



module General connection



Wood construction screws: General 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



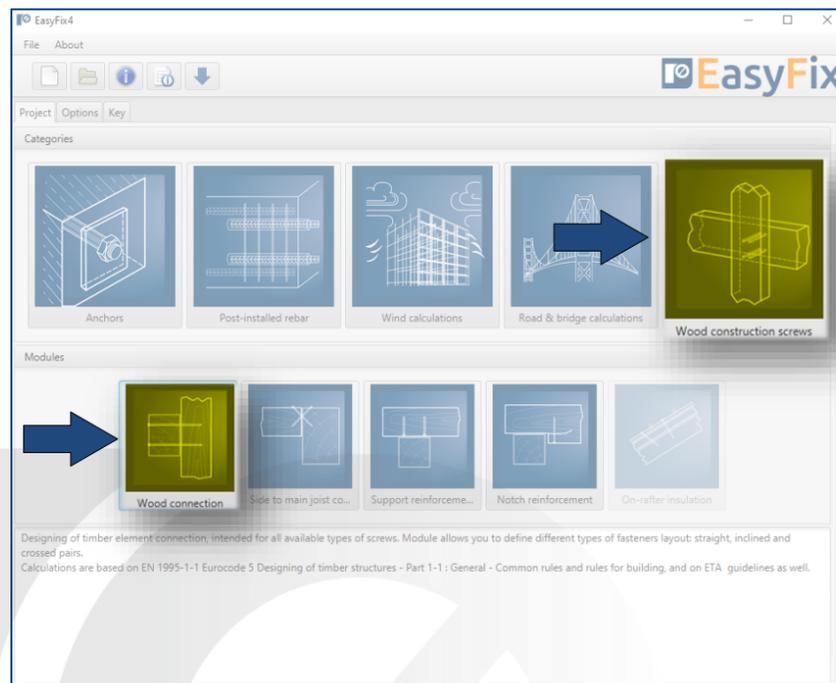
- back to the table of contents



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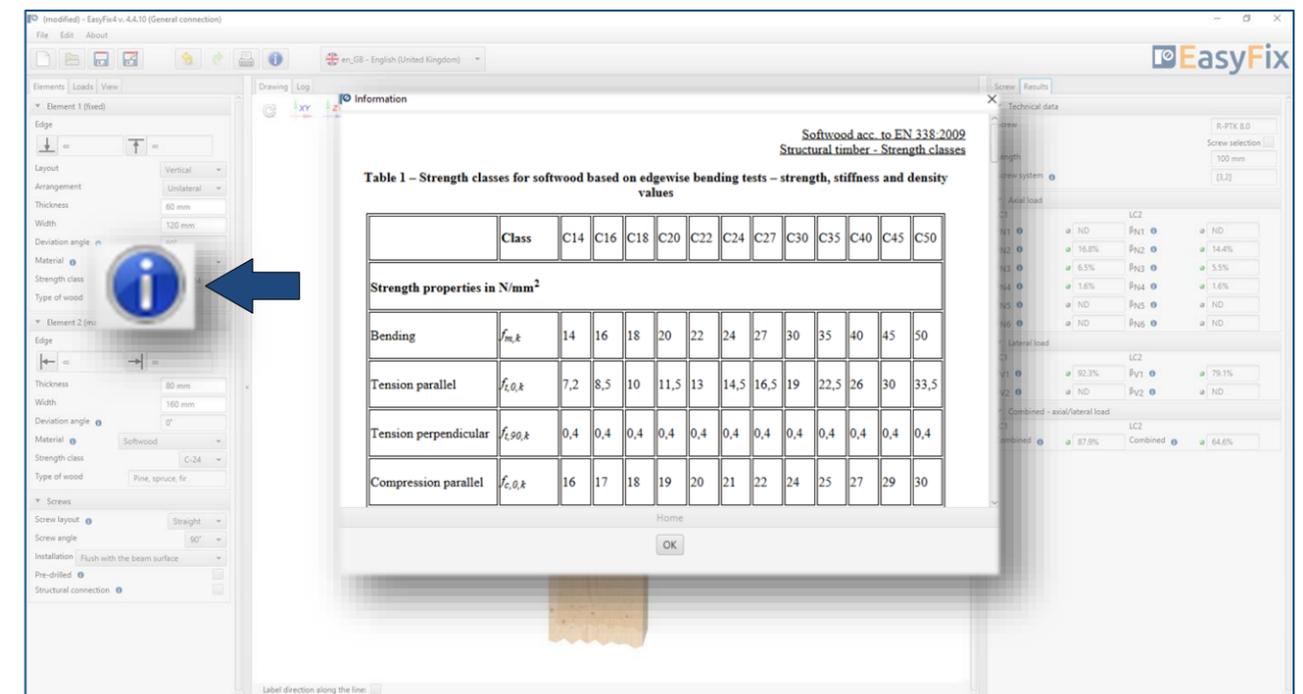
1 General information

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.



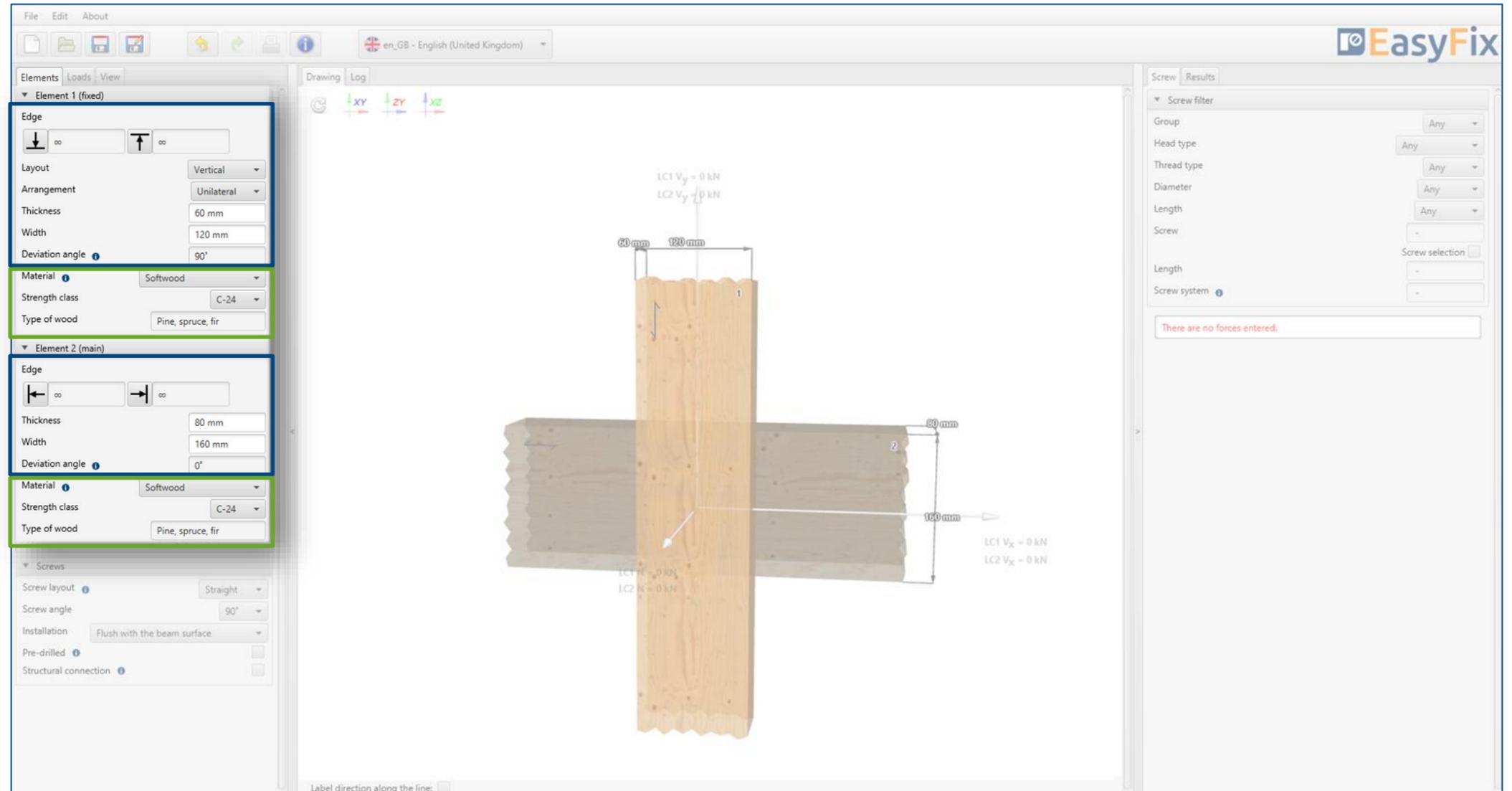
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2.1 Data input Connection elements - wood »

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.



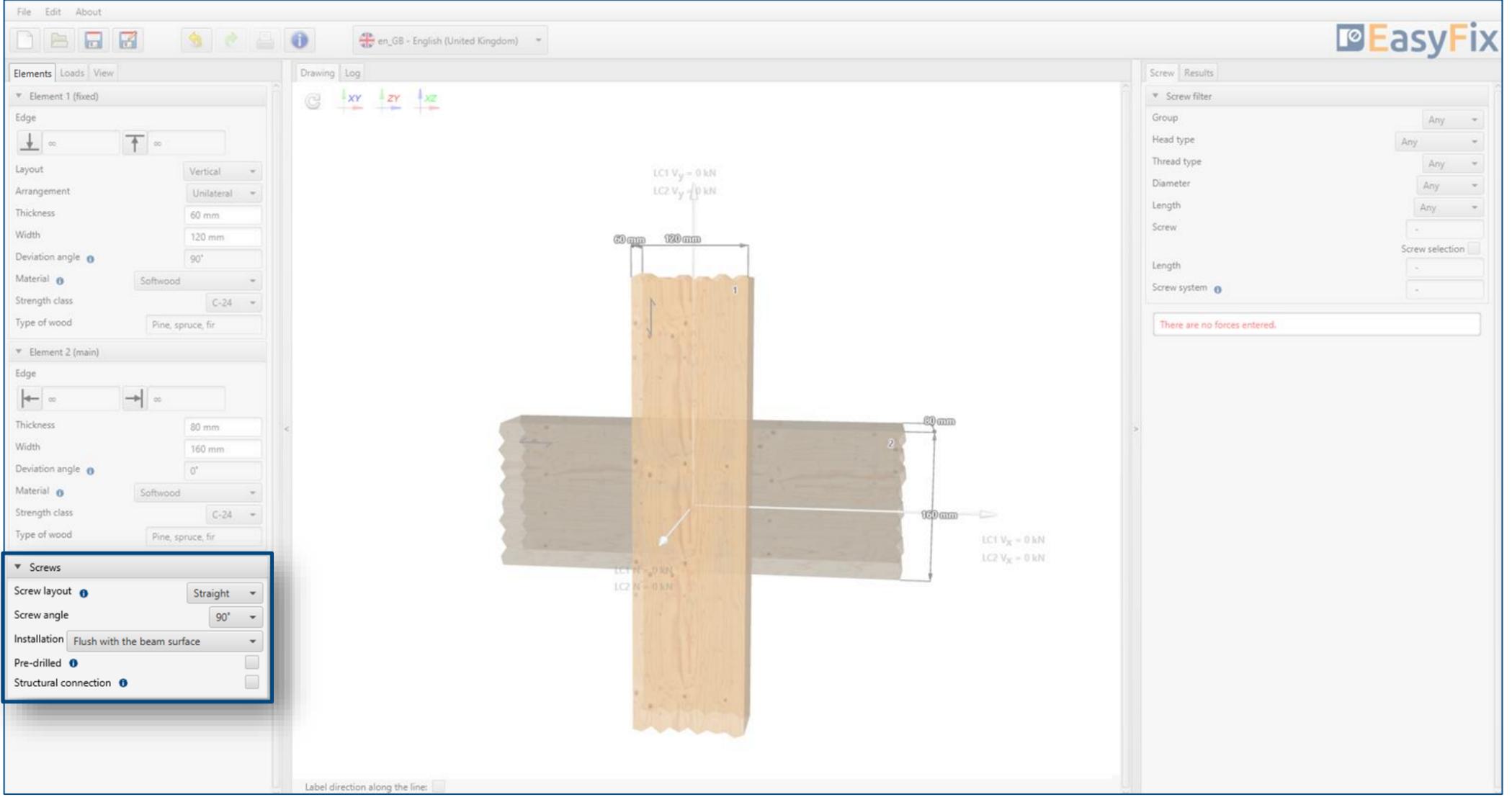


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2.2 Data input Connection elements - screws »

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.





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3 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 displays the EasyFix software interface. On the left, a side panel titled 'STATIC LOADS' is open, showing input fields for permanent and variable actions, safety factors, and load effect duration class. The 'Permanent action (G)' section includes fields for N (0 kN), V_x (0 kN), V_y (0 kN), and a safety factor (γ_G) of 1.35. The 'Variable action (Q)' section includes fields for N (0 kN), V_x (0 kN), V_y (0 kN), and a safety factor (γ_Q) of 1.5. The 'Load effect duration class' is set to 'Long term'. Below these are 'Calculated values' for two load combinations (LC1 and LC2), all showing 0 kN for N, V_x, and V_y. The main window shows a 3D model of a wood connection with dimensions (60 mm, 120 mm, 80 mm, 160 mm) and load labels: LC1 V_y = 0 kN, LC2 V_y = 0 kN, LC1 V_x = 0 kN, LC2 V_x = 0 kN, LC1 N = 0 kN, and LC2 N = 0 kN. On the right, a 'Screw filter' panel is visible with various 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: General connection

4 3D Model



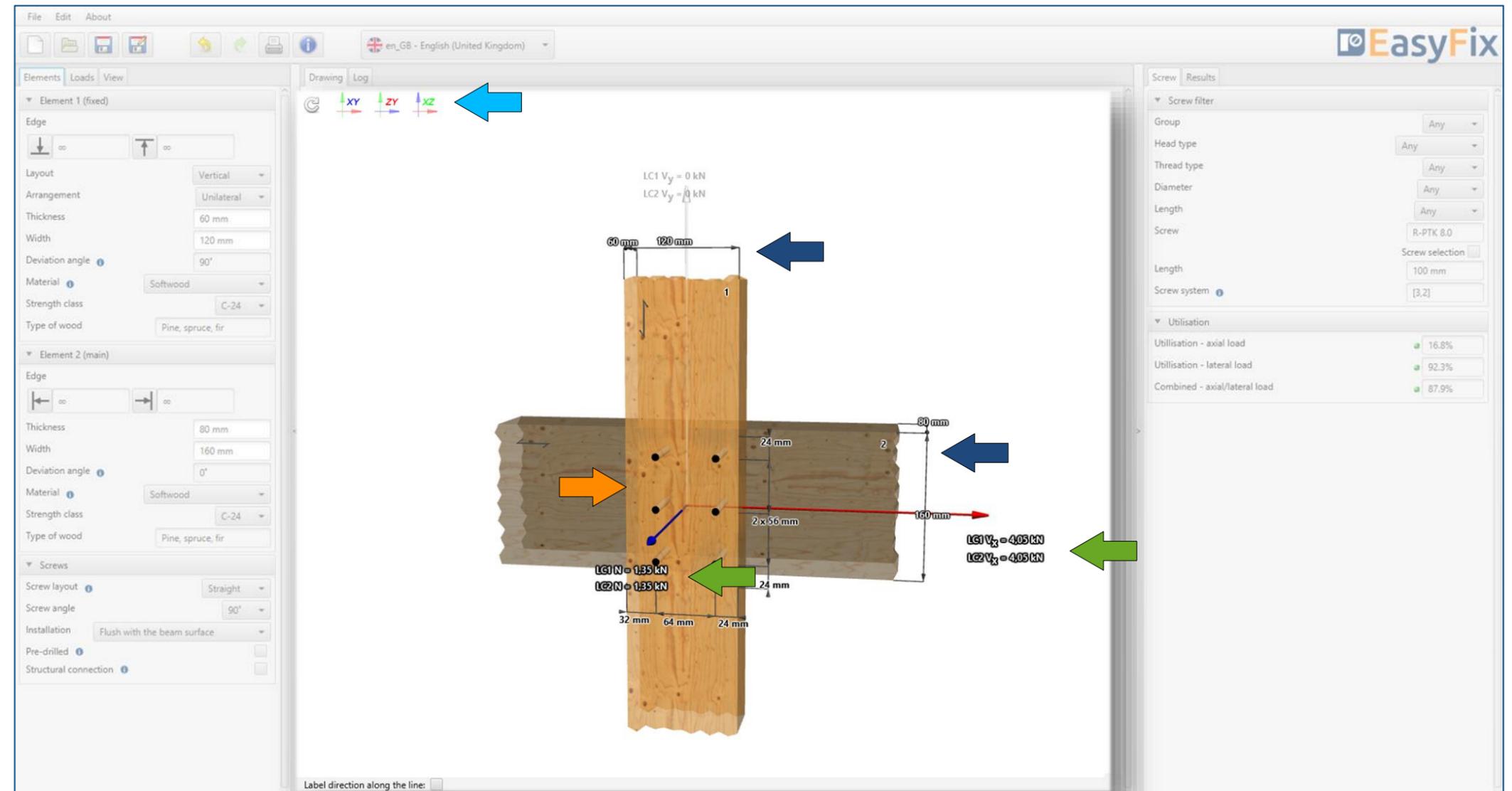
Dynamic 3D model provides a User with a possibility of following results in real time.

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: General connection

5 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 change of screw layout (straight/inclined/crossed) or 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 displays the EasyFix software interface for a wood connection design. The central drawing shows two wood beams joined by screws. The vertical beam (Element 1) has a thickness of 60 mm and a width of 120 mm. The horizontal beam (Element 2) has a thickness of 80 mm and a width of 160 mm. The connection is shown with a 2x3 grid of screws. Dimensions for screw placement are given as 32 mm, 64 mm, and 24 mm from the edges of the vertical beam. A horizontal force of 4.05 kN is applied to the horizontal beam, and a vertical force of 0 kN is applied to the vertical beam. The software interface includes a left sidebar with parameters for Element 1 (fixed) and Element 2 (main), such as material (Softwood), strength class (C-24), and screw layout (Straight). The right sidebar shows the 'Screw filter' settings and 'Utilisation' results. The 'Utilisation' section shows: Utilisation - axial load (16.8%), Utilisation - lateral load (92.3%), and Combined - axial/lateral load (87.9%). A red error message at the bottom of the right sidebar states: 'No results. Too close edge distance for required screws system.'



Wood construction screws: General 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.

Technical data

Screw: R-PTK 8.0
Screw selection:
Length: 100 mm
Screw system: [3,2]

Axial load

LC1		LC2	
β_{N1}	ND	β_{N1}	ND
β_{N2}	16.8%	β_{N2}	14.4%
β_{N3}	6.5%	β_{N3}	5.5%
β_{N4}	1.6%	β_{N4}	1.6%
β_{N5}	ND	β_{N5}	ND
β_{N6}	ND	β_{N6}	ND

Lateral load

LC1		LC2	
β_{V1}	92.3%	β_{V1}	79.1%
β_{V2}	ND	β_{V2}	ND

Combined - axial/lateral load

LC1		LC2	
Combined	87.9%	Combined	64.6%



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7 Results Calculation report >>

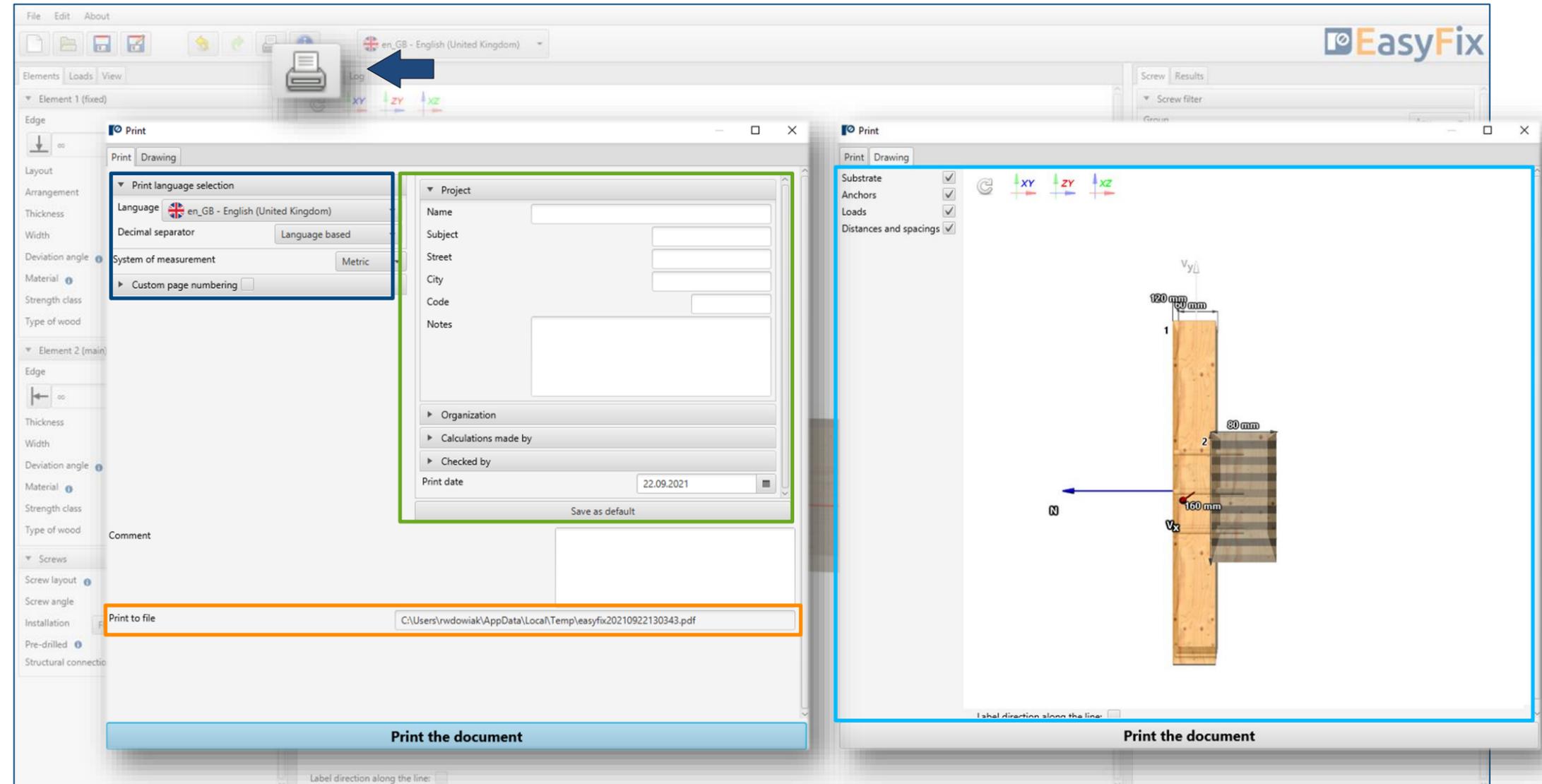
Generating a project report is started by clicking on the Print icon. Next, specify the language of the report along with a possible description. The report is printed to a pdf file, in a destination selected by a Customer.

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: General connection

7 Result Calculation report



Design 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.

EasyFix v. 4.4.10 - General connection TEST VERSION 15.10.2022

Project: Subject: Address: Calculations made by: Radosław Widowski by Rawplug e-mail: radoslaw.widowski@rawplug.com

Date: 2021-09-22 Page: 1/7

Organization: Address: Contact:

Checked by: 2021-09-22

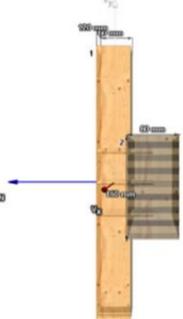
Notes:

Input data

Screw type and size: 6 x R-PTK Ø8 mmx100 mm; Partial thread, Pan head
 Proof: EN:1995-1-1; ETA-12/3456

Screw angle: 90°
 Installation: Flush with the beam surface
 Screw layout: Straight
 Pre-drilled: No
 Structural connection: No
 Arrangement: Unilateral

Members	Element 1 (fixed)	Element 2 (main)
Width	120 mm	160 mm
Thickness	60 mm	80 mm
Length	-	-
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.

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Organization: Address: Contact:

Design loads

Characteristic load	Value	Value	Value
Permanent action (G)	1.5 kN	3.0 kN	0.9 kN
Safety factor (k ₁)	1.35	1.35	1.35
Variable action (Q)	0.9 kN	0.9 kN	0.9 kN
Safety factor (k ₂)	1.5	1.5	1.5
Load effect duration class	Long term		
Service class	3		

Design load

LC1	LC2
1.35 kN	4.05 kN
1.35 kN	4.05 kN

Legend

- W: Wind force
- S: Shear force
- T: Tension force
- Q: Dead load (if permanent action)
- Q₁: Load combination 1 (permanent action + variable action)
- Q₂: Load combination 2 (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, 8.3.1.1, 8.7.2, ETA 12/3456)

Element 1 (fixed)

Distance	Minimum	Designed	k ₁ · k ₂ · k ₃ · k ₄
a ₁	32 mm	64 mm	OK
a ₂	32 mm	64 mm	OK
a ₃	32 mm	32 mm	OK
a ₄	24 mm	24 mm	OK

Element 2 (main)

Distance	Minimum	Designed	k ₁ · k ₂ · k ₃ · k ₄
a ₁	40 mm	64 mm	OK
a ₂	32 mm	64 mm	OK
a ₃	24 mm	24 mm	OK
a ₄	24 mm	24 mm	OK

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

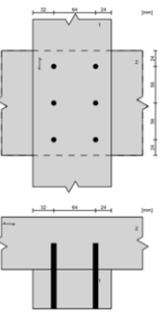
EasyFix v. 4.4.10 - General connection TEST VERSION 15.10.2022

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Date: 2021-09-22 Page: 5/7

Organization: Address: Contact:

Distances and spacings



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

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Date: 2021-09-22 Page: 6/7

Organization: Address: Contact:

Axial load (EN 1995-1-1:2004+AC:2006+A1:2008; section 8.7.2, ETA 12/3456)

Withdrawal failure of the threaded part of the screw in element [1]

LC1	LC2
R _{ax} = ND	R _{ax} = ND

According to ETA 12/3456 section 8.3.1.2(a) Failure mode is not decisive.

Withdrawal failure of the threaded part of the screw in element [2]

LC1	LC2
R _{ax} = 16.8%	R _{ax} = 16.4%

$N_{ax} \leq R_{ax}$

TSR

TSR	TSR	TSR	TSR
1.8	1.8	1.8	1.8

LC1

TSR	TSR	TSR
1.3	1.3	1.3

LC2

TSR	TSR	TSR
1.3	1.3	1.3

Pull-through failure of the screw head

LC1	LC2
R _{ax} = 6.5%	R _{ax} = 6.5%

$N_{ax} \leq R_{ax}$

TSR

TSR	TSR	TSR
1.3	1.3	1.3

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

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Date: 2021-09-22 Page: 4/7

Organization: Address: Contact:

Tension failure of the screw

LC1	LC2
R _{ax} = 1.6%	R _{ax} = 1.4%

$N_{ax} \leq R_{ax}$

Building of screw in element [1]

LC1	LC2
R _{ax} = ND	R _{ax} = ND

Building of screw in element [2]

LC1	LC2
R _{ax} = ND	R _{ax} = ND

Lateral load (EN 1995-1-1:2004+AC:2006+A1:2008; section 8.7.1, ETA 12/3456)

Shear failure modes

LC1	LC2
R _{ax} = 92.3%	R _{ax} = 79.1%

$N_{ax} \leq R_{ax}$

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

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Date: 2021-09-22 Page: 4/7

Organization: Address: Contact:

Block shear failure

LC1	LC2
R _{ax} = ND	R _{ax} = ND

Combined loads LC1 (EN 1995-1-1:2004+AC:2006+A1:2008; section 8.7.3)

LC1	LC2	Combined
10.8%	92.3%	4
		R _{ax} = 1.4%

Correct connection

Combined loads LC2 (EN 1995-1-1:2004+AC:2006+A1:2008; section 8.7.3)

LC2	LC1	Combined
14.4%	79.1%	2.0
		R _{ax} = 64.6%

Correct connection

Remarks

- Designing according to EN 1995-1-1:2004+AC:2006+A1:2008 and ETA-12/3456
- The characteristic values of the timber materials according to EN 338:2009 (softwood), EN 14080:2013 (glued laminated timber).
- The screws shall be submitted 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.
- For asymmetry layout of screws the bearing of torsion moment has to be checked separately.

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

EasyFix v. 4.4.10 - General connection TEST VERSION 15.10.2022

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Date: 2021-09-22 Page: 5/7

Organization: Address: Contact:

Block shear failure

LC1	LC2
R _{ax} = ND	R _{ax} = ND

Combined loads LC1 (EN 1995-1-1:2004+AC:2006+A1:2008; section 8.7.3)

LC1	LC2	Combined
10.8%	92.3%	4
		R _{ax} = 1.4%

Correct connection

Combined loads LC2 (EN 1995-1-1:2004+AC:2006+A1:2008; section 8.7.3)

LC2	LC1	Combined
14.4%	79.1%	2.0
		R _{ax} = 64.6%

Correct connection

Remarks

- Designing according to EN 1995-1-1:2004+AC:2006+A1:2008 and ETA-12/3456
- The characteristic values of the timber materials according to EN 338:2009 (softwood), EN 14080:2013 (glued laminated timber).
- The screws shall be submitted to static or quasi static loading only.
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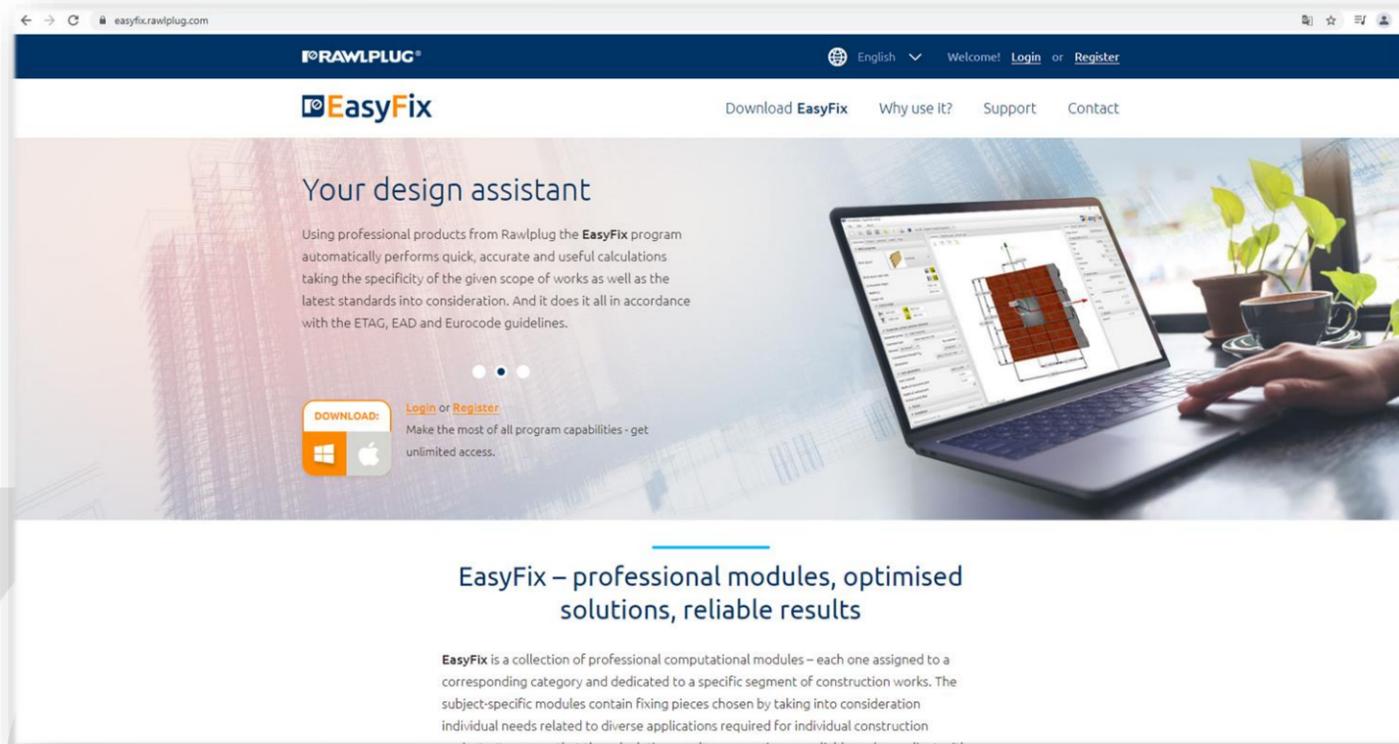
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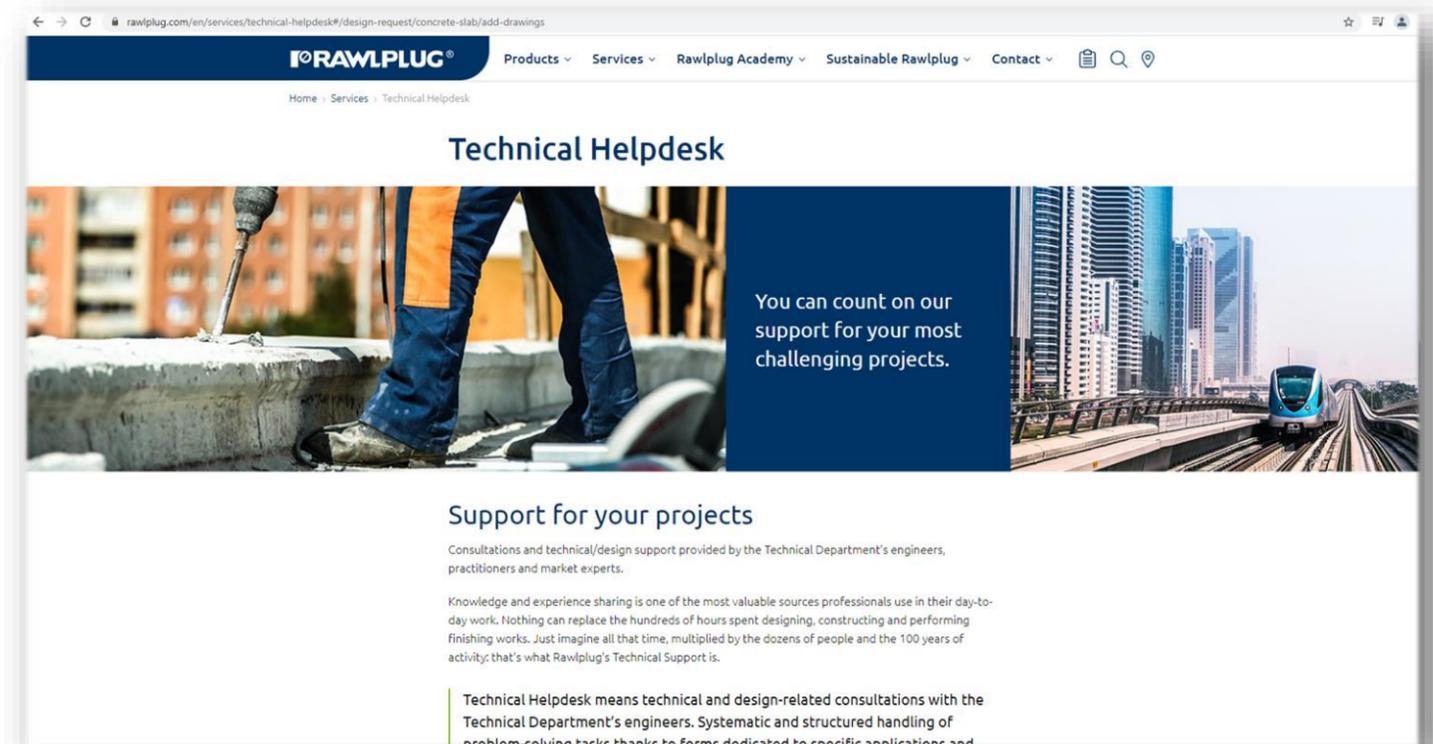
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Have you got any questions?

Visit **EasyFix website** or contact directly with Rawlplug Technical Department via **Rawlplug Technical Helpdesk**.



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



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



