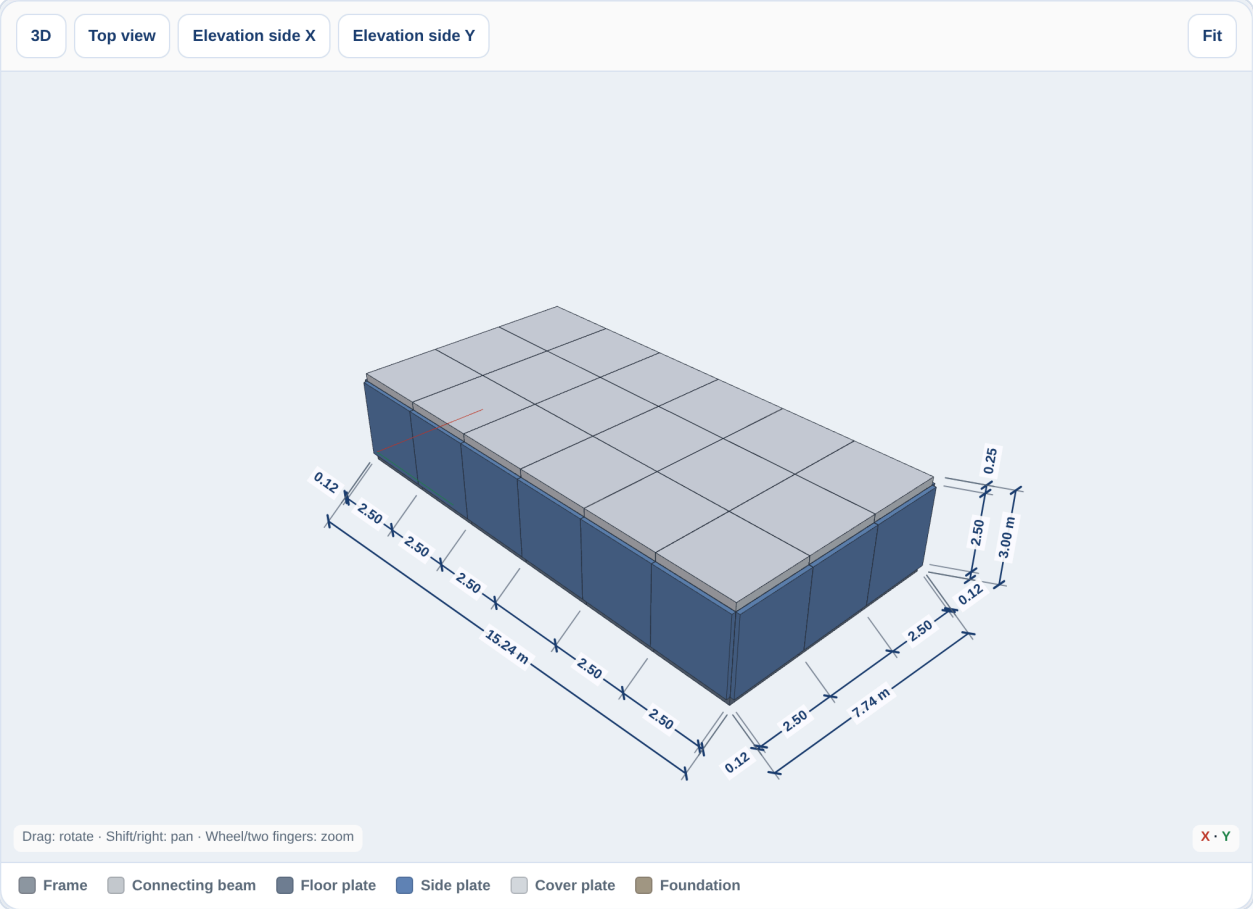
JUMBO BLOCK · ENGINEERING SUITE

JUMBO BLOCK Design

3D installation model and CAD export · Manual



Program version: 1.0.0

Date: October 2026

Program file: design.html · jumboblock.org/design.html

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> **Data protection and processing:** Design works entirely locally in the browser. The project.dbm and all generated files never leave the computer; no data is transmitted to any server. The program uses no third-party libraries.

1 Purpose and overview

JUMBO BLOCK Design creates a three-dimensional model of the planned JUMBO BLOCK installation from the project.dbm. The model shows every module with its two frames and four connecting beams, the floor, side and cover plates, and the selected foundation. It adds dimensions, sections, an exploded view, a list of components and quantities, a print-ready report and export to CAD and BIM software.

Design is part of the JUMBO BLOCK Engineering Suite and can be used free of charge at jumboblock.org. It takes the installation geometry from Plan and presents it visually; it does not perform any design calculation of its own.

Hydro → Plan → **Design** · Budget · Static · Temp

Features

- 3D model of all modules in the checkerboard pattern of frame and beam faces, single layer, any grid X × Y
- Foundation as floor plates, cast-in-place foundation or strip foundations
- Layers can be shown and hidden individually; edges, axes, parallel projection
- Dimensions with overall dimensions or additional chain dimensions
- Section across X or Y and exploded view
- Components and quantities with volumes and weights from the project.dbm
- Report with six views, quantities and hash values for printing or saving as PDF
- CAD export as IFC4, DXF (R12) and STEP AP242
- Design settings are written back to the project.dbm with a dedicated design hash

The JUMBO BLOCK module

A JUMBO BLOCK module is a cube with an edge length of 2.50 m made of twelve beams with a cross-section of 0.25 × 0.25 m. Two frames, each consisting of two columns and two rails, are connected by four connecting beams. Adjacent modules are rotated by 90° about the vertical axis, so that a frame face meets a beam face at every contact surface. Slight chamfers on the beams are not shown in the model.

Floor, side and cover plates measure 2.49 × 2.49 m and are mounted onto the module structure, so they enlarge the body of the installation. The side plates (12 cm) close the outer contour. They are held on the inside by four angles as an assembly aid and are bonded and sealed watertight with SABA EcoSeal joint sealant and adhesive.

2 Requirements and start

System requirements

- A current browser with WebGL, e.g. Chrome, Edge, Firefox or Safari, on a PC, tablet or smartphone
- No installation, no account and no internet connection required while working
- Pop-up windows must be allowed for the page to open the report

Design is opened online at **jumboblock.org/design.html** or locally as the file **design.html**, for example from a USB stick together with the other programs of the suite. If WebGL is not available, the 3D view reports this; data exchange and quantities remain usable.

Workflow

1. Size the installation in **Hydro** and calculate the module grid with plates and weights in **Plan**.
2. Export the **project.dbm** in Plan.
3. Open Design and load the project.dbm with **Import** or drag it onto the 3D view.
4. Select construction and foundation, set up the display and check the model.
5. Create the report, save the view as PNG or export CAD files.
6. Use **Export** to save the project.dbm with the Design settings and pass it on to the other programs of the suite.

> The programs of the suite exchange data exclusively via the project.dbm. Each program writes only its own values and passes all others on unchanged. The Design values are therefore retained after editing in Hydro, Plan, Budget, Static or Temp.

3 Screen layout

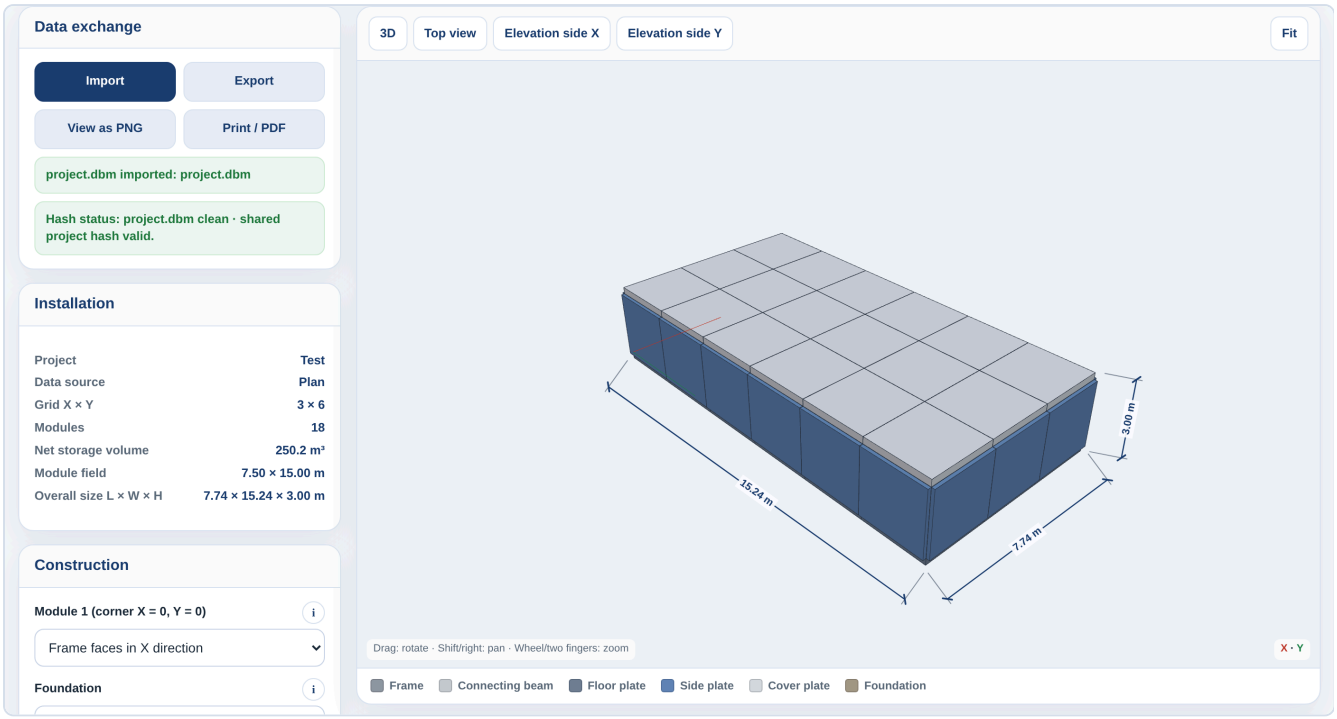


Fig. 1 – Design after importing a project.dbm

At the top is the shared menu of the suite with the German/English language switch. On the left are the cards **Data exchange**, **Installation**, **Construction**, **Display** and **CAD export**; on the right is the 3D view with the card **Components and quantities** below it. On narrow screens the cards are stacked.

Info window

The **i** button next to a setting opens a short explanation. The window is closed with the close button, by clicking outside the window or with the Esc key.

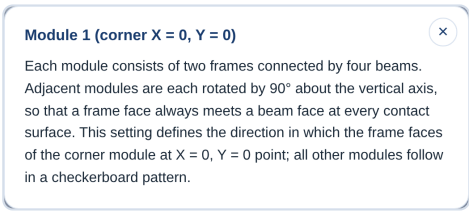


Fig. 2 – Info window

Language

The language is switched in the menu. All texts, the report and the labels in the CAD files follow the selected language. The loaded model and all settings are kept when switching.

4 Data exchange

Import

Import opens the file dialog for a project.dbm. Alternatively, drag the file onto the 3D view. If the file contains no module grid, Design points out that the installation must first be calculated and exported in Plan.

If the project.dbm already contains Design values, Design takes over construction, foundation and display settings from the file.

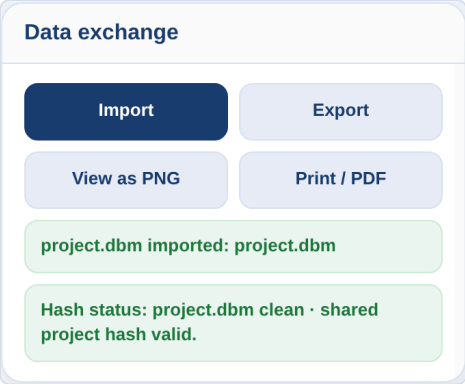


Fig. 3 – Data exchange card

Hash status

After import, Design checks two checksums (SHA-256):

Display	Meaning
Hash status: project.dbm clean · shared project hash valid	The file is unchanged since the last program of the suite wrote it.
Hash status: file modified or not reproducible	The file was edited outside the suite or is damaged. The values should be checked in Plan and exported again.
Hash status: file without project hash	The file contains no project hash.
Design hash: valid	The Design values in the file come unchanged from Design.
Design hash: mismatch detected	Design values were modified outside of Design.

Export

Export saves the project.dbm with the current Design settings and results as `YYYYMMDD_hhmmss_project.dbm`. All values of the other programs are passed on unchanged. Design hash and project hash are recalculated.

View as PNG

Saves the current 3D view including the displayed dimensions as the image `YYYYMMDD_hhmmss_design.png`, for example for presentations or quotations.

Print / PDF

Opens the report in a new window (chapter 10).

5 Installation

The card shows the key figures of the imported installation:

- **Project:** project name from the project.dbm
- **Data source:** Plan or Static
- **Grid X × Y:** number of modules per direction
- **Modules:** number of modules
- **Net storage volume:** from the project.dbm
- **Module field:** length × width of the module structure without plates
- **Overall size L × W × H:** dimensions including side plates, foundation and cover plates

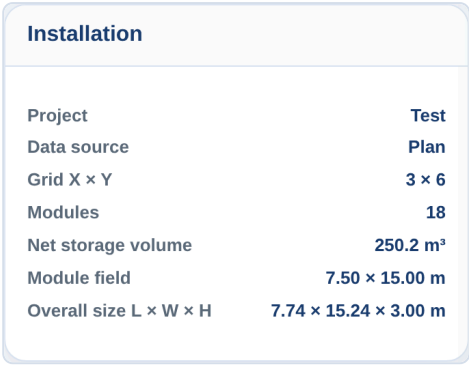


Fig. 4 – Installation card

Data source

Design uses the same geometry precedence as Plan: if the project.dbm contains a geometry from Static that is newer than the calculation in Plan, that geometry is shown; otherwise the geometry from Plan. The **Data source** display shows which geometry is used.

Deviating grid

If the module count in the project.dbm does not match the grid X × Y, a notice is shown. In this case Design shows the complete grid.

6 Construction

Module 1 (corner X = 0, Y = 0)

Defines whether the frame faces of the corner module point in the X or the Y direction. All other modules follow in the checkerboard pattern, each rotated by 90°. The setting corresponds to the laying direction on site and is carried over into the CAD files.

Foundation

The foundation is selected from three variants. The related input fields appear only for the respective variant.

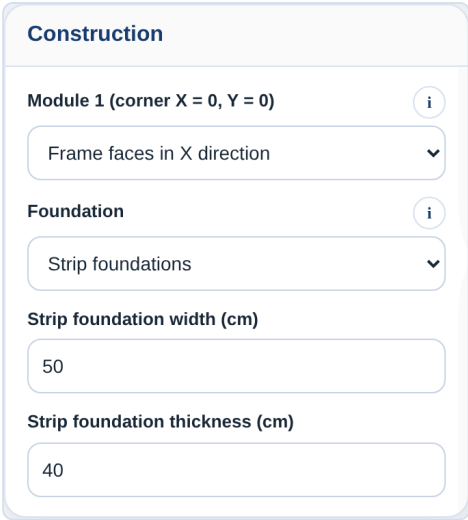


Fig. 5 – Construction card with strip foundations

Foundation	Model representation	Inputs
Floor plates	One plate 2.49 × 2.49 m per module in the floor plate thickness from the project.dbm, centred beneath the module.	none (values from Plan)
Cast-in-place foundation	Continuous slab beneath the entire installation including the side plates. The floor plates are omitted.	Thickness 10–150 cm, default 30 cm
Strip foundations	One strip beneath every grid line in the Y direction over the length of the module field, the outer strips flush with the module field, e.g. for rainwater infiltration. The floor plates are omitted.	Width 25–250 cm, default 50 cm; thickness 10–150 cm, default 40 cm

> Volumes and weights of the cast-in-place foundation and the strip foundations are calculated by Design using the concrete density from the project.dbm. The foundation thickness must be determined for the specific project according to the load.

7 Display

Layers

Modules, **Foundation / floor plates**, **Side plates** and **Cover plates** can be shown and hidden individually, for example to look into the structure with the cover plates hidden.

Edges, axes, parallel projection

Edges emphasises the body edges. **Axes** shows the X and Y directions at the origin at the corner of module 1. **Parallel projection** switches from the perspective view to a true-to-scale parallel view, which is particularly suited to the top view and elevations.

Dimensions

Off, **Overall dimensions** (outer size in length, width and height) or **Overall + chain dimensions** (additionally the grid dimension per module and the thicknesses of side plates, foundation and cover plates). The dimension chains are placed on the edges facing the viewer; all dimensions in metres. Dimensions are hidden in the exploded view.

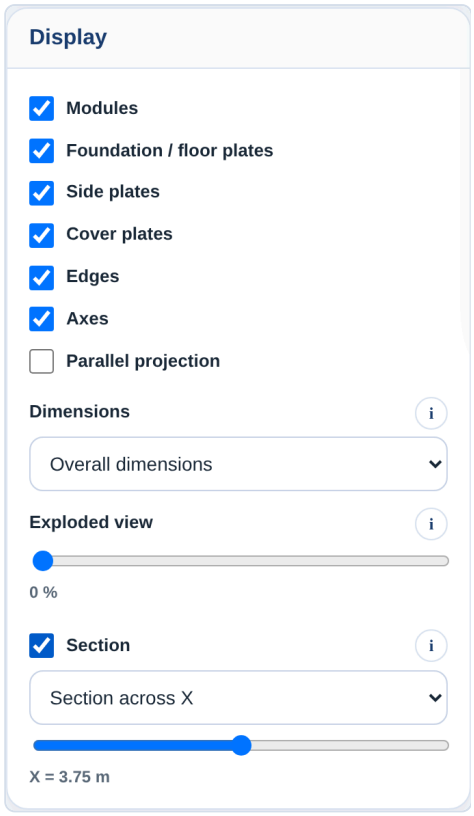


Fig. 6 – Display card with section

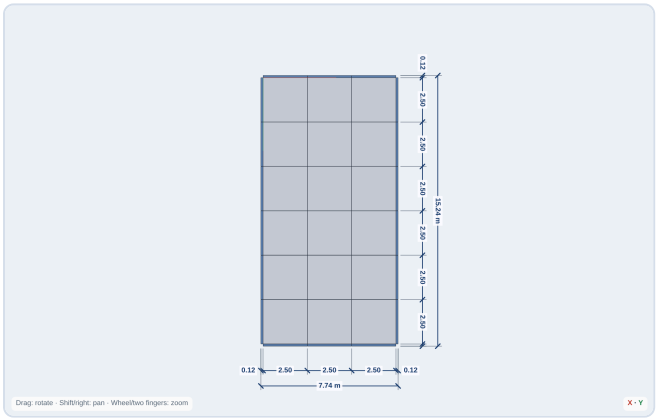


Fig. 7 – Top view with chain dimensions

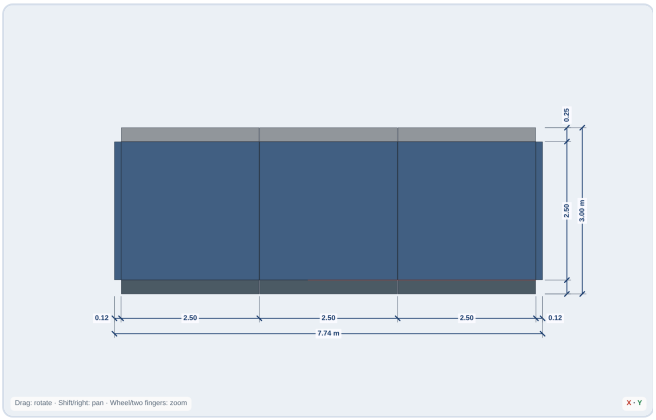


Fig. 8 – Elevation side X with chain dimensions

Exploded view

The slider (0–100 %) moves the cover plates up, the side plates outwards and the foundation down. The modules remain in position. This reveals the layered build-up of the installation.

Section

With **Section** enabled, all components between the viewer and the section plane are hidden. The section plane is perpendicular to the selected axis (**Section across X** or **across Y**) and is moved across the installation with the slider. The section clearly shows the checkerboard pattern of frame and beam faces.

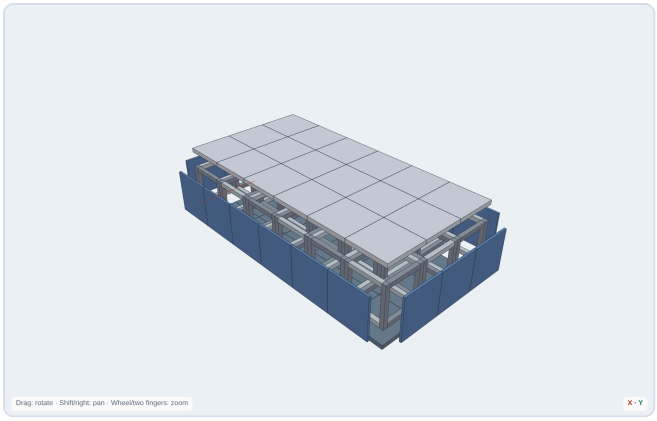


Fig. 9 – Exploded view

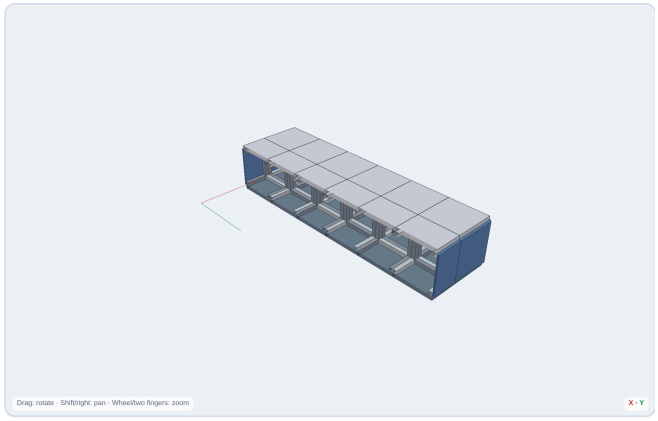


Fig. 10 – Section across X

8 Using the 3D view

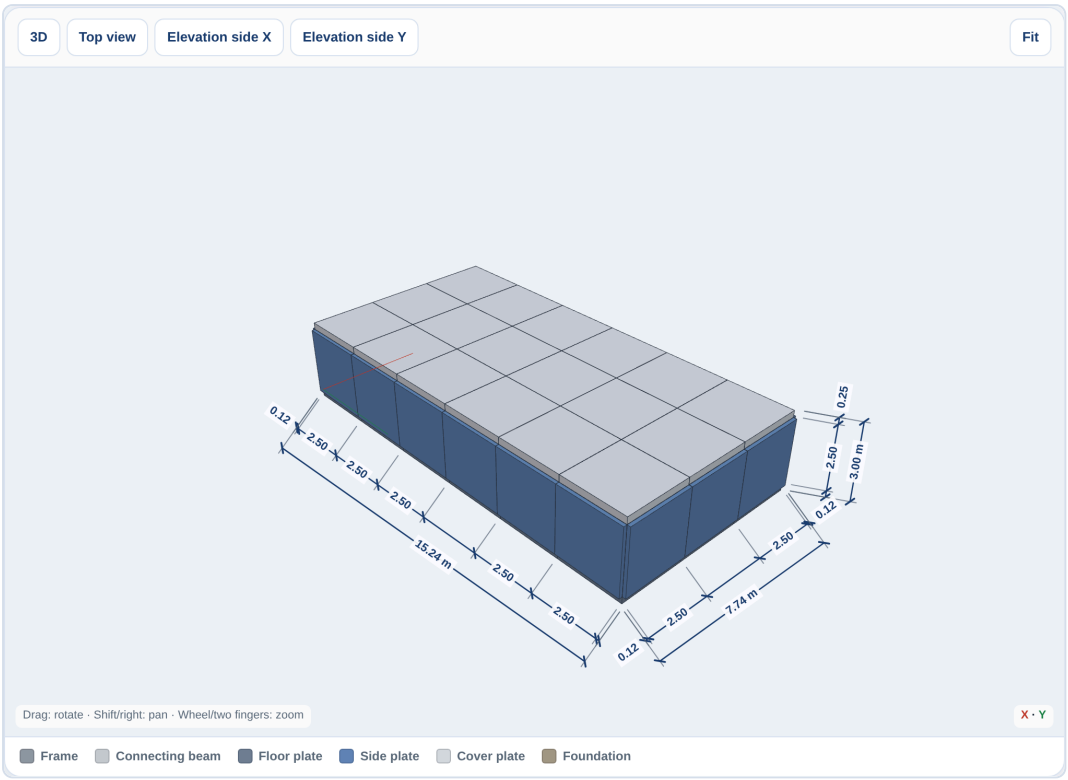


Fig. 11 – 3D view with overall and chain dimensions

Navigation

Action	Mouse	Touch
Rotate	Drag with the left mouse button	Drag with one finger
Pan	Drag with the Shift key held, or with the right or middle mouse button	Drag with two fingers
Zoom	Mouse wheel	Spread or pinch two fingers

View buttons

- **3D:** oblique view of the entire installation
- **Top view:** view from above onto the X/Y plane
- **Elevation side X** and **Elevation side Y:** view of the respective long side
- **Fit:** fits the installation including dimensions into the view

The legend below the view assigns the colours to the components: frame, connecting beam, floor plate, side plate, cover plate and foundation.

9 Components and quantities



Components and quantities

COMPONENT	COUNT DESIGN	COUNT PROJECT.DBM	DIMENSIONS	SINGLE VOLUME	TOTAL VOLUME	TOTAL WEIGHT
JUMBO BLOCK module	18	18	2.50 × 2.50 × 2.50 m	–	–	75.690 t
Side plate	18	18	2.49 × 2.49 × 0.12 m	0.744 m³	13.392 m³	31.472 t
Cover plate	18	18	2.49 × 2.49 × 0.25 m	1.550 m³	27.900 m³	65.566 t
Total installation weight (project.dbm)						**238.294 t**
Cast-in-place foundation	1	–	7.74 × 15.24 × 0.30 m	35.387 m³	35.387 m³	83.160 t
Total installation weight with cast-in-place foundation						**255.888 t**

Volumes and weights of modules and plates from the project.dbm. Cast-in-place and strip foundations are calculated in Design using the concrete density from the project.dbm.

The floor plates of the project.dbm (65.566 t) are replaced in Design by the cast-in-place foundation.

Fig. 12 – Components and quantities with cast-in-place foundation

For each component the table lists the count in the model (**Count Design**), the count in the project.dbm, the dimensions, the single and total volume and the total weight.

Values from the project.dbm

Volumes and weights of the modules and plates are taken unchanged from the project.dbm. They therefore match Plan, Budget and the other programs of the suite. The row **Total installation weight (project.dbm)** shows the total weight from Plan.

With a cast-in-place foundation or strip foundations, the foundation replaces the floor plates of the project.dbm. Design states the replaced floor plates with their weight and additionally shows the **Total installation weight with cast-in-place foundation** or **with strip foundations**.

Notices below the table

- **Deviation from the project.dbm:** if the count of a component in the model differs from the project.dbm, e.g. when the number of side plates was set manually in Plan, both values are given. Design shows the geometric layout; the weights remain those of the project.dbm.
- **Outdated values:** if volumes and weights in the project.dbm no longer match the current dimensions, for example after a change of plate thickness in Static, Design points this out. For current values, import the project.dbm into Plan and export it again.

Smartphone

On narrow screens each table row is shown as a card of its own, with the labels on the left and the values on the right. All figures remain readable without horizontal scrolling.



Components and quantities

JUMBO BLOCK module

COUNT DESIGN	18
COUNT PROJECT.DBM	18
DIMENSIONS	2.50 × 2.50 × 2.50 m
SINGLE VOLUME	–
TOTAL VOLUME	–
TOTAL WEIGHT	75.690 t

Floor plate

COUNT DESIGN	18
COUNT PROJECT.DBM	18
DIMENSIONS	2.49 × 2.49 × 0.25 m
SINGLE VOLUME	1.550 m³
TOTAL VOLUME	27.900 m³
TOTAL WEIGHT	65.566 t

Fig. 13 – Smartphone view

10 Report (Print / PDF)

Print / PDF opens the Design report in a new window. The **Print / PDF** button in the report prints it or saves it as PDF via the browser's print dialog. If the browser blocks the window, allow pop-ups for the page.


Print / PDF

JUMBO BLOCK ENGINEERING TOOLS

Design report · JUMBO BLOCK installation model

This report documents the three-dimensional installation model based on the imported project.dbm, including construction, views, dimensions and component quantities.

Project information

PROJECT NAME	Test
ORGANISATION / MUNICIPALITY / OFFICE	–
CONTACT PERSON	–
PROJECT LOCATION	Bochum
POSTAL CODE	44866
EMAIL	–
PHONE	–
GENERATED ON	18/10/2026, 16:12:34
LANGUAGE	EN

Data basis

FILE	project.dbm
GEOMETRY FROM	Plan
PLAN VERSION OF THE PROJECT.DBM	12.0.0
HASH STATUS ON IMPORT	Hash status: project.dbm clean · shared project hash valid.

Installation key figures

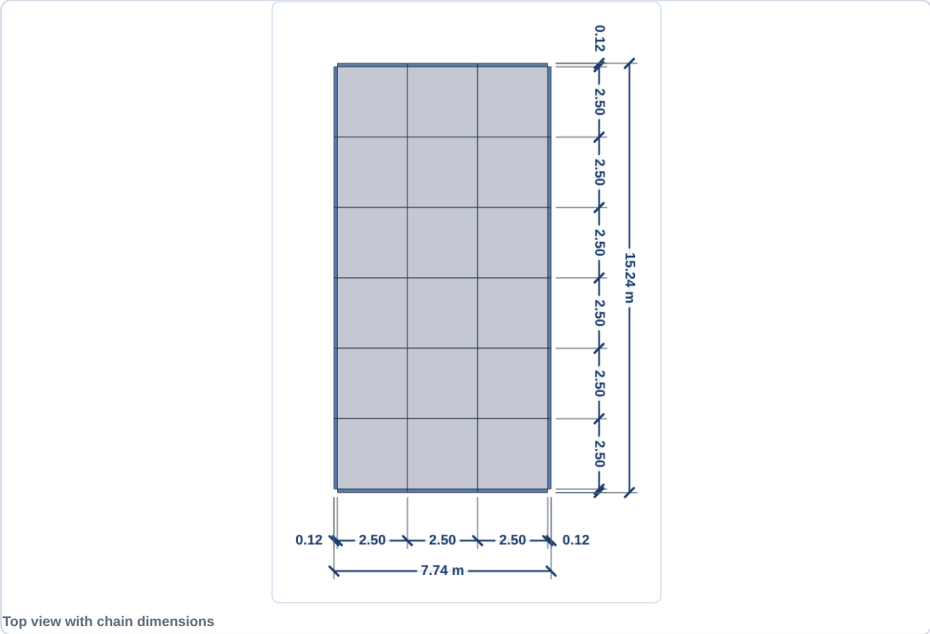
GRID X × Y	3 × 6
MODULES	18
NET STORAGE VOLUME	250.2 m³
MODULE FIELD	7.50 × 15.00 m
OVERALL SIZE L × W × H	7.74 × 15.24 × 3.00 m
MODULE SIZE	2.50 × 2.50 × 2.50 m
PLATE SIZE	2.49 × 2.49 m
SIDE PLATE THICKNESS	0.12 m
COVER PLATE THICKNESS	0.25 m

Fig. 14 – Beginning of the report

Contents

- Project information from the project.dbm
- Data basis: file, geometry source, Plan version, hash status
- Installation key figures: grid, modules, module and plate sizes, plate thicknesses, overall size, foundation
- Description of the construction
- Six views: 3D with overall dimensions, top view, elevation side X and side Y with chain dimensions, section at the centre of the installation, exploded view
- Components and quantities
- Technical note
- Document information with program version, project hash and design hash

The views are generated in high resolution independently of the current screen view. The settings in Design remain unchanged.



Top view with chain dimensions

Fig. 15 – View in the report

11 CAD export: IFC, DXF and STEP

The **CAD export** card exports the complete installation with the selected foundation in three open standard formats. Each file is named `YYYYMMDD_hhmmss_design` with the matching extension.

Format	Target group
IFC4	BIM software, e.g. Revit, ArchiCAD, Allplan, Vectorworks, BIM viewers
DXF R12	classic 2D/3D CAD software, e.g. AutoCAD, BricsCAD, DraftSight
STEP AP242	3D CAD and mechanical design, e.g. SolidWorks, Inventor, Creo, CATIA, NX, FreeCAD

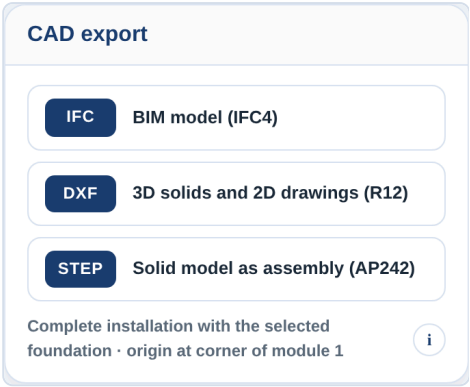


Fig. 16 – CAD export card

Coordinate system

All three formats use the same coordinate system: the origin is at the outer corner of module 1 without side plate, at the top of the foundation. X and Y correspond to the grid in Design, Z points upwards. The unit is metres, for STEP millimetres. The side plates therefore lie in the negative range of X and Y, the foundation below Z = 0.

IFC4 (ISO 16739-1)

- Project structure: project → site → building “JUMBO BLOCK installation” → storey “Installation level”
- Each module as a precast assembly (IfcElementAssembly) of four frame columns (IfcColumn), four frame rails and four connecting beams (IfcBeam)
- Floor plates as IfcSlab (BASESLAB), cover plates as IfcSlab (ROOF), side plates as IfcPlate, cast-in-place foundation as IfcFooting, strip foundations as IfcFooting (STRIP_FOOTING)
- Element types with shared geometry, colours per component type
- Material with concrete grade from the project.dbm
- Quantities from the project.dbm: net volume and net weight per component, net storage volume per module
- Property set **JB_Projekt** with technical note, project name, grid, module count, foundation, project hash, design hash and program version

DXF (R12)

- 3D bodies made of faces (3DFACE), modules as blocks **JB_MODUL_X** and **JB_MODUL_Y** according to their orientation
- Layers: JB_RAHMEN (frames), JB_BALKEN (beams), JB_BODENPLATTE (floor plates), JB_SEITENPLATTE (side plates), JB_ABDECKPLATTE (cover plates), JB_FUNDAMENT (foundation), JB_MODULE, JB_2D_KONTUR (2D outlines), JB_BEMASSUNG (dimensions), JB_TEXT
- 2D drawings in the plane Z = 0 to the right of the 3D model: top view, elevation side X and elevation side Y, each with chain and overall dimensions
- Labels with unit, project name, program version and technical note
- Character set Windows-1252, so that special characters display correctly in all programs

STEP AP242 (ISO 10303-242)

- Solid bodies (B-rep) as an assembly: installation → modules with twelve beams each → plates and foundation
- Unit millimetres, colours per component type
- Project name and technical note in the file description

Reproducible identifiers

The component identifiers (GlobalIds in IFC) are derived from the project hash and the position of the component. Exporting the same project.dbm with the same settings again produces the same identifiers, so BIM software recognises the components when comparing models.

> The files have been checked against the respective standard with common validation tools. Display and functionality on import depend on the respective target program.

12 Data in the project.dbm

Design reads the geometry and quantities from Plan or Static and writes only keys with the prefix `design_`. All other keys remain unchanged.

Key	Content
`design_input_startOrientation`	Orientation of module 1: `x` or `y`
`design_input_foundationType`	Foundation: `plates`, `slab` or `strip`
`design_input_slabThicknessCm`	Cast-in-place foundation thickness in cm
`design_input_stripWidthCm`	Strip foundation width in cm
`design_input_stripThicknessCm`	Strip foundation thickness in cm
`design_view_modules / _base / _side / _cover`	Visibility of the layers
`design_view_edges / _axes / _ortho`	Edges, axes, parallel projection
`design_view_dimensions`	Dimensions: `off`, `main` or `chain`
`design_result_source`	Geometry source: Plan or Static
`design_result_rasterX / _rasterY`	Grid X and Y
`design_result_modules`	Number of modules
`design_result_floorCount / _sideCount / _coverCount`	Number of floor, side and cover plates in the model
`design_result_outerLength / _outerWidth / _outerHeight`	Overall size of the installation in m
`design_meta_exported`	Flag for an export from Design
`design_meta_toolVersion`	Program version
`design_meta_timestamp`	Time of export
`design_meta_hashAlgorithm`	SHA-256
`design_meta_resultHash`	Design hash over all inputs, results and the program version

The shared project hash (`_hash`) secures the entire file and is recalculated on every export. The design hash specifically secures the Design values and remains valid as long as they are unchanged, even when other programs of the suite change their own values.

13 Notes and limits

> **Technical note:** The installation model serves to visualise the technical pre-planning. Dimensions and quantities result from the project.dbm and the selected construction. Project-specific structural verification and execution planning remain necessary.

- Design models single-layer installations. Modules are lined up in the X and Y directions in any number.
- The beams are shown as cuboids of 0.25 × 0.25 m; slight chamfers are neglected.
- The mounting angles of the side plates, joints and bonding with SABA EcoSeal, as well as inlets and outlets, shafts and connections are not part of the model.
- The thicknesses of floor, side and cover plates come from the project.dbm. The thickness of the cast-in-place foundation and the strip foundations is entered in Design and must be verified for the specific project.
- To change grid, plate thicknesses or weights, adjust the installation in Plan or Static and export the project.dbm again.

Troubleshooting

Message or behaviour	Remedy
The project.dbm contains no module grid.	Calculate the installation in Plan and export the project.dbm from Plan.
The file could not be processed.	Check that a project.dbm from the suite was selected and that the file is complete.
WebGL is not available in this browser.	Use a current browser and enable hardware acceleration in the browser settings.
The report window was blocked by the browser.	Allow pop-ups for the page and open the report again.
Notice about outdated volumes and weights	Import the project.dbm into Plan and export it again.

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