rows, and a minus sign icon for deleting rows.

## Output

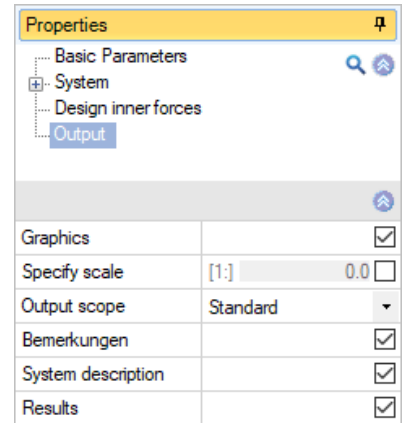
Before starting the output, click on the calculation icon if the option "automatic calculation after each input" is switched off ("Auto off"/"Auto on" icon).

After completion of the calculation, the utilizations are shown on the graphic screen.



### Output scope

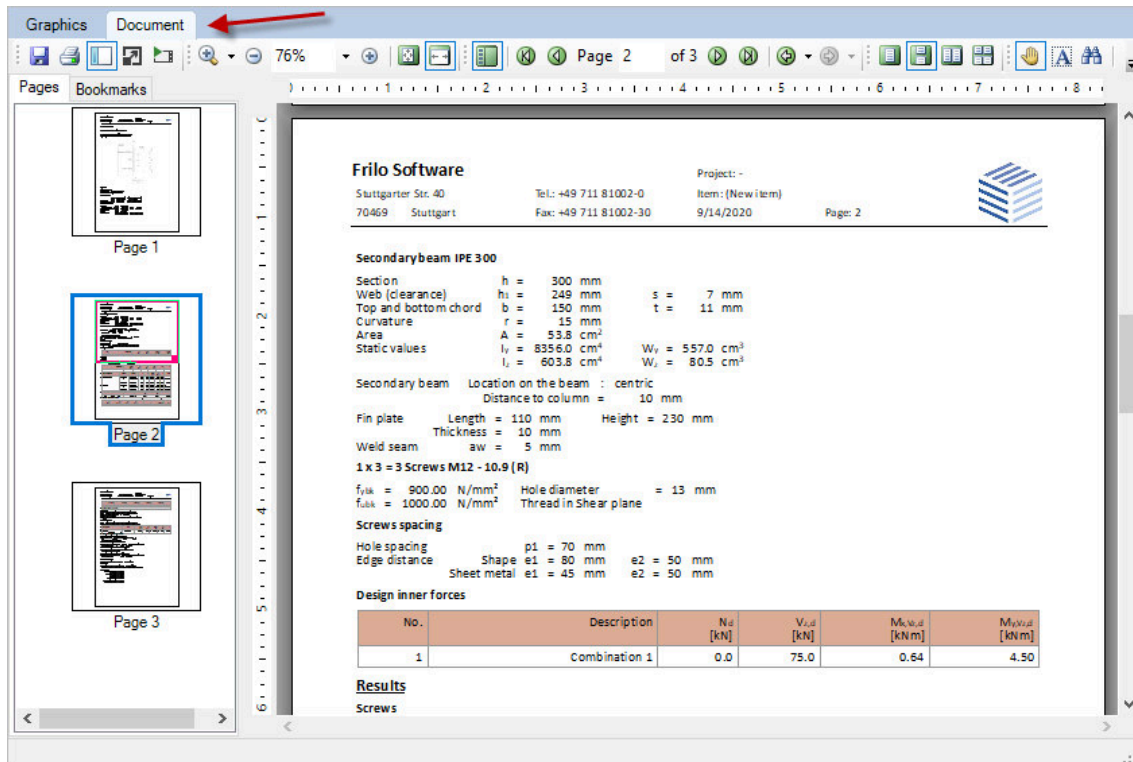
By checking the desired output options, you can determine the scope of data to be put out.



### Output as a PDF document

Via the [Document](#) tab, you can display the document in PDF and print it.

See also [Output and printing.pdf](#)



The screenshot shows the software interface with the 'Document' tab selected. The main content area displays technical specifications for a secondary beam. The 'Document' tab is highlighted with a red arrow.

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 9/14/2020 | Page: 2

**Secondary beam IPE 300**

Section h = 300 mm  
 Web (clearance) h<sub>w</sub> = 249 mm s = 7 mm  
 Top and bottom chord b = 150 mm t = 11 mm  
 Curvature r = 15 mm  
 Area A = 53.8 cm<sup>2</sup>  
 Static values I<sub>y</sub> = 8356.0 cm<sup>4</sup> W<sub>y</sub> = 557.0 cm<sup>3</sup>  
 I<sub>x</sub> = 603.8 cm<sup>4</sup> W<sub>x</sub> = 80.5 cm<sup>3</sup>

Secondary beam Location on the beam : centric  
 Distance to column = 10 mm

Fin plate Length = 110 mm Height = 230 mm  
 Thickness = 10 mm  
 Weld seam aw = 5 mm

1 x 3 = 3 Screws M12 - 10.9 (R)  
 f<sub>yk</sub> = 900.00 N/mm<sup>2</sup> Hole diameter = 13 mm  
 f<sub>sk</sub> = 1000.00 N/mm<sup>2</sup> Thread in Shear plane

Screws spacing  
 Hole spacing p1 = 70 mm  
 Edge distance Shape e1 = 80 mm e2 = 50 mm  
 Sheet metal e1 = 45 mm e2 = 50 mm

**Design inner forces**

No.	Description	N <sub>d</sub> [kN]	V <sub>d</sub> [kN]	M <sub>y,d</sub> [kNm]	M <sub>x,d</sub> [kNm]
1	Combination 1	0.0	75.0	0.64	4.50

**Results**  
 Screws