



module Side to main joist connection



Wood construction screws: Side to main joist connection

General information:

1. General information

Data input:

2.1 Connection elements - wood

2.2 Connection elements - screws

3D Model:

3. Loads

4. 3D Model

Results:

5. Screw filter

6. Detailed analysis

7. Calculation report



- move to a selected issue



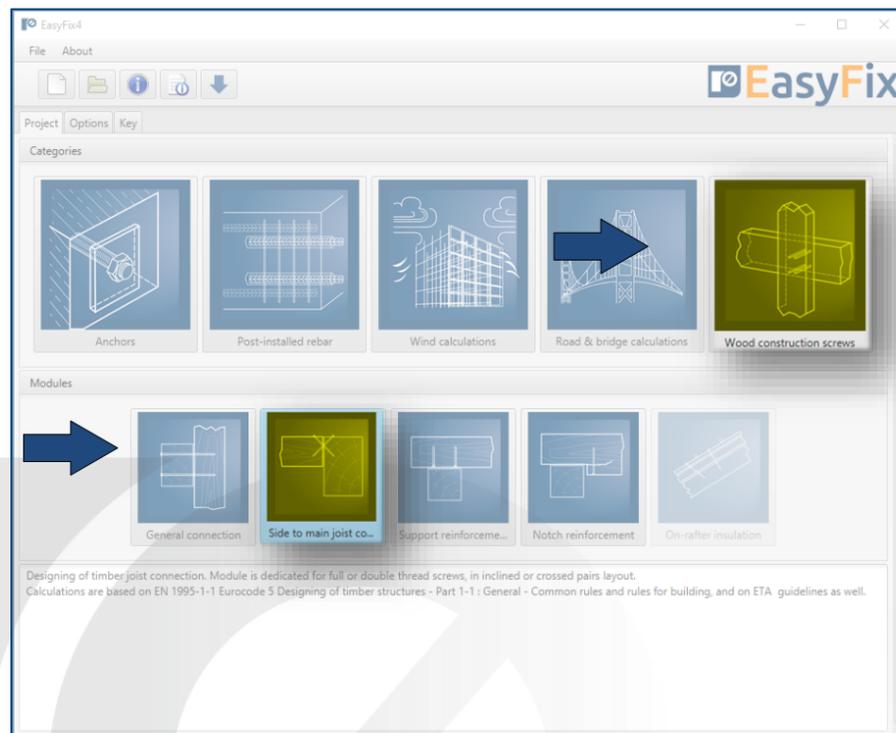
- back to the table of contents



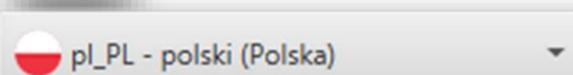
Wood construction screws: Side to main joist connection

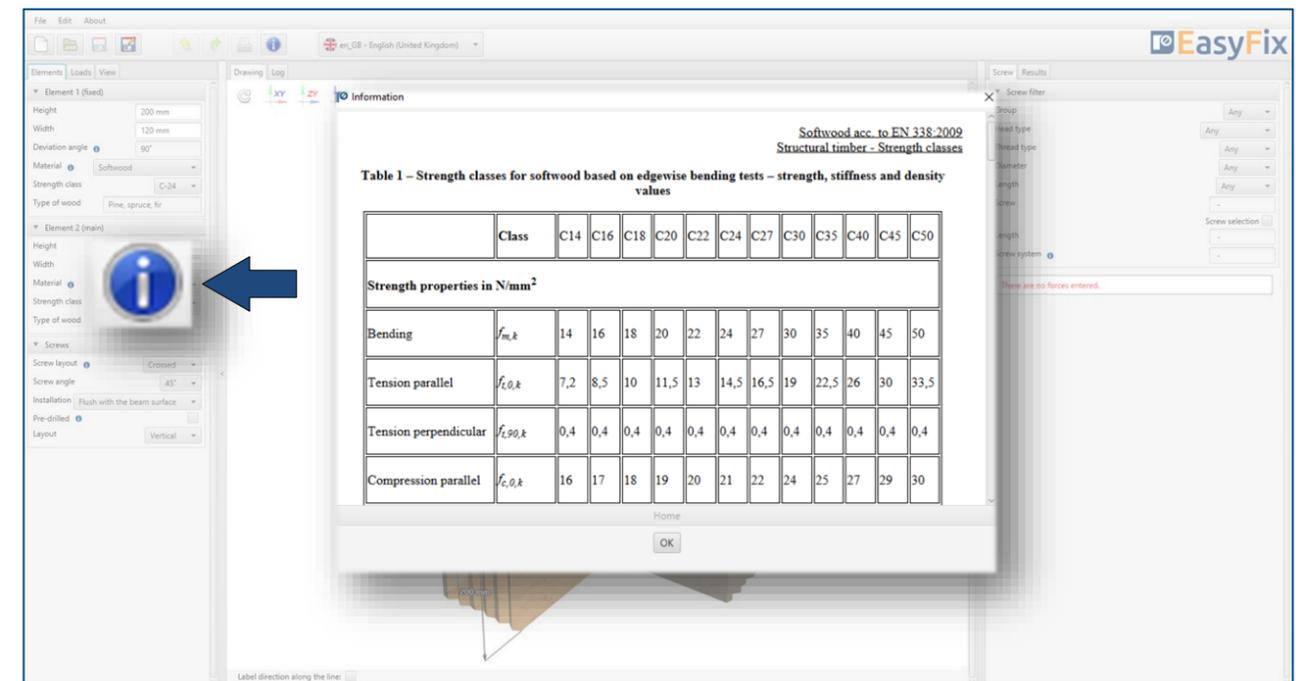
1 General information

Category and module selection:



Icons and symbols meaning:

-  Create a new project
-  Open a project
-  Save |  Save as
-  Undo |  Redo changes
-  Print to a pdf file
-  Software information
-  Language selection
-  Information
-  Instruction manual



Click to **information** icon to display an additional window containing theory related to a particular issue.



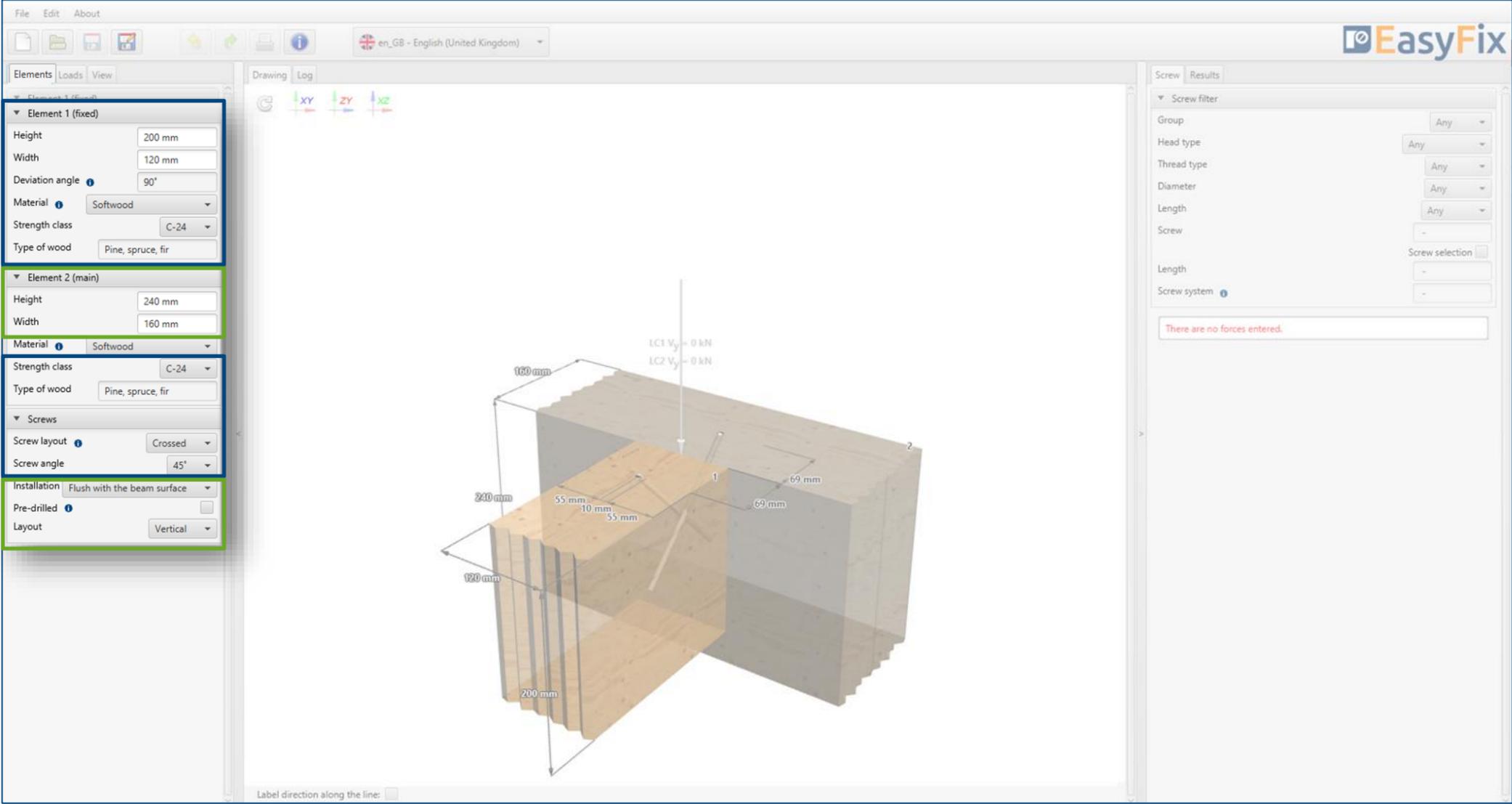
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2.1 Data input Connection elements - wood »

First, define layout of elements as well their dimensions in cross section along with possible distance from their edges. Next, determine the type and strength class of the wooden material.

Geometry and layout of elements:: dimensions can be defined in the side panel and directly on a model as well.

Material: Inputting data by selection from the list.



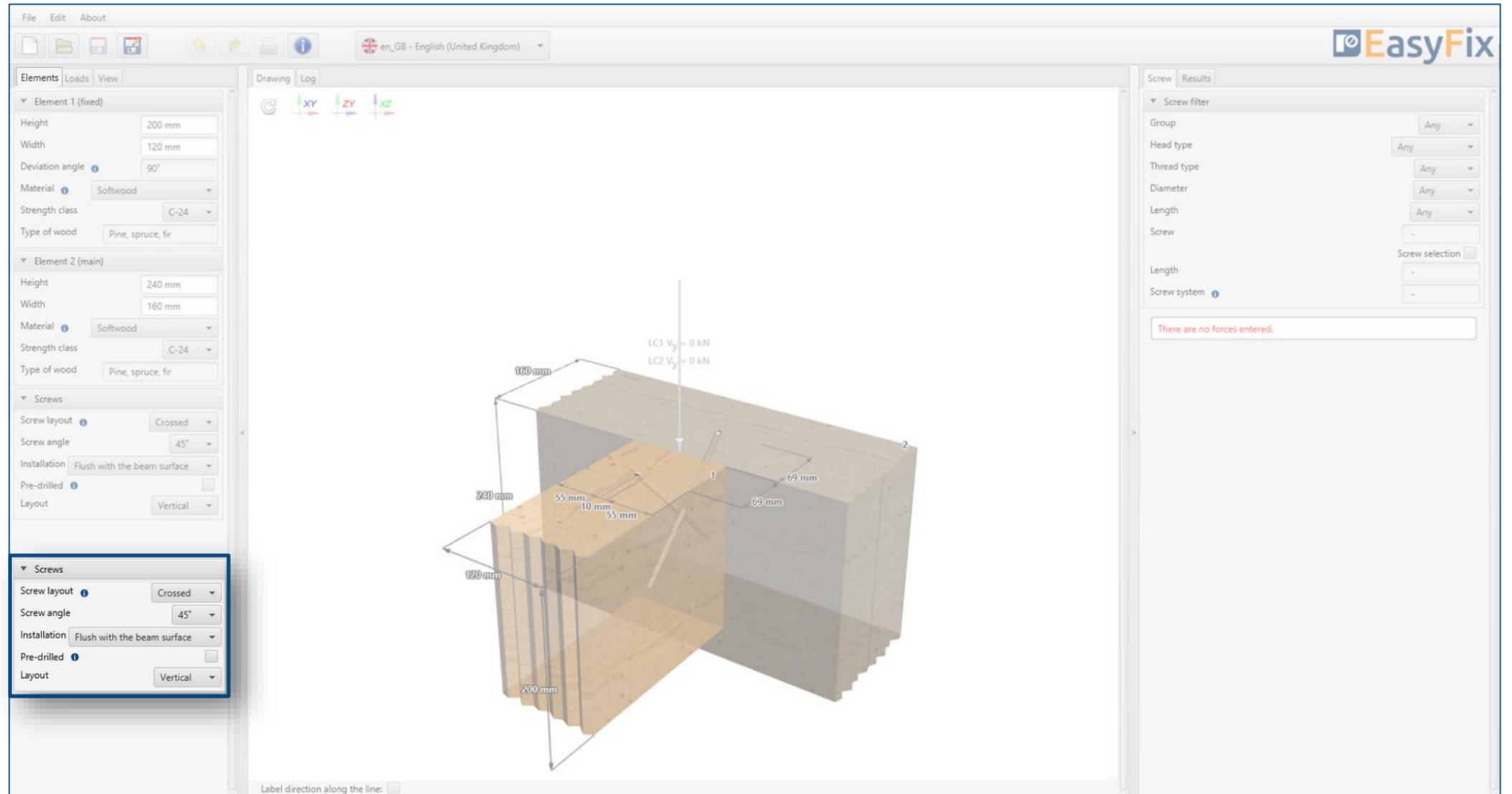


Wood construction screws: Side to main joist connection

2.2 Data input Connection elements - screws »

Further stage is defining of screws layout. Note, that selected layouts and installation types are dedicated for particular types of screws. Depending on a selected layout, possibilities of load change as well. Detailed data is available by clicking the information icon.

Installation parameters:
Inputting data by selection from the list or setting additional options.





Wood construction screws: Side to main joist connection

4 Data input Loads



The final stage of data input is related to loads. In accordance to intended use, wood construction screws are dedicated for static or quasi static loads only. Define characteristic values of permanent and variable loads, service class and load effect duration class as well.

Loads:
Load values can be defined in the side panel and directly on the model as well.

Load combinations:
Design load values for particular load combinations are presented at the bottom part of the panel.

The screenshot shows the EasyFix software interface. On the left, the 'Loads' panel is open, displaying settings for 'Loads static/quasistatic'. It includes sections for 'Permanent action (G)' and 'Variable action (Q)', each with input fields for Normal (N), X-direction (V_x), and Y-direction (V_y) loads, and a 'Safety factor (γ_G)'. Below these are 'Calculated values' for two load combinations, LC1 and LC2. The main window shows a 3D model of a wood connection between a side joist and a main joist. Dimensions are labeled: 180 mm for the side joist width, 240 mm for the main joist height, 200 mm for the side joist height, 55 mm for the side joist thickness, 10 mm for the gap, and 69 mm for the main joist thickness. Two load cases are indicated: LC1 V_y = 0 kN and LC2 V_y = 0 kN. On the right, the 'Screw filter' panel is visible, showing dropdown menus for Group, Head type, Thread type, Diameter, Length, and Screw system. A message at the bottom of the filter panel states 'There are no forces entered.'



Wood construction screws: Side to main joist connection

5 3D Model



Dynamic 3D model provides a User with a possibility of following results in real time.

Geometry:

Dimensions can be defined in the side panel and directly on a model as well.

Loads:

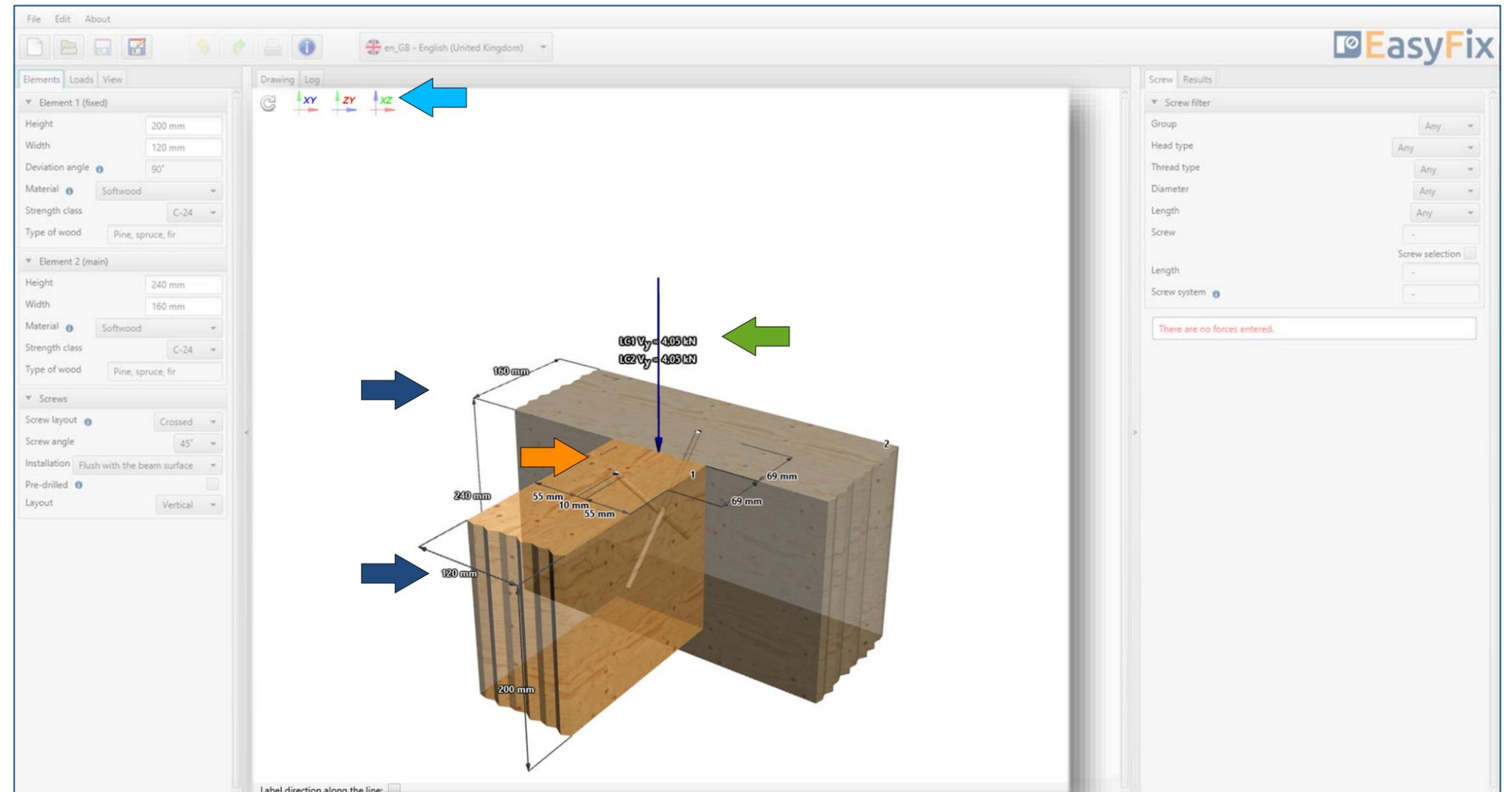
Load values can be defined in the side panel and directly on a model as well.

Screws layout:

Designed layout is presented on a model with spacings and edge distances.

Model navigation:

Model navigation utilises mouse control or default views.





Wood construction screws: Side to main joist connection

6 Results Screw filter

General connection module is ment to select optimised number of the fasteners, their sizes and arrangement as well. Result can be managed by available filters. In case of no result, a comment with information about the reason is displayed. In such situation modification of the filters should be considered.

Screw filter:
Using available filters allows to pre-define screws.

Designed product / Screw system:
Information about design solution are presented in the middle part of the panel.

Utilisation:
Basic data of utilisation of design solution is presented at the bottom part of the panel.

Comments:
In case of no result, a comment with information about the reason is dispalyed.

The screenshot shows the EasyFix software interface. On the left, there are load and action data tables. The main area displays a 3D model of a wood connection with dimensions and load arrows. On the right, there is a 'Screw filter' panel with dropdown menus for Group, Head type, Thread type, Diameter, and Length. Below that, the 'Screw' section shows 'R-PCZ 6.5' and 'Length 190 mm'. The 'Utilisation' section shows 'Utilisation - axial load' at 89.3%, 'Utilisation - lateral load' as ND, and 'Combined - axial/lateral load' as ND. A red error message at the bottom of the filter panel reads: 'No results. Too close edge distance for required screws system.'

Permanent action (G)			
N	V _x	V _y	
0 kN	0 kN	3 kN	
Safety factor (γ _G)		1.35	

Variable action (Q)			
N	V _x	V _y	
0 kN	0 kN	0 kN	
Safety factor (γ _Q)		1.5	
Load effect duration class: Long term			

Calculated values			
Load combination LC1			
N	V _x	V _y	
0 kN	0 kN	4.05 kN	
Load combination LC2			
N	V _x	V _y	
0 kN	0 kN	4.05 kN	



Wood construction screws: Side to main joist connection

6 Result
Detailed analysis »

Detailed analysis allows to check utilisation level for particular failure modes. Defining crucial element helps analysing a case. Detailed information related to all failure modes are available via information icon.

Designed product / Screw system:
Information about design solution are presented in the upper part of the panel.

Utilisation:
Detailed data of utilisation of selected failure modes are presented at the bottom part of the panel.

The screenshot displays the EasyFix software interface. On the left, there are input fields for 'Permanent action (G)' and 'Variable action (Q)', including load values (N, V_x, V_y) and safety factors (γ_G, γ_Q). Below these are 'Calculated values' for two load combinations (LC1 and LC2). The central part shows a 3D model of a wood connection with dimensions (160 mm, 240 mm, 120 mm, 200 mm, 55 mm, 10 mm, 55 mm, 69 mm) and applied loads (LC1 V_y = 4.05 kN, LC2 V_y = 4.05 kN). On the right, the 'Results' panel is visible, containing a table of technical data and utilisation levels.

Technical data			
Screw	R-PCZ 6.5		
Length	190 mm		
Screw system	[1.1]		
Axial load			
LC1		LC2	
β _{N1}	89.3%	β _{N1}	76.6%
β _{N2}	89.3%	β _{N2}	76.6%
β _{N3}	ND	β _{N3}	ND
β _{N4}	25.7%	β _{N4}	25.7%
β _{N5}	40.5%	β _{N5}	40.5%
β _{N6}	37.9%	β _{N6}	37.9%
Lateral load			
LC1		LC2	
β _{V1}	ND	β _{V1}	ND
β _{V2}	ND	β _{V2}	ND
Combined - axial/lateral load			
LC1		LC2	
Combined	ND	Combined	ND



Wood construction screws: Side to main joist connection

7 Results Calculation report >>

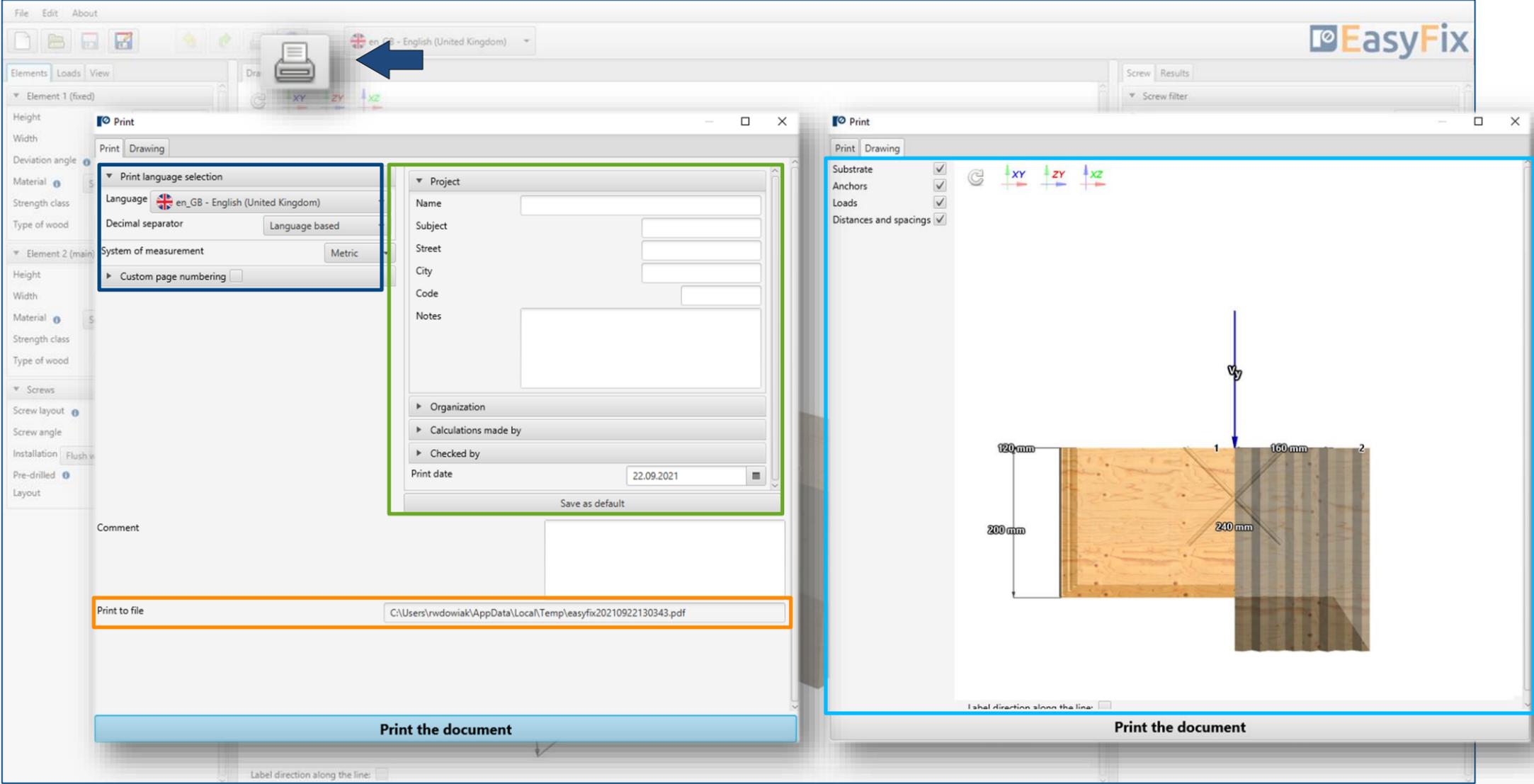
Generating a project report is started by clicking on the Print icon. Next, specify the language of the report along with a possible description. The report is printed to a pdf file, in a destination selected by a Customer.

Print option:
Report language can be defined independently of software language that had been used for calculation process.

Print description:
Detailed description helps to identify the calculation at a later stage of work. This information is visible on the header of each report page.

File path:
Selecting the print file save destination.

Drawing:
In the Drawing panel, it is possible to modify the final model view, that is presented in the printed version of the report.





Wood construction screws: Side to main joist connection

7 Result Calculation report



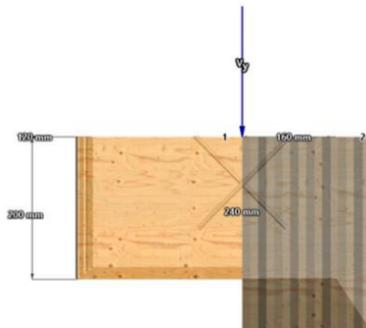
Calculation report includes all information concerning selected design, input data, loads, spacings and edge distance requirements. There are full calculation logs presented along with references to paragraphs concerning appropriate design guidelines.

EasyFix4 v. 4.4.10 - Side to main joist connection TEST VERSION 1fc1810b2

Project: Subject: Date: 2021-09-27 Page: 1/7
Address: Organization: Address: Contact:
Calculations made by: by Rawplug
Checked by: 2021-09-27
Notes:

Input data

Screw type and size	1 x R-PCZ Ø6.5 mmx190 mm; Double thread, Cylinder head	
Proof	EN:1995-1-1; ETA-12/3456	
Screw angle	45°	
Installation	Flush with the beam surface	
Screw layout	Crossed	
Members	Element 1 (fixed)	Element 2 (main)
Width	120 mm	160 mm
Height	200 mm	240 mm
Deviation angle	90°	0°
Material	Softwood	Softwood
Strength class	C-24	C-24
Type of wood	Pine, spruce, fir	Pine, spruce, fir

National regulations, environmental and application conditions must be considered when designing the anchorage.

EasyFix4 v. 4.4.10 - Side to main joist connection TEST VERSION 1fc1810b2

Design loads

Characteristic load	S _k	W _k	V _k
Permanent action (G)	0.4kN	0.4kN	3.4kN
Safety factor (γ _G)	1.35		
Variable action (Q)	0.4kN	0.4kN	0.4kN
Safety factor (γ _Q)	1.5		
Load effect duration class	Light term		
Conversion class	1		
Design load	S_d	W_d	V_d
L1	0.54kN	0.54kN	4.455kN
L2	0.54kN	0.54kN	4.455kN

Legend:
 G: Dead load
 Q: Live load
 W: Wind load
 V: Snow load
 S_d: Design load (Permanent action)
 W_d: Design load (Variable action)
 V_d: Design load (Variable action)
 S_d + W_d: Load combination 1 (Permanent action + variable action)

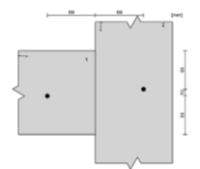
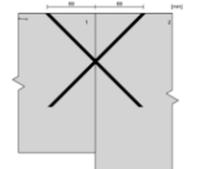
Minimum edge and/or end distances and spacings of screws (EN 1995-1-1:2004+AC:2006+A1:2008; section 8.3.1.2, 8.5.1.1, 8.7.2; ETA-12/3456)

Distance	Element 1 (fixed)		Element 2 (main)
	minimum	designated	
a₁			
a₂	33 mm	≥ 36 mm	OK
a₃	28 mm	≥ 120 mm	OK
a₄	28 mm	≥ 55 mm	OK
s			
s₁	28 mm	≥ 38 mm	OK
s₂	28 mm	≥ 120 mm	OK
s₃	28 mm	≥ 33 mm	OK
s₄	28 mm	≥ 137 mm	OK

National regulations, environmental and application conditions must be considered when designing the anchorage.

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Distances and spacings

National regulations, environmental and application conditions must be considered when designing the anchorage.

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Axial load (EN 1995-1-1:2004+AC2006+A1:2008; section 8.7.2; ETA-12/3456)

Withdrawal failure of the threaded part of the screw in element [1]	L1	L2
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2}$		
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2} \cdot \left(\frac{a_1}{a_{1,d}}\right)^{0.4}$		
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2} \cdot \left(\frac{s_1}{s_{1,d}}\right)^{0.4}$		
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2} \cdot \left(\frac{a_2}{a_{2,d}}\right)^{0.4}$		
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2} \cdot \left(\frac{s_2}{s_{2,d}}\right)^{0.4}$		
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2} \cdot \left(\frac{a_3}{a_{3,d}}\right)^{0.4}$		
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2} \cdot \left(\frac{s_3}{s_{3,d}}\right)^{0.4}$		
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2} \cdot \left(\frac{a_4}{a_{4,d}}\right)^{0.4}$		
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2} \cdot \left(\frac{s_4}{s_{4,d}}\right)^{0.4}$		
Withdrawal failure of the threaded part of the screw in element [2]	L1	L2
$F_{ax,d} = N_{ax,d} \cdot F_{ax,lim} \cdot \gamma_{M2}$	$B_{ax} = 89.3\%$	$B_{ax} = 76.6\%$

National regulations, environmental and application conditions must be considered when designing the anchorage.

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Push-through failure of the screw head

	L1	L2
$F_{push,d} = F_{push,lim} \cdot \gamma_{M2}$	$B_{push} = ND$	$B_{push} = ND$

According to ETA-12/3456 section 8.3.1.2 this failure mode is not decisive.

Tensile failure of the screw

	L1	L2
$F_{t,d} = N_{t,d} \cdot F_{t,lim} \cdot \gamma_{M2}$	$B_{t,d} = 25.7\%$	$B_{t,d} = 25.7\%$

Building of screw in element [1]

	L1	L2
$F_{b,d} = N_{b,d} \cdot F_{b,lim} \cdot \gamma_{M2}$	$B_{b,d} = 48.3\%$	$B_{b,d} = 48.3\%$

Building of screw in element [2]

	L1	L2
$F_{b,d} = N_{b,d} \cdot F_{b,lim} \cdot \gamma_{M2}$	$B_{b,d} = 37.3\%$	$B_{b,d} = 37.3\%$

National regulations, environmental and application conditions must be considered when designing the anchorage.

EasyFix4 v. 4.4.10 - Side to main joist connection TEST VERSION 1fc1810b2

Building of screw in element [1]

	L1	L2
$F_{b,d} = N_{b,d} \cdot F_{b,lim} \cdot \gamma_{M2}$	$B_{b,d} = 37.3\%$	$B_{b,d} = 37.3\%$

Building of screw in element [2]

	L1	L2
$F_{b,d} = N_{b,d} \cdot F_{b,lim} \cdot \gamma_{M2}$	$B_{b,d} = 37.3\%$	$B_{b,d} = 37.3\%$

Combined loads L1 (EN 1995-1-1:2004+AC2006+A1:2008; section 8.7.3)

	Axial	Lateral	Combined
$B_{d,1}$	89.3%	ND	$B_{d,1} = 89.3\%$

Combined loads L2 (EN 1995-1-1:2004+AC2006+A1:2008; section 8.7.3)

	Axial	Lateral	Combined
$B_{d,2}$	76.6%	ND	$B_{d,2} = 76.6\%$

Remarks

- The screws shall be subjected to static or quasi static loading only.
- Screws with the same lengths and diameters has to be used.
- The design, arrangement, amount of screws and further indicated details are valid exclusively for the use of Rawplug screws.
- Calculation report must be verified and accepted by the designer in charge before installation.

National regulations, environmental and application conditions must be considered when designing the anchorage.

EasyFix4 v. 4.4.10 - Side to main joist connection TEST VERSION 1fc1810b2

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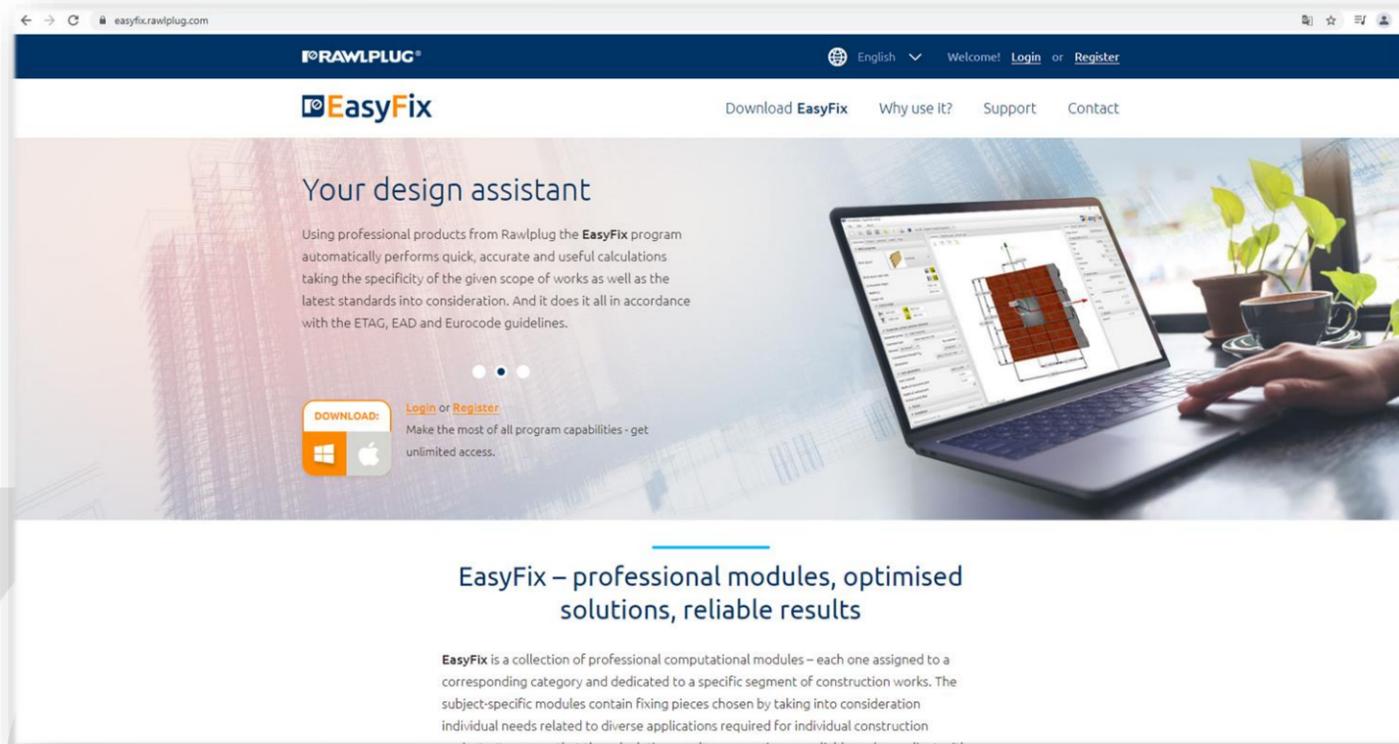
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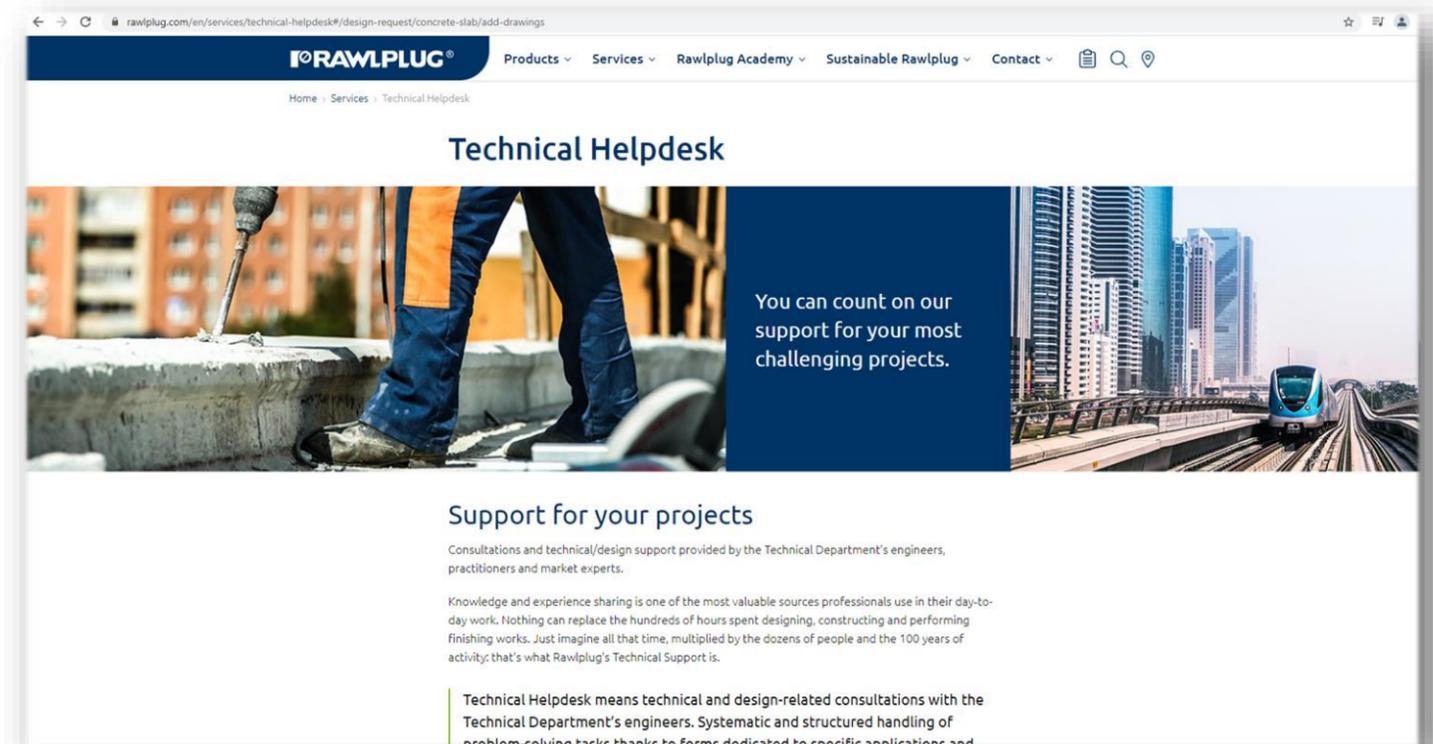
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Have you got any questions?

Visit [EasyFix website](https://easyfix.rawlplug.com/) or contact directly with Rawlplug Technical Department via [Rawlplug Technical Helpdesk](https://www.rawlplug.com/en/services/technical-helpdesk#/).



<https://easyfix.rawlplug.com/>



<https://www.rawlplug.com/en/services/technical-helpdesk#/>



