



# Post Installed Rebar

## Post Installed Rebar

### Designing data:

1. Selection of the product category
5. Conditions of installation
8. Defining of the acting load

### Existing construction:

2. Defining of the existing construction
4. Application of the construction
6. Reinforcement of the existing construction

### New construction:

3. Defining of the new construction
7. Reinforcement of the new construction

### Results:

9. Analysis of the results
10. Generating the printout



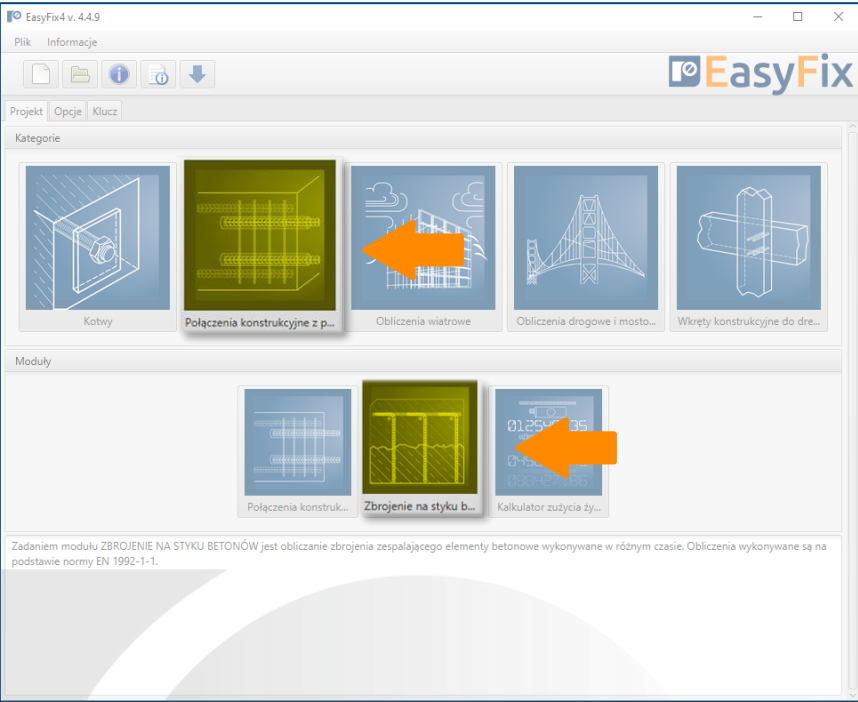
- move to a selected issue



- back to the table of contents

Post Installed Rebar

1 Selection of The product category »



Designing methods:

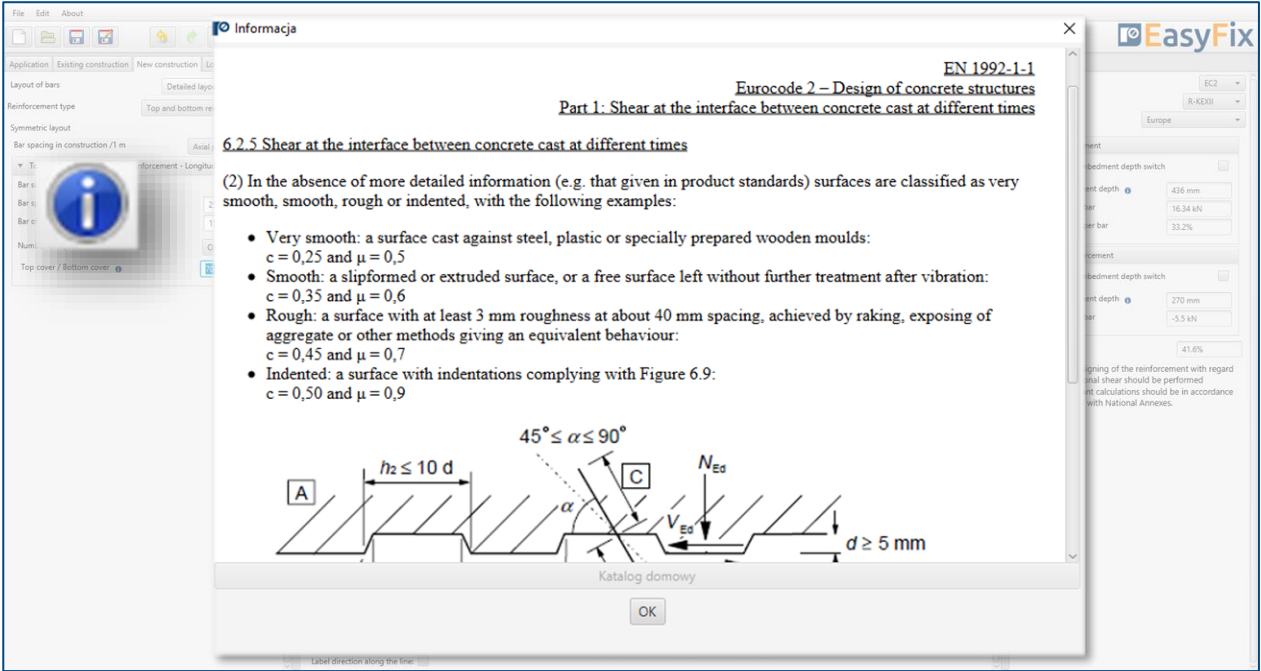
EUROCODE 2 | EN 1992-1-1

PIRR | Post Installed Rebar Rawlplug

Meaning of icons and symbols:

- Create new design
- Open file
- Safe | Safe as
- Undo | Redo changes
- Generate pdf printout
- Information about software
- Language selection

- Info icons
- Instruction manual



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



## Post Installed Rebar

### 2 Defining of The existing construction »

Determining and defining the geometry of the existing structure requires knowledge of the details of the concrete in which to anchor. In example concrete class, steel yield strength, element dimensions.

Determining of the construction type:

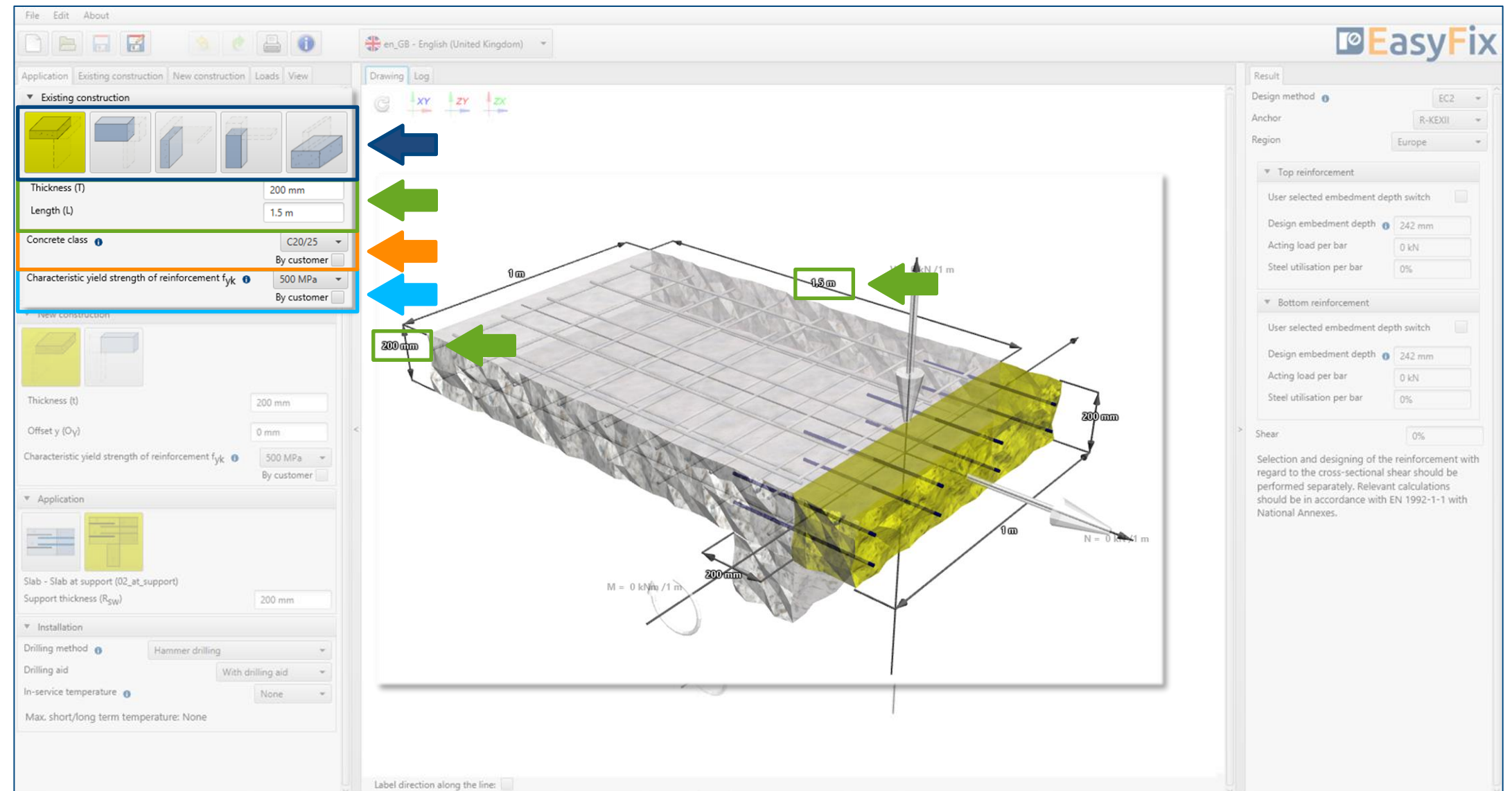
Plate | Beam | Wall | Column | Foundation

Determining of the **structure dimensions**: The geometry of the structure can be specified in the side panel or on the model

Determining of the **concrete strength class**:  
Entering data by selecting from the list or the option "by user".

Determining of the **yield steel strength**:

Entering data by selecting from the list or the option "by user".





## Post Installed Rebar

# 2

Defining of  
The existing construction



Determining of the concrete strength class:

Selecting from the list:

Concrete strength class according to standard EN 206

Option „by user“:

Possibility of manual input of characteristic compressive strength of cylinder  $f_{ck}$ .

or

Possibility of manual input of characteristic compressive strength of cube  $f_{ck, cube}$ .

Existing construction

Thickness (T) 200 mm

Length (L) 1.5 m

Concrete class  $f_{ck}$

Characteristic yield strength  $f_{yk}$  500 MPa

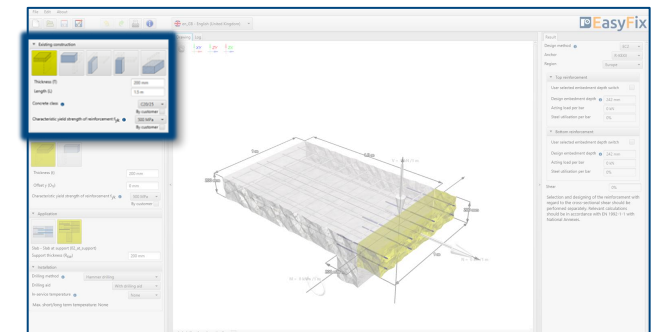
By customer ☒

By customer ☒

$f_{ck}$

20 MPa

$f_{ck, cube}$





## Post Installed Rebar

2

Defining of  
The existing construction



Determining of the yield steel strength:

Selecting from the list:  
Reinforcement according to standard  
EN 1992-1-1:2008

Option „by user“:  
Possibility of manual input yield steel  
strength  $f_{yk}$  and its safety factor  $\gamma_s$   
according to national requirements.

Existing construction

Thickness (T) 200 mm

Length (L) 1.5 m

Concrete class C20/25

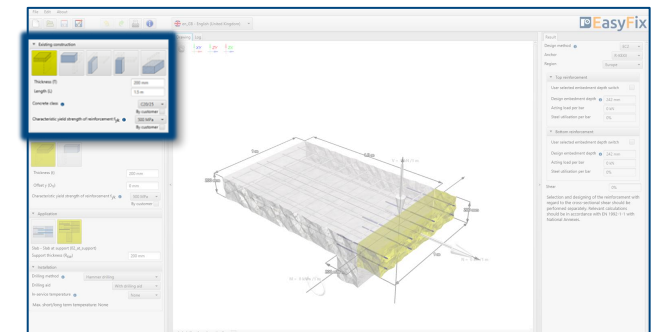
Characteristic yield strength  $f_{yk}$  500 MPa

By customer ☐

By customer ☒

$f_{yk}$  500 MPa

Safety factor  $\gamma_s$  1.15





## Post Installed Rebar

### 3 Defining of The new construction »

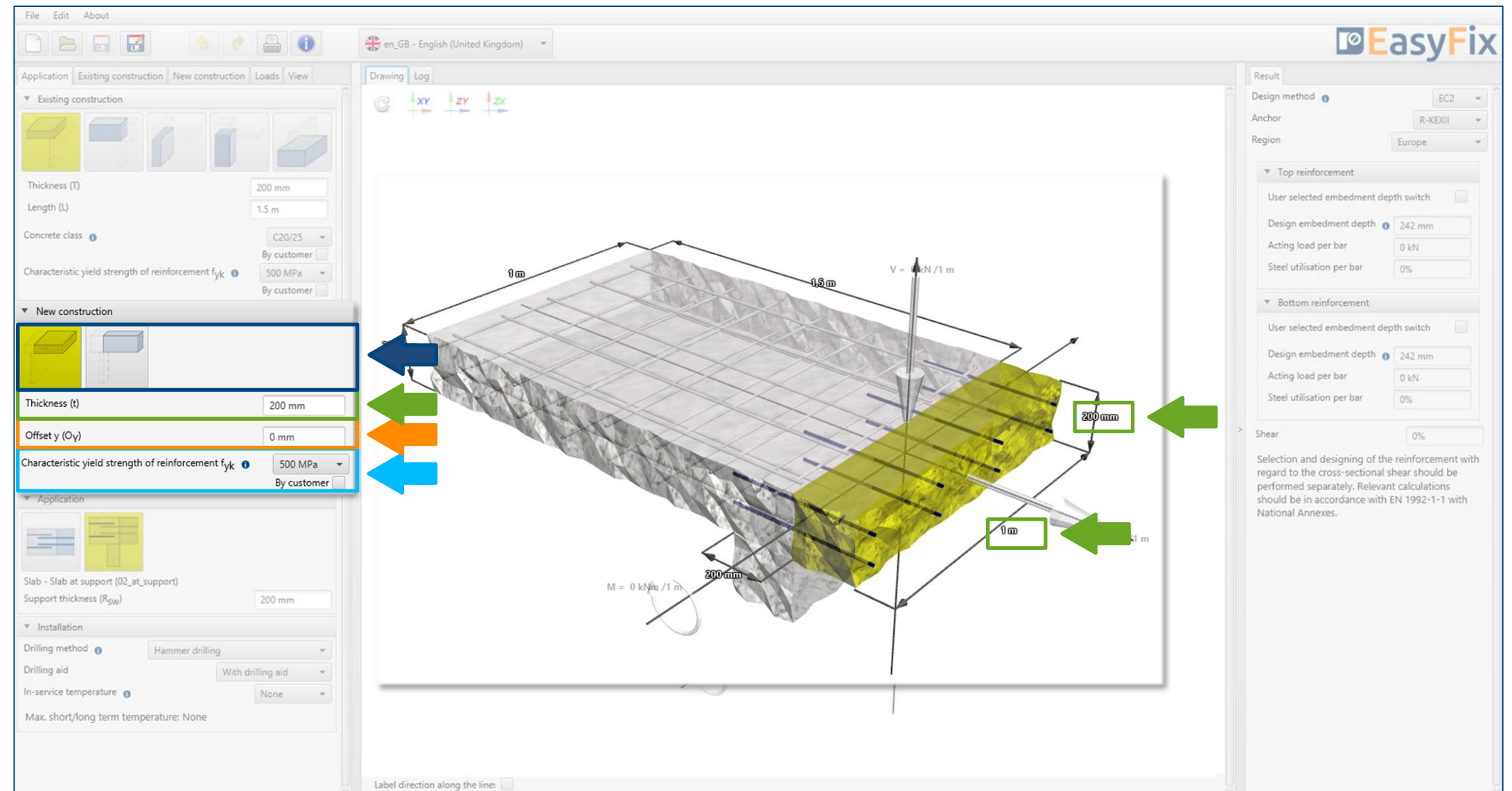
Determining of the **construction type**:  
Depending on the geometry of the existing construction, there is a choice between:  
Plate | Beam | Wall | Column

Determining of the **structure dimensions**: The geometry of the structure can be specified in the side panel or on the model

Determining the **position of the structure**:  
Inputting a possible shift of the new structure in relation to the existing one.

Determining of the **yield steel strength**:  
Entering data by selecting from the list or the option "by user".

Determining and defining the geometry of a new structure requires the knowledge of details, i.e., the steel yield strength, dimensions of the element, layout and diameter of the anchored rebars.





# Post Installed Rebar

## 3 Defining of The new construction »

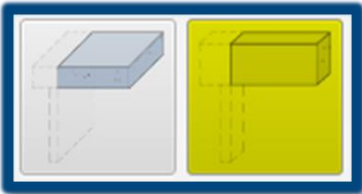


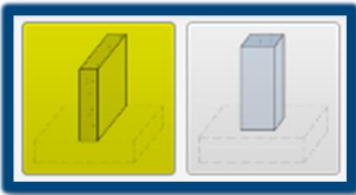
Plate | Beam



Plate | Beam | Wall



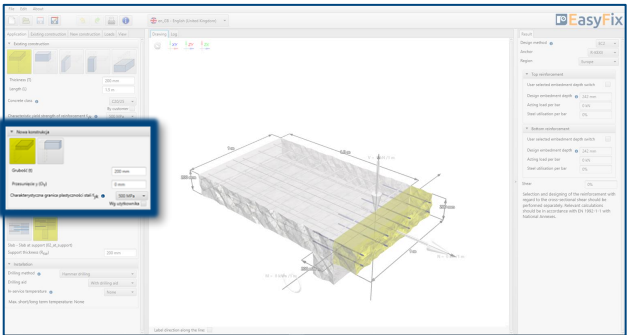
Beam | Column



Wall | Column

Determining of the **construction type**:  
Depending on the geometry of the existing construction, there is a choice between:

- Plate – Plate | Beam
- Beam – Beam | Plate
- Wall – Plate | Beam | Wall
- Column – Beam | Column
- Foundation – Wall | Column





Post Installed Rebar

3 Defining of The new construction »

Determining of the yield steel strength:

Selecting from the list:  
Reinforcement according to standard EN 1992-1-1:2008

Option „by user“:  
Possibility of manual input yield steel strength  $f_{yk}$  and its safety factor  $\gamma_s$  according to national requirements.

New construction

Thickness (t) 200 mm

Offset y ( $O_Y$ ) 0 mm

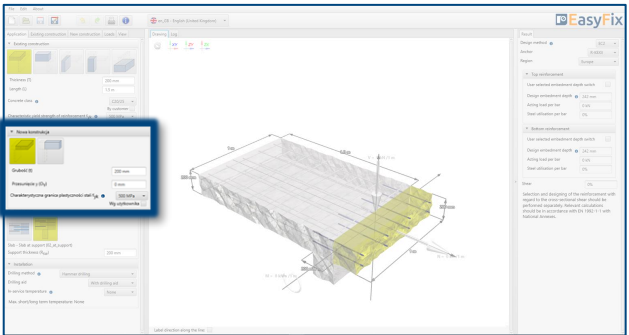
Characteristic yield strength  $f_{yk}$  500 MPa

By customer ☐

By customer ☒

$f_{yk}$  500 MPa

Safety factor  $\gamma_s$  1.15



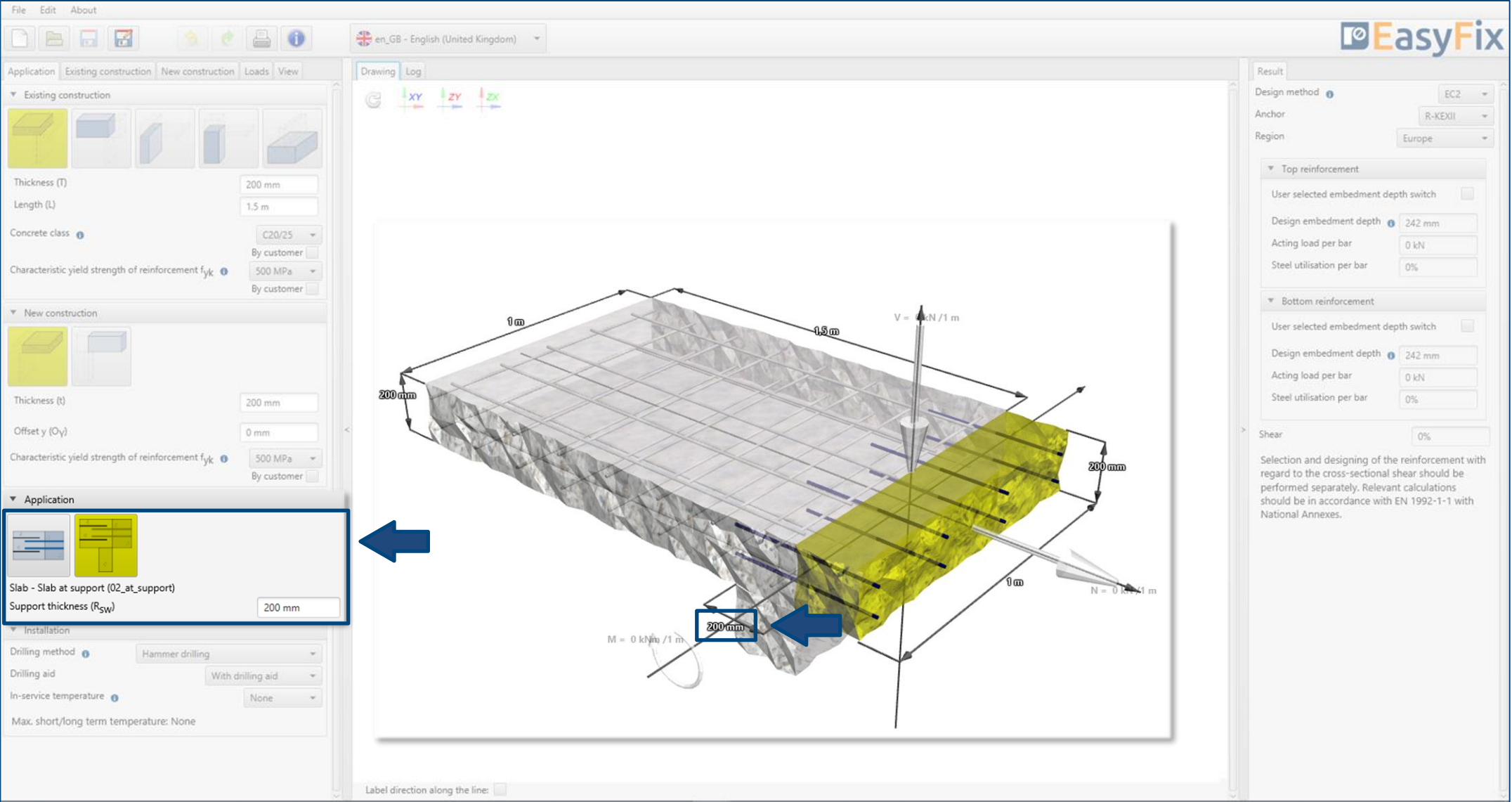


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## 4 Defining of the Construction and its application »

Determining of the type of construction:  
Depending on the type of structure,  
determining the exact work of the  
structure along with the required  
dimensions.

The **Application** panel is used to detail the type of structure and its use. Here we define information on the cooperation of the existing and new elements.





# Post Installed Rebar

## 4 Defining of the Construction and its application »

Determining of the type of construction:

Depending on geometry of existing structure:

- The structure without support
- The structure with support
- The structure simply supported
- Elongation of the structure
- Compression of the structure
- Calculation of lap length



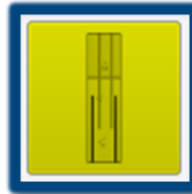
The structure without support



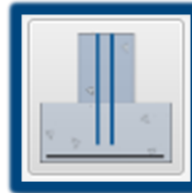
The structure with support



The structure simply supported



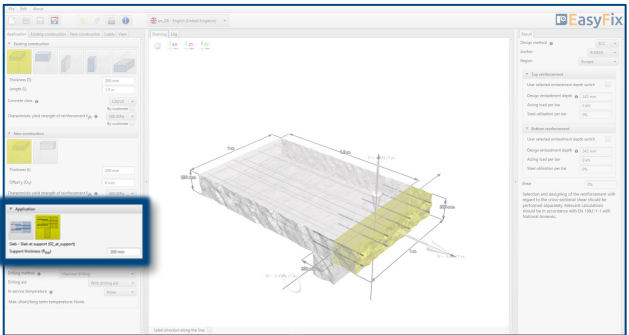
Elongation of the structure



Compression of the structure



Calculation of lap length





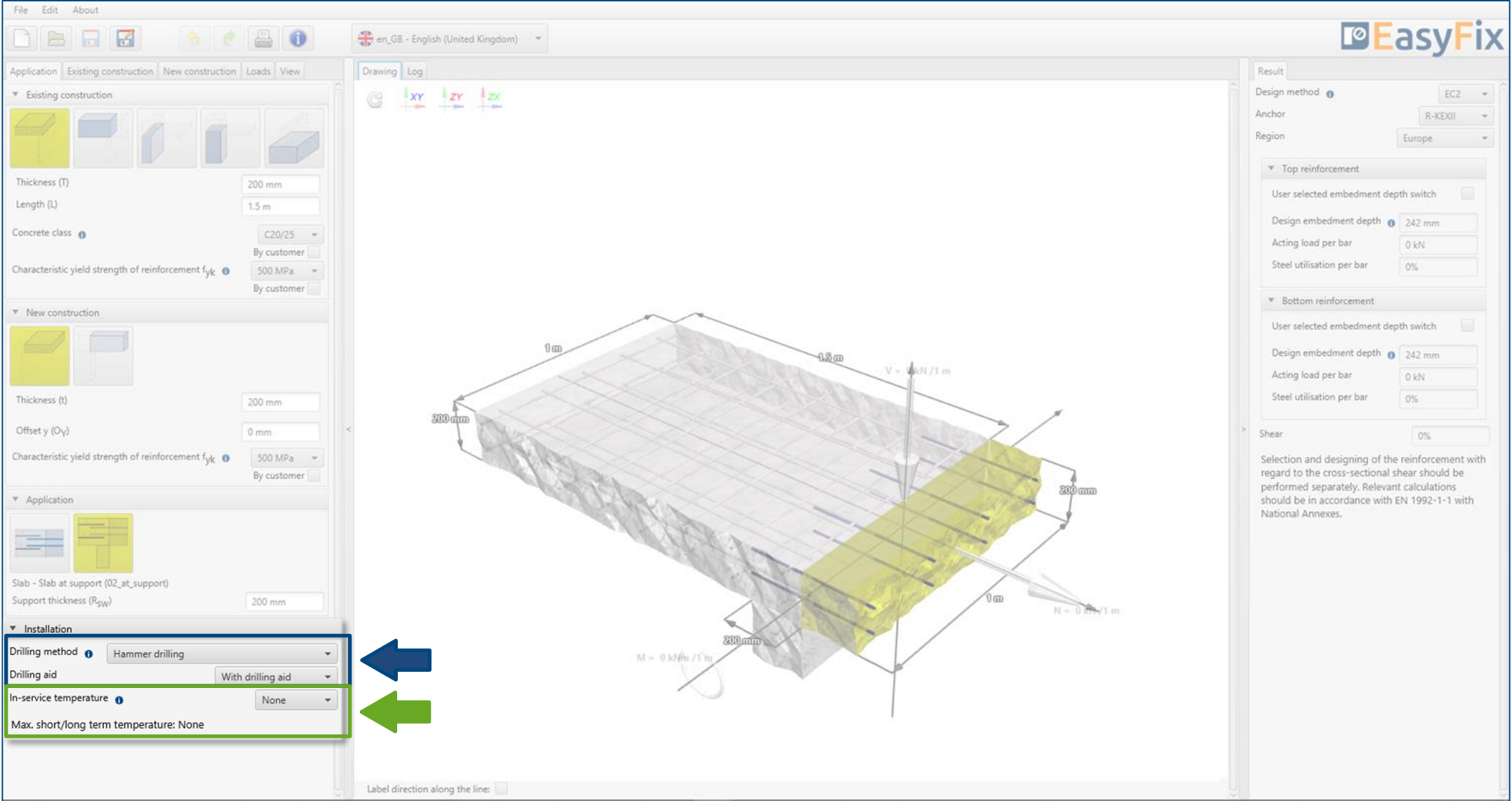
# Post Installed Rebar

5 Conditions of The installation »

Determination and defining of the drilling method in the existing structure. The selection of the drilling method affects on the thickness of the concrete cover.  
The choice of the service temperature determines the minimum and maximum temperature of the substrate at the time of installation of the anchor.

Determination of drilling method:  
Selecting from the list:  
Hammer | Diamond

Determination of service temperature:  
Selecting from the list of results filters  
the proper anchor group.





Post Installed Rebar

5 Conditions of The nstallation



Determination of drilling method:

Selecting from the list:

- Hammer drilling
- Hammer drilling with hollow drill bit
- Compressed air drilling
- Diamond drilling

Selecting from the list of results filters the proper anchor group.

Installation

Drilling method  Hammer drilling

Drilling aid

In-service temperature

Max. short/long term temperature

Hammer drilling


Hammer drilling with hollow drill bit

Compressed air drilling


Diamond drilling



Installation

Drilling method  Hammer drilling

Drilling aid

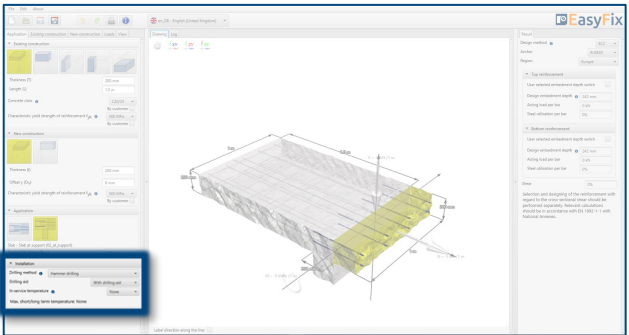
In-service temperature 

Max. short/long term temperature: None

With drilling aid

With drilling aid

Without drilling aid





## Post Installed Rebar

### 5 Conditions of The installation



Determination of service temperature range:

Selecting from the list:

- 40° C ÷ + 40° C
- 40° C ÷ + 80° C
- 40° C ÷ + 120° C

For the appropriate range, the program displays information about the range of short and long-term work.

Selecting from the list of results filters the proper anchor group.

Installation

Drilling method Hammer drilling

Drilling aid With drilling aid

**In-service temperature**

Max. short/long term temperature: None

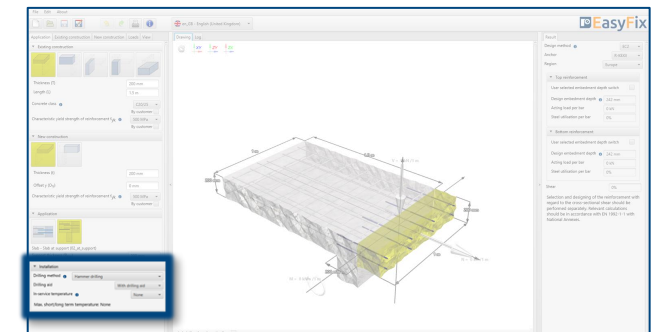
Installation

Drilling method Hammer drilling

Drilling aid With drilling aid

In-service temperature None

**Max. short/long term temperature: 80/50°C**





## Post Installed Rebar

### 6 Reinforcement of the existing construction



Defining reinforcement in an existing structure enables entering data in a simplified or detailed way. The detail model allows you to move the reinforcement in relation to the appropriate axis. Top and bottom reinforcement is defined for each layer.

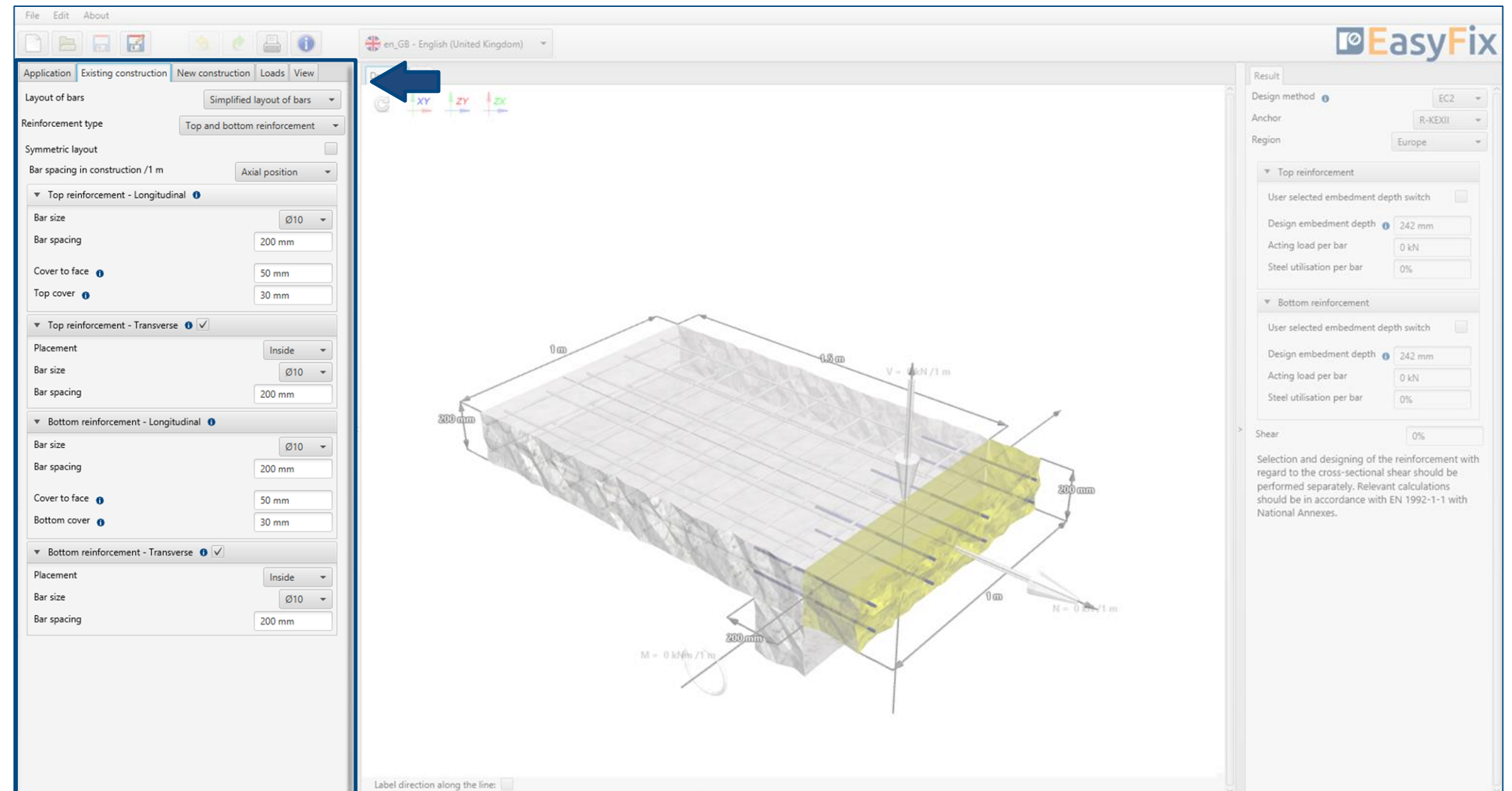
#### Defining the input data:

##### Longitudinal bars:

- The diameter of the bars
- Cover thickness - top| bottom
- Spacing | number of bars

##### Transverse bars:

- The diameter of the bars
- Spacing





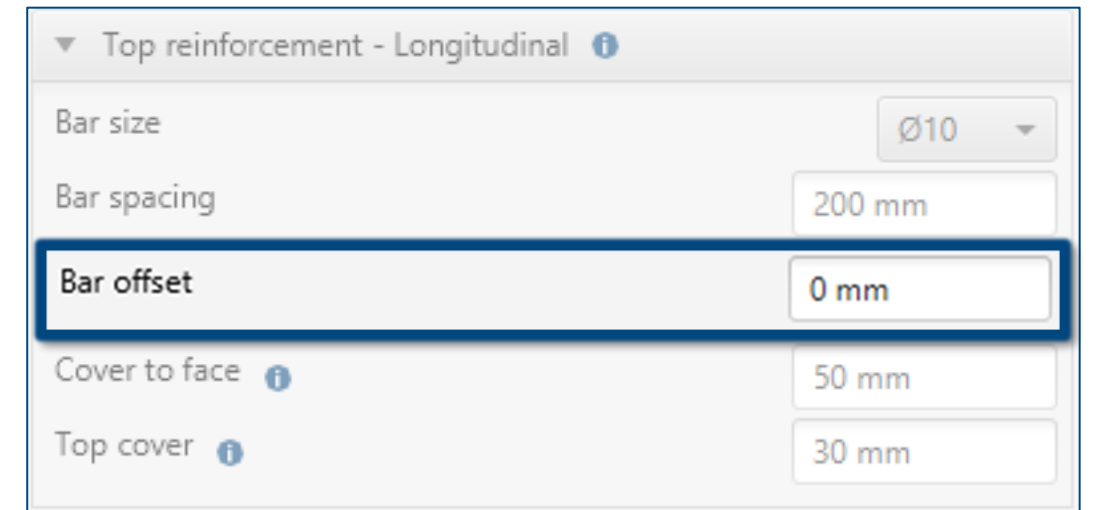
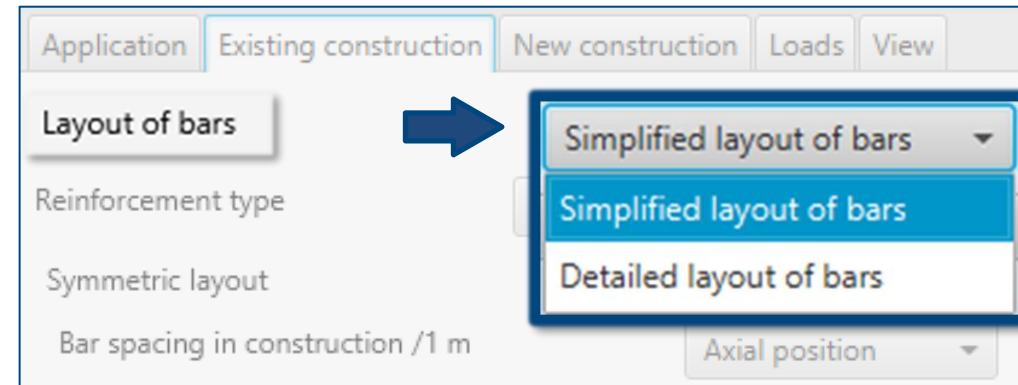
## Post Installed Rebar

### 6 Reinforcement of the existing construction »

#### Determination of bars layer:

##### Selecting from the list:

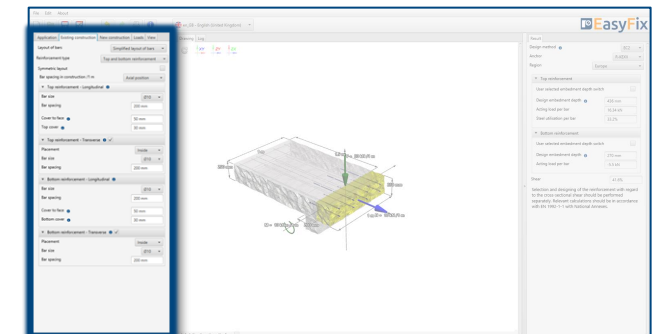
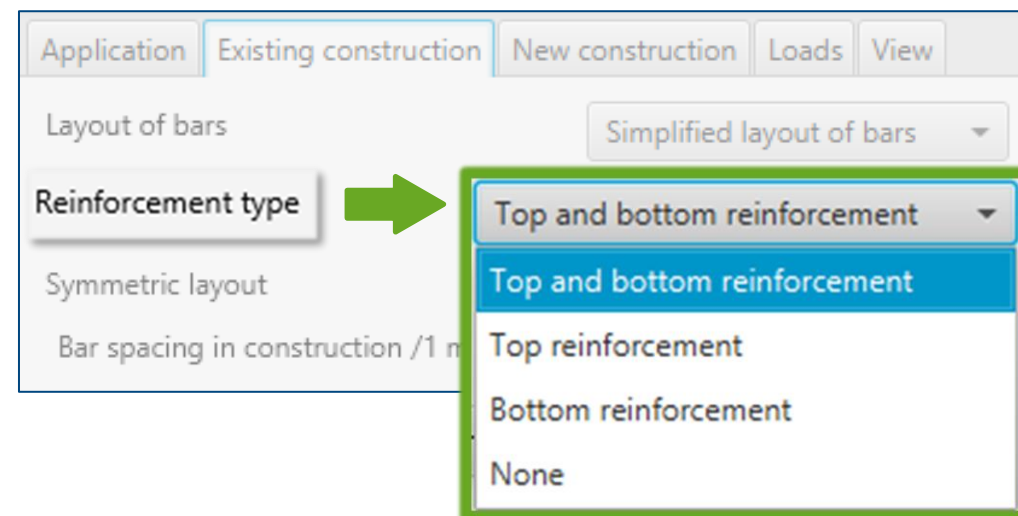
- Simplified bars layout
  - Detailed bars layout.
- It allows to move the reinforcement in relation to the appropriate axis.



#### Determination of positioning of rebar:

##### Selecting from the list:

- Top and bottom reinforcement
- Top reinforcement
- Bottom reinforcement
- None





# Post Installed Rebar

## 6 Reinforcement of the existing construction »

**Symmetric layout:**

Selecting this option allows to enter data for the top and bottom reinforcement, which have the same layer system, at the same time.

**Determination of reinforcement spacing:**

Selecting from the list:

- Axial spacing
- Number of bars

Application Existing construction New construction Loads View

Layout of bars Simplified layout of bars

Reinforcement type Top and bottom reinforcement

**Symmetric layout** ☒

Bar spacing in construction /1 m Axial position

Application Existing construction New construction Loads View

Layout of bars Simplified layout of bars

Reinforcement type Top and bottom reinforcement

Symmetric layout ☐

Bar spacing in construction /1 m

**Axial position**

Axial position

Number of bars

▼ Top reinforcement / Bottom reinforcement - Longitudinal ⓘ

Bar size Ø10

**Bar spacing** 200 mm

**Number of bars** 5

Cover to face ⓘ 50 mm

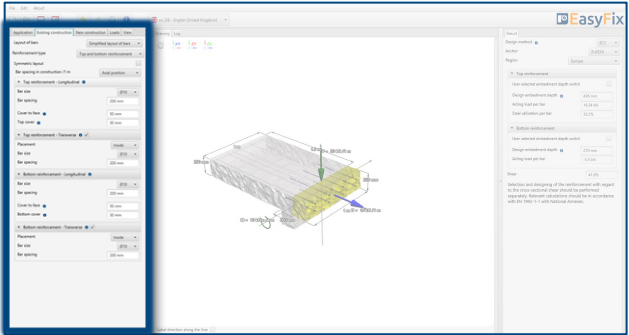
Top cover / Bottom cover ⓘ 30 mm

▼ Top reinforcement / Bottom reinforcement - Transverse ⓘ ☒

Placement Inside

Bar size Ø10

Bar spacing 200 mm





# Post Installed Rebar

## 6 Reinforcement of the existing construction »

The diameter of longitudinal reinforcement

Thickness of concrete cover face

Thickness of top and bottom concrete cover

▼ Top reinforcement / Bottom reinforcement - Longitudinal ⓘ

Bar size

→ Ø10 ▼

Bar spacing

200 mm

Number of bars

5

Cover to face ⓘ

→ 50 mm

Top cover / Bottom cover ⓘ

→ 30 mm

▼ Top reinforcement / Bottom reinforcement - Transverse ⓘ ✓

Placement

Inside ▼

Bar size

Ø10 ▼

Bar spacing

200 mm



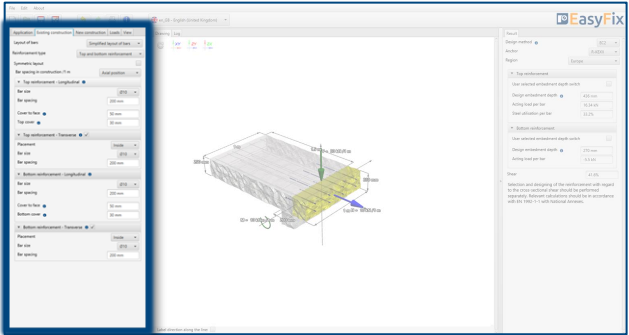
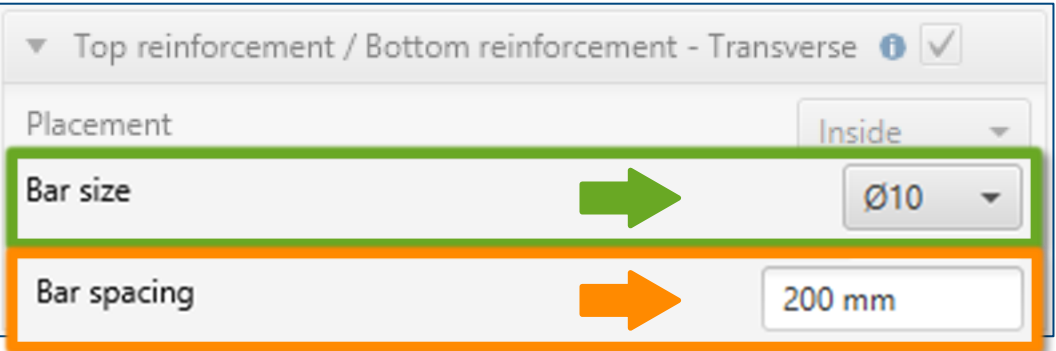
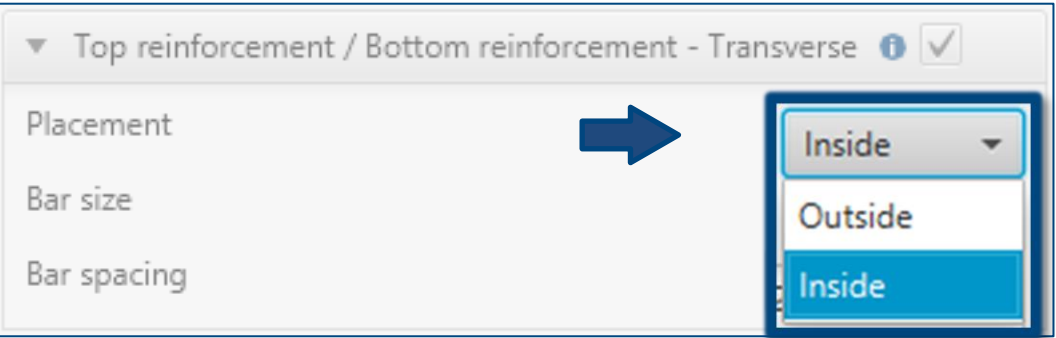
Post Installed Rebar

6 Reinforcement of the existing construction »

Positioning of the transverse reinforcement:  
Internal | External of longitudinal reinforcement

The diameter of the transverse reinforcement or stirrups

The spacing of the transverse reinforcement





## Post Installed Rebar

7

Determination of reinforcement  
In the new construction

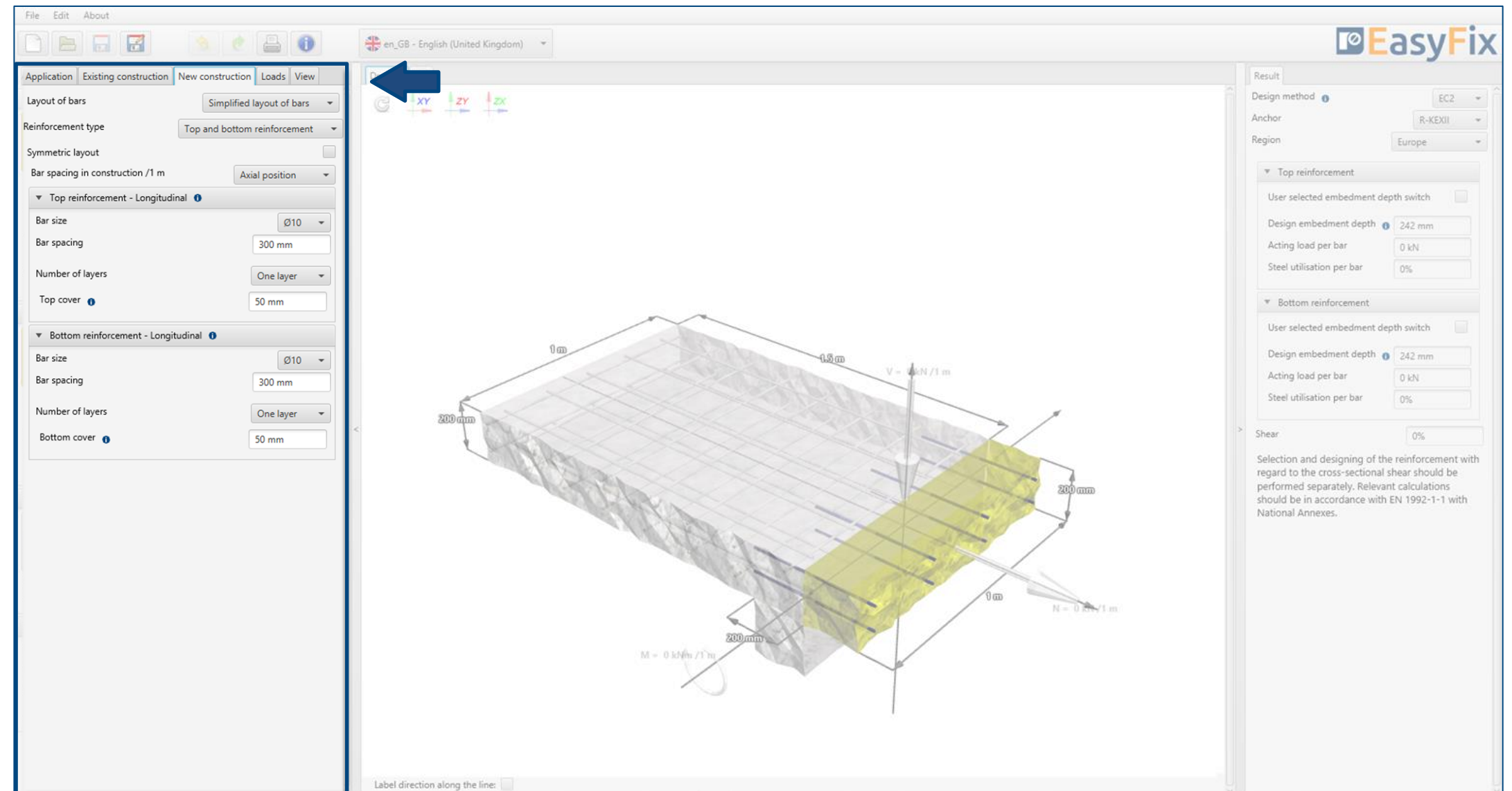


Defining reinforcement in a new structure enables entering data in a simplified or detailed manner. The detail model allows to move the reinforcement in relation to the appropriate axis. Top and bottom reinforcement is defined for each layer.  
Possibility to add an additional row of bars in each layer.

Defining the input data:

**Longitudinal bars:**

- The diameter of the bars
- Cover thickness - top| bottom
- Spacing | number of bars





## Post Installed Rebar

7

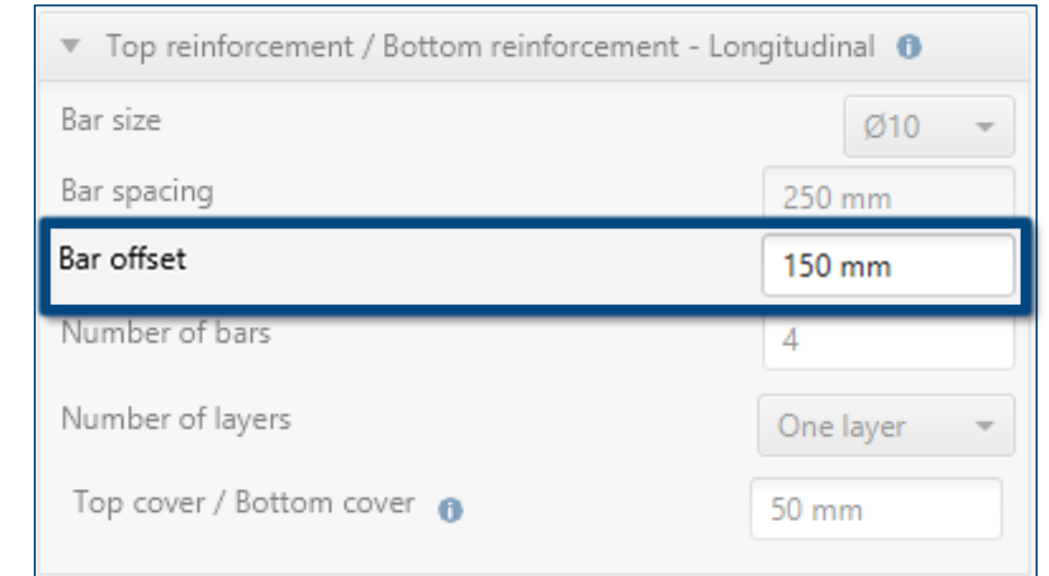
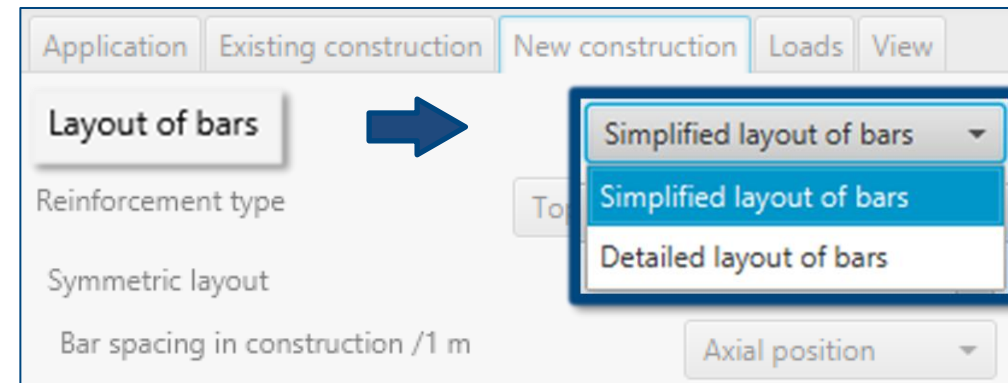
Determination of reinforcement  
In the new construction »

Determination of bars layer:

Selecting from the list:

- Simplified bars layout
- Detailed bars layout.

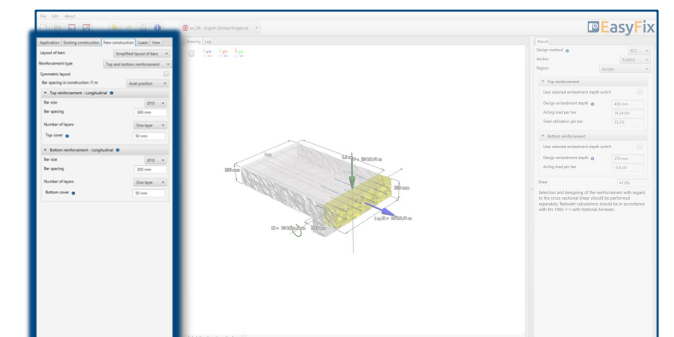
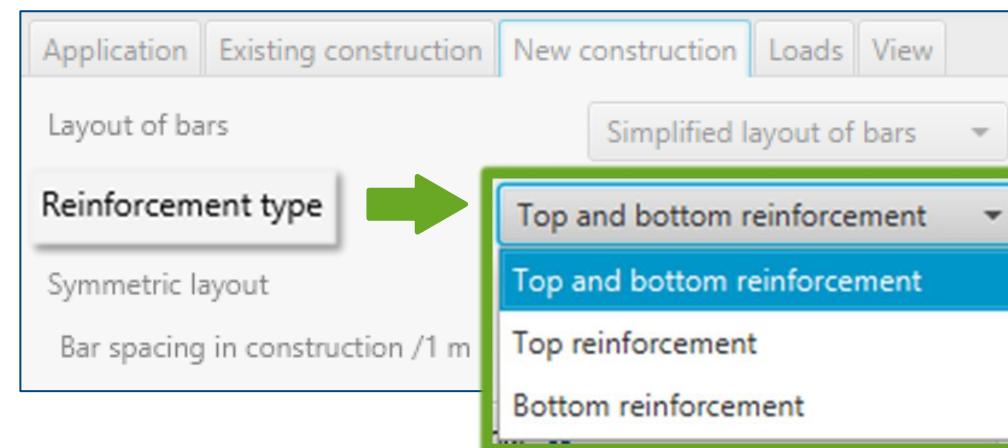
It allows to move the reinforcement in relation to the appropriate axis.



Determination of positioning of rebar:

Selecting from the list:

- Top and bottom reinforcement
- Top reinforcement
- Bottom reinforcement





# Post Installed Rebar

## 7 Determination of reinforcement In the new construction »

**Symmetric layout:**

Selecting this option allows to enter data for the top and bottom reinforcement, which have the same layer system, at the same time.

**Determination of reinforcement spacing:**

Selecting from the list:

- Axial spacing
- Number of bars

Application Existing construction New construction Loads View

Layout of bars Detailed layout of bars

Reinforcement type Top and bottom reinforcement

**Symmetric layout** ☒

Bar spacing in construction /1 m Number of bars

▼ Top reinforcement / Bottom reinforcement - Longitudinal ⓘ

Bar size Ø10

Bar spacing 200 mm

Number of bars 5

Number of layers One layer

Top cover / Bottom cover ⓘ 50 mm

Application Existing construction New construction Loads View

Layout of bars Detailed layout of bars

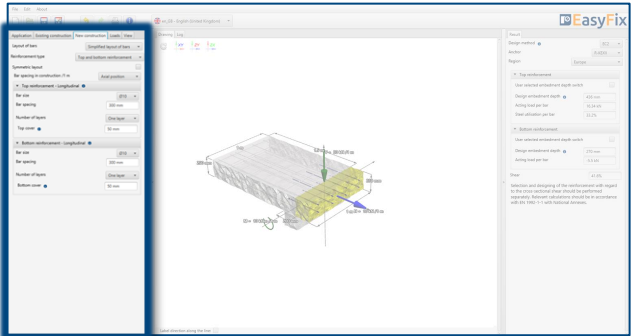
Reinforcement type Top and bottom reinforcement

Symmetric layout ☒

Bar spacing in construction **Axial position**

Axial position

Number of bars





# Post Installed Rebar

7 Determination of reinforcement  
In the new construction »

The diameter of longitudinal reinforcement

Determination of number of layers of longitudinal rebar

Thickness of top | bottom concrete cover

▼ Top reinforcement / Bottom reinforcement - Longitudinal ⓘ

Bar size

→ Ø10 ▼

Bar spacing

250 mm

Bar offset

150 mm

Number of layers

→ Two layers ▼

▼ Layer 1

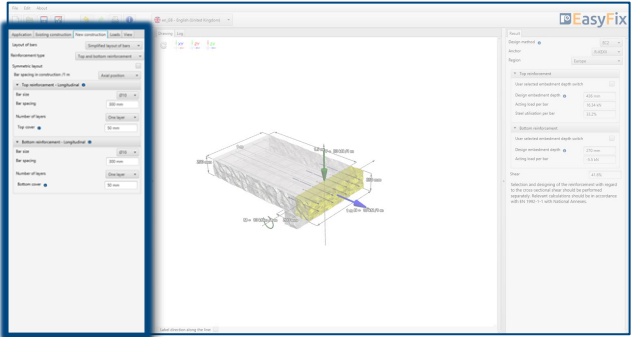
Top cover / Bottom cover ⓘ

→ 50 mm

▼ Layer 2

Top cover / Bottom cover ⓘ

→ 50 mm





## Post Installed Rebar

### 8 Defining Of acting load



Defining of the load depends on the type of structure or the constructor's assumptions. It is also possible to enter loads from the model level. Depending on the work of the structure, it is also possible to take into account the transverse reinforcement and transverse pressure. According to the theory described in Eurocode 2 (EN 1992-4) Part 1.

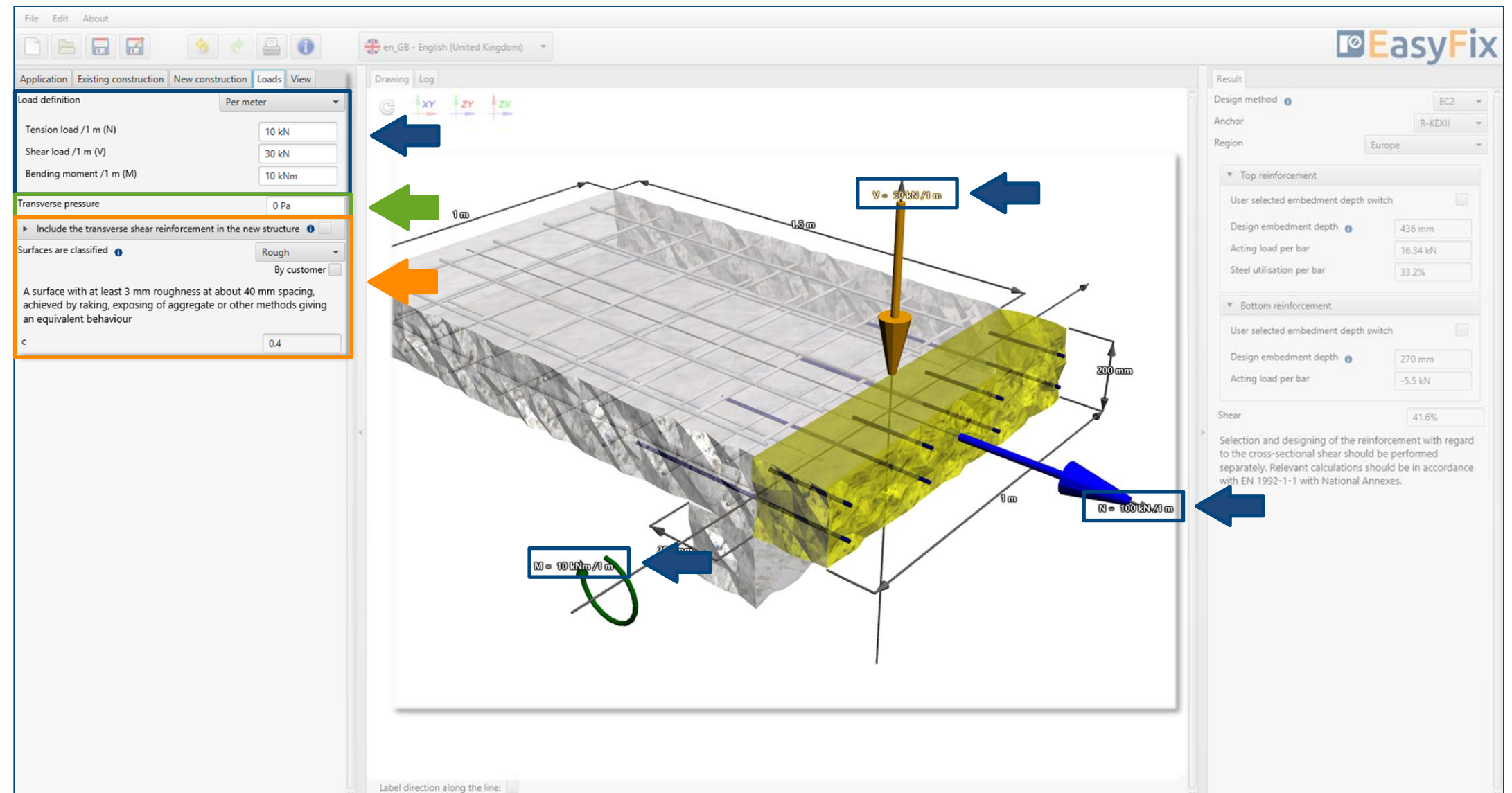
Determination of the input data:

Selecting from the list:

- Acting load per meter | cross section
- Acting load per bar
- Load per yield strength

Including the transverse pressure

Including the transverse shear reinforcement in the new structure





Post Installed Rebar

8 Defining Of acting load



Acting load  
per meter | cross section

Acting load  
per bar

Defining of load  
per yield strength

Load definition

Tension load /1 m (N)

Shear load /1 m (V)

Bending moment /1 m (M)

Per meter

Load definition

Tension load /1 m (N)

Shear load /1 m (V)

Bending moment /1 m (M)

Per bar

Load definition

Tension load /1 m (N)

Shear load /1 m (V)

Bending moment /1 m (M)

Per bar yield strength

Load definition

Per meter

Tension load /1 m (N) 120 kN

Shear load /1 m (V) 100 kN

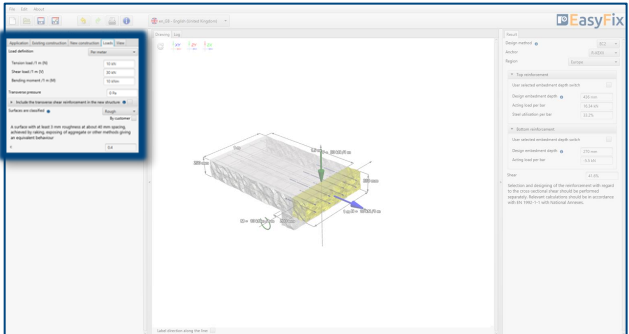
Bending moment /1 m (M) 10 kNm

Top reinforcement

Per bar (N) 30 kN

Bottom reinforcement

Per bar (N) 55 kN





Post Installed Rebar

8 Defining  
Of acting load



Including  
the transverse shear reinforcement in  
the new structure

$\alpha$  - the angle between shear  
reinforcement and the main tension  
chord  
 $\beta$  - the angle between concrete  
compression struts and the main tension  
chord

Including  
Roughness of old concrete surface

▼ Include the transverse shear reinforcement in the new structure ☒

$\alpha$

$\beta$

Surfaces are classified Rough

By customer ☐

A surface with at least 3 mm roughness at about 40 mm spacing,  
achieved by raking, exposing of aggregate or other methods giving an  
equivalent behaviour

c

▼ Include the transverse shear reinforcement in the new structure ☒

$\alpha$

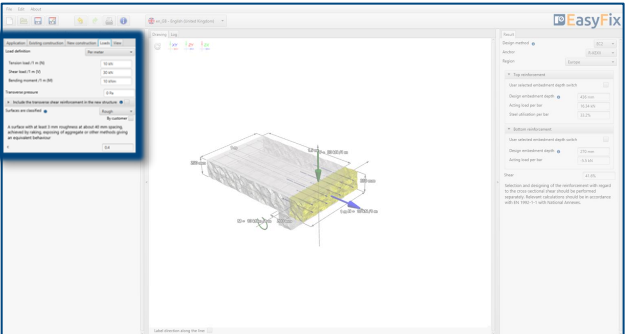
$\beta$

Surfaces are classified Rough

Very smooth  
Smooth  
Rough  
Indented

A surface with at least 3 mm roughness at about 40 mm spacing,  
achieved by raking, exposing of aggregate or other methods giving an  
equivalent behaviour

c





## Post Installed Rebar

### 9 Analysis of the results



In the results panel, we can choose a design method between the calculation of the anchorage according to the standards contained in Eurocode 2 and the PIRR engineering method. In addition, it is possible to filter products and the region in which the products will be used.

#### Panel of filters:

- Design method
- Type of resin
- Region

#### Results of top reinforcement.

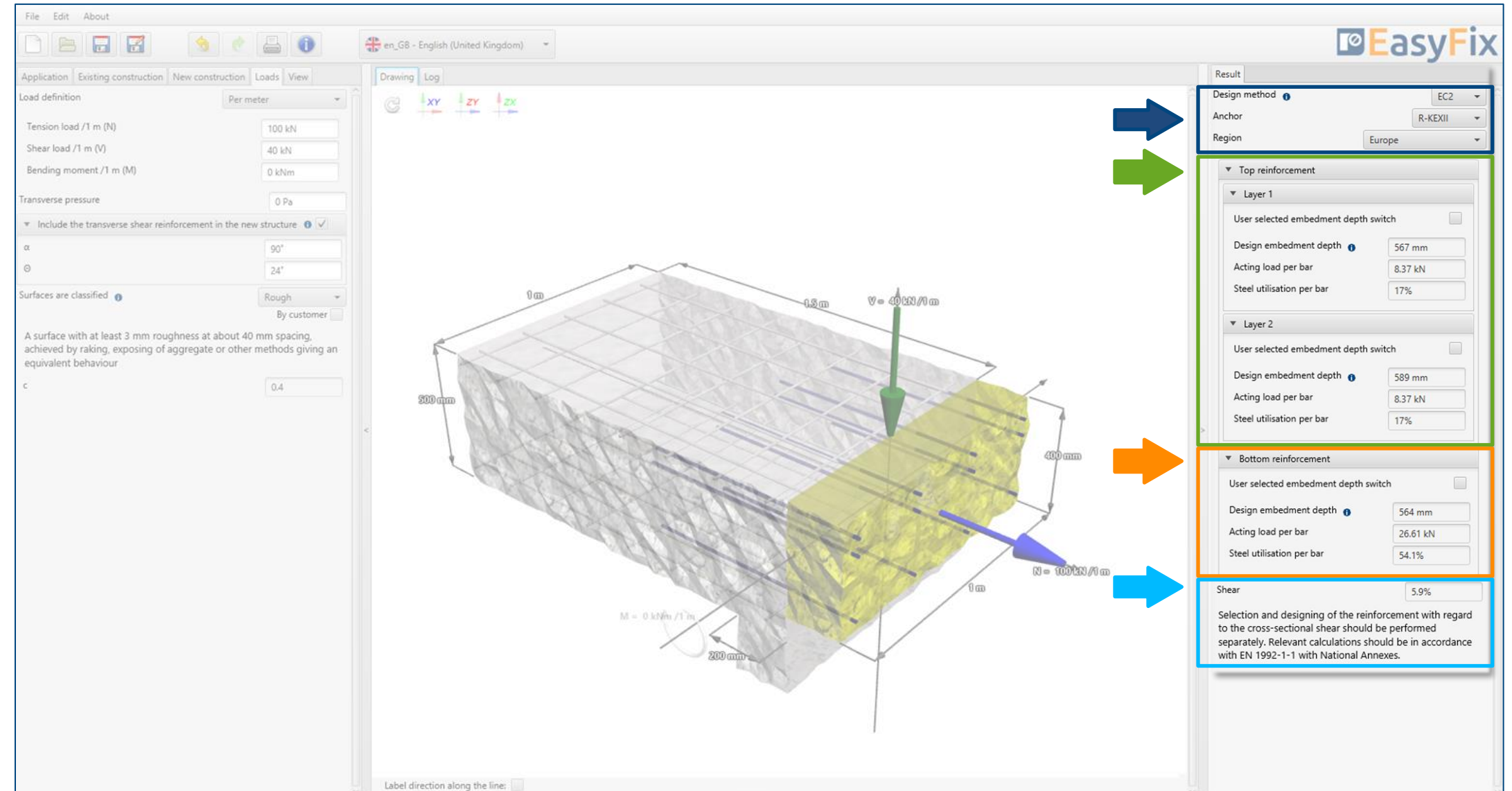
For both layers, if there's more then one.

#### Results of bottom reinforcement.

For both layers, if there's more then one.

#### Verification of shear loads

The results depends on the influence of the transverse shear reinforcement in the new structure.





Post Installed Rebar


9 Analysis of the results »

Design method:  
- Eurocode 2  
- Post Installed Rebar Rawlplug

Selecting a product from the list available for a given region.

Selecting the region where the product will apply.

Result


Design method 

Anchor R-KEXII


Region Europe

EC2  
EC2  
PIRR

Result


Design method  EC2


Anchor R-KEXII

Region 

Europe  
Europe  
Asia  
Africa  
North America  
South America  
Australia

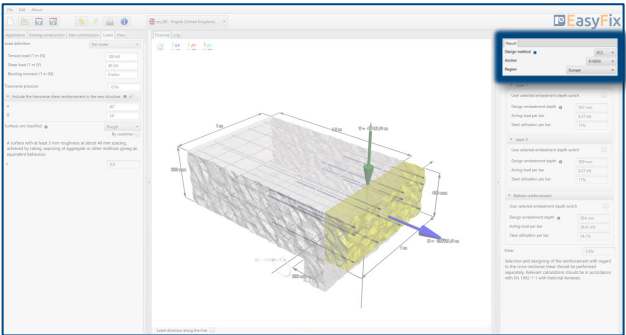
Result

Design method  EC2

Anchor 

Region Europe

R-KEXII





# Post Installed Rebar

## 9 Analysis of the results



The results are shown separately for each layer.

Possibility to enter the declared anchorage depth, not less than the calculated value.

▼ Top reinforcement

▼ Layer 1

User selected embedment depth switch

Design embedment depth ⓘ 567 mm

Acting load per bar 8.37 kN

Steel utilisation per bar 17%

▼ Layer 2

User selected embedment depth switch

Design embedment depth ⓘ 589 mm

Acting load per bar 8.37 kN

Steel utilisation per bar 17%

▼ Bottom reinforcement

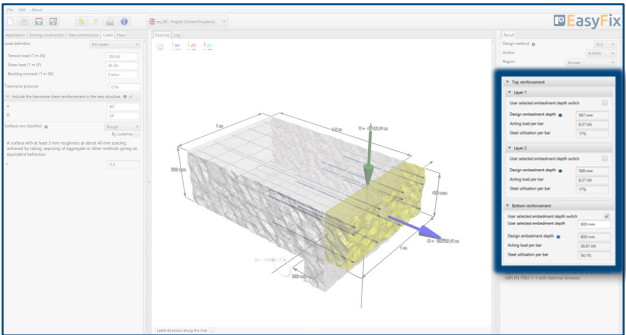
User selected embedment depth switch ☒

User selected embedment depth 600 mm

Design embedment depth ⓘ 600 mm

Acting load per bar 26.61 kN

Steel utilisation per bar 54.1%





## Post Installed Rebar

# 10

Generating  
The printout



Print option.  
Enables you to generate a document in  
a pdf format.

In the printout panel it is possible to set regional options, i.e., language, decimal separator and system of units. The printout in pdf format contains all the data that is necessary in design and during the installation of the product.

The screenshot displays the 'Print' dialog box within the EasyFix software. The dialog box is titled 'Print' and has two tabs: 'Print' and 'Drawing'. The 'Print' tab is selected, showing the following options:

- Print language selection:**
  - Language: pl\_PL - Polish (Poland)
  - Decimal separator: Language based
  - System of measurement: Metric
  - Custom page numbering: ☐
- Project:**
  - Name: [Text field]
  - Subject: [Text field]
  - Street: [Text field]
  - City: [Text field]
  - Code: [Text field]
  - Notes: [Text area]
- Organization:**
  - Calculations made by: [Text field]
  - Checked by: [Text field]
- Print date:** 23.09.2021
- Print to file:** C:\Users\azurek\Favorites\6. ARCHIWUM\3. AKTYWNOŚĆ\NEF wydruki\easyfix202109231349

A large blue arrow points from the 'Print' icon in the software's toolbar to the 'Print' dialog box. The background shows the main software interface with various input fields for load definition, transverse pressure, and reinforcement details.

