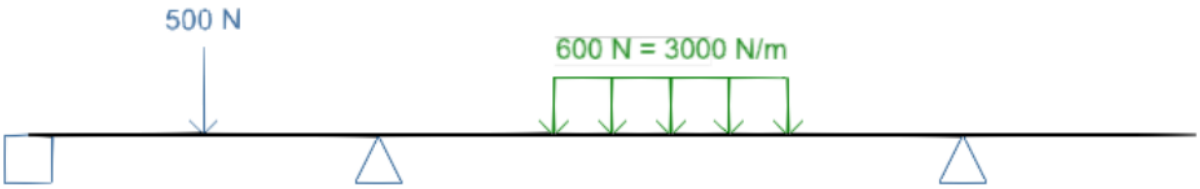
Walraven Rail Selector

User manual



Content

1 Introduction

Walraven Rail Selector (WRS) is an online web application with the main objective to verify that a Walraven fixing rail / channel is valid for user's desired purpose. Based on a few inputs, the user can obtain a structural report justifying a specific configuration (fixing rail / channel geometry with specific vertical loads applied).

1.1 Calculations

Only user-defined configurations are analysed; no load combinations are taken into consideration automatically. It is the user's responsibility to validate all possible scenarios related to installation and utilisation.

Safety factor:
On the impact side, a safety factor $\gamma_{G/Q}$ of $1{,}40$ is taken and, on the material side, a safety factor γ_M of $1{,}10$ is used. The overall safety factor γ is therefore $1{,}54$.

Fixing rail / channel own weight:
The dead weight of the fixing rail / channel is always taken into account.

Validation:
The tool validates whether stress or deflections are not exceeded.
Additionally, when selecting "Simple cantilever" or "Fixing rail + base plate" in the "Construction type" field from the "Rail" dashboard, an additional check is performed to validate the maximum moment in the end plate.

Base plates considered in the calculations:

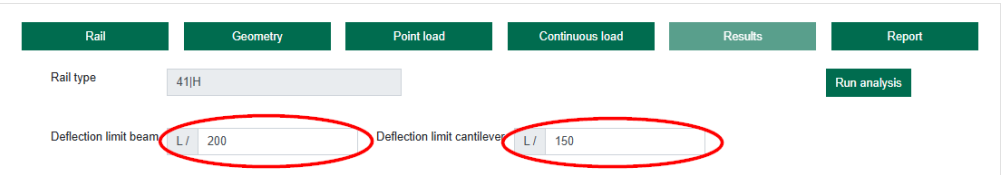
- Walraven RapidStrut® – Walraven RapidStrut® Base Plate G2 (BUP1000) - Walraven International
  - 665885400 – 485 Nm
- Walraven RapidRail® – Walraven RapidRail® Wall Plate - Walraven International
  - 6613200 – 140 Nm
  - 6613235 – 310 Nm
- Walraven Maxx – Walraven Maxx Base Plate - Walraven International
  - BP80 – 2446 Nm
  - BP100 – 3492 Nm
  - BP120 – 3928 Nm

Default maximum deflection and maximum stress values:

Default values defined in the tool	
Beams	L/200
Cantilever arms	L/150

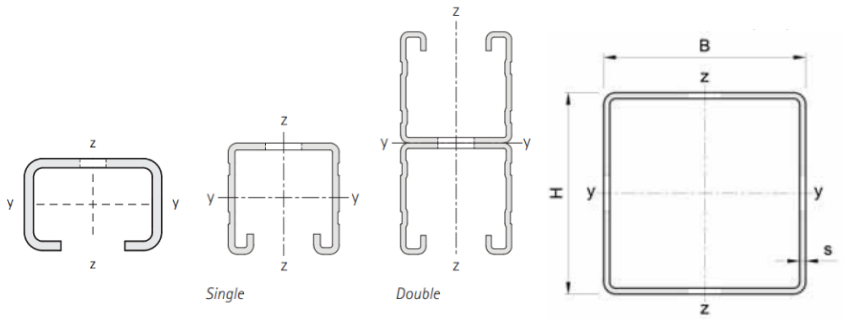
Stress values defined in the tool	
Walraven RapidStrut® and Walraven Rapidrail®	160,0 MPa
Maxx	152,6 MPa

In both cases, default values can be adjusted by the user to more conservative values (more restrictive). This adjustment can be done in the "Results" dashboard.



1.2 Conditions / Considerations

All calculations are valid only for ambient temperatures for channels stressed about the Y-axis.



Other construction parts such as anchors or threaded rods must be verified separately by the user.

Further information such as cross-section properties and recommendations for the ideal suspension method can be found in the technical data sheets.

Datasheet Walraven RapidRail® Fixing Rails
Datasheet Walraven RapidStrut® Channels
Datasheet Walraven Maxx Heavy Profiles

The tool performs calculations using the minimum inertia, ensuring result validity regardless of the channel orientation (open-up; open down). This means that the worst case scenario is calculated to be on the safe side.

1.3 Disclaimer

The design results are based essentially on the conditions defined by the user of the software and on the data entered by them. Therefore, the end-user bears the sole responsibility for the absence of errors and the completeness of the data. Furthermore, the end-user is solely responsible for having the results of the calculation checked and cleared by an expert prior to using them for the specific application.

Walraven is taking continuous care updating the manual, so the tool and manual matches with product ranges, UI, UX. During the update process some discrepancies might exist temporarily.

2 Getting Started

2.1 System Requirements

Before using the Warlraven Rail Selector, ensure that your system meets the following requirements:

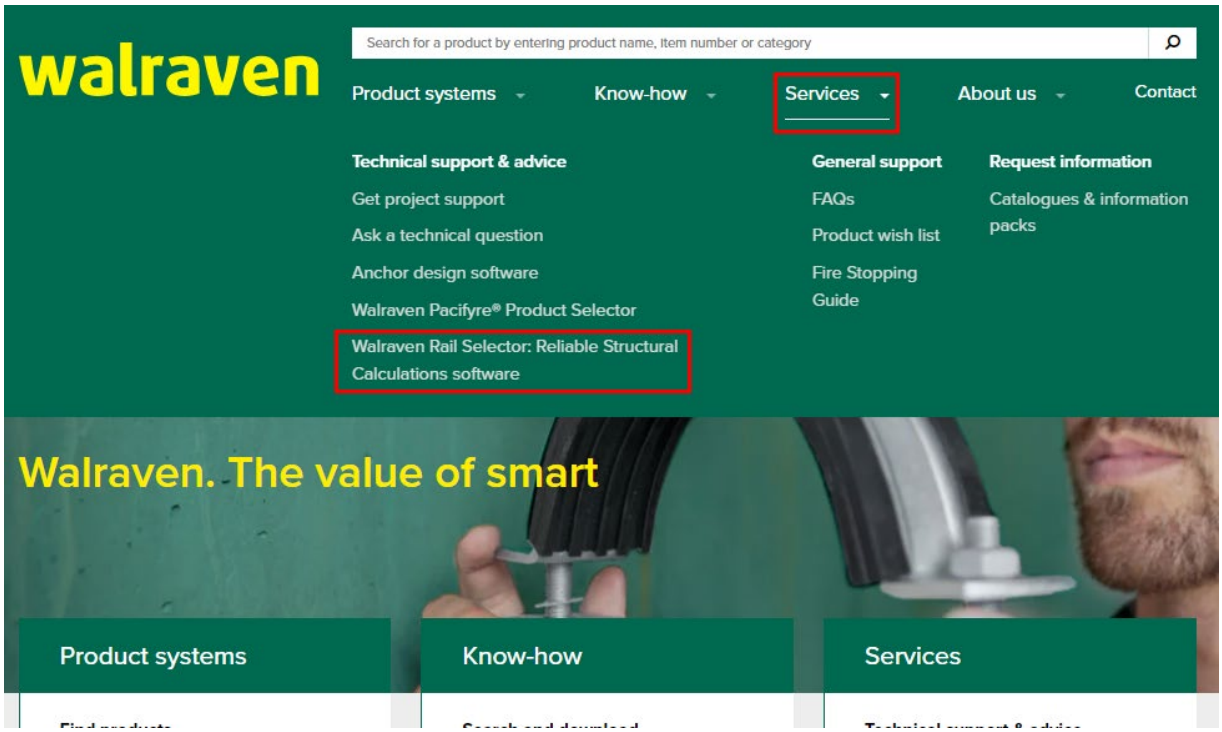
- A modern web browser (e.g Chrome or Edge).
- An active internet connection.
- It is recommended to use a PC/laptop or tablet.

2.2 Accessing the Walraven Rail Selector

To access the WRS, go to:

- www.walraven.com - Services – Walraven Rail Selector,
- or directly to the tool via this link: https://www.walraven.com/int/walraven-rail-selector/

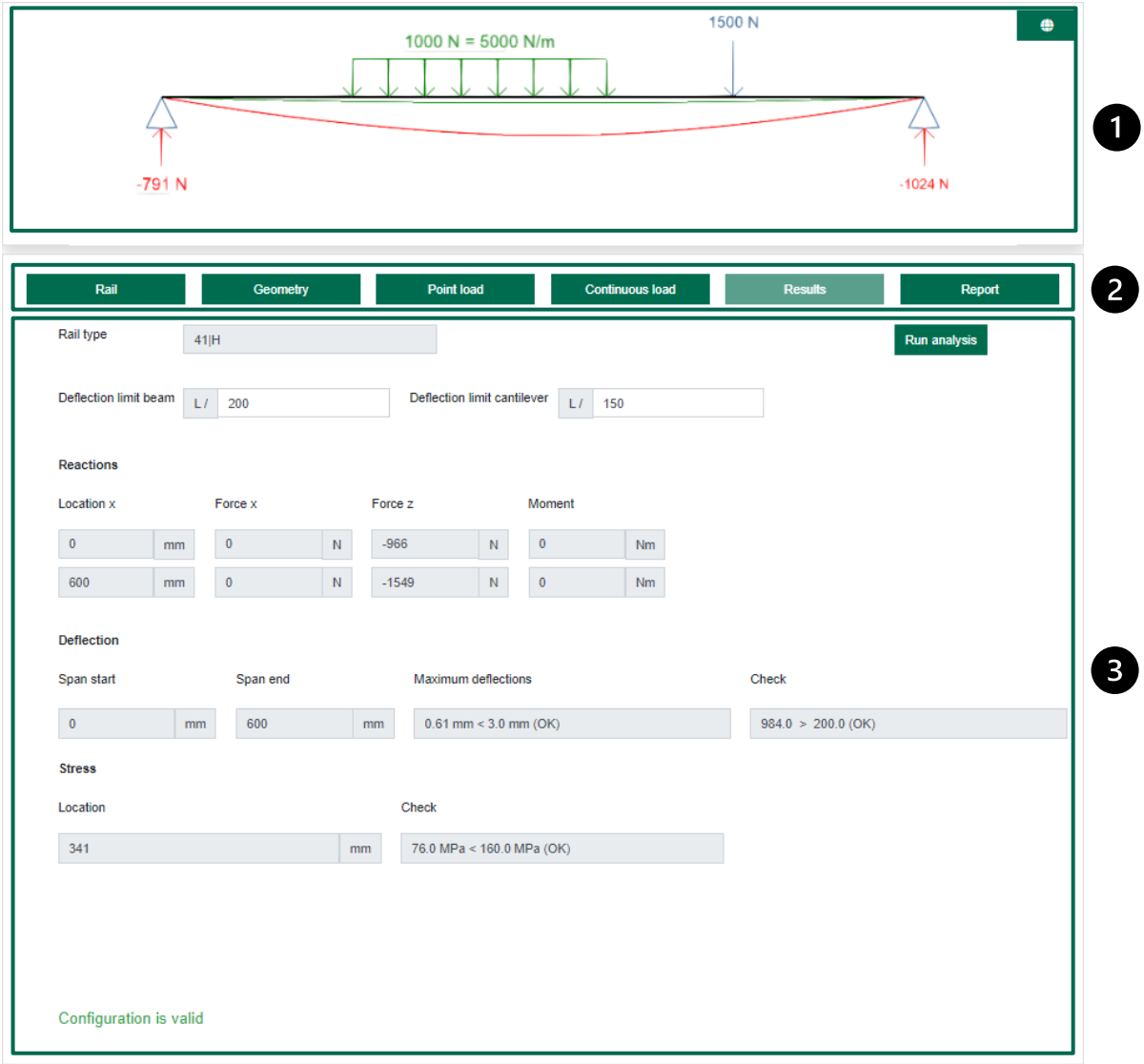
The tool is freely available and no login details are needed.



3 User Interface

3.1 General overview

The interface is divided into three main areas: graph, dashboard buttons, and a dashboard control panel.



Legend:

1 – Graph → schematical visualisation of the configured solution displays supports, loads and results. Globe icon in the top right corner allows users to change the language.

2 – Dashboard buttons → clickable buttons to navigate from one dashboard to another.

3 – Dashboard control panel → specific region used to interact with the tool; here the user can provide input and read results. Each different dashboard has a different control panel.

The tool is divided into six dashboards, a more detailed description of which can be found in the following pages.

The enter button to each dashboard can be either highlighted or shaded, as you can see below:

A highlighted button means that the dashboard is accessible, while a greyed-out button indicates that the dashboard is not accessible.

If the dashboard is not accessible, it may be because some information needs to be added. In this case, the tool will warn you with a yellow text such as the example below:

Please assign a rail family before continuing to the next steps.

Another reason could be that you have entered some of the data incorrectly. In this case, the tool will warn you with red text. See example below:

There cannot be two supports in the same location. Please assign different locations before proceeding to the next steps

System of dashboards:

Legend:

1 – Rail dashboard → To define a Walraven fixing rail to be used.

2 – Geometry dashboard → To define the fixing rail length and support type and location.

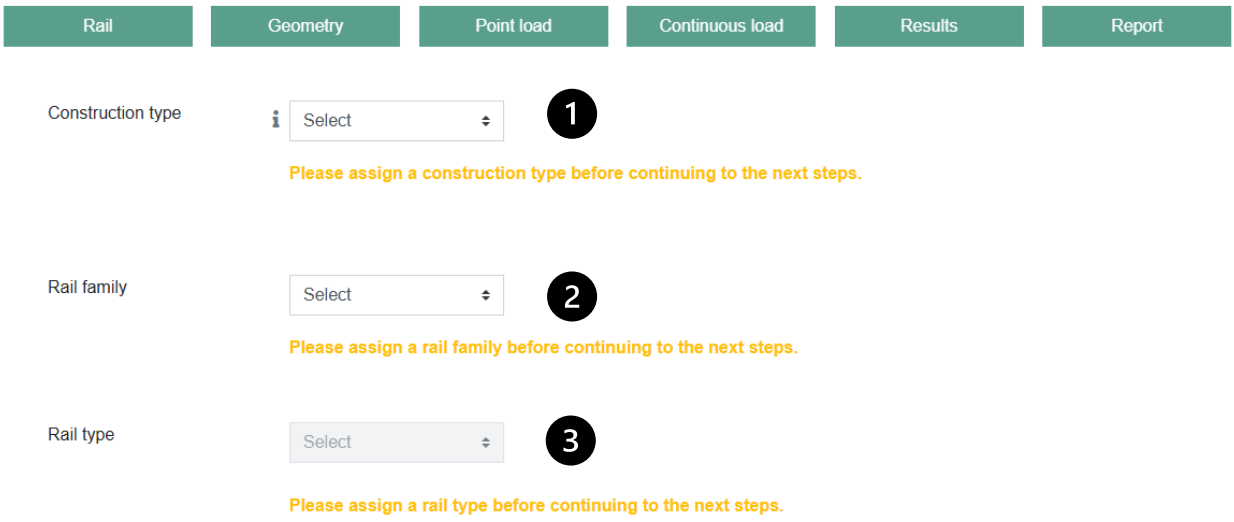
3 – Point load dashboard → To define point load position and magnitude.

4 – Continuous load dashboard → To define continuous load position and magnitude.

5 – Results dashboard → To visualise results.

6 – Report dashboard → To generate and download a report.

3.2 Rail dashboard



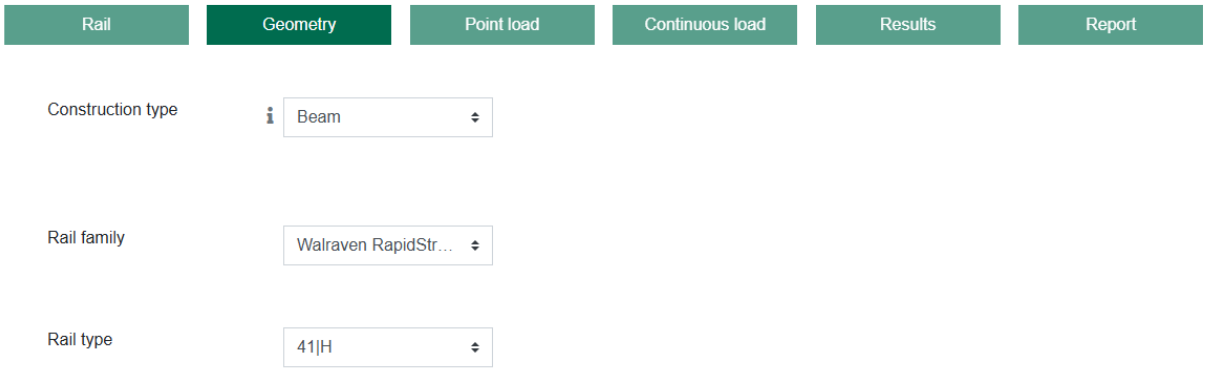
Legend:

1 – Dropdown to choose between construction types (Beam, Simple Cantilever or Fixing rail + base plate)

2 – Dropdown to choose rail family

3 – Dropdown to choose rail type

On Rail dashboard, you will select the construction type (1), rail family (2) and rail type (3)After properly selecting all three dropdowns, the "Geometry" button will become highlighted, see example below:



3.2.1 Rail Dashboard – Construction type

There are three options to select from: Beam, Simple cantilever, Fixing rail + base plate. Selections made in this field will affect the following options when moving forward.

Construction type

There are 3 construction types available in the Walraven Rail Selector (WRS)

Beam

Definition

Fixing rail with custom length that can be fixed to the wall, ceiling or other fixing elements with additional parts.

With this construction type, the Walraven Rail Selector only validates the fixing rail.

Fixing rails available

To be used with Walraven RapidRail®, Walraven RapidStrut® and Walraven Maxx fixing rails.

Analysis considerations

Used when one or multiple supports are to be considered.

Bending Moment in the rigid supports must be manually checked by the user to ensure that other products (connectors) are suitable for its purpose.

Simple Cantilever

Definition

Fixing rail with specific length that has a steel end plate welded in one of its endings.

Each specific length and rail type is a different article code.

Fixing rails available

To be used with Walraven RapidRail® and Walraven RapidStrut® fixing rails.

Analysis considerations

Used when a single rigid support is to be considered.

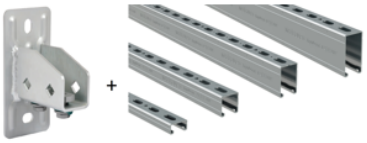
Bending Moment in the end plate is automatically checked by the tool.

Fixing rail + base plate

Definition

Fixing rail with custom length that is fixed to the wall, ceiling or other fixing elements by means of baseplate.

Fixing rail and baseplate considered in the analysis.



Fixing rails available

To be used with Walraven RapidRail®, Walraven RapidStrut® or Walraven Maxx fixing rails.

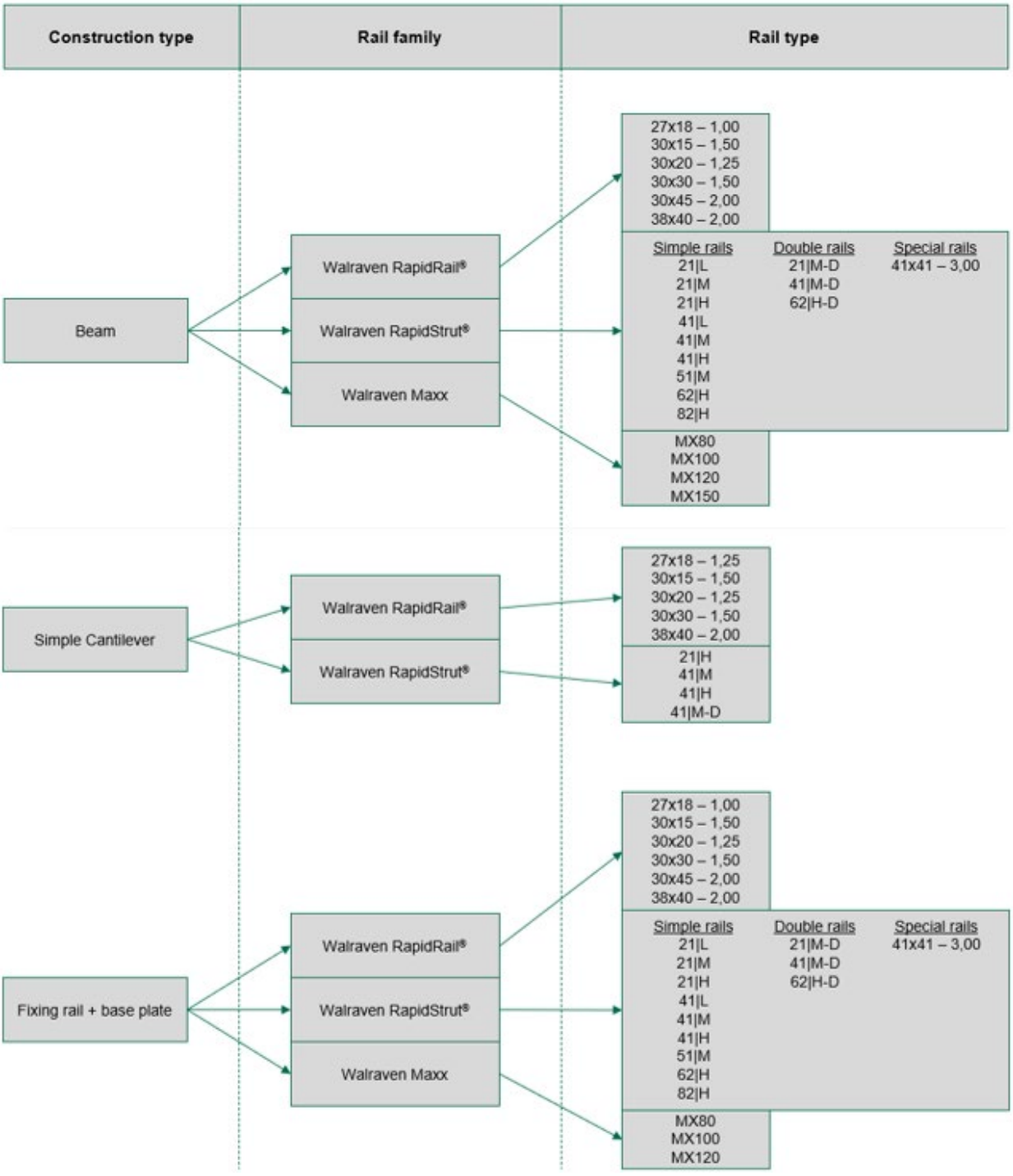
Analysis considerations

Used when a single rigid support is to be considered.

Bending Moment in the base plate is automatically checked by the tool.

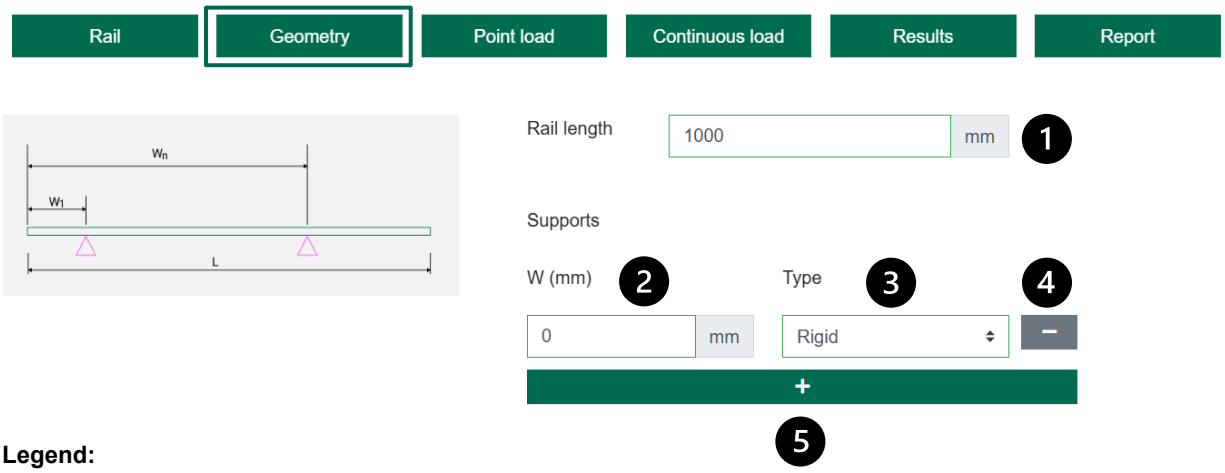
3.2.2 Rail dashboard – Selection logic

The following image shows the logic behind the WRS when selecting different options in the Rail Dashboard.



3.3 Geometry dashboard

In this dashboard, you will be able to define the solution geometry, fixing rail length and support setup.



Legend:

1 – Field to define rail length

2 – Field to define support location

3 – Dropdown to choose between rigid and pinned support

4 – Button to delete existing support

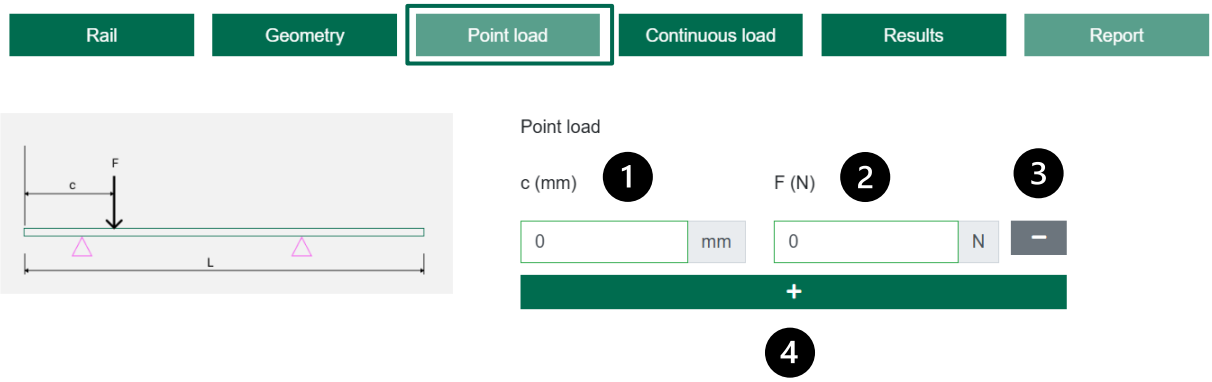
5 – Button to add support

It is important to note that this dashboard is affected by choices made in the previous one – “Rail” dashboard:

Construction type	Rail length	Support
Beam	To be freely defined within the range: $100 < Rail\ length < 20.000$ Length units: mm	Single support → the tool will automatically adjust the support type as “Rigid” Multiple supports → user can decide whether they are “Rigid” or “Pinned”
Simple cantilever	To be selected from the dropdown. Options are related to Walraven product range. The dropdown options depend on previous choices made on “Rail” dashboard – “Rail family” and “Rail type”	Always one support considered at the rail's left edge. Not possible to adjust position. Not possible to add or remove supports.
Fixing rail + base plate	To be freely defined within the range:$100 < Rail\ length <$ $100 < Rail\ length < 20.000$ Length units: mm	Always one support considered at the rail's left edge. Not possible to adjust position. Not possible to add or remove supports.

3.4 Point load dashboard

In this dashboard you will be able to define punctual loads. This dashboard does not depend on the previous choices made.



Legend:

1 – Field to define point load position

2 – Field to define point load value

3 – Button to delete point load

4 – Button to add point load

Only vertical loads can be defined with the WRS.

There is no minimal amount of point loads required. A configuration can be analysed without having any point load included.

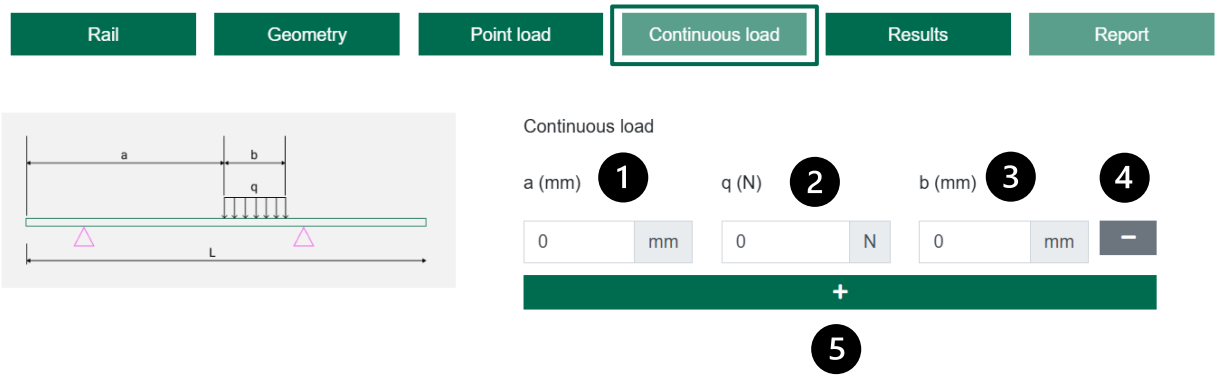
Point load FAQ's:

- **Can two point loads be located at the same point?**

  Yes; be aware there is no indication that both loads are at the same location; so it is difficult to visually identify.

3.5 Continuous load dashboard

In this dashboard you will be able to define continuous loads. This dashboard does not depend on previous choices made.



Legend:

1 – Field for continuous load starting position

2 – Field for continuous load value

3 – Field for continuous load length

4 – Button to delete continuous load

5 – Button to add continuous load

Only vertical loads can be defined with the WRS.

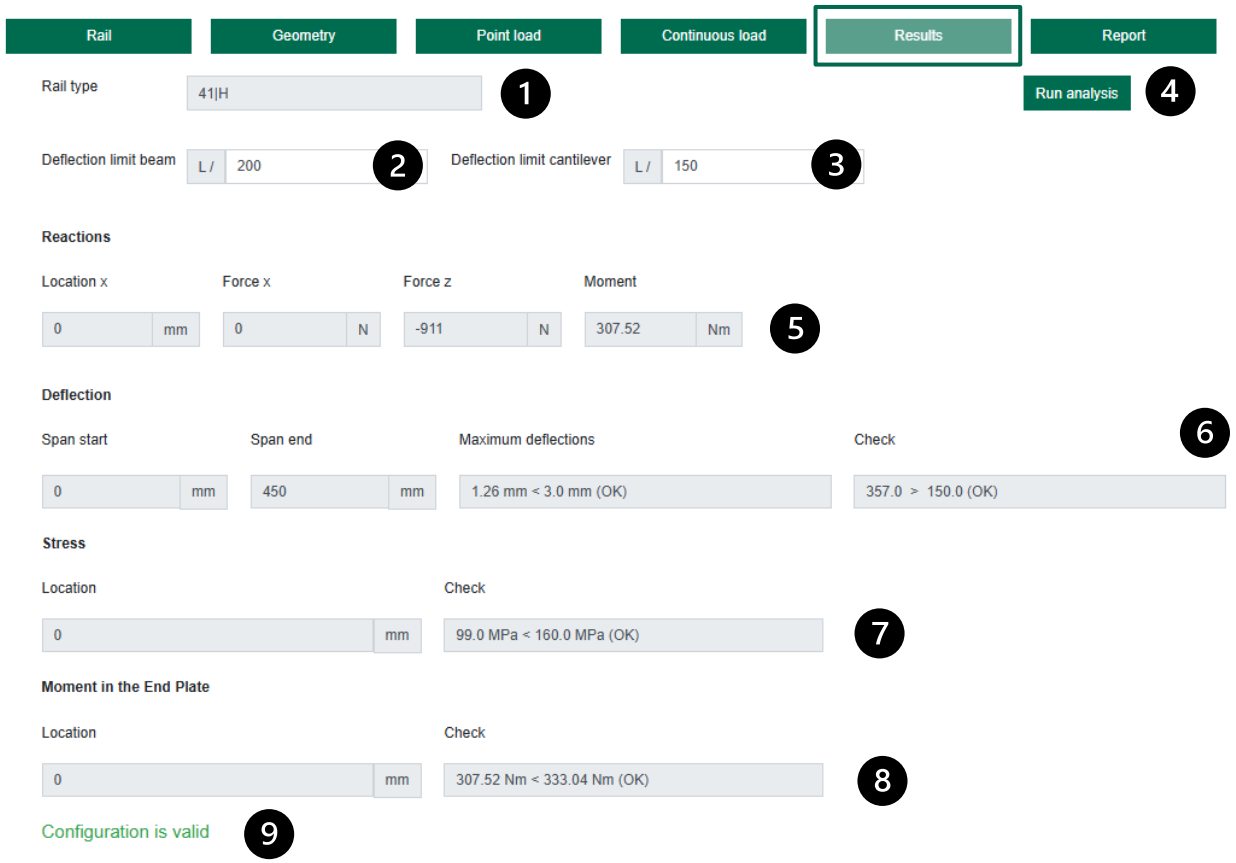
There is no minimum amount of continuous loads required. A configuration can be analysed without having any continuous loads included.

Continuous load FAQ's:

- **Can two continuous loads be located at the same point?**
  Yes; be aware there is no indication that both loads are at the same location; so it is difficult to visually identify.

3.6 Results dashboard

In this dashboard, the structural calculations result will be displayed. You are also able to adjust deflection limits for beams and cantilevers. Only more restrictive deflection limits can be applied.



Legend:

1 – Rail type → Type of fixing rail that has been selected in the “Rail” dashboard, and which properties have been used to perform the structural calculations.

2 – Deflection limit beam → Maximum beam deflection that will be considered valid for the calculation.

3 – Deflection limit cantilever → Maximum cantilever deflection that will be considered valid for the calculation.

4 – Run analysis → Although the structural analysis is performed automatically when entering this dashboard, you can run the analysis manually. This is mandatory when adjusting deflection limits.

5 – Reactions information → Information about reaction forces and reaction moments in the supports.

6 – Deflection information → Information about span deflection. Calculated deflection / maximum allowable deflection

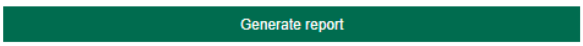
7 – Stress information → information about fixing rail stress. Calculated stress / maximum allowable stress

8 – Moment in the End Plate information → Information about resultant moment in the end plate. This section will only appear if “Simple cantilever” or “Fixing rail + base plate” has been selected in the “Construction type” dropdown in the “Rail” dashboard.

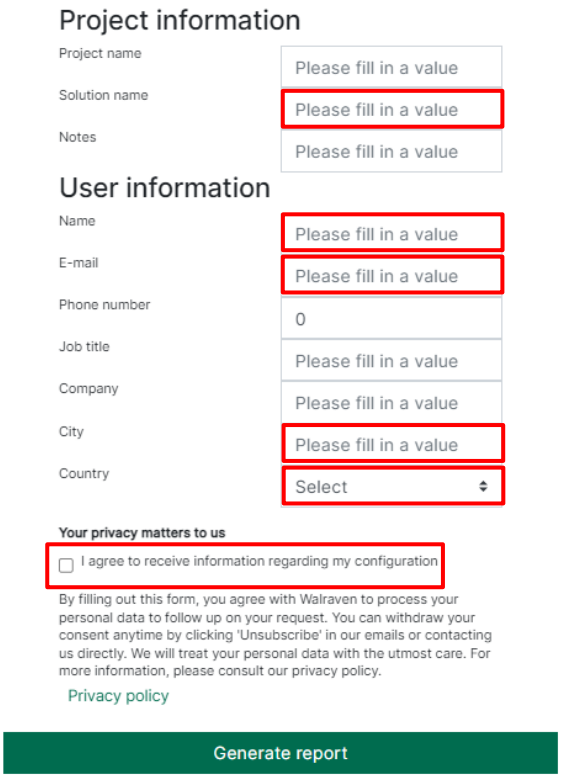
“Report” dashboard button will only be available (green highlighted) if the structural results are showing a valid configuration. That means that no report can be generated if the structural results are showing a failing configuration.

3.7 Report dashboard

In this dashboard you can obtain a structural report. The structural report will show all inputs used for the configuration, fixing rail properties and results, reactions, stress and deflections. The structural report can be downloaded only if the results from the analysis show a valid configuration.



When pressing the button “Generate report”, a pop-up will appear. To download the report, please fill in all the details. Fields marked in red are mandatory:



After filling in all the required fields, please tick the box to agree to data processing and confirm the report generation by clicking on “Generate report” again.

To download the report, press the "Download report" button:

3.8 Symbols, Icons and Abbreviations

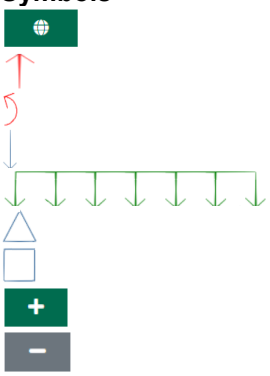
Lowercase

a (mm)	Continuous load starting position (left edge); expressed in millimetres
b (mm)	Continuous load length; expressed in millimetres
c (mm)	Point load position; expressed in millimetres
mm	Length unit; millimetres
q (N)	Continuous load; expressed in Newtons

Capital letters

F (N)	Point load; expressed in Newtons
L	Fixing rail length; expressed in millimetres
MPa	Stress unit; Megapascal
N	Force unit; Newtons
Nm	Moment unit; Newtons meter
W (mm)	Support position; expressed in millimetres

Symbols



Globe icon, to select language

Reaction force

Reaction moment

Point load

Continuous load

Pinned support – locked displacements; free rotations

Rigid support – locked displacements; locked rotations

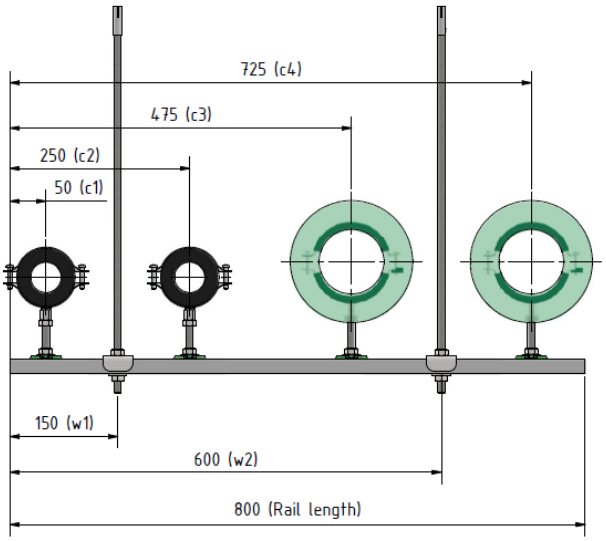
Add (support, point load or continuous load)

Remove (support, point load or continuous load)

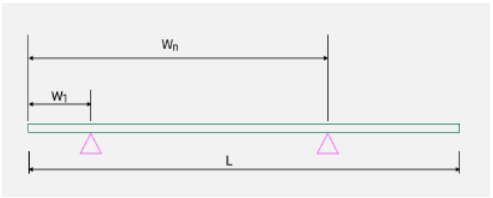
4 Examples

Provided examples are only intended to show how to configure the tool inputs. Examples are not meant to be used as installation recommendations nor best practices.

4.1 Example 1 - Beam



Geometry:



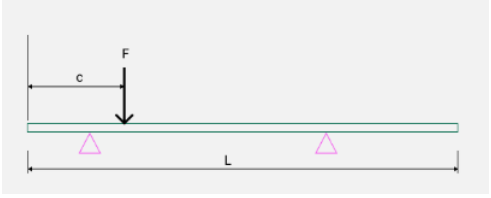
Rail length 800 mm

Supports

W (mm)		Type	
150	mm	Pinned	−
600	mm	Pinned	−

\+

Loads:

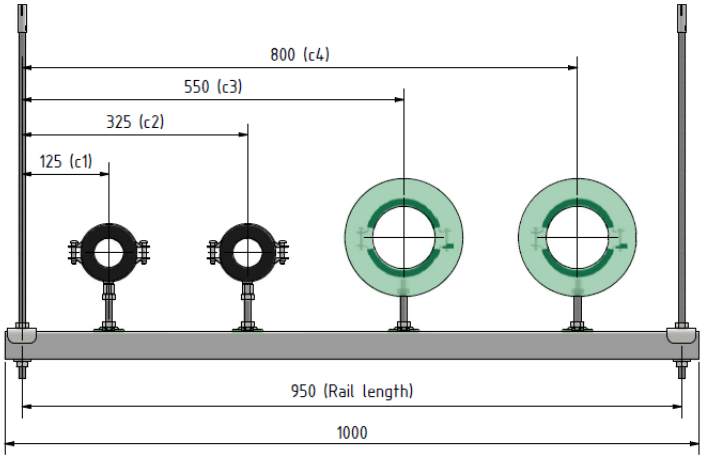


Point load

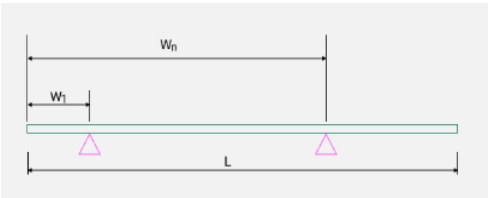
c (mm)		F (N)	
50	mm	150	N −
250	mm	150	N −
475	mm	450	N −
725	mm	450	N −

\+

4.2 Example 2 – Beam



Geometry inputs:



Rail length 950 mm

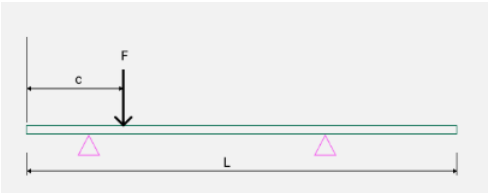
Supports

W (mm)		Type	
0	mm	Pinned	−
950	mm	Pinned	−

\+

In this example, the 'Rail length' is set to 950 mm, matching the distance between the threaded rods for simplified input. Placing the first support at the rail's left edge (0 mm) streamlines data entry, and the 25 mm beyond each threaded rod (on both ends of the rail) can be ignored in calculations.

Point load inputs:

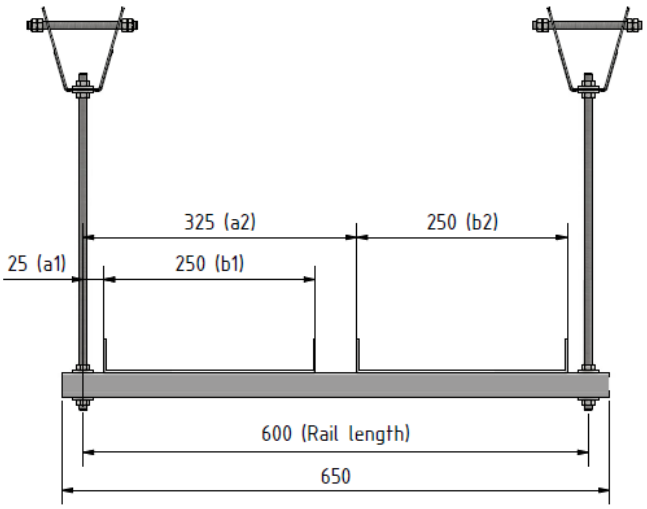


Point load

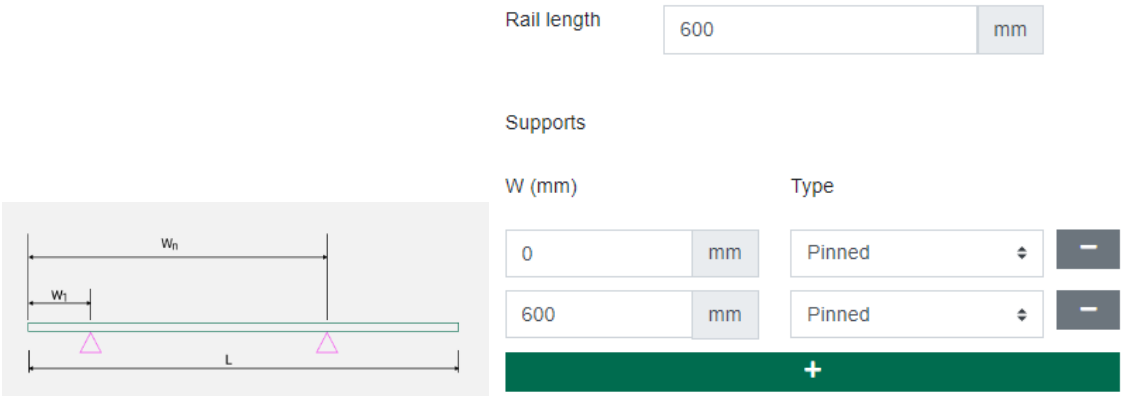
c (mm)		F (N)	
125	mm	150	N −
325	mm	150	N −
550	mm	450	N −
800	mm	450	N −

\+

4.3 Example 3 – Beam

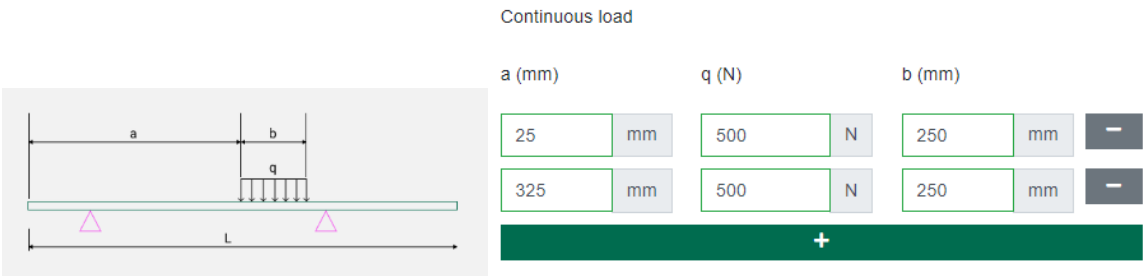


Geometry:

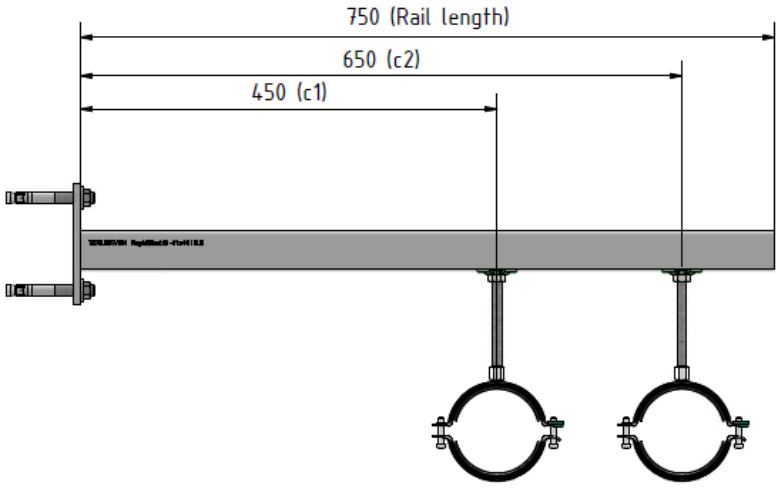


In this example, the 'Rail length' is set to 950 mm, matching the distance between the threaded rods for simplified input. Placing the first support at the rail's left edge (0 mm) streamlines data entry, and the 25 mm beyond each threaded rod (on both ends of the rail) can be ignored in calculations.

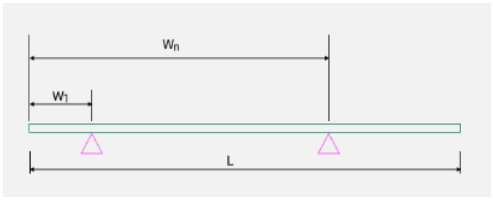
Continuous load input:



4.4 Example 4 – Cantilever



Geometry:

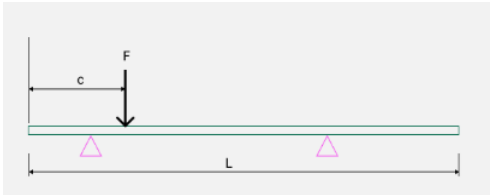


Rail length 750mm

Supports

W (mm)	Type
0 mm	Rigid

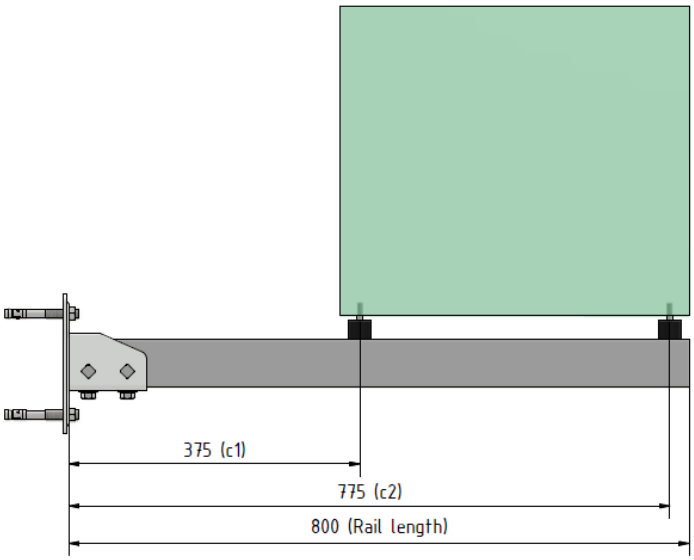
Loads:



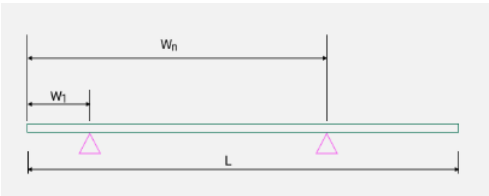
Point load

c (mm)	F (N)	
450 mm	250 N	−
650 mm	250 N	−
+		

4.5 Example 5 – Fixing rail + base plate



Geometry:

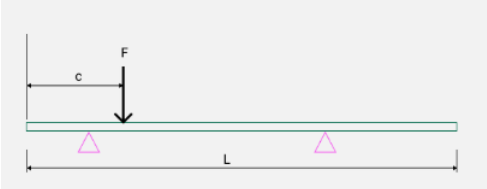


Rail length 800 mm

Supports

W (mm)	Type
0 mm	Rigid

Loads:



Point load

c (mm)	F (N)
375 mm	400 N
775 mm	400 N

5 Troubleshooting and Support

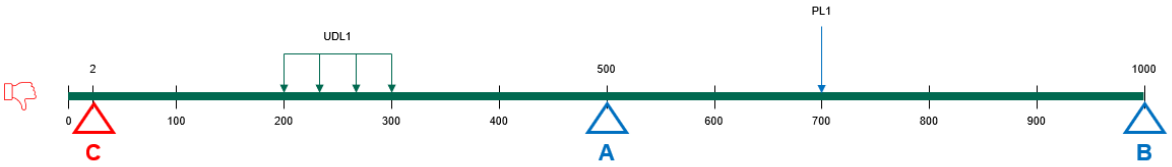
In case of doubts or support required, please get in contact with your local Walraven contact.

5.1 Positioning accuracy

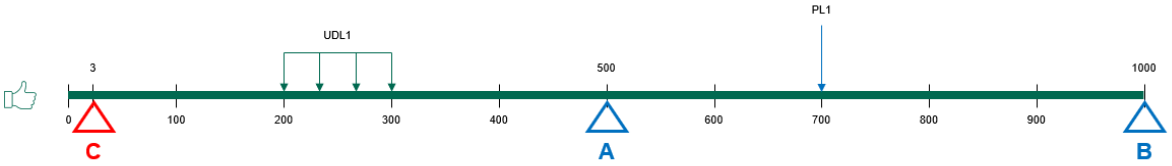
The following examples show how to avoid positioning an element (support, punctual load, continuous load) in an invalid position:

Diagrams not in scale

Case 1: Support (C) added too close (2mm or less) to the starting node of the beam (position = 0 mm)

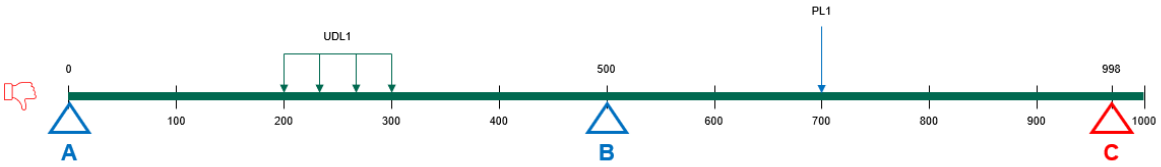


Solution: Support (A) to be moved to the position *0 mm* or *3 mm at least*.

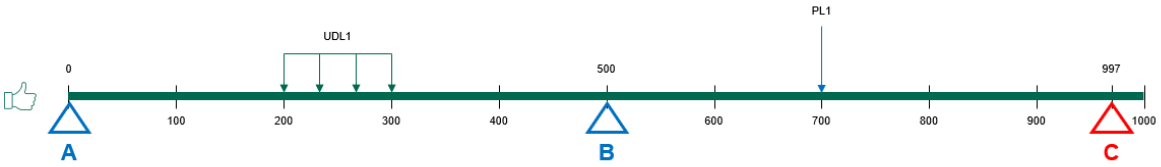


Diagrams not in scale

Case 2: Support (C) added too close (2mm or less) to the ending node of the beam (position = 1000 mm)

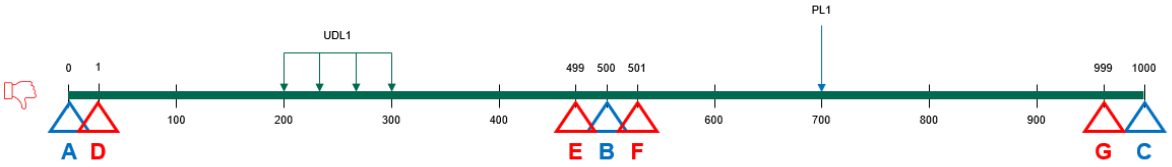


Solution: Support (C) to be moved to the position *997 mm at least* or *1000mm*.



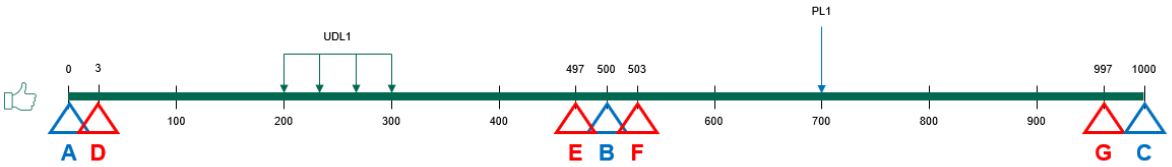
Diagrams not in scale

Case 3: Support (D, E, F and G) added too close (2mm or less) to existing Supports (A, B and C)



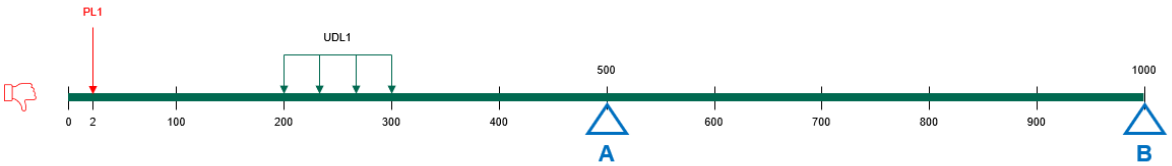
Solution:

- Support (D) to be moved to the position *3 mm at least*.
- Support (E) to be moved to the position *497 mm at least*.
- Support (F) to be moved to the position *503 mm at least*.
- Support (G) to be moved to the position *997 mm at least*.

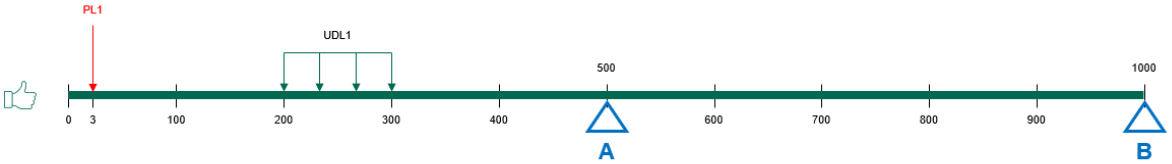


Diagrams not in scale

Case 4: Punctual Load (PL1) placed too close (2mm or less) to the ending node of the beam (position = 1000 mm)

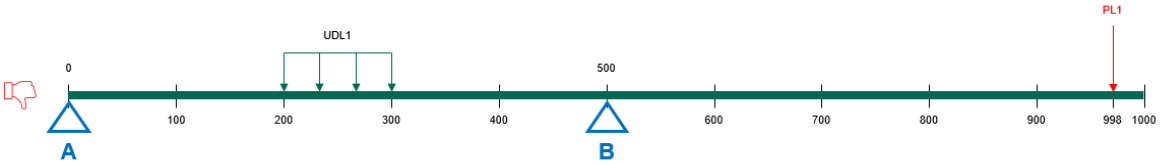


Solution: Punctual Load (PL1) to be moved to the position *0 mm* or *3 mm*.

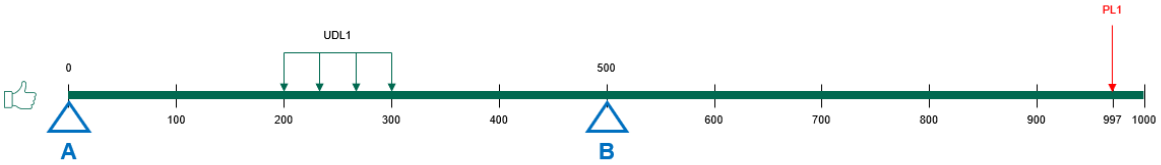


Diagrams not in scale

Case 5: Punctual Load (PL1) placed too close (2mm or less) to the starting node of the beam (position = 0 mm)

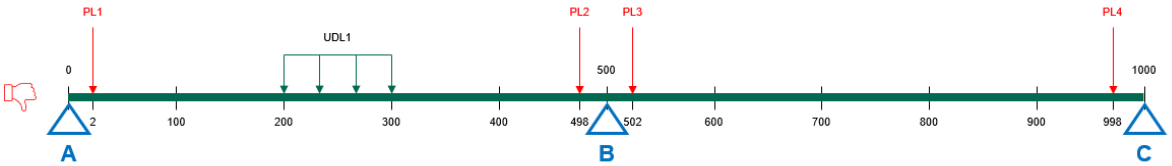


Solution: Punctual Load (PL1) to be moved to the position *997 mm* or *1000 mm*.



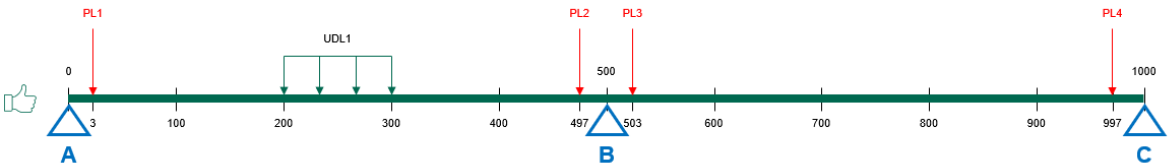
Diagrams not in scale

Case 6: Punctual Loads (PL1, PL2, PL3 and PL4) placed too close (2mm or less) to existing Supports (A, B and C)



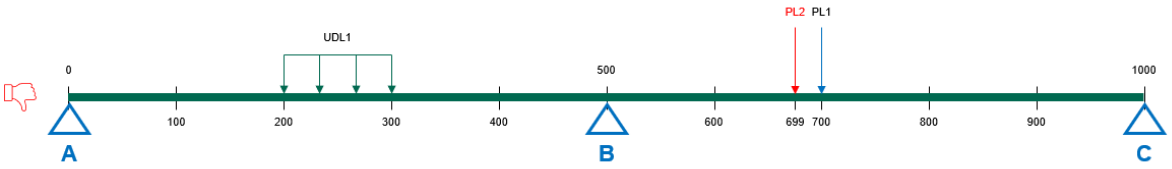
Solution:

- Punctual Load (PL1) to be moved to the position *0 mm* or *3 mm*.
- Punctual Load (PL2) to be moved to the position *497 mm* or *500 mm*.
- Punctual Load (PL3) to be moved to the position *500 mm* or *503 mm*.
- Punctual Load (PL4) to be moved to the position *997 mm* or *1000 mm*.

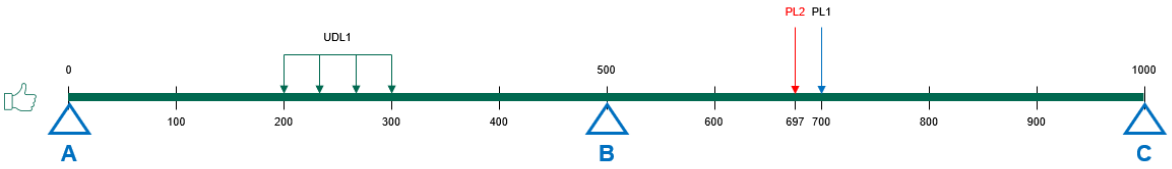


Diagrams not in scale

Case 7: Punctual Load (PL2) added too close (2mm or less) to existing Punctuall Load (PL1).

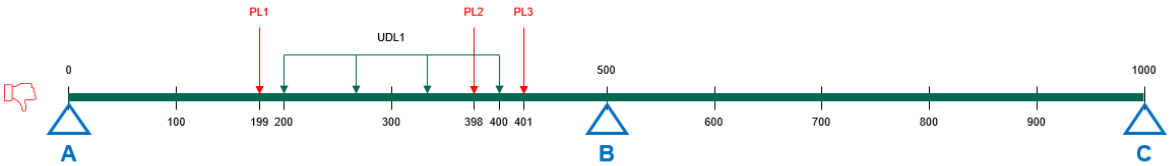


Solution: Punctual Load (PL2) to be moved to the position *697 mm*.



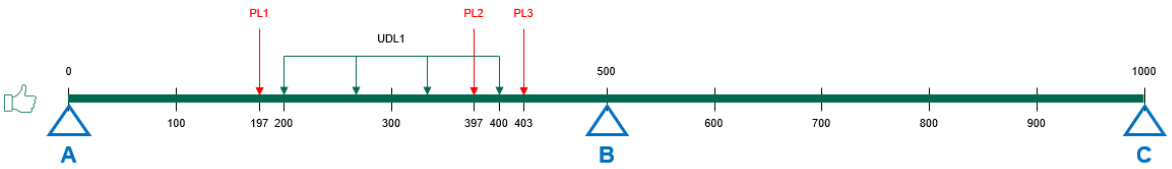
Diagrams not in scale

Case 8: Punctual Loads (PL1, PL2 and PL3) placed too close (2mm or less) to existing Uniformly Distributed Load (UDL1)



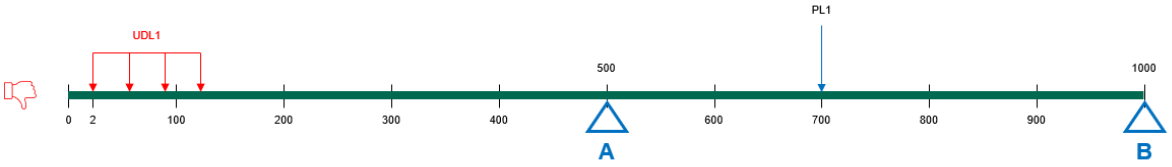
Solution:

- Punctual Load (PL1) to be moved to the position 197 *mm* or *200 mm*.
- Punctual Load (PL2) to be moved to the position *397 mm* or *400 mm*.
- Punctual Load (PL3) to be moved to the position *400 mm* or *403 mm*.

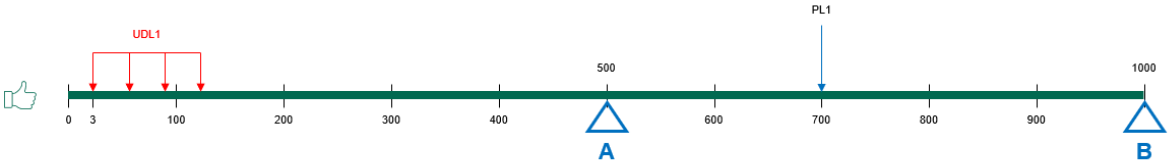


Diagrams not in scale

Case 9: Uniformly Distributed Load (UDL1) placed too close (2mm or less) to the starting node of the beam (position = 0 mm)

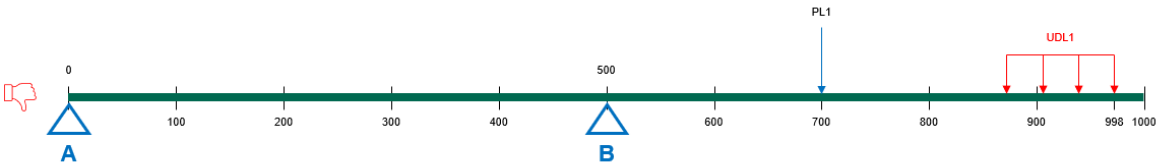


Solution: Uniformly Distributed Load (UDL1) left edge to be moved to the position *0 mm* or *3 mm*.

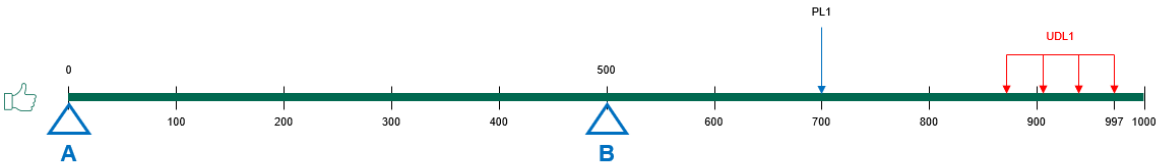


Diagrams not in scale

Case 10: Uniformly Distributed Load (UDL1) placed too close (2mm or less) to the ending node of the beam (position = 1000 mm)

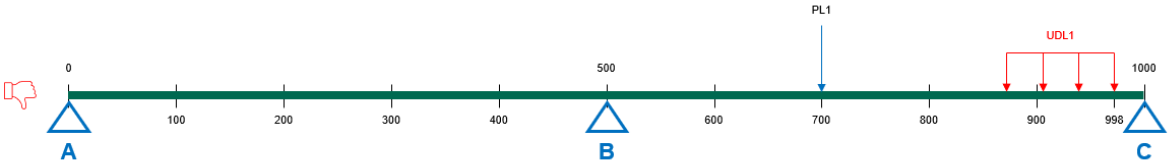


Solution: Uniformly Distributed Load (UDL1) right edge to be moved to the position *997 mm* or *1000 mm*.



Diagrams not in scale

Case 11: Uniformly Distributed Load (UDL1) placed too close (2mm or less) to existing Support (C)



Solution: Uniformly Distributed Load (UDL1) right edge to be moved to the position *997 mm* or *1000 mm*.