

SPANer

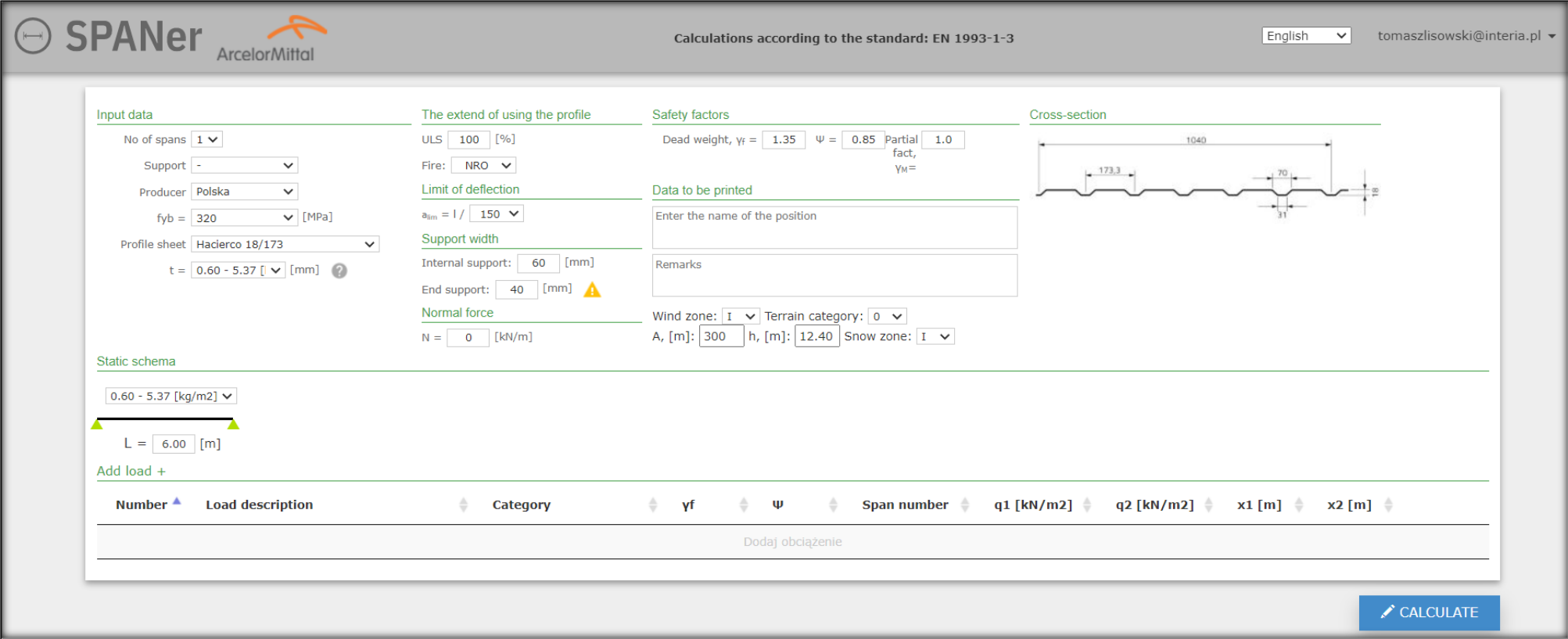
assistance in the selection of profiled sheets offered by
ArcelorMittal Construction.

FIRST STEPS

ArcelorMittal

SPANer – FIRST STEPS

After logging in, we can start designing.
In this presentation we will focus on how to fill in all the data correctly and how this affects other fields.



The screenshot shows the SPANer software interface with the following sections and data:

- Header:** SPANer ArcelorMittal, Calculations according to the standard: EN 1993-1-3, English, tomaszlisowski@interia.pl
- Input data:**
 - No of spans: 1
 - Support: -
 - Producer: Polska
 - fyb = 320 [MPa]
 - Profile sheet: Hacierco 18/173
 - t = 0.60 - 5.37 [mm]
- The extend of using the profile:**
 - ULS: 100 [%]
 - Fire: NRO
 - Limit of deflection: $\rho_{lim} = 1 / 150$
 - Support width:
 - Internal support: 60 [mm]
 - End support: 40 [mm]
 - Normal force: N = 0 [kN/m]
- Safety factors:**
 - Dead weight, $\gamma_r = 1.35$, $\psi = 0.85$, Partial fact, $\gamma_M = 1.0$
- Cross-section:**
 - Diagram showing a profile with dimensions: 1040, 173.3, 70, 31.
- Data to be printed:**
 - Enter the name of the position
 - Remarks
- Wind zone:** I, Terrain category: 0, A, [m]: 300, h, [m]: 12.40, Snow zone: I
- Static schema:**
 - 0.60 - 5.37 [kg/m²]
 - L = 6.00 [m]
- Add load +**
- Table:**

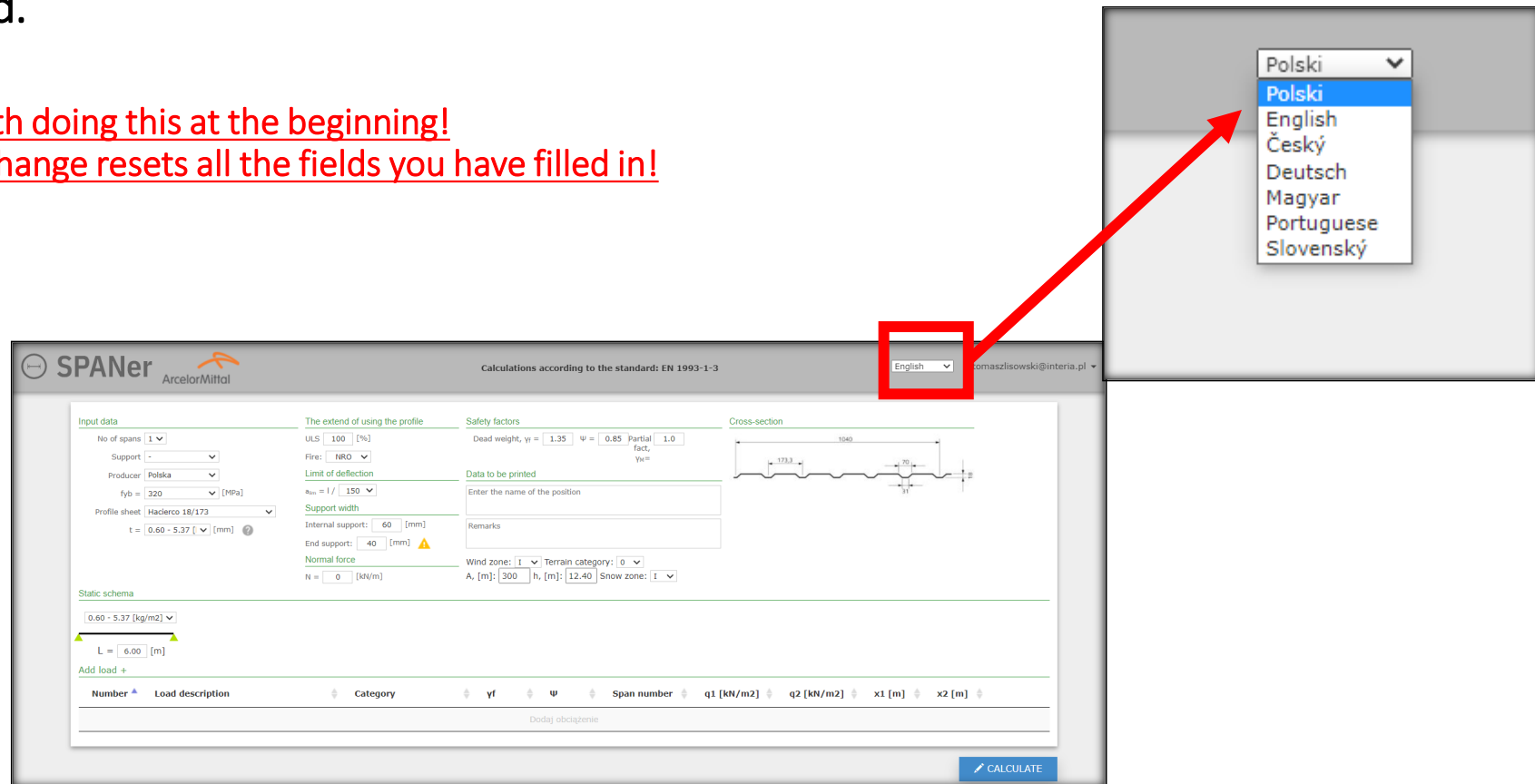
Number	Load description	Category	γ_f	ψ	Span number	q1 [kN/m ²]	q2 [kN/m ²]	x1 [m]	x2 [m]
Dodaj obciążenie									
- Buttons:** CALCULATE

SPANer – FIRST STEPS

Language selection

The first step is to select the language. This is important as it affects both the language in which we will use the programme and in which the subsequent report will be created.

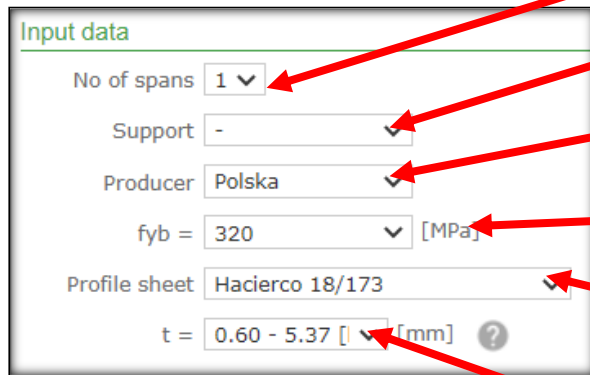
It is worth doing this at the beginning!
A later change resets all the fields you have filled in!



SPANer – FIRST STEPS

Selection of input data

Let us now focus on filling in the next fields. What options do we have?



The screenshot shows the 'Input data' section of the SPANer software interface. It contains several input fields: 'No of spans' (dropdown menu set to 1), 'Support' (dropdown menu set to '-'), 'Producer' (dropdown menu set to 'Polska'), 'fyb =' (dropdown menu set to 320 with '[MPa]' next to it), 'Profile sheet' (dropdown menu set to 'Hacierco 18/173'), and 't =' (dropdown menu set to '0.60 - 5.37' with '[mm]' and a help icon next to it). Red arrows point from the explanatory text on the right to each of these fields.

1 to 8 spans available

in addition, a support can be inserted in any configuration

SPANer is used in many countries. In addition to changing the language, as mentioned on the previous page, it is also possible to select the country of production and, as a result, the base of profiles offered in a particular region (does not affect the language change)

If necessary, it is possible to change the fyb value. However, we recommend using fyb=320MPa (due to greater availability)

By selecting the relevant country of manufacture, you will be given the option of using one of the many products sold in that region. The product database is always kept up-to-date. Profiles that are no longer manufactured but may still appear in older designs are identified by us as '(discontinued)'.

In this field, the offered sheet thicknesses are displayed for the selected profile, together with their weights to facilitate an initial assessment of the cost-effectiveness of the solution.

Making changes in this block does not remove the data entered in other fields, which is a great help when we are just looking for the optimum profile for our project. Obviously, a change in e.g. the country of production will involve a change in the available profiles, thus "proposing" the lowest profile for the given region, but all other filled-in fields not directly related to this correction will remain unchanged.

SPANer – FIRST STEPS

% load capacity usage, allowable deflection, width of supports

Let us now focus on filling in the next fields. What options do we have?

The extend of using the profile

ULS [%]

Fire: ▾

Limit of deflection

$a_{lim} = l /$ ▾

Support width

Internal support: [mm]

End support: [mm] ⚠

Normal force

N = [kN/m]

In this field, we specify the permissible level of use of the load bearing capacity of the trapezoidal sheet (e.g. due to fire resistance classification provisions).

If you want the reason for the load-bearing capacity limitation (e.g. the requirement to meet fire resistance class RE15) to appear automatically in the report, select the appropriate option in this field. However, the selection itself does not automatically change the level of use from the field above (this would be difficult to do in practice due to the number of classifications).

Depending on the need, we can determine our expected permissible deflection.

The width of the plate support can have a significant impact on the selection of a suitable solution. It is therefore worth determining this value correctly, separately analysing systems with different supports by giving the widths of the actual support in a given situation. We have described how to determine the width of the outermost support under „⚠“.

If there is a normal force in the sheet metal, its value should be indicated in this field. Other loads will be given elsewhere.



SPANer – FIRST STEPS

Safety factors, data for printing, profile preview

What opportunities do we have?

This is where we influence the coefficients we want to apply to the profile sheet, if necessary.

"Name of the position" allows different calculation positions to be distinguished in the report. This name will be displayed both in the report and will be visible in the programme database. This is particularly important for more complex projects.

"Remarks" is a space for the designer's notes. This information will only be saved in the Project set up in the software. You will not see it in the report

The additional information provided here has an impact on the report records, so we recommend that you complete it. As we are continually developing the programme, the data listed here may have an impact on further functionalities or new report positions in the future. You should therefore get into the habit of completing each field correctly.

The screenshot displays the SPANer software interface with several sections:

- Safety factors:** Includes input fields for Dead weight, $\gamma_f = 1.35$, $\psi = 0.85$, Partial fact, $\gamma_M = 1.0$, and $\gamma_M =$.
- Data to be printed:** A text input field labeled "Enter the name of the position".
- Remarks:** A text area for notes.
- Additional parameters:** Wind zone: I, Terrain category: 0, A, [m]: 300, h, [m]: 12.40, Snow zone: I.
- Cross-section:** A technical drawing of a profile with dimensions: 1040 (total width), 173.3 (flange width), 70 (web width), 31 (flange thickness), and 18 (web thickness).

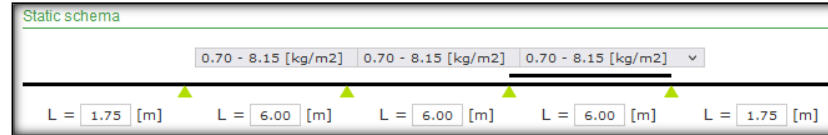
The "Cross-section" field allows you to view the profile you have selected at a glance, to see its dimensions such as height or coverage width.

SPANer – FIRST STEPS

Adjustment of static scheme, span and sheeting arrangement.

What opportunities do we have?

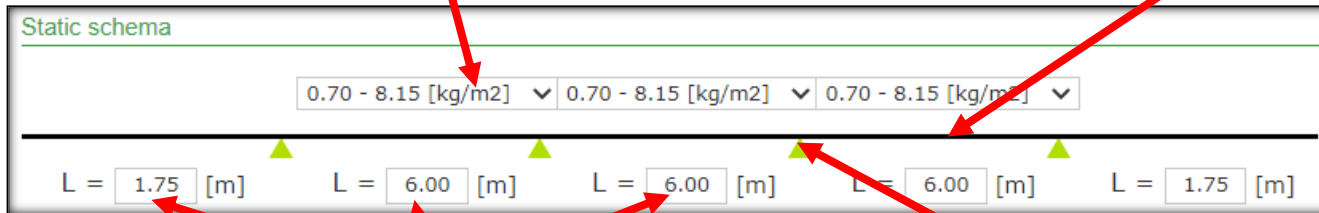
The choices made so far affect the static layout displayed in the next field. However, we can further influence it by looking for the most optimal solution.



Clicking on the line representing the span allows reinforcement to be introduced in the span in question by double-layering the profiled sheeting.

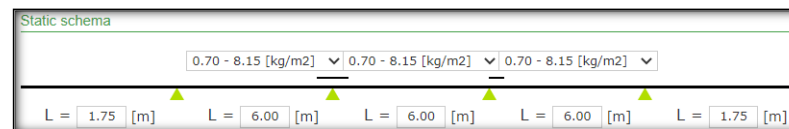
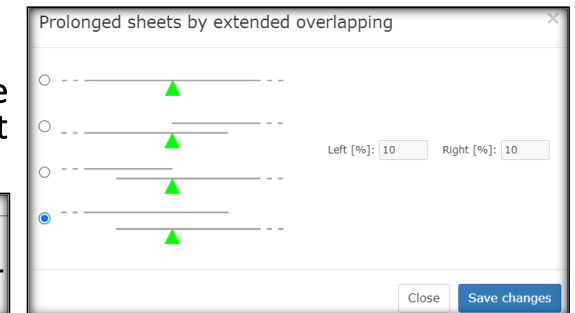


If required in a particular span, the sheet thickness can be changed individually by selecting a value from the list (changing the 't' value discussed on an earlier slide changes the thickness in all fields).



Here, we can specify the correct spans by filling in the subsequent fields (double-clicking in the span window in the next span 'rewrites' the value from the first span).

Clicking on the triangle symbolising the support allows you to enter a variant extension.



SPANer – FIRST STEPS

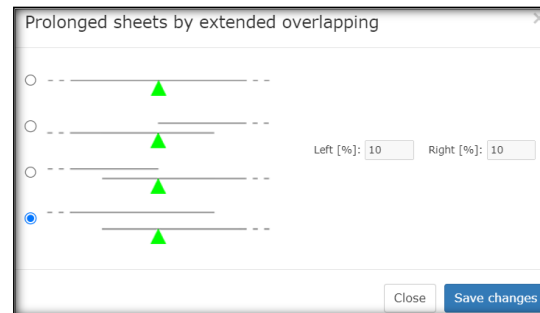
Double sheeting, extension over support

What opportunities do we have?

Reinforcing the span by double-layering sheet of the same thickness often provides a solution in situations where simply increasing the thickness of the sheet does not provide sufficient load-bearing capacity. However, we do not recommend this solution if it is not necessary. It is, of course, a case-by-case design decision, but in areas of overlap or congestion, overlapping of consecutive plates (in extreme cases up to 8) may prove difficult or even impossible to install correctly. It is therefore worth considering other options.



The use of extensions is usually related to the desire for a multi-span arrangement on the roof. In practice, profiled sheets are supplied in lengths of less than 15 m, which is usually not sufficient to cover the entire roof (the use of longer lengths usually involves increased transport costs). Above this length, stiffeners are required if the "advantages" of a multi-span system are to be achieved. The possibility of using stiffeners on both sides also sometimes allows the use of thinner sheeting. However, it should always be borne in mind that stiffening involves an increase in the total m2 of plate required.





SPANer – FIRST STEPS













Adding loads

What opportunities do we have?

The last thing left to complete is to add the loads. Firstly, it should be noted that self-weight is added automatically (it is not shown in the statement below but will be shown in the report). Normal force N is also not mentioned in this statement. However, we can add any number of other loads by giving them an appropriate description, specifying the category, place of application, etc.

Here we can add further loads

Loads that have already been added can easily be edited

Number ▲	Load description	Category	γ_f	ψ	Span number	q1 [kN/m ²]	q2 [kN/m ²]	x1 [m]	x2 [m]	
1	roof lawyers	Permanent	1.35	0.85	wszystkie	0.27	0.27	0	21.5	 
2	instalacje	Live	1.50	1.00	wszystkie	0.50	0.50	0.00	21.50	 
3	wiatr	Wind	1.50	0.60	wszystkie	0.14	0.14	0.00	21.50	 
4	śnieg podstawowy	Snow	1.50	1.00	wszystkie	0.72	0.72	0.00	21.50	 
5	Attyka, worek śniegowy	Snow	1.50	1.00	LEFT	1.08	0.70	0.00	1.75	 
6	Attyka, worek śniegowy	Snow	1.50	1.00	1	0.70	0.00	0.00	3.25	 

or delete



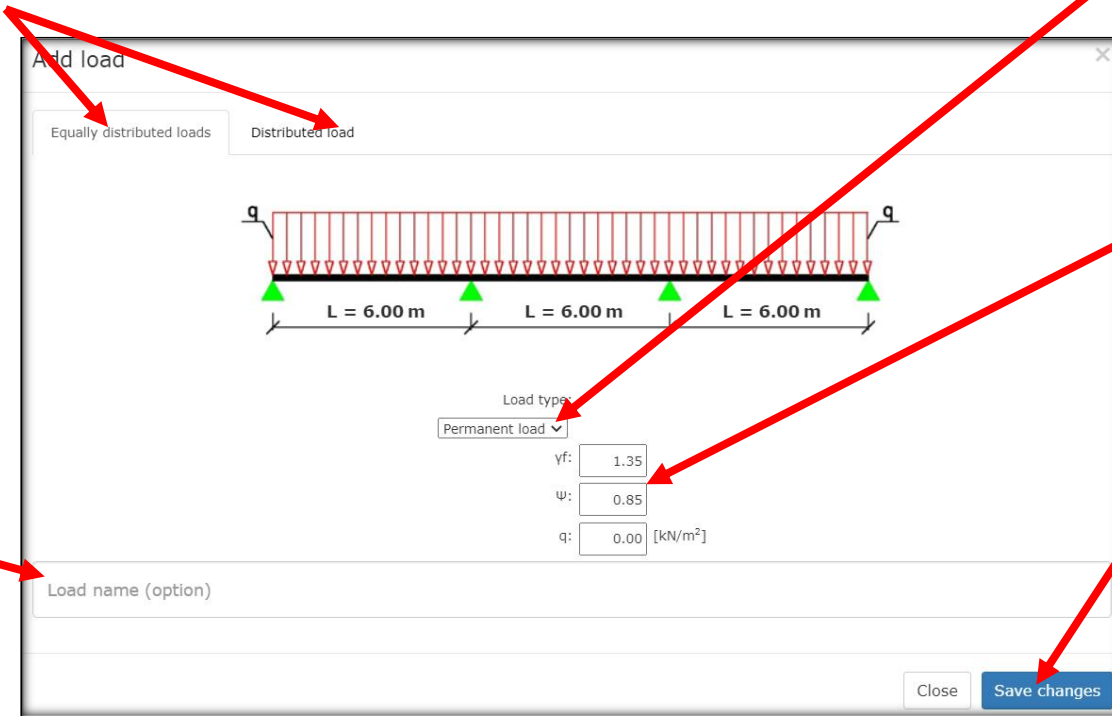
SPANer – FIRST STEPS

Adding loads

Loads distributed over the whole

When adding a load, we need to decide whether it should apply to the whole scheme or only to one particular span (or part of it). Loads that are distributed over the whole will automatically adapt to the scheme when the spans or number of spans are changed.

There are 4 load types to choose from. Each of them has a different colour in the set-up, which makes it easier to get things under control when we plan to model more complex cases.



This is the place where you can give new loads an individual name. This will be displayed later in the statement and in the report.

We can individually specify the coefficients and load value for each of the loads entered.

Finally, it is necessary to save the changes



SPANer – FIRST STEPS

Adding loads

Distributed loads on the span

Entering values starts with the indication of the span.

There are more positions to be filled for the second tab. A load spread over one span allows more complex layouts to be introduced. The drawing below, together with the symbols placed, will help with this.

The load value at the beginning and end is given as shown in the figure. After the value of q1 has been determined, the program will complete field q2 with the same value by default. If the design case is different, the notation should of course be changed.

If the load does not apply to the entire span, uncheck this box.

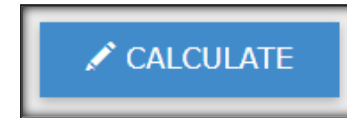
x1 and x2 should be given according to the drawing.

Finally, it is necessary to save the changes.

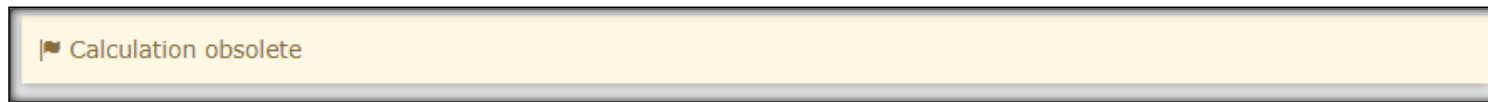
SPANer – FIRST STEPS

Complete data entry: calculations

Once all the previously described steps have been completed, the only thing left to do is to use the



A range of information and calculation results are displayed below, allowing us to quickly determine the correctness of the data entered and the optimisation of the profile for the designed layout and loads. If you are not fully satisfied with the result, you can easily edit all the fields you filled in earlier. The programme will then inform us if the changes made affect the results or the report.



Another use of "CALCULATE" will get you closer to the expected result.

With all parameters in one tab together with the results, express optimisation can be carried out in just a few steps.

SPANer – FIRST STEPS

We encourage you to use our programme free of charge. Should you have any problems, our technical team will be happy to clarify any doubts.

We are constantly developing our software. We believe that the accessibility, intuitiveness, functionality and clarity of SPANer will make your work easier and enable you to make the best possible selection of the profiled sheets offered by ArcelorMittal Constuction.

ArcelorMittal