



module Support reinforcement



Wood construction screws: Support reinforcement

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1. General information

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- move to a selected issue



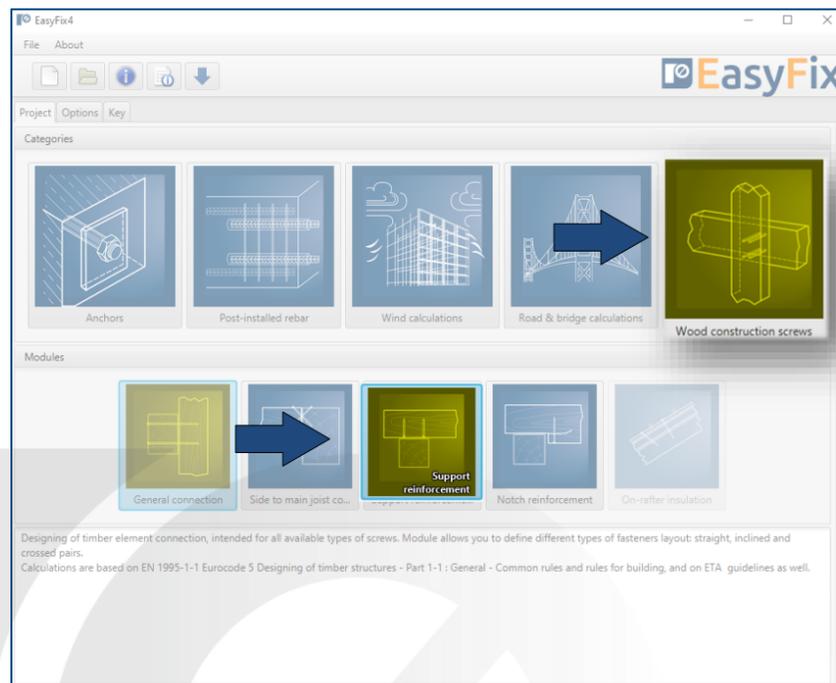
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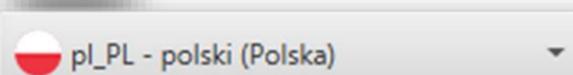
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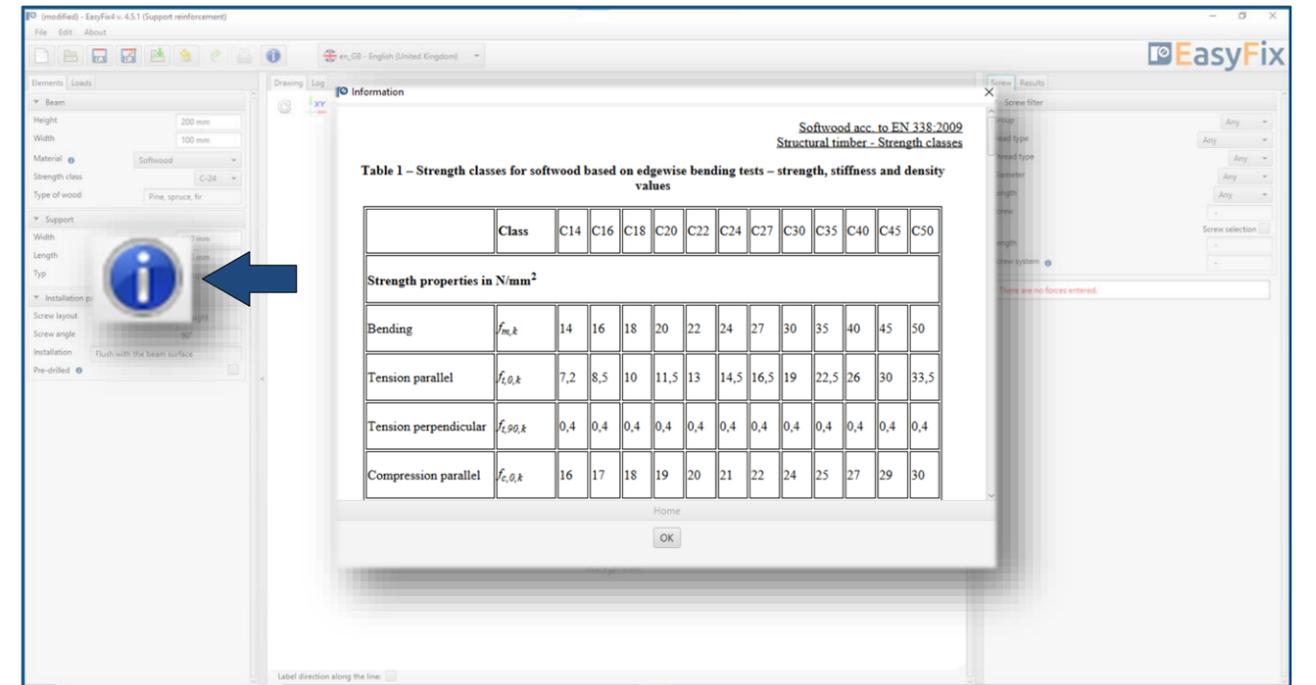
1 General information

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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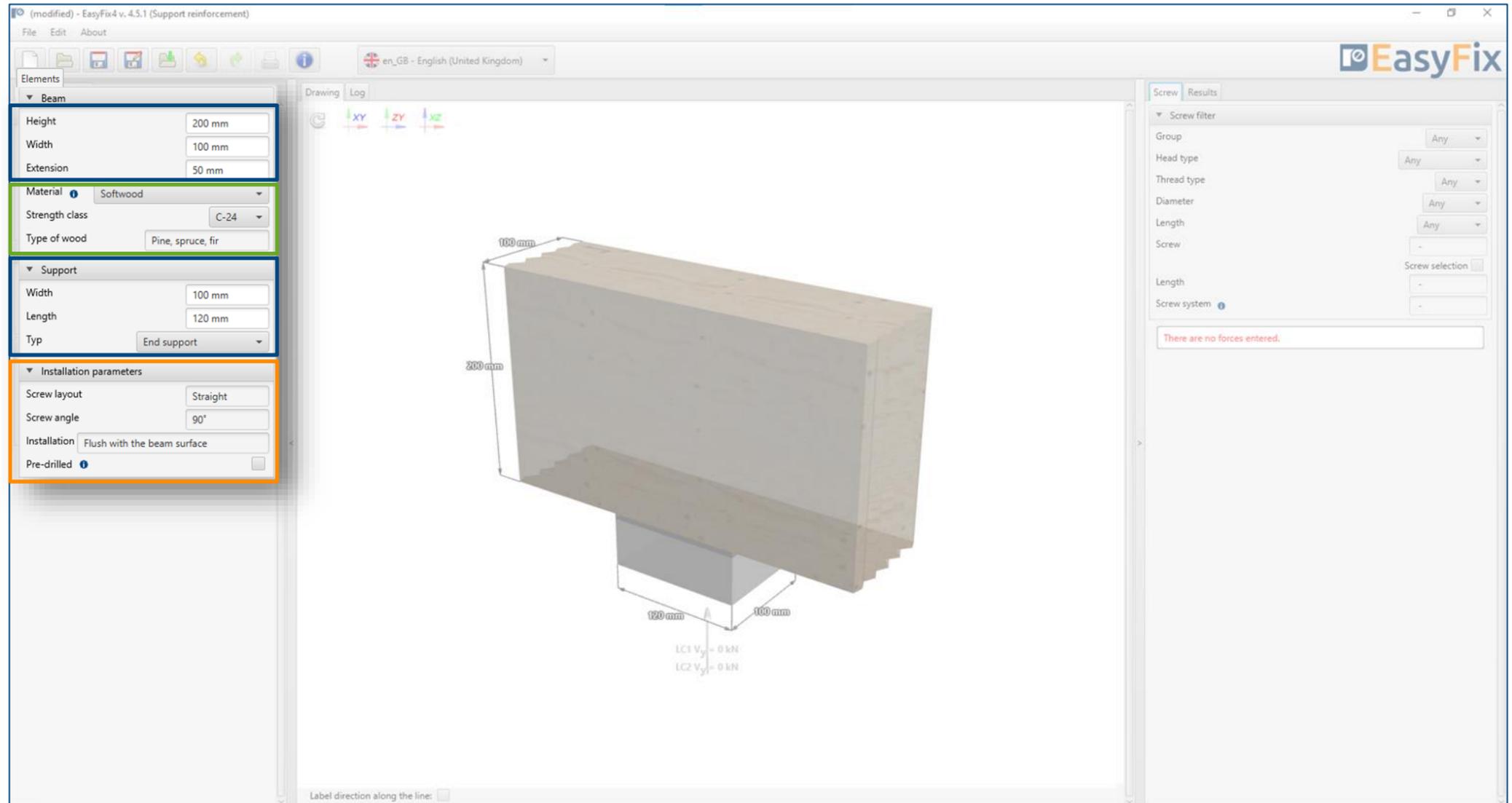
2 Data input
Elements – beam, support »

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. Installation parameters can not be modified. Dedicated solution is presented at the bottom of the panel.

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.

Installation parameters: informations are presented at the bottom part of the panel.





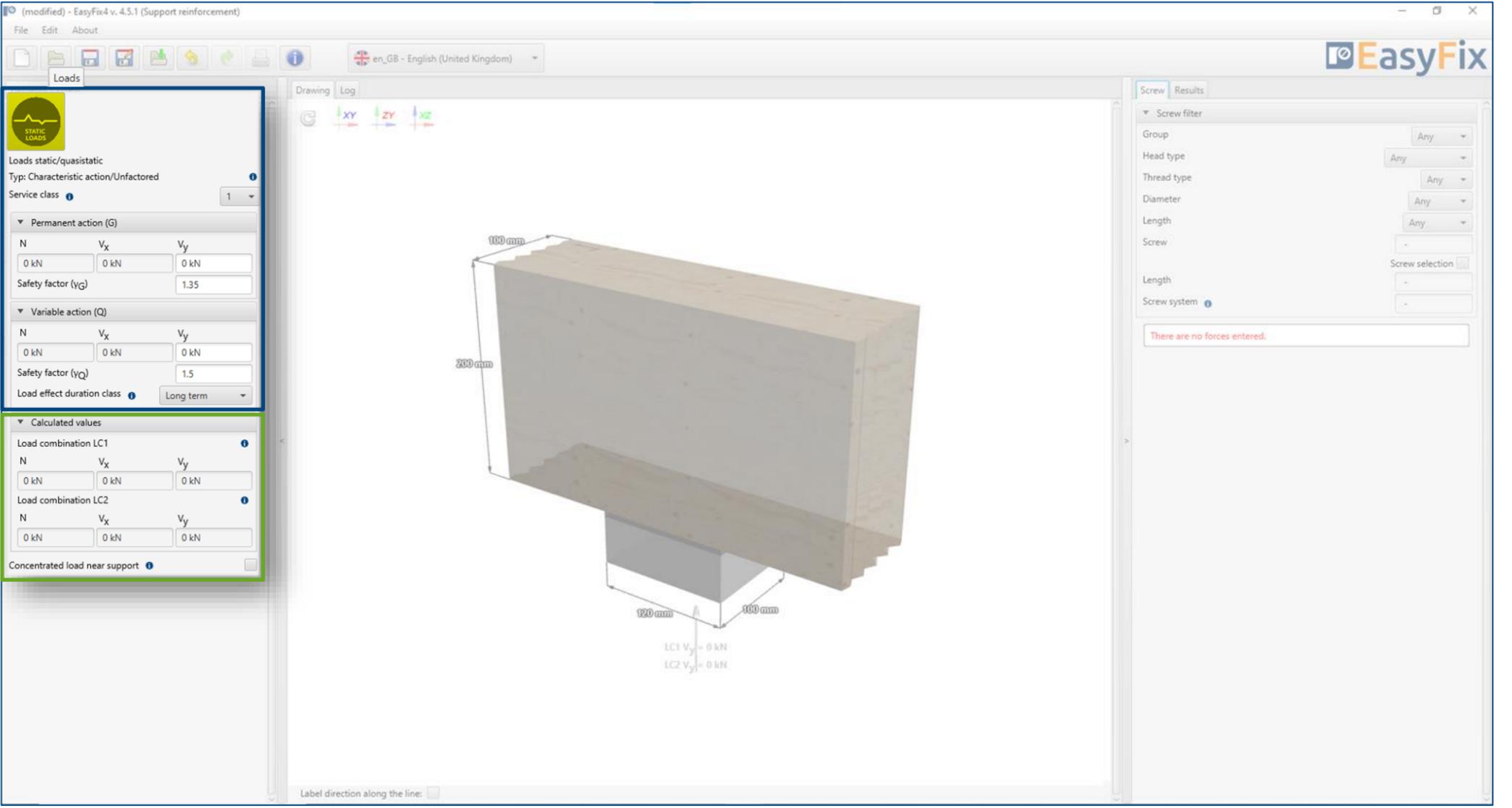
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3 Data input Loads

The next 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.





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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:

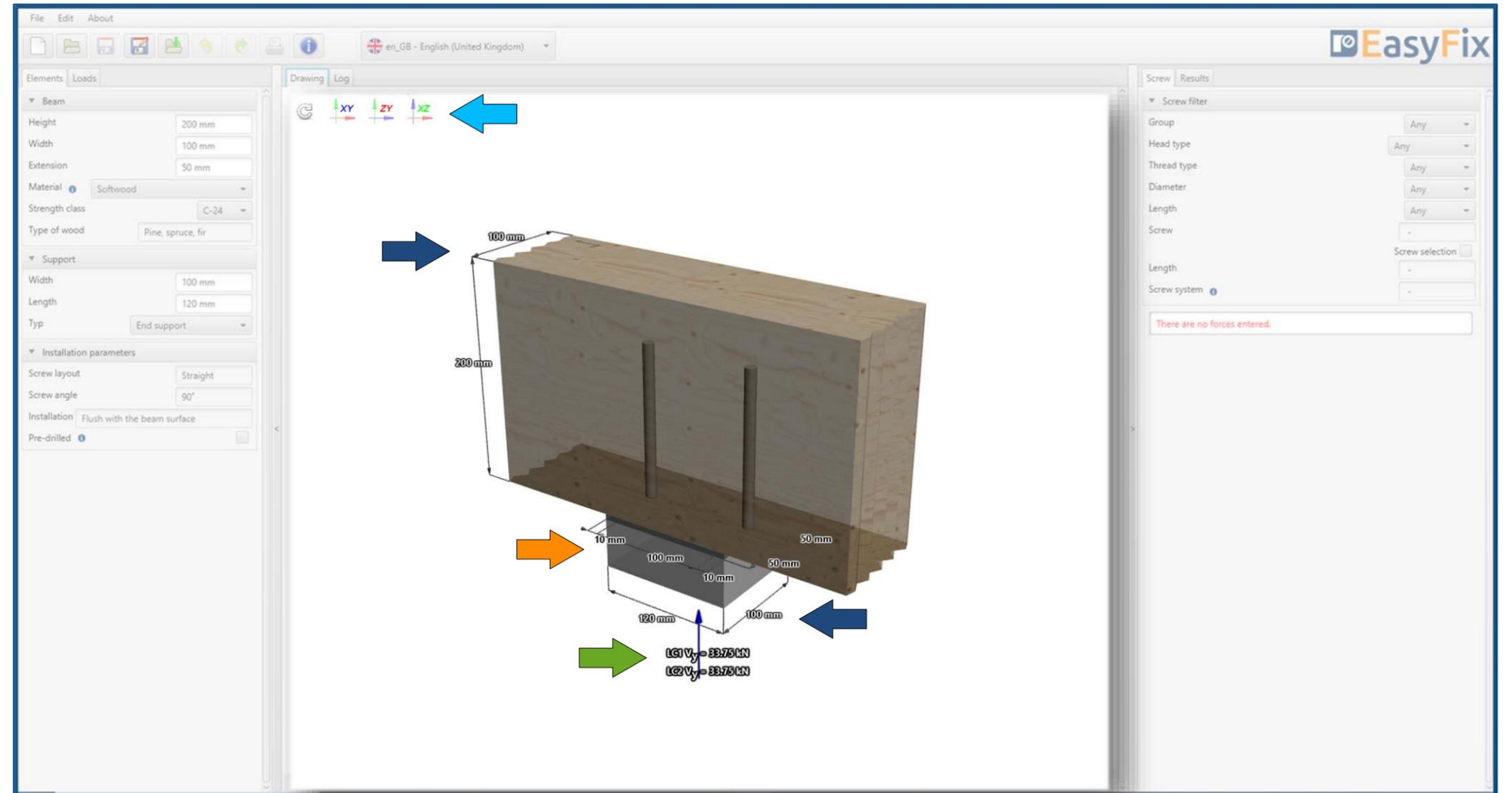
Load values can be defined in the side panel and directly on a model as well.

Screws layout:

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

Model navigation:

Model navigation utilises mouse control or default views.





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5 Results
Screw filter »

Support reinforcement module is meant to select optimised number of the fasteners, their sizes and arrangement as well. Result can be managed by available filters. Resistance analysis is performed in two steps – without and with the reinforcement. Information of the reinforcement of the support is necessary is presented in Utilisation panel.

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.

The screenshot displays the EasyFix software interface. On the left, the 'Elements' panel shows configuration for a 'Beam' (Height: 200 mm, Width: 100 mm, Material: Softwood, Strength class: C-24) and an 'Intermediate support' (Width: 100 mm, Length: 120 mm). The 'Installation parameters' section is set to 'Straight' layout, '90°' angle, and 'Flush with the beam surface' installation. The central 'Drawing' area shows a 3D perspective view of the beam and support assembly with dimensions (100 mm, 200 mm, 10 mm, 100 mm, 10 mm, 50 mm, 120 mm, 100 mm) and load labels (LC1 V_y = 33.75 kN, LC2 V_y = 33.75 kN). On the right, the 'Screw' panel shows a filter for 'R-PVS 10.0' screws with a length of 140 mm and a system of [2, 1]. The 'Utilisation' panel compares results for 'Support without reinforcement' (LC1: 162.5%, LC2: 139.3%, indicating reinforcement is necessary) and 'Support with reinforcement' (LC1: 94.1%, LC2: 80.7%). It also shows axial load utilisation at 94.1% and lateral/combined loads as 'ND' (Not Determined).



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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 shows the EasyFix software interface. On the left, there are configuration panels for 'Beam' and 'Support'. The 'Beam' panel includes fields for Height (200 mm), Width (100 mm), Material (Softwood), Strength class (C-24), and Type of wood (Pine, spruce, fir). The 'Support' panel includes Width (100 mm), Length (120 mm), and Typ (Intermediate support). Below these are 'Installation parameters' for Screw layout (Straight), Screw angle (90°), Installation (Flush with the beam surface), and Pre-drilled (checked).

The central 3D model shows a wood beam with two screws. Dimensions are labeled: 100 mm width, 200 mm height, 120 mm support length, 100 mm support width, 10 mm edge distance, and 50 mm spacing between screws. Load values are shown as $LC1 V_y = 33.75 \text{ kN}$ and $LC2 V_y = 33.75 \text{ kN}$.

On the right, the 'Results' panel is visible, containing 'Technical data' and 'Axial load' sections. The 'Technical data' section shows Screw (R-PVS 10.0), Length (140 mm), and Screw system ([2,1]). The 'Axial load' section shows utilisation percentages for various failure modes:

Failure Mode	Utilisation	Failure Mode	Utilisation
$\beta_{NSR.1}$	94.1%	$\beta_{NSR.1}$	80.7%
$\beta_{NSR.2}$	80.9%	$\beta_{NSR.2}$	69.3%
β_{N1}	ND	β_{N1}	ND
β_{N2}	ND	β_{N2}	ND
β_{N3}	ND	β_{N3}	ND
β_{N4}	ND	β_{N4}	ND
β_{N5}	ND	β_{N5}	ND
β_{N6}	ND	β_{N6}	ND

The 'Lateral load' section shows utilisation for β_{V1} and β_{V2} as ND. The 'Combined - axial/lateral load' section shows utilisation for LC1 and LC2 as ND.



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7 Results Calculation report >>

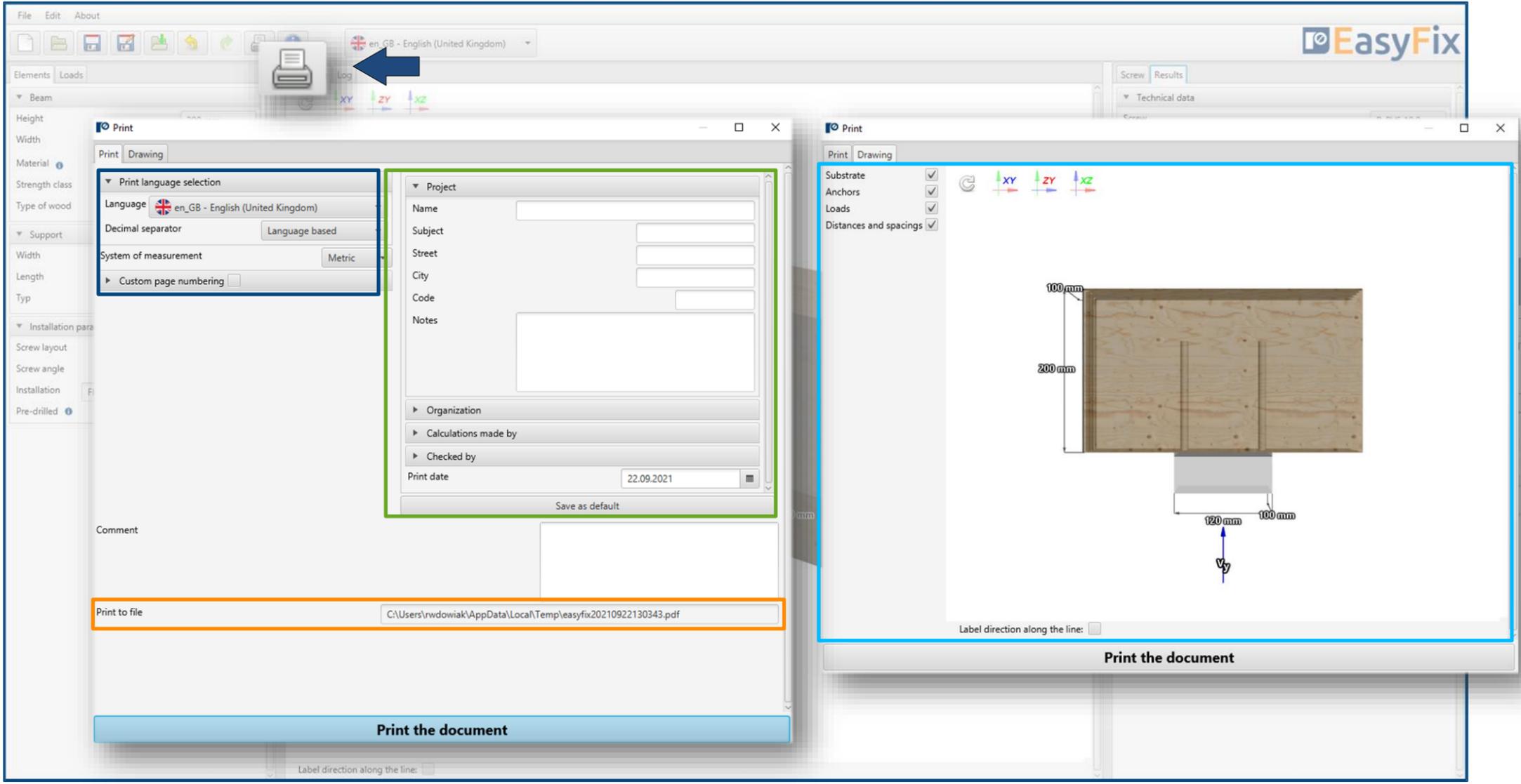
Generating a project report is started by clicking on the Print icon. Next, specify the language of the report along with a possible description. The report is printed to a pdf file, in a destination selected by a Customer.

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.





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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.

EasyFix4 v. 4.5.1 - Support reinforcement TEST VERSION 1fc1810b2

Project: Subject: Date: 2021-12-13 Page: 1/6
Address: Organization: Address: Contact:
Calculations made by: Radosław Wdowiak
 by Rawplug e-mail: radoslaw.wdowiak@rawplug.com
Checked by: 2021-04-23
Notes:

Input data

Screw type and size: 2 x R-PVS Ø10 mmx140 mm; Full thread, Countersunk head
Proof: EN:1995-1-1; ETA-12/3456
Screw angle: 90°
Installation: Flush with the beam surface
Screw layout: Straight
Pre-drilled: No
Concentrated load near support: No
Member Beam:
Width: 100 mm
Height: 200 mm
Extension: -
Material: Softwood
Strength class: C-24
Type of wood: Pine, spruce, fir
Member Support:
Width: 100 mm
Length: 120 mm
Typ: Intermediate support

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

EasyFix4 v. 4.5.1 - Support reinforcement TEST VERSION 1fc1810b2

Design loads

Characteristic load	M	V _{Ed}	T _{Ed}
Permanent action (G)	0.8kN	0.0kN	21.5kN
Safety factor (γ _G)	1.35		
Variable action (Q)	0.8kN	0.0kN	0.8kN
Safety factor (γ _Q)	1.5		
Load effect duration class	Long-term		
Service class	2		
Design load			
LCD	0.8kN	0.0kN	22.715kN
LCT	0.8kN	0.0kN	22.715kN

Legend:
 G: Dead load
 Q: Live load
 T: Wind load
 U: Snow load
 U₂: Ice load
 U₃: Suction load
 U₄: Suction load
 U₅: Suction load
 U₆: Suction load
 U₇: Suction load
 U₈: Suction load
 U₉: Suction load
 U₁₀: Suction load
 U₁₁: Suction load
 U₁₂: Suction load
 U₁₃: Suction load
 U₁₄: Suction load
 U₁₅: Suction load
 U₁₆: Suction load
 U₁₇: Suction load
 U₁₈: Suction load
 U₁₉: Suction load
 U₂₀: Suction load

Minimum edge and/or end distances and spacings of screws (EN 1995-1-1; 2006+AC209+A12008; section 8.1.2, 8.5.1.1, 8.7.2, ETA 12/3456)

Distance	Beam	Support	A _{1, min}	A _{2, min}
A ₁	70 mm	100 mm	OK	
A ₂				OK
A ₁₂				
A ₁₂₂	40 mm	50 mm	OK	

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

EasyFix4 v. 4.5.1 - Support reinforcement TEST VERSION 1fc1810b2

Distances and spacings

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

EasyFix4 v. 4.5.1 - Support reinforcement TEST VERSION 1fc1810b2

Beam compression on support (EN 1995-1-1:2006+AC2006+A12008; section 6.1.3)

Beam compression on support with additional reinforcement (EN 1995-1-1:2006+AC2006+A12008; section 6.1.3; ETA 12/3456)

Beam compression on support with reinforcement	LCT	LCD
	94.1%	99.7%

Correct connection

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

EasyFix4 v. 4.5.1 - Support reinforcement TEST VERSION 1fc1810b2

Axial load (EN 1995-1-1:2006+AC2006+A12008; section 8.7.2; ETA 12/3456)

Withdrawal failure of the threaded part of the screw in element (2)	LCT	LCD
	F _{ax, LCT} = 7.50 kN	F _{ax, LCD} = 8.82 kN

Backing of the screw in element (2)

	LCT	LCD
	F _{ax, LCT} = 17.7 kN	F _{ax, LCD} = 17.7 kN

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

EasyFix4 v. 4.5.1 - Support reinforcement TEST VERSION 1fc1810b2

Combined loads LCT (EN 1995-1-1:2006+AC2006+A12008; section 8.7.3)

Axial	Lateral	Combined
94.1%	ND	ND

Combined loads LCD (EN 1995-1-1:2006+AC2006+A12008; section 8.7.3)

Axial	Lateral	Combined
99.7%	ND	ND

Remarks:

- Designing according to EN 1995-1-1:2006+AC2006+A12008 and ETA-12/3456
- The characteristic values of the timber materials according to EN 338:2009 (softwood, EN 14089:2013 (light laminated timber).
- 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.
- Support reinforcement requires even distribution of the load, by using a steel plate. Its thickness has to be calculated separately.

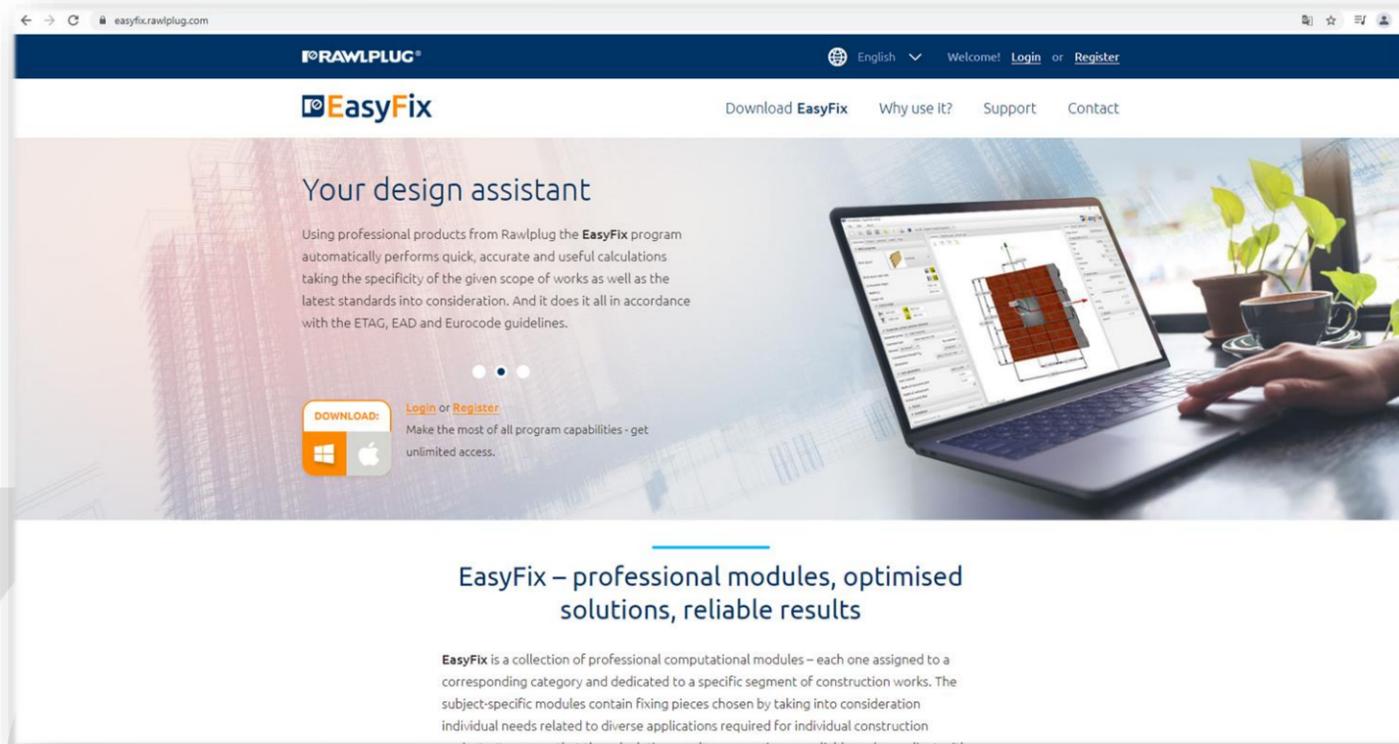
National regulations, environmental and application conditions must be considered when designing the anchorage.



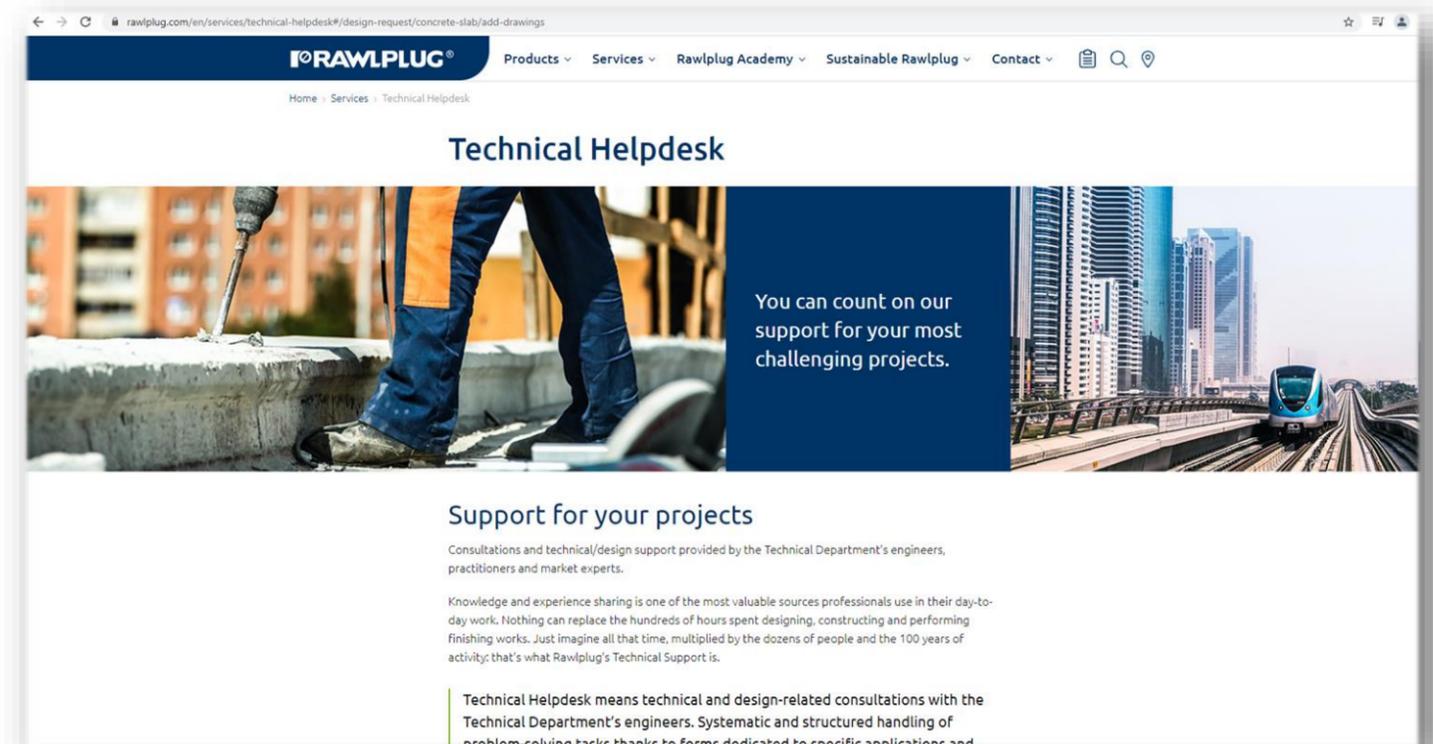
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Have you got any questions?

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#/>



