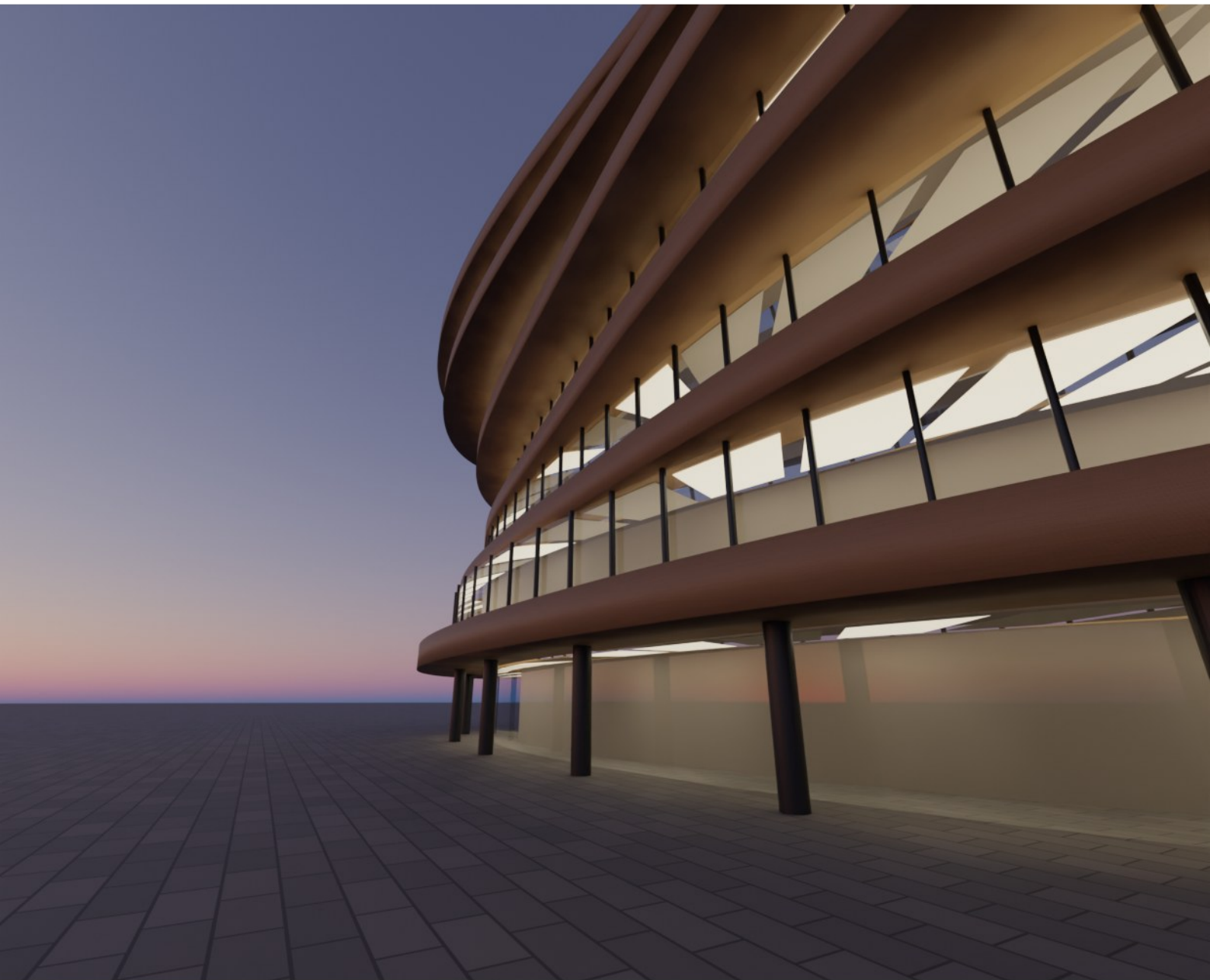


BIMOpen user manual



BIMOpen user manual

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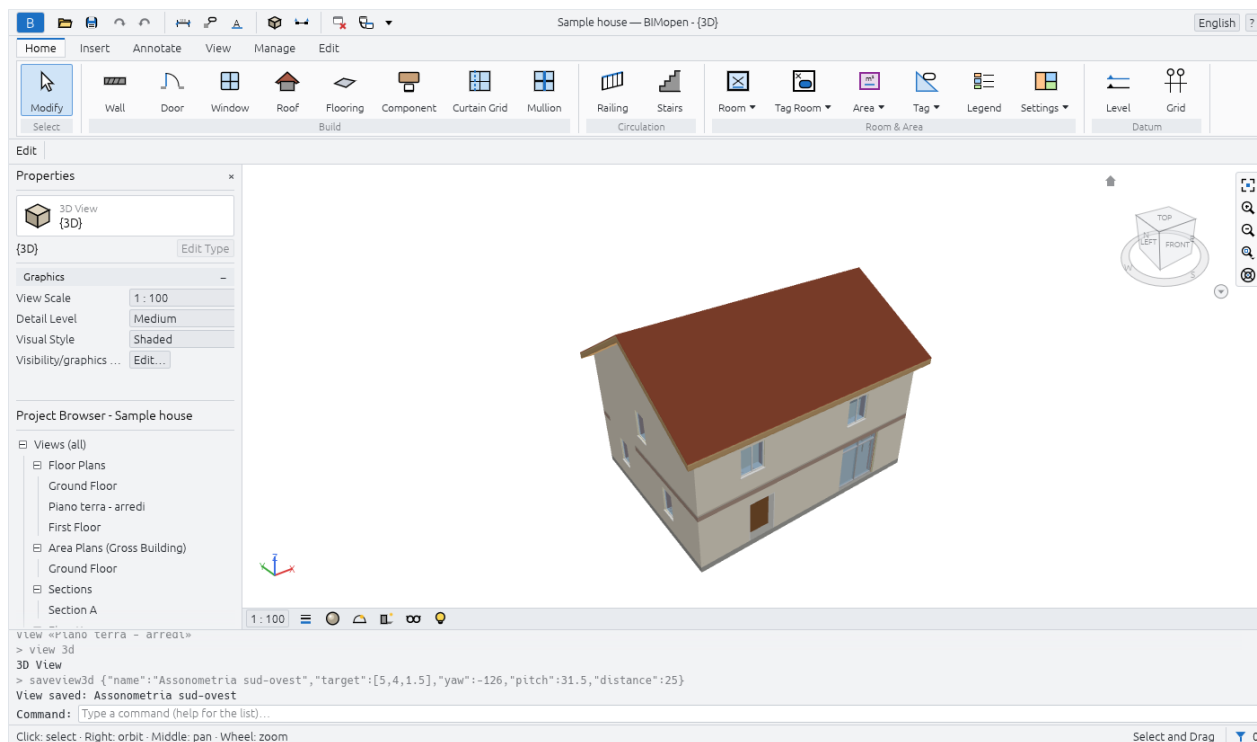
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BIMopen user manual

BIMopen is an open-source application for building information modelling (BIM). You model the building with walls, doors, windows, floors, roofs, stairs and rooms, and the drawings come from the model: plans, sections, elevations, 3D views, schedules and sheets are views of the same model and change together when you edit it.

BIMopen runs on the desktop (Linux, Windows, macOS) and in a web browser, and it can be driven from a command line and by AI agents over MCP. Its interface speaks six languages: Italian, English, German, French, Spanish and Arabic, the last one written from right to left.



How this manual is organised

Chapter	What it covers
Getting started	Installing and starting BIMopen, the sample project, and a first small house from an empty project to a sheet
The interface	The application menu, the quick access toolbar, the ribbon, the options bar, Properties, the Project Browser, the drawing area, the status bar, the command line and how to move around in the views
Projects and files	Opening, saving, exporting and importing projects
Selecting and modifying	Selecting elements and the Modify tools
Walls, doors and windows	The building envelope and its openings
Floors, roofs, stairs and components	Floors, roofs, stairs, railings, curtain walls and placed components
Views and graphics	Plans, sections, elevations, 3D views and how they are drawn
Annotation and 2D details	Dimensions, text, tags, rooms, areas and 2D details
Sheets, schedules and printing	Sheets, schedules, printing and project settings
Command line and MCP	Typing commands, <code>bimopen-cli</code> and the MCP server for agents
Keyboard shortcuts	Every key and typed shortcut
Troubleshooting	What to do when something does not work as expected

The chapters from *Projects and files* to *Sheets, schedules and printing* are being written area by area: each one is completed when the features it describes have been checked one by one through the interface. Until then they list what they will contain.

Conventions

- Names of the interface are written in **bold**, as they appear on the screen in English: **Home** tab, **Wall** button, **Properties** palette.
- A path through the interface is written with arrows: **Home ► Build ► Wall** means the **Home** tab of the ribbon, its **Build** panel, its **Wall** button.
- Keys are written like `Ctrl+Z`; a shortcut typed at the keyboard, letter by letter, is written in capitals, like `WA`.
- Commands typed at the command line, and their output, are written `like this`. Points are `x,y` in metres.
- Notes, tips and warnings are set apart:

Note

A note adds something worth knowing.

Tip

A tip shows a quicker or better way.

Warning

A warning tells you about something that can lose work or give a wrong result.

What this manual describes

This manual describes BIMOpen as it is today, and only what has been tried in the program. When a feature is not described yet, it may still exist: the [roadmap](https://atsanna.github.io/bimopen-site/roadmap.html) (<https://atsanna.github.io/bimopen-site/roadmap.html>) lists what is available and what is planned. The whole manual is also a PDF, one per language: the last entry of the navigation, **PDF**, downloads it.

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Getting started

This chapter shows how to start BIMOpen on the desktop and in the browser, what the sample project contains, and how to model a first small house: four walls, a door, a window, a floor, a roof, a 3D view and a sheet with the plan on it. It takes about ten minutes.

Running BIMOpen on the desktop

BIMOpen is built from its source code with Rust, version 1.90 or later. On Linux the graphical interface also needs the development files of xkbcommon, Wayland and GTK 3.

```
sudo apt-get install -y libxkbcommon-dev libwayland-dev libgtk-3-dev # Debian, Ubuntu
cargo run --release -p bimopen -- --sample                        # opens the sample house
```

The program is `bimopen`. It accepts a file to open and one option:

Command	What it opens
<code>bimopen</code>	A new, empty project
<code>bimopen --sample</code>	The sample house
<code>bimopen house.bimopen</code>	The project saved in <code>house.bimopen</code>

You can also open a project by dragging a `.bimopen` file from the file manager into the window.

Language and theme

The first time, BIMOpen speaks the language of the operating system when it is one of its six languages (Italian, English, German, French, Spanish, Arabic), and English otherwise. To change it, use the language menu at the right end of the title bar (the globe with the language's name), or **Application menu ► Options ► Language**. The interface changes at once.

In **Options** you also choose the **Theme**, **Light** or **Dark**, and whether the background of the views is inverted (**Invert background color**: dark views with light lines). Choosing the dark theme also inverts the background; you can turn it back off. BIMOpen remembers the language and the theme for the next time.

Running BIMOpen in the browser

The web version is the same program, compiled for the browser. Open atsanna.github.io/bimopen-site/app/ (<https://atsanna.github.io/bimopen-site/app/>): it starts with the sample house. Nothing needs to be installed, and the project stays in your browser: it is not sent anywhere.

The address accepts these options, which can be combined with `&`:

Address	Effect
<code>app/?lang=de</code>	Opens in German for this visit (<code>it</code> , <code>en</code> , <code>de</code> , <code>fr</code> , <code>es</code> , <code>ar</code>)
<code>app/?empty</code>	Starts with a new, empty project instead of the sample
<code>app/?webgl</code>	Draws with WebGL2 even where WebGPU is available

The browser must support WebGPU or WebGL2. In the browser some things work differently:

- **Open...** cannot show a file dialog: drag a `.bimopen` file into the page to open it;
- **Save** and the exports download the file, with the name of the project.

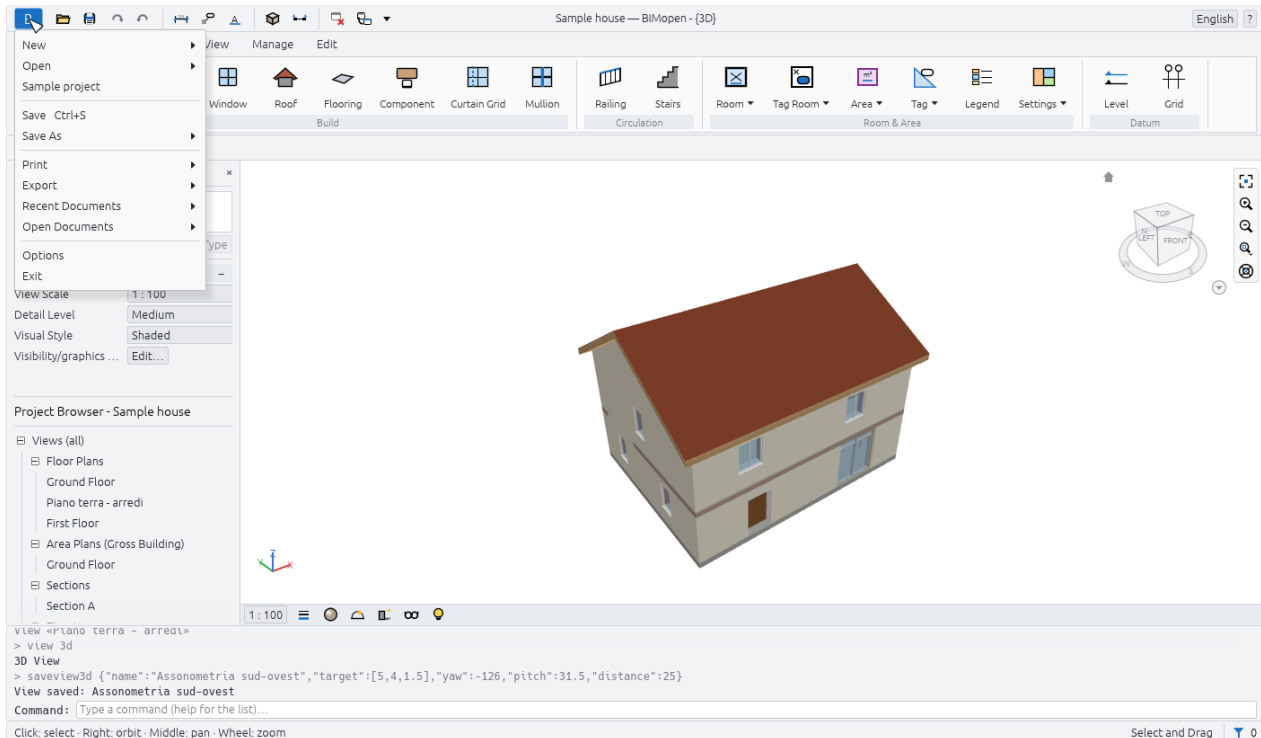
To build the web version yourself:

```
cargo xtask web # builds dist/web
python3 -m http.server 8080 -d dist/web # then open http://localhost:8080
```

`cargo xtask web` needs the `wasm32-unknown-unknown` target of Rust and the `wasm-bindgen` command of the version written in `Cargo.lock`; with binaryen's `wasm-opt` installed, the result is smaller.

The sample project

The sample house shows most of what BIMopen can do. Open it with **Application menu ► Sample project**, with `bimopen --sample`, or by typing `sample` at the command line.



It contains:

- two levels, each with its floor plan, and five grid lines;
- fifteen walls of four types, with layers, joined at the corners;
- six doors and twelve windows, tagged in the plans;
- two floors, a pitched roof, a stair with its railings and a storefront curtain wall;
- furniture and plumbing fixtures, eight rooms coloured by use, with a legend;
- a section, an elevation, an area plan, a saved 3D view and a drafting view with a wall detail;
- dimensions, text notes and the schedules of walls, doors, windows, rooms and materials.

Tip

The sample is a good place to try a tool before using it on your own project: a new sample is always one click away, and nothing you change in it is saved unless you save it.

Your first house

The steps below start from an empty project and end with a sheet. Every step names the button to click; the [interface chapter](#) explains each part of the window.

1. Start a new project

1. Click the blue **B** button at the left end of the title bar: the **application menu** opens.
2. Click **New ► Project....** The **New project** dialog proposes BIMopen's default template: click **OK**.

The new project has two levels, **Ground Floor** and **First Floor**, a floor plan for each, and the default 3D view. It has no walls yet. Its wall, door, window, floor and roof types are ready to use.

2. Open the ground floor plan

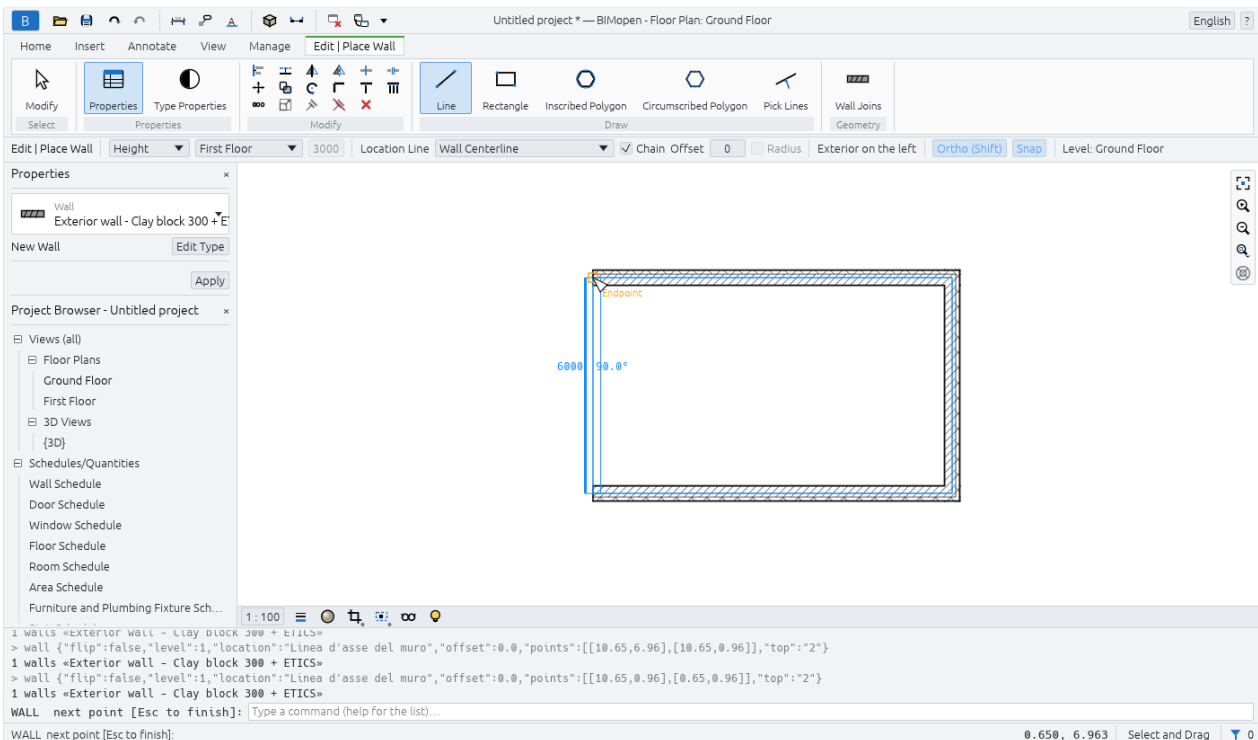
In the **Project Browser**, under **Views (all) ► Floor Plans**, double-click **Ground Floor**. The plan opens in the drawing area and the title bar shows **Floor Plan: Ground Floor**.

Note

A single click on a view in the Project Browser shows its properties in the **Properties** palette without opening it. A double-click opens it.

3. Draw four walls

1. Click **Home ► Build ► Wall**. The ribbon switches to the contextual tab **Edit | Place Wall**, the options bar shows the settings of the wall, and **Properties** shows the type of the next wall, **Exterior wall - Clay block 300 + ETICS**.
2. On the options bar, turn on **Ortho (Shift)**: the walls stay horizontal or vertical.
3. Click in the plan where the first corner goes. The command line asks for the next point: **WALL next point [Esc to finish]:**.
4. Click the second, third and fourth corners. While you move the mouse, the length and the angle of the wall being drawn are shown next to it.
5. Click the first corner again: the four walls are joined at the corners.
6. Press Esc to stop the chain, and Esc again to end the tool.



Tip

You can draw the same walls by typing their corners in metres: `wall 0,0 10,0 10,6 0,6 c`. The final `c` closes the chain. See [Command line and MCP](#).

4. Add a door and a window

1. Click **Home ► Build ► Door**, then click on a wall where the door goes. The door is placed in the wall, which is cut around it. The command line confirms it: **Door «Single swing door 80x210» in wall ...**.
2. Press Esc: the tool ends and the ribbon returns to the **Home** tab.
3. Click **Home ► Build ► Window**, click on another wall, and press Esc.

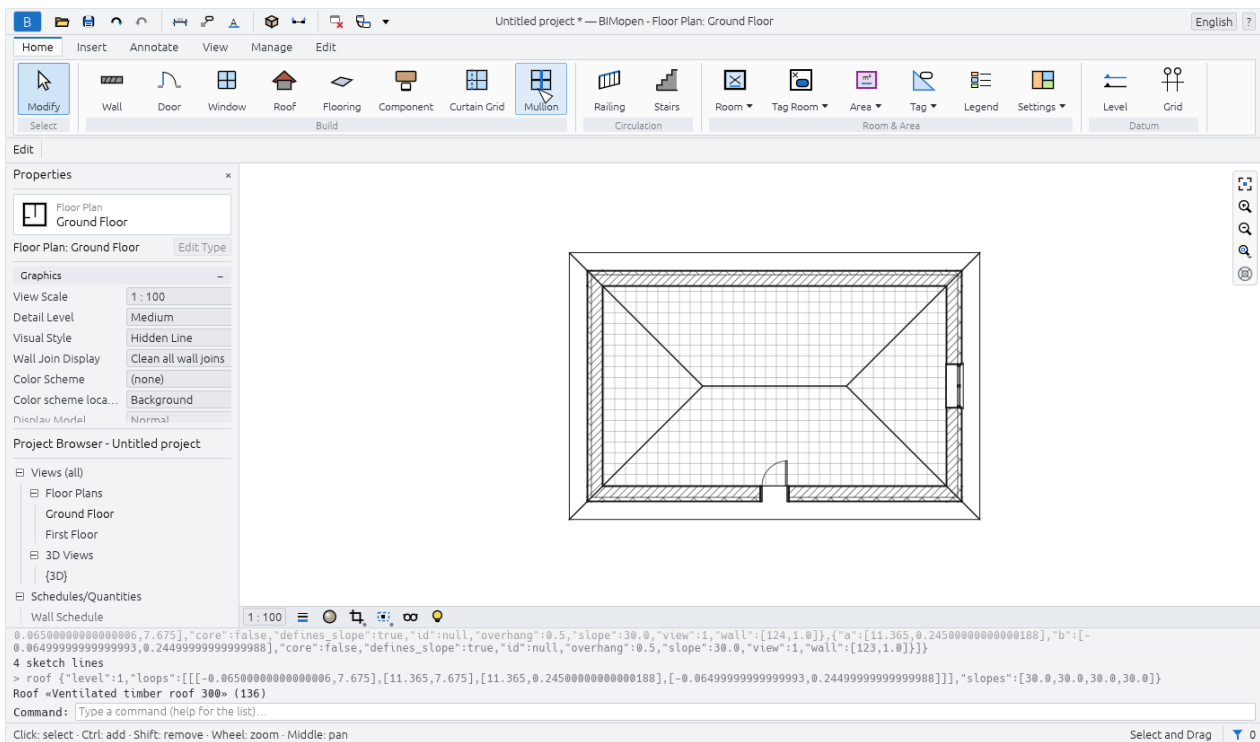
A door or a window can only be placed in a wall: after a click away from the walls, the command line answers **no wall at that point** and nothing is placed.

5. Add a floor and a roof

1. Click **Home ► Build ► Flooring**. Sketch mode opens: the contextual tab **Edit | Create Floor Boundary**, with **Pick Walls** active.
2. Move the cursor over a wall and press Tab: the four walls are highlighted. Click: their lines go on the inner faces of the walls.
3. Click **Finish Edit Mode**: the floor is made and the command line gives its area.
4. Click **Home ► Build ► Roof**. **Pick Walls** is active again; the options bar has **Defines Slope** (ticked) and the **Overhang** (500 mm by default).

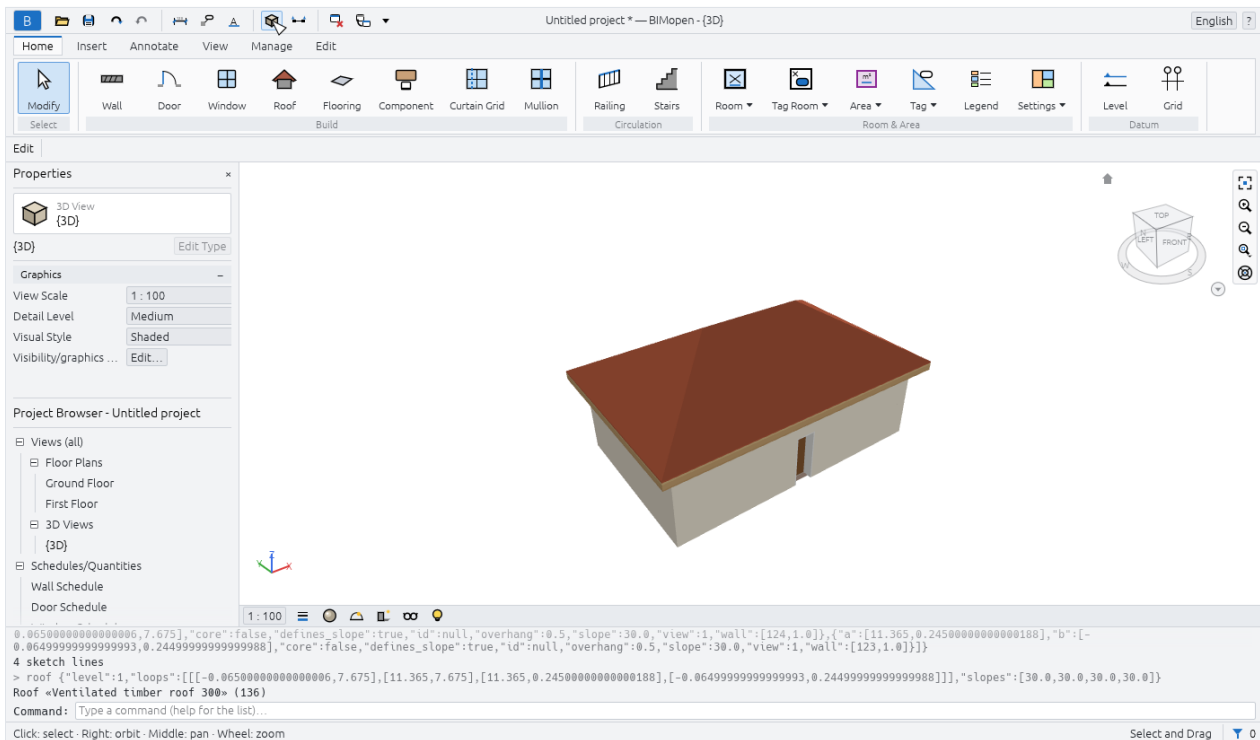
5. Press Tab over a wall, click, then **Finish Edit Mode**: a hip roof sloping at 30° covers the walls, with the overhang all around.

Floors, roofs, stairs and components tells more about sketch mode.



6. Look at it in 3D

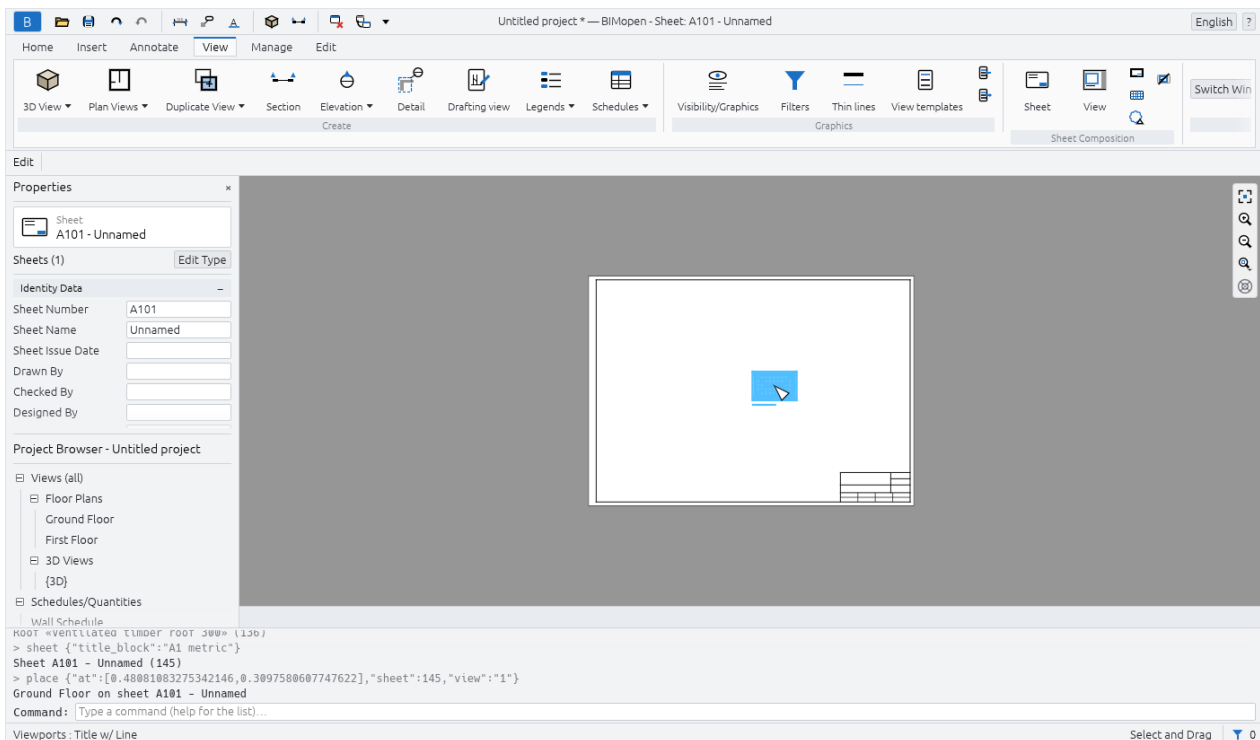
Click the **3D View** button (the cube) on the quick access toolbar. The default 3D view, **{3D}**, opens. Drag with the right mouse button (or with Shift and the middle button) to orbit, drag with the middle button to pan, and turn the wheel to zoom; the left button selects, as in plans. Home fits the whole model in the view.



7. Put the plan on a sheet

1. Click the **View** tab, then **Sheet Composition ► Sheet**. The **New Sheet** dialog lists the title blocks: none, A0, A1, A2 or A3, with their size in millimetres.
2. Click **OK**. The sheet is created with the next free number (**A101** for the first one, then **A102...**) and opens.

3. Click **Sheet Composition ► View**. The **Views** dialog lists the views that are not on a sheet yet.
4. Choose **Floor Plan: Ground Floor** and click **Add View to Sheet**. A rectangle of the plan's size follows the cursor: click on the sheet where the plan goes. It is placed at its own scale, 1 : 100, as a viewport, which stays selected.



8. Undo, redo and save

- **Ctrl+Z** undoes the last change (here, the viewport goes away); **Ctrl+Y** redoes it. The arrows of the quick access toolbar do the same.
- **Ctrl+S** saves the project. A project that has never been saved asks for a file name first; the file has the extension **.bimopen**. In the browser, the file is downloaded.

The title bar shows an asterisk after the project's name while there are unsaved changes: **Untitled project ***.

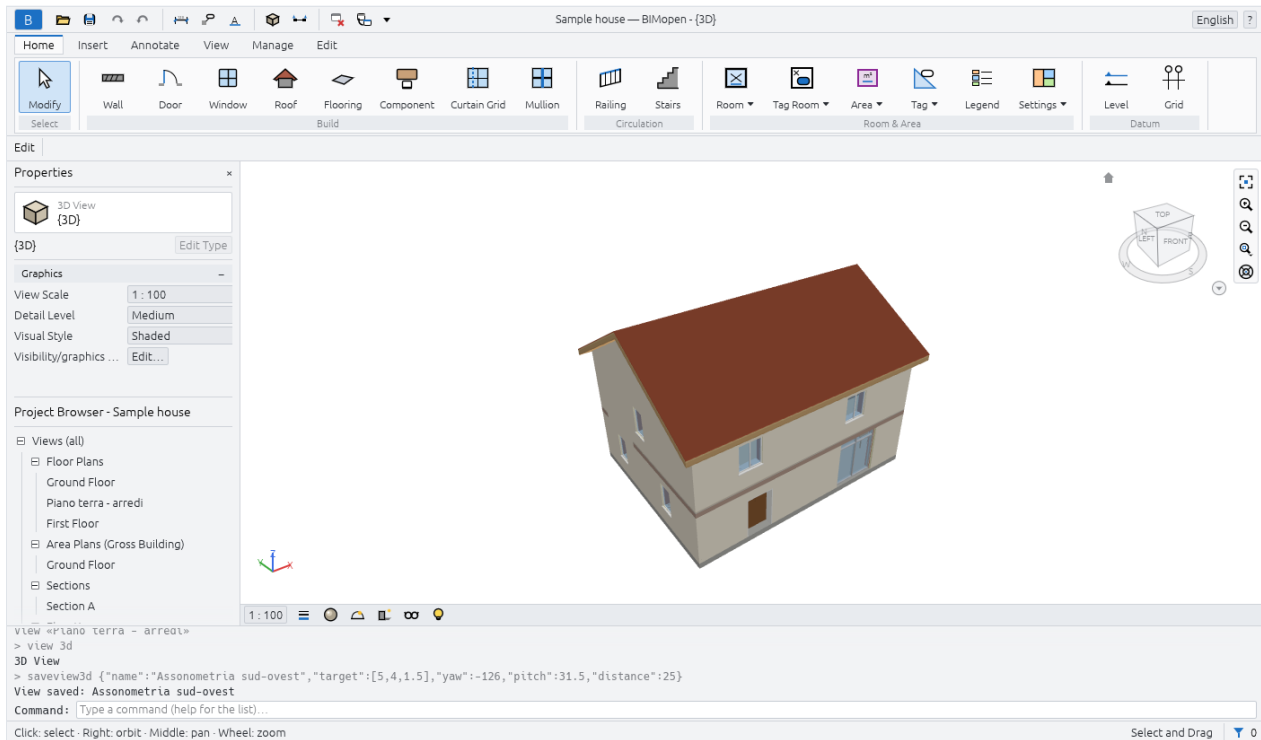
What next

- [The interface](#) describes every part of the window.
- [Keyboard shortcuts](#) lists the keys and the two-letter shortcuts, such as **WA** for a wall.
- [Command line and MCP](#) shows how to type commands, run scripts and let an agent model for you.

The interface

The BIMopen window has the same parts in the desktop and in the web version. From top to bottom:

1. the **title bar**, with the application menu, the quick access toolbar, the name of the project and of the active view, the language menu and the help menu;
2. the **ribbon**, with its tabs and panels of tools;
3. the **options bar**, with the settings of the active tool;
4. on the left, the **Properties** palette above the **Project Browser**;
5. the **drawing area**, where the views open in windows, each with its view control bar;
6. the **command line**, with the log of what has been done;
7. the **status bar**.

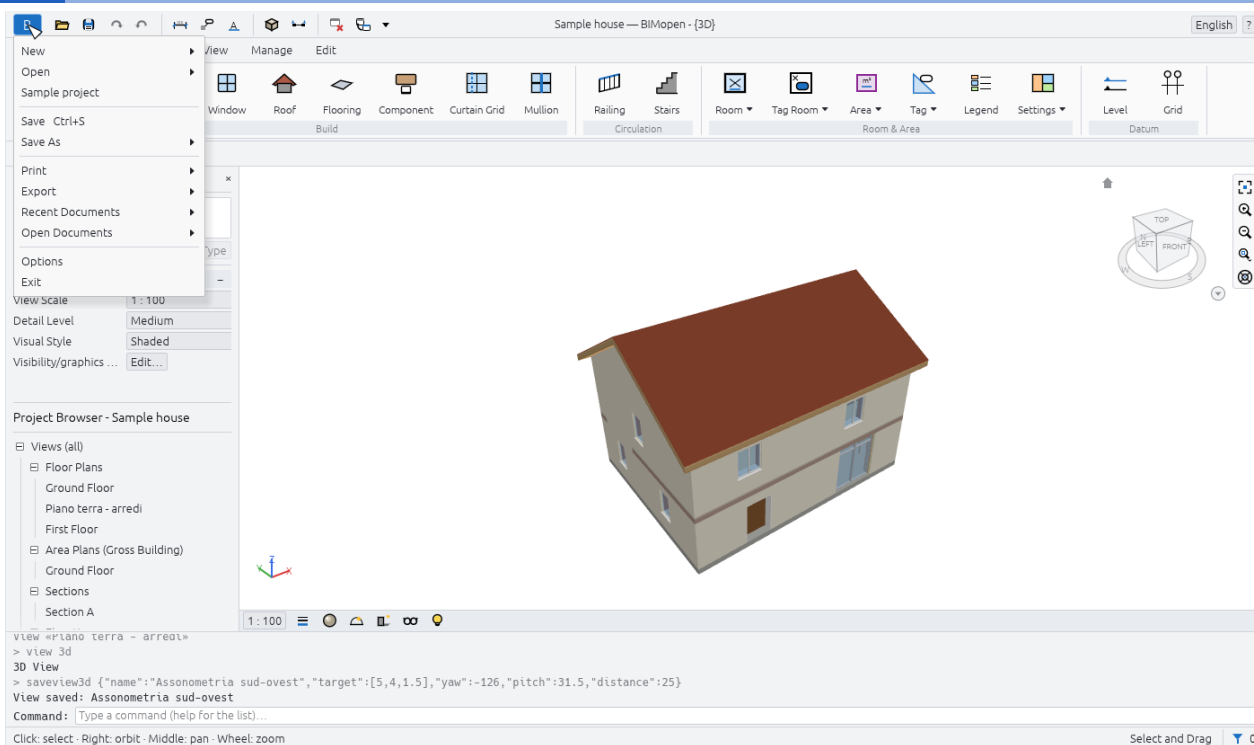


The palettes keep their width whatever they show: a long name is cut with «...» and its tooltip shows it whole. Drag the edge of the palettes to make them wider or narrower, and the line between **Properties** and the **Project Browser** to share the height; BIMopen remembers both for the next session. In the **BIMopen** style the tool panel and the element panel work the same way.

In Arabic the whole window is mirrored: the palettes are on the right, the ribbon and the options bar read from right to left, and the navigation bar is on the left edge of the views.

Application menu

The blue **B** button at the left end of the title bar opens the application menu: the commands that work on the whole project.



Item	What it does
New	Closes the current project and starts a new one from the default template: two levels with their plans, and the default types
Open...	Opens a <code>.bimopen</code> project, or imports an <code>.rvt</code> model, chosen in a file dialog. In the browser, drag the file into the page instead
Sample project	Opens the sample house
Save <code>Ctrl+S</code>	Saves the project in its file; a project never saved asks for a name, like Save As...
Save As...	Saves the project in a new <code>.bimopen</code> file and goes on working on that file
Print... <code>Ctrl+P</code>	Prints sheets to PDF
Export ► Export IFC4...	Writes the model as an IFC4 file
Export ► Export plan SVG...	Writes the active plan as an SVG drawing
Export ► Export view PNG...	Writes the active view as a PNG image
Open Documents	Lists the open view windows; click one to bring it to the front
Options	Opens the Options dialog
Exit	Closes BIMopen (desktop only)

New, **Open...** and **Sample project** replace the current project without asking: save it first if you want to keep it.

Warning

Unsaved changes are lost when you choose **New**, **Open...** or **Sample project**. The asterisk after the project's name in the title bar tells you that there are unsaved changes.

Options

Application menu ► **Options** has, among others, these settings:

Setting	Values	Effect
User Interface ► Language	Italiano, English, Deutsch, Français, Español, العربية	The language of the whole interface, at once

Setting	Values	Effect
User Interface ► Theme	Light, Dark	The colours of the window. Dark also turns on Invert background color
Graphics ► Invert background color	on, off	Views with a dark background and light lines
ViewCube ► ViewCube size , Inactive opacity	Small, Medium, Large; 0 % to 100 %	The size of the cube, and how much it shows while the pointer is elsewhere
ViewCube ► Show compass	on, off	The compass ring under the cube
ViewCube ► Keep scene upright	on, off	Dragging the cube never turns the model upside down; off, the view can pass over the top
ViewCube ► Fit to view	on, off	A click on the cube also fits the model in the window
SteeringWheels ► Wheel size , Wheel opacity	Small, Medium, Large; 0 % to 100 %	The navigation wheel's size and background

BIMopen remembers the language and the theme the next time it starts.

Quick access toolbar

Next to the application menu, the quick access toolbar keeps the most used commands one click away. Rest the mouse on a button to read what it does and its shortcut.

Button	What it does
Open... (folder)	As in the application menu
Save (disk)	Saves, Ctrl+S
Undo (arrow left)	Undoes the last change, Ctrl+Z . Greyed when there is nothing to undo
Redo (arrow right)	Redoes the change just undone, Ctrl+Y . Greyed when there is nothing to redo
Aligned dimension	Starts the aligned dimension tool, DI
Tag by Category	Starts Tag by Category , as on Annotate ► Tag : click an element to tag it, TG
Text	Starts the text tool, TX
3D View (cube)	Opens the default 3D view, {3D}
Section	Starts the section tool, SE
Close Hidden	Closes every view window except the active one. Greyed when only one is open
Switch Windows	Lists the open view windows; the active one is ticked

In the middle of the title bar, when the window is wide enough, BIMopen shows the name of the project and of the active view, for example **Sample house — BIMopen - Floor Plan: Ground Floor**. An asterisk after the project's name means that it has unsaved changes.

At the right end:

- the **language menu**, a globe with the name of the current language: choose another one and the interface changes at once;
- the **?** menu: **Commands** lists every command at the command line (as typing **help**), and **About** shows the version, the licence and the credits.

? ► Help (F1) opens this manual, in the language of the interface, in the browser. F1 opens the page of what you are doing: the open dialog, the ribbon button under the mouse (its tip ends with **Press F1 for more information**) or the active tool.

Right-click a ribbon tool and choose **Add to Quick Access Toolbar**: the tool joins the toolbar and starts from there whatever tab is open. Right-click any tool of the toolbar, the default ones included, for **Remove from Quick Access Toolbar** or **Add Separator** (a line to its right). The small arrow at the end of the toolbar, **Customize Quick Access Toolbar**, lists the default tools: tick one to show it again, untick it to remove it. In the same menu, **Customize Quick Access Toolbar...** opens a window with the toolbar's tools in order: **Move Up** and **Move Down** move the one selected left or right, **Add Separator** puts a line after it, **Remove** takes it (or a line) away, **OK** applies. **Show below the Ribbon** moves the whole toolbar under the ribbon (or above it

again). The toolbar is kept for the next sessions. On the ribbon's tabs and in the quick access toolbar each command has its own icon.

Ribbon

The ribbon groups the tools in tabs, and each tab in panels. The name of a panel is written under its buttons. A button whose name is followed by a small mark opens a menu. Resting the mouse on a button shows what it does and, in brackets, the shortcut you can type to start it.

Tab	Panels
Home	Select, Build, Circulation, Room & Area, Datum
Annotate	Select, Dimension, Text, Detail, Tag
View	Create, Graphics, Sheet Composition, Windows
Manage	Settings, Inquiry
Edit	The contextual tab: its panels depend on the active tool and on the selection

Press and release Alt, or press F10, to show the key tips: a letter on every tab (**I, N, A, V, G, M**, from the first tab to the contextual one) and, on the buttons of the open tab, the shortcut of their tool. Type a tab's letter to open it, then a button's letters to start its tool; Esc hides the key tips. While they show, what you type does not go to the command line.

The Home tab

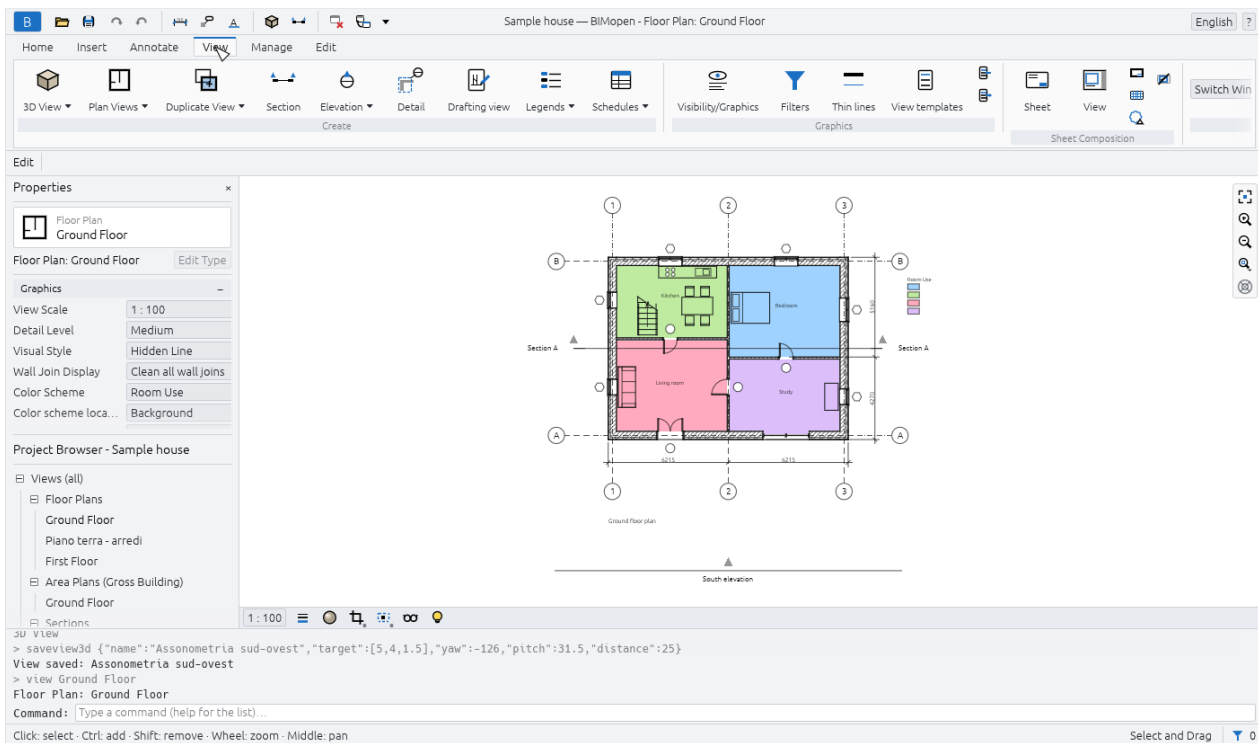
Panel	Buttons
Select	Modify : ends the active tool and goes back to selecting, Esc
Build	Wall WA, Door DR, Window WN, Roof RF, Flooring SB, Component CM, Curtain Grid CG, Mullion MU
Circulation	Railing RA, Stairs ST
Room Area	Room RM, Separation RS, Area ▼ (Area Plan, Area Boundary Line, Area), Legend LG, Settings ▼ (Area and Volume Computations, Color Schemes)
Datum	Level : drawn in an elevation or a section, two clicks at the new level's height (from a plan it opens an elevation); Grid GR

Area Boundary Line and **Area** work in an area plan: until one is open they are greyed, and their tip says to open an area plan first.

The Annotate tab

Panel	Buttons
Select	Modify
Dimension	Aligned DI, Linear DL, Angular DA
Text	Text TX
Detail	Detail line , Filled region , Masking region , Detail component CD, Repeating detail RD, Insulation IS
Tag	Tag All TG

The View tab



Panel	Buttons
Create	3D View ▾ (Default 3D View, Save View), Plan Views ▾ (Floor Plan, Area Plan), Duplicate View ▾ (Duplicate, Duplicate with Detailing), Section SE, Elevation ▾ (Elevation EL, Framing Elevation), Detail DT (a callout), Drafting view VD, Schedules ▾ (Schedule/Quantities, Material Takeoff, Sheet List, Note Block, Predefined schedules)
Graphics	Visibility/Graphics VG, Filters , View templates , and two small buttons: Apply template to current view , Create template from current view
Sheet Composition	Sheet : a new sheet with the title block you choose; View : places a view on the open sheet
Windows	Switch Windows , Replicate , Cascade , Tile , Maximize , Close Hidden , User Interface

Save View works only while a 3D view is open, **Duplicate with Detailing** only for views that are not 3D, and **Sheet Composition** ► **View** only while a sheet is open.

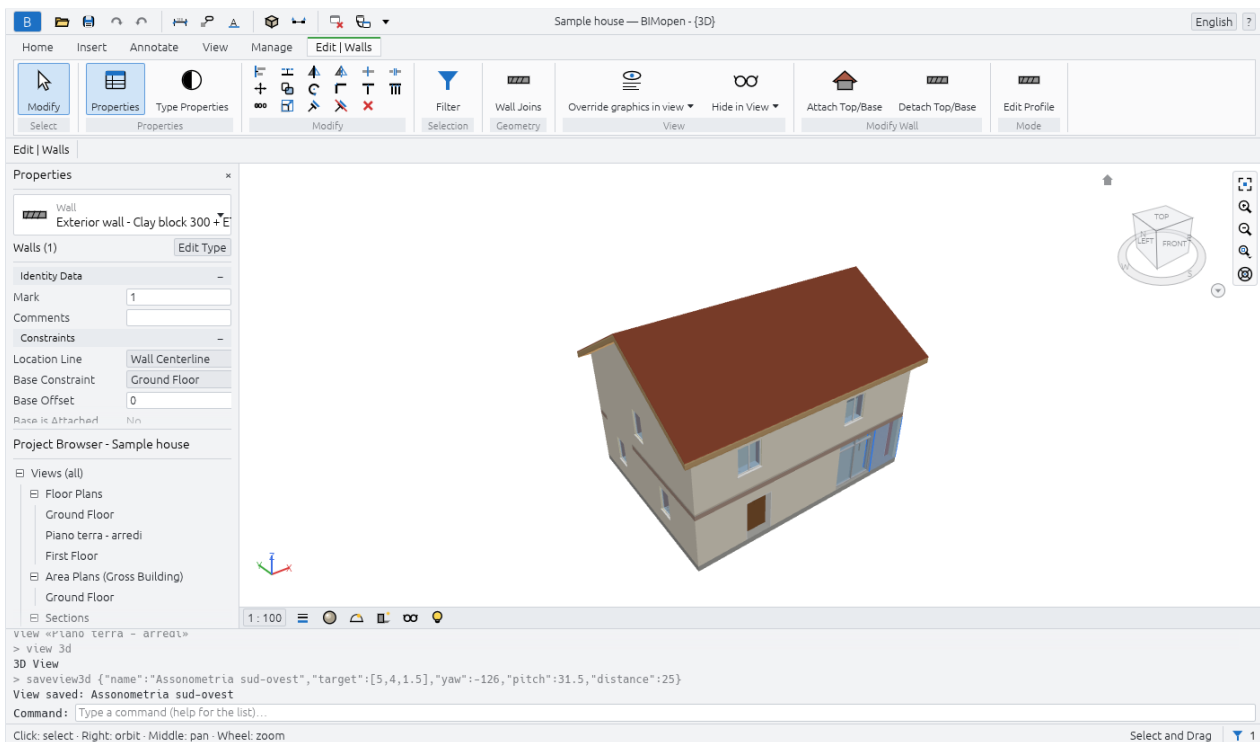
The Manage tab

Panel	Buttons
Settings	Materials , Project information , Object styles , Line styles , Purge unused , Project units UN, Snap , and Additional settings (Line styles, Fill patterns)
Inquiry	Check : checks the openings and references of the model and reports at the command line

Snap turns snapping on and off for the whole program: it is highlighted while on.

The contextual tab

When you start a tool or select something, the ribbon switches by itself to the last tab, which takes the name of what you are doing: **Edit | Place Wall** while drawing walls, **Edit | Walls** with walls selected, **Edit | Multi-Select** with elements of different categories. The tab is marked with its own colour. When the tool ends, or the selection is cleared, the ribbon goes back to the tab you were using.



It always has these panels:

Panel	Buttons
Select	Modify
Properties	Properties: shows or hides the Properties palette; Type Properties: the properties of the type of the selection, or of the next element the tool will place
Modify	Seventeen small tools in three rows: Align AL, Offset OF, Mirror - Pick Axis MM, Mirror - Draw Axis DM, Split Element SL, Split with Gap SG; Move MV, Copy CO, Rotate RO, Trim/Extend to Corner TR, Trim/Extend Single Element , Trim/Extend Multiple Elements ; Array AR, Scale RE, Pin PN, Unpin UP, Delete (De1)

Delete works only when something is selected. The [selecting and modifying chapter](#) describes the Modify tools.

Other panels appear for what is selected or for the tool:

When	Panel and buttons
Anything selected	Selection: Filter (see Selecting and modifying)
Doors or windows selected	Opening: Flip facing , Flip hand
Walls selected	Modify Wall: Attach Top (the walls rise to the roof above them), Detach Top
A level selected	View: Open plan
Sections or elevations selected	Section: Split Segment (sections only), Flip , Go to View
A callout selected	Detail: Go to View
Curtain walls selected	Curtain Wall: Curtain Grid , Mullion , Panel
Flooring or Roof tool	Draw: Boundary Line , Pick Walls
Stairs or Railing tool	Mode: Finish Edit Mode ; Draw: Run or Lines
Mullion tool	Placement: Grid Line , Grid Line Segment , All Grid Lines
A detail tool	The drawing shapes of the tool

Options bar

Under the ribbon, the options bar starts with the name of the contextual tab, then shows the settings of the active tool. They apply to the next elements you place. At its end, while a tool is active, it shows the level you are working on: **Level: Ground Floor**.

Tool	Settings on the options bar
Wall	Height or Depth ; the level the wall reaches, or Unconnected with its value; Location Line ; Chain ; Offset ; Radius (greyed: curved walls are not available yet); Exterior on the left or Exterior on the right (the space bar swaps them)
Roof	The shape: Gable , Hip or Flat ; Slope , from 5° to 60°; Overhang , up to 2 m
Stairs	Width , in millimetres; Railing Type , or None
Dimensions	What the cursor picks first on a wall: Wall centerlines or Wall faces
Detail (callout)	The scale of the new detail view, or Reference other view and the detail or drafting view the callout points at (always on in a drafting view)
Area Boundary Line	Line or Pick lines ; with Pick lines , Apply area rules or an Offset
Tools that draw lines	Ortho (Shift) : horizontal and vertical segments only; Snap : snapping to endpoints, midpoints and intersections

With **Ortho (Shift)** off, holding Shift while drawing gives the same constraint; with it on, Shift releases it.

Right-click the options bar and choose **Dock at Bottom** to move it just above the status bar; **Dock at Top** brings it back. The choice is kept for the next sessions.

Properties

The **Properties** palette shows and changes the parameters of what you are working on. From top to bottom it has:

- the **type selector**: the family in small letters and the type underneath. Click it to choose another type: the selected elements change type, or, while a tool is active, the next element gets that type;
- a row with what the palette is showing, for example **Walls (1)** or **New Wall**, and the **Edit Type** button, which opens the type properties;
- the parameters, in groups (**Constraints**, **Graphics**, **Identity Data**...). Click the name of a group to fold it. Values in grey are read-only: they are computed from the model;
- the **Apply** button, which confirms a value you are typing. Enter does the same.

What the palette shows depends on the situation:

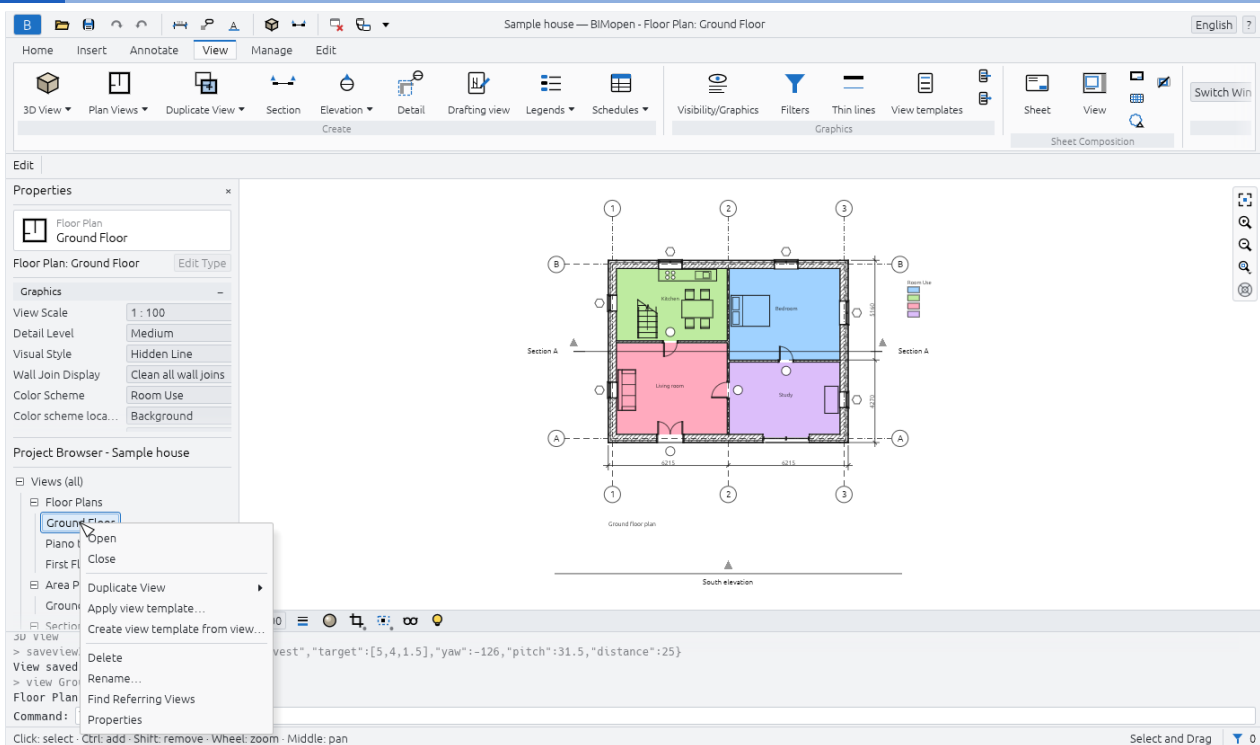
Situation	The palette shows
Nothing selected, no tool	The properties of the active view (scale, detail level, visual style...), or of the view clicked in the Project Browser
A tool active	The type of the next element, as New Wall , New Door ...
One element selected	Its type and its instance parameters
Several elements of one category	Their number, as Walls (3)
Elements of different categories	Multi-Select , Common (5) , and how many of each category, as 3 × Walls

Lengths are written and read in the project's units (millimetres in a new project). You can type a value with its unit, for example **2.7m**.

To close the palette, click × on its title; to show it again, use **View ► Windows ► User Interface ► Properties** or the **Properties** button of the contextual tab.

Project Browser

The **Project Browser** lists the views, schedules, sheets and families of the project in a tree. Its title carries the name of the project. Click  or  to fold or unfold a branch.



Branch	What it contains
Views (all) ► Floor Plans	The floor plans of every level, from the lowest, and the callouts drawn in plans
Views (all) ► Area Plans (...)	The area plans, one branch per area scheme
Views (all) ► Sections, Elevations	The sections and the elevations
Views (all) ► Detail Views	The callouts drawn in sections
Views (all) ► 3D Views	{3D}, the default 3D view, and the saved 3D views
Views (all) ► Drafting views	The drafting views
Schedules/Quantities	The project's schedules, then the predefined schedules
Sheets (all)	The sheets, as number - name
Families	The types of the project, by category: walls, doors, windows, floors, roofs, components and the others

The branches of area plans, sections, elevations, detail views and drafting views appear only when they have something in them. The active view is written in bold.

With a view:

- a **click** shows its properties in the Properties palette, without opening it;
- a **double-click** opens it;
- a **right-click** opens its menu: **Open**, **Close** (closes its windows), **Duplicate View ► (Duplicate, Duplicate with Detailing), Apply view template..., Create view template from view..., Delete, Rename..., Properties**.

The menu of a sheet has **Apply view template to all views...** instead of the two template items, and no **Duplicate View. {3D}** cannot be deleted or renamed.

With a schedule of the project, a click selects it, a double-click opens it, and the right-click menu has **Open**, **Schedule Properties...** and **Delete**. A predefined schedule opens with a click.

With a type, under **Families**, a double-click opens its type properties; the right-click menu has **Type Properties**, **Duplicate...**, **Create Instance** (starts the tool that places it, with that type) and **Delete**.

After a click in the Project Browser, the keyboard moves in it: Up and Down go from row to row (the view's properties show in the palette), Right opens a branch, Left closes it or goes up to the branch the row is in, Enter opens the view.

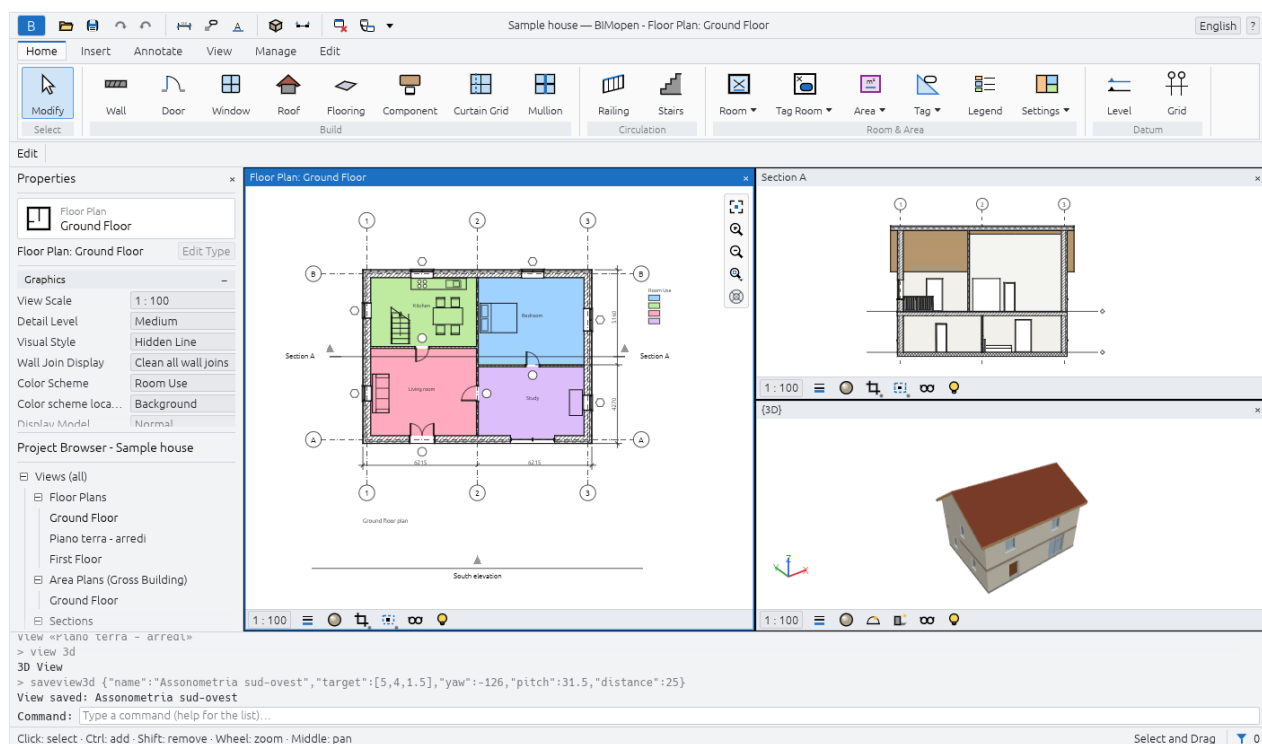
Views go on sheets from here too. Drag a plan, section, elevation, drafting view, legend, saved 3D view or schedule onto the open sheet: its viewport follows the cursor and stays where you drop it. Or drop it on a sheet's name in the tree: the sheet opens and the viewport follows the cursor until you click. While you drag, the tree scrolls when the cursor nears its edge. The right-click menu of a sheet has **Add View....** The views on a sheet are listed under it; the right-click menu of one has **Remove from Sheet**, and the menu of **Sheets (all)** has **New Sheet....** In a 3D view the right-click menu also has **Zoom to 3D Extents**: the whole model, the elements hidden in the view too. A view already on a sheet is refused, with the reason on the command line; legends and schedules can go on several sheets. A saved 3D view is drawn on the sheet with the edges seen from its camera.

The right-click menu of a plan, section or drafting view has **Find Referring Views**: the views that show its symbol and the sheets it is on; **Go to View** opens the one chosen.

Drawing area and view windows

Every view you open is a window in the drawing area. A view opened again comes to the front; at least one window always stays open. **View ► Windows** arranges them:

Button	What it does
Switch Windows	Lists the open windows; the active one is ticked
Replicate	Opens a second window on the active view, with its own zoom
Cascade	Overlapping windows, each with its title bar: drag a title to move a window, its edges to resize it
Tile	All the windows side by side, each with a title bar; the active one has a blue title and frame
Maximize	The active window fills the drawing area; the others wait underneath
Close Hidden	Closes every window except the active one
User Interface	Shows or hides the Project Browser , Properties , the Command line , the Status bar and the Navigation bar



Click in a window to make it active: the tools work in the active window, the others only show the model. In **Tile** and **Cascade**, the **x** on a window's title bar closes it.

Tile puts the active window at the top left and the others after it, from the most recently active; **Switch Windows** lists them in the same order. Tile again after working in another window and that window comes first.

User Interface ► Keyboard Shortcuts lists the commands with their shortcuts. Search a command by name, or **Filter** the list (**All**, **All Defined**, **All Not Defined**, **All Reserved**); select a command, type the keys in **Press new keys** and click **Assign**. The same keys may go to several commands: typed in the drawing area, the status bar shows the first, the arrow keys go through the others and Enter or Space runs the one shown; **Export...** writes every shortcut to an XML file and **Import...** reads such a file

back as your shortcuts (a file naming no command here is refused, and your shortcuts stay); **Remove** takes away the keys you added. Your shortcuts are kept for the next sessions and start the command when typed, as the built-in ones do.

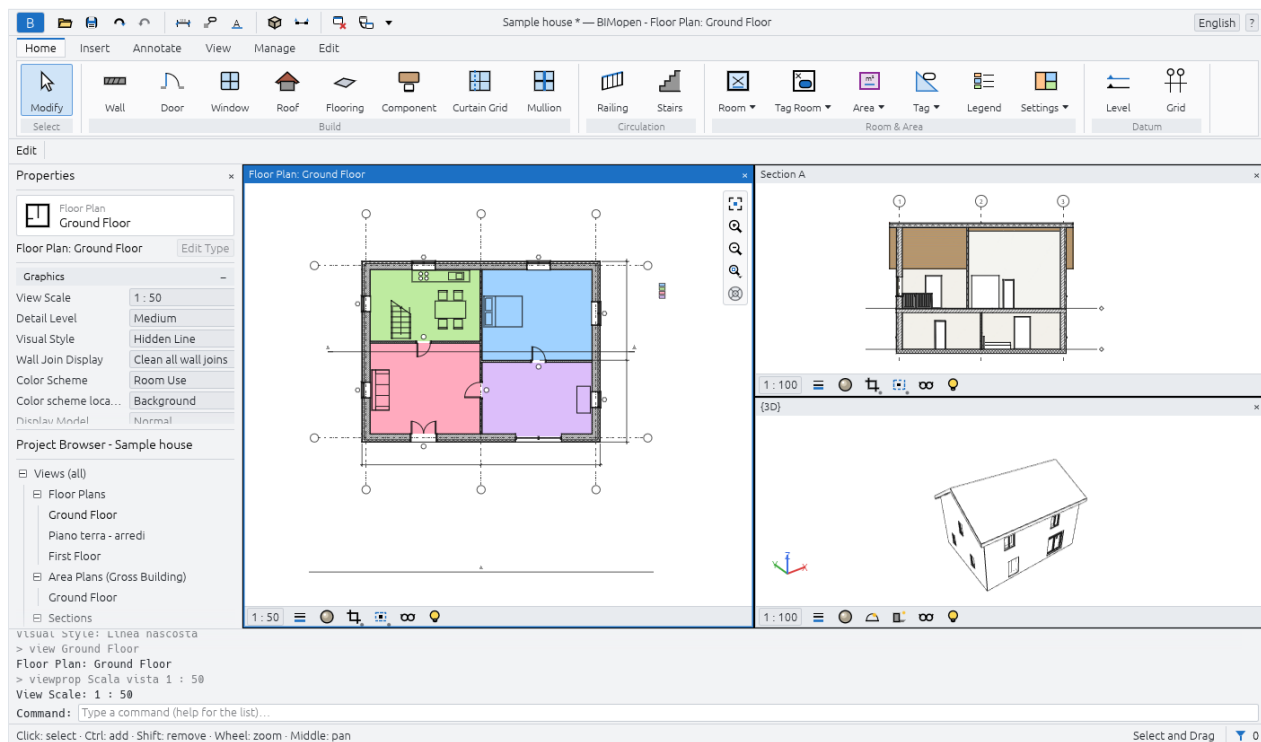
A tool never changes the active view by itself. Started in a view where it cannot work (a roof or a room in a 3D view, a level in a plan, an area outside an area plan), it opens **Go to View**: the views that suit it, with the plan of the active level chosen first. **Open View** opens the chosen view and starts the tool there; **Cancel** leaves everything as it was. **Edit Boundary** of a floor, roof, stair or railing, from a section or an elevation, asks the same way for a plan of its level, and a new section or elevation leaves the plan you drew it in active. **Move**, **Copy**, a linear **Array** and **Mirror - Draw Axis** also work in sections and elevations: along the view; the axis is the vertical plane at right angles to the view through its first point, however it is drawn. A radial **Array** works in plans and 3D views: in a section or an elevation it stays chosen, but its clicks make nothing and the status bar asks for **Linear**.

View control bar

At the bottom of every plan, section, elevation, callout and drafting view:

Control	What it does
The scale, for example 1 : 100	Opens the list of scales; under Custom type another one, as 1 : 75 , and press Enter
Detail level	Coarse , Medium or Fine
Crop View	Crops the view to its crop region, or stops cropping; a blue dot shows it is on
Show Crop Region	Shows or hides the crop region's frame; a blue dot shows it is on
Temporary Hide/Isolate	Hides or isolates elements or categories in this view until you reset it; framed while active

In a 3D view, the bar has the **Visual style** (**Wireframe**, **Hidden Line**, **Shaded**, **Shaded with Edges**, **Consistent Colors**) and **Temporary Hide/Isolate**. A sheet has no view control bar: its views have their own scale.



Navigation bar

On the right edge of the active view (the left edge in Arabic), three buttons: **Zoom to Fit** (the same as Home), **Zoom In** and **Zoom Out**.

Under them, **Zoom Options** opens the zoom menu: **Zoom in Region** (drag a rectangle on the view; Esc gives up), **Zoom Out (2x)**, **Zoom to Fit**, **Zoom All to Fit** (every open window), **Zoom Sheet Size** (the view at the size it prints), and **Previous Pan/Zoom** and **Next Pan/Zoom**, which go back and forth through the views of that window. Typed: **ZR**, **Z0**, **ZF**, **ZA**, **ZS**, **ZP**. In a 3D view the last button, **SteeringWheels**, opens the navigation wheel: drag its **Zoom**, **Orbit** or **Pan** sector; click **Center** to make the model point under its centre the point the view turns about, or **Rewind** to go back to the previous view; **Close Wheel** (x) closes it.

Moving around in the views

In plans, sections, elevations and sheets

Mouse wheel	Zooms in and out at the cursor
Drag with the middle button	Pans
Drag with the left button	A selection window, or moves the selected elements (Selecting and modifying)
Home	Fits the whole view in the window

In 3D views

Drag with the right button, or Shift + middle button	Orbits around the model
Drag with the middle button	Pans
Drag with the left button	A selection window, or moves the selected elements
Mouse wheel	Zooms in and out
Home	Fits the whole model in the window

A small tripod in the lower corner of the 3D view shows the directions of the axes: X red, Y green, Z blue. A saved 3D view remembers where you left it.

In 3D, the wheel zooms keeping the model point under the cursor in place, and the orbit turns about the centre of the selection, or about the point the view looks at when nothing is selected.

The **ViewCube**, in the top corner of the 3D view, turns with the model. Each face has a square in the middle, a strip along each edge and a small square at each corner. The square in the middle looks straight at that side (**TOP**, **FRONT**, **RIGHT**...); an edge strip, which runs across both faces beside the edge, looks from between those two sides; a corner square, on the three faces around the corner, looks from between three. The region under the pointer lights up before you click, and the view turns there in a brief transition. Drag the cube to orbit.

Seen straight on, the cube is a flat square: the triangles outside its four sides turn the view to the face beyond that side, and the two curved arrows at its top right corner turn the picture a quarter turn clockwise or counterclockwise.

A flat compass ring lies at the cube's base, with **N**, **E**, **S**, **W** at the true points of the compass; it turns with the view. Click a letter to look from that point of the compass. Drag the ring, or a letter, to turn the model about the vertical through the point the view turns about, following the pointer round the ring.

The house, **Home view**, goes back to the starting view. Right-click the cube, or click the round button at its bottom right, for its menu: **Home view**; **Set Current View as Home** (each 3D view keeps its own, with the project); **Orient to View** ► (a plan from above, an elevation or a section along its line, another 3D view from its camera); **Orient to Direction** ► (any of the 26 directions of the cube); **Options...**, which opens the **ViewCube** page of **Options**.

The context menu of a view

Right-click in a view while no tool is active. If the cursor is on an element that is not selected, the element is selected first. The menu has:

- **Cancel**: clears the selection;
- **Select All Instances** ► **Visible in View** or ► **In Entire Project**: the elements of the same type; **Select Previous**: the selection made before;
- **Hide in view** ► **Elements** or ► **Category**: hides the selected elements, or their whole categories, in this view;
- **Override graphics in view** ► **By category...**: opens **Visibility/Graphics** on the categories of the selection;
- **Visibility/Graphics...**

While a tool is active, a right-click opens the tool's menu instead, and the step in progress stays: **Cancel** (what Esc does, which still cancels the step), **Repeat [command]**, **Snap Overrides** ► (the snap of the next point, as the keys **SE**, **SM**, **SN**, **SI** and **SO** do; only in plans and drafting views), **Zoom in Region**, **Zoom Out (2x)**, **Zoom to Fit**, **Previous Pan/Zoom**, **Next Pan/Zoom** and **Properties**. It is the same in plans, sections, elevations, 3D views and on sheets, in both interface styles. In a sketch the overrides work in every view, with **Center** and **Perpendicular** too.

At the top of the menu, **Repeat [command]** starts the last tool you used again; Enter does the same when no tool is active and the command line is empty. The menu is the same in plans, sections and 3D views.

Command line

Under the drawing area, the command line shows the log of what has been done, the most recent at the bottom: the commands run, in grey after a `>`, their results, and errors in red. On its last row, the prompt says what the active tool expects, for example `WALL next point [Esc to finish]:`, or `Command:` when no tool is active.

You do not need to click it: whatever you type while no field is being edited goes to the command line. Enter runs the line; Up and Down bring back the lines typed before. The [command line chapter](#) describes the commands.

Status bar

On the left, the status bar shows:

- while a tool is active, what the tool expects (the same prompt as the command line);
- with no tool, the category and the type of the element under the cursor, as **Walls : Exterior wall - Clay block 300 + ETICS**;
- while you drag, the length of the move, as **Move: 1500**;
- otherwise a reminder of the mouse: **Click: select · Ctrl: add · Shift: remove · Wheel: zoom · Middle: pan** in plans, **Click: select · Right: orbit · Middle: pan · Wheel: zoom** in 3D.

On the right, the number of selected elements and a funnel: click the number to open **Filter**. Then **Select and Drag**, which lets you drag elements without selecting them first; in a plan, also the coordinates of the cursor in metres.

Selecting, in short

The [selecting and modifying chapter](#) describes selection in full. The essentials:

- click an element to select it; click an empty point to clear the selection;
- Ctrl + click adds an element to the selection, Shift + click takes it out; Tab highlights the next element under the cursor, or a chain of joined walls;
- drag from left to right to select what is entirely inside the rectangle, from right to left to select what it touches;
- drag a selected element to move it;
- Ctrl+A selects the elements of the open plan's level, or of the whole model in a 3D view; Del deletes the selection; Esc clears it.

Interface styles

BIMopen has two interface styles. Both run the same commands, with the same names, keyboard shortcuts and results; only the look and the place of the tools change.

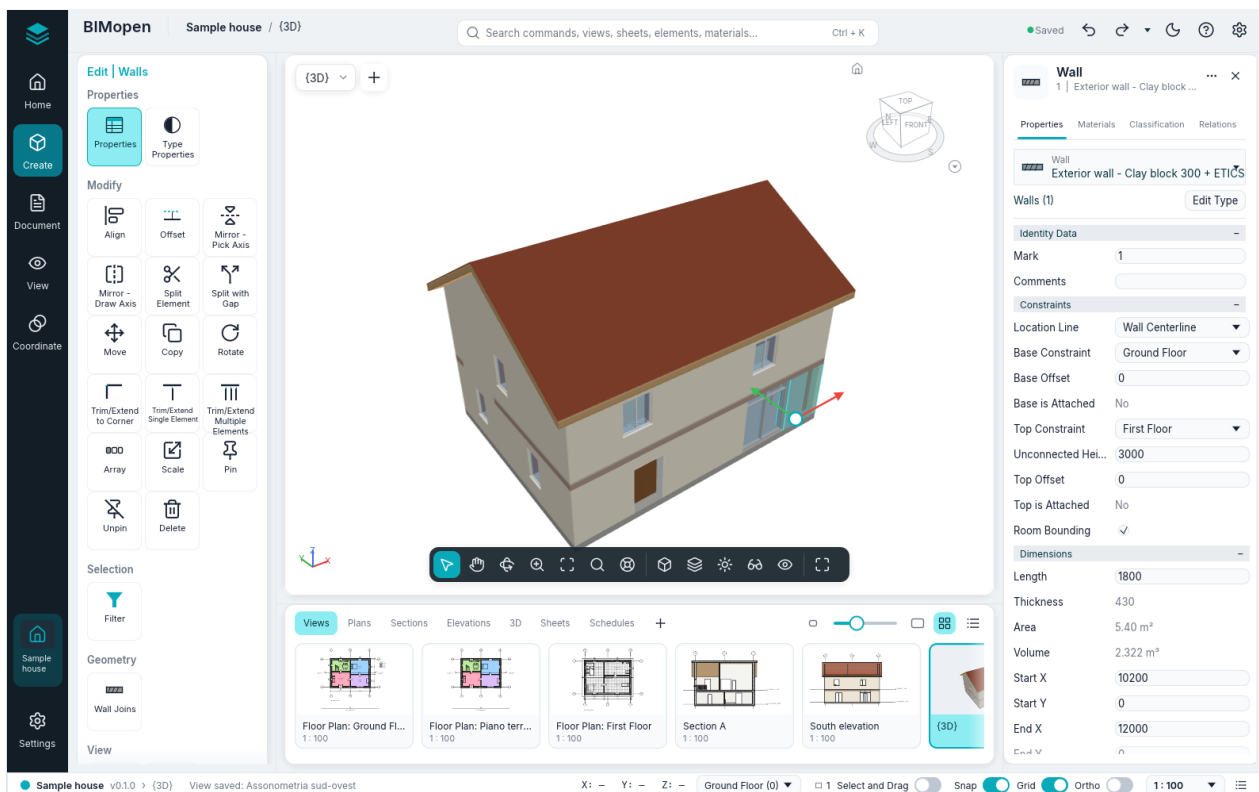
- The **Revit** style, described in [The interface](#): the ribbon, the options bar, the **Properties** palette and the **Project Browser**. BIMopen starts in this style.
- The **BIMopen** style: a side rail, a command search, tool cards, tools floating over the view, an element panel with tabs and a strip of view thumbnails.

Choosing the style

1. Open the application menu and choose **Options** (in the **BIMopen** style, the gear at the right end of the top bar).
2. Under **User Interface**, set **Interface** to **Revit** or **BIMopen**.

The window changes at once. The choice is remembered, on the desktop and in the browser, and the next session starts in the same style. **Theme** (**Light** or **Dark**) applies to both styles.

The BIMopen style



Part	Where	What it holds
Rail	Left edge	BIMopen's mark (the application menu), Home (the project), Create , Document , View , Coordinate , the open project and Settings . They take the place of the ribbon's tabs. A click on the selected entry folds the tool panel
Top bar	Top	The project and the active view, the command search, undo and redo, the save state, the light or dark theme, the ? menu and Options
Tool panel	Left, beside the rail	The ribbon's tabs as groups of tiles, each command once: Create has Home and Insert (with the Architecture tab), Document the sheets and Annotate , View the View tab and the Project Browser , Coordinate Inquiry , Settings Manage . While a tool works or something is selected, the contextual tab (« Modify Walls »: move, copy, rotate, mirror, trim, align, edit profile, Finish Edit Mode ...) sits on top; Esc or a click on empty space takes it away
Options strip	Over the view,	The options of the tool (height, location line, chain...), the options bar of the Revit style

Part	Where	What it holds
	while a tool works	
View	Centre	The view selector and + for a new view. One view bar, bottom centre: select, the Pan , Orbit (3D) and Zoom modes (with one on, the left button drags the view; Esc ends it), zoom to fit, Zoom Options , SteeringWheels (3D) the visual style, the detail level, Sun and shadows (3D), Crop (crop view, show the crop region), Temporary Hide/Isolate (its menu, as the view control bar's; the view is framed while it is on) and Reveal Hidden Elements full screen. In 3D views the ViewCube (a click on a face, an edge or a corner looks from there, a drag orbits, the house goes back to the starting view); on the selection, the move arrows (drag one to move along it, the centre to move freely in plan: the distance shows as you drag, the release moves as Move does)
Element panel	Right	The selected element: Properties (the same parameters as the Properties palette), Materials (the layers of its type with their colours and thicknesses, and a layered preview), Classification (category, type, IFC class) and Relations (level, host, hosted doors and windows, views and schedules). With nothing selected, the properties of the active view
View strip	Under the view	The views by kind (Views , Plans , Sections , Elevations , 3D , Sheets , Schedules) as thumbnails or as a list; a click opens the view, + makes a new one
Status bar	Bottom	The project and the version, the active view, the prompt of the active tool, the cursor coordinates, the active level (its menu opens the plan of another level), the selection count (it opens Filter), the Select and Drag , Snap , Grid and Ortho switches, the scale of the view and the command log

The **Structure** and **MEP** tabs of **Create** say that these disciplines are not in BIMopen yet.

Command search

Press Ctrl+K, or click the search box in the top bar, and type a few letters: the list shows the commands, views, sheets, schedules, elements and materials that match. Click a result, or choose it with the arrow keys and press Enter: a command starts, a view opens, an element is selected and shown, a material opens in **Materials**. The search finds every command of the ribbon's tabs, the contextual tab's too (with a view selected on a sheet, «activate» finds **Activate View**), and runs it as its button does.

The search box is also the command line of the style. Typing in a view writes there, as the command line does in the **Revit** style, and Enter runs a keyboard shortcut (**WA**, **DR**, **ZF**...) or a command with its arguments (**wall 0,0 5,0**) as typed. The list of commands is in [Command line and MCP](#).

Right-click menu

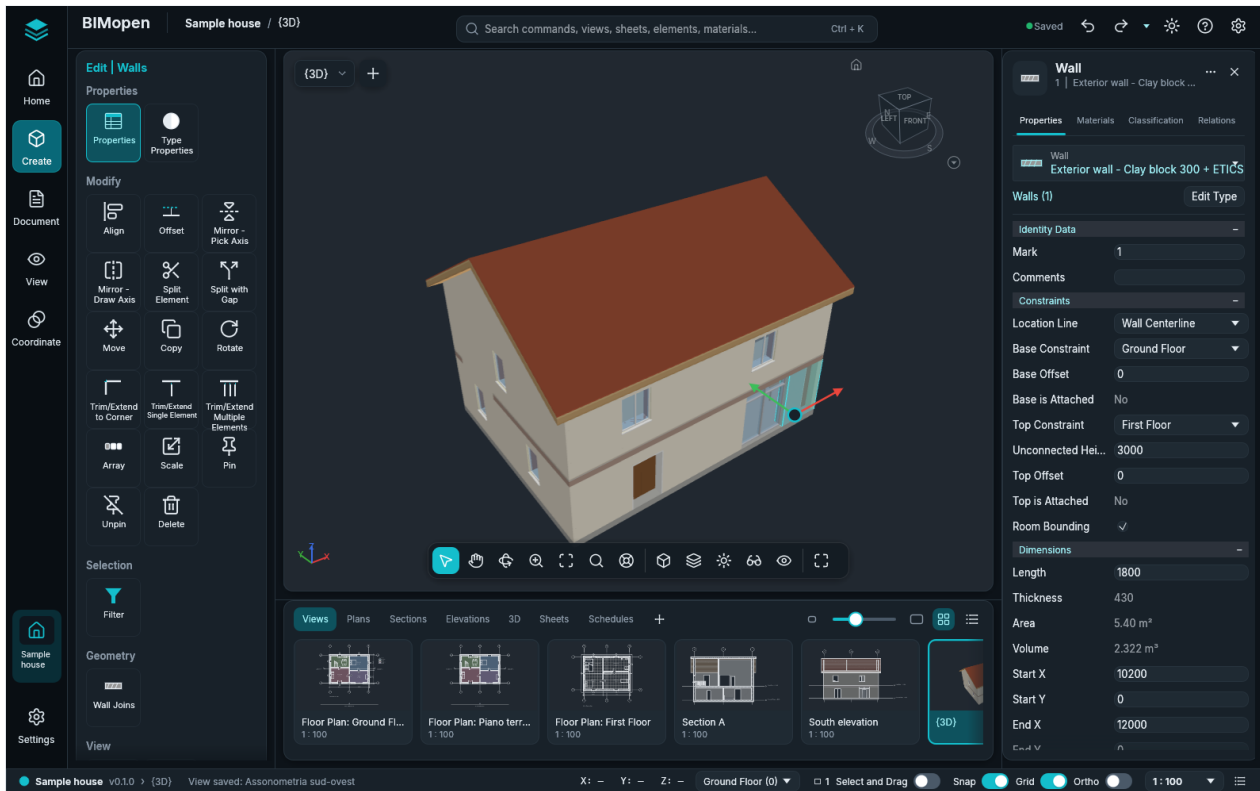
In plans, sections and 3D views the right button opens a dark menu: with a selection, the modify commands first (**Move**, **Copy**, **Rotate**, **Align**, **Offset** and the others), then the same items as the view's menu in the **Revit** style.

Everything of the Revit style

Every function of the **Revit** style is in the **BIMopen** style, once:

- every button of the ribbon is a tile of the tool panel, in the rail entry that holds its tab, and the contextual **Modify** tab sits on top of the panel while a tool works or something is selected;
- BIMopen's mark at the top of the rail opens the application menu; the top bar has undo, redo and the ? menu;
- **View** holds the whole **Project Browser**, with its menus;
- a thumbnail of the view strip can be dragged onto the open sheet, or onto a sheet's thumbnail, and its right-click menu has the browser's actions and **Open in the active window**;
- the view selector's menu arranges the view windows (**Switch Windows**, **Tile**, **Cascade**, **Maximize**, **Replicate**, **Close Hidden**); Ctrl+Tab goes to the previous window;
- the right button on a tile offers **Add to Quick Access Toolbar**: the tool shows in the top bar, works from any section of the rail, and its right button offers **Remove from Quick Access Toolbar**;
- the key tips work as on the ribbon: tap Alt (or press F10), then a tab's letter opens the rail section that holds it (its letter shows on the rail) and a tool's letters start it.

Light and dark



In Arabic the whole window is mirrored, in both styles: the rail and the tool panel are on the right, the element panel on the left.

Projects and files

This chapter describes how a project is created, opened, saved and exchanged with other programs, its settings and the options of BIMopen itself.

Creating a project

application menu > **New** > **Project...** opens **New project**:

- **Template file**: BIMopen's default template, or the one set in **Options** > **File Locations**; a template file chosen with **Browse...**; or **None**, which starts from two levels and one type of each kind.
- **Create new**: **Project** or **Project Template**.

A project made from a template has everything the template had: types, settings, views, sheets, project information and print settings. Saving it asks for a name, so the template is not overwritten.

Templates

A template is a `.bimtpl` file. **application menu** > **Save As** > **Template...** saves the open project as a template; a project created as a **Project Template**, or a template opened, is saved as a template too.

Opening a project

Ctrl+O, **application menu** > **Open...** or **Open** on the quick access toolbar opens a project. **application menu** > **Recent Documents** lists the latest projects, the most recent first; a pin keeps a project in the list. Without a file, BIMopen starts on **Recent Files**, with the recent projects, **Open...**, **New** and the **Sample project** (unless **Enable Recent Files page at startup** is unticked in the options). Dropping a project file on the window opens it too.

A project already open in another BIMopen window opens read-only: **Save** asks for a new name. If BIMopen stopped without saving (a crash, a power cut), opening the project again brings the unsaved work back as unsaved changes.

Saving

Ctrl+S, or **Save** on the quick access toolbar, saves the project; until then the file stays as it was last saved, and the title bar shows an asterisk. **application menu** > **Save As** > **Project...** writes it to a new file and goes on there.

Save As > **Options...** opens **File Save Options**: **Maximum backups** keeps that many earlier versions beside the file (`house.0001.bimopen`, `house.0002.bimopen...`), deleting the oldest; **Compact file** rewrites the file without its obsolete parts at the next save.

When a changed project stays unsaved for the interval set in **Options** > **General** (**Save reminder interval**, 30 minutes to start with), **Save Reminder** offers to save it, not to save it, or to change the interval.

Before **New**, **Open...**, a recent document, the sample project, or closing the window, a changed project asks **Save changes to ...?:** **Yes** saves it, **No** drops the changes, **Cancel** keeps it open.

In the browser, **Open...** uses the browser's file chooser, and **Save** downloads the file; backups, crash recovery and read-only opening need a file on disk and are desktop-only.

Project settings

Project information

Manage > **Settings** > **Project information** sets the project's name, number, client, address, issue date and status: the title blocks of every sheet show them.

Project units

Manage > **Settings** > **Project units** lists the quantities (length, area, volume, angle, slope and the others) with a sample of each, and the **Decimal symbol/digit grouping**. **Format...** of a quantity sets its unit, its **Rounding** (a number of decimals, or **Custom** with an **Increment factor**, such as 5 mm), its **Unit symbol**, **Suppress trailing zeros**, the plus sign for positive values and digit grouping.

Sun Settings

Manage ► Additional settings ► Sun Settings opens the sun settings of the active view, the same as the sun button of the view control bar (see [Views and graphics](#)).

Options

application menu ► Options has four tabs; the choices are kept between sessions.

Tab	What it sets
General	The save reminder interval
User Interface	The theme (Light or Dark), the language, the interface style and size; Enable Recent Files page at startup ; the ribbon tab after a selection ends or a tool closes (Stay on the Modify tab or Return to the previous tab) and Display the contextual tab on selection ; Tooltip Assistance (None , Minimal , Normal , Extra High)
Graphics	Invert background color , Selection color , Highlight color , Use anti-aliasing for 3D views , Temporary Dimension Text Appearance (size and background)
File Locations	Default template file path (the template of New) and Default path for user files (where the file dialogs open)

Transferring project standards

Manage ► Settings ► Transfer Project Standards copies settings from another project into this one. In **Select Items To Copy**, choose the project with **Browse...** (**Copy from:**), then tick what to copy: the types of walls, floors, roofs, doors and windows, stairs, railings, curtain panels and mullions, line styles, filled region types, materials, fill and line patterns, line weights, object styles, view templates, filters, viewport types, title blocks, the project units, the print settings and the project information (**Check all**, **None**).

What is copied brings along what it uses: a wall type its materials, a material its patterns, a view template its filters. When names are already in the project, **Duplicate Types** asks whether to **Overwrite** them or to transfer the **New Only**. The whole transfer is one step of undo.

Exchanging files

Exporting to IFC

application menu ► Export ► IFC... writes the model in IFC4: walls with their axis and body, openings, doors, windows, floors, roofs, stairs, railings, curtain walls, furniture and rooms as spaces, on their storeys.

Export ► Options ► IFC Options... opens **IFC Export Classes**: the IFC class of each category; **Not Exported** leaves a category out, and **Default** goes back to the standard classes. The classes are kept with the project.

Opening IFC files

application menu ► Open ► IFC... makes a new project from an IFC2x3 or IFC4 file, in metres or millimetres: storeys become levels, walls are rebuilt from their axis (or from the long side of their body), slabs become floors, doors and windows go in the walls their openings cut, and spaces become rooms. The messages count what was not read.

Open ► IFC Options... opens **Import IFC Options**: what each IFC class becomes (walls, floors, doors, windows, rooms or **Not Imported**), and **Default**. The choices are kept between sessions.

Revit projects

Opening a `.rvt` file makes a new project from what can be read of it: levels, wall types and walls, doors and windows, floors. The messages say what was approximated.

Other exports

Printing to PDF and exporting images are described in [Sheets, schedules and printing](#); schedules export as delimited text from the same chapter. `bimopen-cli convert` exports from the command line (see [Command line and MCP](#)).

Selecting and modifying

Before most changes you select what to change. This chapter describes how elements are highlighted and selected, how a selection is refined, how selected elements are dragged, and the tools of the **Modify** panel. Everything here works the same in the desktop app and in the browser.

Highlighting and selecting

Move the cursor over an element: its lines are drawn wider, the status bar at the bottom of the window names it (category and type, as **Walls : Exterior wall...**), and after a moment the same words appear under the cursor. Click to select the highlighted element. A selected element is drawn in the selection colour in every view where it shows, and the count at the right end of the status bar says how many elements are selected.

A right click on an element selects it and opens the context menu. Esc, or a click on an empty spot, clears the selection.

To...	Do this
add an element to the selection	Ctrl + click
take an element out of the selection	Shift + click
select what is wholly inside a window	drag from left to right
select what a window touches	drag from right to left (the window is dashed)
add, or take away, what a window catches	drag with Ctrl, or with Shift
select again what was selected before	Ctrl+Left, or right click ► Select Previous

Windows work in plans, sections, sheets and 3D views. In a 3D view the left button selects; the right button orbits and the middle button pans (see [The interface](#)).

Elements close together: TAB

When elements lie close together or one over the other, the one highlighted may not be the one you want. Keep the cursor still and press Tab: the next element under the cursor is highlighted and the status bar names it. Shift+Tab goes back. Click to select the highlighted element. In a 3D view Tab goes from the nearest element to the ones behind it; on a sheet, through views placed one over the other.

Chains of walls and lines

Walls and lines joined end to end form a chain. With the cursor on one of them, Tab highlights the whole chain (the status bar says **Chain of n joined elements**); a click selects it. A chain can mix walls with room separation lines and area boundaries; detail lines chain with the detail lines of their view. Where three or more meet, the chain goes on along the one that makes the smallest angle with the last; a wall that stops against another one between its ends takes the chain on along that wall.

Part of a chain. Select the first element of the part, move the cursor over the last one and press Tab: the elements between them are highlighted. Tab again highlights the whole chain, a third time the last element alone. Click to select what is highlighted. On a closed chain the part goes round by the side where the cursor is: near the end of the last element that one way round reaches first.

Elements joined at a point. Select an element and keep the cursor on it, near an end where others are joined. Tab highlights it with the nearest one joined there; Tab again, every element joined there. Click to select them.

A selected chain. Where two selected walls or lines meet, a round control appears. Drag it to move the joint: the selected ends there move together and stay joined; elements not selected are left where they are. Drag the chain with Shift to move it whole, horizontally or vertically; drag it with Ctrl to place a copy.

Filtering a selection

Click the count in the status bar, or **Filter** on the contextual tab, to open **Filter**. It lists the categories in the selection, how many elements each has, and the total. Untick a category to leave its elements out: the selection and the count in the status bar follow at once. **Check all** and **Check none** tick or untick every category. **OK** keeps the selection, **Cancel** brings back the one you started with.

Select All Instances

Right-click an element ► **Select All Instances**, then **Visible in View** (the elements of the same type shown in the active view) or **In Entire Project**. Typing **SA** and Enter does the same as **Visible in View**. The element must have a type: rooms, for example, have none.

Dragging elements

Drag a selected element to move it; the whole selection moves together, and one drag is undone by one **Ctrl+Z**. A temporary dimension shows the move, and the status bar its length (**Move: 1500**). With **Select and Drag** turned on in the status bar, an element can be dragged without selecting it first; with it off, a drag that starts on an element not selected draws a window.

- A wall joined at its ends to walls that are not selected moves square to itself only, and the joined walls stretch to stay joined. Walls that stop against it follow too. Hold **Shift** to move it freely; the joined walls still follow.
- Any other element moves freely; hold **Shift** to keep the move horizontal or vertical.
- Doors and windows move with their wall and keep their place along it. Dragged on their own, they slide along the wall; dropped on another wall, they move into it.
- Hold **Ctrl** when you start dragging to place a copy instead.

Elements are dragged in plans, sections and elevations (along the view), on sheets (views), and in 3D views, where they move on the horizontal plane where you grabbed them. The arrow keys move the selection a small step, rounded to a tidy value at the zoom of the view; with **Shift**, ten steps.

The Modify tools

The **Modify** panel of the contextual tab has three rows: **Align, Offset, Mirror - Pick Axis, Mirror - Draw Axis, Split Element, Split with Gap; Move, Copy, Rotate, Trim/Extend to Corner, Trim/Extend Single Element, Trim/Extend Multiple Elements; Array, Scale, Pin, Unpin, Delete**. The status bar says what each tool expects next, and the options bar shows its options. **Esc** cancels the step in progress; pressed again, it ends the tool.

Move, Copy, Rotate, the two **Mirror** tools, **Array** and **Scale** work on the selection. Started with nothing selected, they let you select first (clicks, **Ctrl**, windows, **Tab**), then go on when you press **Enter** or **End** on the options bar.

Move, Copy and **Rotate** also work in 3D views: their points are taken on the plane of the level clicked.

Before each click the tool shows what the click would do: the selection drawn where it would go (moved, copied, turned, mirrored about the axis under the cursor, offset to the cursor's side, aligned to the reference), following the cursor, with the distance or the angle beside it.

Where a tool asks for a second point, you can type a distance (or an angle) instead and press **Enter**: it shows next to the cursor while you type, and is measured towards the cursor.

Move

Click a base point, then the destination. The tool ends and the elements stay selected. Options:

- **Constrain**: the move is along or square to the selected wall (horizontal or vertical for other elements);
- **Disjoin**: walls joined to the moved ones do not follow, and a door or window can be moved onto another wall;
- **Copy**: copies are placed instead; with **Multiple**, one at each click until **Esc**.

Copy

As **Move**, but a copy is placed. With **Multiple**, a copy at each click until **Esc**; **Constrain** as for **Move**.

Rotate

The centre of rotation shows at the middle of the selection; drag it to put it elsewhere. Click the first ray, then the second: the selection turns by the angle between them, shown by a temporary angular dimension. Instead of the second ray, type the angle and press **Enter**, or type it in **Angle** on the options bar and press **Enter**. **Copy** turns a copy; without **Disjoin**, walls joined to the turned ones follow.

Mirror

Mirror - Pick Axis: click a wall, a grid or a line as the axis. **Mirror - Draw Axis**: click two points. **Copy** is ticked: a mirrored copy is placed; untick it to mirror the elements themselves.

Array

Linear: click two points. **Number** is how many elements in all. With **Move To: 2°** the two points give the spacing; with **Last**, the last element goes to the second point and the others are spread evenly. **Constrain** keeps the direction along or square to the selection.

Radial: drag the centre where the copies turn about, click the first ray, then the second (or type the angle and press Enter, also in **Angle**). With **2°** the angle is between neighbours, with **Last** it is the whole span.

Offset

Moves a wall or a line square to itself, or places a copy (**Copy** is ticked).

- **Numerical:** set **Offset**, then click the element on the side it should go to. Press Tab first to offset the whole chain (of the same category) as one: its corners are kept.
- **Graphical:** click the element (Tab for the chain), then two points: the distance between them, square to the element, is the offset. You can type it instead. Ctrl copies.

Align

Click the reference, then the element to align: the face of the element nearest to your click goes onto the face of the reference nearest to its click. **Prefer** chooses **Wall faces** or **Wall centerlines**. After aligning, a padlock shows on the aligned face: click it to keep the two aligned, so that moving the reference moves the other one too. Without **Multiple Alignment** the next click picks a new reference; with it (or holding Ctrl) you can align several elements to the same one. Esc once starts a new alignment, twice ends the tool.

Trim/Extend

Walls and lines are trimmed or extended; click each one on the part to keep.

- **Trim/Extend to Corner:** two elements, which then meet at a corner;
- **Trim/Extend Single Element:** the boundary, then the element;
- **Trim/Extend Multiple Elements:** the boundary, then each element in turn.

Split Element and Split with Gap

Split Element: click a wall or a line where it should become two. With **Delete Inner Segment**, click two points: the part between them is removed, with the doors and windows in it. **Split with Gap:** set **Joint Gap**, then click: the two parts are that far apart.

Scale

Walls and lines (and the position of dimensions) can be scaled; with anything else selected, **Scale** is not available. **Graphical:** click the origin, the end of a first vector, the end of a second one: the elements are scaled by the ratio of the two lengths (you can type the second one). **Numerical:** set **Scale Factor**, then click the origin. Doors and windows keep their distance from the middle of their wall.

Pin and Unpin

Pin keeps the selected elements where they are: they cannot be dragged, moved by a tool or deleted, and a message says so. A pinned element shows a pushpin when selected; click the pushpin, or use **Unpin**, to free it.

Delete, undo and redo

Delete (or the Del key) removes the selection and what it hosts; pinned elements stay. Ctrl+Z undoes the last change and Ctrl+Y redoes it: each tool, drag or nudge is one step.

Typed shortcuts

Type the letters and press Enter: **MV** Move, **CO** Copy, **RO** Rotate, **MM** Mirror - Pick Axis, **DM** Mirror - Draw Axis, **AR** Array, **OF** Offset, **AL** Align, **TR** Trim/Extend to Corner, **SL** Split Element, **SG** Split with Gap, **RE** Scale. **PN** pins and **UP** unpins the selection, **SA** selects all its instances visible in the view. [Keyboard shortcuts](#) lists them all.

Not yet available

- Tab to reach a part of an element: a curtain panel or mullion, a part of a stacked wall;

- **Select All Instances** from a type in the Project Browser;
- **Group and Associate** of **Array**;
- splitting walls along a horizontal line in elevations and 3D views;
- cut, copy and paste through the clipboard, **Paste Aligned**, **Create Similar**.

Walls, doors and windows

This chapter describes how walls are drawn, how they join and attach to roofs and floors, how their types and layers are set up, and how doors and windows are placed in them, flipped, moved and drawn at each detail level.

Drawing walls

Home ► Build ► Wall (or type **WA**) starts the wall tool, in a plan or in the 3D view. Pick the wall type in the type selector at the top of the **Properties** palette; **Type Properties** changes the type, and with it every wall of that type. The contextual tab **Edit | Place Wall** shows the **Draw** panel, and the options bar shows:

Option	What it does
Height or Depth	The wall rises from the level (Height) or goes down from it (Depth)
A level, or Unconnected with a value	The wall reaches that level, or is that high (or deep)
Level	In a 3D view only: the level the walls stand on; takes the level of the surface of the first click
Location Line	The plane of the wall that runs along the clicks: Wall Centerline (the default), the core centre line, or one of the finish and core faces, exterior or interior
Chain	On, each click ends a wall and starts the next one; off, each two clicks make a wall on its own
Offset	The location line runs this far from the clicks, towards the exterior
Radius	Not available: it needs curved walls, and is shown disabled

In the 3D view the wall being drawn follows the cursor as a solid, with its thickness and its height up to the top level (or the height typed), on the plane of the level, with its length and angle as a temporary dimension; **Shift** keeps it square and **Esc** takes it away. **Rectangle**, the polygons and **Pick Lines** work there too: the walls of the whole shape follow the cursor, and the line of the level under the cursor is picked as in plan.

While drawing:

- the wall's exterior is on the left of the drawing direction: drawn from left to right, the exterior face is at the top. The preview shows the exterior face thicker;
- the **space bar** puts the exterior of the next wall on the other side;
- after the first point, type a length and press Enter: the wall ends that far, in the direction of the cursor;
- **Esc** ends the chain; **Esc** again, or **Modify**, ends the tool.

The **Draw** panel picks the shape:

Shape	How
Line	Click the start and the end of each wall
Rectangle	Click two opposite corners: four joined walls, with the exterior outside
Inscribed Polygon	Set Sides in the options bar, click the centre and a corner: the corners are on the circle
Circumscribed Polygon	The same, but the sides touch the circle
Pick Lines	Click a line of the plan (a line or an edge of an element): a wall along it. Press TAB over a line to take the whole chain of lines joined to it, then click

The location line and flipping

Select a wall: blue dots mark the ends of its location line, and two arrows stand on its exterior side. Clicking the arrows turns the wall over about its location line: the first and the last layers swap, and the doors and windows keep their orientation. Changing **Location Line** of a placed wall does not move it; the next flip turns it about the new plane. Changing the type of a wall, or its layers, keeps its location line where it was.

Attaching walls to roofs and floors

A wall can follow a roof or a floor instead of a fixed height.

1. Select the walls.
2. **Edit | Walls ► Modify Wall ► Attach Top/Base.**
3. In the options bar, **Attach Wall: Top** or **Base**.
4. Click the roof or floor, in a plan, a section or the 3D view.

With **Top**, the walls rise or drop to the underside of the roof (following its slopes: the gable walls go up to the ridge) or of the floor above. With **Base**, they stand on the top face of the floor below. From then on they follow it: a steeper roof, a roof raised by its base offset, a moved floor carry the walls with them.

To detach them: select the walls, **Edit | Walls ► Modify Wall ► Detach Top/Base**, then click the element to detach them from, or press **Detach All** in the options bar. The walls keep the height they have at that moment, and can be attached again at any time. When a roof or floor with walls attached to it is deleted, the walls keep their height too.

The properties **Top is Attached** and **Base is Attached** show the state (read-only); while the top is attached, **Unconnected Height** is read-only.

Editing a wall's profile

A wall need not be a rectangle: its outline can be sketched in an elevation or a section parallel to it, with holes, as for a gable or a stepped wall.

1. Select the wall and click **Mode ► Edit Profile** in its contextual tab. From a plan or a view that is not parallel to the wall, **Go To View** lists the sections and elevations parallel to it: choose one and click **Open View**.
2. Sketch mode opens with the wall's outline in magenta. Change it with **Line** and **Rectangle** (see [sketch mode](#)): pick a line and press **Del**, draw new ones; a loop inside is a hole.
3. Click **Finish Edit Mode** (or **Cancel Edit Mode** to leave the wall as it was).

The wall takes that outline in 3D, in sections and in plan, where it is cut only where the outline reaches the cut plane; its doors and windows still cut it. A top attached to a roof or a floor still clips it. A curtain wall keeps the panels and mullions inside its new outline. **Mode ► Reset Profile** makes it a rectangle again; **Ctrl+Z** undoes either.

The profile can also be edited in the 3D view: the sketch lies on the wall's plane and the view stays 3D. Only from a plan does **Go To View** appear, and nothing changes until a view is opened with **Open View**. While sketching, the wall's original outline is drawn as dashed reference lines; the sketch snaps to their ends and onto them.

Wall joins

Walls whose ends meet join by themselves, and so do a wall ending on the side of another and two walls crossing each other. At **Medium** and **Fine** detail each layer is resolved against the layers of the other wall:

- at a corner (an L), each layer meets the same layer of the other wall: the finishes wrap round the corner and the cores meet;
- at a T, the core of the wall that ends runs through the finishes of the other wall up to its core; its own finishes stop at the face, which is open there;
- where two walls cross (an X), a core runs through the finishes of the other wall;
- pieces of the same material merge with no line between them; a thin line separates two different materials; the free outline is drawn thick.

At **Coarse** detail joined walls are one fill, with no line between them. Sections and the 3D view use the same pieces, so nothing overlaps.

The Wall Joins tool

Edit ► Geometry ► Wall Joins, then click the grey square that appears on a corner. The options bar offers:

- **Configuration:** **Butt** (one wall runs through, the other stops against it), **Miter** (both end on the bisector) or **Square off** (the wall that stops ends square); **Previous** and **Next** change which wall runs through;
- **Display:** **Clean Join**, **Don't Clean Join** (the walls butt, with a thick line between them) or **Use View Setting**.

Each change can be undone. **Esc** ends the tool.

The plan's property **Wall Join Display** (in **Graphics**) is the view setting: **Clean all wall joins**, or **Clean same wall type** to keep a thick line where walls of two types meet, unless their corner is set to **Clean Join**.

Disallowing a join

To keep an end of a wall from joining (an expansion gap, say), select the wall, right-click the blue dot of that end and choose **Disallow Join**: both walls then end square, apart. A small mark beside the end shows it; click it, or right-click the dot and choose **Allow Join**, to join it again.

Wall types and layers

Type Properties of a wall shows, under **Construction, Structure** with its **Edit...** button, **Wrapping at Inserts, Wrapping at Ends, Width** (the sum of the layers, read-only) and **Function (Interior, Exterior, Foundation, Retaining, Soffit, Core-shaft)**; under **Graphics, Coarse Scale Fill Pattern** and **Coarse Scale Fill Color**, how cut walls of the type are filled at **Coarse** detail. **Duplicate...** makes a new type; its name does not follow its layers.

Structure ► Edit... opens **Edit assembly**: the layers from the exterior side to the interior side, each with its function, material and thickness, between the two **Core Boundary** rows. **Insert, Delete, Up** and **Down** change the list. A membrane layer has no thickness, and every other layer is at least 4 mm thick: other values are refused, and the dialog stays open.

The **Wraps** column ticks the layers that may wrap. Below the table:

- **Wrapping at Inserts (Do not wrap, Exterior, Interior, Both)**: the ticked layers outside the core on that side turn into the jambs of doors and windows; the layers behind them are pulled back;
- **Wrapping at Ends (Do not wrap, Exterior, Interior)**: the same at the free ends of the walls.

Wrapping is drawn in plan only. A door or window type overrides the wall's wrapping with its **Wall Closure**.

Wall properties

Under **Constraints: Location Line, Base Constraint, Base Offset, Base is Attached, Top Constraint** (a level, or **Unconnected**), **Unconnected Height, Top Offset** (with a level), **Top is Attached** and **Room Bounding** (untick it and the rooms around the wall ignore it). Under **Dimensions: Length, Area, Volume**. Under **Identity Data: Mark** and **Comments**.

Placing doors and windows

Home ► Build ► Door (**DR**) or **Window** (**WN**), in a plan, a section, an elevation or the 3D view. Pick the type, then move over a wall: the opening follows the cursor along it, and temporary dimensions measure from its centre line to the centre lines of the nearest walls across the host on each side. A door swings to the side of the wall the cursor is on; the **space bar** puts its hinge on the other jamb. Click to place it: the wall is cut in every view. A window takes its type's **Default Sill Height**.

Doors and windows get a **Mark** that counts up by category (1, 2, 3...), from the highest.

Tags

Edit | Place Door ► Tag ► Tag on Placement (or the same for windows) tags each opening as it is placed. The options bar then offers **Horizontal** or **Vertical**, and **Leader** with its length. A door's tag shows its **Mark**; a window's tag shows its type's **Type Mark**. **Annotate ► Tag All** tags the openings not tagged yet.

Flipping a door or window

Select a door or window in a plan: arrows across the wall, on the side it opens to, turn its swing over; arrows beside it, along the wall, put its hinge on the other jamb. The context menu does the same: **Flip Hand** (the hinge) and **Flip Facing** (the swing).

Moving a door or window to another wall

Select it, **Edit | Doors ► Host ► Pick New Host** (or **Edit | Windows**), then click another wall: the opening moves there, where you clicked, with its type and sill. It stays selected.

Door and window properties

Instance: **Level, Sill Height, Width** and **Height** (of the type), **Head Height, Comments, Mark**. Changing **Sill Height** or **Head Height** moves the opening up or down; its size stays.

Type: **Wall Closure** (By host, or a wrapping of its own), **Function** (Interior or Exterior), **Door Material** (Glass Material for windows) and **Frame Material**, **Trim Width**, **Thickness** (of a door's leaf, or the depth of a window's frame), **Default Sill Height** and **Window Inset** (windows: how far the frame sits from the exterior face), **Trim Projection Ext** and **Trim Projection Int** (doors), **Leaves** and **Type Mark**. A door cannot become a window by changing its type.

How walls, doors and windows are drawn

The **Detail Level** of the plan decides:

	Coarse	Medium	Fine
Walls	One fill (or the type's coarse pattern), joined walls merged	Each layer with its material's cut pattern	As Medium
Windows	The frame as one outline, the glass along it, the wall below seen as lines	The frame cut at each jamb and at the mullion of a two-leaf window, at its inset; one line of glass; the exterior sill and the interior sill board	As Medium , with double glass
Doors	The leaf as a line and its swing	The frame at each jamb, the leaf with its thickness, its swing	As Medium , with the trims out of the faces

In every case the layers end at the jambs of the opening, closed by the cut line, or wrap into them as the types ask. In sections and in 3D, doors and windows show their frame, leaves, glass and sills, in the type's materials.

Curtain walls

A curtain wall is a wall of a curtain wall type, drawn with the **Wall** tool: pick **Curtain Wall** (one glass panel the length of the wall), **Exterior Glazing** (grid lines by the type) or **Storefront** (grid lines and mullions) in the type selector, then draw as for any wall, in plan or in 3D, with **Chain** and the **Draw** shapes. A basic wall changes into a curtain wall by picking a curtain wall type in the type selector; the doors and windows it hosts are deleted, because a curtain wall does not host them, and a message says so (undo brings them back).

In plan each glass panel is drawn with its thickness and the mullions are cut. A type with **Automatically Embed** ticked (the **Storefront**) drawn along a wall cuts its own hole in it, in plan, sections, 3D and IFC.

- The type's **Vertical Layout** and horizontal layout (**Fixed distance**, **Fixed number**, **Maximum spacing**) with their spacing, and the instance's **Number of Vertical Grids** and **Vertical Justification**, place the grid lines by themselves.
- **Home ► Build ► Curtain Grid**: click near the top or bottom edge for a vertical line, near a side for a horizontal one, in an elevation, a section, a plan or the 3D view (on the face under the cursor); it snaps to the middle and the thirds of the panel.
- **Home ► Build ► Mullion: Grid Line, Grid Line Segment** or **All Grid Lines**, with the mullion type picked in the type selector; click the grid line in an elevation, a section or the 3D view.
- Select the curtain wall, then **Panel** in its contextual tab: pick a panel type (a **Curtain Wall Door**, a glazed or solid panel, or none) and click the panel to change, in an elevation, a section or the 3D view.

Panels and mullions have their own schedules, and the IFC export writes the curtain wall with its plates and members.

At the command line

The same operations, typed:

```
attach                attach the selected walls to the roof over them
attach 412            attach their top to element 412 (a roof or a floor)
attach base 398       attach their base to the floor 398
detach all            detach them from everything
walljoin 0,0 {"kind":"Giunto d'angolo","cleanup":"Non calcolare unioni"}
walljoin 57 1 disallow wall 57 does not join at its end
rehost 120 12,4       move door or window 120 into the wall at 12,4
door {"point":[3,0],"tag":{"vertical":true,"leader":true,"length":1}}
```

Not available yet

Curved walls (**Arc**, **Circle**, **Radius**), **Pick Faces**, structural walls, stacked walls, wall sweeps and reveals, vertically compound layers (regions), **Join Geometry**, phases, and skylights in roofs.

Floors, roofs, stairs and components

Floors, roofs, stairs and railings are drawn in **sketch mode**: their lines are sketched first, and the element is made only when the sketch is finished. Components (furniture and plumbing fixtures) are placed with a click. Curtain walls are described in [Walls, doors and windows](#).

Sketch mode

Home ► Build ► Flooring, Roof, Stairs and Railing open sketch mode. The contextual tab is named after what is sketched (**Edit | Create Floor Boundary, Create Roof Footprint, Create Stairs Sketch, Create Railing Path**) and has:

- the **Mode** panel: **Finish Edit Mode** makes the element; **Cancel Edit Mode** drops the sketch and leaves the model as it was;
- the **Draw** panel, with the drawing tools of the element;
- for stairs and railings, the **Tools** panel.

Nothing is made while sketching: the lines are magenta, and the model changes only with **Finish Edit Mode**. The whole element is then one step of the undo history: one **Ctrl+Z** takes it away.

Drawing lines

Tool	How it draws
Line	Click point after point: each click ends a line and starts the next. The length and angle of the line under the cursor are shown beside it; Shift keeps it horizontal or vertical. With Chain off on the options bar, each line is drawn on its own. Clicking the start of the chain again closes the loop Type a length and press Enter : the line ends that far along the cursor's direction (a stair's run too).
Rectangle	Two opposite corners: four lines
Pick Walls	Click a wall: its line is added to the sketch (see below). Press Tab over a wall, then click, to pick the whole chain of walls joined end to end
Pick Lines	Move over a wall, a grid, a line or the edge of a floor or roof: the line under the cursor is highlighted and named (a wall's faces, each layer boundary, its two Core Boundary lines and its axis); Tab goes to the next one there. Click to add a sketch line on it (set off by Offset towards the cursor)
Slope Arrow	Click the tail, then the head of the arrow (floors and roofs)

Offset on the options bar moves the drawn lines (and the lines of picked walls) by that distance.

The arcs of the **Draw** panel (and a circle, as two halves) are one sketch line each: picked, measured and dragged as arcs, kept by the floor, roof, stair, wall profile or region, and given back as arcs by **Edit Boundary, Edit Sketch** or **Edit Profile**. In every view a sketch point snaps to the ends and middles of the sketch's lines and arcs, to arcs' centres, where lines cross and onto a line or an arc; from the point being drawn from, to the foot of a perpendicular and to the point where a line touches an arc. The marker and its name show where the point snaps; **S C** and **S P** ask for the centre or the perpendicular for the next point.

Floors and roofs need closed loops. A loop drawn inside the outer one is an **opening**: the floor or the roof has a hole there. When **Finish Edit Mode** finds lines that do not close or that cross, a message says so and the sketch stays open to be fixed (**Continue**).

Picking and changing sketch lines

Esc ends the chain being drawn; a second **Esc** puts the drawing tool down (so does **Modify**). While the sketch is open its lines are elements of the view, and **Modify** works on them as on other lines; nothing else can be picked until the sketch is finished:

- the line under the cursor is highlighted; a click selects it, **Ctrl** adds lines, **Shift** takes them away, a window selects several, **Tab** the chain of joined lines;
- the ends of the selected lines drag, and the ends joined there follow; a dragged line takes the lines joined to it along;
- **Move, Copy, Rotate, Mirror - Draw Axis, Array, Align, Offset, Trim/Extend to Corner** and **Split Element** work on them, and the sketch stays open;
- one selected line shows temporary dimensions to the nearest parallel line on each side (another sketch line, the wall's original outline, a wall, a grid, a level): click the value and type a distance to move the line; the symbol beside it makes a permanent dimension, kept while the sketch is open;
- its properties are in the **Properties** palette: **Defines Slope** and **Slope**, for a roof line picked from a wall its **Overhang**, and its **Length**.

Align takes as its reference the line under the cursor, and **Tab** goes to the next one there, so a sketch line can be aligned to a wall's layer or core boundary. While drawing or dragging an end, the points snap to the corners of the walls' faces, layers and core boundaries, then onto those lines. **Del** deletes the selected lines. **Ctrl+Z** while sketching takes back the last change to the sketch, not to the model. All this works in plans, in sections and elevations (a wall's profile) and, for selecting, dragging ends and deleting, in the 3D view.

Editing the sketch of an element

Select a floor, a roof, a stair or a railing: the **Mode** panel of its contextual tab has **Edit Boundary** (floors), **Edit Footprint** (roofs), **Edit Sketch** (stairs) or **Edit Path** (railings). Sketch mode opens with the element's lines, openings, slopes and arrow; **Finish Edit Mode** changes the same element, **Cancel Edit Mode** leaves it unchanged.

The sketch opens with **Modify** active: its lines can be selected and changed at once.

In a plan the sketch is drawn on the level; in the 3D view it lies on the element's own plane (the floor's top, the roof's base) and the 3D view stays open.

A new floor can be sketched in the 3D view too: **Flooring** started there puts the sketch on the plane of the level, the line being drawn follows the cursor with its length, and **Finish Edit Mode** makes the floor without leaving the 3D view. In the 3D view the options bar's **Level** chooses the work plane: the level whose plane the sketch lies on and the floor goes on. **Pick Walls** takes the wall whose face is under the cursor. Roofs by footprint, stairs and railings are sketched in a plan.

Floors

1. Click **Home ► Build ► Flooring**. Sketch mode starts with **Pick Walls**.
2. Click the walls around the floor, or press **Tab** over one of them and click to pick them all. Each line goes on the **interior face** of its wall; the lines of walls that meet are trimmed or extended to meet at the corner.
3. Or draw the boundary with **Line** or **Rectangle**; draw a loop inside it for an opening.
4. Click **Finish Edit Mode**.

On the options bar, **Extend into wall (to core)** puts picked lines into the wall up to the face of its core, and **Offset** moves them (a negative offset moves them away from the walls). The type of the new floor is the one in the type selector at the top of **Properties**.

Sloped floors

A floor slopes in one direction, set in one of two ways while sketching:

- a **Slope Arrow**: its properties are **Specify (Height at Tail, from the heights of its two ends, or Slope)**, **Height Offset at Tail**, **Height Offset at Head** and **Slope**. The heights are measured from the top of the floor;
- one boundary line with **Defines Slope** ticked and its **Slope** in degrees: the floor rises from that line, inwards.

The floor is sloped in 3D and in sections. Its **Slope Angle** in **Properties** changes the slope afterwards.

Floors over walls

When a floor crosses walls (an upper floor resting on the walls below, for instance), its slab is cut out of them: in 3D and in sections the wall stops under the floor and goes on above it, and walls go on through the floor's openings.

Floor properties

Property	What it is
Level, Height Offset From Level	The level and the height of the top face from it
Slope Angle	The slope of a sloped floor, in degrees
Thickness	From the type's layers (read-only)
Perimeter, Area, Volume	Without the openings (read-only)
Comments, Mark	Free text

Type Properties has the floor's **Structure** (its layers) and its default thickness.

Roofs

1. Click **Home ► Build ► Roof**. Sketch mode starts with **Pick Walls**; the options bar has **Defines Slope**, **Overhang** and **Extend into wall (to core)**.
2. Pick the walls (Tab for the whole chain). Each line goes on the **exterior face** of its wall, moved out by the overhang (from the face of the core with **Extend into wall (to core)**).
3. Or draw the footprint with **Line** or **Rectangle**; a loop inside is an opening.
4. Click **Finish Edit Mode**.

Every line with **Defines Slope** rises inwards at its **Slope** (30° by default); a small triangle with the slope is drawn beside it. The shape comes from those lines:

- all the lines define the slope: a **hip** roof;
- two opposite lines do not: a **gable** roof, the walls under the gables rise to the ridge when attached;
- no line defines the slope: a **flat** roof, or a roof sloping along a **Slope Arrow** (then no line may define a slope).

To change one line, press Esc twice, click the line and change **Defines Roof Slope**, **Slope** or (lines picked from walls) **Overhang** in **Properties**.

Select walls, click **Modify Wall ► Attach Top/Base**, then the roof: they rise to its underside, gables included ([Walls, doors and windows](#) tells more).

Roof properties

Property	What it is
Base Level, Base Offset From Level	Where the eaves are: by default on top of the walls of the level
Slope	The slope of every line that defines one (or of the arrow)
Thickness, Maximum Ridge Height, Area, Volume	Read-only
Comments, Mark	Free text

In plan a roof shows its outline, ridges and hips; in 3D its slopes, overhangs and layers.

Stairs

1. Click **Home ► Circulation ► Stairs**. Sketch mode starts with **Run**.
2. Click where the first riser is, then where the run ends: the run snaps to whole treads, and the status bar counts the risers made and left (for example **9 risers created, 8 remaining**).
3. To turn, click again away from the end of the first run and draw the next one: a landing joins them. At any angle the landing is bounded by the two runs' risers, its outer corner where their outer sides meet.
4. When every riser is placed, click **Finish Edit Mode**.

Dashed guides show where the next run can start: the last run's extension beyond its end and the lines of its first and last risers. A click near them snaps onto them. In a 3D view the stair is drawn the same way, on the plane of the active level.

A curved run (a spiral stair): with **Run** active, click **Center-ends arc**, then the centre, the start of the run line (its distance from the centre is the radius of the walking line) and the end, going round past half a turn if needed, but under one turn (further, the run stops short and the status bar warns that the runs would overlap). The risers radiate from the centre a tread apart on the run line; riser lines drawn radiating from a centre make a curved run too. A second curved run round the same centre and on the same run line (a click near them takes them) is joined to the first by a landing along the arc.

A stair can also be drawn by its lines. In its sketch, click **Draw ► Boundary** and draw the left and right edges (green), then **Riser** and draw the riser lines (black) between them, with **Line** or **Pick Lines**. Parallel, evenly spaced risers make a run, as wide as the risers; a landing joins two runs out to the boundary lines. Each riser is as high as the storey divided by the desired number of risers; with fewer riser lines the stair stops short of the top (**Properties** shows the actual number). **Edit Sketch** gives the same lines back. Each run drawn with **Run** is at once boundary and riser lines like these: they can be moved or deleted like the others. A landing follows its boundary lines: split its far edge with **Split Element** and drag a piece to notch it, or draw it wider than the runs.

The **Width** on the options bar is that of the new stair (by default the type's). **Tools ► Railing Type** chooses the railings of the new stair: a railing type, put on both sides, or **None**.

The number of risers comes from the height between **Base Level** and **Top Level** (with their offsets) and the type's **Maximum Riser Height**; changing a level or an offset in **Properties** changes the risers. **Edit Sketch** reopens its boundary and riser lines:

change or delete them (click, Del) and draw runs again; the railings of the stair follow. **Multistorey Top Level** repeats the stair, with its railings, storey by storey up to that level; a storey whose height is not the stair's gets no copy, and a warning names it. With the stair selected, the blue flip arrows beside its first riser make it go up from the other end; **Up Label**, **Up Arrow**, **Down Label** and **Down Arrow** in **Properties** show or hide the plan symbol's parts. The square grip under the **UP** text drags it elsewhere.

In plan the stair shows its treads up to the cut line, the break line, the arrow and the **UP/DN** text; in 3D its treads and risers, or a monolithic slab, its landings and railings.

How a stair is built

Type Properties of the stair decide its construction:

- **Monolithic Stairs** ticked: each run is a concrete slab cut to the steps; its underside runs parallel to the slope, **Structural Depth** below the inner corners of the steps, and the landings are as thick: the sloping underside of a run meets the landing's underside along a line, without a step; each run ends with its last tread: the landing, flush with it, or the floor above makes the last riser, so steps and slab show as one solid with no line across the risers.
- otherwise treads (**Tread Thickness**) with risers (**Riser Type Straight**, **Riser Thickness**) or open (**None**), on stringers: **Right Stringer** and **Left Stringer Closed** (a board the treads are housed in), **Open** (a board cut to the steps, the treads on top) or **None**, and **Middle Stringers** under the treads, with their **Stringer Thickness** and **Stringer Height**.
- **Begin with Riser** and **End with Riser** cleared: the board of the stair's first or last riser is not built.
- **Riser Type Slanted** leans each riser board, its top under the front of the tread above; **Riser to Tread Connection** runs each tread under the riser behind it (**Extend Tread Under Riser**) or the riser down behind the tread (**Extend Riser Behind Tread**).
- **Nosing Length** sets how far a tread runs past its riser; **Extend Below Base** moves the foot of the stringers (negative: below the base level); **Tread Material**, **Riser Material**, **Stringer Material** and **Monolithic Material** colour the parts; **Break Symbol in Plan** and **Text Size** control the plan symbol.

The landing stops behind the last riser of the run that reaches it, following its back face; in a monolithic stair it starts at the riser's face. In a monolithic stair whose top floor has its edge on the last riser, the run's underside goes on under that floor until it meets the floor's underside, as under a landing.

A section across the stair shows it cut with its slab. **Volume** in **Properties** and in the schedule of stairs is the volume of its solids.

The type's **Text Font**, **Nosing Profile** (**Default** or **Rounded**) and **Apply Nosing Profile** (front only, front and left, or front, left and right: past a side without a closed stringer), **Open Stringer Offset**, **Trim Stringers at Top** (**Match Level** stops the side stringers at the top level) and its identity data (**Keynote**, **Model**, **Manufacturer**, **Type Comments**, **URL**, **Description**, **Assembly Code**) are in **Type Properties**, as is a monolithic stair's **Underside of Stringer** (**Smooth**, a sloping slab, or **Stepped**: the slab follows the steps). Under **Calculation Rules**, **Use Stair Calculator** with a **Target**, **Maximum** and **Minimum Result** checks 2 risers + 1 tread: a stair outside the range is made, and a warning says so.

Ramps

1. Click **Home ► Circulation ► Ramp**. Sketch mode starts with **Run**.
2. Click where a run starts, then where it ends: it slopes at most the type's **Ramp Max Slope (1/x)** and rises at most its **Maximum Incline Length** (while drawing, a longer run stops there); the length made and left show beside the cursor.
3. Draw the next run away from the end of the first: a landing joins them. **Boundary** and **Riser** draw a ramp by its lines, with a riser line at the start and the end of each run.
4. Click **Finish Edit Mode**.

The type's **Shape** is **Thick** (its **Thickness**) or **Solid** (down to the base), and **Ramp Material** colours it. Its railings, **Edit Sketch** and **Properties** work as for stairs.

With **Arc from Center and End** in the **Draw** panel, click the centre, the start of the run line and then its end round the centre: the run curves round it, two lines radiating from the centre at its ends and two boundary arcs at its sides. The type's **Show Up Arrow in All Views** draws the whole up arrow and **UP** in the plan of the top level too; its **Text Font** and identity data are as for stairs.

Railings

1. Click **Home ► Circulation ► Railing**.

2. Draw the path with **Line**: one chain of connected lines (a path in pieces, a closed path or one that goes back over itself is refused at **Finish Edit Mode**).
3. To put the railing on a stair, click **Tools ► Pick New Host** and then the stair: the path drawn on it climbs with the stair.
4. Click **Finish Edit Mode**.

Edit Path reopens the path of a railing. The railing's **Type Properties** has its **Railing Height** and **Baluster Spacing**: changing them changes every railing of that type.

The railings of a stair run on over its landings as one rail, at their height above the line of the nosings and above the landings. Where a run leaves a landing one riser higher, the type's **Tangent Joins** (the rail goes straight on) and **Angled Joins** (it turns) decide the join: **Extend Rails to Meet** (tangent joins only) carries the sloping rail on down to the landing, **Add Vertical/Horizontal Segments** rises upright at the first riser, **No Connector** leaves a gap.

The rails are mitred at every joint, where the path turns and where the slope changes: with **Rail Connections Weld** each rail is one piece, with **Trim** its pieces are cut on the joint's vertical plane. A post stands at the start and the end of each railing and at every change of direction in plan (none where only the slope changes). Use **Landing Height Adjustment** with **Landing Height Adjustment** raises (or lowers) the rail over the landings by that much.

Components

1. Click **Home ► Build ► Component**. The type selector lists the components loaded in the project; a preview follows the cursor, in plan and in the 3D view.
2. Press Space to turn the preview by 90°.
3. Click to place the component on the level of the plan.

Mode ► Load Family opens the library, by folder (**Furniture, Plumbing Fixtures**): choose a family and click **Open** to add its types to the project.

Select a component and click **Host ► Pick New Host**, then a floor: the component moves onto the floor and stays on its top (click an empty point to put it back on the level). Its properties are **Level, Host, Offset from Level, Rotation, Mark** and **Comments**; **Type Properties** has its width, depth, height and material.

Schedules and IFC

Floors, roofs, stairs, railings and furniture have their schedules (**View ► Create ► Schedules ► Schedule/Quantities**), one row per element. **Export ► Export IFC4...** writes floors as slabs (with their openings and slopes), roofs, stairs with their flights and landings, railings, furniture and plumbing fixtures. A multistory stair is written once in each storey it is repeated in, with its railings.

Not yet in BIMopen

Ceilings, roofs by extrusion, shafts and vertical openings, slab edges, fascias, gutters and soffits come after this chapter's realignment.

Views and graphics

This chapter describes the views of the model, how each one is drawn, and how to change what a view shows and how: visual styles, scale and detail level, the view range of a plan, crop regions, hiding and isolating, **Visibility/Graphics**, filters and view templates. Line weights, line patterns and object styles are described in the same terms by the program's dialogs **Manage ► Settings**.

3D views

View ► Create ► 3D View ► Default 3D View opens the default 3D view, **{3D}**, framing the whole model; opened again, it shows the model as it was left. Drag to orbit (or **Shift** and the middle button), drag with the middle button to pan, and turn the wheel to zoom at the cursor; see [The interface](#).

To keep a framing, **View ► Create ► 3D View ► Save View**: type a name and press Enter. The new view is listed under **3D Views** in the **Project Browser** and opens at once; it keeps the framing it is left with. Renaming **{3D}** in the **Project Browser** (right-click ► **Rename...**) does the same: **{3D}** becomes a named view, and the next default 3D view is a new **{3D}**.

A selected element is washed in blue and half see-through, its edges in blue: what is behind it stays visible.

Floors cut the walls they pass through: where a slab crosses a wall the wall stops under it and goes on above it, so the slab's edge and the wall's face are one surface.

Visual styles

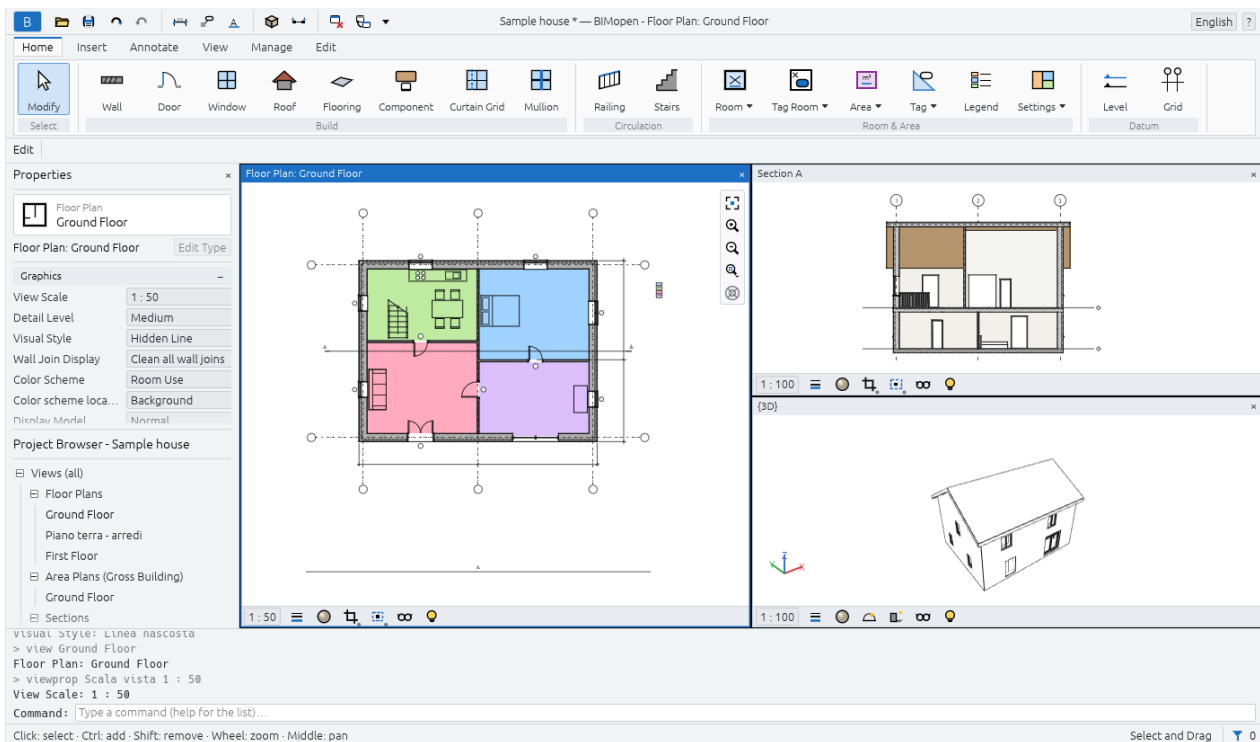
The **Visual Style** button of the view control bar, at the bottom of every view window, offers:

Style	What is drawn
Wireframe	Every edge, also those behind other faces; no faces
Hidden Line	Faces in the paper colour and the edges in front of them
Shaded	Faces lit, in the colour of their material
Shaded with Edges	As Shaded , with the edges in front
Consistent Colors	Faces in the colour of their material, the same whatever the light

The style belongs to the view and can be undone. The keyboard shortcuts **WF**, **HL** and **SD** choose **Wireframe**, **Hidden Line** and **Shaded**.

The edges are the real ones: where two faces meet at an angle, and the outline of each face and each opening. A wall with a window shows its own outline and the window's, and no line where the pieces of the wall meet.

Plans, sections and elevations have a visual style too. A plan is drawn in **Hidden Line** until another style is chosen; in **Shaded** its floors, seen from above, take the colour of their material, and the faces of sections and elevations take their materials' colours.



Sun and shadows

In a 3D view the view control bar has two more buttons:

- **Shadows On / Shadows Off:** in the shaded styles the sun lights the model and casts shadows, from the walls onto the floors, from the roof's eaves onto the walls;
- the sun path button: **Sun Path On** draws a compass ring on the ground around the model, with the four points of the compass, the sun's path through the day as an arc over it, and the sun where it is. **Sun Settings...** sets where the sun is:

Mode	What it takes
Still	Latitude, Longitude, Time zone (UTC) , the day and month and the Time : the sun's position follows
Lighting	Azimuth (degrees clockwise from north) and Altitude

Each view has its own sun settings, and the changes can be undone. Shadows are drawn by the 3D window on the graphics card; plans, sections, elevations and exported images do not show them yet.

Plans and their view range

View ► Create ► Plan Views ► Floor Plan opens **New Plan**: pick the levels and the scale, then **OK**. With **Do not duplicate existing views** on, the levels that already have a plan are left out; turn it off to make a second plan of a level.

A plan is a horizontal cut of the model at the **Cut Plane** of its view range. Walls crossing the cut plane are drawn cut, with the cut patterns of their layers' materials at **Medium** and **Fine** detail; lower walls and the floors of the level are seen from above.

To change the view range, select nothing (so that **Properties** shows the view), then **View range ► Edit...**. Each plane is measured from a level, with an offset:

Plane	Level
Top	The plan's own level (Associated Level), the Level Above , a level by name, or Unlimited
Cut Plane	Always the plan's own level
Bottom	The plan's own level, the Level Below or a level by name
View Depth	As Bottom , or Unlimited

OK sets the four planes together, as one change. They must stay in order, from the top down (top, cut plane, bottom, view depth): otherwise the window explains what is wrong and stays open. Floors below the bottom, down to the view depth, are

drawn *beyond* in thin lines; so are floors a little under the bottom, such as a sunken slab, even with the view depth at the bottom.

Light and dark background

Options ► Theme ► Dark (or **Invert background color**) turns the drawing area dark. As on an inverted background, black lines, text and patterns are drawn light, colours keep their hue, and colour fills such as the rooms' are darkened, so the text over them stays readable. **Options ► Interface size** makes the whole interface bigger, from 100 % to 250 %, on top of the screen's own scale: useful on screens with many pixels. It is kept for the next start.

Opening a view from its symbol

Double-click a view's symbol to open its view: a section line or its head, an elevation symbol, a callout's boundary (a reference callout opens the view it points at), a level's line in a section or elevation (its floor plan opens), or a view placed on a sheet. The view's window becomes the active one.

View ► Create ► Elevation ▼ ► Framing Elevation makes an elevation of a grid: click beside the grid, on the side to look from (before the click, a line and an arrow show the view). The elevation looks at the nearest grid, as wide as the bay between the grids that cross it and as deep as the next grid parallel to it.

Scale, detail level and crop region

The view control bar shows the view's **View Scale** and **Detail Level** (in 3D views too).

- At a smaller scale the model is drawn smaller on paper while text, tags and symbols keep their size on paper: at 1:200 a text covers twice as much of the model as at 1:100.
- At **Coarse** a cut wall is one fill; at **Medium** and **Fine** its layers show, each with its material.

Sections cut the model the same way. Walls, floors and roofs that meet in the cut are drawn as one: a thick outline round them, a thin line only where two materials meet, none between two parts of the same material; walls attached to a roof stop under it. Each cut layer has its material's cut pattern (at **Coarse**, the type's **Coarse Scale Fill Pattern** in its **Coarse Scale Fill Color**, set on wall, floor and roof types, else one solid fill). Furniture and plumbing fixtures are never cut: they are seen whole. A window is cut with its frame in the thick cut line and its glass in thin lines; what lies beyond the cut is drawn in thinner projection lines.

Crop View clips the view to its crop region, **Show Crop Region** draws the region; drag its edges to resize it. To type its size: **Properties ► Size Crop ► Edit...**, then **Width** and **Height**; the region keeps its centre.

Hiding and isolating

Temporary Hide/Isolate (the glasses on the view control bar) acts on the selected elements, in the active view only, and does not change the project:

Command	Shortcut	What stays visible
Isolate Element	HI	Only the selected elements
Hide Element	HH	Everything but the selected elements
Isolate Category	IC	Only the categories of the selected elements
Hide Category	HC	Everything but those categories

The view gets a coloured border. Each use narrows what is shown: hiding one element and then another hides both. **Reset Temporary Hide/Isolate** (HR) shows everything again; **Apply Hide/Isolate to View** hides for good what was hidden for now.

To hide for good in the view, select the elements, then right-click ► **Hide in view ► Elements** or **Category**, or the contextual tab's **View ► Hide in View**, or type EH (elements) or VH (category).

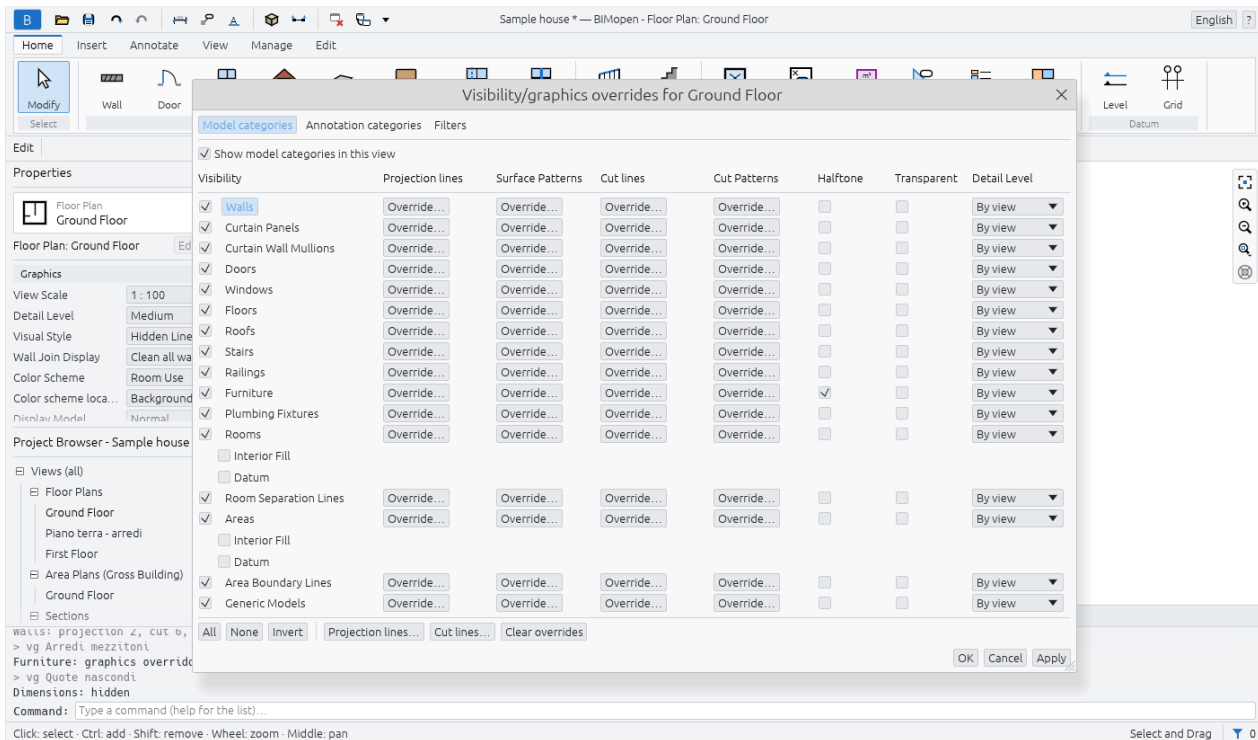
Reveal Hidden Elements (the light bulb on the view control bar, or RH) frames the view in magenta and shows what is hidden in magenta, the rest in halftone. A hidden element can then be selected and shown again: right-click ► **Unhide in View ► Elements** (or **Category**). Click the light bulb again, or type RH, to leave.

Visibility/Graphics

View ► Graphics ► Visibility/Graphics (or **VG**, or **Properties ► Visibility/graphics overrides ► Edit...**) shows, for the active view, one row per category:

- the check box shows or hides the category; **Show model categories in this view** shows or hides them all;
- **Projection lines** and **Cut lines: Override...** sets the weight, colour and pattern;
- **Surface Patterns** and **Cut Patterns**: the material's patterns, hidden, in another colour or replaced by another fill pattern;
- **Halftone** blends the lines with the background;
- **Transparent** makes the surfaces see-through in the 3D view;
- **Detail Level** draws the category at another level than the view.

Clear overrides takes the selected rows back to the object styles. Changes show at once: **Apply** keeps them and the window, **Cancel** (or the window's ×) takes back what was not applied, **OK** keeps them and closes.



One element can have its own graphics in a view: select it, then right-click ► **Override graphics in view ► By Element...** (or the contextual tab's **View** panel). **View-Specific Element Graphics** has **Visible**, **Halftone**, **Transparent**, the surface and cut patterns and the projection and cut lines. They apply only in this view, over the category's and the filters'.

Filters

View ► Graphics ► Filters lists the project's filters: **New**, **Duplicate**, **Rename**, **Delete**. A filter has categories and up to four rules on their parameters, all of which an element must meet.

In **Visibility/Graphics ► Filters**, **Add** applies a filter to the view; its row then sets visibility, lines, **Halftone** and **Transparent** for the elements that pass it. Where filters disagree, the one higher in the list wins: **Up** and **Down** move the selected filter.

View templates

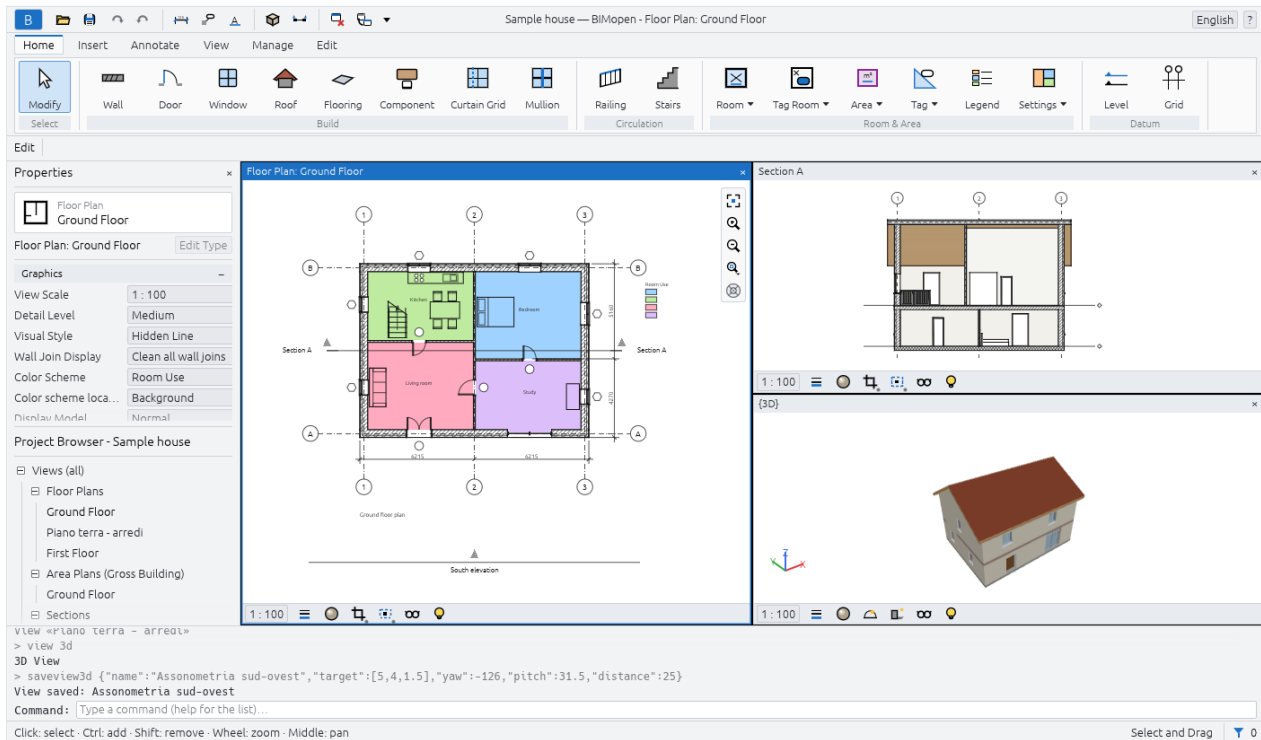
View ► Graphics ► View templates ► Create template from current view keeps the view's scale, detail level, visual style, view range and graphics as a template, by name. **View templates ► Apply template to current view** gives them to another view of the same kind: a plan (a second plan of a level too), a section or elevation, or a 3D view. A view does not follow later changes of its template until it is applied again, and the graphics of single elements are never part of a template.

Managing views

Right-click a view in the **Project Browser**:

- **Duplicate View ► Duplicate** copies the view with its properties; **Duplicate with Detailing** copies its dimensions, text, tags and 2D details too. The copy opens;
- **Rename...** asks for the new name (**Rename View**); names stay unique among views.

View ► Windows ► Tile shows all the open views side by side, filling the drawing area: with three windows, the active one on the left at full height and two stacked on the right.



Annotation and 2D details

This chapter describes dimensions and constraints, text notes, tags, rooms and areas with their colour schemes, legend views, and the 2D drawing tools: detail lines, regions, detail components, repeating details, insulation and drafting views. Annotations belong to the view they are made in: a dimension placed in a plan does not appear in another plan.

Before each click, every tool shows what it would make where the cursor is: the dimension with its value, the note's box, the tag on the element under the cursor, the region a room or area would fill, the line, region, component or insulation being drawn.

Dimensions

Annotate ► Dimension holds the dimension tools: **Aligned**, **Linear**, **Angular**, **Radial**, **Arc Length**, and the spot dimensions **Spot Elevation**, **Spot Coordinate** and **Spot Slope**. They work in plans, sections, elevations, drafting views and legends. Pick the dimension type in the type selector while the tool is on; **Type Properties** changes the type, and with it every dimension of that type.

Aligned and linear dimensions

With **Aligned**, the options bar offers which part of a wall is picked (**Wall centerlines**, **Wall faces**, **Center of Core**, **Faces of Core**) and what a click picks:

- **Individual References:** click references one after the other (wall faces or centre lines, grids, door and window edges, detail lines, the edges of legend symbols), then click an empty spot to place the dimension line there. While you choose, the string follows the cursor. Press **TAB** over a wall to step through its references.
- **Entire Walls:** one click dimensions a whole wall. **Options** opens the automatic dimensioning options: **Openings** with their **Centers** or both **Widths**, **Intersecting Walls** and **Intersecting Grids**. A grid that falls on a wall end adds no witness line.

Linear measures along the horizontal or the vertical of the view, between points such as wall ends: where you place the line decides which, and the **space bar** switches between the two.

Angular measures the angle between two walls, grids or lines that meet; more lines through the same point make a string of angles, each with its value; the last click picks the sector. **Radial** and **Arc Length** dimension an arc: click it, then where the dimension goes.

Changing a dimension

- Select a dimension and click its value: **Dimension Text** opens. **Use Actual Value** keeps the measure and adds text above, below, before or after it; **Replace with text** shows words instead (a number is refused).
- Drag the blue control under the text to move it away from the line; dragged back near the line, it snaps into place. Text moved far away gets an arc leader to its segment; **Leader** on the options bar removes it.
- **Modify | Dimensions ► Witness Lines ► Edit Witness Lines:** click elements to add witness lines, click an existing witness line to remove it, then click an empty spot to finish. Each witness line of a selected dimension has a control in its middle: right-click it ► **Move Witness Line**, then click the new reference; or ► **Delete Witness Lines**.
- Select an element the dimension measures and click a value next to it: type a new distance and press Enter, and the element moves.

The type sets the tick (diagonal, filled arrow or dot), the extensions of the dimension and witness lines (**Witness line control:** a gap to the element, or **Fixed to Dimension Line** with its **Witness Line Length**), the **Line Weight** and **Tick Mark Line Weight**, the **Centerline Symbol** and **Centerline Pattern** of witness lines to centre lines, the colour, the text size, offset, background, bold, italic and underline, the units (**Use project settings** or a unit with its decimals), and for linear dimensions the **Dimension String Type:** **Continuous**, **Baseline** (stacked values from the first reference) or **Ordinate** (values from the first reference along one line). **Show Opening Height** writes the height of a door or window under the width measured jamb to jamb. Radial types can drop the **R** prefix and their centre mark (**Center Marks**, with its size). With arrows, a segment too short for them has them outside, and the line runs on past them by **Flipped Dimension Line Extension**. **Annotate ► Dimension ► Dimension Types** opens the type properties of each family's current type, to set before dimensioning.

A selected baseline string shows a flip control at its origin: click it, or press the **space bar**, to measure from the other end. **Baseline Offset** in its properties sets the distance between its lines on paper.

Temporary dimensions

Select a wall or a grid: temporary dimensions show the distance to the nearest parallel walls or grids. A door or window shows its distance along its wall to the walls crossing it on each side, and a component its distance to the nearest wall in each

direction. Click a value, type a new one and press Enter to move the element; click the dimension symbol beside it to make it permanent. While a door or window is placed, temporary dimensions show its distance to the nearest walls. With several elements selected none are shown, and the options bar offers **Activate Dimensions** to show them for all the selected elements.

Constraints

Select a dimension: a padlock is shown on each segment. Click it to lock the segment: the distance then holds when either element moves, and a move that would break it is refused. Click it again, or right-click it ► **Toggle Lock**, to unlock; right-click ► **Show Related** selects the two elements the lock ties. A string of two segments or more shows **EQ**: click it and the references become equally spaced, and stay so when one of them moves. **Equality display** in the properties shows the values instead of **EQ**.

Selecting an element a constraint holds shows the constraint as blue dashed lines, unless the category **Constraints** is hidden in **Visibility/Graphics**. Deleting a dimension that holds a constraint asks what to do: **OK** deletes the dimension and keeps the constraint; **Delete Elements** deletes both. **Modify ► Align** with its padlock closed is a constraint too.

Spot dimensions

- **Spot Elevation**: in a plan, click a floor, a roof or the level; in a section, any point. The value is in metres with its sign.
- **Spot Coordinate**: the north and east coordinates of a point in a plan.
- **Spot Slope**: the slope of a roof pitch in a plan, or of a sloped line in a section, with an arrow pointing down.

The options bar offers **Leader** and, with a leader, **Shoulder**: with no leader one click places the spot; with a leader, click the point and then the text; with a shoulder, the point, the bend and the text. While you hover, the value shows at the cursor. For spot elevations it also offers **Relative Base**: (for a type whose **Elevation Origin** is **Relative**) and, in plans, **Display Elevations::** the actual elevation, the top, the bottom, or both. For spot slopes, **Slope Representation**: draws an **Arrow** or, in sections, a **Triangle**.

A selected spot has grips at its point, its shoulder and its text: drag the point and the spot measures what is there. A spot on a floor or a roof is deleted with it.

The spot type sets **Elevation Indicator**, **Top Indicator** and **Bottom Indicator** (texts before the value), the **Symbol**, **Include Elevation** and the **North/South Indicator** and **East/West Indicator** of coordinates, and the **Leader Line Length** and **Slope Direction (Down or Up)** of slopes.

Text

Annotate ► Text ► Text (TX): click where the note goes and type; Enter starts a new line. A click gives a note that does not wrap; dragging gives it a width, and the words wrap in it. Clicking elsewhere finishes the note, and **Esc** ends the tool. The text size is on paper: the note keeps its printed size at any view scale.

The **Format** panel sets, before placing or on a selected note:

- the leader: **No Leader**, **One Segment** (click the tip, then the note), **Two Segments** (tip, elbow, note) or **Curved**;
- the alignment, left, centre or right, and **Bold**, **Italic** and **Underline** (Ctrl+B, Ctrl+I, Ctrl+U while typing), which apply to the whole note;
- on a selected note, **Add Left Straight Leader** and the other three leader buttons, and **Remove Last Leader**;
- **Left Attachment** and **Right Attachment (Top, Middle, Bottom)**: where the leaders meet the note; chosen while placing, they stay for the next notes.
- **Paragraph Format**: the paragraphs as a list, with **Bullets**, **Numbers**, **Lowercase letters** or **Uppercase letters**; wrapped lines are indented under the text.

Near the line of another note's corner, a new note snaps to it, and a dashed line shows it.

On a selected note, drag the cross to move the box (the leader tips stay), the round side controls to change its width, and the rotation control to turn it. A grip in the middle of each leader makes an elbow when dragged, or bends a curved leader. Double-click inside it to edit the words. Its properties include **Arc Leaders**, **Left Attachment** and **Right Attachment**, and **Keep Readable**, which never shows it upside down. The text type sets the colour (of text, border and leaders), the background (**Opaque** masks what is behind), **Show Border** with its offset, the leader arrowhead, the size, bold, italic and underline. **Duplicate...** in **Type Properties** makes a new text type.

Annotate ► Text ► Find/Replace finds words in the notes of the current selection, the current view or the whole project (**Scope:**), with options for case and whole words. **Find All** lists the matches with the view they are in; **Find Next**, or a click on a

row, selects that note and shows its whole text under **Context**. **Replace** changes the first, **Replace All** every one, and **Close** closes the dialog.

Symbols

Annotate ► Symbol ► Symbol (**SY**) places a 2D annotation symbol in a plan, a section, a drafting view or a legend: a **North Arrow**, a **Centerline Symbol**, a **Flow Arrow**, a **Target** or a **Revision Delta**, the last two with a text of their own. The symbol follows the cursor before the click; the **space bar** turns it a quarter, or **Rotation** on the options bar sets its angle. With **Number of leaders**: above zero, the click places the symbol and the next clicks put the ends of its leaders. The type sets the symbol's size on paper and its leaders' arrowhead; **Duplicate...** in **Type Properties** makes a new one.

Tags

Annotate ► Tag ► Tag by Category (**TG**): hover an element (a door, window, wall, room or area) and click to tag it. The options bar sets **Horizontal** or **Vertical**, the **Leader** and its length; the **space bar** switches the orientation, while placing or on a selected tag. Door and window tools have **Tag on Placement**, so each new door or window comes with its tag.

Tag All opens **Tag All Not Tagged**: tick the categories, the tag type of each, the leader and the orientation, for all the elements of the view or only the selected ones; only elements with no tag get one.

With a leader, **Attached End** ends it on the element; **Free End** ends it where you clicked, and a selected tag shows a grip to drag that end anywhere (**Leader End** in the properties switches between the two). A tag lines up with the other tags of its kind while you place it or drag it: near the line of another tag's centre it snaps to it, and a dashed line shows it. Tags hidden in the view (**Visibility/Graphics**) are turned on when you tag, and the message says so.

Double-click a tag to edit what it shows: a door's mark or a wall's type mark in place; a room's or area's number and name together in **Edit Label Values**. A tag takes another type of its own category from the type selector, and **Pick New Host** (**Host** panel) moves it to another element of the same category. Room tag types choose whether they show the number, the area and the volume. A room or area tag set to **Pattern** keeps an angle: it turns with **Rotate**, and the **space bar** lines it up with each wall near it in turn (**Rotation** in its properties). Deleting a room's tag leaves the room, and the message says so.

Rooms

Home ► Room & Area ► Room (**RM**), then click inside a region enclosed by walls or room separators: the room fills it, around free-standing walls too. In the options bar:

- **Upper Limit** and **Offset**: the room reaches that level plus the offset (4000 mm by default); a higher level gives a room over several storeys, such as an atrium;
- **Tag on Placement**, on by default, with the tag's orientation and leader;
- **Room: New**, or a room that is not placed, to put it back;
- **Highlight Boundaries**: walls and separators that bound rooms turn orange, and the warning lists them.

A room placed in open space is kept with a warning, and takes its shape once the space is closed; a second room in a region already taken is marked **Redundant Room** and not counted twice. A number another room already has, a room lower than the computation height (1200 mm) and a base above it are warned about too, and so is a room separator drawn over another.

Walls bound the rooms of a level when they stand at its computation height: 1200 mm while **Automatic Room Computation Height** is ticked in the level's properties, otherwise its **Computation Height**.

A section shows the rooms it cuts when they are selected or under the cursor (**TAB** reaches a room behind other elements). A room selected there has an arrow at its top and one at its base: drag them to change its **Limit Offset** and **Base Offset**.

Room Separator draws lines that split a space into rooms without walls. A wall bounds rooms while its **Room Bounding** property is on. Floors and roofs above cap the room's volume.

Deleting a room removes it from the plan but keeps it in the project, **Not Placed**, with its data; its tags go with it. Deleting a room tag leaves the room. A room tag dragged out of its room asks whether to **Move to Room**.

Rooms show through their tags. In **Visibility/Graphics**, **Rooms** has **Interior Fill** and **Datum** (the cross lines). **Settings ► Area and Volume Computations** opens on **Computations**: the room boundary at the wall finish, centre, core layer or core centre, and **Areas and Volumes** to compute volumes too (by default only areas; the volume is always measured to the wall finish). Its second tab is **Area Schemes**.

Areas

Areas belong to an area scheme: **Gross Building** (which cannot be deleted) and **Rentable** come with every project, and **Area Schemes ► New** adds more.

1. **Room & Area ► Area ► Area Plan**: pick the scheme and the levels. Answer **Yes** to draw area boundary lines along the exterior walls, **No** to draw them yourself.
2. **Area ► Area Boundary Line**: draw the boundaries, or pick walls; with the area rules on, an exterior wall of a gross plan gives its outer face.
3. **Area ► Area**: click inside the boundaries. The area is tagged when placed; **Tag ► Area Tag** tags it later. Placed where no boundaries close a region, the area is kept with a warning and takes its shape once they do; a second area in a region is **Redundant Area**.

Deleting an area leaves it in the project, not placed, without its tags; **Area**: in the options bar of the **Area** tool lists the areas not placed, to put one back with a click.

Colour schemes

A colour scheme fills the rooms or areas of a plan (and the rooms a section cuts) by a value (name, number, department, area type) or by ranges of area. Set it in the plan's **Color Scheme** property; **(none)** turns it off. **Settings ► Color Schemes (Edit Color Scheme)** creates and duplicates schemes and edits the title, the parameter, the values with their colour and visibility, their order and the ranges. **Apply** keeps the changes and sets the scheme of the view with the dialog open. **Color scheme location**, a view property, draws the fills in the **Background** (under the model) or in the **Foreground** (over the model, under the annotations).

Room & Area ► Legend places the legend of the plan's scheme: a swatch and a label for each value. Its **Values displayed** are **By view** (those in the plan) or **All**, and **Columns** flows the swatches into several columns. A plan can have several legends; deleting one leaves the scheme.

Legend views

View ► Legends ► Legend opens **New Legend View**: a name and a scale. The legend opens and is listed under **Legends** in the Project Browser. **Annotate ► Component ► Legend Component** places the symbol of a type: in the options bar, the type, the **View** it is seen from (a wall in plan or section; a floor or roof in section or plan; a door, window or component in plan, front or back) and the **Host Length**, the piece of wall a door or window sits in. Legend components draw at the legend's detail level, can be moved and dimensioned (the edges of doors, windows and components; walls, floors and roofs are not), and are not counted by schedules. Text, detail lines and regions work as in a drafting view. A legend can be placed on several sheets.

A type dragged from **Families** in the Project Browser into a legend becomes its legend component where it is dropped; a type of **Families ► Symbols** places that annotation symbol. **Create Similar**, in the context menu of a selected element, starts the tool that places it with its type: for a legend component, with its view and host length too.

Detail lines and regions

Annotate ► Detail ► Detail line (DL) draws lines in the open view only, in the line style of the **Line style** panel. The **Draw** panel offers **Line**, **Rectangle**, **Inscribed Polygon**, **Circumscribed Polygon**, **Circle**, **Start-End-Radius Arc**, **Center-ends Arc**, **Tangent End Arc**, **Spline**, **Ellipse** and **Partial Ellipse**. The options bar shows what the shape takes:

Option	What it does
Chain	Each line (or arc, or spline) starts where the last ended; off, each one stands alone
Offset	What is drawn moves that far sideways; chained lines join at their corners
Radius	A circle, polygon or centre-ends arc of that radius (a circle takes one click); chained lines and rectangles get round corners. Offset is then ignored
Sides	The number of sides of a polygon

After the first click, type a length (a line, a chord) or a radius (circles, polygons, arcs, ellipse axes) and press **Enter**; the value shows at the cursor. A centre-ends arc never exceeds 180°: past it, it turns the other way, and a typed angle sets its end. A tangent arc starts at the end of a line or arc you click. **Shift** keeps lines and polygon radii horizontal or vertical and turns chords, arc radii and ellipse axes in steps of 45°, and keeps the sweep of an arc at 90°, 180° or 270°. **Esc** ends a chain or a spline. The same shapes and options are in every sketch (floors, roofs, regions, revision clouds, wall profiles).

Region ► Filled region opens sketch mode: the boundary is sketched with every shape of the **Draw** panel and with **Pick Lines**, and loops inside another are holes. Curves are kept as short straight segments. Esc ends a chain and keeps the sketch; **Modify** and the Modify tools work on its lines. **Finish Edit Mode** makes the region in the current region type, or says why it cannot (an open or crossing boundary). A selected region's **Edit Boundary** opens its sketch again. The type sets its fill pattern, colour and background (**Opaque** hides what is behind). **Region ► Masking Region** makes a region in the paper colour that hides what is beneath it. A region shows its **Area** and has **Comments**. A selected region has a grip at each vertex: drag one to change its shape.

Detail components, repeating details and insulation

- **Component ► Detail component**: a 2D symbol (brick, block, timber, steel section, insulation board, break line) placed in a drafting or detail view; the **space bar** lines it up with each wall or detail line near the cursor in turn (a quarter turn when there is none).
- **Component ► Repeating detail**: click a start and an end; the type sets the repeated component, the **Layout** (fill the available space, fixed distance, fixed number, maximum spacing), the **Spacing**, **Inside** and the rotation within the pattern. The instance has the **Number** when the layout is a fixed number.
- **Insulation**: click two points; **Width** and **Offset** (the insulation runs that far to the left of the clicks) in the options bar; with **Pick Lines** ticked, a click on a detail line or a wall draws it along that line. The insulation width and the bulge ratio in its properties. Selected insulation, and a selected repeating detail, have a grip at each end.

Draw order

Select detail items only: **Arrange** offers **Bring to Front**, **Bring Forward**, **Send to Back** and **Send Backward**. Detail items always draw over the model, and a new one goes on top. **Undo** restores the previous order.

Drafting views

View ► Create ► Drafting view asks for a name and a scale (or a custom one). The view opens and is listed under **Drafting views**; everything drawn in it is 2D, with no model behind it. It can go on one sheet. **Duplicate View ► Duplicate with Detailing** copies a view with its detail items, text, dimensions and legend components.

Display Model in the properties of a plan, a section or a detail view draws the model **Normal**, **Halftone** (greyed under the details) or not at all (**Do not display**), leaving the details and annotations.

View ► Create ► Detail with **Reference other view** ticked on the options bar draws a callout that points at an existing detail or drafting view instead of making a new one: its head names that view and a double-click opens it; **Referenced view** in its properties changes it. In a drafting view the callout is always of this kind.

Hide at scales coarser than in the properties of a section or a callout hides its symbol in the views whose scale is coarser, for example a 1 : 50 detail left out of the 1 : 100 plan.

At the command line

Every tool has its command: `dim`, `lineardim`, `angulardim`, `radialdim`, `arcdim`, `spotelevation`, `text`, `findreplace`, `tag`, `room`, `roomsep`, `areaplan`, `areaboundary`, `area`, `colorscheme`, `legend`, `legendview`, `legendcomponent`, `detailline`, `region`, `mask`, `draworder`, `lock`, `eq`. `help` followed by a command shows its usage; [Keyboard shortcuts](#) lists the typed shortcuts.

Sheets, schedules and printing

This chapter describes how the project is documented: sheets and their title blocks, the views placed on them, revisions, schedules, printed drawings and exported images.

Sheets

A sheet is a drawing to print: a title block and the views placed on it. Sheets are listed under **Sheets (all)** in the Project Browser, by number.

Creating a sheet

View > Sheet Composition > Sheet opens **New Sheet**: choose a title block (its paper size is shown), **None**, or one of the placeholder sheets of the sheet list. **OK** creates the sheet with the next free number (**A101**, **A102**...) and opens it.

Right-click a sheet in the Project Browser > **Rename...** to change its number and name in **Sheet Title**. The other parameters of the sheet are in the **Properties** palette: **Sheet Number**, **Sheet Name**, **Sheet Issue Date**, **Drawn By**, **Checked By**, **Designed By**, **Approved By**, **Appears In Sheet List**, its guide grid and its revisions. Several sheets picked together in the Project Browser (with **Ctrl** or **Shift**) are changed together: the palette shows the values they share.

Manage > Settings > Project information sets what every sheet shows: **Project Issue Date**, **Project Status**, **Client Name**, **Project Address**, **Project Name** and **Project Number**.

View > Create > Schedules > Note Block makes a schedule of the symbols placed with **Symbol**, of one family only (north arrows, targets, revision deltas...): in **New Note Block** choose the **Family** and type the **Note Block Name**, then **OK**. **Note Block Properties** opens first, with the same tabs as any schedule; by default each row shows the symbol's type, its text and the count.

Title blocks

The title block shows the project's information, the sheet's number and name, the people and the dates, the current revision and the scale (**As indicated** when the views have different scales); above it, a table lists the sheet's revisions with their number, description and date. A double click on one of its fields types the value in place.

- Click a line of the title block to pick it: the type selector changes it to another paper size, **Del** removes it (the sheet and its views stay).
- **View > Sheet Composition > Title Block** inserts one on the open sheet: choose it in the type selector, its frame follows the cursor, click to place it.
- **Edit Type** shows its **Sheet width** and **Sheet height**; **Duplicate...** makes a new paper size.

Views on sheets

Drag a view from the Project Browser onto the sheet, or use **View > Sheet Composition > View (Views, then Add View to Sheet)**: the view follows the cursor at its scale, and a click places it as a viewport. A view goes on one sheet only; a schedule on several.

A picked viewport:

- moves with the mouse or the arrow keys, unless it is pinned (**Pin**); near another view, its title lines up with the other's and a dashed line shows it;
- has its **View Scale**, its **Title on Sheet** (also typed by double-clicking the title) and its **Rotation on Sheet** (90° clockwise or counter-clockwise; the title stays horizontal);
- shows the end of its title line, which can be dragged;
- takes a viewport type from the type selector: **No Title**, **Title w/ Line** or **Title w/o Line**, or a type of your own (**Show Title**, **Show Extension Line**, line weight, colour and pattern of the line);
- leaves the sheet with **Del**; the view stays in the project.

Activate View (on the **Modify | Viewports** tab or the right button) edits the view where it is on the sheet, the rest of the sheet in halftone; **Deactivate View** goes back to the sheet. A view turned on its sheet cannot be activated: take its rotation off first. A double click on a view opens it in its own window.

Guide grids

View > Sheet Composition > Guide Grid asks for a name and covers the sheet with a grid. Pick it to drag its corners or to set its **Guide spacing**; the sheet's **Guide Grid** parameter shows the same grid on other sheets, or none. Views dragged near the grid's lines snap onto them. The grid is never printed.

Sheet list

View > Create > Schedules > Sheet List makes a schedule of the sheets: number, name and any other field. Sheets with **Appears In Sheet List** unticked are left out. **Rows > New** adds a placeholder sheet: a row that is not a sheet yet and is not in the Project Browser. **Filter placeholder sheets** shows every row, hides the placeholders or shows only them. A placeholder chosen in **New Sheet** becomes a real sheet.

Revisions

View > Sheet Composition > Sheet Issues/Revisions lists the revisions of the project, one per row: **Sequence**, **Numbering** (**Numeric**, **Alphabetic** or none), **Date**, **Description**, **Issued**, **Issued to**, **Issued by** and **Show**. **Add** adds one; a row picked by its sequence number is merged into the one above or below (its clouds go with it) or moved up and down. **Numbering** is **Per Project** or **Per Sheet** (the place of the revision among the sheet's revisions); **Alphabetical order > Options...** sets the letters used. An issued revision cannot be changed, and neither can its clouds, until **Issued** is unticked.

Annotate > Detail > Revision Cloud draws a cloud in a plan, a section, a drafting view or on a sheet: sketch closed loops with the shapes of the **Draw** panel, then **Finish Edit Mode**; a selected cloud's **Edit Sketch** opens them again, unless its revision is issued. The cloud takes the latest revision not issued; picked, it shows its **Revision** (to change), its number, date and people, its **Mark** and **Comments**. **Show** of a revision draws its clouds and tags, keeps them but does not draw them, or hides them.

A sheet lists the revisions of the clouds of its views and of its own clouds. Its **Revisions on Sheet** (in the Properties palette, **Edit...**) adds other revisions to the list.

Schedules

A schedule is a table of the elements of the model, and a view like the others: it opens in a window of the drawing area, is tiled, cascaded and switched with plans, sections and 3D views, and is listed under **Schedules/Quantities** in the Project Browser. It follows every change of the model at once, and every change made in it changes the model.

Creating a schedule

View > Create > Schedules > Schedule/Quantities opens **New Schedule**: choose a category, a name (the default follows the category until one is typed) and **Schedule building components** or **Schedule keys**. **OK** opens **Schedule Properties**; its second **OK** creates the schedule and opens its view. **Material Takeoff** in the same menu lists the materials of the layers of walls, floors and roofs.

Schedule Properties

The dialog opens again from the **Properties** palette of the schedule (each tab has its **Edit...** button) or from the right button on the schedule in the Project Browser. Its tabs:

Tab	What it sets
Fields	The columns, chosen from Available fields : and put in order; the fields of the rooms the elements are in; Add Parameter... for a project or shared parameter; Calculated Value... for a formula (with + , - , * , / , ^ , sqrt , round , IF , AND , OR , NOT and units) or a percentage
Filter	Up to four criteria, all of which an element must meet
Sorting/ Grouping	Up to four sort levels, each with Header , footer and Blank line ; the grand totals; Itemize every instance (off: one row per type)
Formatting	Per field: heading, orientation, alignment, hidden field, Format... (units, rounding, symbol), totals and Conditional Format... (a background colour where a value meets a test)
Appearance	Grid lines and outline with their line styles, the title and the column headers, a blank row, Header text and Body text (size, Bold , Italic); shown when the schedule is on a sheet

Working in a schedule view

- A cell edits the element, or its type for a type parameter; every edit is one step of undo.

- A row selects its elements in every view. **Highlight in model** on the **Modify | Schedule/Quantities** tab opens **Show Elements in View**, which brings a plan forward framed on them; **Show** goes on to the next view.
- **Rows > Delete** deletes the elements of the selected rows, after asking.
- Headings picked together are joined under a common heading with **Group**, and parted with **Ungroup**; **Hide column** and **Unhide all columns** work on the column picked.

Schedules on sheets

Drag a schedule from the Project Browser onto a sheet. Selected on the sheet, it shows its controls: the Z on the right edge of a segment splits it in two, the arrow in the middle of a segment moves it (dropped on the segment beside it, the two join), the dot at the bottom of a segment moves its last row, and the triangles at the top of the columns set their widths. A double click, or **Edit Schedule** on the right button, opens the schedule view. The same schedule can go on several sheets.

Key schedules and material takeoffs

A key schedule (**Schedule keys** in **New Schedule**) defines named sets of values, one row per key, added and deleted with **Rows**. Its **Key Name** becomes a parameter of the category: choosing a key for an element gives it all the values of that row.

A material takeoff lists, for each element, the materials of its layers with their area and volume; its fields can be sorted, grouped and totalled like any other.

Project and shared parameters

Manage > Settings > Project Parameters adds parameters to the elements of some categories, or to their types, with a name, a type of value and the group they show in the Properties palette.

Manage > Settings > Shared Parameters opens **Edit Shared Parameters**: the shared parameter file in use (**Browse...**, **Create...**), its groups and the parameters of each group. A shared parameter keeps its name and type, and has an identifier of its own, so that several projects add the same parameter. In **Parameter Properties**, choose **Shared parameter** and **Select...** to add one to the project; **Export...** writes a shared parameter of the project back to the file.

Exporting and reusing schedules

- **Application menu > Export > Reports > Schedule...** writes the schedule as delimited text: **Export Schedule** sets the field delimiter, the text qualifier and which headings and group rows go in the file.
- **Create view template from view...** on the right button of a schedule makes a view template with its fields, filter, sorting, formatting and appearance; **Apply view template...** gives them to another schedule.
- **Save to New File...** on the right button writes the schedule's setup, without the elements, to a file of its own. **Insert > Import > Insert from File > Insert Views from File...** brings the schedules of another project into this one, with their project parameters.

Printing

Printing writes PDF files: on the desktop they are saved where you choose, in the browser they are downloaded.

The Print dialog

Ctrl+P, or **application menu > Print > Print...**, opens **Print**:

- **File**: the name of the file and, when several views or sheets are printed, **Combine multiple selected views/sheets into a single file** (one page each) or **Create separate files** (one file each, named after the sheet or view).
- **Print Range**: **Current window**, **Visible portion of current window** (only what the window shows), or **Selected views/sheets** with **Select...**
- **Reverse print order** prints the last page first.
- **Settings**: the print settings in use, changed with **Settings...**; **Preview** shows the pages.

Plans, sections, elevations, drafting views and sheets print as drawings; the 3D window prints as an image of the view; a schedule prints its table on a page. The page is always white, elements hidden temporarily in a window are printed, and each printed sheet carries the date and time of the print.

View/sheet sets

Select... opens **View/Sheet Set**: tick the sheets and views to print (**Show** sheets, views or both; **Check all**, **Check none**). A set is saved by name with **Save As...** and kept in the project; **Save**, **Reset**, **Rename...** and **Delete** manage the saved sets, and the name list picks one again.

Print Setup

application menu ► **Print** ► **Print Setup...**, or **Settings...** in **Print**, sets:

Setting	What it does
Size Orientation	and The paper (A0 to A4, or the sheet's own size) and its orientation
Paper Placement	Center , or an offset from the lower-left corner
Hidden line views	Vector Processing or Raster Processing (the pages as images, at the raster quality chosen)
Zoom	Fit to page , or a percentage of the real size
Colors	Black Lines, Grayscale or Colour
Options	Show view links in blue , Hide unreferenced view tags , Hide crop boundaries , Replace halftone with thin lines

Settings are saved by name with **Save As...**, and kept in the project. Closing the dialog after changing saved settings asks whether to save the changes; **No** keeps them for this session only.

Print Preview

application menu ► **Print** ► **Print Preview**, or **Preview** in **Print**, shows the pages as they will print, in their colours: **Previous Page** and **Next Page** go through them, the wheel zooms and dragging pans; **Print...** prints, **Close** goes back.

Exporting images

application menu ► **Export** ► **Images and animations** ► **Image...** opens **Export Image**:

- the file name and the **Export Range**: the current window, its visible portion, or the views and sheets chosen (one file each);
- the **Image Size**: **Fit view(s)/sheet(s) to** a number of pixels across or down, or a zoom percentage of the real size at a resolution;
- the options, as for printing: view links in blue, crop boundaries and unreferenced view tags hidden;
- the **Format** of views without shading and of shaded views: PNG, JPEG, BMP or TIFF.

The 3D window is exported as it is shown, with its visual style.

Command line and MCP

Everything you do in BIMOpen is a command. A click on **Wall** and two points in the plan run the same `wall` command you can type yourself. This chapter describes the command line of the window, the `bimopen-cli` program, which runs the same commands without a window, and the MCP server, through which an AI agent can model, check and render a project.

The command line in the window

The command line sits under the drawing area. Its upper part is the log; its last row is where you type.

- You do not need to click it first: whatever you type while no other field is being edited goes there.
- Enter runs the line. The command is echoed in the log after a `>`, followed by its result; an error is shown in red and changes nothing.
- Up and Down bring back the lines typed before.
- On the left of the row, the prompt says what is expected: `Command:` when no tool is active, or the request of the active tool, such as `WALL next point [Esc to finish]:`.
- `help` lists every command with a line of description; `help wall` shows the usage of one. `? ► Commands` in the title bar does the same as `help`.

Typed shortcuts start the tools

A command typed **without arguments** starts the interactive tool, as if you clicked its button: `WA` (or `wall`) starts the wall tool, `DR` the door tool, `VG` opens Visibility/Graphics. The same command **with arguments** does the work at once, without the tool: `wall 0,0 5,0` draws a wall from the origin to 5 m along x.

Command names, their short forms and their arguments are the same in every language of the interface; most also accept an Italian name, such as `muro` for `wall`. Parameter names, type names and view names follow the language of the interface: in English you type `set Unconnected Height 2.7m`, in Italian `set Altezza non collegata 2.7m`. The [keyboard shortcuts chapter](#) lists every short form.

Points and lengths

You type	It means
<code>3,4</code>	The point x = 3 m, y = 4 m
<code>@2,0</code>	2 m along x and 0 along y from the previous point
<code>@4<90</code>	4 m from the previous point, at 90° (angles counter-clockwise from the x axis)
<code>2.7m</code> , <code>270cm</code> , <code>2700mm</code>	A length with its unit
<code>2.7</code> or <code>2,7</code>	A length in metres: at the command line a number without unit is in metres

For example, `wall 0,0 @6,0 @4<90 0,4 c` draws a 6 × 4 m rectangle; the final `c` closes it.

Warning

At the command line `set Unconnected Height 2700` means 2700 **metres**. Write the unit: `2700mm`. In the Properties palette, instead, a number without unit is in the project's units, millimetres in a new project.

Arguments in JSON

Every command also takes its arguments as a JSON object, which gives access to all its options. The usage line of `help` lists them:

```
wall 0,0 10,0 {"height":3.2,"location":"Linea d'asse del muro"}
roof walls {"slope":30,"overhang":0.5}
sheet A102 Plans {"title_block":"A3"}
export doors.csv {"schedule":"doors"}
```

Commands you will use often

Command	What it does
<code>new, sample</code>	A new project, the sample project
<code>open house.bimopen, save house.bimopen</code>	Opens and saves a project
<code>undo, redo</code>	Undoes and redoes the last change
<code>view 3d, view Ground Floor</code>	Opens the default 3D view, or the plan of a level
<code>wall, door, window, floor, roof</code>	Model elements: see the usage with <code>help</code>
<code>select walls, select all, deselect</code>	Selects by category, everything, nothing
<code>set <parameter> <value></code>	Sets a parameter of the selection, as in the Properties palette
<code>type <type name></code>	Changes the type of the selection, or of the next element
<code>move 1,0, copy 0,3, rotate 90</code>	Modifies the selection
<code>delete</code>	Deletes the selection
<code>list walls, params 102, info</code>	Lists elements, the parameters of one, a summary of the project
<code>schedule doors</code>	Shows a schedule at the command line
<code>export house.ifc</code>	Exports IFC, SVG, PNG or CSV, by the file's extension

Every element has a number, its id, shown in brackets after it is created: Door «Single swing door 80x210» in wall 102 (106) . Commands accept it where they need an element: `params 106, delete 106` .

bimopen-cli

`bimopen-cli` runs BIMOpen without a window: to convert files, to build a project from a script, to check a model, or to serve agents over MCP. Build it with `cargo build --release -p bimopen-cli` .

```
bimopen-cli info <file>
bimopen-cli convert <in> <out> [--level NAME] [--view 3d] [--schedule walls|doors|windows|floors|rooms|materials]
bimopen-cli run [<file> | --sample] [--cmd LINE]... [--script FILE] [--save FILE] [--export FILE]...
bimopen-cli commands
bimopen-cli mcp [<file> | --sample]
```

Subcommand	What it does
<code>info <file></code>	A summary of the project and, in JSON, its levels, element counts and active view
<code>convert <in> <out></code>	Opens <code><in></code> (<code>.bimopen</code> or <code>.rvt</code>) and writes <code><out></code> : <code>.ifc</code> , <code>.svg</code> or <code>.png</code> of a plan (the lowest level, or <code>--level</code>), <code>.png</code> of the 3D view (<code>--view 3d</code>), <code>.csv</code> of a schedule (<code>--schedule</code>), or <code>.bimopen</code>
<code>run</code>	Opens a file, the sample, or a new project, then runs the options in order: <code>--cmd</code> one line, <code>--script</code> a file of lines (empty lines and lines starting with <code>#</code> are skipped), <code>--save</code> and <code>--export</code> a file
<code>commands</code>	Every command, with its description and usage
<code>mcp</code>	The MCP server on standard input and output
<code>--version</code>	The version

The messages are in the language of the environment variable `BIMOPEN_LANG` (`it`, `en`, `de`, `fr`, `es`, `ar`), or of the system (`LANG`), or Italian. `bimopen-cli` ends with code 0 when everything worked, 1 when a command failed (the message says which), and 2 when the arguments are wrong (it prints the usage).

```
export BIMOPEN_LANG=en
bimopen-cli run --script house.txt --save house.bimopen --export house.ifc
bimopen-cli convert house.bimopen plan.svg
bimopen-cli convert house.bimopen doors.csv --schedule doors
bimopen-cli convert house.bimopen first.png --level "First Floor"
bimopen-cli convert house.bimopen house-3d.png --view 3d
bimopen-cli convert project.rvt project.bimopen
```

A script is a text file with one command per line, exactly as typed at the command line:

```
# a small house
wall 0,0 10,0 10,6 0,6 c
door 5,0
window 10,3
floor walls
roof walls
```

The schedules are written as CSV with ; between the columns, the headings in the language of the messages and a total row at the end.

MCP: BIMopen for AI agents

The Model Context Protocol (MCP) lets an AI agent use programs as tools. `bimopen-cli mcp` is an MCP server: it speaks JSON-RPC 2.0 on standard input and output, one message per line, and keeps one project open for the whole conversation. Without a file it starts from a new project; `--sample` starts from the sample house.

To add it to an agent, give the agent the command to start. For example, in Claude Code:

```
claude mcp add bimopen -- bimopen-cli mcp --sample
```

or, in a client configured with JSON:

```
{ "mcpServers": { "bimopen": { "command": "bimopen-cli", "args": ["mcp", "--sample"] } } }
```

The server offers seven tools:

Tool	Arguments	What it does
<code>command_line</code>	<code>line</code>	Types a line at the command line, exactly as a person would
<code>execute</code>	<code>command</code> , <code>args</code>	Runs a command with its arguments in JSON
<code>inspect_model</code>	-	A summary: levels, element counts, active view, selection
<code>query_elements</code>	<code>category</code> (optional)	The elements, with id, category and name: <code>walls</code> , <code>doors</code> , <code>windows</code> , <code>floors</code> , <code>rooms</code> , <code>roomseps</code> , <code>grids</code> , <code>levels</code> , <code>types</code>
<code>get_params</code>	<code>id</code>	Every parameter of an element
<code>schedule</code>	<code>kind</code>	A schedule: <code>walls</code> , <code>doors</code> , <code>windows</code> , <code>floors</code> , <code>rooms</code> or <code>materials</code>
<code>render</code>	<code>view</code> , <code>width</code> , <code>height</code> , <code>yaw</code> , <code>pitch</code>	A PNG image of a view: <code>3d</code> , the name of a level for its plan, of a section, elevation, callout or drafting view, or the number or name of a sheet; <code>yaw</code> and <code>pitch</code> turn the 3D camera, in degrees

The answers carry the message of the command and, when there is one, its data in JSON, such as the ids of the elements created. An agent can check its own work by asking for a render.

Tip

Ask the agent to render the plan and the 3D view after each step: it sees what it built and corrects itself.

Keyboard shortcuts

BIMopen has two kinds of shortcuts: **keys**, such as **Ctrl+Z**, which act at once, and **typed shortcuts**, such as **WA**, which you type letter by letter. At the command line a typed shortcut waits for **Enter**, like any command; typed over the drawing area, it acts as soon as it is complete when nothing longer begins with its letters (see below). Typed shortcuts are the same in every language.

On macOS, **Cmd** takes the place of **Ctrl**.

Keys

Key	What it does
Ctrl+Z	Undoes the last change
Ctrl+Y or Ctrl+Shift+Z	Redoes the change just undone
Ctrl+S	Saves the project; a project never saved asks for a file name
Ctrl+P	Opens Print
Ctrl+A	Selects the elements of the open plan's level, or of the whole model in a 3D view
Del	Deletes the selected elements, and the elements they host
Home	Fits the whole view in its window
F1	Opens the page of this manual about the open dialog, the ribbon button under the mouse or the active tool
Esc	Cancels the step in progress; pressed again, ends the tool; with no tool, clears the selection
Enter	Runs the line typed at the command line; confirms a value in the Properties palette
Up / Down	At the command line, the lines typed before
Space	While drawing walls, swaps the exterior and interior side; while placing a component or a detail component, rotates it
Shift	While drawing, keeps segments horizontal or vertical (or frees them, when Ortho is on); with a click or a window, takes elements out of the selection; while dragging, frees a joined wall or keeps the move horizontal or vertical
Ctrl + click	Adds an element to the selection; held when a drag starts, places a copy
Tab / Shift+Tab	Highlights the next (previous) element under the cursor, or a chain of joined walls and lines
Ctrl+Left	Selects again what was selected before
Left Right Up Down	Move the selection a small step; with Shift , ten steps

Ctrl+Z, **Ctrl+Y**, **Ctrl+A**, **Del** and **Home** act on the model only while you are not typing in a field: in a field they act on the text.

In a floor, roof, stair or railing sketch, **Esc** (or a double-click) also finishes the sketch when it has enough points.

In the **Text Note** dialog, **Ctrl+Enter** inserts the note and **Esc** cancels it.

Alt pressed and released, or **F10**, shows the ribbon's key tips. With no tool active and nothing typed, **Enter** repeats the last tool. After a click in the Project Browser, the arrow keys and **Enter** move in its tree.

Mouse

	In plans and sections	In 3D views
Wheel	Zoom at the cursor	Zoom
Middle button, drag	Pan	Pan; with Shift , orbit
Left button, drag	Selection window (left to right: inside; right to left: touching), or moves the selected elements	The same
Right button	Context menu; with a tool active, the tool's menu (Cancel , Snap Overrides ▶...)	The same; dragging, orbit

In plans and sections		In 3D views
Double-click	Finishes a sketch	–

Typed shortcuts

Type the letters while no field is being edited, then press Enter. Without arguments, a shortcut starts the tool or opens the dialog; with arguments, it runs the command at once (see [Command line and MCP](#)).

With the cursor in the drawing area, the letters go to the command line (in the BIMopen style, to the search), and a shortcut acts as soon as it is typed, with no Enter, when no longer shortcut or command name begins with its letters: **VR** (view range), **WT** (tile), **ZE**, **ZF**, **ZA**, **ZP**, **ZR**, **ZO**, **ZS**, **HR**, **HH**, **HC**, **IC**, **DL** (detail line), **RT** (room tag), **TG** (tag by category), **TX**, **CC** (copy), **MV**, **RM**, **LL** (level), **RC** (revision cloud), **PP** (shows or hides **Properties**), **PT**, **RP**, and the shortcuts you added. The others begin longer names and wait for the next letter, a space (arguments follow) or Enter: **VG** (vgsb...), **HI** (hide), **DI** (dim), **AL** (align), **WA** (wall), **DR** (draworder), **UN** (undo), **MA** (mask); so **dim**, **wall 0,0 5,0** or **WA 0,0 5,0** typed over the view run as typed. **MA**, **PT** and **RP** say in the status bar that they are not available yet. Typed in the command line itself, a line waits for Enter.

While a tool waits for a point in a plan or a drafting view, **SE** (ends), **SM** (middles), **SI** (intersections), **SN** (nearest) and **SO** (off) override the snaps for that point only (also chosen in the right button's **Snap Overrides ▶**; **SE**, **SI** and **SO** with Enter, as longer names begin with them); the status bar says so, and Esc or the point taken ends it. In a section or a 3D view, whose points are not snapped that way, they are refused with a message. In a sketch they work in every view, and **SC** (an arc's centre) and **SP** (the perpendicular from the point drawn from) too.

Modelling

Shortcut	Command	Starts
WA or W	wall	Wall
DR	door	Door
WN	window	Window
SB	floor	Floor (the Flooring button)
RF	roof	Roof
CM	component	Component
ST	stair	Stairs
RA	railing	Railing
CG	curtaingrid	Curtain grid
MU	mullion	Mullion
CP	curtainpanel	Curtain wall panel
GR	grid	Grid
RM	room	Room
RS	roomsep	Room separation
PA	areaplan	The Area Plan dialog
CA	areaboundary	Area boundary line
–	area	Area
LG	legend	Color fill legend
SC	colorscheme	The Color Schemes dialog

Modifying

Shortcut	Command	Starts
MV or M	move	Move
CO	copy	Copy

Shortcut	Command	Starts
RO	rotate	Rotate
MM	mirror	Mirror - Pick Axis
DM	mirror	Mirror - Draw Axis
AR	array	Array
OF	offset	Offset
AL	align	Align
TR	trim	Trim/Extend to Corner
SL	split	Split Element
SG	split	Split with Gap
RE	resize	Scale
PN	pin	Pins the selection
UP	unpin	Unpins the selection
SA	selectinstances	Selects all instances of the selection's types visible in the view
DEL	delete	Deletes the selection
U	undo	Undoes the last change

Annotating and detailing

Shortcut	Command	Starts
DI	dim	Aligned dimension
DL	lineardim	Linear dimension
DA	angulardim	Angular dimension
TX	text	Text
TG	tag	Tags the untagged doors and windows of the level
-	detailline	Detail line
RG	region	Filled region
-	mask	Masking region
CD	detailcomponent	Detail component
RD	repeatingdetail	Repeating detail
IS	insulation	Insulation

Note

Typed alone, DL starts the detail line, as in Revit; followed by points at the command line, it draws a linear dimension (lineardim).

Views and settings

Shortcut	Command	Starts or opens
SE	section	Section
EL	elevation	Elevation
DT	callout	Callout (the Detail button)
DS	splitsegment	Split Segment of a section
VD	draftingview	The Drafting view dialog
PP	floorplan	The Floor Plan dialog
DV	duplicateview	Duplicates the active view

Shortcut	Command	Starts or opens
VG or VV	vg	Visibility/Graphics
WF, HL, SD	-	Wireframe, Hidden Line, Shaded: the visual style of the active view
HH, HI	-	Hide Element, Isolate Element for now
HC, IC	-	Hide Category, Isolate Category for now
HR	-	Reset Temporary Hide/Isolate
EH, VH	-	Hide in view: the selected elements, their category
RH	-	Reveal Hidden Elements, on and off
TL	thinlines	Thin lines, on and off
SO	objectstyle	Object styles
MA	material	Materials
UN	units	Project units
PU	purge	Purge unused
-	filter	Filters
-	viewtemplate	View templates
-	applytemplate	Apply a view template to the active view
-	linestyle	Line styles
-	fillpattern	Fill patterns
-	saveview3d	Saves the {3D} view with a name
-	renameview	Renames the active view

The commands with - have no short form, but their whole name works the same way. [help](#) lists every command and its short forms.

The zoom commands have typed shortcuts too: [ZR](#) zoom in region, [ZO](#) zoom out (2x), [ZF](#) zoom to fit, [ZA](#) zoom all to fit, [ZS](#) zoom sheet size, [ZP](#) previous pan/zoom. **View ► Windows ► User Interface ► Keyboard Shortcuts** gives any command shortcuts of your own ([The interface](#)).

Troubleshooting

This chapter collects situations that can surprise you, and what to do about them. It grows with the manual: each area of the realignment adds its own.

Starting BIMopen

The web app shows «BIMopen non si è avviato» and an error

The browser could not give BIMopen a graphics surface: the message ends with `webgl2 not available` or with a WebGPU error. BIMopen in the browser needs WebGPU or WebGL2.

- Turn on hardware acceleration in the settings of the browser, then reload the page.
- Try another browser, or a newer version of the same one.
- Add `?webgl1` to the address to use WebGL2 even where WebGPU exists but does not work.

The desktop app does not build on Linux

The interface needs the development files of xkbcommon, Wayland and GTK 3. On Debian and Ubuntu:

```
sudo apt-get install -y libxkbcommon-dev libwayland-dev libgtk-3-dev
```

The interface

The Properties palette, the Project Browser or the command line has disappeared

They are closed with the **×** on their title, or from **View ► Windows ► User Interface**. Tick them again in **User Interface**. The **Properties** button of the contextual tab also shows the palette again.

What I type ends up at the command line

Whatever you type while no field is being edited goes to the command line: this is how typed shortcuts work. To type in a field of the Properties palette or of a dialog, click the field first.

A button is greyed

Some tools work only in the right view, and their tip says why. **Area Boundary Line** and **Area** need an open area plan: the tip says **Open an area plan first**. **Save View** needs an open 3D view; **Sheet Composition ► View** needs an open sheet; **Undo** and **Redo** are greyed when there is nothing to undo or redo.

DL starts a dimension instead of a detail line

DL is the short form of the linear dimension. To draw detail lines, use **Annotate ► Detail ► Detail line**, or type `detailline`.

Modelling

«no wall at that point»

A door or a window must be placed in a wall. Click on the wall itself, or give a point on its line at the command line.

A height set at the command line is enormous

At the command line a number without unit is in metres: `set Unconnected Height 2700` makes the wall 2700 m high. Undo with **Ctrl+Z** and write the unit: `2700mm` or `2.7m`. In the Properties palette a number without unit is in the project's units.

Files

Unsaved work is gone after New, Open or Sample project

These commands replace the current project without asking. Save before using them: the asterisk after the project's name in the title bar shows that there are unsaved changes.

Open... in the browser does not show a file dialog

In the browser, drag the `.bimopen` file into the page: the command line says **Drag a .bimopen file into the window to open it.**

bimopen-cli prints its usage and stops

The arguments are not the ones it expects: it ends with code 2 and shows the usage. A command that fails ends with code 1 and a message saying which line failed. See [Command line and MCP](#).