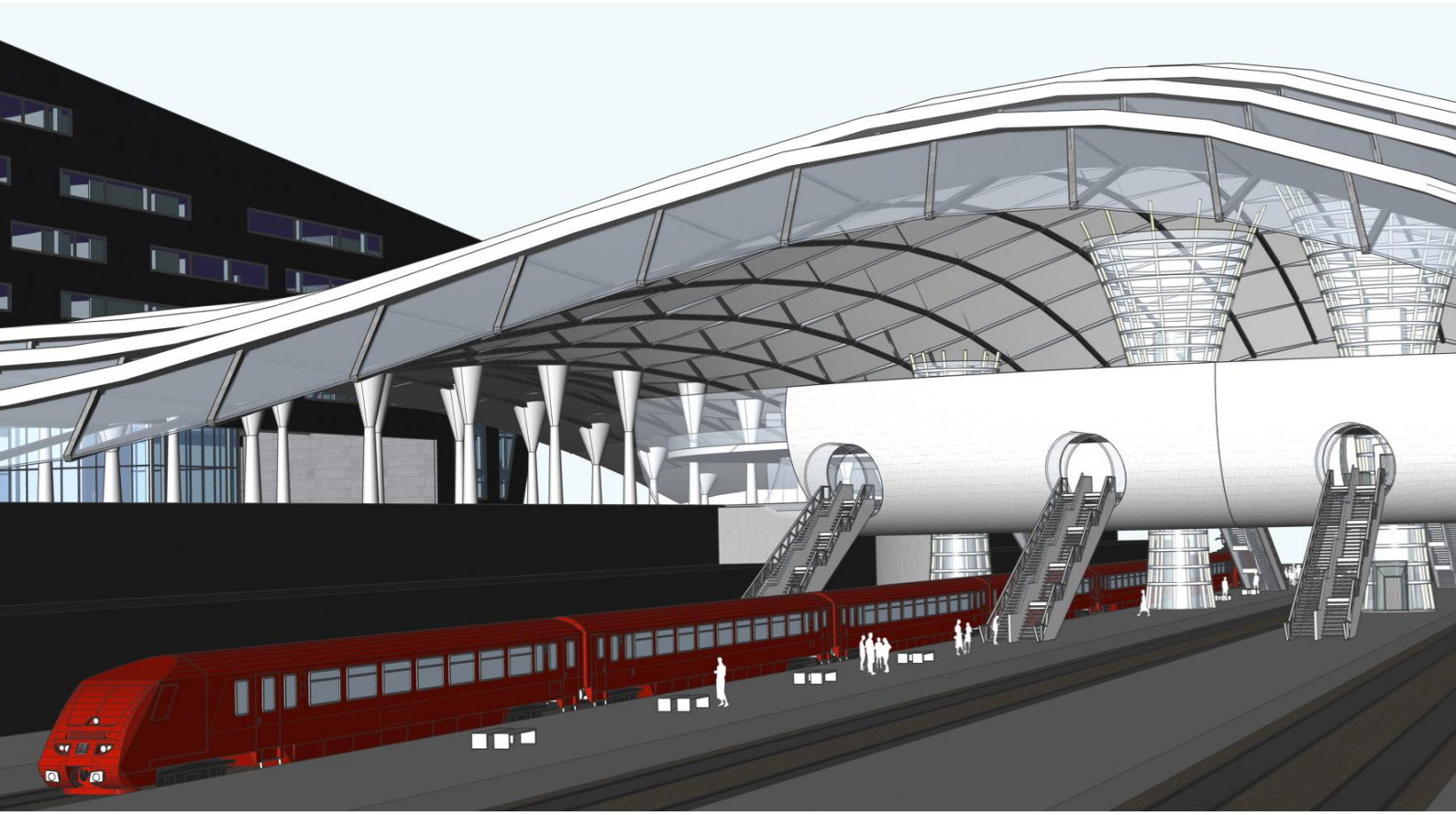


Updated for V22 – Made with V22.2.05

BricsCAD BIM Academy

Table of Contents[1]

I. BricsCAD BIM – A different approach

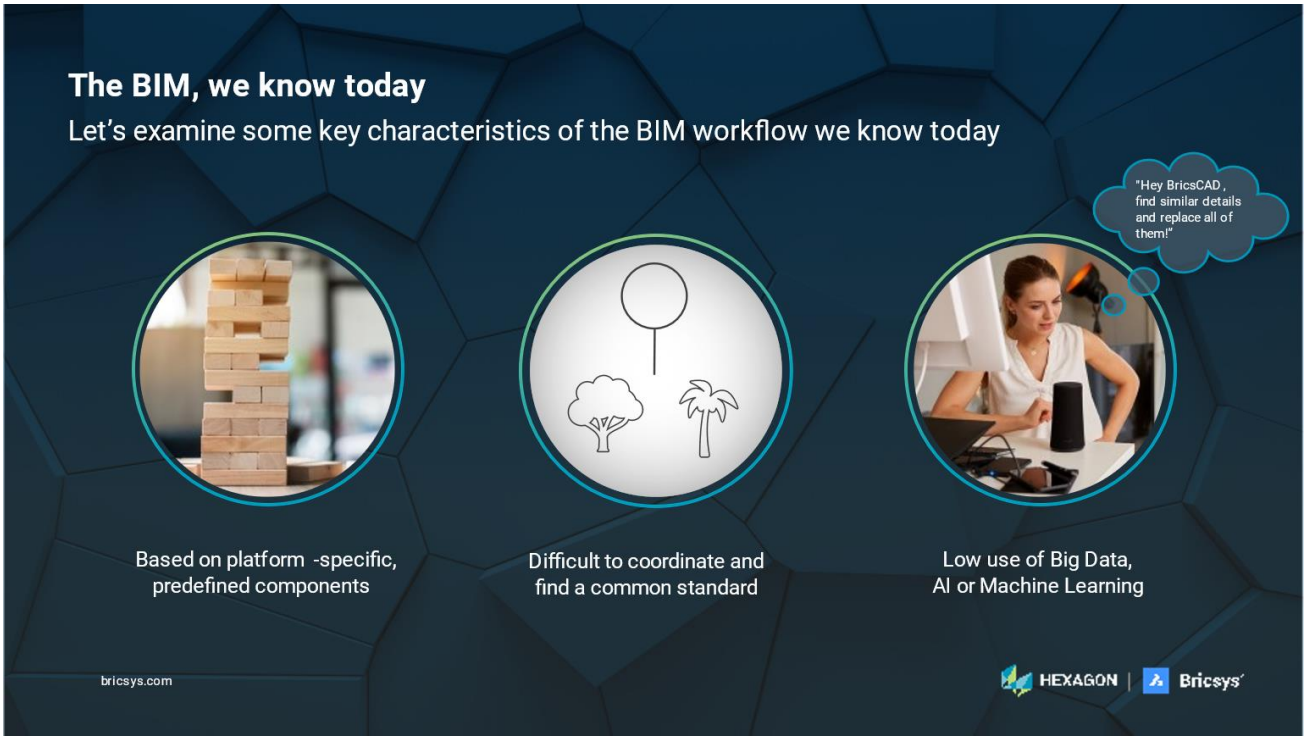
Let's examine some key characteristics of the BIM we know today:

In the typical BIM workflow, models are assembled from platform-specific, predefined components. While it's not impossible to create complex shapes with this approach, it is best suited for more rectangular designs that can easily be divided to building blocks. This approach limits design freedom, as instead of focusing on geometry the designer can only use choose from a set of pre-defined components. This approach does not fit every type of project and it is not applicable at every project stage!

It also makes interoperability a challenge, as each platform interprets these components in a slightly different way. While one platform defines a simple shape, like a tree, in a certain way, another platform may define that slightly differently. The common denominator will be what everyone can agree on, and that will inherently be very simplistic, as it will only contain the similar parts of each platform.

You must have heard the saying that the most important letter in BIM is the "I" for information. BIM is often mentioned as a *database*, but interestingly there is very little application of Big Data or Machine Learning in the industry, while these technologies are exponentially developing in other sectors. Imagine if you could talk to your BIM software just like a smart speaker. Instead of asking about the weather, you could ask something like this:

"Hey BricsCAD, find me similar details and replace all of them!"



During the lifecycle of the project, a vast collection of technologies is used, and data is often created in silos.

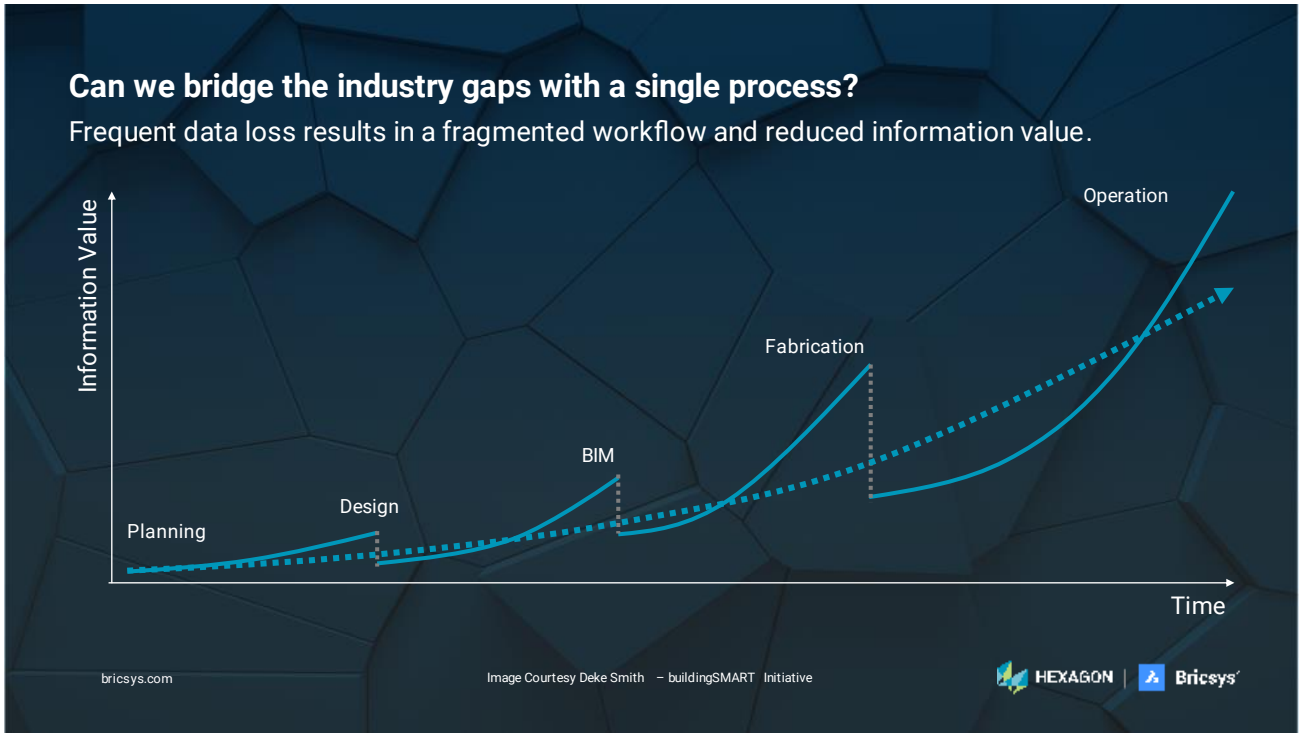
In the early design stage, it is not always possible to assemble a design idea from a set of pre-defined components. It is more flexible and efficient to model the geometry first and document it straight away. Small firms and designers of complex shapes tend to use 3D direct modeling tools, instead of BIM. These tools are great for modeling but have no capabilities for documentation. Designers are forced to turn to CAD, which creates a split workflow.

BIM is most used in detailed design and some parts of construction. When the project reaches this stage, the design geometry cannot be directly converted to BIM elements, so everything must be remodeled in a BIM software. This creates a disconnect between the world of early design and BIM.

BIM is then used all through detailed design and construction documentation phase. The project is usually re-modeled for construction, as those firms use a different level of detail. Fabricators and manufacturers of building products must look

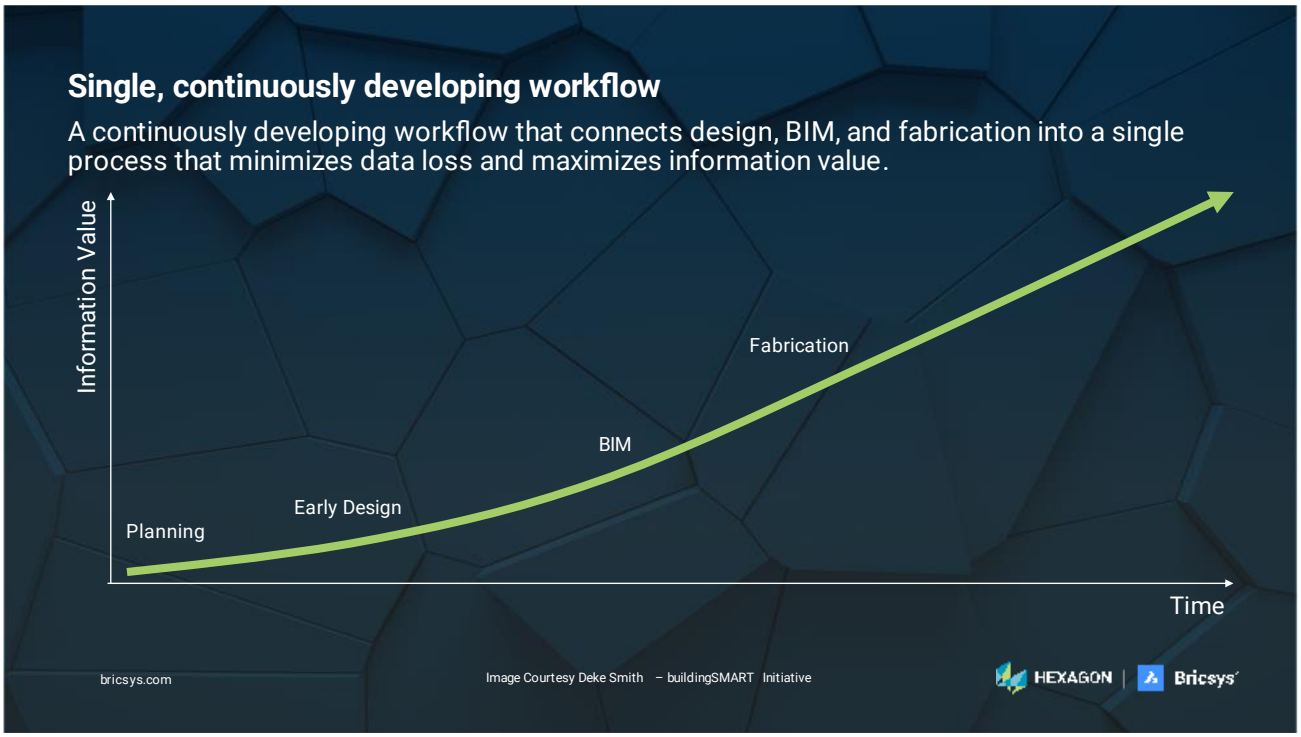
for solutions outside BIM that are able to support their need for increased accuracy. There is no easy way to connect fabrication the BIM workflow.

These industry gaps create an information loss at each transition from one stage to another.



The BricsCAD BIM workflow starts with direct modeling of generic solids, but it continues with the gradual development of detail powered by AI and Machine Learning. *The same elements* can be evolved throughout the project lifecycle by adding more and more detail. BIM elements can be *directly converted to fabrication* models in BricsCAD Mechanical.

We call this the *BricsCAD Ultimate platform*, a unified workflow with continuously developing level of detail that connects design, BIM, and fabrication into a single process, all on a shared DWG platform. This avoids the re-work and information loss caused by the current, fragmented industry workflow.



We learned from the difficulties of the past 30 years, and took a fresh, new look at BIM to offer you a fundamentally different approach. We are the only BIM software vendor that puts AI and Machine Learning in the center of the workflow. In BricsCAD BIM, *design decisions come first*, and AI algorithms automate the laborious tasks of manipulating BIM data, and the level of detail. We allow you, to model anything you want and let AI convert it to a smart BIM. We also apply our advanced AI engine to support the documentation workflow and make it more automated. This AI engine is pre-programmed by our engineers, and trained on real BIM models.

Designers often stay away from BIM, as using a direct modeling tool fits their design process better. While these tools are great for modeling, they don't have documentation capabilities, so designers must also use CAD for drawings. BricsCAD BIM brings the best of both worlds together! You can find a flexible, direct modeling tool and a professional CAD product all in the same DWG platform.

This familiar platform can also be an advantage for *CAD users* who are looking for an *easy entry to BIM*. Our customers report a cheaper, shorter, and easier transition to BIM, thanks to the familiar BricsCAD design environment. Spending less on software, training, and avoiding the performance dip during transition really lowers the barrier to entry. This is the easiest switch from CAD to BIM that you will find on the market!

BricsCAD BIM extends the core functionality of BricsCAD to 3D and BIM workflows while remaining in the same, familiar DWG format.

Unlike other BIM software, that is mainly optimized for detailed design, BricsCAD BIM supports all levels of detail, and you can choose the one that is best suited for your workflow. Your project can be gradually developed from a mass model to a detailed BIM, then handed over to fabrication without the need to remodel anything. This is a great advantage for primary BIM users (main authors of the BIM data: architects, engineers, and construction companies).

The all-in-one BricsCAD platform lets you access 2D, 3D, or in BIM workflows in the same environment, and in cost-effective way without the need to install a new software package. This is great for secondary BIM users, who can participate in BIM projects without investing heavily in an expensive BIM platform.

II. Introduction to the manual

1. The step-by-step instructions include figures to provide additional context.
2. Modules have “starter” .dwg files that should be used.
3. The text parts in **“BOLD BLUE”** indicate BricsCAD commands.
4. The text parts in **“bold black”** indicate important pieces of information, among which inserted and/or selected key entries or values. Values are listed in mm when not specified.
5. The exercises are in metric units (mm).
6. Before beginning, make sure the following settings are enabled:
   - In the Status Bar (bottom right of your screen): ESNAP, STRACK, DUCS, DYN, QUAD, RT.
   - In the Command Line: DMPUSHPULLSUBTRACT = 0, INTERSECTEDENTITIES = 1, EXTRUDEOUTSIE = 1, EXTRUDEINSIDE = 1, BIMOSMODE = 1, QUADDISPLAY = 5, (optional - for better on-screen rendering) ANTIALIASSCREEN = 3.

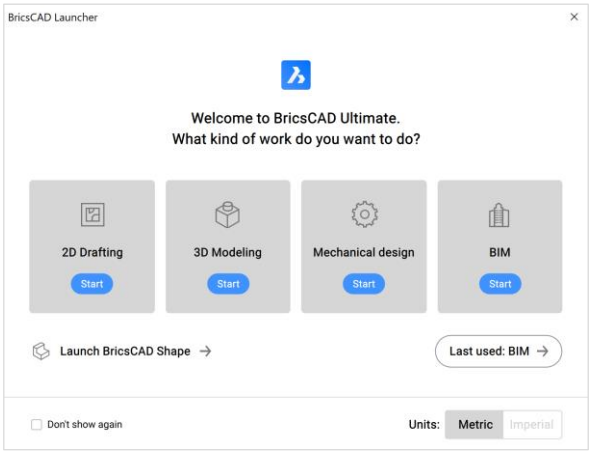
01. Interface, viewing, and navigation

This module explains the **BricsCAD BIM V22** interface and shows how to show and hide (selected) entities, make sections and navigate in 3D.

A. Interface

a. BricsCAD Launcher

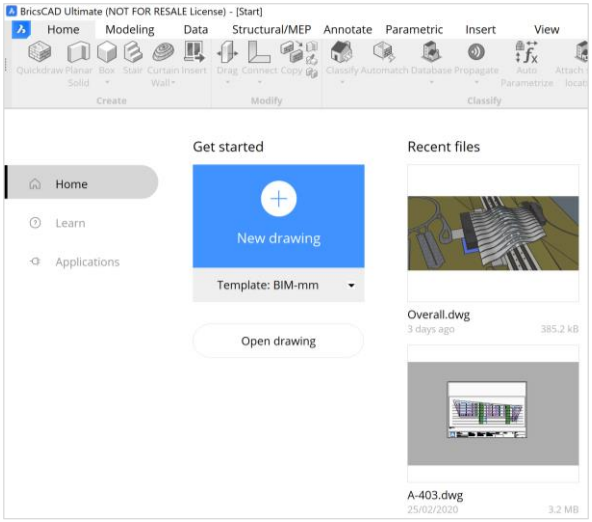
When starting BricsCAD, the Launcher dialog appears. Here you can select your workspace. Since our training is for BIM we will select the **BIM workspace**.



b. Getting Started

In the welcome window, you have 3 main sections: Home, Learn and Applications.

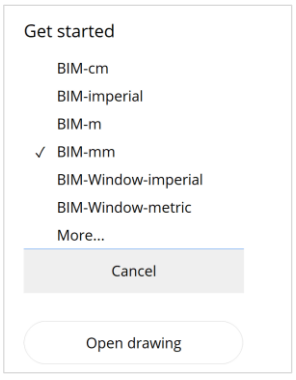
1. From the **Home** tab, you can create a new drawing, choose your units, open a drawing or access your most recent files.
2. From the **Learn** section, you can access tutorials.
3. From the **Applications** section, you can explore third-party applications.



c. New drawing

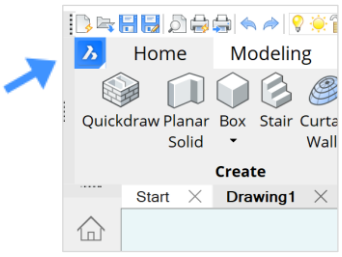
Before starting a **New drawing**, check that you use the **BIM-mm** template. You can change it by scrolling down through the templates and selecting **BIM-mm**.

NOTE: Once the model space appears, check that the settings are according to the ones mentioned in the introduction.



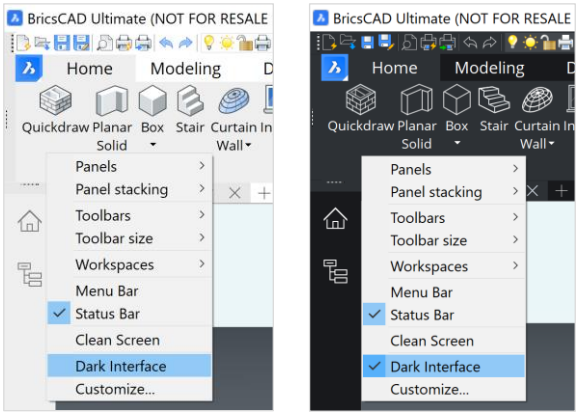
d. File Menu

The **File** menu can be accessed through the BricsCAD icon, in the top left corner of the ribbon.



e. Dark Interface

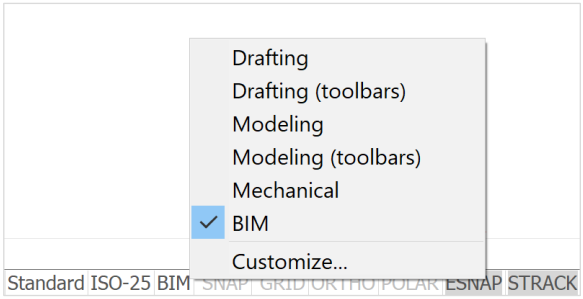
BricsCAD is set by default to have a Dark Interface, but this can be easily changed by right-clicking anywhere in the ribbon or toolbar, and de-selecting **Dark Interface**.



f. Workspaces

Switching between workspaces can be done from the **Status Bar**. If you right-click on the tab displaying **BIM**, the list of different workspaces will be displayed.

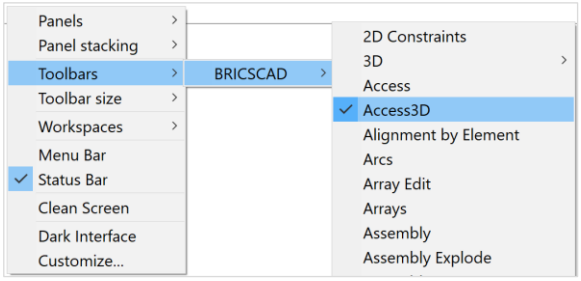
TIP: You can also access the Workspaces by right-clicking anywhere in the ribbon or toolbar.



g. Access Toolbar

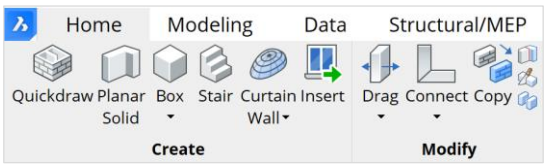
BricsCAD Access toolbar at the top of your screen acts as an Express Toolbar. Here you will find the most used tools when 3D modeling.

You can access this toolbar by right-clicking in the ribbon, selecting **Toolbars**, then **BricsCAD** and **Access3D**.



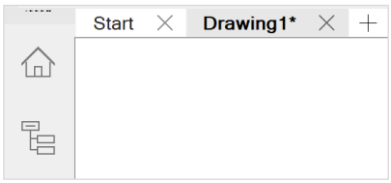
h. Ribbon Tabs

Common tools are organized in groups (e.g. 'Create' or 'Modify' groups) within tabs (e.g. the 'Home' tab). Each tab corresponds to a group of functionality.



i. Drawing Tabs

These allow you to easily switch between different open drawings.



j. Model Tab

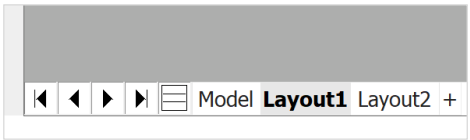
The **Model Space** is an area in which you create two-dimensional and three-dimensional entities based on either the World Coordinate System (**WCS**) or User Coordinate System (**UCS**).

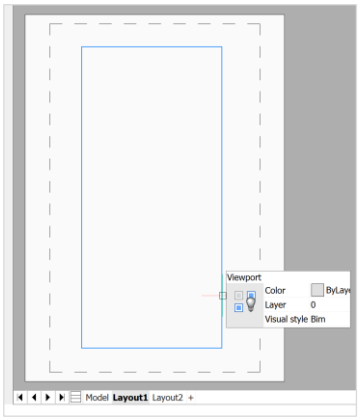
k. Layout Tabs

The layout tabs can also be referred to as **Paper Space**. Here is a work environment that provides a view (through a **Viewport**) onto the Model Space. The view is displayed at a certain **Scale** so it can fit the size of the paper.

The virtual paper is displayed in white inside the Paper Space. Use the **PRINT** command to adjust the paper size. After pressing **Apply**, followed by **Cancel**, the virtual paper's size will adjust.

The scale of the view can be adjusted as a property of the Viewport.





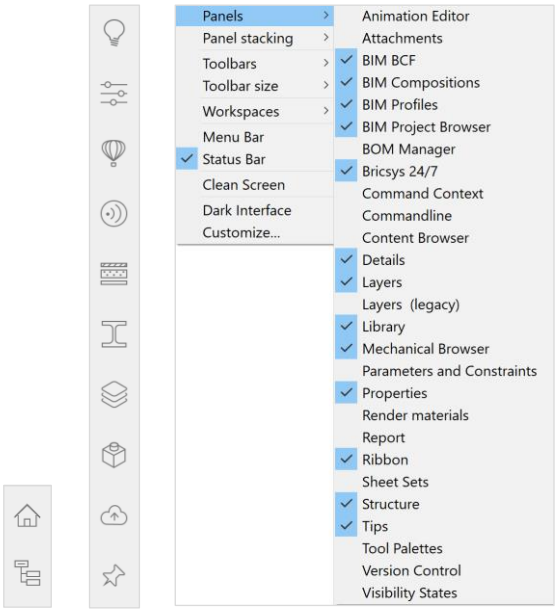
l. Dockable panels

A set of dockable panels is shown on either side of the screen. In the BIM workspace, by default, the Structure panel and the BIM Project Browser panel are pinned to the **left-hand** side.

On the **right-hand** side, you will find the Tips, Properties, Library, Details, BIM Compositions, BIM Profiles, Layers, Mechanical Browser, Bricsys 24/7, and BIM BCF panels.

Most of these panels will be covered later in this document.

Extra panels can be found by right-clicking in the ribbon, selecting **Panels**, then checking the desired panel. To change the panel stacking method, see the options under **Panel stacking**.



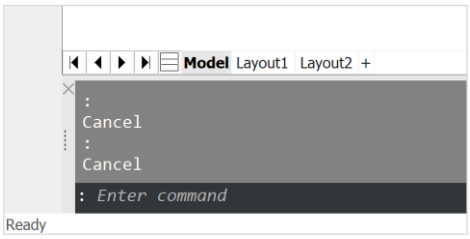
m. **Commandline**

In the lower field, called the Commandline, you can type the commands you want to execute.

In this same field BricsCAD shows prompts, options and other information regarding the execution of commands, also when you started a command from within the Ribbon or Quad.

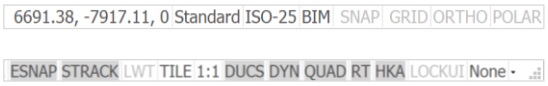
Press **F2** to show the full command prompt in a separate window, or **Shift + F2** to show/hide the commandline.

When the commandline is shown, the sub-options of the command become clickable. However, you can continue to type in the sub-options by entering one of the letters indicated in (orange) capitals.



n. **Status Bar**

The Status Bar sits along the bottom edge of the BricsCAD application window. It contains a lot of information about the settings in the current drawing.



B. Viewing

If you work with many entities in a drawing, everything that you have in the drawing is visible in the view. When you want to temporarily make only a few entities - or one particular entity - visible and manage them in a view, you can use the **Hide** or **Isolate** tools.

a. **File**

1. Click on **OPEN** drawing.
2. Select the file **01B.dwg**.

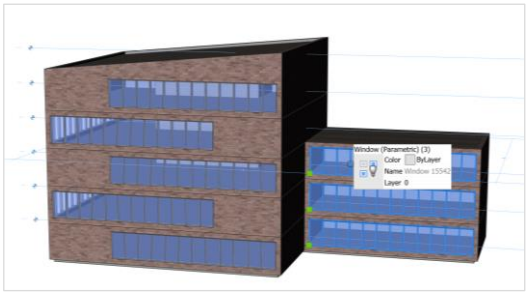
b. **Hiding Entities**

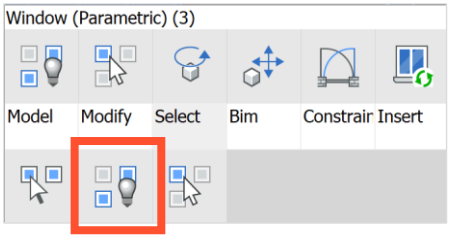
The **HIDEOBJECTS** tool temporarily hides the selected entities in the view.

In this drawing, we will hide the windows from the right part of the building.

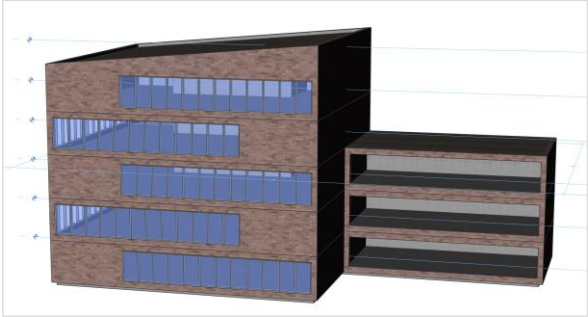
1. Select the 3 large windows from the right part of the building.
2. The Quad appears at your cursor, move the cursor over the icon, the Quad expands, click on the **Select** tab and click on **HIDEOBJECTS**

   NOTE: The tooltip in the Quad reads **Hide Entities**.

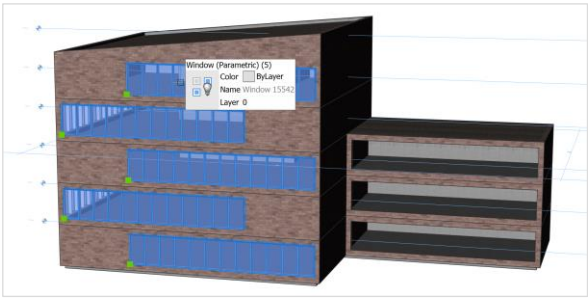




3. All entities that have been selected are hidden in the view.



c. **Isolating Entities**

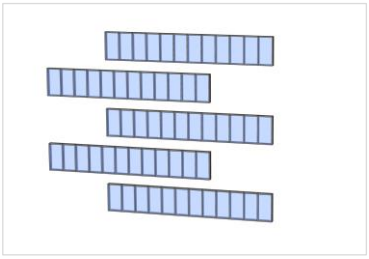


The **ISOLATEOBJECTS** tool temporarily hides all entities except those that have been selected.

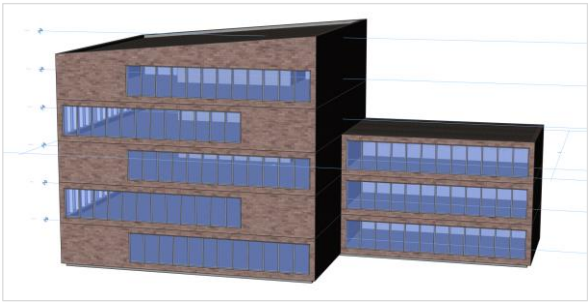
In this model,

1. Select the 5 front windows from the left part of the building.
2. Once the Quad appears, go to **Select** tab and click on **ISOLATEOBJECTS**.

   NOTE: The tooltip in the Quad reads **Isolate Entities**.
3. All entities that have been selected are temporarily isolated.



d. **Showing entities**



The **UNISOLATEOBJECTS** tool brings back all hidden entities in the view.

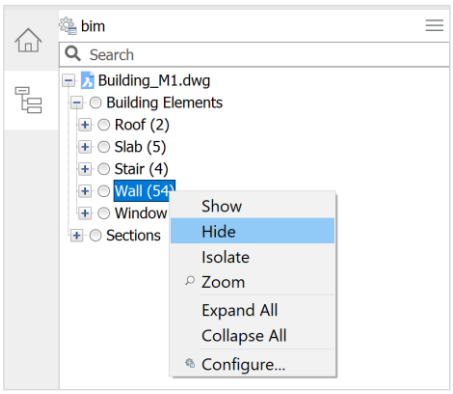
Let's bring all entities back to the view:

1. Right-click in empty space in the model space. The Quad appears in No Selection state.
2. Move cursor over the **General** tab and click on **UNISOLATEOBJECTS**.

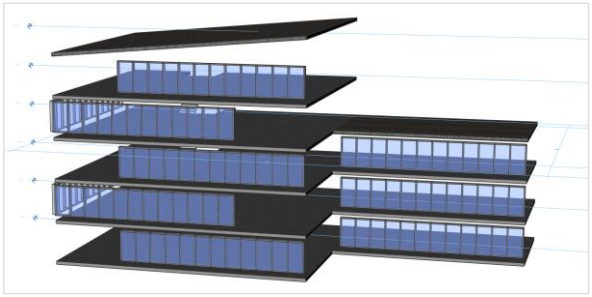
   NOTE: The tooltip in the Quad reads **Show Entities**.
3. All entities that were temporarily hidden and isolated will be shown.

e. **Structure panel**

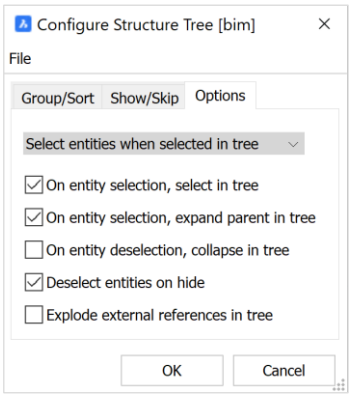
The **Structure** panel can also be used to hide and isolate selected entities as well as revealing all hidden entities in the model space.



1. Open the **Structure** panel.
2. Make sure the current configuration is set to **bim**. If not, click the hamburger menu on the top right corner of the Structure panel and choose the **bim** preset from the list.
3. Select **Wall** elements. All entities under this element will be selected.
4. Right-click and select **Hide**.
5. All the walls have been temporarily hidden.



NOTE: Make sure the settings for the Structure panel are correct by clicking on the name **bim** on top of the Structure panel. You will enter a dialog where you need to go to the **Options** tab. There you need to choose the preset **Select entities when selected in tree** from the dropdown.



C. Navigation in 3D

As you navigate around and through your 3D model, the location of the model in space remains constant. It's your current view (viewpoint) of the model that is changing.

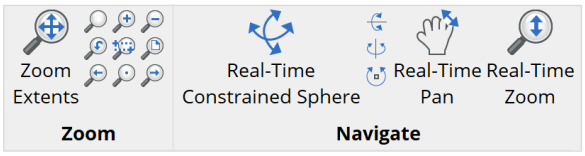
a. **Mouse and Keyboard Navigation**

The most used navigation tools are the zoom in/out, pan and orbit which can be easily accessed through the mouse and keyboard.

1. **Zoom in/out** – roll the mouse wheel.
2. **Pan** – hold the mouse wheel or middle mouse button.
3. **Orbit** – hold **Shift** key and mouse wheel.

b. **View Ribbon Tab**

Extra zoom, panning and orbit tools can be found in the **View** tab from the ribbon.



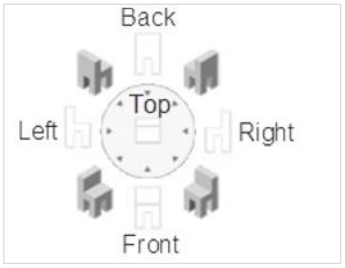
c. **LookFrom Navigation Tool**

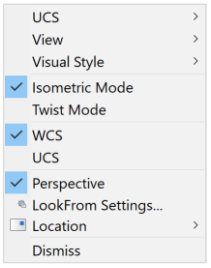
The **LOOKFROM** tool is displayed in the upper right corner of the drawing area.

Click on different places on the **LOOKFROM** tool to display the view from standard viewpoints.

TIP: To view **Bottom** viewpoints hold **Ctrl** key.

NOTE: A right-click menu offers access to additional controls and settings. To learn more, refer to BricsCAD Online Help.



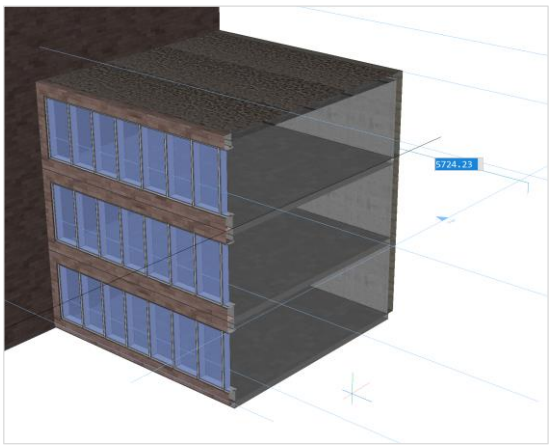


d. **BIM Sections**

The **BIMSECTION** command allows you to create a cross-section in your BIM model and thus view the interior details.

1. Select **BIMSECTION** from the No Selection Quad.

   NOTE: The tooltip in the Quad reads **Define Section**.



2. You are prompted **Select a point to place section or [Detail/Interior/Scale/Reflected ceiling]**.
3. Do one of the following:
   - To create a plan section, click a point anywhere outside the model.
   - Hover the cursor over the face of a 3D solid which is parallel to the section plane you want to create (DUCS in the status bar needs to be active) and left-click.
   - Optionally, hit the **Shift** key to lock the highlighted plane, allowing you to start from a point outside the selected 3D solid face and left-click.
4. The initial section plane displays dynamically and the 3D model is clipped accordingly.
5. You are prompted **Specify distance**.

6. Do one of the following:

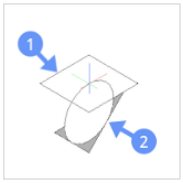
   - Type a value in the dynamic dimension field to offset the section from the initial position.

   - Move the cursor until the section plane is at the location you want it to be and left-click.

     NOTE: Make sure that you snap to the desired point, or that you disable your **ESNAP** temporarily to freely place the section.

7. The BIM Section entity is defined.

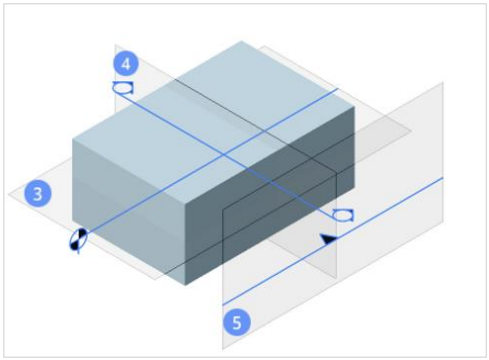
e. **BIM Section types**



TIP: The **BIM Section tracker** indicates:

1. SECTION PLANE (1).
2. VIEW DIRECTION (2).

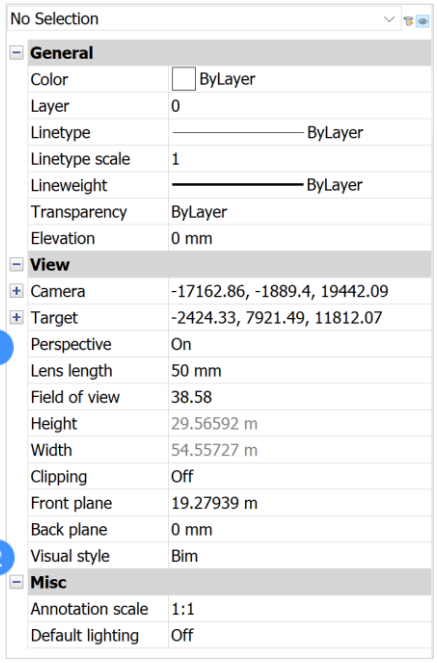
NOTE: The **Section Type** will depend on the section plane's direction and its place in the model.



3. **PLAN** shows a horizontal section plane (3).
4. **SECTION** shows a vertical section that cuts through the model (4).
5. **ELEVATION** shows the exterior elevation view (5).

f. **Properties Panel**

Extra view settings can also be found in the Properties Panel while nothing is selected.



1. **PERSPECTIVE** reports the current value of the **PERSPECTIVE** system variable and switches perspective view mode on and off (1).
2. **VISUAL STYLE** reports the current visual style and allows you to select a different one (2).

D. Selecting entities & Quad cursor

The following steps will demonstrate how to work with the Quad cursor, and highlight and select 3D model entities.

a. **A new file**

1. Go to the **Start** tab.

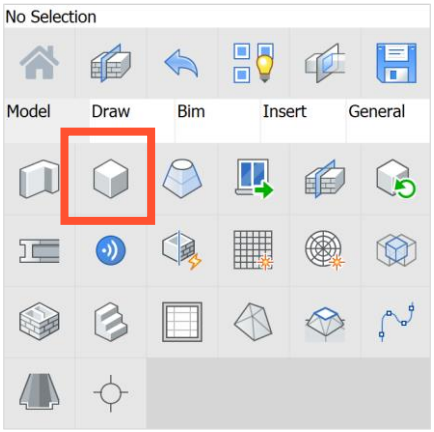
   NOTE: You can use the **GOTOSTART** command if you can't find the start tab at the front of your drawing tabs.

2. Press **New drawing** with the **BIM-mm** template selected.

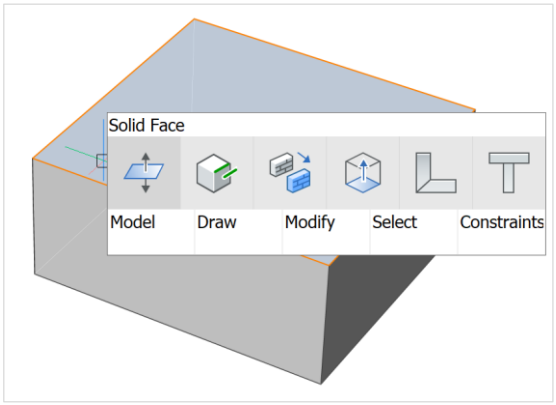
   NOTE: The drawing units of this file will be in millimeters.

b. **Using the Quad**

The quad is a floating toolbar that adjusts its content depending on what you are highlighting and what you may have selected in the current workspace.



1. We'll start with the empty drawing from before.
2. Right-click in the model space. The quad appears in No Selection state.
3. Move the cursor over the **Model** tab.
4. The tool group is expanded with more tool options.
5. Click the **BOX**  icon from the quad.
6. Draw a simple 3D box by following the prompt instructions on the commandline.
7. Hover the cursor over one of the faces of the box. The Quad displays a single icon, which is the most recently used tool with this entity type.
8. Right-click to launch the most recently used tool or move the cursor over the icon to further expand the Quad.



c. **Selection modes**

Selection modes allow you to control which sub-entities (faces, edges, and boundaries) should highlight in selection preview, and can be selected.

1. Selection modes can be found in the **Access** toolbar or by typing **SELECTIONMODES** in the command line.

2. Click the faces and boundaries options  .

   NOTE: In this state, the select edges and display sides and ends toggles are inactive, whereas select faces and select boundaries are active.

Enable detection of 3D solid edges	Controls whether 3D solid edges are highlighted by selection preview, and can be selected.
Enable detection of 3D solid faces	Controls whether 3D solid faces are highlighted by selection preview, and can be selected.
Enable boundary detection	Controls whether closed boundaries in XY-plane of the current coordinate system or on the face of 3D solids are detected.
Enable display sides and ends	Controls whether the sides and ends of BIM profiles - columns, beams or members - are highlighted as a whole, instead of as their separate underlying geometry (edges, faces, boundaries).

d. **Highlighting vs Selecting entities**

When select edges is off, select faces and boundary detection are on (default), do one of the following:

1. Hover over a face of the box with your mouse cursor.

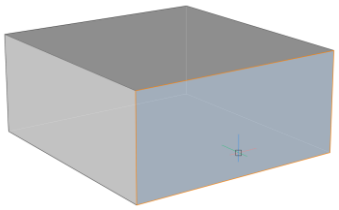
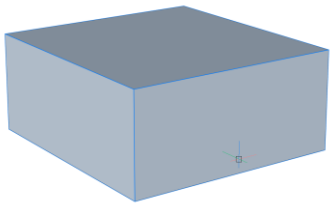
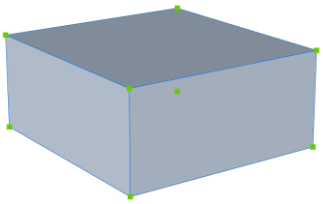
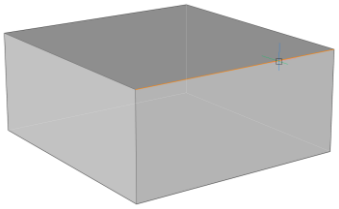
   The solid face is highlighted in orange. When the face is highlighted, click this face to select it.

2. Hover over one of the faces of the solid while holding down the **Ctrl** key.

   The solid displays in blue. When the solid is highlighted, click the solid to select it.

3. Hover over the edge of the solid while holding down the **Ctrl** key.

   The edge displays in blue. When the edge is highlighted, click the edge to select it.

Highlighted/ Selected Face	
Highlighted Solid	
Selected Solid	
Highlighted/Slected Edge	

e. Selecting multiple entities with selection windows

The selection windows allow you to select one or more than one entity at a time.

There are two types of selection windows in BricsCAD.

1. Blue selection window: it appears when creating a window from left to right.

2. Green selection box: it appears when creating a box from right to left.

The steps:

1. Click and move the mouse to the right to create a blue window around the box geometry you've created before.

   When the box is completely inside the window, it will be added to the selection set.

   NOTE: By default, selection windows only select entire entities (e.g. solids, lines, polylines, blocks), but not sub-entities (e.g. solid faces, solid edges).

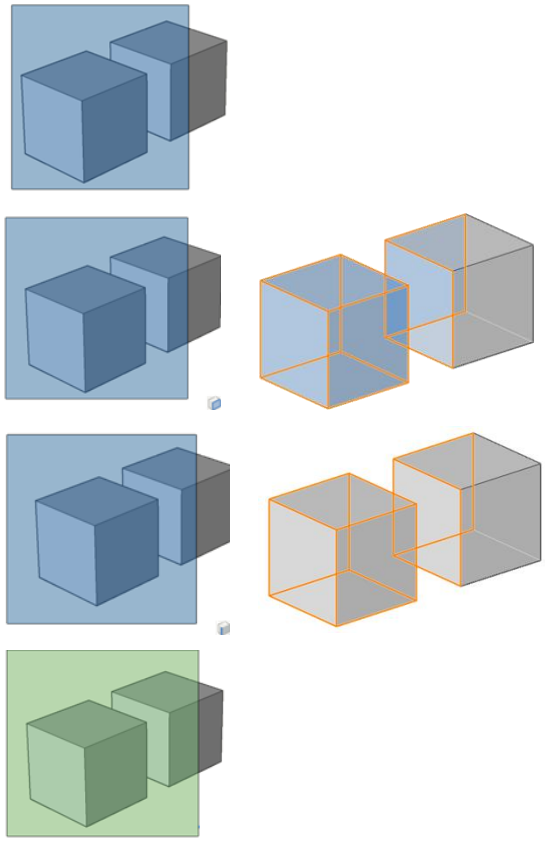
2. Hit the **Ctrl** key once during window selection to select the **faces** of the 3D box.

3. Hit **Ctrl** twice during window selection to select the **edges** of the 3D box.

4. Click and move the mouse to the left to create a green window around the box geometry.

   When the box overlaps the window or is completely inside the window, it will be added to the selection set.

   NOTE: To select faces or edges of the 3D box with the green selection box, follow the same process as with the blue selection box.



02. Create a BIM project

This module will describe how to create BIM projects, either starting from scratch or from existing .dwg files. You will also learn how to add new files to your already existing BIM projects.

The most important take-away from this module will be to always create a BIM project inside a separate, dedicated folder on your computer. This is because BIM projects contain a lot of files and they are better not mixed over folders or inside one big folder, as it would confuse the program. So remember, the program will no longer know which file belongs to which project if they are not kept in one dedicated folder per BIM project.

A. BIM project from scratch

In this section we will create a BIM project from scratch: no files to begin with, just starting with a fresh drawing.

a. **Create a new BIM project from a new file**

1. QNEW a new file in the **BIM-mm.dwt** template with the **new drawing** button in the GOTOSTART tab.

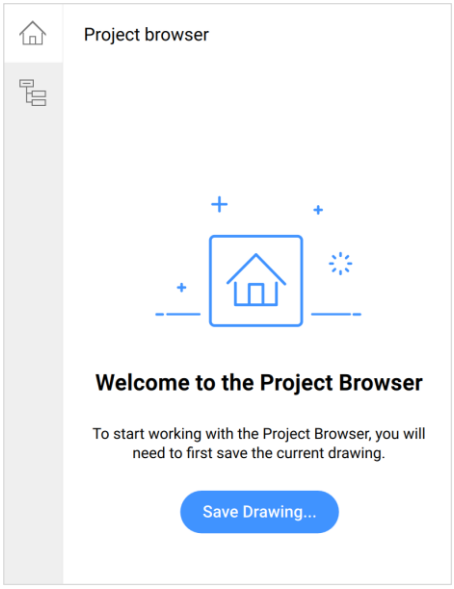
2. Go to the **BIM Project Browser** panel.

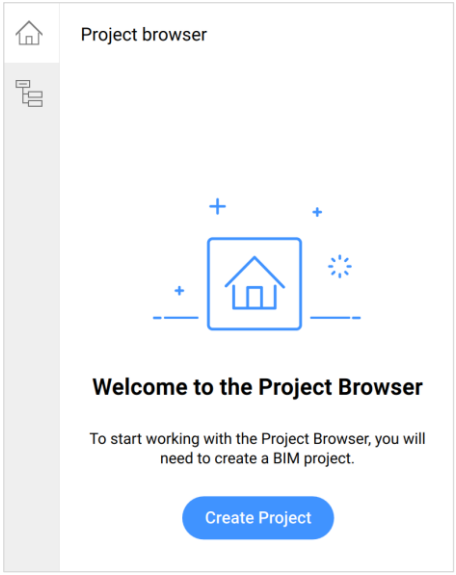
3. The panel greets you welcome and with the blue **Save Drawing…** button you can SAVEAS this file in fresh, **empty folder** on your machine, preferably in the empty **02A** folder in the training files, with the name **02A.dwg**.

   NOTE: , As mentioned in the preface of this module , if you want to start fresh on a new BIM project it is very important to not just save the drawing in an existing folder of your machine (that might already contain some unrelated files), but to save the drawing in a **new and empty folder** on your machine.

4. Now the blue button will change to a **Create project** button. Simply click the button and the entire folder on your machine containing the open drawing will be turned into a BIM project folder.

   NOTE: If you would happen to have saved the drawing in a folder on your machine that does already contain a BIM Project anyways, then you will see another bue button appearing, saying **Add to project**. In the description text you would then see to which BIM project (folder) that would be: in this case the folder you just saved the drawing to. BricsCAD BIM counts a folder as a BIM project folder in BricsCAD, as soon the folder contains a file with the extension **.bsyslib**. What this file contains will be discussed in a next part.





b. **Inside a BIM project folder**

So what exactly makes this folder on my machine a BIM Project folder? This will be explained below in a few points.

NOTE: For more information regarding each of the mentioned elements, you can look to the **Basic documentation sets** module later on in this training, the **Advanced documentation sets** module in the **BIM Advanced** training manual or the dedicated sections in the **BIM Customization** training manual.

1. First of all, to check if you successfully created a BIM Project, you need to have a similar BIM Project Browser panel as you can find in the images to the right.

   NOTE: If you decided to save the drawing to another empty folder, not called **2A**, then your files seen in the panel – and discussed hereafter – will have the name of that folder instead.

2. Secondly, you can check if you have a **.bsyslib** file stored in the folder where this new drawing file is stored.

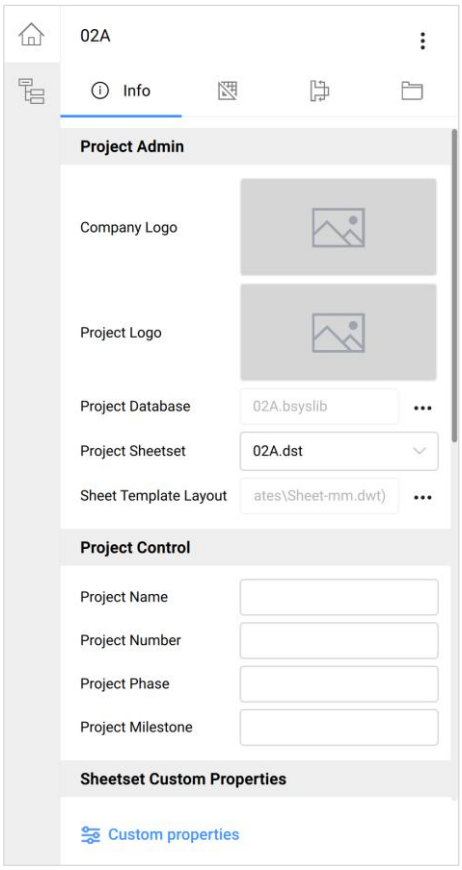
   NOTE: To easily find where your current open drawing is stored you can right-click the tab below the ribbon with the open file's name and find the **Open folder** option. This will open the folder in which this drawing is stored with your machine's file browser.

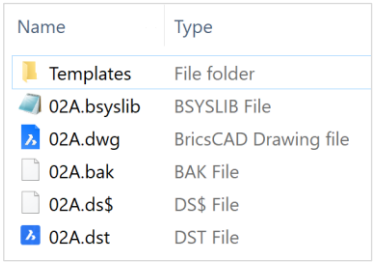
3. The **.bsyslib** file is a database file that stores information such as materials and compositions, steel profiles, custom properties, and the connection with the generated sheets. Using one external database avoids duplicating materials, and allows you to modify a material or composition over the entire project instead of in just one model. We will dive deeper in the materials and compositions later on in this training manual.

   NOTE: For now it is important to remember that all BIM project related information is stored inside the .**bsyslib** file and you can **not** manually delete or edit it. BricsCAD BIM will take care of updating this database while working on your BIM project, it is not something that you should do manually.

4. Besides the database file, you will also find that some other files and folders were created in your BIM Project folder:

   - The **Templates** folder contains the .dwt template that will be used to create your





sheets later on. We will cover this in the module **Basic documentation sets**.

- The **.dst** file is the sheetset that will be used to keep all sheets in this BIM project together.

- The **.bak** file is a back-up of your drawing and the **.ds$** file is a back-up of your sheetset. By changing their extensions to .dwg and .dst respectively you can turn them back into actual drawings or sheetsets.

B. BIM project within a folder already containing files

In this section we will turn an existing folder, that is not a BIM Project folder yet, into a BIM Project folder.

a. BIM project including existing files

1. OPEN **02B_Master.dwg**.

2. This drawing will show two buildings. Both of them were made in other, separate **.dwg** files, as can be found in the folder **02B** in the training files. They were attached to the current .dwg (the master file) as **External References** (Xrefs) through the XATTACH command, accessible in the **Attachements** panel. In that same Attachments panel you can now see both files listed, together with their **Saved path** and **Found path**.

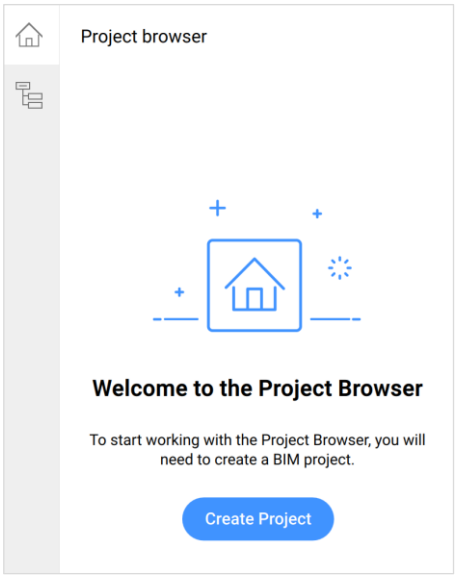
   NOTE: When attaching Xrefs that will be part of a BIM Project, it is best to attach them with either **Relative path** (if they are located in a subfolder of your project) or **No path** (if they are stored within the same folder of your master file). This way the paths can be traced back later on, when the entire BIM Project folder is moved to another location on your computer or on a different computer altogether.

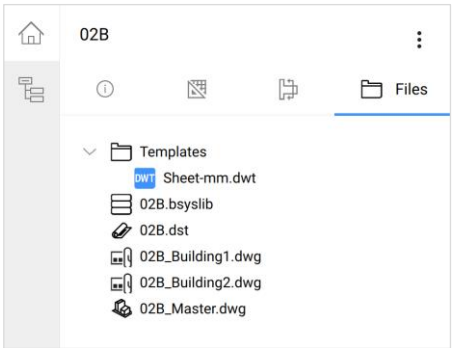
3. Now open the **BIM Project Browser** panel.

4. Again you will find a blue button, saying **Create Project**.

5. Click it to transform the folder where your current drawing is saved into a BIM Project folder.

6. You'll get a similar panel as before, but if you navigate to the **Files** tab in the BIM Project Browser panel, this time you will find that all files have been listed here and that the Xrefs are automatically detected as being Xrefs, and the





current drawing is marked as **Master** model. The creation of the BIM Project succeeded!

NOTE: It is best to start the entire **Create Project** process from the actual master drawing, like we did here. That is: start the process always from the model that contains the Xrefs instead of starting from within an Xref.

If you start within an Xref all files (including .dwg's) will be listed in the BIM Project as well, but only in the current .dwg will you be able to see the BIM Project, as the current .dwg drawing will be the only one actually connected to the .bsyslib database. As such, only the .dwg that was active when you clicked the **Create Project** button will show you the BIM Project data in the panel. When opening the other drawings in the list (this time indicated with a blue .dwg icon) you will see the interface change to show you the **Add to project** button, that allows you to also connect this drawing to the BIM Project's database.

NOTE 2: When doing the **Create project** process in the advised way, you will get a yellow pop-up balloon telling you that the Xrefs have changed and need reloading. This is due to the fact that their databases where automatically changed to point towards the central .bsyslib database of the BIM Project.

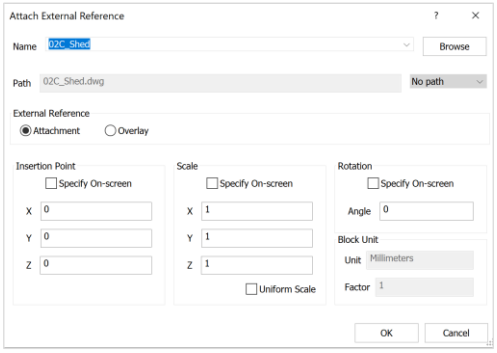
NOTE 3: If you would change the names of the files on your computer, after creating the Xref links and the BIM Project, it is necessary to update the **Saved paths** in the **Attachment** panel. Afterwards, it can also be beneficial to run the **Refresh** option in the **BIM Project Browser** menu to make sure all names are refreshed there correctly as well.

C. Add files to your BIM project

In this section we will add a drawing to our BIM Project from the previous section.

a. Add a drawing to an existing BIM project

1. First of all, while the drawing is not open yet make sure you save or move the drawing, that you want to add, **inside** the BIM Project folder you want to add it to. Here this means moving the **02C_Shed.dwg** inside the **02B** folder of the training files. This will make sure that this drawing is 'added' to BIM Project that is located in the folder.



NOTE: The process of moving the drawing file inside the folder will not create Xref links, nor will it attach the database of the .dwg to the central database. These two steps are up next.

2. Next we will reference this file in our Master model, so **OPEN** the Master model **02B_Master.dwg** once more if it was not open anymore.

3. Go to the **Attachments** panel and use the **XATTACH** button to reference your file **02C_Shed.dwg** from the **02B** folder in the training folder.

4. You will get the pop-up as seen in the images.

5. Choose **No path** and leave all checkmarks unchecked to insert the model at location 0,0,0 with scale 1 and 0 degrees rotation.

6. Click **OK** to accept.

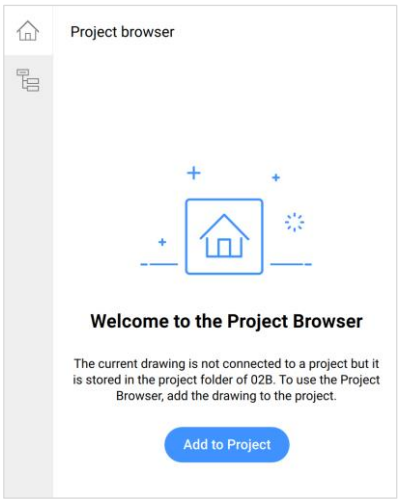
7. The model is now added as Xref to our Master model dwg, but the drawing's database is not yet added to the central .bsyslib database.

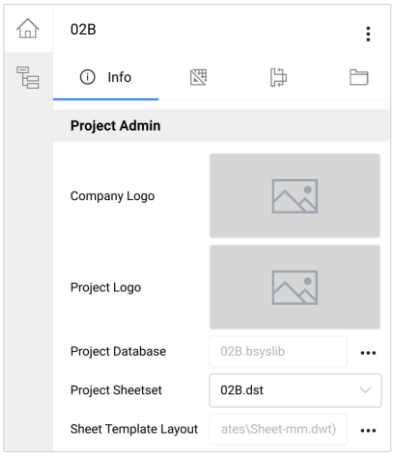
8. To do this, open **OPEN** the Xref model **02C_Shed.dwg**.

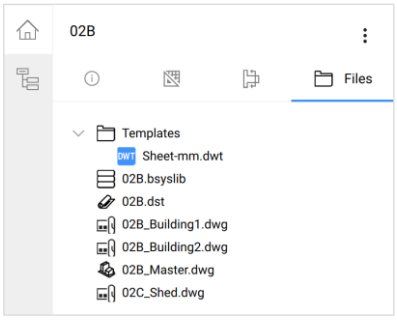
   NOTE: You can also do this by double-clicking the file name in the **Files** tab of the BIM Project Browser after a **Refresh** of the panel.

9. You should now see the panel change once again to the message as shown in the image to the right. Click the **Add to Project** button to add this drawing's database to the central .bsyslib database.

10. The drawing is now completely added to the BIM Project folder from before and you should now always see the same info and header (**02B**) in the BIM Project Browser panel, independent of which of the .dwg's in the folder is opened in BricsCAD.







In the next chapters, we will always start with ready-made BIM projects that contain the needed model files to start the exercises. Note that some of these files won't have any geometry or only a limited amount of geometry, so you can really learn to create BIM models from scratch. The making of BIM models can be done in several ways. The main thought to take away from the next chapters is that no matter how you obtained the geometry in your .dwg drawings, you can use it as starting point to add intelligence and data, and take your BIM project and models further. Some possible ways to create geometry are:

1. (Chapter 03) Starting from an existing 2D layout, either by extruding objects upwards or by using Quickdraw.

2. (Chapter 04) Importing 3D geometry from another program and/or file format such as .dwg, .3dm, .stp, .rvt, .ifc, .skp.

3. (Chapter 05) Starting from a 3D mass model and either 'sculpting' your way to a more detailed model (direct modeling) or using the automated tools in BricsCAD BIM (BIMQuickBuilding).

4. Other methods, which are not explained in the basic training manual:

    - (Advanced BricsCAD BIM training) Using the BricsCAD BIM structural toolset to make the preliminary design of profile-based structural models.

    - (Advanced BricsCAD BIM training) Turning a point cloud model into a BIM model, a.k.a. Scan-To-BIM, by tracing over the point cloud with BricsCAD BIM's advanced point cloud toolset, including a lot of semi-automated workflows, and adjusting the model with BricsCAD's direct modeling tools.

    - (BricsCAD Civil training) Making site models for your BIM project.

    - (BricsCAD Help Center) Using the RhinoInside plugin in BricsCAD BIM to be able to run Grasshopper scripts directly inside BricsCAD BIM. These scripts can then create (some parts of) the building geometry for you.

    - (BricsCAD Application Store) Using other plugins that help you to create the BIM model you need.

03. Model from 2D to 3D

In this chapter, we'll create a building starting from a simple 2D layout, on one hand using Quickdraw and on the other hand using more standard tools like Extrude.

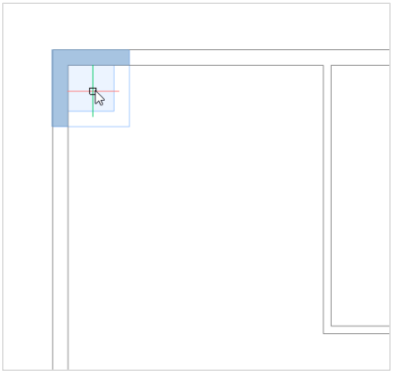
A. Quickdraw

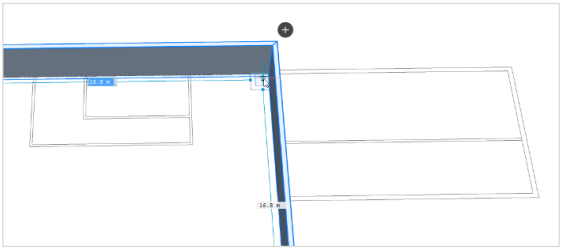
We will be using the tool **QUICKDRAW** to trace over an existing simple 2D floor plan and create a 3D model from it.

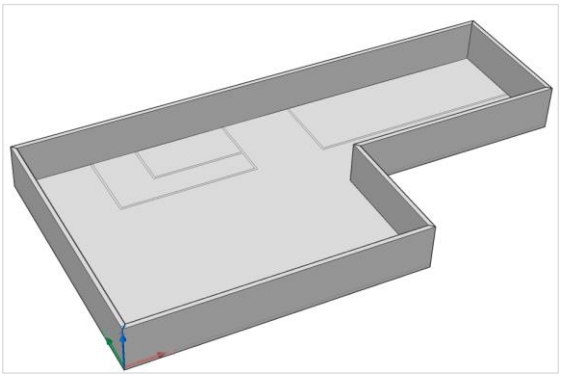
a. **Trace over an existing layout**

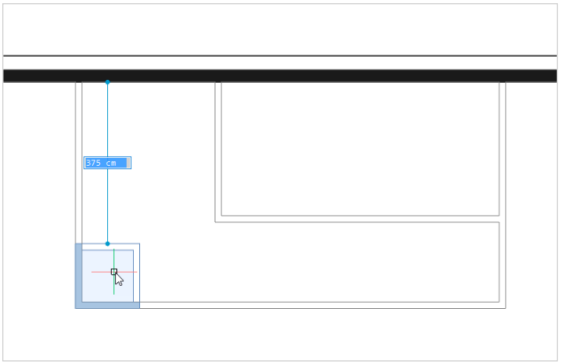
1. **OPEN** **03A.dwg**.
2. Let's start with the layout that is drawn along the current UCS and that has simple rectangular spaces.
3. In the **Home** tab of the Ribbon, click **QUICKDRAW** .
4. A special cursor appears, indicating the locations of the walls you will be creating.
5. Move the cursor close to one of the corners of the layout: you will see that it snaps to the lines. Position your cursor as shown in the image.
6. Left-click: you are now drawing the first room. Move your cursor to the opposite (bottom right-hand) corner of the layout and left-click again. If you now rotate the camera, you'll see that you created 4 walls and a slab.
7. We can expand this room into an L-shaped room by moving our cursor into the corner of the two walls highlighted in the image and left-clicking.

   NOTE: The walls you are snapping to are highlighted in blue.
8. By moving the cursor to the right, you will see that a part of the right-hand wall becomes red. This means that we will be removing this part of the wall so that the room can be expanded into an L-shaped room.
9. Again, snap to the (other) bottom right-hand corner and left-click. You should now have an L-shaped room.
10. We can use these steps to trace the interior walls as well. Note that the cursor becomes 'thinner' as it snaps to these lines.







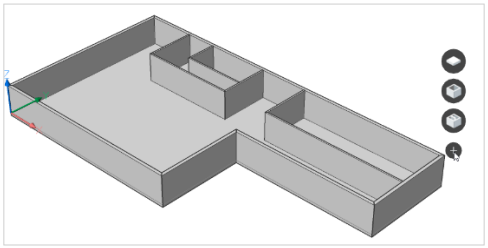


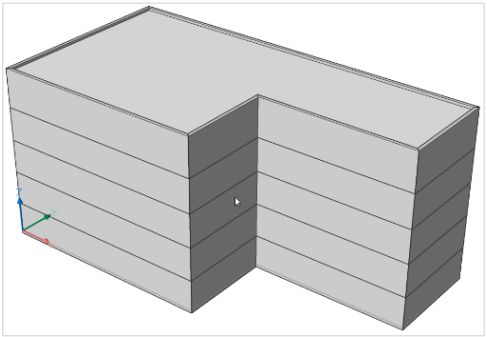
11. Continue using Quickdraw until all of the lines of this layout have been traced over, and you have every inner wall in place.

    NOTE: Quickdraw uses default values for slab thickness, room height etc. These default values can be found and changed in the settings dialog.

    NOTE 2: This Quickdraw tool can be used in combination with direct modeling tools. For the sake of simplicity this section and the previous section were split up but it is perfectly possible to use hybrid methods.

b. **Copy floors**





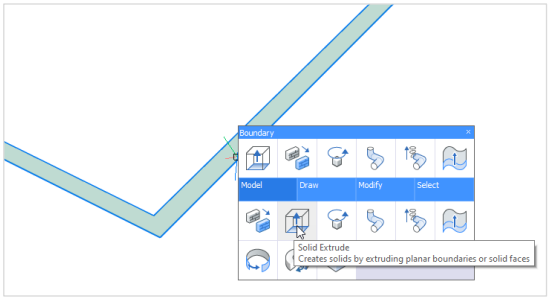
1. When Quickdraw is active, a little '**+**' icon is displayed next to the building. Clicking it gives you three options:
   - Copy an entire floor.
   - Copy only the outer walls of the floor.
   - Create a flat roof.
2. Click the copy entire floor button four times so you have a total of 5 floors.
3. Finally, click the create roof button to finish the building envelope.
4. **Esc** from the Quickdraw command.

NOTE: The Quickdraw command automatically gave all the elements the correct classification while creating the geometry. This means that after we used solely Quickdraw to transform a 2D plan into a 3D building, we do not need to classify the elements anymore. Although it is a good habit to regularly check, e.g. by using the **Structure** panel set on the bim configuration, if all the classifications are (still) correct. You can always verify that an element is now more than just a solid by hovering over the entity and seeing its BIM classification in the **Rollover Tip**, or by selecting the entity and seeing the extra BIM property sets in the **Properties** panel.

B. Direct modeling

The previous section consisted of a rectilinear layout, aligned with the current UCS. The second example is not so simple: the outer walls are not aligned to the current UCS, the inner walls are not perpendicular and there is a cylindrical wall. Since Quickdraw only works in the current UCS, it's not straightforward to use this tool for this particular situation, so we will use different direct modeling tools instead.

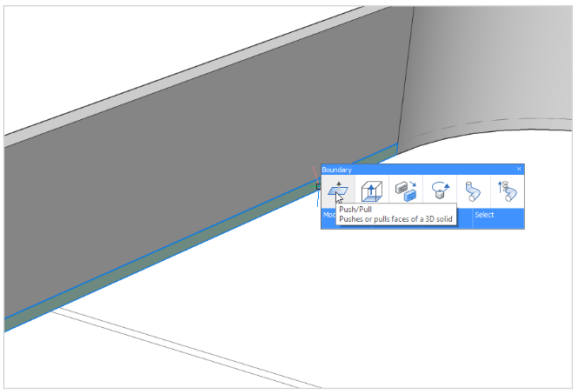
a. **Make the outer walls**

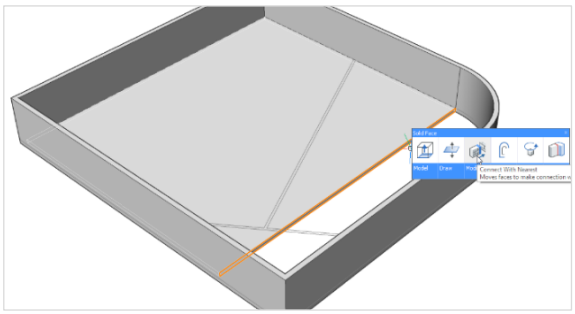


1. OPEN **03B.dwg**.
2. Make sure that SELECTIONMODES **Boundary Detection** is **enabled** and move your cursor inside the two lines of the outer walls. The boundary should be highlighted in green.
3. In the Quad under the **Model** tab, click DMEXTRUDE **(in SOlid MOde)**.

   NOTE: The tooltip in the Quad reads **Solid Extrude**.
4. Move your cursor upwards, enter a value of **3000** mm and press **Enter**.
5. Let's also DMPUSHPULL the bottom face of the walls down over a distance of **250** mm so we can easily create a floor slab later on.

b. **Make the slab**



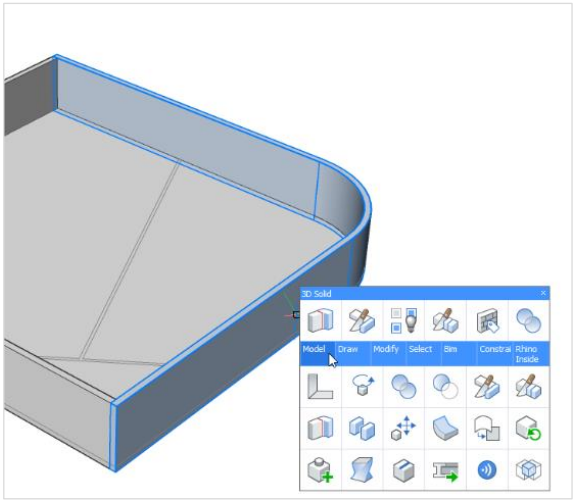


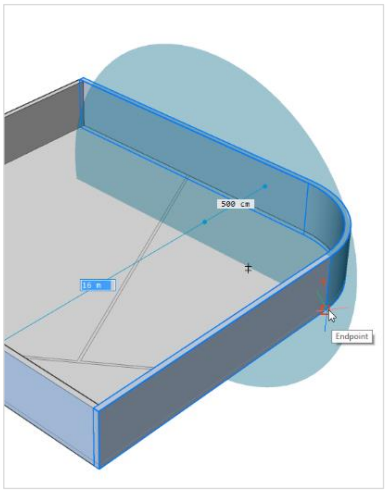
1. Now we can use the boundary between the lower edge of one of the walls and the layout lines to DMEXTRUDE **(in SOlid MOde)** a part of the floor slab.
2. After creating a part of the floor slab, use TCONNECT **(suboption: Connect to nearest)** on the face that doesn't connect to the walls yet, so the connection to the cylindric wall can be made properly.

   NOTE: After highlighting a solid face, you can find a button in the **Model** tab of the Quad to immediately start the correct sub-command. The tooltip on this icon reads **Connect With Nearest**.

   NOTE 2: If you want to use the command through the command line, you'll need to type in TCONNECT first. Then click only the face you want to connect to the nearest objects in the model space. After selecting the face, type **C** to choose the **Connect to nearest** suboption.

c. **Split the walls**





1. Currently the outer walls are all constructed as 1 solid. Use **BIMSPLIT** on this solid to split it up into separate pieces.

   NOTE: This is easiest when **SELECTIONMODES Boundary Detection** and **SELECTIONMODES 3D Solid Faces Detection** are turned **off**.

   NOTE 2: It is a BIM best practice to construct every wall (or other entity in your BIM model) separately. This is so that every entity can have their own BIM data, such as classification, number, composition, fire rating, etc. Let this also be the reason why we make the walls and the slabs separate solids: so they can be labelled individually.

2. After Bimsplit, the walls were split into three parts, instead of five, as the cylindrical wall was not split.

3. We can still adjust manually, so that the cylindrical wall is also broken into different pieces. To do this, highlight the solid of the cylindrical wall and in the Quad under **Model** tab, click **SLICE (suboption: Multislice)**.

   NOTE: Be careful, this icon look very similar to **SLICE (suboption: Object)** icon, which is different in use and not recommended here.

   NOTE 2: The tooltip in the Quad, to immediately launch the correct suboption, reads **Multislice**.

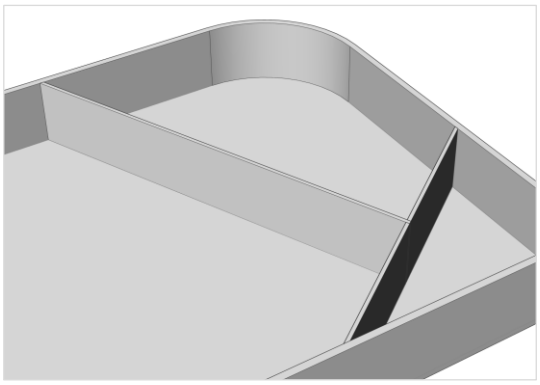
4. Multislice asks for a **slicing plane**: choose the face of the wall perpendicular to this part of the wall. A blue slicing plane should appear that indicated where you will slice the selected object.

5. Snap to the point where the straight wall and the curved wall come together, and left-click. Hit **Enter** to exit Multislice.

6. Do the same in the perpendicular direction for the other segment of the wall.

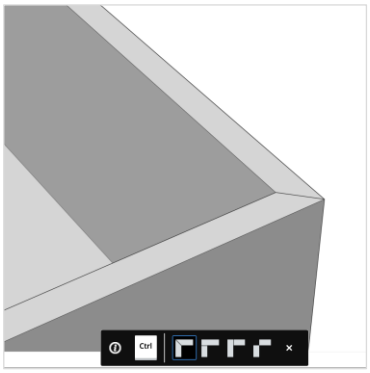
7. In total we should now have 5 walls: four straight walls and one cylindrical.

d. **Make the inner walls**



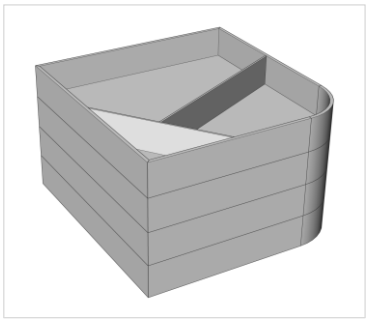
1. Make sure SELECTIONMODES **Boundary Detection** is enabled and move your cursor inside the two lines of the interior walls. The boundary should be highlighted in green.
2. In the Quad under **Model** tab, click DMEXTRUDE **(in SOlid MOde)** .
3. Move your cursor upward, enter a value of **3000** mm and press **Enter**.
4. Now use BIMSPLIT on these interior walls to split them into separate solids.

e. **(Optional) Change wall connections**



1. With LCONNECT you can change the L-shaped wall-wall connections two by two into miter-connections or (the opposite) butted-connections.
2. You can also choose to work with a combination of the SLICE command and the UNION, SUBTRACT and INTERSECT toolset.

f. **Copy floors upwards**

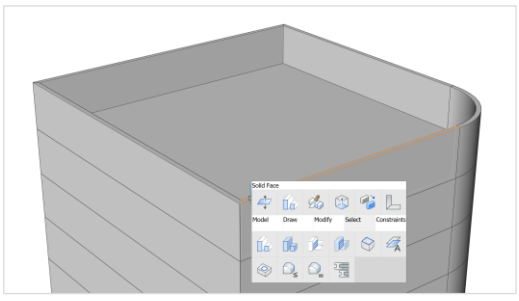


1. Copy this floor upwards using the COPY or MANIPULATE command.

   NOTE: During the **Copy** command you could try the **Array** sub-option to easily make multiple copies, equally distanced from each other, in one direction.

   NOTE 2: During the **Manipulate** command you could try the **Repeat** sub-option to easily repeat the movement multiple times, each time making a copy of the geometry.

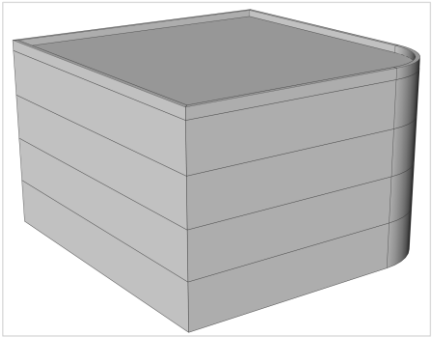
g. **Make the roof and roof edges**



1. Make another copy, this time leaving out the inner walls.
2. Highlight one of the top faces of the outer walls of the copy and in the **Select** tab of the Quad choose the SELECTALIGNEDFACES command.

3. All top faces should now be highlighted.

4. Use **DMPUSHPULL** to make the walls lower by **2500** mm.

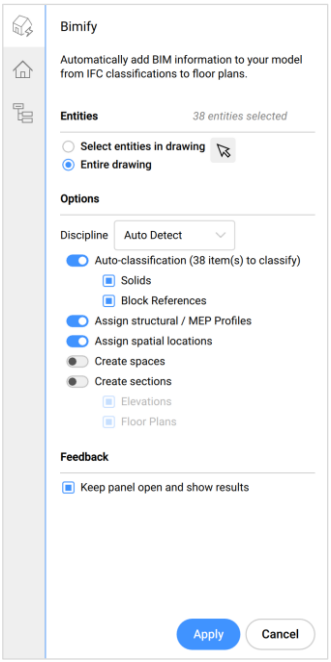


h. **Classify the elements**

1. Use **BIMIFY** to classify the entire drawing in an automatic way.

2. You can turn **off** the **Create spaces** and **Create sections** options for now.

3. Check if the result is as desired, with help of the **Structure** panel, and use **BIMCLASSIFY** to classify entities to another classification if needed.



04. Import models

The following chapter will give a few examples of how to import geometry and how it can be used to start or enrich your BIM model. Besides the formats mentioned here, BricsCAD BIM is also able to import .dxf, .wmf, .emf, .wmz, .emz, .dae, .dgn, .skp, .ifczip and .rfa files. For more information, please visit the Bricsys Help Center. With a license for Communicator for BricsCAD, you can import even more file formats. For more information on Communicator for BricsCAD, please visit the Bricsys website on www.bricsys.com.

A. Dwg

BricsCAD BIM natively works with .dwg as its file format. This means you can also start a BIM model by 'importing' a 3D .dwg file. Dwg is an open file format so the source application does not matter to BricsCAD and the model gets treated as if it was a native BricsCAD file.

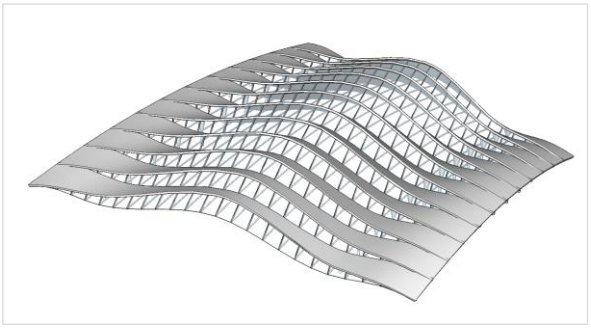
What other applications won't have, and what is unique to BricsCAD BIM, is the BIM data that can be added to the 3D geometry. To help with adding the data, the tool **Bimify** gives you a headstart when classifying geometry. As such, it can convert a 'stupid' 3D model into a basic BIM model swiftly.

NOTE: In the section **Classification** of the **Add BIM data** module we will do just this: open an existing .dwg file and add BIM data to it. Therefore we won't cover the topic of 'importing' .dwg files any further here.

B. 3dm

A .3dm file is a Rhino 3D file. This file type is used a lot for 3D models without BIM data. In this part, we will import such .3dm file and add BIM data to it in BricsCAD BIM.

a. **Import a .3dm file**



1. Make a new file with **BIM-mm.dwt** as template.
2. Save it as **04B_Canopy.dwg** in the training folder **04B** in the folder **04. Importing Models** by using **SAVEAS**.
3. Click the Bricsys button next to the **Home** tab on the **Ribbon** and click **Import**, or type in the **IMPORT** command.
4. Select **04B_Canopy.3dm** and click **Open**.

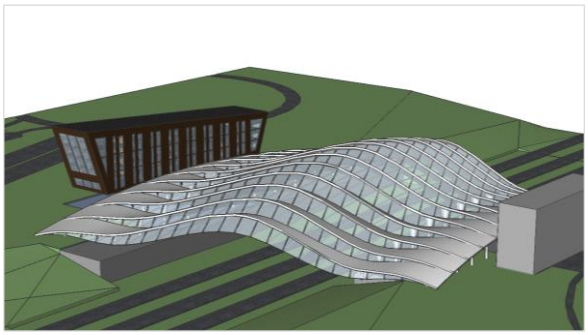
   NOTE: In the drop-down menu **Files of Type**, underneath the **File Name** field, make sure **Rhino file (*.3dm)** or **All files (*.*)** is selected. Otherwise you won't be able to see or select the correct file.
5. After a short period, the model is imported in the new drawing.

NOTE: The model does not contain any BIM data so far, as the .3dm file's source application, Rhino 3D, is not a BIM software.

b. **Add BIM data**

1. You can now use **BIMCLASSIFY** to classify the solids as you see fit.
2. **QSAVE** the file.

c. **Attach file to overall model**



1. **OPEN** the overall model **04B_Overall.dwg**.
2. Go to the **Attachments** panel and click on the **XATTACH** icon.
3. Navigate to the training folder **04B** in the folder **04. Importing Models**.
4. Choose the file **04B_Canopy.dwg** to attach it to the overall model.

   NOTE: From now on you can add the drawing to the BIM Project database as well.

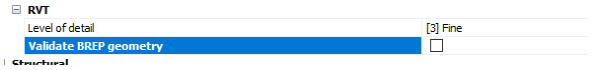
   NOTE 2: We will work further on a similar project in the first section of the next module.

C. Rvt

An .rvt file is an Autodesk Revit model file. This file type is version-dependent, i.e. created in Revit 2020, and doesn't state so unless you open them in Revit. BricsCAD V22 supports only Revit files created from 2015 – 2021, and therefore will not import models from Revit 2022. Some BIM data is lost during this import process, but **most** 3D geometry, BIM classification, materials and compositions, etc. are retained. In this part, we will import such file, modify some geometries and add BIM data to it in BricsCAD BIM. Sheets and annotation elements are not carried forward, but you may find some in the Structure panel.

a. **Import an .rvt file**

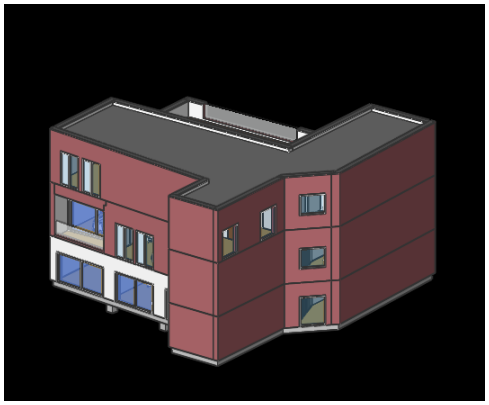
1. Make a new file with **BIM-mm.dwt** as template.
2. Save it as **04C.dwg** in the training folder **04. Importing Models** by using **SAVEAS**.



3. Before importing, go to **SETTINGS**, and scroll down and go to the section **BIM > Import and Export > RVT**. Here you can find some settings on import of RVT files. Disable **Validate BREP**

Geometry for this exercise.

NOTE: As importing RVT files is still Work In Progress, disabling validating BREP geometry helps to accurately bring in as much geometries as possible. However, disabling validation should be done at the user's risk, so do warn the user beforehand.



4. Close the **Settings** dialog.

5. Click the Bricsys button next to the **Home** tab on the **Ribbon** and click **Import**, or type in the IMPORT command.

6. Select **04C.rvt** and click **Open**.

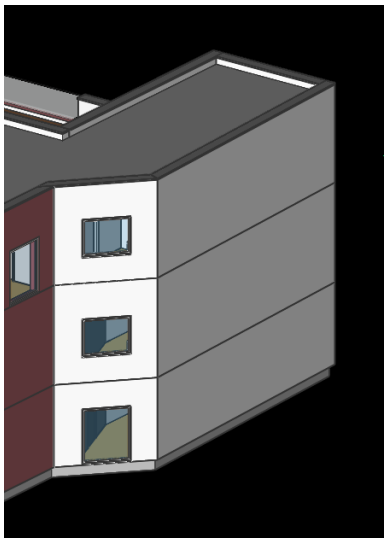
7. Choose the sub-option **All** when prompted which elements should be imported.

   NOTE: Unless you are certain where your desired elements are located in the specific views or levels or worksets etc., always choose **All** to ensure you have all the geometries brought into BricsCAD.

8. After a short period, the model is imported in the new drawing.

   NOTE: Not all metadata or parameters can be brought over from Revit, i.e. Revit Phases etc. **Compositions** and **Materials** are brought over and can be used like a native BricsCAD BIM composition.

b. **Modify geometry and add BIM data**



1. All the necessary BIM data expected in a BricsCAD BIM model should already be present.

2. Navigate to your **Structure** panel and your entities should be sorted based on your BIM classification.

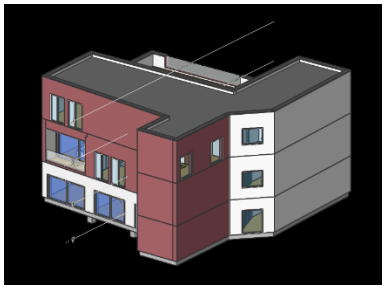
3. Under entities, you can select **RVT_2D_VIEWS**. These are Revit views and have been converted to BricsCAD BIM entities. You can adjust or **delete** them.

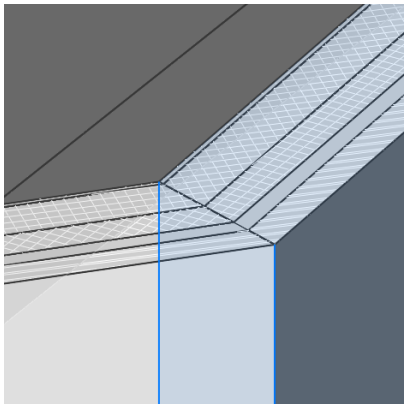
4. Wall junctions or joint connections are not brought in from Revit. It's as though they are unjoined. Choose LCONNECT to miter-join the walls.

5. Click CLASSIFY to automatically generate spaces and sections.

6. Double-click 03_Roof section to activate the section and see how the plies meet in the external walls.

7. **QSAVE** the file.





D. Ifc

An .ifc file is an Industry Foundation Classes file. This file type is used a lot as exchange format for BIM models and their BIM data. In this part, we will import such .ifc file and check its BIM data.

a. Import an .ifc file

1. Open a new drawing in the **BIM-mm** template.

2. Save it as **04D.dwg** in the training folder **04D** in **04. Importing Models** by using **SAVEAS**.

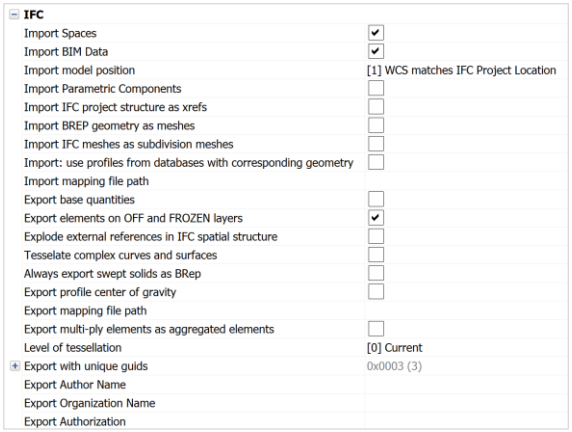
3. Under **SETTINGS**, scroll down and go to the section **BIM > Import and Export > IFC**. Here you can find some settings on import and export of IFC files.

4. Make sure the default settings are applied, as shown in the image. Non-default settings will be highlighted in blue.

5. Close the **Settings** dialog.

6. Click the Bricsys button next to the **Home** tab on the **Ribbon** and click **Import**, or type in the **IMPORT** command.

7. Select **04D_Arch.ifc** and click **Open**.



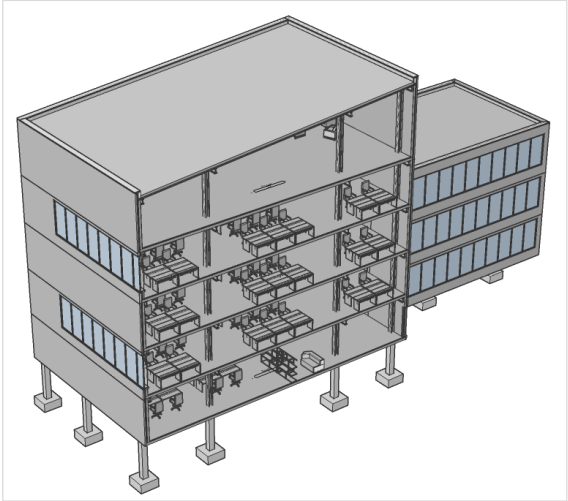
NOTE: In the drop-down menu **Files of Type**, underneath the **File Name** field, make sure **IFC file (*.ifc;*.ifczip)** or **All files (*.*)** is selected. Otherwise you won't be able to see or select the correct file.

8. A building should be imported. Navigate through the model using the **Structure** panel, the **Spatial locations** manager and the **Compositions** panel, and check if everything is in order.

9. Now, **IMPORT** the other IFC file: **04D_Str.ifc**.

10. A steel structure should be imported. In this case, the steel structure is located on a different spatial location: **Steel structure** as opposed to **Main Building**.

    NOTE: Notice that the entities are imported as native elements, such as solids and block refs. This means that we can edit these imported entities as if they were created in BricsCAD, both in terms of their geometry as in terms of their assigned BIM data!



In this section we only explained the importing of .ifc files. In the **BIM Advanced** training we will cover exporting to .ifc, as well as other ways to collaborate on BIM projects.

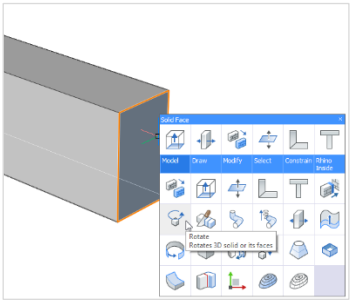
05. Model with masses

The following chapter will give examples of how to turn simple massing/volume studies into actual building geometry. You will learn some basic modeling tools along the way.

A. Direct modeling

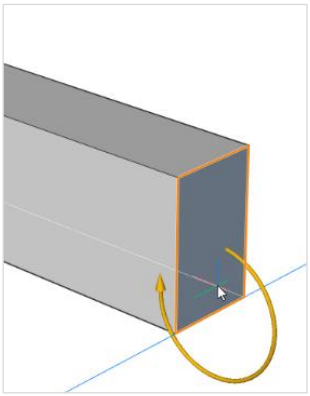
With direct modeling in BricsCAD we mean using all the basic tools – e.g. box, sphere, pushpull, extrude, slice, mirror– to make and adjust 3D entities until they reach the desired shape. All these tools work by changing the geometry freely and manually, not dictated by any predefined rules, almost like you would sketch on paper.

a. Manipulate the basic shape

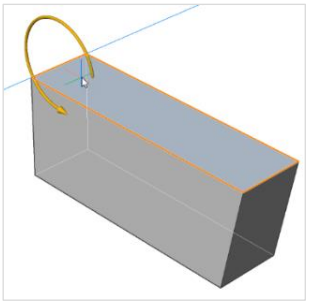


1. **OPEN** the model **05A_Overall.dwg**.
2. Hover your cursor over the building that looks like a box and in the Quad under **Modify**, click **OPEN** on the **External Reference** (Xref).
3. Alternatively, open the **Attachments** panel, right-click **05A_East.dwg** and click **Open**.

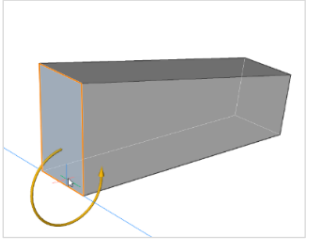
   NOTE: If the **Attachments** panel is not showing in your panel stack, right-click any empty space of the **Ribbon** and under **Panels**, enable **Attachments**.



4. Now you should be able to see the box in a separate drawing. We want to rotate some faces of the box to create a more interesting shape. To do this, make sure that **SELECTIONMODES** **Face Detection** is **enabled**.
5. Hover over the end face of the box so that it is highlighted in orange, and in the Quad under the **Model** tab click **DMROTATE**.



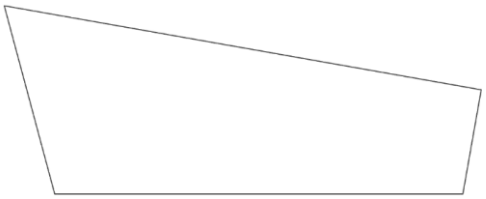
6. A yellow widget appears that indicates the rotation direction and axis. Move your cursor close to the **bottom** edge of the face, until the widget 'rotates' around that edge.
7. Move your cursor to the right so that the face rotates '**outwards**',
8. Type in **10** degrees and hit **Enter**.



9. Do the same for the top face: rotate it **10** degrees **downwards** around its **left** edge (see image).

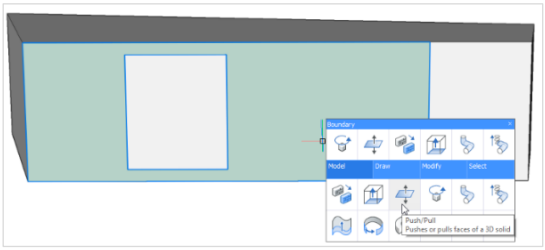
10. Do the same for the opposite end face of the box: rotate it **15** degrees **outwards** around its **bottom** edge (see image).

11. In the end, you should end up with a shape similar to the one shown in the final image (side view).



b. **Use DmPushPull**

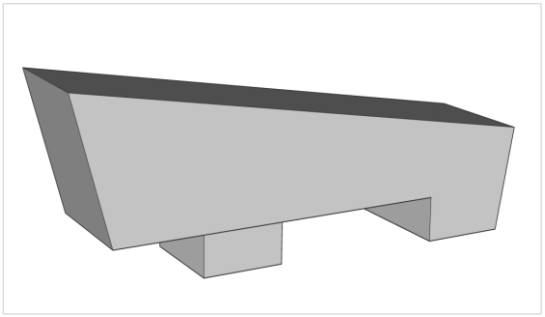
We want to use some push/pull to create a more interesting shape. We want the shape to be similar to the one of the example building (see **05_Overall.dwg**).



1. Rotate the camera so you can see the bottom side of the solid. We will be using the existing rectangles as a basis for what to push/pull.

2. Make sure SELECTIONMODES **Boundary Detection** is enabled.

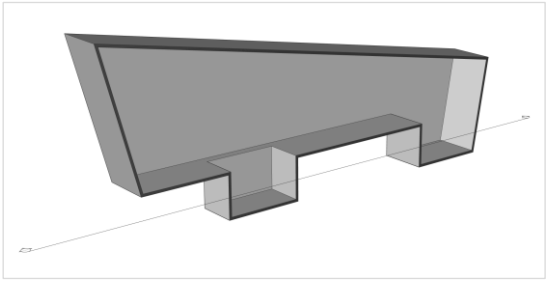
3. Move your cursor on the bottom face of the solid so that the boundary is highlighted as shown in the image on the right.



4. Once you have this boundary selected or highlighted, use DMPUSHPULL and push these faces inwards over a distance of **5500** mm. Thus, you should end up with something similar as shown in the final image.

c. **Use shell**

Currently, our building is still just a mass: if we section through our building, we see that it is not hollow so no spaces can be made inside.



1. In the **Home** tab of the Ribbon, click BIMSECTION. Hover the cursor over one of the side faces until it is highlighted in orange, and left-click. You should now be able to clip vertically through your model. Move the cursor inward so that you're clipping about halfway through the model, and left-click.

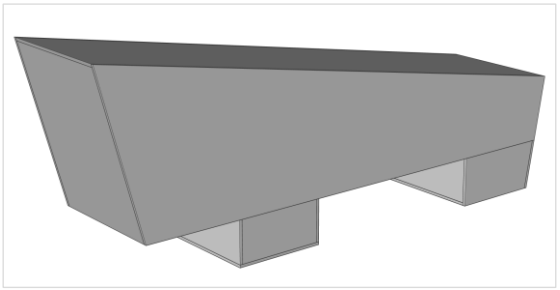
2. In the **Modeling** tab of the Ribbon, under **Solid Editing**, click SOLIDEDIT **(suboption sequence: Body > Shell)** .

3. Select the solid and press **Enter**.

4. When prompted the enter the shell offset distance, type in **300** mm and press **Enter**.

5. Hit **Enter twice** to exit the solid editing command.

d. Split the model



The solid is now hollow, but it still consists of 1 single object. As done in a previous lesson, we again want to split up the model so every object is a separate entity. Otherwise, you might run into problems when performing commands like Bimify or when assigning compositions.

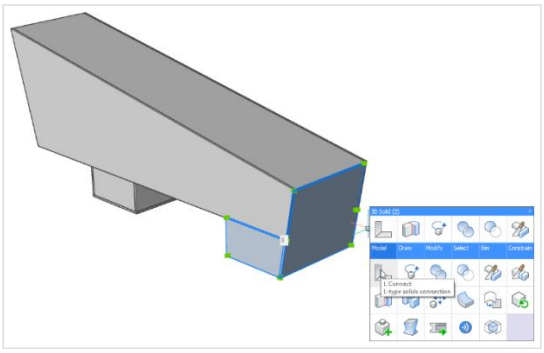
1. Remove the section plane if you haven't done so already.

2. Highlight the **solid** (not one of the faces), and in the Quad under **Model** click **BIMSPLIT**  . This will try to assume how to split the model into separate solids.

   NOTE: This command works best on relative simple geometry.

We now have 18 solids.

e. Clean up the outside of the splitted model

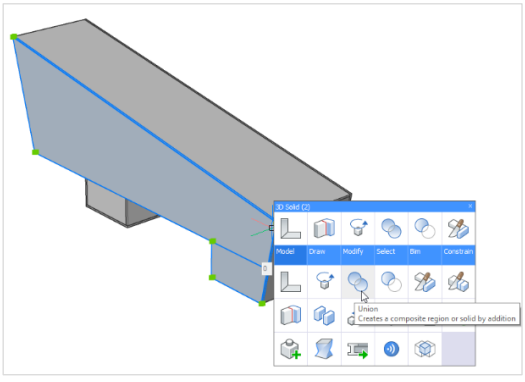


We need to clean up a bit after using **BIMSplit**, because it did not do exactly what we wanted. E.g. as we can see on the previous image, the large sidewall (on either side) was also split into two pieces.

1. Select the two walls, as indicated in the images to the right, and in the Quad under the **Model** tab click **LCONNECT**  . This allows you to change how the two walls are connected.

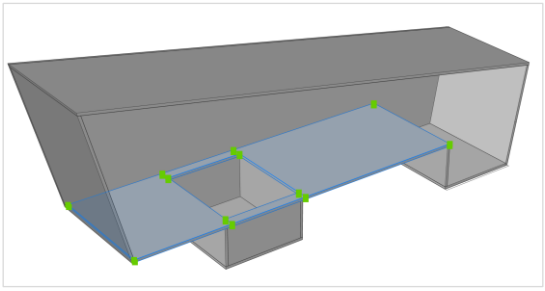
2. Hit **Ctrl** a few times to cycle through the different options. Finally, press **Enter** when encountering the solution as indicated on the image on the right.

3. Finally, start the **UNION**  tool and union the two coplanar walls together, as shown on the image.

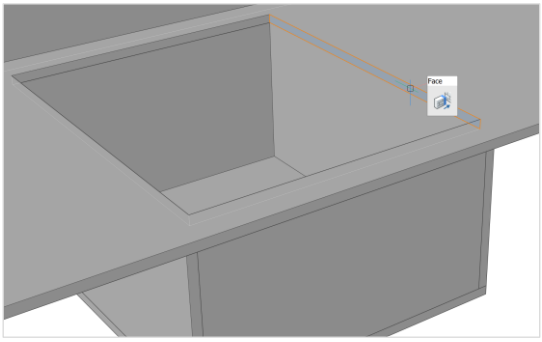


Repeat this process on the other side of the building.

f. **Clean up the inside of the splitted model**



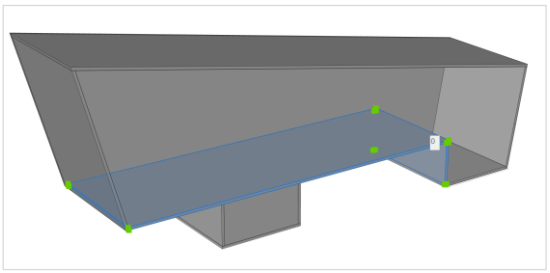
1. Highlight the side wall **solid** and in the Quad under **Select** tab, click HIDEOBJECTS.
2. Now that we can look inside, we see that the floor slab has a hole in it where the support structure is located, and the slab itself is split into 4 separate pieces.
3. In the **Modeling** tab of the Ribbon, under **Solid Editing**, click UNION and select the four parts of the floor slab.



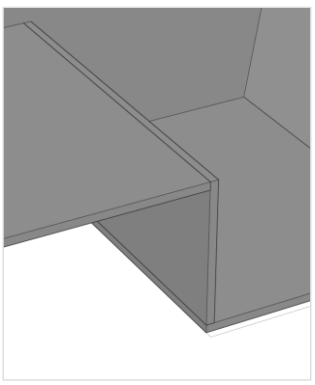
4. To remove the hole in the slab, highlight any of the inner faces of the hole (make sure SELECTIONMODES **Face Detection** is **enabled**), and in the Quad under **Model**, click TCONNECT **(suboption: Connect to nearest)**.

   NOTE: The tooltip on this icon reads **Connect With Nearest**.

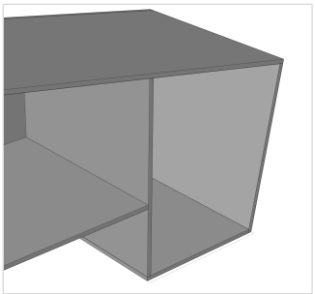
g. **Create interior walls and slabs**



1. Let's change the connection between the upper floor slab and the wall highlighted in the image.
2. Select both solids as in the image, and in the Quad under **Model** tab, click LCONNECT.
3. Hit the **Ctrl**-key a few times until the connection is shown as in the image, i.e. with the slab butted against the wall instead of resting on top of it. Press **Enter** to accept.



4. Highlight the top face of the wall, and in the Quad under **Model**, click TCONNECT **(suboption: Connect to nearest)**. This should connect this wall with the roof slab, so we now have two separate rooms inside our building.
5. We can create some more interior floor slabs. We can do this by simply copying the existing upper floor slab in the Z-direction, or we could use the BIMCopy tool.

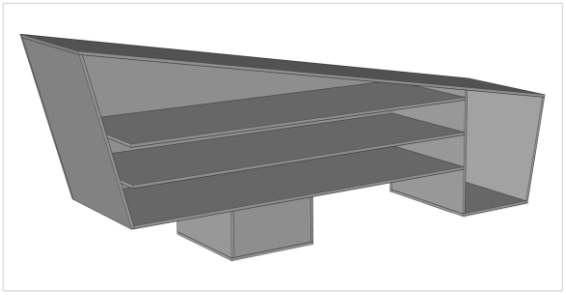


6. Highlight the top face of the upper floor slab and in the Quad under **Model** tab, click BIMCOPY.
7. Choose the **Repeat** sub-option of the command so you can make repeated copies.

8. Move the cursor upward, type in **4000** mm and hit **Enter**.

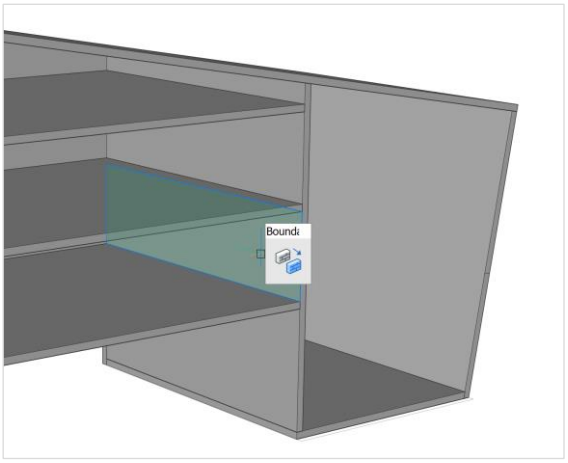
9. Move your cursor until there are in total 3 slabs above each other. Click on the Ruler to confirm the amount of copies you have and exit the command.

   NOTE: Make sure **not** to accidently snap to a wrong entity snap point, otherwise the copies will run till that snap point instead of what is seen in the preview. Clicking on top of the Ruler makes sure to ignore the snap points behind your cursor, so the ruler value is taken. Alternatively, you could disable **ESNAP** temporarily before clicking.



10. Notice that the two upper floor slabs are not connected to the slanted end wall. We can again use **TCONNECT** **(suboption: Connect to nearest)** on the end faces to solve this problem.

11. The BIMCopy tool can also be used on boundaries. Make sure **SELECTIONMODES** **Boundary Detection** is **enabled** and hover the cursor over the boundary highlighted in the image. This way you can easily **BIMCOPY** (parts of) walls and floor slabs around your model.



B. BIMQuickBuilding

Quickbuilding is a BricsCAD BIM specific tool especially designed to turn massing studies – either generated from space volumes (bottom-up) or building volumes (top-down) – into a low level of detail BIM model. This transformation from volume study into a BIM building happens in an semi-automatic way, so that you can iterate quickly between different volume variants. After the transformation you can find some statistics on the building to assess whether the desired areas and ratios are met.

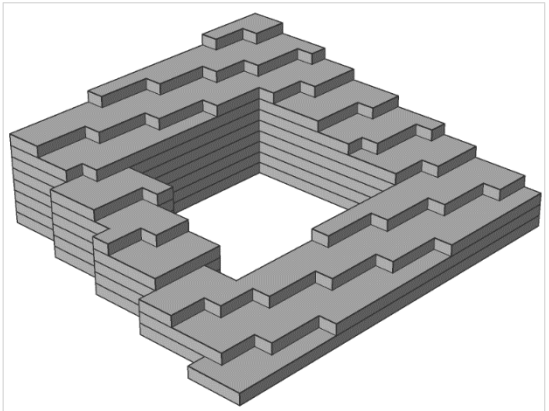
a. A stepped building

1. **OPEN** the model **05B_Overall.dwg**.

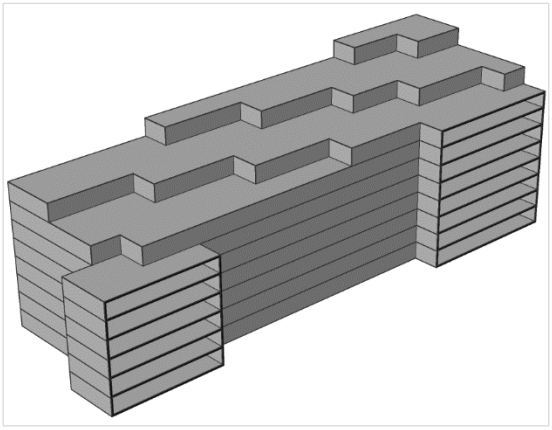
2. Hover your cursor over one of the stepped building and in the Quad under **Modify**, click **OPEN** on the **External Reference** (Xref).

3. Alternatively, open the **Attachments** panel, right-click **05B_Stepped.dwg** and click **Open**.

4. NOTE: If the **Attachments** panel is not showing in your panel stack, right-click any empty space of the **Ribbon** and under **Panels**, enable **Attachments**.



5. This geometry is still a single solid, representing the mass model of a building. We can turn this into an actual building using **BIMQuickBuilding**.



6. Highlight the solid and in the Quad under BIM, click **BIMQUICKBUILDING** .

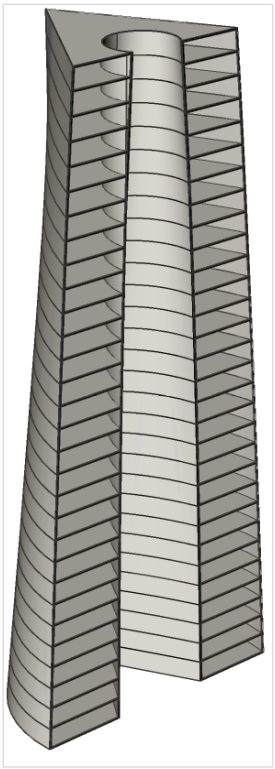
7. Enter a desired story height of **3000** mm and press **Enter**.

   NOTE: A new drawing is created in a temporary location – BimQuickBuilding did not alter your original mass model. To make sure you don't lose your work, **SAVEAS** this drawing to another location.

8. BimQuickBuilding has created **walls**, **slabs** and **roofs**, as well as spatial elements: **building**, **stories** and **spaces**.

b. **Lofted geometry**

BimQuickBuilding also works on more complex geometry, such as lofted or twisted objects. It generally takes a bit more time to generate the required geometry – the more complex the mass is, the more time BimQuickBuilding will take.



1. **OPEN** the model **05B_Overall.dwg** once again.

2. Hover your cursor over the lofted geometry and in the Quad under **Modify**, click **OPEN** on the **External Reference** (Xref).

3. Alternatively, open the **Attachments** panel, right-click **05B_Lofted.dwg** and click **Open**.

4. Highlight the solid and use BIMQuickBuilding on it.

5. Enter a story height of e.g. **4000** mm and press **Enter**. This might take a minute.

06. Components

This module covers most of the basic components that are part of a BricsCAD BIM model. It showcases how to insert them from the Library. More specific methods that can be used to create custom components will be covered in another training manual. You can freely choose to add other (extra) components to your model, just as you see fit for your design.

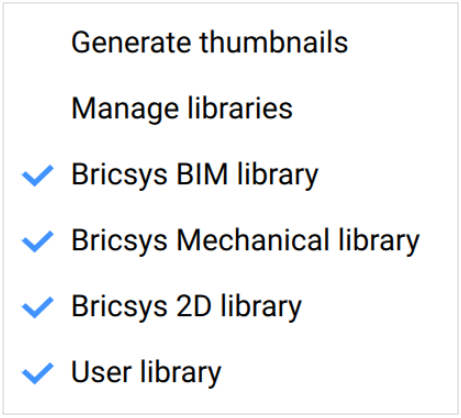
A. Windows

In this section you will explore the **Library** panel, insert a window from the **Library** and edit the window to fit your design.

a. **Explore the Library panel**

1. On the right-hand side of your screen, open the **Library** panel. It should contain several categories such as Windows and Doors with 3D components. If it does not, click the little menu icon in the top right corner and enable **Bricsys BIM Library**.

   NOTE: Aside from the BIM components also the so-called **Bricsys Mechanical Library** and **Bricsys 2D Library** are delivered with the product. These libraries contain respectively 3D components used in mechanical design, such as standard parts and sheet metal features, and 2D blocks used in various 2D drafting applications.



2. The Bricsys BIM Library, Mechanical Library, and 2D Library are saved under **C:\Program Files\Bricsys\BricsCAD V22 en_US\UserDataCache\Support\en_US** in the respective sub-folders **Bim > Components**, **DesignLibrary**, and **Blocks2D**.

   NOTE: Above path is specified for a Windows Operating System. For Mac, open the **Finder**, go to the **Go** tab and click on **Go to folder…** and type in **var/Bricsys/BricsCAD V22 en_US/UserDataCache/Support/en_US**.

3. When creating custom components these will be saved under **C:\ProgramData\Bricsys\ Components**, or whichever path or paths is/are specified in the **COMPONENTSPATH** variable. Whether or not these custom components get listed in the Library panel is determined by the **User Library** checkmark in the Library panel menu.

   NOTE: The **COMPONENTSPATH** variable can be accessed in the **Settings** dialog under the corresponding variable name or simply by clicking on the **Manage Libraries** option in the Library panel menu.

   NOTE 2: Above path is specified for a Windows Operating System. For Mac, open the **Finder**, go to

the **Go** tab and click on **Go to folder…** and type in **var/Bricsys/Components**.

4. Left-clicking a category will open it.

5. Left-clicking a component will allow you to insert that component.

   NOTE: When inserting a component the command **BMINSERT** is launched with the correct file path already selected. If you want to insert a component that is not in your Library however, you can manually call the BMInsert command or click its icon in the ribbon or in the No Selection Quad. Then navigate your way to the components's file path and click **Open**.

b. **Insert window from Library**

1. **OPEN** the model **06.dwg**.

2. Make sure the Dynamic UCS (**DUCS**) and Dynamic Input (**DYN**) are **enabled**. This can be toggled on in the **Status Bar**, at the bottom right of your screen.

3. In the **Library** panel, browse to the **Windows** category.

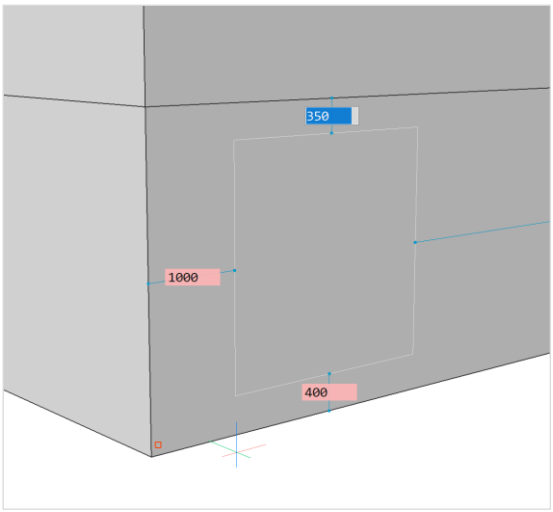
4. Left-click the **Window 1x1** component.

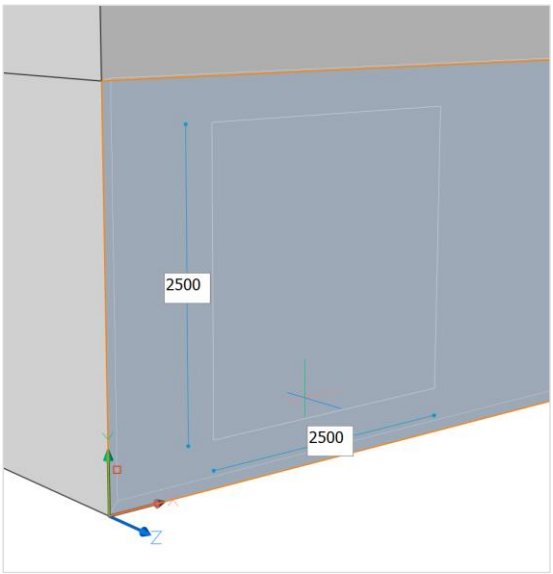
5. Automatically the properties panel is opened and the properties of the window are shown. Here you can change its geometric parameters such as Width, Height or GlazingDepth. Change the **Width** and **Height** both to **2500** mm.

6. Move your cursor over the back wall of the building. The outline of the window is displayed, and dynamic inputs are displayed indicating the distances to the edges of the wall.

7. Enter a value in the dynamic dimension field that is highlighted, and press **Tab** to jump to the next dimension. The one you entered is now locked and displayed in red. Using this technique you can accurately position the window in the wall.

8. While still placing the window, press **Ctrl** once. The dynamic input fields change from 'positioning' to 'dimensions': you can now edit the width and height of the window while placing it. Again you can press **Tab** to toggle between the dynamic input fields that now represent the width and height dimensions.





9. To go back to the 'positioning' dynamic input fields, press **Ctrl** again.

10. To finally place the window, press **Enter** or left-click.

    NOTE: If you highlight or select this window and in the Quad under **Model** tab click **BMINSERT**, you will be able to copy this exact window (including its new parameter values) over to other locations in your drawing.

c. **Editing an existing window**

1. Select the window that you just inserted.

2. Open the **Properties** panel.

3. Here you can find several properties of the window, such as for example **IFC Common** properties. Also the geometric **Parameters** that you saw before are visible here.

4. Change some of the parameter values and see what happens to the model.

Parameters	
W	250 cm
H	250 cm
Rebate	0 mm
PlacementDepth	90 mm
LiningThickness	60 mm
LiningDepth	60 mm
GlazingDepth	20 mm
GlazingOffset	20 mm

B. Doors

The same steps – as the steps for inserting a window from the library – apply for inserting other types of components as well. In this case we will insert a door from the library.

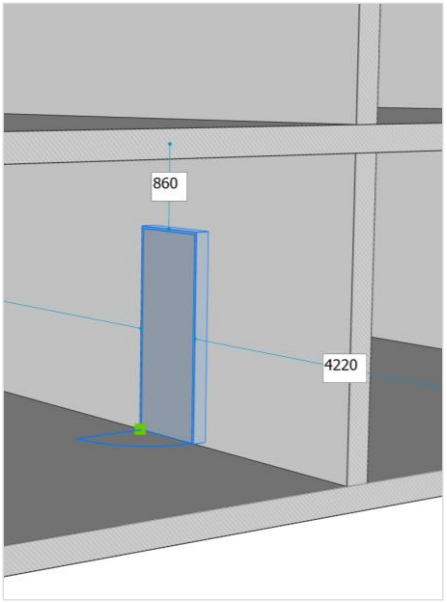
a. **Insert door from Library**

1. Continue in model **06.dwg**.

2. Activate the vertical section plane so you clip through the building.

3. Insert a door from the Library in one of the interior walls of the building, just like you inserted windows from the library before.

   NOTE: Pay attention that your **DUCS** is **on**, and that you don't snap to a snap point by either turning **off ESNAP** or typing in the **Dynamic Dimensions** around your door upon insertion, which will overrule any detected snap point location. If you type in the **Dynamic Dimensions**, remember that you can switch between the different ones by hitting **Tab**, and you can switch between **positioning dimensions** and **sizing dimensions** by



hitting **Ctrl**. Make sure for doors that the **bottom** positioning dimension is equal to **0** mm.

4. Note that the door displays a swing line. If you want the door to have a different orientation, highlight it and in the Quad under Model tab, click one of the **BIMFLIP** icons: for suboption **Left-right** click for suboption **In-out** click .

C. Curtain walls

The same steps – as the steps for inserting a window from the library – apply for inserting other types of components as well. In this case we will insert a simple curtain wall from the library.

a. **Insert curtain wall from Library**

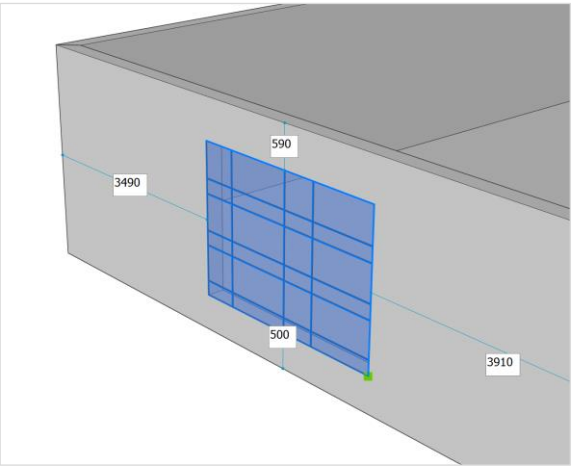
1. Continue in model **06.dwg**.

2. Insert the component **Window Curtain Wall 2x2** or **Window Curtain Wall 3x3** from the Window category of the Library in one of the outer walls of the building, just like you inserted regular windows from the library before.

   NOTE: This type of curtainwall has to be inserted in an entity that acts as a host entity, e.g. in a regular Wall.

3. You can customize the parameters in the **Properties** panel as you see fit to arrive at a satisfactory curtain wall pattern. Pay special attention to the fact that you can repeat the base pattern in the horizontal or vertical direction by increasing the value of the parameter **Horizontal_sets** or **Vertical_sets** respectively.

   NOTE: In the images to the right you can see a **Window Curtain Wall 2x2** with customized parameters.



Parameters	
Width_Left	1000 mm
Width_Right	500 mm
Height_Bottom	200 mm
Height_Top	500 mm
Horizontal_juncture	10 mm
Vertical_juncture	10 mm
Horizontal_sets	2
Vertical_sets	3

D. Stairs

The same steps – as the steps for inserting a window from the library – apply for inserting other types of components as well. In this case we will insert a simple staircase from the library.

a. **Insert stairs from Library**

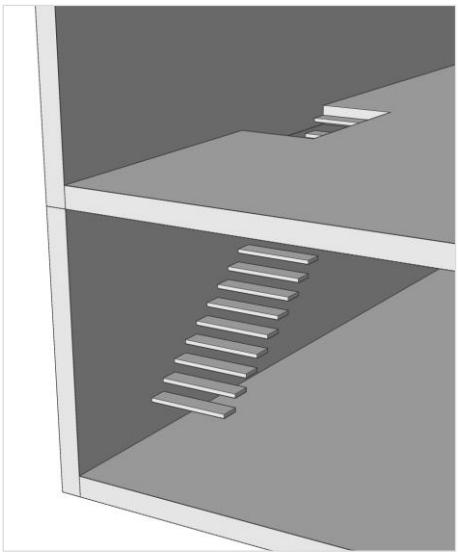
1. Continue in model **06.dwg**.

2. Insert the component **Stairs Staircase** from the Building category of the Library in one of the slabs of the building, just like you inserted components from the Library before.

   NOTE: Before accepting the insertion location of the component, you can still rotate the component by choosing the supoption **Rotate** and typing in the degrees for the rotation angle.

3. The stairs were inserted and a hole was created in the slab, based on the subtractor solid inside the stairs component, just like the hole in the wall was created when inserting a window.

4. When the stairs are selected, you can customize the parameters in the **Properties** panel as you see fit to arrive at a staircase with the needed height, width, void length, etc.



Parameters	
Width_Step	1000 mm
Thickness_Step	50 mm
Height_Staircase	300 cm
Length_Staircase	400 cm
Length_Void	200 cm

E. Furniture – From library

Do the same as for inserting a window, door, wurtain wall or staircase from the Library, but this time navigate to the **Furnishing Elements category** and choose the furniture you'd like to add.

F. Custom components

If you want to alter a component beyond its geometric parameters (e.g. add extra geometry, change the materials…), remember that you can use the following steps on any type of component. More in-depth methods to alter or create custom components will be explained in another training manual.

a. **Customizing a library object**

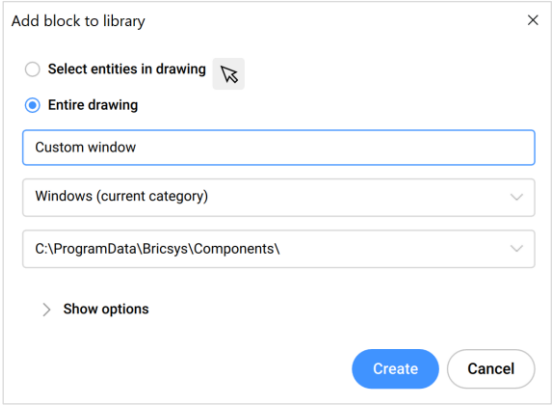
1. Insert the object you wish to alter in your drawing.

2. Hover your cursor over the component and in the Quad under **Model** tab click **BMOPENCOPY**  .

   NOTE: The tooltip in the Quad reads **Open a copy**.

3. Make the modifications you want.

4. Open the **Library** panel.



5. Browse to the category where you want to save this component. Click the **blue plus** icon at the bottom of this panel. A dialog box displays.

6. Tick the **Entire Drawing** option.

7. Enter a name in the **Name** field. The category and folder where it will be created should already be filled in correctly.

8. Click the **Create** button.

   NOTE: If the component is not displayed in the Library panel click the right-hand side menu button and select the **Generate thumbnail** option in the fly-out menu.

9. Now this component can be inserted from the Library just like any other component.

   NOTE: If you don't wish to save this object into the library, you can save the .dwg anywhere on your system and insert it using **BMINSERT**  to insert it from that file location.

07. Add BIM data (a.k.a. increase alphanumerical LOD)

This module explains the different methods to add more BIM data into your BIM model.

A. Structure panel

The Structure panel is a useful tool to quickly add data to specific (sub)sets of entities and/or to check if the data was applied correctly on all entities as desired. That is why in this section you will get to know the Structure panel more in-depth.

a. Default BIM Structure panel

1. OPEN **07_Arch.dwg**.
2. Open the **Structure** panel at the left-hand side.
3. The Structure panel is an interactive tree that displays all the entities in the current model.
4. The **tree structure** of the Structure panel represents the hierarchical set of rules in a graphical form. Each rule has a **filter** property, a **grouping** property, and a **sorting** property. Organizing the properties in the Structure panel enhances the performance of your project while querying the entities among others.
5. Make sure the default **bim** configuration file is active. Using the configurable structure tree on the Structure panel the BIM model can be organized in a way that you want to view the elements. Once you configured the tree, you can easily save this structured tree as a **.cst** file. By default, the .cst files are stored in the SUPPORTFOLDER.
6. If **bim** is not active, click the little hamburger menu at the top of the structure tree. Choose **bim** from the drop-down list.
7. You can now see how many solids and block references there are in the drawing, as none of the entities are yet classified.

   NOTE: As seen before, when you use smart modeling tools like Quickdraw, WindowCreate, BimStair, etc. to create your model, it will already automatically classify (parts of) your model into different BIM classifications and spatial locations. If this is the case, the default bim configuration will also show you these things.

b. **Customized Structure panel**

As mentioned before, the Structure panel is customizable. Let's take a look at how this can be accomplished.

1. Click **bim** at the top of the Structure panel. The **Configure Structure Tree** dialog appears.

2. First, let's make sure we create a new configuration file instead of editing the existing bim.cst. Click **File** at the top left, click **Save as** and create a new file, e.g. **custom.cst**.

3. For now we are only interested in the **Building Elements** rule, so we can collapse all other ones (i.e. Spatial Elements, Sections & Entities).

4. We can see that the **Building Elements** rule only displays entities that have a **BIM Building Element Type**.

5. Then, we see that these objects are grouped according to different rules: first they are grouped according to their **Diff type** (we can ignore this for now), then they are grouped by **BIM Building**, within each building they are grouped further by **BIM Story**, by **BIM Type**, and finally by **BIM Composition**.

6. Finally, the objects within each group are sorted (A to Z) by **BIM Name** and within the BIM Name (or when no BIM name is available) by entity **Name**.

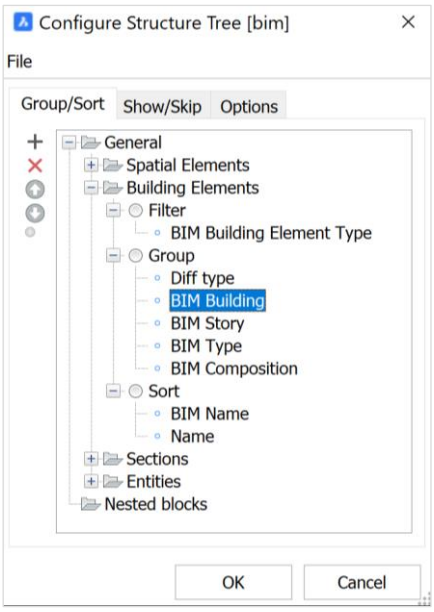
7. Let's say we are **not** interested to see elements in groups that represent their Building or Story information, so we can simply remove them from the grouping properties. Right-click **BIM Building** and **delete** the property. Do the same for **BIM Story**.

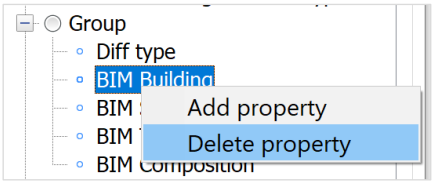
8. What if we want to group existing objects by a certain property? We can easily **add a rule** by clicking the **plus** icon. This opens up a new dialog where we can select a property.

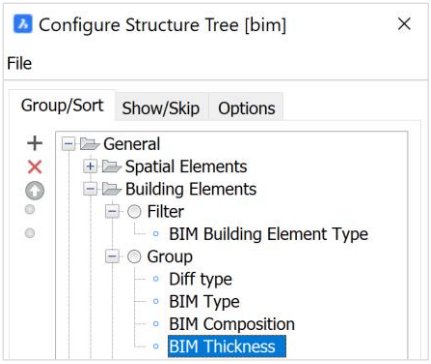
9. Scroll down this list and under **Extensions > Quantity**, select **Thickness**.

10. Finally, select the **Thickness** property in the list of **Grouping** properties, and move it down using the **down arrow** on the left-hand side of the dialog box. Move it so that it you have the same configuration as shown in the image on the right. Click **OK**.

11. Later, we will switch between the **custom.cst** and the **bim.cst** configuration according to our needs.







B. Classification

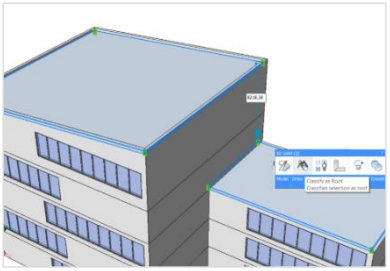
There are two main ways to classify geometry in BricsCAD BIM: our AI-driven tool **BIMIFY** and the manual approach of **BIMCLASSIFY**. In this section we wil use both methods inter-mixed.

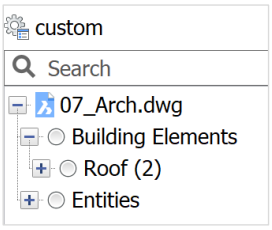
a. **Manual classification**

1. Continue in the file **07_Arch.dwg**.
2. Select the two top slabs and use **BIMCLASSIFY (suboption: _roof)** from the Quad. Now you have two **Roof** elements in your drawing.

   NOTE: The tooltip in the Quad reads **Classify as Roof**.

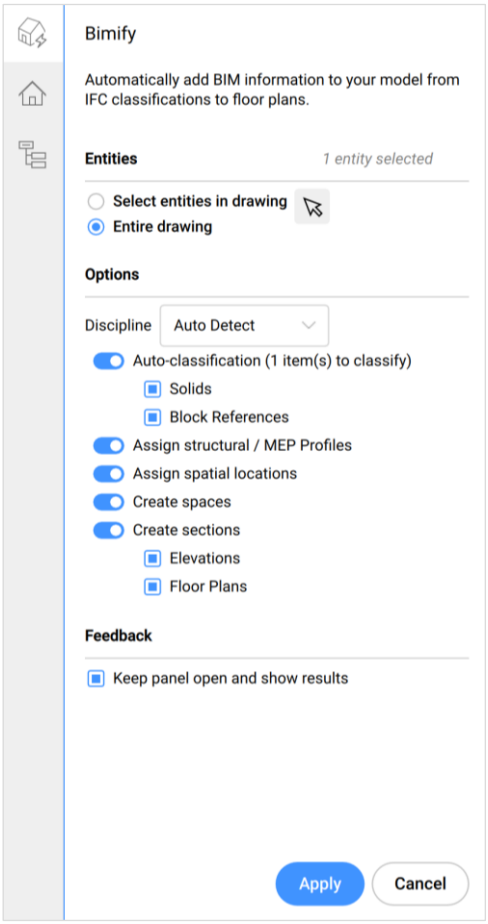
   NOTE 2: In the **custom.cst** Structure panel, the two entities have shifted to the category **Building Elements > Roof**.





b. **Bimify**

1. Continue in the file **07_Arch.dwg**.
2. Classifying elements can be done manually, or automatically using **BIMIFY**. If any solids remained unclassified, Bimify will take care of them. Bimify will also add elevations and floor sections.
3. Launch the **BIMIFY** command from the **Bim** tab in the no-selection Quad.
4. A temporary panel opens to give you the different options of the command. This panel is called the **Command Context** panel.
   - In this panel, you have the option to scan the entire drawing, or just scan the selected entities in the drawing. Choose the **Entire drawing** option.
   - Bimify can **Auto Detect** whether a model is an Architectural, Structural or MEP model. BricCAD uses this information during the autoclassification process. Define this information before you launch Bimify, to improve the accuracy of the automatic classification.



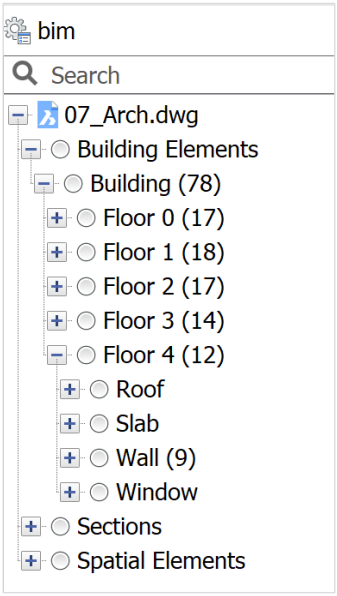
- The option **Auto-classification** enables us to classify 3D **Solids** and/or **Block References** automatically.

- Checking the **Assign structural / MEP Profiles** box allows us to automatically assign column, beam, member or flow segment profiles. If their profiles match a definition in the profile library, the profile name will be automatically added to the entity's properties as meta-data. If no matching profile definition is found, a new one is created in the library.

- **Assign spatial locations** will assign locations to objects, i.e. whether they are part of a certain building or floor.

- **Create spaces** will create new solid objects that are classified as spaces, based on the adjoining walls and slabs.

- **Create sections** allows to create automatic elevations and floor plan section planes in your BIM model.



5. Leave all options turned on and press the blue **Apply** button to apply them all.

6. **Close** the panel.

7. Expand **Building Elements** in the **bim.cst Structure** panel. All the 3D solids in the model are now divided over different floors and classified in different types of building elements.

8. Spaces, as well as elevations and floor sections, have also been added to the model.

C. Spatial locations

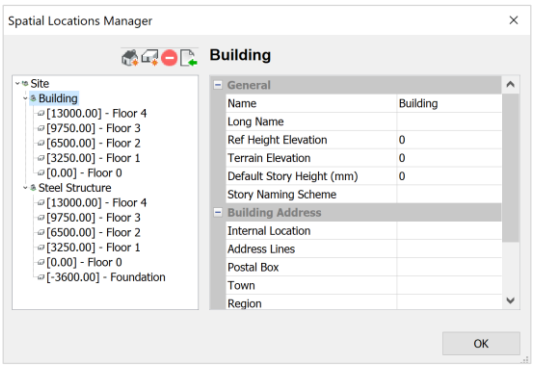
The spatial locations allow you to specify a building and its stories in a project. In BricsCAD, a BIM model file can contain one site and multiple buildings and a building can contain multiple stories. When the entities are classified as a building element in the project, these classified entities will have a Building and a Story property. Every building element in the BIM model resides on a particular story within a particular building.

a. **View and edit the spatial locations**

1. Select **BIMSPATIALLOACTIONS (sub-option Dialog)** in the **Bim** tab of the Quad.

2. A dialog should appear in which you see two buildings. Rename the **Building** building, which has 5 stories, to **Main Building**. You can do this by selecting the **Building** name under the **Site** and changing the value in the **Name** field.

3. After refreshing the Structure panel by switching between .cst configurations, you should see the rename take effect.



D. BIM Compositions & Physical Materials

To further add BIM data to your drawing, you can add **Compositions** to the entities of the model. They can consist out of multiple plies or out of a single ply. In BricsCAD BIM, predefined compositions of each building element type are stored in the central database of the program. They can then be copied from there to the project database.

a. **BIM Compositions and physical materials**

1. Open the **BIM Compositions** panel on the right-hand side of your screen. If the panel is not shown, right-click a blank menu area and select **BIM Compositions**.

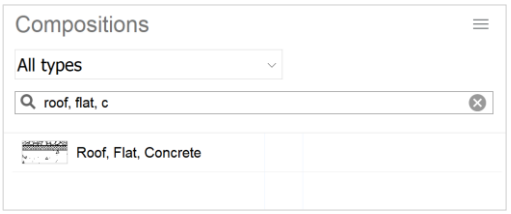
   NOTE: It should appear with an icon in the tool panels. If it appears as a standalone, drag it over tool panels and position cursor until the large rectangle turns blue and release.

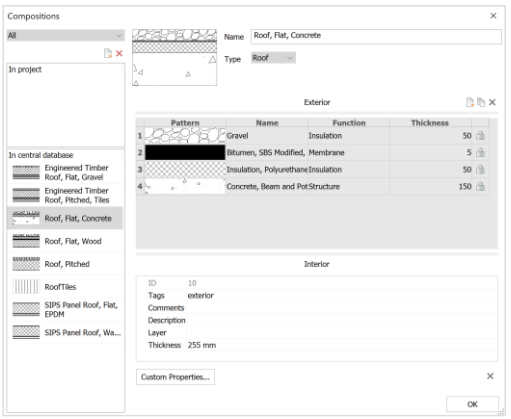
2. Use the search button to find **Roof, Flat, Concrete**.

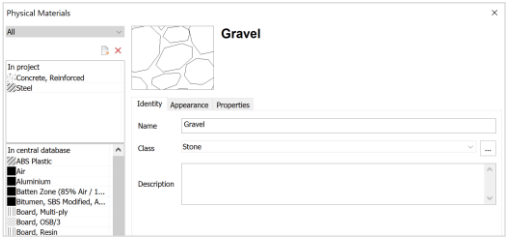
3. Double-click to open the **Compositions** dialog to edit the composition plies. Compositions plies are made out of a **Physical Material** with a **Pattern**, a **Name**, a **Function**, and a **Thickness** that you can toggle between being locked (closed lock) or being variable (open lock).

4. You can access the **Physical Material** of the ply by double-clicking its **Name** or **Pattern**. A new dialog will open, in which you can change the (ply) material's information.

   NOTE: **Physical Materials** are not the same as **Render Materials**. **Physical Materials** are used to define the plies of compositions and store physical and other abstract information inside of them. **Render Materials** on the other hand define the aesthetic representation that needs to be







given to a certain entity or to a certain **Physical Material**.

5. Press **OK** on all dialogs that are open to close them again.

6. Drag and drop this roof type onto the slanted roof.

7. You are prompted to select a reference face. The top face should be highlighted by default. If it is not, you can change it by clicking this icon: .

   NOTE: The selected face (reference face) will stay in the same position while the other face will shift if the object needs to get thicker or thinner.

8. In this case, you need the reference face to be the top face. If not, you should flip it and press **Enter**. The composition is now applied to the roof.

9. Make sure **RENDERCOMPOSITIONMATERIAL** is toggled **On**. This option allows to enable displaying render materials of compositions applied to objects in the model.

10. Create a **BIMSECTION** through the ribbon or by Quad selecting it in the **Model** tab.

11. Select the front face of the building to define the direction of the section.

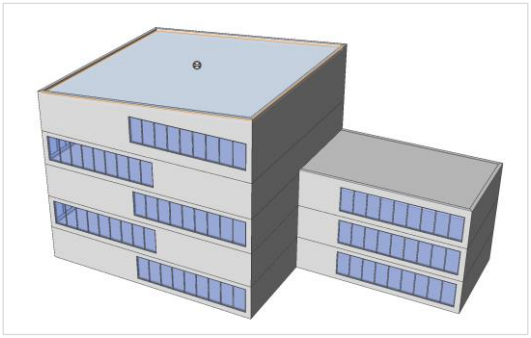
12. Type in **2000** mm to define the location distance of the section as opposed to the selected face.

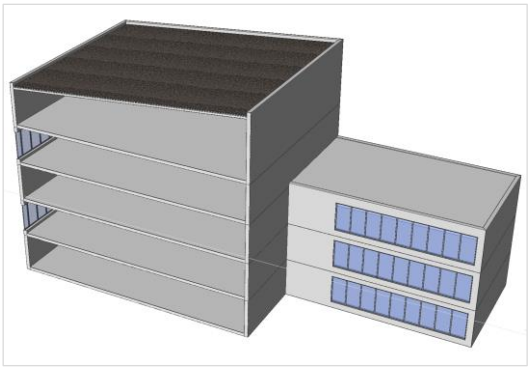
13. Click on the dropdown menu of the **Compositions** panel and choose the **Show only compositions in project...** option. You will now see only the compositions that were already added to the project database.

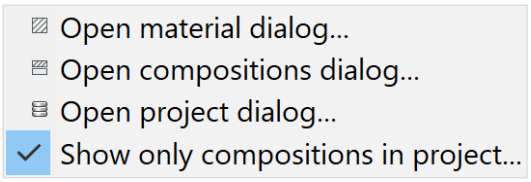
14. Select the other roof and drag-and-drop the **Roof, Flat, Concrete** onto that roof as well. Accept the default reference face.

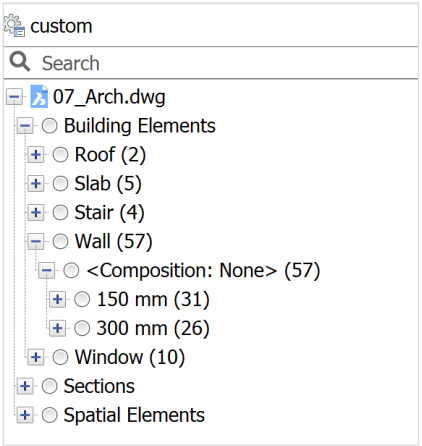
15. Find the correct entities by using the **custom.cst Structure** panel and selecting the elements and then drag and drop the following compositions onto those entities:

    - 5 slabs: **Floor, Concrete, Insulated**
    - 31 interior walls of 150 mm: **Interior wall, 140**
    - 26 exterior walls of 300 mm: **Cavity Wall, Brick**









NOTE: When searching the correct compositions in the **Compositions** panel, make sure to turn **Off** the **Show only compositions in project...** option.

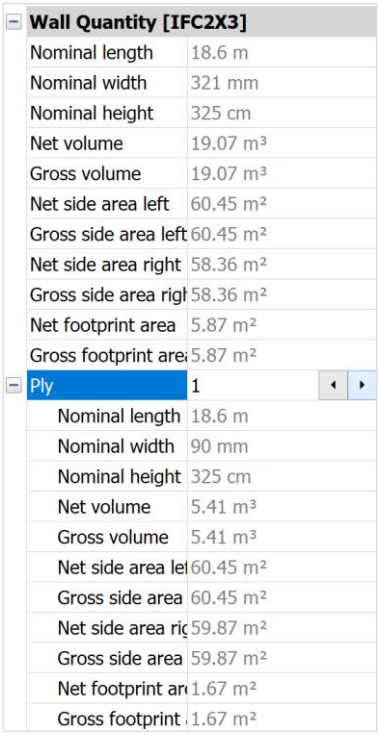
E. Composition plies

To better understand the information present in the current state of our drawing, let's take a deeper look at the plies of the compositions that we just added.

a. **View composition ply data**

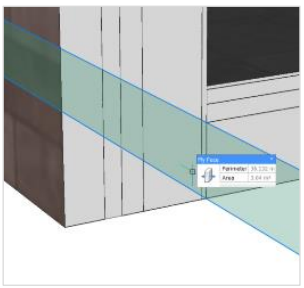
1. Zoom in to the connection between the bottom floor slab and the exterior wall.
2. Select the exterior wall **solid**.
3. Go to the **Properties** panel.
4. Scroll all the way to the bottom until you find the **Ply** section in the **Wall Quantity [IFC2x3]** section.
5. Here you can read all the quantities related to the selected ply. The plies get counted, starting by **1**, from the **Reference face** (corresponding with the **Exterior** ply, or uppermost ply in the **Composition** dialog) till its opposite face (normally the **Interior** ply, or lowermost ply in the **Composition** dialog).

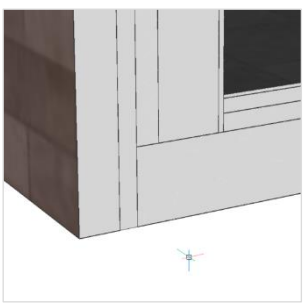
   NOTE: To see the properties of the next or the previous ply, click the corresponding icons in the **Ply** field to cycle through the plies.



b. **Edit composition ply geometry**

1. Make sure LEVELOFDETAIL is toggled **On**. This allows to manipulate individual composition plies/materials.
2. Since you will be editing the plies of the compositions, SELECTIONMODES **Face Detection** should be **enabled** and the other options disabled.
3. Hover your cursor near the concrete surface of the floor slab, and press **Tab** until the **Ply Face** of the concrete ply is highlighted.
4. Quad select DMPUSHPULL and move it to the insulation layer of the wall, like in the image, as such you can manipulate all individual plies





geometrically. Make sure to toggle **Ctrl** (if **DMPUSPULLSUBTRACT** = **0**) to activate the **Enable subtract** suboption. This will automatically subtract the pushpulled area from all the other entities it crosses, so you don't create overlaps.

F. BIM Properties

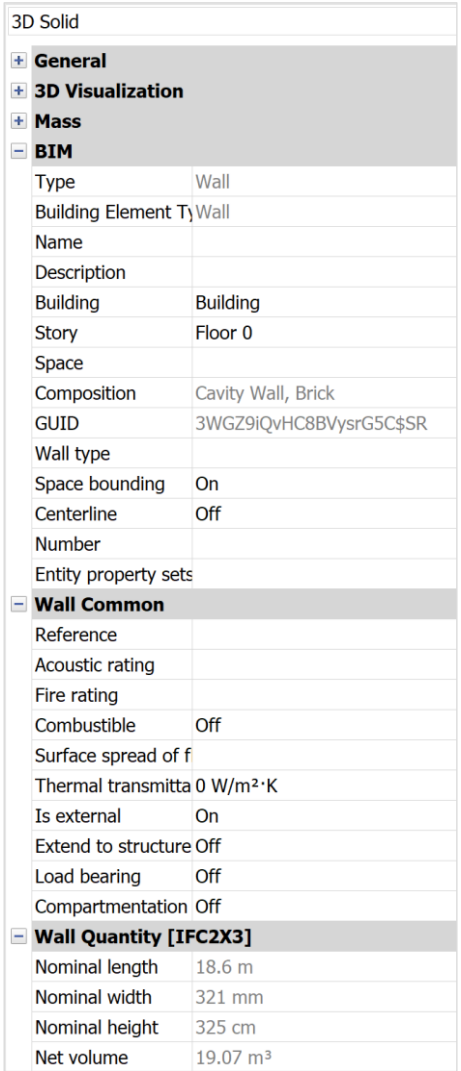
Every entity has properties. A **Line** entity has CAD properties such as **Color**, **Layer** and **Linetype**. BIM entities have these properties as well, but besides those properties other properties are available depending on the type of entity we select.

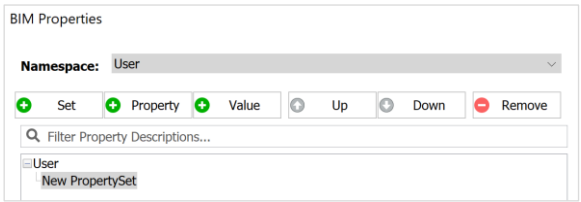
a. Properties

1. Select one of the exterior wall solids and open the **Properties** panel once again. You can choose to expand or collapse the following sections:

   - **General** properties are the properties that all entities have, also the ones without BIM data.
   - **3D Visualization** properties are the properties that are used to represent the entity.
   - **Mass** properties are calculated based on the geometry of the solid and are not editable. Expanding this section can take time, because of the calculations that need to be made.
   - **BIM** properties include spatial locations, compositions, and other BIM specific properties
   - **Wall Common** is part of the **IFC Common** properties, governed by BuildingSmart. These property sets are hardcoded and used by other BIM applications in a similar fashion. In the **Wall Common** properties you can for example enter values for **Fire rating** or **Acoustic rating**.

     NOTE: If you select a window this section will read **Window Common** instead of **Wall Common**, etc.
   - **Wall Quantity** properties are part of the **IFC Quantity** properties. They are calculated based on the geometry of the solid, according to the BuildingSmart calculation conventions. As stated before, this section also allows you to see the quantities of separate composition plies.





2. It's possible to create custom properties as well. In the no-selection Quad under the **BIM** tab, click

the **BIMPROPERTIES** command. A dialog box pops up to allow you to specify and edit the shown properties in your BIM project, per entity type.

3. By default, three namespaces exist. **IFC2X3** contains the IFC Common properties that we talked about earlier. **User** contains the custom properties. **Quantity** contains the IFC Quantity properties.

4. Go to the **User** namespace, add a new property **Set** and give it an **Id**, e.g. **Custom Properties**.

5. You can choose which types of objects this property set applies to. This way, you can make custom property sets for e.g. windows, or columns and beams, or whichever combination you want. In this case, we'll just apply it to all categories.

6. Add a new **Property** to the selected property set and give it an **Id**, e.g. **Cost**.

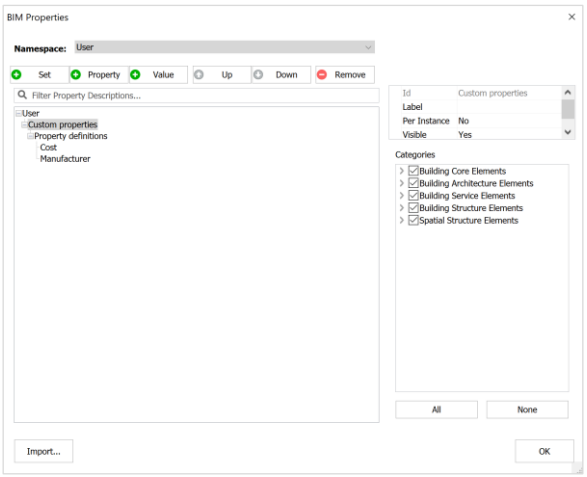
7. You can also define the type of data that this property can contain:

   - **Boolean**: an On or Off value.
   - **Integer**: a whole number between -2147483648 and 2147483647.
   - **Real**: an approximation of a real number.
   - **String**: a sequence of characters, can be both numbers and letters.

8. Change the **Cost** property to a **Real** type.

9. Let's add another property to this set: **Manufacturer**. The data type should be **String**.

10. If we now select any BIM entity, we should be able to see these new properties in the **Properties** panel under the **Custom properties** section. You can now fill in the values.



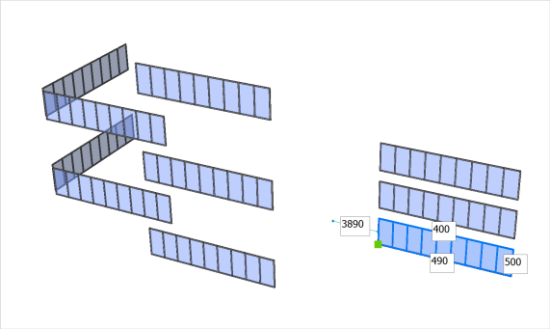
Custom properties	
Cost	0
Manufacturer	

G. Numbering

In a BIM model, the numbering of entities is an important aspect of adding BIM data. It allows us to identify elements quickly, to sort on their numbering, to tag them when creating 2D documentation about the project, etc. In this section we will see how to manually number entities or how to do this in a semi-automatic fashion. For more advanced numbering methods, it is adviced to do this with the help of some scripts: we will cover working with scripts in the **BIM Customization** training.

a. **Numbering manually**

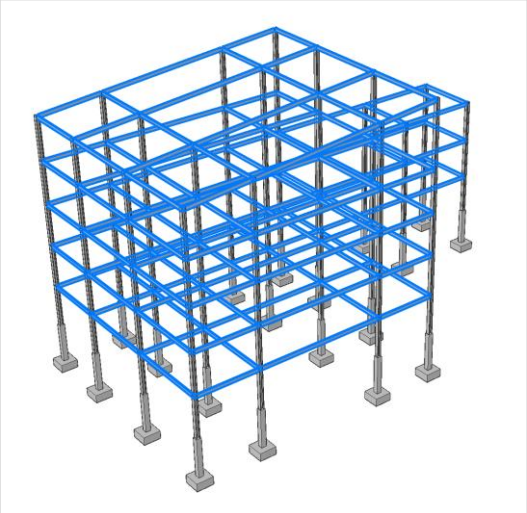
1. Continue in the model **07_Arch.dwg**.
2. Use the **custom.cst Structure** panel to quickly isolate all windows in the model.
3. Select one of the windows and go to the **Properties** panel.
4. Find the **Number** property in the **BIM** section.
5. Fill in the number that you want this window to have, e.g. **00-001** which could stand for the **001**st window on floor **00**.
6. You can do the same for the other windows.
7. UNISOLATEOBJECTS after you're done.



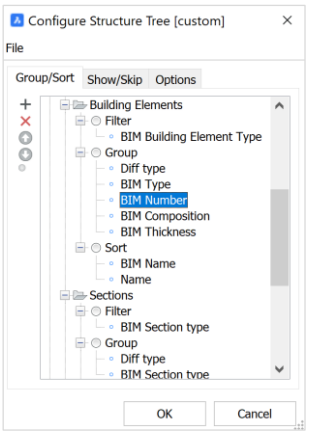
BIM	
Type	Window
Building Element Ty	Window
Name	
Description	
Building	Building
Story	Floor 0
Space	
Composition	
GUID	3oIHzchi54UxhIjJg2orA2
Space bounding	Off
Construction type	Not defined
Operation type	Not defined
Window inset	
Overall height	0 mm
Overall width	0 mm
Sill height	0 mm
Head height	0 mm
Assembly code	
Assembly subtype	
Number	00-001
Entity property sets	

b. **Numbering semi-automatically**

1. OPEN **07_Str.dwg**.
2. In the **custom.cst Structure** panel, select all beams.
3. Launch the NUMBER command from the **Bim** tab in the Quad.
4. Click the sub-option **Prefix** and enter **B-**. All the numbers that will be given will start with this prefix, denoting that these elements are a beam. In a similar fashion you can give the numbers a **Suffix** if desired. Here we leave the suffix **empty**.
5. In the sub-option **Number style** you can choose between arabic (i.e. 1, 2, 3, …), roman (i.e. I, II, III, …), roman lowercase (i.e. i, ii, iii, …), letters (i.e. A, B, C, …) or letters lowercase (i.e. a, b, c, …). Leave it on sub-option **arabic (0)**.
6. In the sub-option **Entities sorting**, you can choose the main directions, according to the UCS, in which the numbers get assigned. Choose **Z** here to start with numbering the lowest elements and



to then continue in an upwards fashion as the numbers increment. You can continue with pressing **Y** now, so that for entities with the same Z value (in our case that are the entities on the same story) we will start the numbering from the front to the back of the building. Conclude with pressing **X**, so that for entities on the same elevation and on the same distance to the front, we will start the numbering from the left to right.

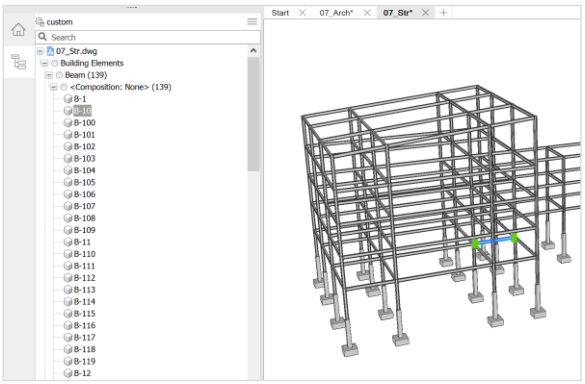


7. The sub-option **Overwrite Numbers** allows you to either keep or overwrite the already filled in numbers. As none of the beams have a number at the moment, this option does not matter.

8. The **First index** sub-option can also be left at **1** to start numbering from 1 (or I, I, A,a) onwards.

9. Press **Enter** to start the numbering.

10. Select one of the beams and check the **Number** property in the **Properties** panel to assure the numbering was successful and as intended.

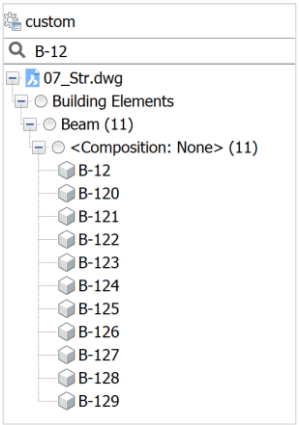


11. Alternatively, configure the **custom.cst Structure** panel to sort on **BIM Number** as well. As such you can easily see the BIM numbers in the structure and click on the one you want to inspect to highlight it in the drawing.

12. You could now do the same steps for the columns and footings.

c. **Search on numbering**

1. Once the entities have received a number you can search on this number by making sure the **Structure** panel is sorted on **BIM Number** (see above) and then simply typing the number you are searching for in the **Search** bar.



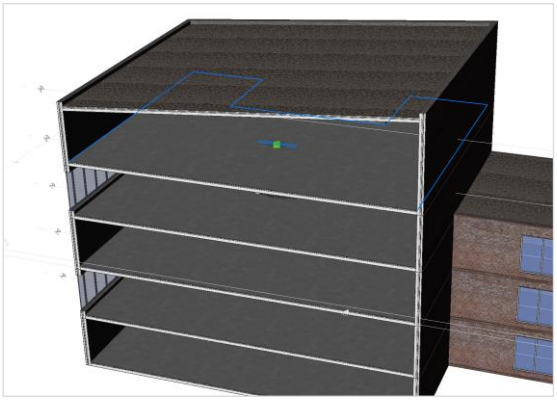
H. BIM Spaces

In a BIM model it is important to be able to make spaces. With spaces you can calculate the floor area, wall area, perimeter and volume of your spaces. This is convenient to quickly calculate the amount of flooring, paint, skirting board, ventilation flow, etc. that is needed to equip these spaces. On top of that you can add properties to each space, such as their number (for fire safety plans), their types of coverings, whether they are hadicap accessible or not, etc.

Finally, you can use spaces to generate interior elevation section entities or even to generate your custom diagrams for floor occupancy etc. by using Typed Plans.

In this section, we will cover how to add and edit spaces. For other use cases of spaces, please consult the Bricsys Help Center or the BIM Advanced or BIM Customization training manuals.

a. **Inspect spaces**



1. OPEN **07_Arch.dwg** once again.
2. **Open** the vertical section that we created earlier by double-clicking it.
3. Notice that **Bimify** has already created all the spaces for us, as we included that option during the command.
4. Select the space on the top floor by clicking on its name bubble.
5. Make sure you have selected a **Space** entity by going to the **Properties** panel. There you should see that you have selected a **3D Solid** that has in the **BIM** section a **Type** that is a **Space**.
6. You should also see the **Space Common** section where you can add some properties to the space, as well as the **Space Quantity** section where you can read the quantities of the selected space.
7. In the **BIM** section notice that there is a field **Representation**. This dictates how your space will be shown in the model. Standard this is put on **Footprint**, showing you only the contour and name bubble of the space in the model. However, you can switch it to **Solid** to see the entire space solid instead.

   NOTE: It is best to leave the representation on footprint when modeling other elements of your model, as such you won't accidentally modify the space solid in the process. However, if you want to inspect the actual shape of the space and/or you want to edit this shape, then you can temporarily switch to the solid representation instead.
8. Try out both representations and see the representation of the space in the model change accordingly.
9. Other properties that can be found in the **BIM** section are the **Update method** and the **Status** of the space.

   NOTE: When putting the **Update method** on **Manual** it is expected you will modify the space solid by direct modeling to update it according to

the changes in the model. When put on **Automatic**, you can use the command **BIMUPDATESPACE** to run a semi-automatic regeneration of the space. When a space is put on the **Manual** update method you will not be able to use this command to regenerate this space.

NOTE 2: In the **Status** field you can indicate whether the space is **Up to date** or **Out of date**. When the **Manual** update method is used, you are in charge of changing this field accordingly. When the **Automatic** update method is used, BricsCAD BIM will detect when the space is no longer corresponding with the rest of the model and thus is **Out of date**. In this case you will be able to run the **BIMUPDATESPACE** command to regenerate the space and the **Status** will switch back to **Up to date** automatically after the regeneration. You can always overrule this property manually, also when in **Automatic** mode.

10. Leave the **Update method** and **Status** as is.

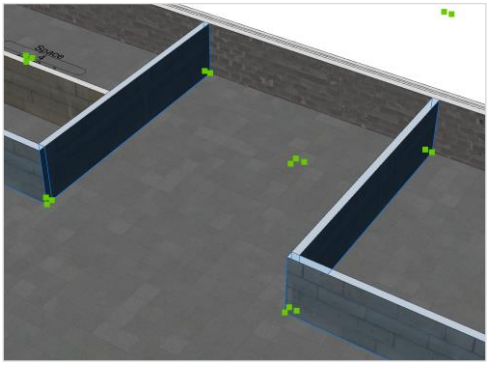
3D Solid	
General	
3D Visualization	
Mass	
BIM	
Type	Space
Spatial Element Typ	Space
Representation	Footprint
Update method	Manual
Status	Out of date
Name	Space
Description	
Building	Building
Story	Floor 4
Composition	
GUID	1AculYSa14agG7lU5pTH$u
Number	19
Interior Elevations	Off
Entity property sets	
Custom properties	
Space Common	
Reference	
Category	
Floor covering	
Wall covering	
Ceiling covering	
Skirting board	
Gross planned area	0 m²
Net planned area	0 m²
Publicly accessible	Off
Handicap accessible	Off
Concealed flooring	Off
Concealed ceiling	Off
Space Quantity [IFC2X3]	
Average height	474.292 cm
Net perimeter	86.29 m
Gross floor area	306.12 m²

b. **Update the model and the spaces**

1. Make sure the **Update method** of the big space on the **first floor** is set to **Automatic** and its **Status** is **Up to date**.

2. Open the horizontal section of the first floor.

3. Change the L-connection of the four highlighted walls, as shown in the image, two by two with the help of the **LCONNECT** command.

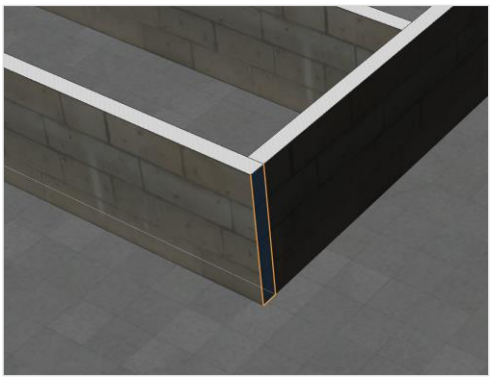


4. **DMPUSHPULL** the highlighted face so that it overlaps with the next wall. Make sure the **Subtract** mode is **disabled** while pushpulling,

otherwise you will also subtract a part of the space solid.

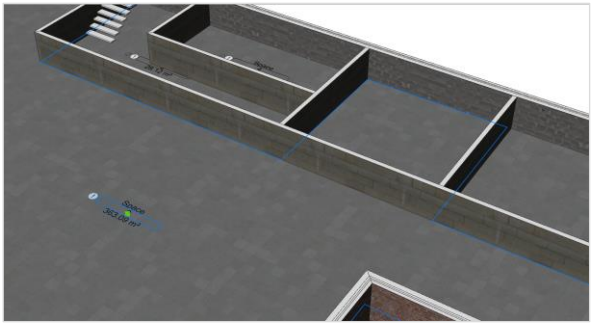
5. Use the **UNION** command to union the two walls that are collinear into one.

6. The endresult should look like in the images to the right.

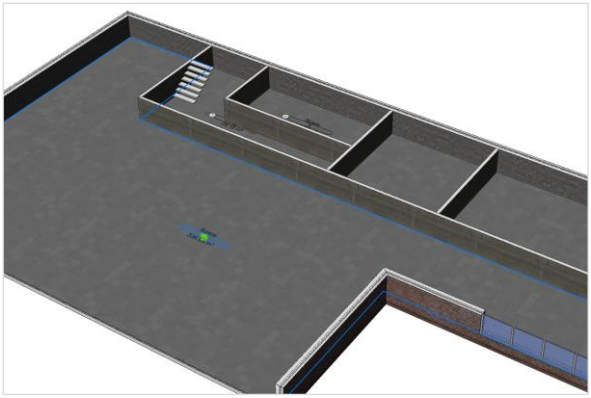


7. Notice that the big space on the first floor now turned **Out of date** automatically, and hasn't changed shape yet.

8. To let it adapt to the new wall locations, select the big space and from the Quad in the **Bim** tab launch the **BIMUPDATESPACE** command.



9. The big space will now be automatically adjusted to follow the walls. However, the small space we just created won't have a space yet.



NOTE: We could also have deleted the protrusion in the space shape by direct modeling onto the solid representation of the space. As such it would also have been possible to adjust the space to the new wall locations when the mode had stayed on **Manual**.

NOTE 2: You can also launch the **BIMUPDATESPACE** command on multiple space entities at once, e.g. after selecting them all with the help of the **Structure** panel. In that case only the ones that have their **Update method** set on **Automatic** will be updated by BricsCAD to follow the design changes in the model. This means you can always put the **Update method** of a space on **Manual** if you want to have full control over the geometrical changes of that space entity.

c. **Add spaces**

1. We can now add the small space.

2. In the no selection Quad select the **BIMSPACE** command from the **Bim** tab.

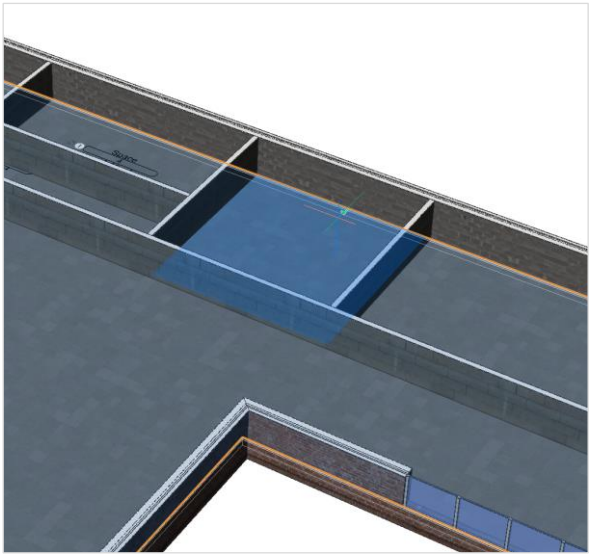
   NOTE: The tooltip in the Quad reads **Space**.

3. You will now see a cross or a checkmark appear next to your cursor. This indicates whether or not it is possible to create a new space entity on this location.

4. Try hovering over the floor inside the small room we just created.

NOTE: This is easier when **ESNAP** is turned off, otherwise you might be snapping to locations where you don't want to put the space.

5. Click that location when the cursor displays a checkmark and the blue area is as shown on the image to the right. The same properties as we saw before will also apply to this new space.



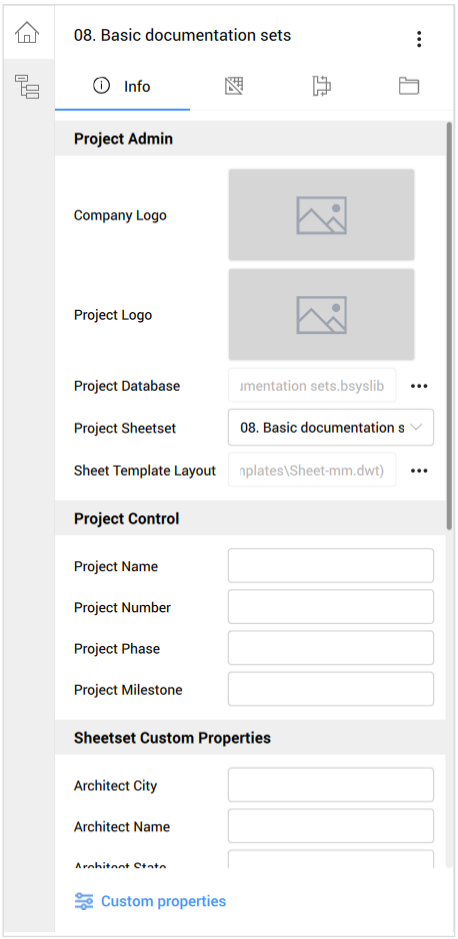
08. Basic documentation sets

This module explains the basics of drawing documentation. We will explore a project in the **BIM Project Browser** panel and place 2D drawings, generated from our BIM model, onto sheets. To explore a more elaborated BIM Project and to learn the more advanced options of the BIM Project Browser, see the **BIM Advanced** training manual.

A. Exploring the project

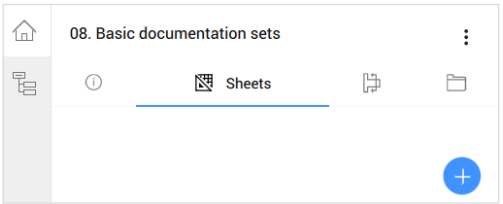
a. The Info tab

1. **OPEN** the model **08_master.dwg**.
2. On the left-hand side of the screen, open the **BIM Project Browser** panel.
3. The **BIM Project Browser** panel is opened on the first tab, which is the **Info** tab. This tab contains general information about the current project, which is split up in 4 categories.
4. The **Project Admin** and **Project Control** categories contain info about the project itself, such as the name of the project and the database and sheetset to be used by the project.
5. The **Sheetset Custom Properties** and **Sheet Custom Properties** categories hold properties which can be used by the titleblocks on sheets. Properties in these categories can be added, edited or deleted, by clicking the **Custom Properties** button at the bottom of the info tab.

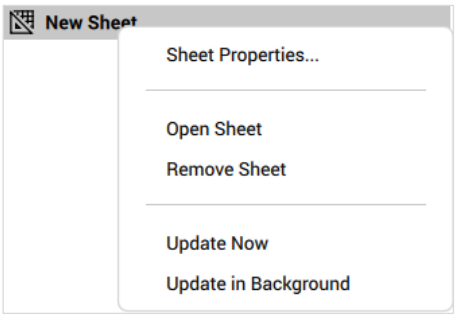


b. The Sheets tab

1. Go to the **Sheets** tab.
2. The **Sheets** tab shows an overview of the sheets in the project and the different generated section results on these sheets. For now this tab is empty, but we will add sheets further in this chapter.
3. For now, know that with the **blue plus** button at the bottom of the sheets tab, it is possible to add a new subset to the sheetset or to add new sheets to the sheetset or selected subset.
4. When there are subsets and sheets in the project, right-clicking them will open a context menu. For



the sheets, the context menu will have the following options:

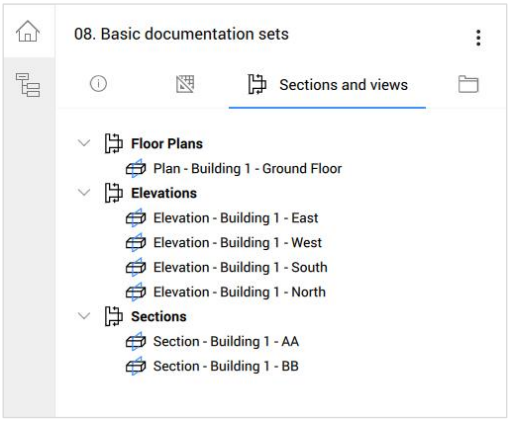


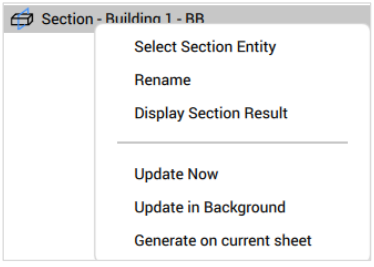
- **Sheet Properties…**: Opens the **Sheet Properties** dialog box that allows you to show and modify the properties of a sheet.
- **Open Sheet**: Opens the sheet.
- **Remove Sheet**: Removes the sheet.
- **Update Now**: Updates the section results on this sheet.
- **Update in Background**: Updates the section results on this sheet in the background.

5. Double-clicking a section will perform the same action as picking **Open Sheet** from the right-click menu.
6. When changes to the models in the project are made, the generated section results based on these models get out-of-date and they have to be updated. To update the drawings automatically, in the **BIM Project Browser menu**, select the option **Auto Background Updating**.

c. **The Sections and views tab**

1. Open the **Sections and views** tab.
2. The **Sections and views** tab shows a list of all the project sections, grouped by type. Whether a BIM section entity is considered a project section depends on the section entity's **Project section** property.
3. Right-clicking a project section will open a context menu, which allows you to do the following things:



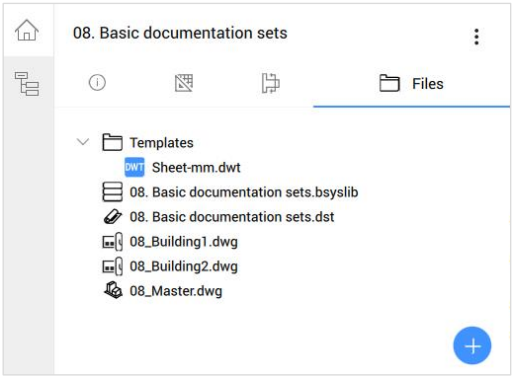


- **Select Section Entity**: Opens the model the section entity belongs to and selects the section entity.
- **Rename**: Renames the section entity.
- **Display Section Result**: Displays the project section's section result in the corresponding sheet and zooms in on its viewport. If not already open, the sheet is opened.
- **Update Now**: Regenerates the project section's section result.
- **Update in Background**: Updates the section's section result in the background.

- **Generate on current sheet**: Generates the section result on the currently active sheet.

4. Double-clicking will do the same thing as picking **Select Section Entity** in the right-click menu.

d. **The Files tab**



1. Go to the **Files** tab.

2. The **Files** tab shows all the files that are located inside the project's folder on your machine:

   - Drawings: master models, xrefs, sheets and other drawings (.dwg)
   - Database (.bsyslib)
   - Sheetset (.dst)
   - Templates (.dwt)
   - Schedules
   - Scripts
   - Images
   - …

3. Right-clicking on a file will open a context menu depending on the type of the file, allowing you to delete files, rename schedules, etc.

4. For .dwg drawings, the first option in the right-click menu is **Mark as master model**, which makes the drawing a master drawing. This means that any section or 3D view defined in that drawing or in one of its Xrefs will be listed in the **Sections and views** tab. Multiple drawings can be master drawings.

5. Pressing the **blue plus** button at the bottom of the tab will give the following options:

   - **New Schedule**: Opens the **Schedule Wizard** dialog box that allows you to create a schedule (a .dxd file in the project folder) based on a new or an existing schedule's data extraction definition (a .dxd file not located in the project folder).
   - **Import Schedules**: Opens the **Select Schedules to import** dialog box that allows you to quickly add a schedule without needing to go through the **Schedule Wizard**.

More on schedules will be covered in the next module of this training manual.

- **New Typed plan**: Opens the **BIM Typed Plan Editor** dialog box that allows you to create a typed plan, existing out of a drawing customization and a tag customization.

- **Import Typed plan**: Opens the **Select a Typed Plan to import** dialog box to import an already defined typed plan. More on typed plans can be found in the **BIM Advanced** and **BIM Customizations** training manuals.

- **Import script**: Opens the **Select script to import** dialog box from which you can import a Python or LISP script. More on scripts can be found in the **BIM Customizations** training manual.

- **Import Templates**: Opens the **Select templates to import** dialog box from which you can choose to import a template. More on templates can be found in the **BIM Customizations** training manual.

B. Sheetset setup

a. **Create sheets from existing section entities**

1. To create sheets, we will go to the **BIM Project Browser menu** and select the option **Sheetset setup** and a dialog will open. In this dialog we can see of a list of viewports that will be created, a list of our sections and a preview of the sections onto the sheets that will be created.

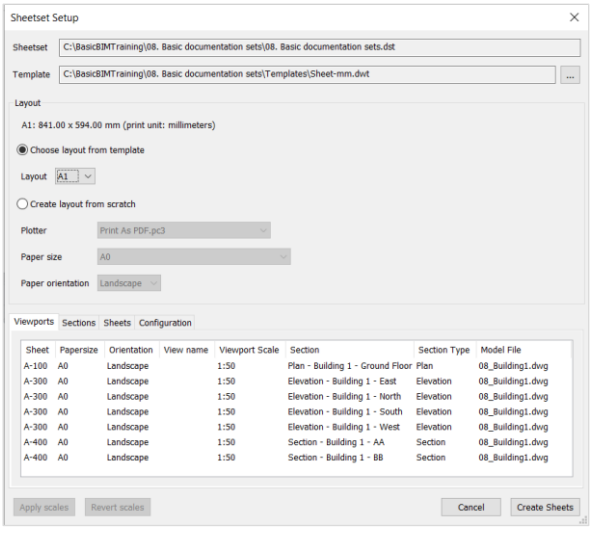
2. The dialog consists of 5 parts, explained one-by-one hereafter.

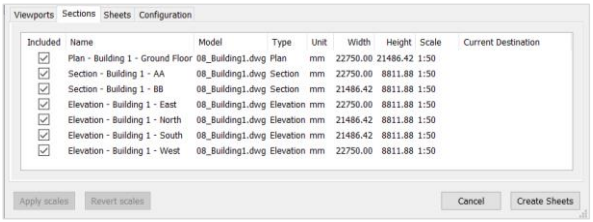
3. In the **general info at the top**:

   - You see the path of the sheetset that is associated with the project. You see the sheetset template that is being used. You can specify your own here if you wish. And you see options for choosing the paper layout the sheets will have.

   - If you choose a layout from template, it will look at the template for the sheets to find all available lay-outs and list them in the drop-down.

   - You can also choose to create an empty layout from scratch, by choosing a plotter, a





paper size and an orientation from the respective drop-downs.

4. For this exercise, pick **Choose layout from template** and select layout **A1**.

5. In the **Viewports** tab:

   - You see a list of all sheets (existing sheets and sheets that will be created), with their **Papersize** and paper **Orientation**.

   - Under **Section**, you also see which section entities are (being) generated on these sheets.

   - For new viewports that still have to be created on new sheets, the **View name** is left empty.

   - By double clicking the **Viewport Scale**, it can be changed. For new viewports, the sheetset set-up takes the **Initial scale** – specified in the properties of your section entities – as default value to start from.

6. In this project, we will accept all the **default values** for the **Viewports**.

7. In the **Sections** tab:

   - You see all the section entities available in the models of your project.

   - You can select or deselect the sections to be **Included** as project sections.

   - If a section is already placed on a sheet then this is stated in the **Current Destination** column. These sections will not be placed onto any new sheets, so that the current destination will never be overwritten.

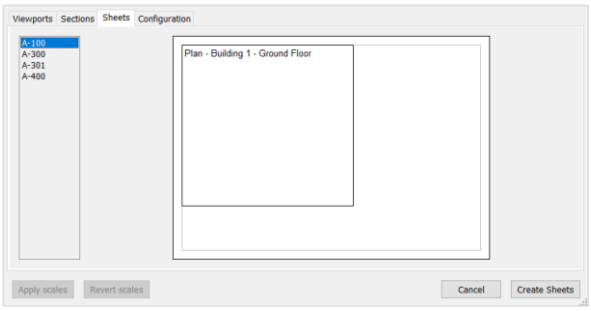
   - You can also change the (Initial) **Scale** of the section entity by double clicking it.

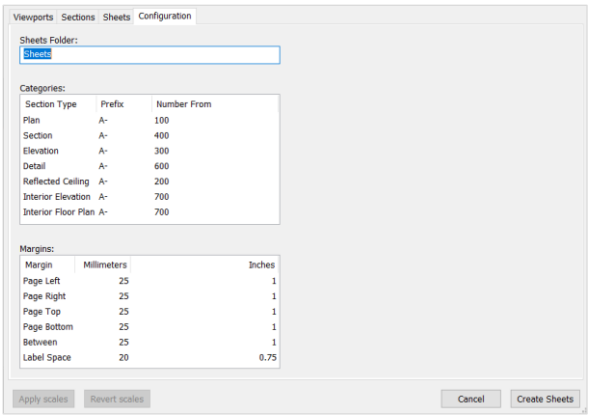
8. In this project, we will accept the **default values** for the **Sections** and thus include all sections.

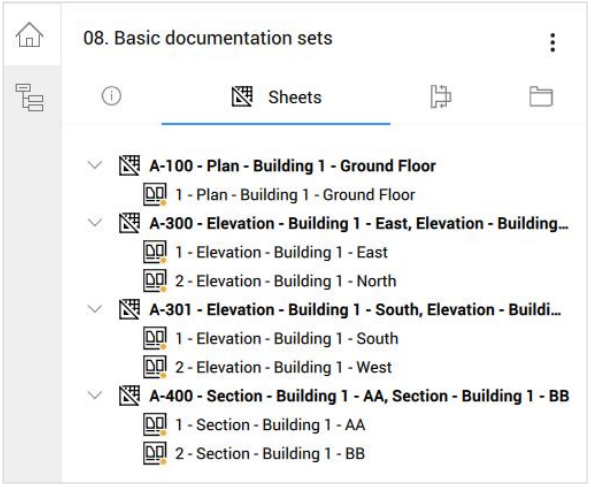
9. In the **Sheets** tab:

   - Here you see a preview of your section results' outlines onto your sheets.

10. We are creating 4 sheets now: one with the floor plan, called A-100, and two with the elevations, called A-300 and A-301, and one with the sections called A-400.







11. In the **Configuration** tab:

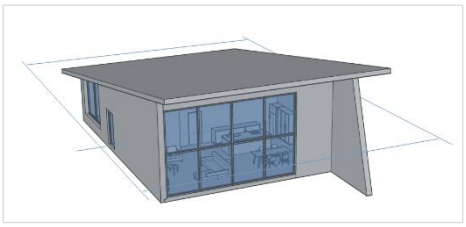
    - Here you can specify some naming options, as well as make sure that different types of sections are placed onto separate batches of sheets or onto one batch of sheets.

    - You can also specify margins.

12. In this project, we will leave the **default settings** for the **Configuration**.

13. Finally, click **Create sheets** and the sheets will be created as shown in the BIM Project Browser panel.

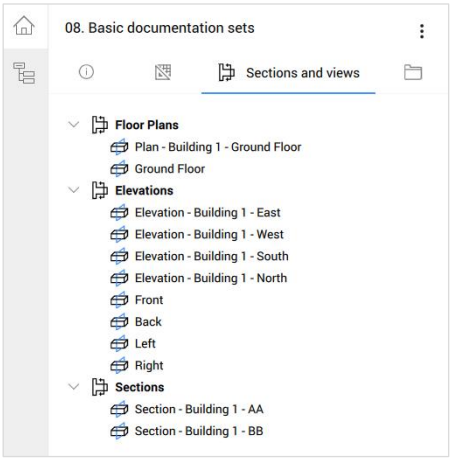
b. **Add new section entities**



1. Let's open up **08_Building2.dwg** by selecting the Xref of Building 2 and choosing **OPEN** from the Quad in the Modify tab.

2. We can run **BIMIFY** from the Quad in the Bim tab on the entire drawing of Building 2 to generate the section planes, or manually create section planes using the **BIMSECTION** command.

   NOTE: A section plane has a property called **Project Section**: if this property is **On**, the section plane will appear in the **BIM Project Browser** panel and you can use it to generate drawings.

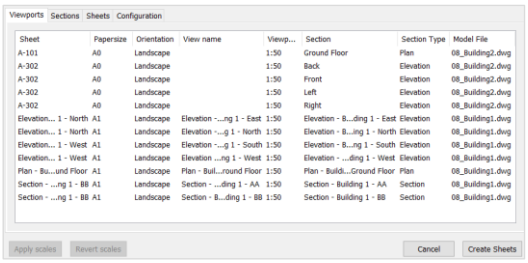


3. Let's run **BIMIFY** on this drawing. This open a command panel, make sure **Create sections** is selected and click the **Apply** button. Automatically, one floor plan and four elevations are created.

4. If we now **QSAVE** the file, go back to our Master model and reload the attachment in the Attachments panel, we can see the sections appear in the drawing.

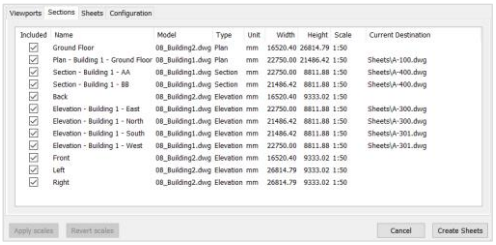
5. If we **Refresh** the **BIM Project Browser** panel from its menu, we will see the sections appear in the **Sections** tab as well.

c. **Add new sections to new sheets**



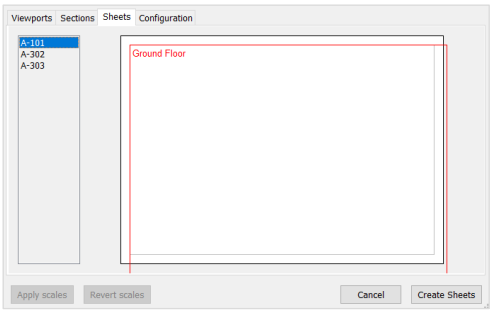
1. If we go to **Sheetset Setup** in the **BIM Project Browser menu** we can now include the new sections on some new sheets.

2. We see the same dialog as before, but now you see in the **Viewports** tab that some view names are filled in and other are left empty. In the **Sections** tab we can also have sections that already have a current destination filled in.



3. We will again **Choose layout from template** and pick the layout **A1**. In the **Sheets** tab, we get three sheets: one for the plan and two for the elevations. No preview is shown for the sections that already have a destination file.

4. Let's try and change the scale for the plan to **1:20** instead. You can do that in either the **Viewports** tab or the **Sections** tab.



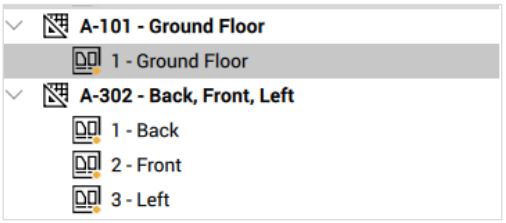
5. If we now go back to the **Sheets** tab, we see that the preview for **Floor 0** turned red, because it doesn't fit the sheet size anymore.

6. Revert the plan scale to **1:50**.

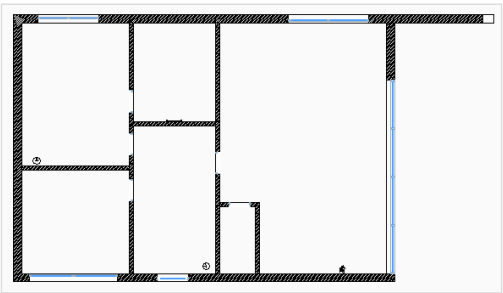
7. Hit **Create Sheets** to create the new sheets.

8. We see that the sheets are added to the **Sheets** tab and they are again automatically updated in the background, if the **Background update** is on.

d. **Check the generated drawings**



1. To see the resulting drawing of section **Ground Floor**, go to the **Sheets** tab. Drawings with an orange dot are out of date or not yet generated. Right-click them and select **Update Now** or **Update in Background** or turn on **Auto Background Updating** in the BIM Project Browser menu.



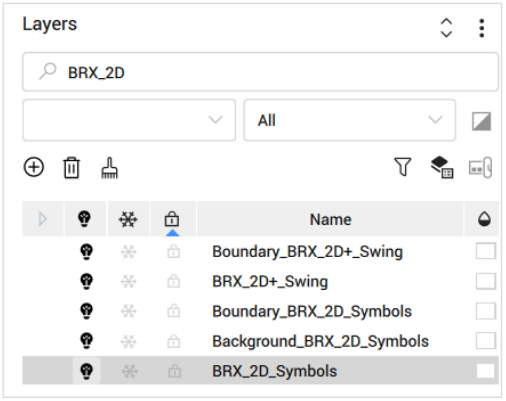
2. If there is no orange dot, double-click **Ground Floor** or right-click it and select **Display Section Result**. It is also possible to open a generated drawing from the **Sections** or **Views** tab, by right-clicking the section and choosing **Display Section Result**.

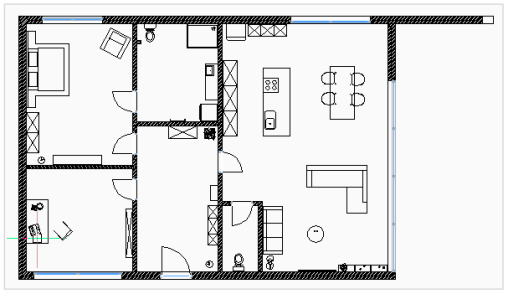
3. The floor plan is placed on a sheet and we see the cut-through representation of the walls. However, we don't see the furniture.

4. To fix that, filter on **BRX_2D** in the **Layers** panel. Make sure all layers with this in their name are turned **on**.

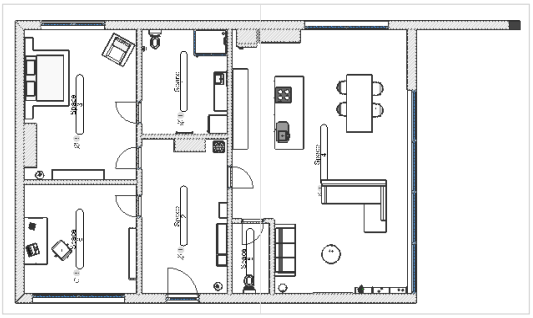
5. If the BRX_2D layers are turned on we see our furniture. This happens because our real section was replaced by a 2D symbolic representation. The component we cut through had a 2D representation on the BRX_2D layer and this makes that our actual section will be overwritten. If you want a 2D representation together with the actual section, you need to use the **BRX_2D+** layer. This is, for example, handy for doors, where you want to display a door swing together with the cut-through representation of the door.

   NOTE: We will discuss the created layers in more detail in the advanced training.



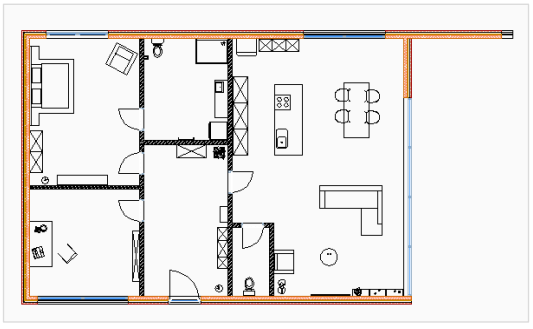


e. **Changing the 3D model**



1. Let's make some changes to the BIM model and update the floor plan. Open up the section in the 3D model easily by selecting the viewport we were looking at before and executing BIMSECTIONOPEN command in the Quad's **Model** tab.

   NOTE: The tooltip in the Quad reads **Open Model**.



2. Select an interior door and Quad select **BIMFLIP (suboption Left-right)**. The door swing is flipped.

3. Delete the couch in the living room and open the **Library** panel. Browse to the **Furnishing Elements** and drag a chair into the living room.

4. Give the outer walls the composition **Cavity Wall, Brick** by first selecting the walls and then drag and drop the composition from the **Compositions** panel onto the selected elements.

5. QSAVE drawing **08_Building2.dwg**.

6. Switch to the **Ground Floor** plan.

7. Update the floor plan either using the **Sheets** tab in the **BIM Project Browser** panel or select the BIM

Viewport and Quad select **BIMSECTIONUPDATE**  in the **Model** tab.

NOTE: The tooltip in the Quad reads **Update Section**.

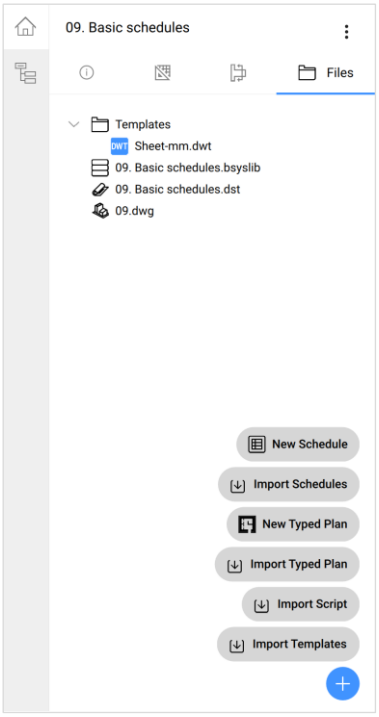
8. The floor plan view will update to display the changes.

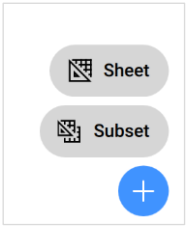
09. Basic schedules

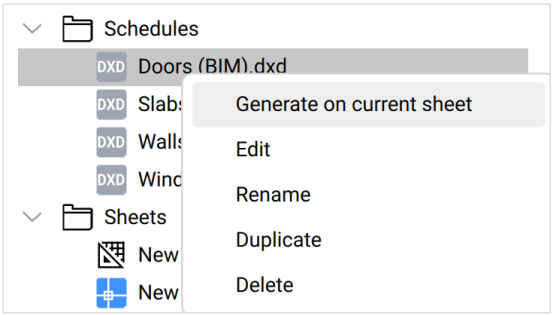
In this module you will learn to add schedules to your BIM project by using pre-defined schedule definitions. You will also learn the basics of updating the schedule and exporting it's content to a .csv file.

A. Add schedules to your BIM project

a. Use pre-defined schedule definitions







1. OPEN **09.dwg**.
2. Go to the **Files** tab in the **BIM Project Browser** panel.
3. Click the **blue plus** button in the lower right corner of the panel.
4. A series of possibilities displays on screen. Click on **Import Schedules**.
5. Import **Windows (BIM).dxd**, **Doors (BIM).dxd**, **Slabs (IFC2x3).dxd**, and **Walls (IFC2x3).dxd**.
6. Now we can start generating the schedules onto sheets, but to do that let us first make an empty sheet.
7. Go to the **Sheets** tab.
8. Click the **blue plus** icon and click on **Sheet**.
9. Right-click on the newly added sheet and open the **Sheet properties…** to edit the name and number of the sheet as you see fit, e.g. **001** - **Schedules**.
10. Now double-click on the sheet name to open this new sheet and choose the lay-out on which you want the schedule, e.g. **A0**.
11. Go back to the **Files** tab and now right-click the **Doors (BIM).dxd** and choose the option **Generate on current sheet**.
12. The schedule will be made, listing all the entities classified as a door in the model, with a small preview.

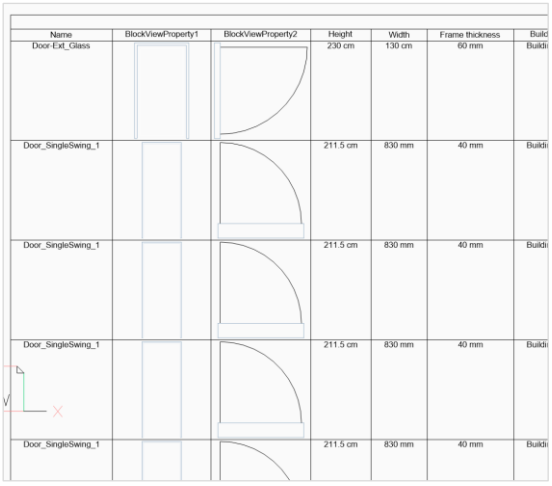
    NOTE: You might still need to move the schedule onto a better location on the paper by selecting it and using the MOVE command.
13. You can now do the same for the other .dxd files (data extraction definition templates) that we imported earlier and they will list the slabs, walls and windows in a similar manner.

14. To see or change which entities and which of their properties are exported, you can inspect the .dxd file by right-clicking it and choosing **Edit**. Now you will enter the **Schedule Wizard** dialog and will see the **Filter** being pre-filled to filter out only certain elements, e.g. only the doors for the door schedule. In the next step of the dialog, you will see the **Properties** being checked or unchecked to indicate whether or not they need to be exported to the schedule and in which order they need to be listed.

    NOTE: The Schedule Wizard is also directly accessible through the **New Schedule** button under the **blue plus** button of the **Files** tab.

15. After editing the schedule definition, or after editing and saving the model, you can simply run the **DATALINKUPDATE** command from the **Modify** tab of the Quad on the corresponding highlighted schedule to update the table and let it respond to the changes that were done.

16. From the same **Modify** tab of the Quad you can also choose to run the **TABLEEXPORT** command to save the content of the table to a **.csv** file that you can further process in a .csv editor like Excel.



For more about customizing the .dxd files and for a detailed explanation about the Schedule Wizard and its functionality see the **BIM Customization** training manual or the **Bricsys help center**.

10. Collaboration

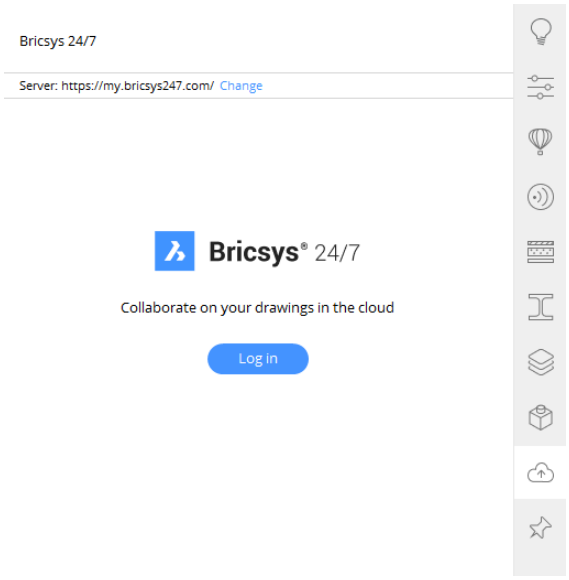
In this module you will learn different collaboration methods used in BricsCAD BIM. One of these methods is the Bricsys 24/7 panel inside of BricsCAD. If you do not have access to a Bricsys 24/7 project, you can skip this intro section of this module or you can read it as an example. For IFC import and export, we will focus on how to change the used IFC format inside of BricsCAD BIM and on different import and export options, as well as give some tips on how to collaborate through IFC files. To end, we will also make use of the BCF (BIM Collaboration Format) panel that allows you to connect to a BCF server or to import a BCF file and see the related issues.

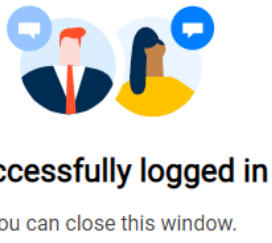
A. Use the Bricsys 24/7 panel

We will download some files from Bricsys 24/7 by using the Bricsys 24/7 panel inside BricsCAD.

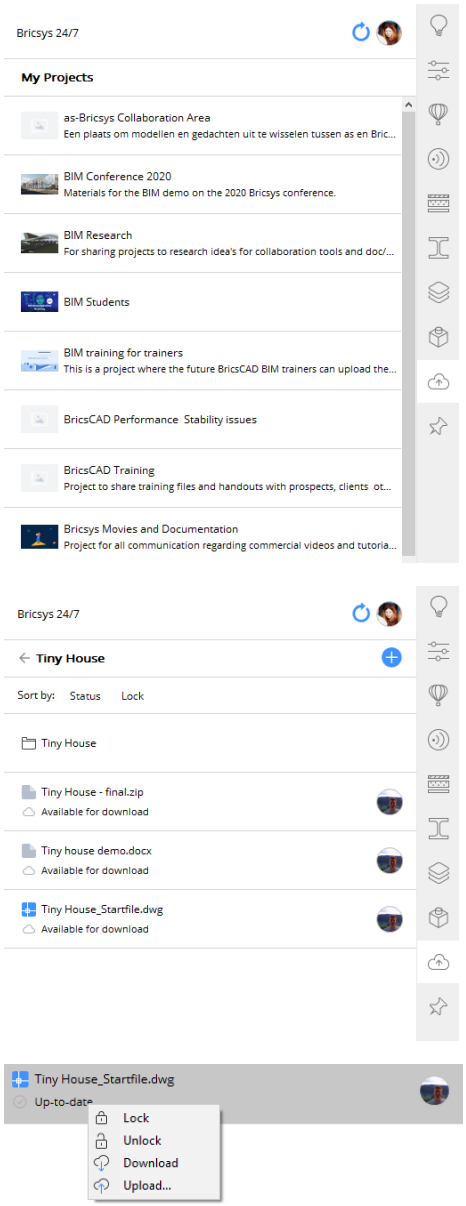
a. **Log in to 24/7 in BricsCAD**

1. If you open the **Bricsys 24/7** panel inside BricsCAD for the first time, you will see two things:
   - The name of the 24/7 server you want to connect to is listed all the way at the top of the panel. You can still choose to change the server using the **Change** button.
   - A blue **Log in** button, allowing you to log in to your own 24/7 account.
2. If you press the **Log in** button, you will be redirected to the 24/7 webpage in your standard browser.
3. You can now use your Bricsys 24/7 credentials to log in.
4. Once successfully logged in you should see a success message. You can now close this tab of your browser and return to BricsCAD.
5. In the **Bricsys 24/7** panel, you should now see a list of projects you are part of.





b. **Browse to a project and download files**



1. Choose one of your projects by double-clicking it.
2. Double-click the folder you want to go in.
3. Double-click the file you want to download and open.
4. The status of the file will change from 'Available for download' to 'Downloading' and 'Up-to-date' once it is downloaded.
   - If you chose to open a .dwg file, this file will immediately open in BricsCAD.
   - If you chose to download and open another file type, this will launch the associated file-type's program to display the respective file.
5. To download a file or entire folder without opening the file/folder you need to right-click and choose **Download** from the drop-down menu.
6. In this right-click menu you will also find the options to **Lock/Unlock** a file to make sure it is unavailable (or back available) for download by others in the project.
7. As last option of the right-click menu you will find the option to **Upload** the changed file back to 24/7 so the others in the project can see the changes you made.
8. These downloaded files are stored in their respective folders underneath the main folder **Bricsys247** that is – by default – located in your **Documents** folder of your computer.
9. Lastly, if you need to upload a new file to Bricsys 24/7, that wasn't in the cloud project yet, you can use the **blue plus** button in the respective folder where you want to upload the new file. The button is located at the top-right corner, underneath your profile icon. After pressing this button, you will be redirected to your folder navigator where you can choose the file to upload.

B. IFC format

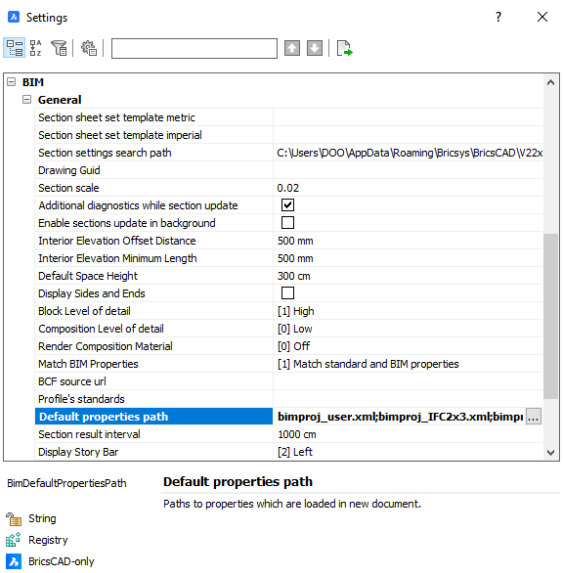
We will see how to start off a drawing with the correct IFC template: IFC4 or IFC2x3.

a. **Change from the default IFC2x3 template to the IFC4 template**

By default, the IFC format that is used within BricsCAD is **IFC2x3**. However, we can redefine the used IFC template to **IFC4** upon the creation of a new drawing. Below you will find the steps to do this.

NOTE: It is thus important to choose which IFC format you need before creating the BIM model.

1. Open a new drawing in BricsCAD. This is just to be able to get to the **Settings**.
2. Go to **Settings**.
3. Find the **BimDefaultPropertiesPath** (under **BIM** > **General**).
4. Open the path list by clicking on the 3 dots next to the path that is already filled in.
5. Change the path with **IFC2x3** in it **to** the path: **C:\Program Files\Bricsys\BricsCAD V22 en_US\Support\bimproj_IFC4.xml** by clicking the 3 dots and navigating to the correct file.
6. Now as soon as you start a new drawing in the BIM workspace (e.g. by launching the **BIM-mm** template), you will see that the properties of the entities will follow the **IFC4** standard instead of the **IFC2x3** standard.



C. Export IFC files

We will export a file to IFC and define some rules on what and how to export.

a. **Export with an export mapping file**

1. Browse to the folder **01. Collaboration** and open **exportmapping.txt** using a text editor.

   This is an export mapping file. It contains some simple rules, such as mapping a certain BricsCAD BIM type to a certain IFC type.

   In this case, BimDbFootings are mapped to IfcColumns. If no explicit mapping is mentioned in this file, then the types will be implicitly mapped to their corresponding IFC types (e.g. BimDbFooting to IfcFooting, BimDbWall to IfcWall etc.).

```
BimDbFooting    IfcColumn
BimDbFurnishingElement  skip
BimDbFlowTerminal   skip
```

It also contains two lines saying that furnishing elements and flow terminals should be skipped, i.e. will not be exported.

NOTE: Mapping to the default type can be done in two ways: either by writing the corresponding export type explicitly, or by writing 'default' as the export type.

2. Open the drawing **MainBuilding.dwg** from the **Hillside offices** folder.

3. Open the **Settings** dialog. Under **BIM > Import and Export > IFC**, find the **ExportMappingFilePath** setting, and choose **exportmapping.txt**.

4. In the Ribbon under the **Home** tab use the **IFCEXPORT** command.

5. Press **Enter** to select the entire model.

6. Choose a file name.

7. In the **Save As** type, you can choose to export as **IFC2X3**, **IFC4** or as **IFC4x1**.

8. Click **Save**.

9. (optional) Open the IFC file in an IFC viewer such as BIM Vision or Solibri. You will notice that no furnishing elements or flow terminals are present in the drawing. Also, the Footings were exported as columns.

D. Import IFC files

We will import an IFC file and define rules on what and how to import.

a. Import IFC files using custom mapping

The same method of export mapping can be used for **import** mapping. The exact same rules apply, the same type of file can be used, and the same syntax is used. The only difference is the order of types: now obviously an IFC type should be mapped to a BimDb type. So instead of writing 'BimDbWall IfcWall' you should write 'IfcWall BimDbWall'.

1. Try to create your own Import Mapping File, e.g. converting IfcWindows to BimDbDoors, and skipping some entity types.

HINT: the delimiter used between two words in this file is **tab**.

2. In the **Settings** dialog, select this new file as your import mapping file.

3. Import one of the IFC files and check if it worked correctly.

NOTE: For more information about import and/or export mapping of IFC files, see our help page.

E. Use BCF panel

We will import a BCF (BIM Collaboration Format) file in BricsCAD through the BCF panel. This will show us the issues in a certain BIM model and will allow us to communicate about how to resolve them. You could also connect to a BCF server environment for real-time collaboration on issues, but as not all the trainees will have access to such a server, we refer to the Bricsys help center for more information on this specific topic: https://help.bricsys.com.

a. Working with the BCF panel

1. Open a new drawing in the **BIM-mm** template.

2. Under **Settings**, make sure the **Import Mapping File Path** is **empty**, i.e. no mapping file is used.

3. **Import** the **West_Str.ifc** file.

4. Zoom out so you can see the geometry.

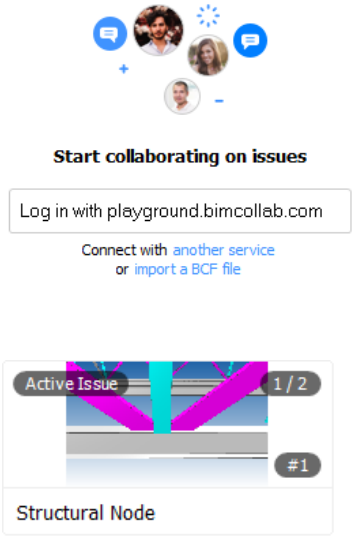
5. Open the **BCF Panel**  . If you cannot see this icon, right-click anywhere in the ribbon and under panels, enable **BIM BCF**.

6. In this panel, you get the option to either log in to a BCF service such as BIMcollab, BimSync or BIMtrack, or to import a .bcf file. Due to practical reasons, in this training we will only cover the .bcf file import. For more information on syncing with BCF servers, please visit our help page: https://help.bricsys.com.

7. Click **Import a BCF file** and choose **Structural_node.bcf**. You should see an active issue appear in the BCF Panel.

8. Click this issue. You should find some information on the issue e.g. creation date, due date & assignee.

9. Click one of the images at the bottom. This should take your camera to the location of the issue. This allows you to easily navigate through issues and solve them where necessary.



11. Components Advanced

This module continues the Components chapter in the basic training. Instead of adding components with the Library panel, this chapter explains you how add/create more custom components with BricsCAD specific tools.

A. Windows – BimWindowCreate tool

This section explains how to create a window with the dedicated **BIMWINDOWCREATE** tool. It lets you create window components with custom geometry on the fly without the need to predefine a window or fiddle with existing ones. This command allows three types of input geometry: a closed boundary on any solid face, a closed polyline, a BIM grid.

a. **On a polyline**

1. **OPEN** the model **02A.dwg**.

   On one of the sides of the building a rectangle and two lines were already drawn. We can use this as input geometry to create windows.

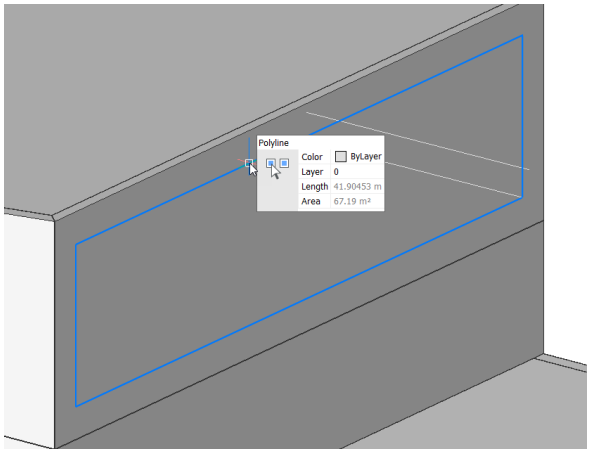
2. From the ribbon under the **Home > Classify** tab or under the **Modeling > Building Elements** tab, click on **BIMWINDOWCREATE**.

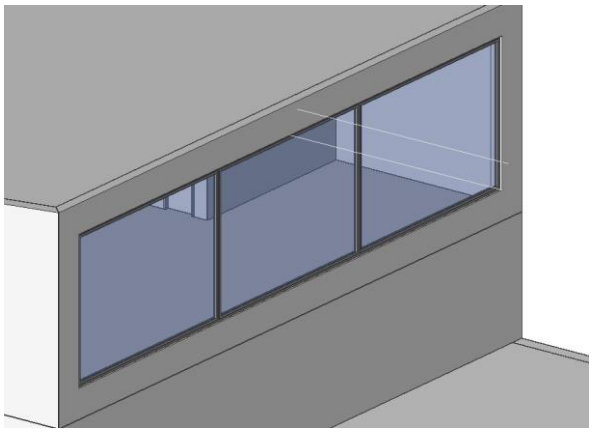
3. As input geometry, click the polyline highlighted in the image on the right and press Enter.

4. A dialog box appears allowing you to choose the style of the window. Let's select the middle left one (window divided into 3 parts).

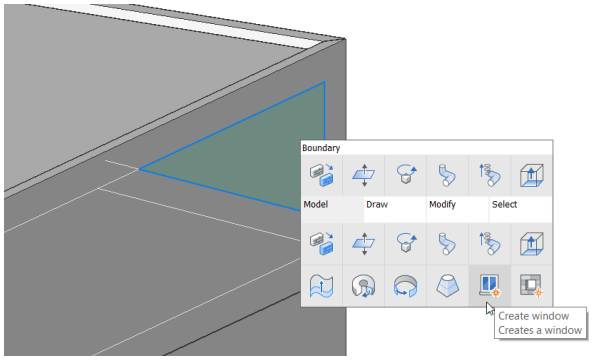
5. A window is created in the shape of this polyline. Select the window and open the **Properties** panel. You should be able to alter its properties such as **LeftPanelThickness** and **RightPanelDepth**.

6. **Undo** until before the window was created.



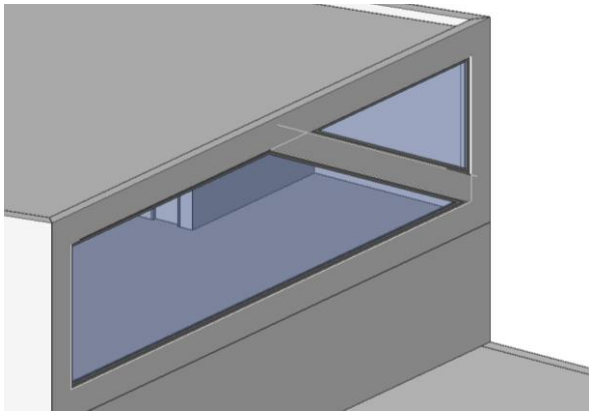


b. **On a closed boundary on a solid face**



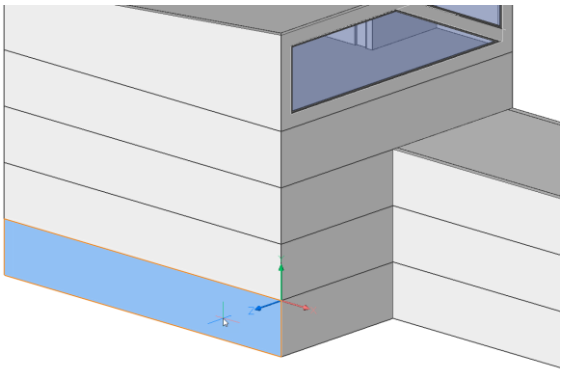
Now let's use a boundary to create a window. Make sure **Boundary Detection** is **enabled** or SELECTIONMODES is set to **value 4**.

1. Move your cursor inside the polyline: a boundary should be highlighted in green as shown in the image on the right.
2. In the Quad under **Model** tab, click BIMWINDOWCREATE.
3. Again, a dialog box is displayed. Choose a window style.
4. Do the same for the other portion inside the polyline so that you have two windows as shown in the final image.
5. Disable **Boundary Detection** or SELECTIONMODES is set to **value 0**.



NOTE: It's also possible to select multiple polylines or boundaries before using BIMWINDOWCREATE, this way you can create multiple windows at once.

c. **On a BIM grid**

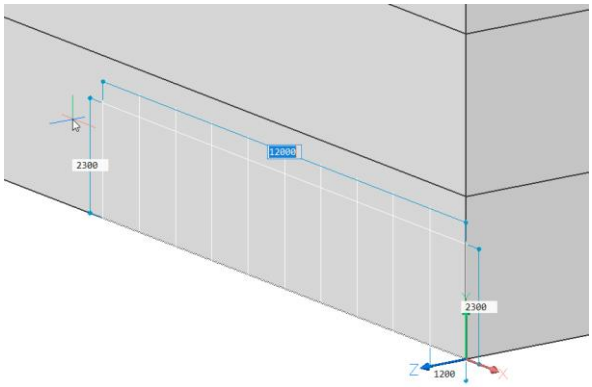


Let's create a temporary grid on one of the façades. Go to the LOOKFROM and select **'Top Front Right'**.

1. Zoom into the front wall on Floor 0. Make sure **ESNAP** is **Off**.
2. From the ribbon under the **Home** > **Classify** tab, click the BIMGRID (**Rectangular** sub-mode) icon.
3. Move your cursor on the side façade of the building. Make sure your **DUCS** (Dynamic UCS) is **On** and the UCS is pointing the right way up (X-axis horizontal, Y-axis vertical).

   (Optional) Hit the **Shift** key once to lock this plane, see image on the right.
4. Left-click in the right bottom corner on this face to start creating the grid. Move your cursor further to the left until you see multiple grid cells appear.
5. Four dynamic input fields are displayed: two for the individual grid cell sizes (X and Y direction) and two for the overall grid size (X and Y

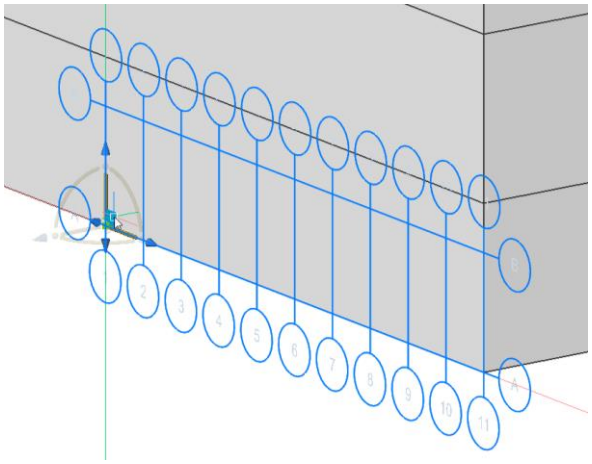
direction).
Hit the TAB-key until the dynamic input field is highlighted that governs the **Horizontal dimension of one grid cell**. Type in **1200** mm and hit **Tab**.



6. Hit the TAB-key until the dynamic input field is highlighted that governs the **Vertical dimension of one grid cell**. Type in **2300** mm and hit **Tab**.

7. Move your cursor until you have a grid of **10 by 1 cells**, in total a grid of **12000 m by 2300 mm**, and left-click. The grid is now created.

8. (Optional) You can now still make modifications on the grid by using the **BEDIT** tool.

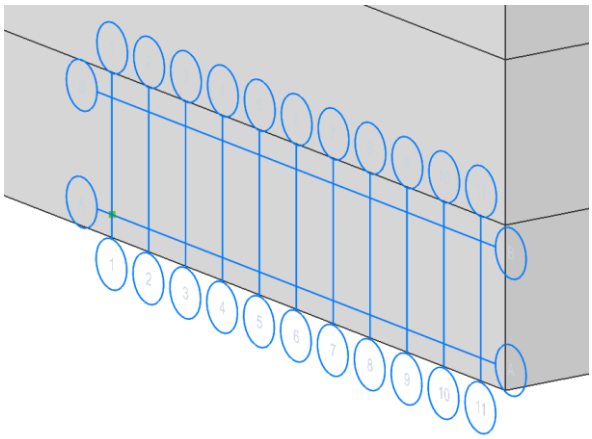


NOTE: Automatically grid labels are created as well.

9. Quad select the **MANIPULATOR** or by long left clicking the created grid. Choose the little blue rectangle to move the grid along the X- and Z-direction.

10. Move the grid towards the middle on the wall (see image on the right).

11. Select the grid and Quad select under **Model** tab, click **BIMWINDOWCREATE**.

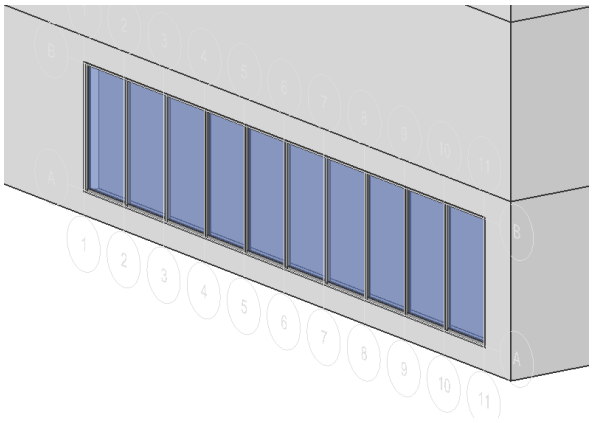


12. Afterwards, select the grid used to create the window and delete it.

NOTE: When selecting the window, the Dynamic input fields are displayed. After creating/adding a window, you can still adjust the location of the window afterwards.

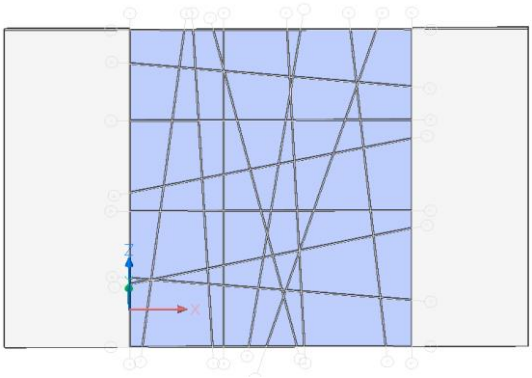
NOTE: The created custom window is parametric, so you can easily change the geometric values such as height, width, frame thickness, etc.

13. (Optional) Instead of drawing your own grid, use the irregular grid from drawing **02A_Bimgrid.dwg**.

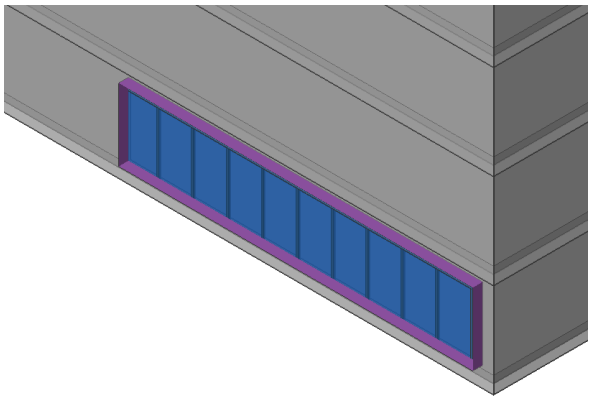


NOTE: This grid was created by using the rectangular grid tool as shown before, and using **BEDIT**. The different grid axes were randomly rotated and shifted to generate a random pattern.

14. Select the grid and Quad select under **Model** tab, click **BIMWINDOWCREATE**.

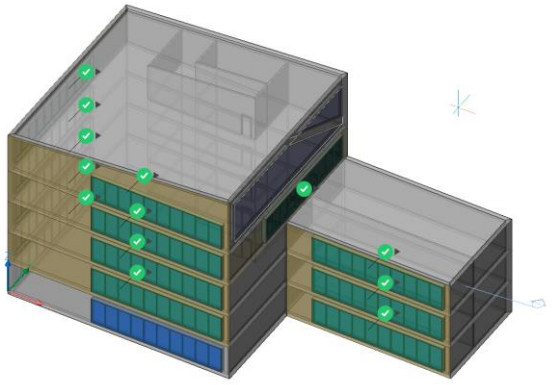


d. **Using BIMPROPAGATE to place multiple windows**



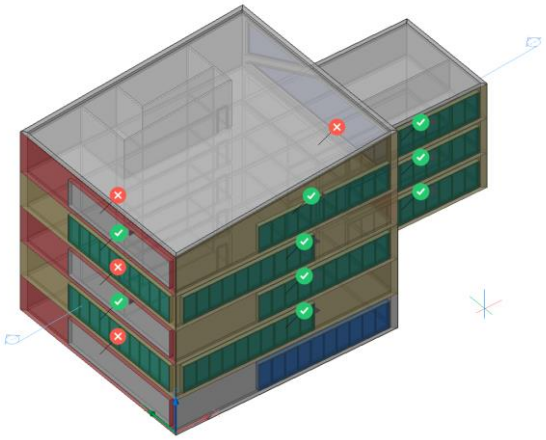
BIMPROPAGATE is a unique feature in BricsCAD BIM. It can be used to copy detailed connections or components, propagate will search for similar situations in the drawing where the connection can be applied to.

Before getting into the BIMPROPAGATE workflow it is important to note that there are five variants of BIMPROPAGATE, each working on a limited set of situations. These five variants were designed to guide new users through the process of BIMPROPAGATE and help to keep the tool more clear and concise, as they are designed for more specific use cases. However, they are still distillates from the original BIMPROPAGATE command, so every problem you can solve with a particular flavor you can also solve using the standard BIMPROPAGATE command.



Go to the **LOOKFROM** and select **'Top Front Right'**.

1. Zoom into the window created with BIMGRID.
2. From the ribbon under the **Home** > **Classify** tab, click the **BIMPROPAGATE** .
3. Select the wall where the window is inserted into, and press Enter.
4. Select the window we want to multiply, and press Enter.
5. The drawing will be displayed with an X-ray Visual style. Press Enter again to confirm the detail entity.

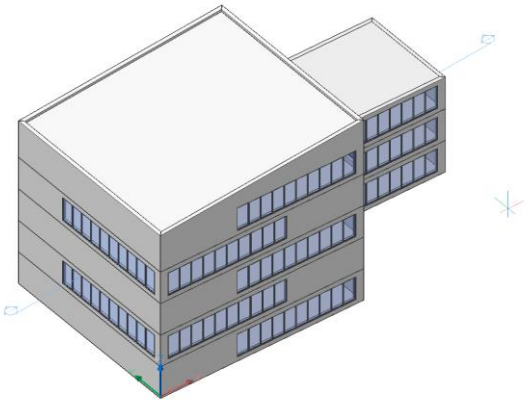


The locations where the desired detail can be applied will be marked with a green checkmark. Click on the checkmark to unselect it, the checkmark will then turn red.

Some of the checkmarks have a little black triangle next to it, that means that the checkmark has extra location options.

6. Check/uncheck some of the checkmarks and use the options 'Left' or 'Right' like the image on the right.

7. Press Enter to **Apply all 13** visible suggestions.



B. Curtain walls – CurtainWall tool

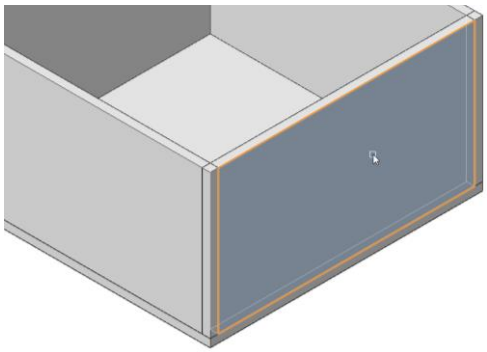
This section explains how to create a curtain wall with the dedicated **BIMCURTAINWALL** tool. It lets you create curtain walls on the fly, starting from solid faces, without the need to use a Curtain Wall from the Library. It also allows (double) curved input faces.

a. Curtain wall tool on a simple face

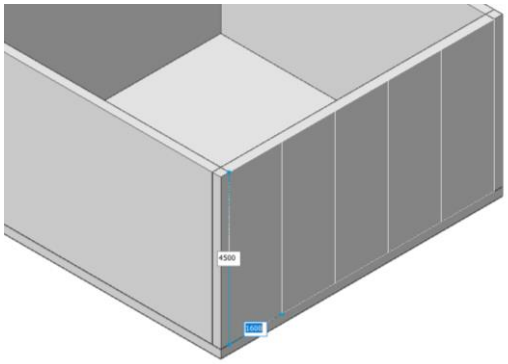
1. **OPEN** the model **02B_Curtainwall.dwg**.

2. In the ribbon under the **Modeling > Create** tab, click the **BIMCURTAINWALL** icon.

3. Select one of the side faces of the small box.



Automatically a first grid is laid out on this face. You can use the dynamic input fields to give an approximation of how wide and high you want the grid cells to be. Alternatively, you can use the command prompts to enter the number of panels in both directions.



4. Type in **NU** and press Enter. Type in **1** and press Enter.

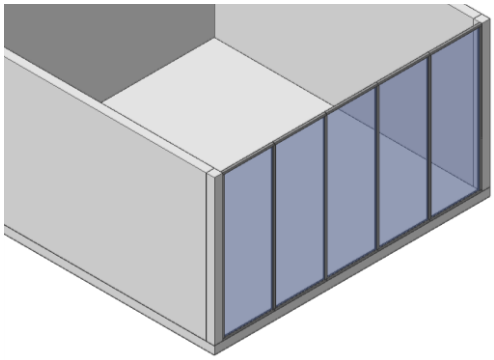
5. Type in **NV** and press Enter. Type in **5** and press Enter.

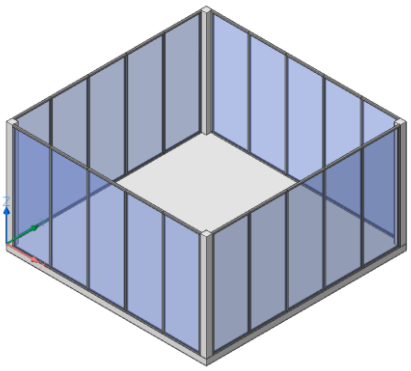
6. Once you are happy with the sizes of your panels, press Enter again to confirm. Your panel should have a height of **4500mm** and a width of **1600mm**.

7. At this stage it is possible to change the frame **Width**, frame **Depth**, **Glass Thickness** and **Connection Type**.

8. Press Enter to create the curtain wall. Note that this process has consumed the host solid.

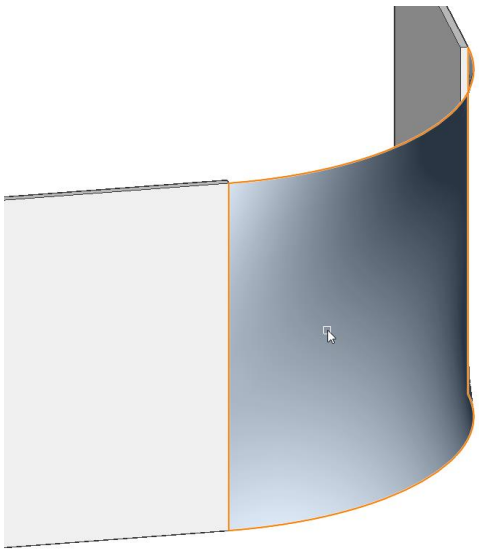
9. Repeat the process for the other sides.





b. **Curtain wall tool on a double curved face**

You can create curtain walls from planar surfaces, but you can also create curtain walls from free form surfaces. In this example, we are going to create a curtain wall from a double curved surface.



1. In the ribbon under the **Home > Create** tab or **Modeling > Building Elements** tab, click the **BIMCURTAINWALL** icon.

2. Click the main face of the lofted surface.

NOTE: This surface was created by using the **LOFT** command on three arcs.

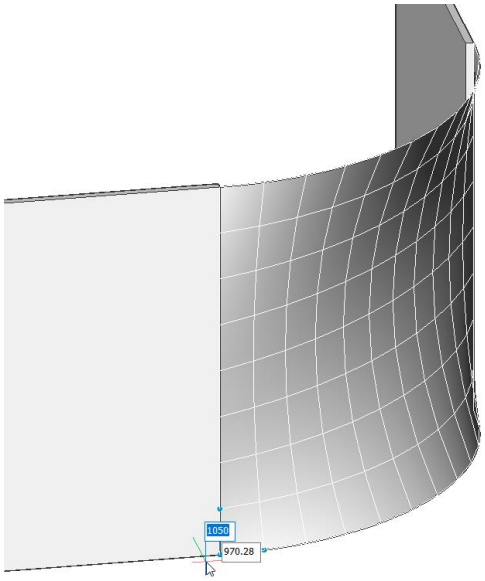
3. Choose a proper panel size so that the glazing still looks smooth enough. Try **1000 x 1000** cells, and press Enter.

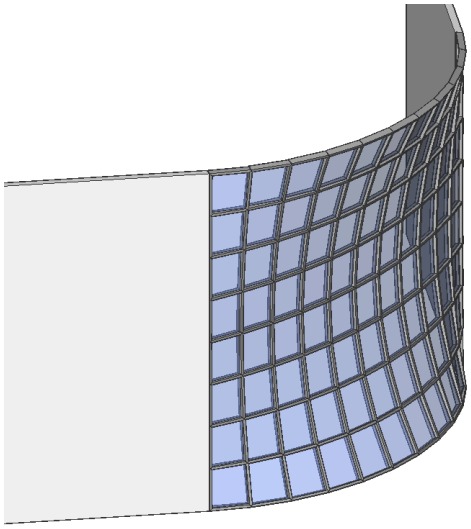
4. You are now asked whether to **Planarize** the cells. In the previous example you were not asked because it was already a planar face.

NOTE: Whether to planarize or not depends on the type of surface you are using. Generally planarizing can be useful as it tends to simplify the geometry. However, in the case of twisted surfaces this may not lead to satisfactory results.

5. In this case, we will choose **not** to planarize. Type in **N** and press Enter.

6. Change the frame **Depth** to **150** and the **Connection type** to **Smooth**. Press Enter to accept.
   A smooth curtain wall should now be created in the shape of the lofted surface.

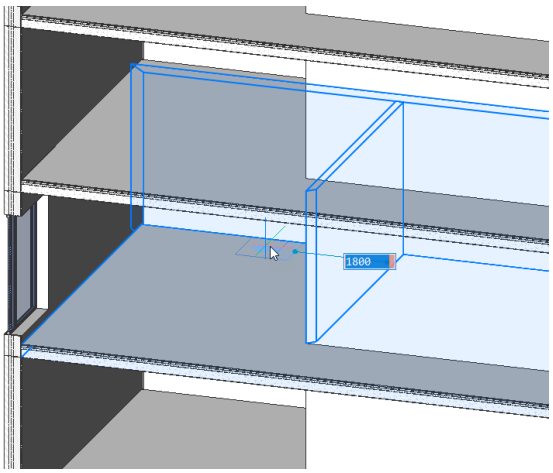




C. Stairs – BimStair tool

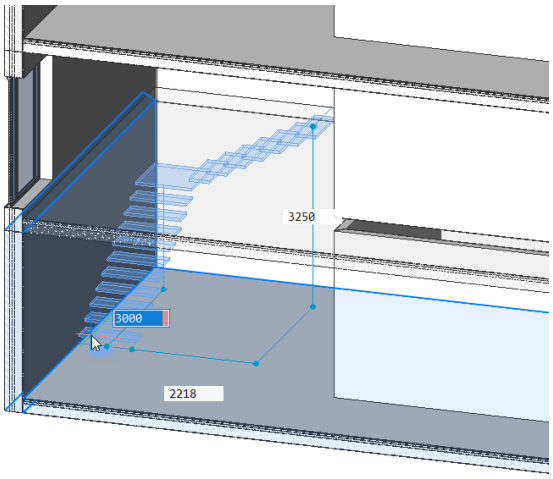
This section explains how to make stairs with the automatic **BIMSTAIR** tool.

a. Use BIMStair

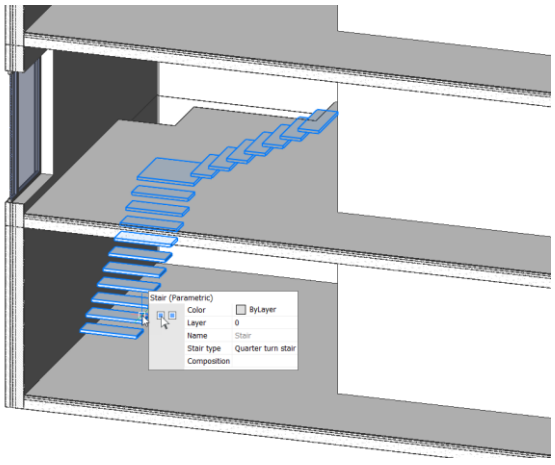


1. **OPEN** the model **02C.dwg**.
2. Activate the vertical section by using **CLIPDISPLAY** or by double-clicking, so you can see inside the building.
3. In the **Home > Create** tab of the ribbon, click **BIMSTAIR**.
4. Zoom into the bottom left corner of the building. A special cursor appears, similar to the Quickdraw cursor. This time it shows the first tread and the direction of the stair. Hit the **CTRL**-key to change the direction.

NOTE: The cursor snaps to existing slabs and walls. This allows for easy alignment with existing objects.



5. Move the cursor so that it snaps to the back wall and is going 'towards' the left wall, as shown in the image.
6. Type in **1800mm** in the Dynamic input field, so that the stair will be located 1800mm from the interior wall (see first image on the right).
7. A live preview of the stair is shown as you move your cursor over the slab beneath it. You can make single-flight stairs, L-shaped stairs, and U-shaped stairs.
   Move your cursor along the left wall so that an L-shaped stair is previewed.
8. Press the TAB-key to switch the Dynamic input field. Change the length of the second flight of the staircase to **3000mm**.
9. Click or Press Enter to create the stair.



NOTE: When the stair is created, automatically an opening is made in the upper slab. This is based on the **HEADROOM** setting. More default settings for the BIMSTAIR tool can be found in the **Settings** dialog under BIM > General > Stair.

10. Select the stair and open the **Properties** panel. Under **Parameters**, you can find and alter its geometric properties, such as stair width or step thickness.

b. Using BIMPROPAGATE to multiply stairs

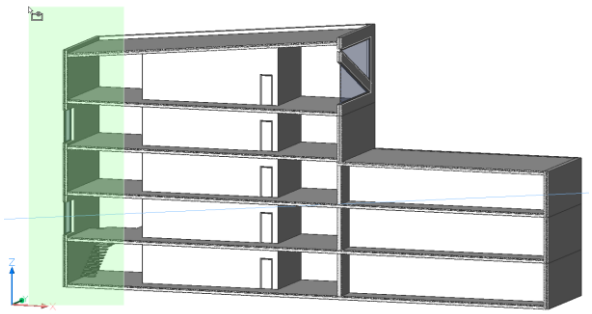
Much like the previous exercise, we can use BIMPROPAGATE to multiply the staircase over the rest of the levels of the building.

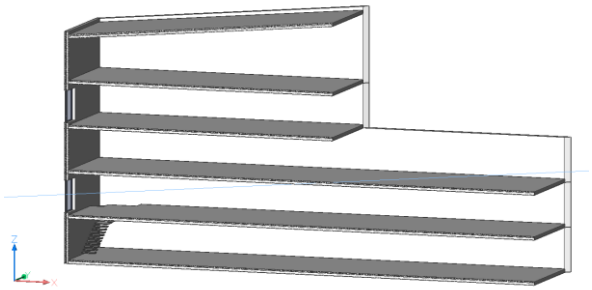
By default, BIMPROPAGATE will automatically scan or search for similarities over the entire drawing. For large drawings, it might take longer for BIMPROPAGATE to search. For that, you can hide the parts of the drawing that don't need to be scanned/searched to improve the command performance.

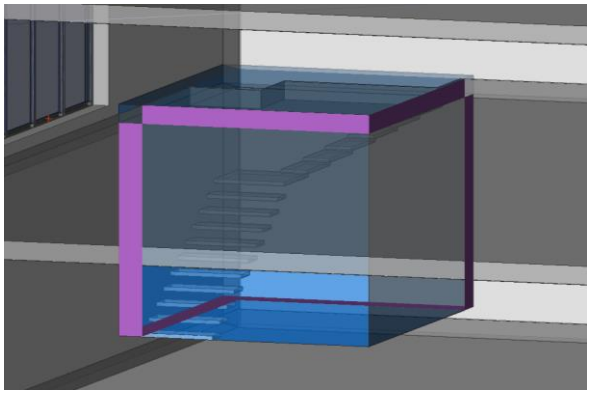
1. Hover over the left corner of the building with a green selection box and click to select the entities.
2. Quad select to **ISOLATE** the entities.
3. From the ribbon under the **Home** > **Classify** tab, click the **BIMPROPAGATE** .
4. Select the slab and 2 walls in the corner as base solids, and press Enter.
5. Select the staircase we want to multiply, and press Enter.
6. The drawing will be displayed with an X-ray Visual style. Press Enter again to confirm the detail entity.

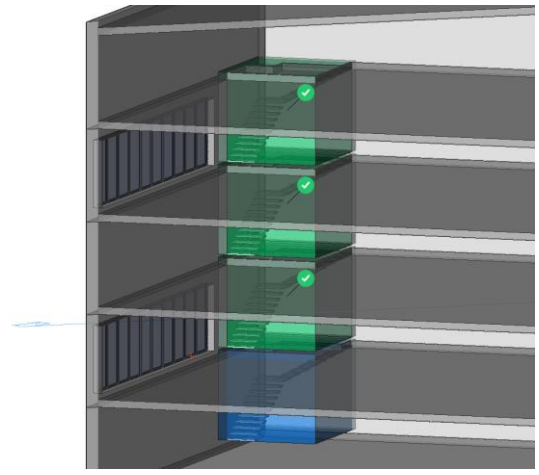
The locations where the desired detail can be applied will be marked with a green checkmark. Click on the checkmark to unselect it, the checkmark will then turn red.

7. Press Enter to **Apply all 3** visible suggestions.
8. Hover over an empty space and Quad select **SHOW ENTITIES** to show the full model.







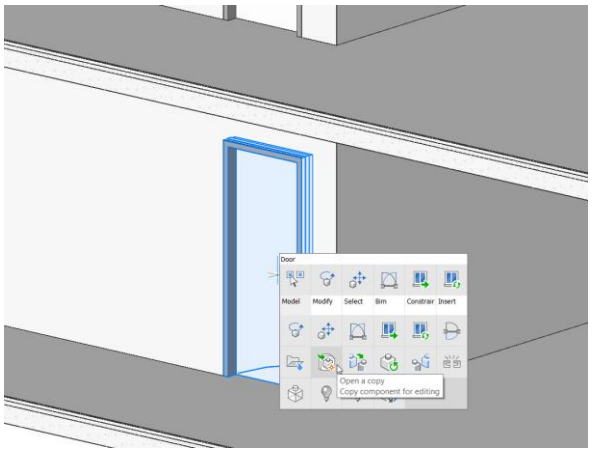


12. Increase geometric LOD

This module explains you how to further increase your geometric Level of Detail (LOD).

A. Increase LOD on Component

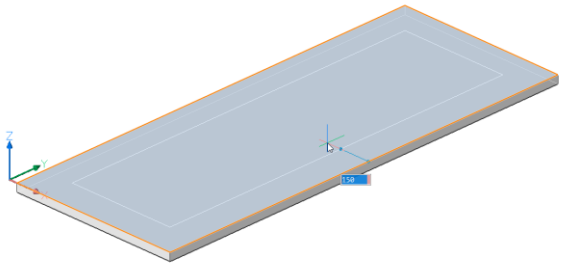
a. **Edit existing door panel**



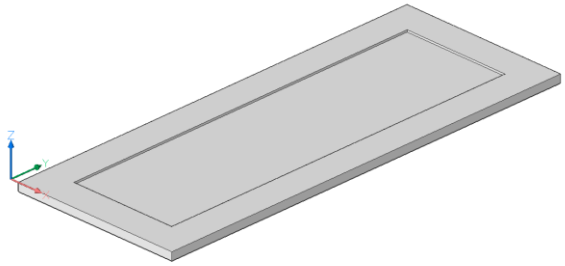
It is possible to increase the LOD of every component in your drawing. Nothing is pre-defined or fixed, you can use direct modeling tools to create more detailed custom components.

1. **OPEN** the model **03A.dwg**.
2. Activate the vertical section by using **CLIPDISPLAY** or by double-clicking, so you can see inside the building.
3. Zoom into one of the doors in the drawing. Select the door and **OPEN A COPY**.

A new drawing will automatically be opened, containing the door component. Here you can do all the necessary edits to increase the LOD of the door.



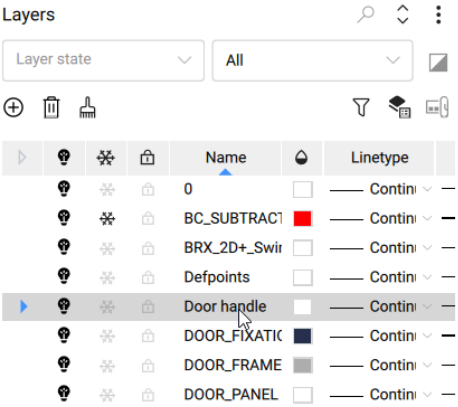
4. Select the door panel and **ISOLATE** it.
5. Highlight the top surface of the door panel and Quad select **OFFSET** from the **Draw** tab.
6. Give an offset of **150mm**, a polyline is created on the surface.
7. Select the polyline created and launch **EXTRUDE** to create a depression of **10mm** in the door panel.
8. Repeat steps 5-7 for the other side of the door panel.

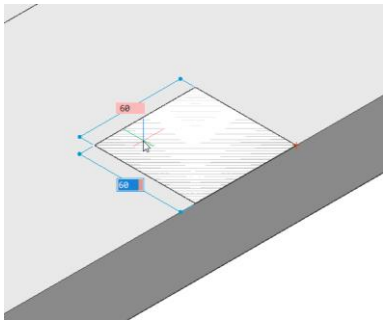


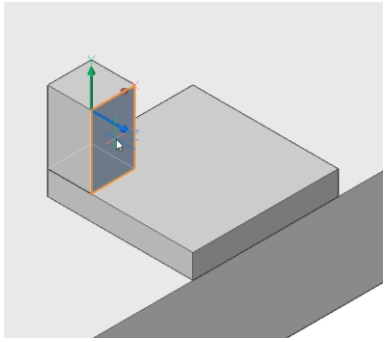
b. **Adding door handles**

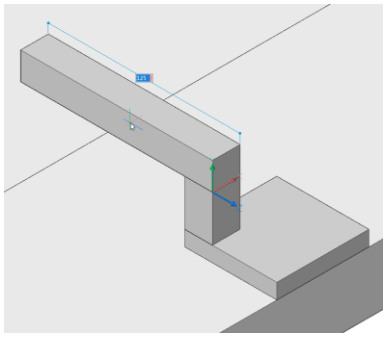
Continuing in the same drawing, let's model the door handles on this door component. First, let's create a new layer for this door handle.

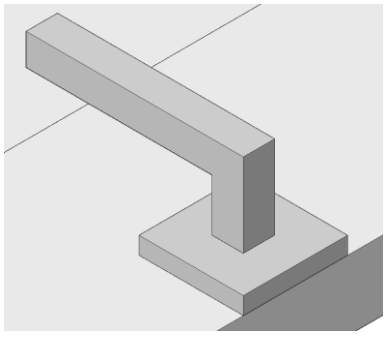
1. Open the LAYERS PANEL and press **Add Layer**.
2. Name the new layer **'Door handle'** and set this as the current layer.
3. Zoom into the middle of the door panel and launch the BOX command from the ribbon **Home > Create** tab.
4. Make sure **ENSNAP Midpoint** is **ON**. Snap to the Midpoint of the panel and hover the box towards the bottom of the floor.
5. Fill in the Dynamic input fields: type in **60mm**, hit the TAB-key and type in **60mm** again, press Enter.
6. Fill in **10mm** for the height of the box and press Enter.
7. Launch BOX again and snap to the corner of the just created box.
8. Fill in **18mmx18mm** and give it a height of **30mm**.
9. Launch BOX again and hover on the side surface of the previously created box (see image on the right). Make sure **DUCS** is **ON**.
10. Snap and click to a corner.
11. Fill in **18mmx18mm** and give it a length of **125mm**.
12. UNION the last 2 boxes.
13. MOVE the door handle to the middle of the base solid. Make sure that **ENSAP Geometric center** is **ON**.
14. Select both door handle solids and Quad select the MANIPULATOR.
15. Move both entities **30mm** to the right along the Y-axis and **30mm** towards the door panel along the X-axis.
16. Select both solids and use the MANIPULATOR to mirror them to the other side of the door.





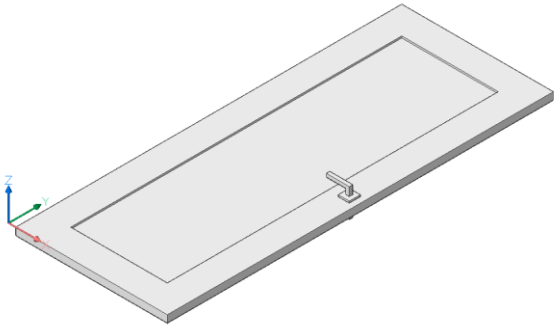






17. Hover over an empty space and Quad select **SHOW ENTITIES** to show the full door component.

18. **SAVE** this drawing in your project folder and name it **'Door_custom.dwg'**.



NOTE: You can also save this component to the **Library** panel.

c. **Replace existing door component**

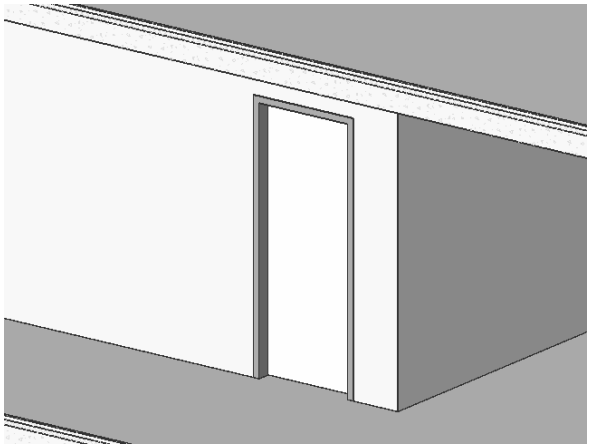
Now you have edited and increased the LOD of the door, you can use this component in the project.

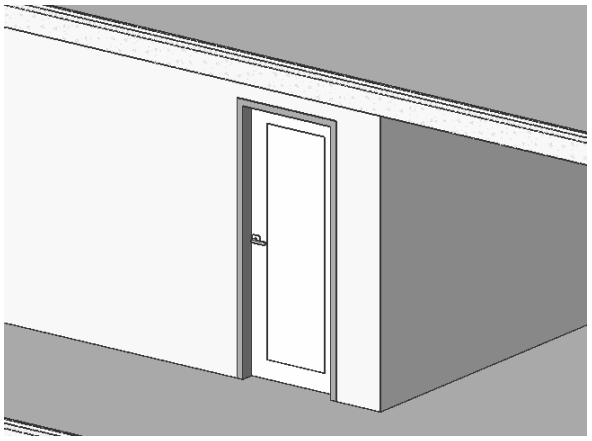
1. Go back to drawing **04A.dwg**.

2. Select one of the doors in the model and Quad select **REPLACE** from the Quad Model tab.

3. Press Enter to choose a component **from File**.

4. A dialog will pop open to find the door component you've just saved. Choose the component file **Door_custom.dwg** and click Open or press Enter.





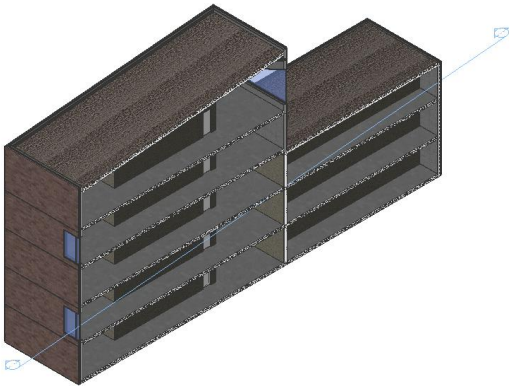
NOTE: You can select multiple doors and replace them at once.

NOTE: Instead of replacing existing doors, you can also use **BMINSERT** to add new doors to the model.

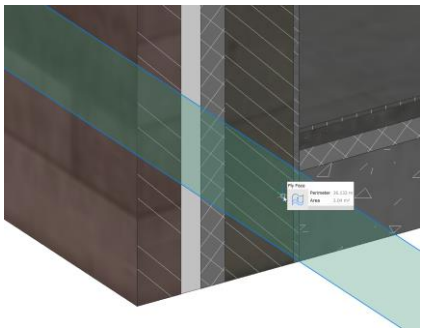
B. Increase LOD on Composition plies

a. Editing Composition plies

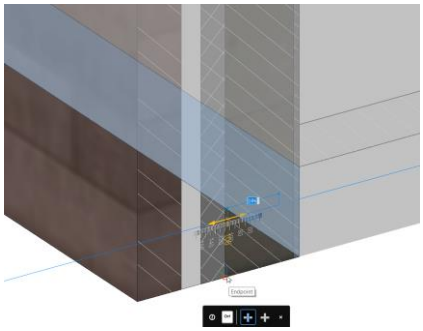
To further add more detail and information in your drawing, let's increase the Level of Detail (LOD) by editing the plies of the compositions.



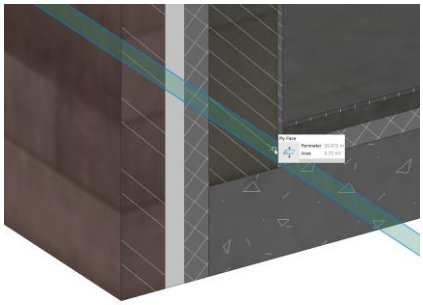
1. **OPEN** the model **03B.dwg**. Make sure setting **RENDERCOMPOSITIONMATERIAL** is toggled **ON**.
2. Activate a vertical section by using **CLIPDISPLAY** or by double-clicking, so you can see inside the building.
3. Zoom in to the connection between the bottom floor slab and exterior wall.



4. Make sure **LEVEL OF DETAIL** is toggled **ON**. Level of Detail allows to manipulate individual composition plies/materials.
5. Since you will be editing the plies of the compositions, **Selection of faces** should be **ON** in the ribbon or **SELECTIONMODES** should be **value 2**.
6. Hover cursor near the concrete surface of the floor slab, and press the TAB-key until the Ply Face of the Concrete ply is highlighted in green.

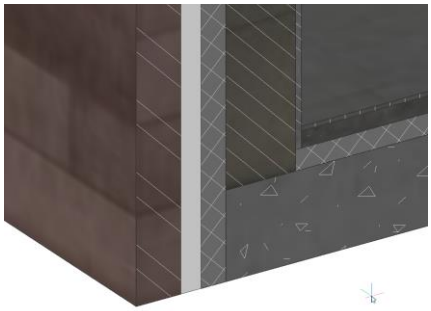


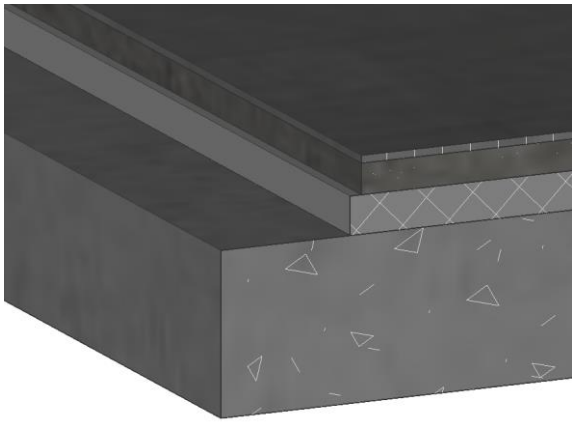
7. Quad select **PUSH/PULL** and move it to the insulation layer of the wall (like the image on the right). Make sure setting **DMPUSHPULLSUBTRACT** is **ON**.
8. Do the same for the floor screed layer, until it looks like the right images.



9. You can check the change in the geometry of the floor slab.
10. **Selection of faces** can be turned **OFF** in the ribbon or **SELECTIONMODES** should **be value 0**.
11. Select the floor slab and Quad select **ISOLATE ENTITIES**. The floor geometry is isolated, and you should see the form changes that you just made.

12. Quad Select **UNISOLATE** .

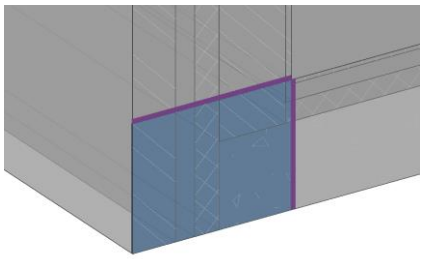




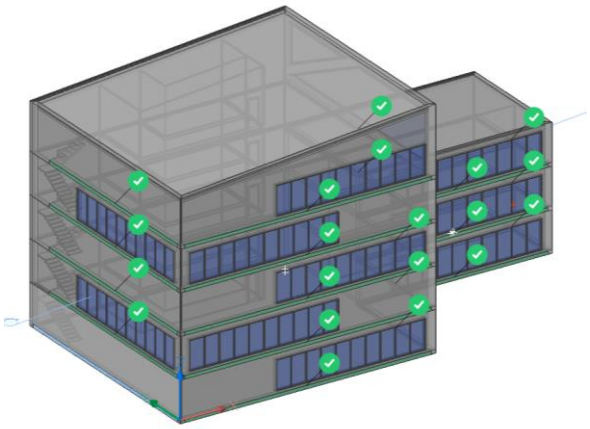
b. **Using BIMPROPAGATE on Planar Details**

In the previous module we used BIMPROPAGATE to multiply components like doors and staircases.

BIMPROPAGATEPLANAR is one of the five Propagate options in BricsCAD BIM. It can be used to copy detailed connections between two or more planar entities. Propagate will search for similar situations in the drawing where the connection can be applied to. Common examples are wall-slab connections or wall-wall connections.

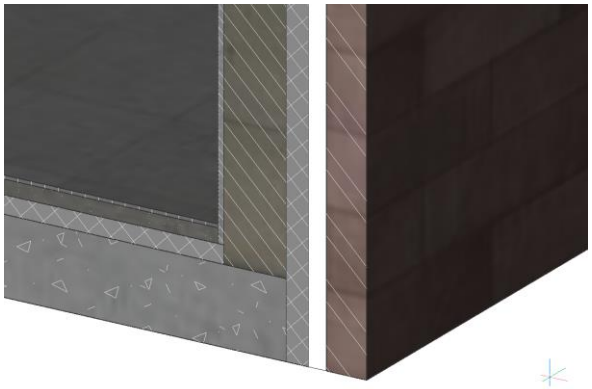


1. Toolbar select **BIMPROPAGATE PLANAR** (Quad: **Mode**l tab).
2. Select the floor and wall that have been edited previously.
3. Press Enter twice, once to confirm the reference solids, once to confirm an extra solid (optional).
4. The detail should be shown as in the top right image. Press Enter to confirm the detail.
5. The locations where the desired detail can be applied will be marked with a green checkmark.
6. Press Enter to **Apply all 20** visible suggestions.



7. The section will be activated again.

8. Zoom in to the other side of the building where you didn't edit the composition plies to see the applied connection.



C. The Details panel

a. **Details panel**

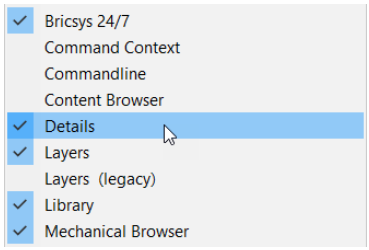
On Windows, paste the details from the Details folder in the following path:
C:\ProgramData\Bricsys\Support\Bim\Details

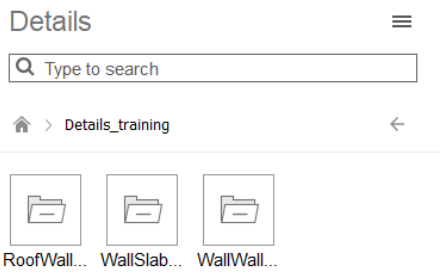
For Mac open the Finder, go to the Go tab and click on 'Go to folder…' and type in var/Bricsys/Details. Paste the content of the Details folder there.

The Details folder can be found in the Starter files provided with the training.

The Details Panel is a panel where you can store construction details, like planar details (e.g wall-wall connections, wall-roof connections, etc), structural steel details and MEP details.

This way you can use a certain detail not only inside one drawing but also in other drawings outside a certain project.





1. **OPEN** the model **03C_SecondBuilding.dwg**.

2. Turn **ON** of the **Floor Plan section (Floor 1)** by using **CLIPDISPLAY** or by double-clicking.

3. Zoom in to the **Wall, Front - Wall, Back**-connection

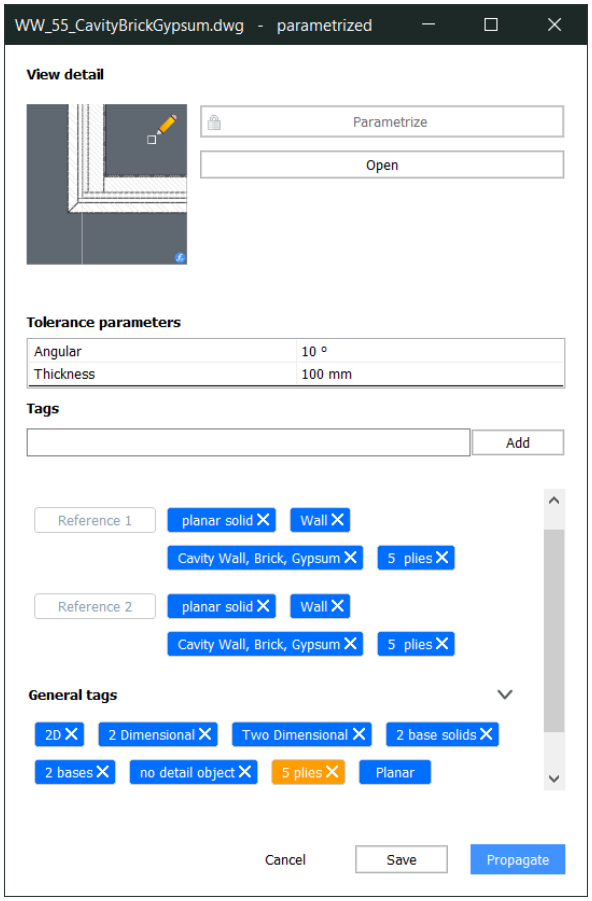
4. Open the **DETAILS PANEL** on the right-hand side of your screen. If the panel is not shown, right-click a blank menu area and select **Details**.

5. It should appear with an icon in the Tool Panel. If it appears as a standalone, drag it over Tool Panel

and position cursor until the large rectangle turns blue and release.

6. Like most of the dockable panels in BricsCAD, it is equipped with a search tool so you can quickly find the specific detail you are searching for. In the Details Panel, this search function works with tags: solid tags, general tags, and customized tags.
   Use the search button to find all wall connection using the **Wall**-tag. Click on the **+ sign** once.

7. Choose the detail **WW_55_CavityBrickGypsum.dwg** and open it by double-clicking.



b. **Propagate saved Details**

1. Click **Propagate** in the detail dialog.

2. The locations where the desired detail can be applied will be marked with a green checkmark

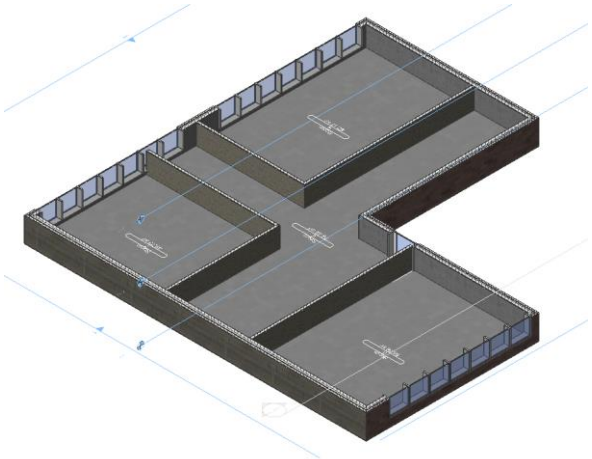
3. Only apply the suggestions on the connections of the blind facade (like the image).

4. Press Enter to **Apply all 4** suggestions.

5. The floor section will be activated again.

6. Zoom in to the Wall, Front - Wall, Back-connection again to see the difference.

7. Close the section plane.



We can use this saved detail on other drawings as well.

8. Open drawing **03C.dwg**.

9. Drag and drop the detail **WW_55_CavityBrickGypsum.dwg** into the drawing to propagate.

10. The locations where the desired detail can be applied will be marked with a green checkmark

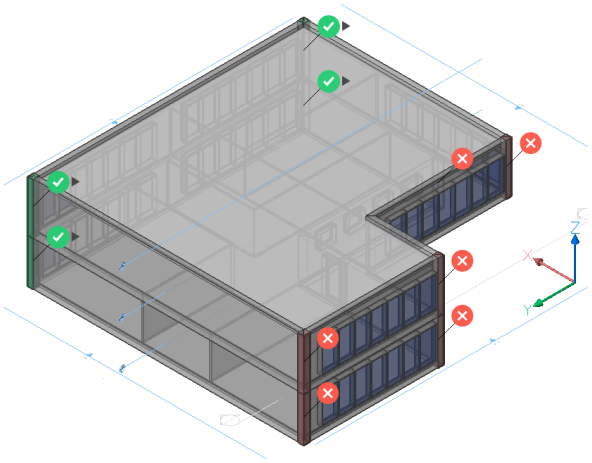
11. Only apply the suggestions on the connections of the blind facade (like the image).

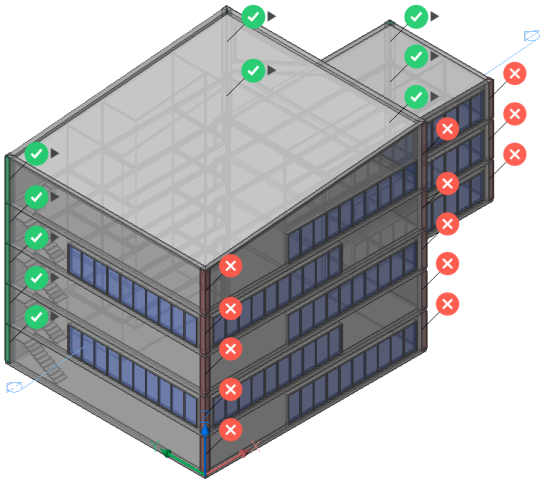
12. Press Enter to **Apply all 10** suggestions.

13. Turn **ON** of any **Floor Plan section** by using CLIPDISPLAY or by double-clicking.

14. Check the new construction detail.

15. Close the section plane.





13. MEP Modeling

In this section you will learn how to create piping and duct networks using the built-in library of profiles. You'll learn how to work with the Profiles dialog & panel, how to use the direct modeling tools associated with MEP Modeling and even how to automatically create duct layouts.

A. The Profiles panel and dialog

BricsCAD BIM uses the concepts of Linear Solids; these are solids that are extrusions of a profile or cross section along an axis. Typical objects that can be linear solids are beams, columns, pipes, and ducts. These profiles are saved in a database and can be accessed through the Profiles Panel and the Profiles Dialog.

a. The Profiles dialog

The Profiles dialog gives you an overview of all the profiles that can be used for Linear solids.

1. Open **Shed_MEP.dwg.**

2. Call the **BIMPROFILES** command. You can also find this in the ribbon under **Structural/MEP > Profiles**

3. In this dialog you will find all the profiles currently in the central database, as well as the profiles currently used in the project.

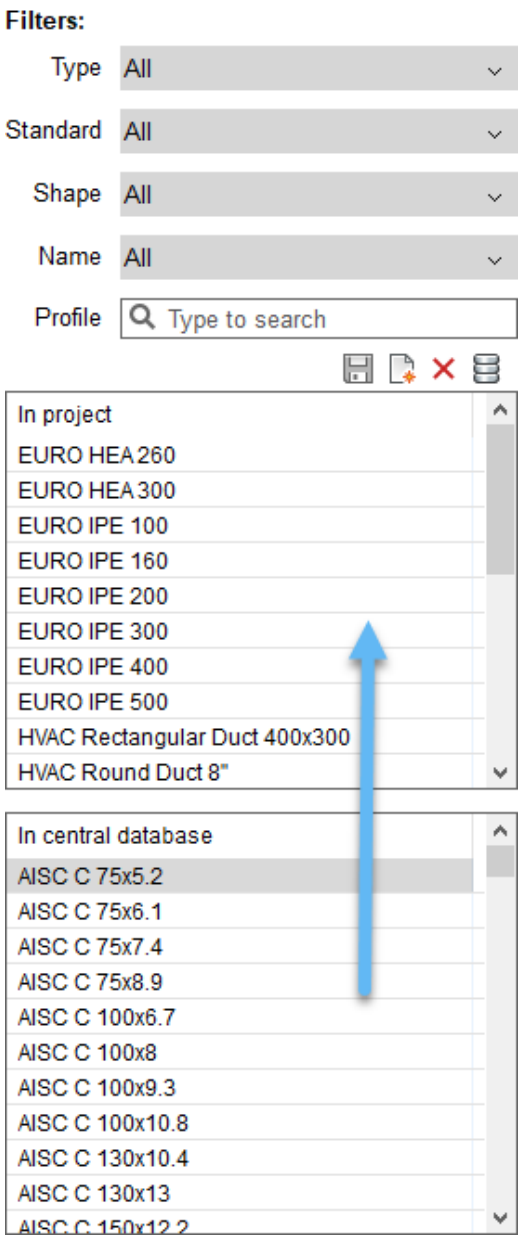
   You can filter on type (Piping, Structural Steel, HVAC) and on standard. Some commonly used standards for structural steel profiles and pipe sizes are included in the central database by default.

   NOTE: If you only want to include certain standards in the panel, you can use the **BimProfileStandards** setting.
   - You can also filter on the shape of the profile. For MEP modeling we will mainly be using (hollow) circles and rectangles.

   Finally you can filter on the name of the profile, or use the search field.

4. Note that in this project some IPE and HEA profiles are used for the steel structure, some rectangular and round ducts for the ventilation system, and round pipes with different diameters for the sanitary system.

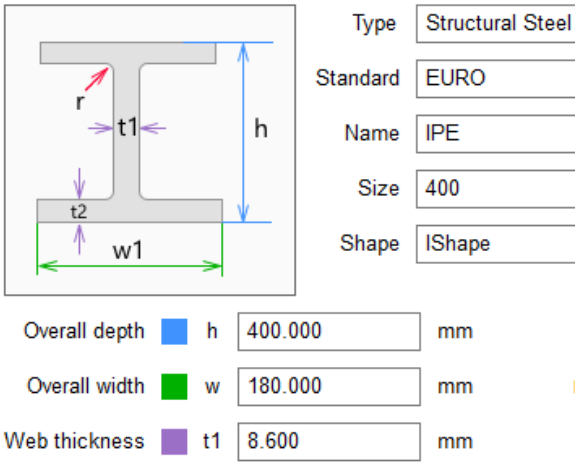
5. When selecting a profile, a preview is shown on the right-hand side, along with some more information such as its type, standard, name, size,



shape, and the different parameters defining the size of the profile.

6. If you use a certain profile for the first time in a given project, this profile will automatically be added to the list of profiles used in the project. You can also manually copy profiles from the **Central** database to the **Project** database by dragging and dropping it from one field to the other field, see blue arrow in the first image.

7. It is possible to create new profiles, either based on existing profiles or shapes, or using a completely custom shape.



b. **The Profiles panel**

The Profiles panel gives you a list overview of the same profiles that were shown in the Profiles dialog.

1. Open the **Profiles** panel. If you don't see this icon in the panel list, right-click the ribbon and under Panels, enable **BIM Profiles**.

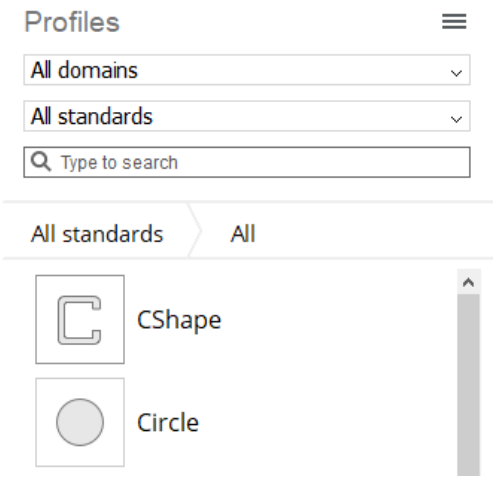
2. You can filter on the same properties as in the Profiles dialog, such as type/domain, standard, shape etc.

3. There are two ways to use the Profiles panel to start modeling:

   - Drag-and-drop a profile into an empty space in your model. This will launch the **BIMLINEARSOLID** command and allows you to start modeling freely with this profile

   - Drag-and-drop a profile onto an existing linear solid or a line segment. This will launch the **BIMAPPLYPROFILE** command to re-apply this new profile onto the existing segment.

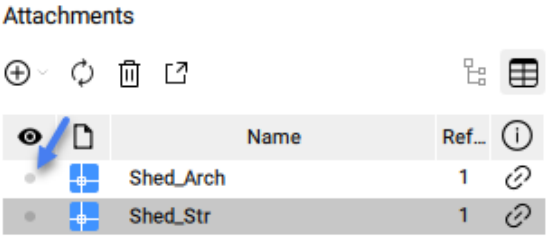
   We will use both methods in the next section.



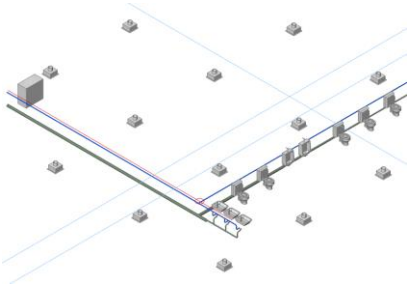
B. Modeling with profiles

In this section we will learn how to use profiles to create pipes and ducts. We will start with a simple piping example, and in a later example show how to create automatic branching for ventilation ducts.

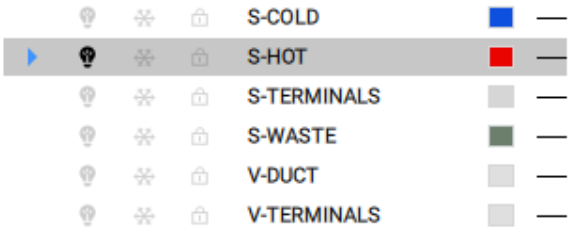
a. Creating flow segments



1. Open **Shed_MEP.dwg.**
2. Note that this drawing has 2 External References inserted: one architectural model and one structural model. Open the **Attachments** panel and unload both Xrefs by clicking the dot in the 'eye' column.
3. Now that we have a clear view of everything that is in this model, we can see that two pipe layouts have already been created: a pipe for wastewater and a pipe for cold water. Let's create a pipe layout for the hot water now.



4. Open the **Layers** panel. Right-click the layer called **S-HOT** and choose **Isolate Selected Layers**.



5. You will notice that there is one line, two points and six small pipe segments already on this layer. We will use this existing geometry to make the creation process of this pipe layout easier.
6. Open the **Profiles** panel. The pipe size we want to use for this hot water pipe is already used in the project. Using the hamburger menu on the top-right, choose **Show only profiles in project**. You can use the dropdowns to filter on Piping domain, or you can simply search in the list of used profiles.
7. Drag-and-drop the profile called **Pipe DN 32 30** onto the red line. This will launch the BIMAPPLYPROFILE command. You can now press **Enter** to accept the default settings.

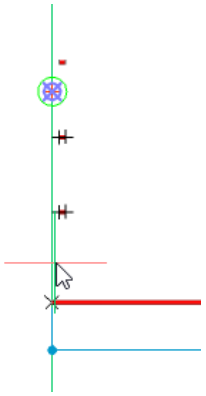
8. Left-click the middle of the **LookFrom** widget so we get a top view of the model.
9. Drag-and-drop the same profile into an empty space in Model Space. This will launch the BIMLINEARSOLID command and allows you to start modeling freely with this profile.
10. As a starting point, snap to the Point object (indicated by the magenta circle) on the pipe we just created. NOTE: make sure snapping to **Node**

is enabled in the **ESNAP** settings. Also make sure **STRACK** is enabled, and either **ORTHO** or **POLAR** is enabled in the status bar.

11. As the next point, Snaptrack down from the second Point object (displayed as the green circle) so the pipe can make a right angle.

12. As the final point, snap to the second Point object (green circle).

13. Finally, press **Enter** twice to exit the command. If all went well, you should end up with a pipe layout as indicated in the image on the right.

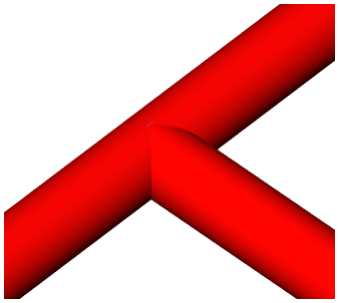


14. Using these steps, we created 2 new flow segments. They are (linear) solids classified as **Flow Segments** and with the profile **Pipe DN 32 30** attached.

15. Note that between the two flow segments, a bend was automatically created. This is also a solid, classified as a **Flow Fitting**. Selecting this flow fitting and opening the **Properties** panel you can find and edit some parameters such as the radius and tangent length.

b. **Connecting flow segments**

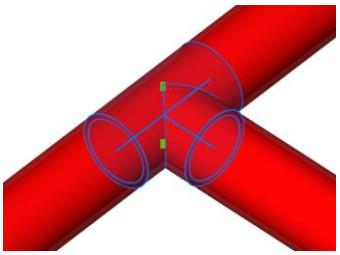
1. Take a look at where the two newly created pipes form a T. Currently the two pipes are interfering with each other, this connection has not been resolved yet.



2. Select both pipe segments and from the **Quad** under **Model**, choose FLOWCONNECT. Now the pipe will be cut in such a way that it fits around the other pipe without clashing.

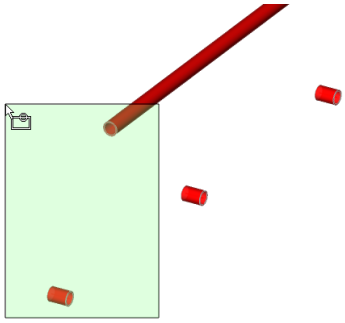
3. Open the **Settings** dialog and search for the **AutomaticTees** setting. Enable this setting and close the dialog.

4. Select both pipe segments and from the **Quad** under **Model**, choose FLOWCONNECT. Now an extra flow fitting is created as a separate object, which connects the (now three) pipes.



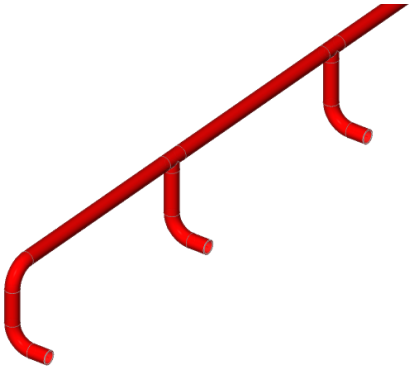
5. In the ribbon under **Structural/MEP** enable the DISPLAYAXES setting. This setting will make all linear solids slightly transparent and will display the axes with a red line. It might be hard to

see in this particular example because of the red color of the solids.



6. Select the main pipe together with one of the small pipes that were already in place, and from the **Quad** under **Model**, choose **FLOWCONNECT**  . This searches for the best connection option between the two pipes and automatically creates it for you. In this case, two fittings and one more flow segments will be created.

7. Repeat the previous step twice with the other small pipes, until you end up with a setup as shown in the final image.

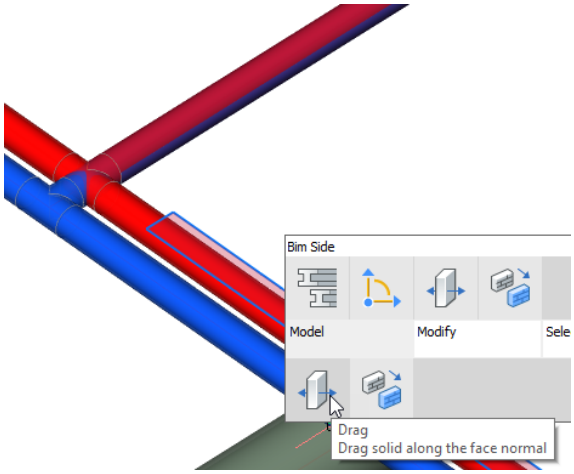


8. Repeat these steps on the other end of the pipe as well.

c. **Modifying flow segments**

1. Call the **LAYUNISO**  command to see the other pipes and installations. We can see that the hot water pipes and cold water pipes are clashing. To fix this we will move the hot water pipe up so it is above the cold water pipe.

2. In the ribbon under **Structural/MEP**, enable **DISPLAY SIDES AND ENDS** 



3. Hover your cursor over the top of one of the red pipes, until a red rectangle is displayed. This is a special selection mode to be able to move and copy linear solids which don't have flat side faces (such as round pipes) more easily.

4. In the **Quad** under the **Model** tab, click **DRAG** 

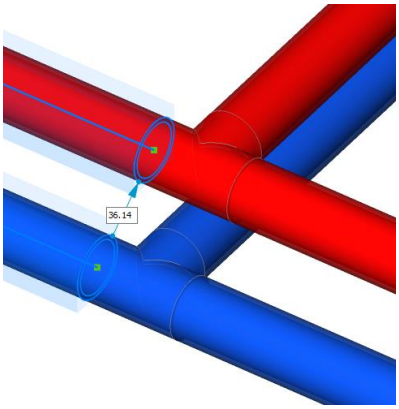
5. Move the pipe up over a distance of **50 mm**. Notice that not only this pipe was moved up, but all the connected pipes in the same plane moved along. Also, the other connected pipes were lengthened and the connections were retained.

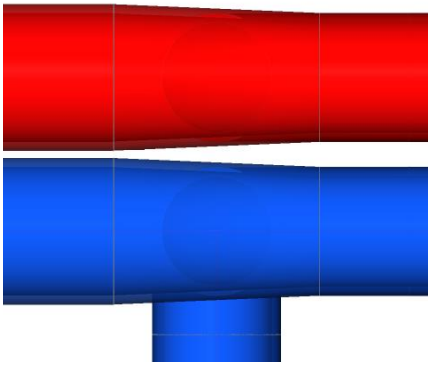
   NOTE: there is also a yellow selection mode for linear solids when hovering near one of the ends of the solid. This allows stretching and push/pulling the solid.

6. Select both the blue and the red pipe to the left of the T-connection

7. From the **Profiles** panel, drag-and-drop the **Pipe DN 40 30** profile onto one of the pipes.

8. After pressing Enter to accept, the pipes will have a larger diameter. Note that the two pipe tees have been automatically turned into reducers, i.e. one end has a diameter of 40mm and the other end has a diameter of 30mm.





C. Branching

In this section we will look at the automatic branching tool that BricsCAD BIM offers. We'll use an example of a ventilation duct system.

a. **Understanding Flow Connection Points**

Flow Connection Points are entities that define how flow terminals (e.g. toilets, sinks, ventilation units, light fixtures…) are connected with a system, where the flow segments enter the component, what kind of pipe/duct needs to connect etc. It is possible to define these Flow Connection Points to add more intelligence to the model.

1. Using the **Layers** panel, isolate the layer called **V-TERMINALS.**

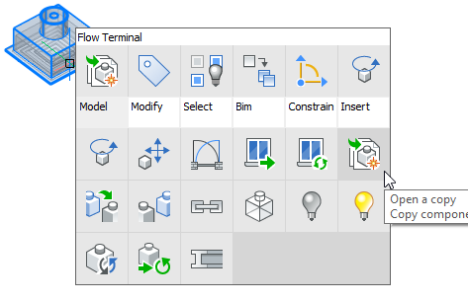
2. Select one of the ceiling units and open the **Properties** panel.

3. Notice that the properties contain a subsection about Connection Points. This contains information such as the type of connection, flow

Connection point index	1
⊟ Connection point	79143.86, -10269.79, 2932.77
X	79143.86
Y	-10269.79
Z	2932.77
Point type	HVAC
Flow direction	In
Profile	HVAC Round Duct 8"
Profile name	Round Duct
Profile standard	HVAC
Profile size	8"

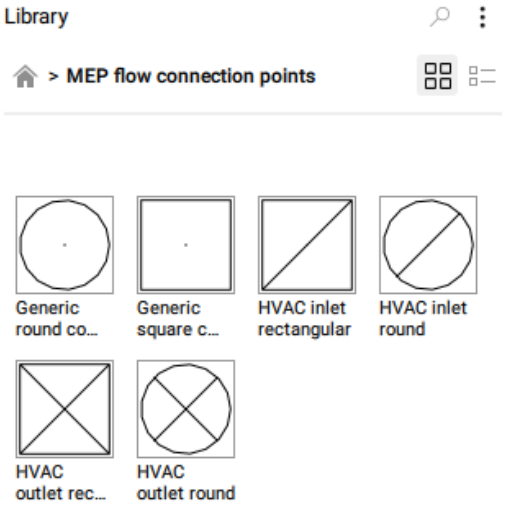
direction and the profile that needs to be connected to this flow connection point.

4. Let's take a look at one of these flow connection points in detail. Highlight one of the flow terminals and in the **Quad** under **Model**, click **OPEN A COPY**



5. In this model we can find a Circle entity that was classified as a **Flow Connection Point** using **BIMCLASSIFY**. Selecting this circle you will find the same properties of type, flow direction and profile in the properties panel.

6. If you want to add your own flow connection points to an object, e.g. a toilet or sink, you can do so easily by going to the **Components** panel and in the **Bricsys BIM Library** going to **MEP flow connection points**. You can then drag-and-drop these flow connection points onto the model.



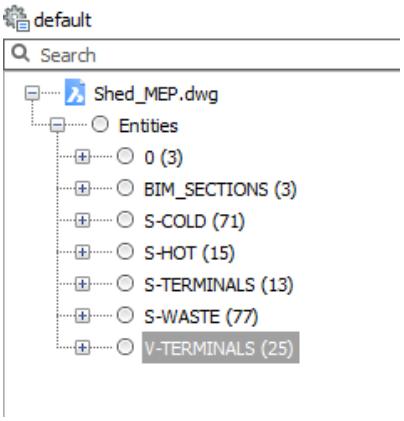
7. Once a component contains one or more flow connection points, you can connect the component to a flow segment automatically using **FLOWCONNECT**

b. **Using FlowConnect to create a layout**

If multiple flow terminals are laid out in a grid, it is possible to use **FLOWCONNECT** to automatically suggest possible routing options between these flow terminals.

1. Go back to **Shed_MEP.dwg** and use **LAYUNISO** to get a full view of the model again.

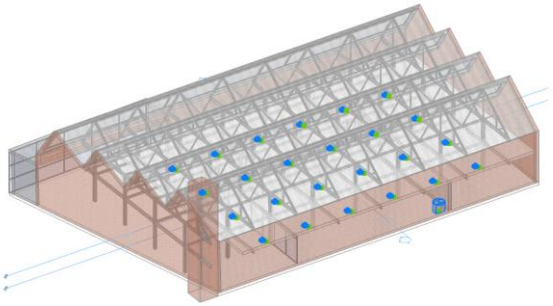
2. Using the **Attachments** panel, reload the architectural and structural models.



3. Set the current visual style to **X-Ray**. This can be done in the **Quick Access** toolbar, in the **Properties** Panel or by right clicking the **LookFrom** widget.

4. Set the current layer to **V-DUCT**

5. Open the **Structure** browser. Make sure the configuration is set to **Default**. If not, you can change this by clicking the hamburger menu on the top right.



6. By default, the structure of the drawing should now be grouped by Layer. Select the node called **V-TERMINALS.**

7. In the Ribbon under **Structural/MEP**, click CONNECT FLOW SEGMENTS

8. The command automatically detects that the ceiling terminals should be connected to the one main unit. It shows a preview of how these terminals could be connected.

   NOTE: if the lines are not very visible, try turning on line weight display (**LWT** in the status bar)

9. Press **Ctrl** to cycle between different options. In this case, it found 4 possible configurations through which you can cycle.

10. Cycle through the options until you encounter the one highlighted in the image on the right. Press **Enter** to accept.

11. Now the command creates a preview of ducts based on the information that was defined in the Flow Connection Points of the flow terminals: round ducts for the ceiling terminals, a rectangular duct for the main unit.

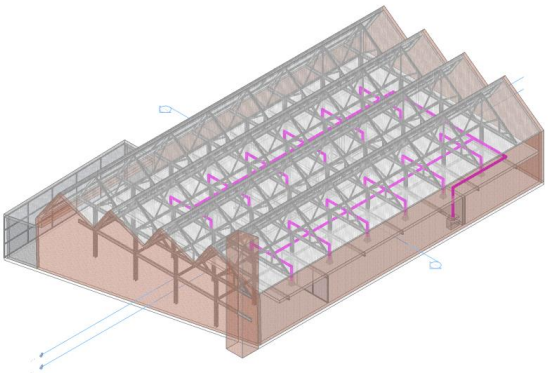
12. Notice that in the command line we still have the option to **Tune** the model. Choose this option.

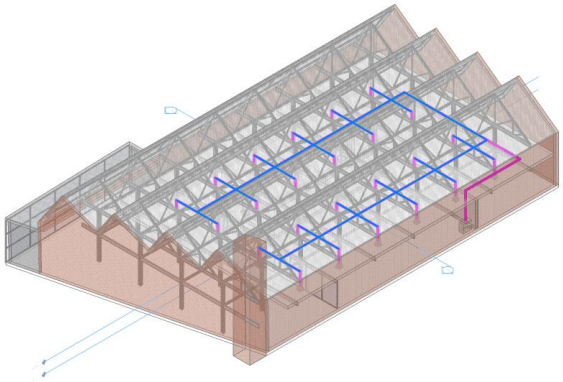
13. Choosing to change the **Topology** will bring us back to the options we cycled through earlier.

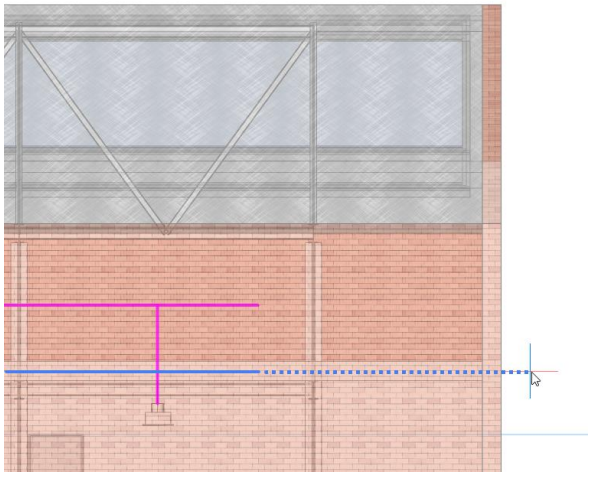
14. Choose to tune the **Height**. You are prompted to select which lines to edit; select the entire model using a selection window.

15. You can now dynamically change the height of these ducts by moving the mouse cursor. Change the view to a side view using the **LookFrom** widget, and move the cursor so that the lines are located above the steel structure, and inside the concrete slab (or type in a value of **1050 mm** downward). Let us assume for this exercise that this is a realistic and structurally sound solution.

16. Press **Enter** a few times until you exit the command.

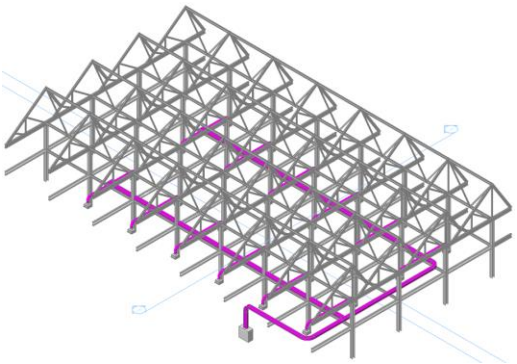






c. Modifying the new layout

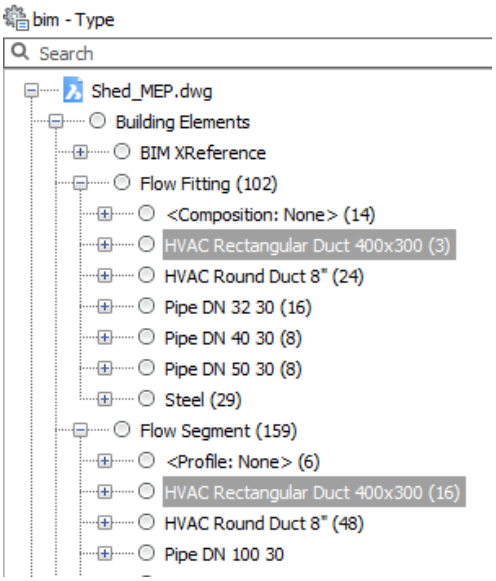
Let's take a closer look at our new layout and how it fits together with the structural model.



1. In the **Attachments** panel, unload **Shed_Arch.dwg.**

2. (Optional) set the current visual style back to **Modeling** and turn off **LWT** in the status bar. You might need to call **REGEN** to apply these changes visually.

3. Let's assume the MEP engineer calculated the required ventilation flow and confirmed that the current ducts are too large for this setup. We can change the duct size easily, the most efficient way of selecting these ducts is through the **Structure** browser. For this purpose we will use a custom structure browser configuration that is delivered with the exercise files, called **bim – Type.cst**.



4. Open the support folder by calling the **SUPPORTFOLDER** command, and copy **bim – Type.cst** into this folder.

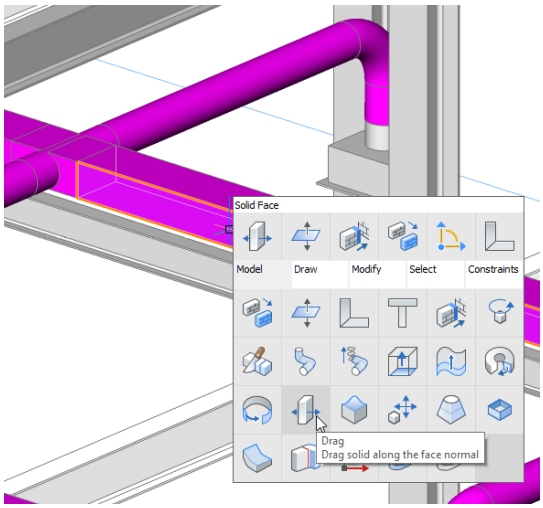
5. Open the **Structure** browser, and using the hamburger menu on the top right, select **bim – Type.cst**.

6. In this new structure browser setup, expand the **Building Elements** nodes and under that the **Flow Fitting** and **Flow Segment** nodes, and select all flow fittings and segments with the profile **HVAC Rectangular Duct 400x300**.

7. In the **Profiles** panel, search for the profile called **HVAC Rectangular Duct 300x200** and drag-and-drop it onto one of the selected flow segments. Press **Enter** to apply.

8. Notice that both the main ducts are clashing with the columns of the structural model. Let's fix this by moving the ducts aside.

9. Highlight one of the side faces of a segment of the main duct, and in the **Quad** under **Model**, call the **DRAG** command.



10. Move the duct aside so that it doesn't clash with the column anymore, e.g. over a value of **500 mm**. Note that the ducts remain intact.

11. Repeat this process for the second duct.

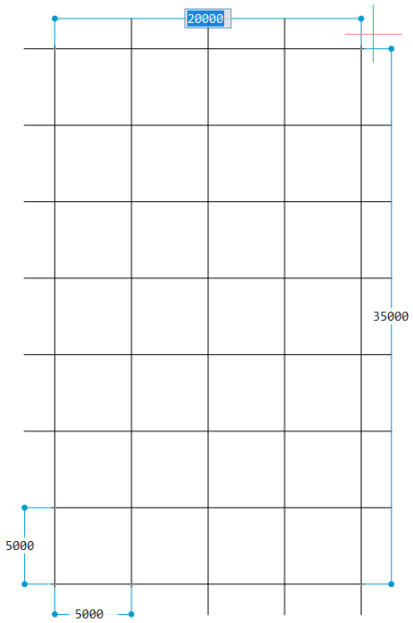
14. Structural modeling

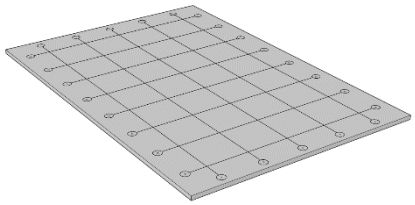
A. Creating the columns

a. Creating a base grid

We'll start by creating a grid, and drawing a base slab underneath it

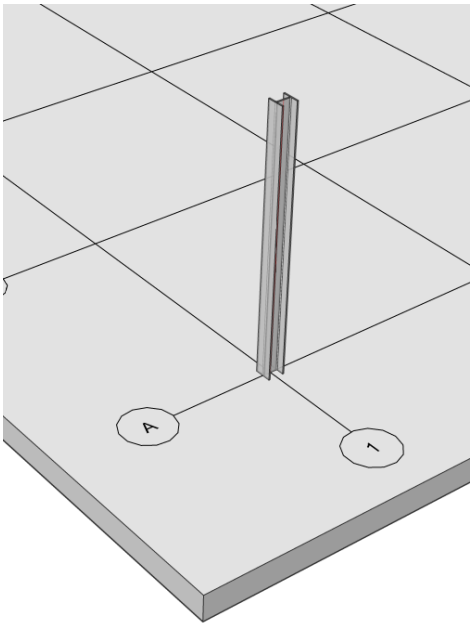
1. Open a new mm drawing and save it
2. In the Quad under the **Model** tab, click **BIMGRID**  . Choose a start point by left-clicking
3. Type in values for the grid sizes, using **Tab** to switch between dimensions until you get the values as shown in the image on the right (i.e. grid cells of **5000 x 5000** and a total grid size of **35000 x 20000**)
4. Start the **BOX**  command, and start drawing somewhere outside of the grid
5. Choose the opposite corner so that the grid is entirely on top of the slab (see image)
6. Type in **500** to give the slab a thickness, and press **Enter**





b. Creating a column

1. Open the **PROFILES PANEL**  on the right of your screen.
2. Choose Domain: Structural Steel.
3. Choose Standard: *EURO*.
4. Click the I-shape icon, and search for **HEA**.
5. Drag the **EURO HEA 300** profile into the modeling area.
6. Start drawing the linear solid at the intersection point of two of the grid axes. Draw vertically upwards (make sure ORTHO or POLAR is enabled).
   Make sure the orientation is as indicated in the image on the right (i.e. flanges parallel with the Y-axis). If the orientation is not as shown in the



image, you can enter **Q** and press **Enter** while still drawing to give the profile a Quarter Turn.

7. Enter a height of **5000** and press **Enter**.

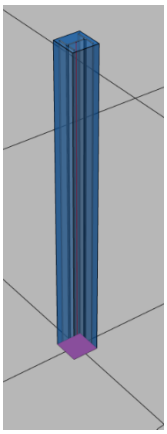
c. Understanding Propagate

Propagate is a very versatile tool that can be used in many different situations. It is used to automatically copy objects or details to similar locations.

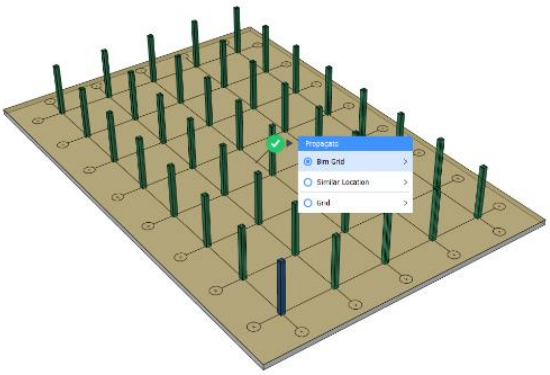
The key concept: there are 2 selection sets:

- Reference solids: solids that define the relation of that detail. Specify as many reference solids as relevant!
- Detail solids: solids that need to be copied around.

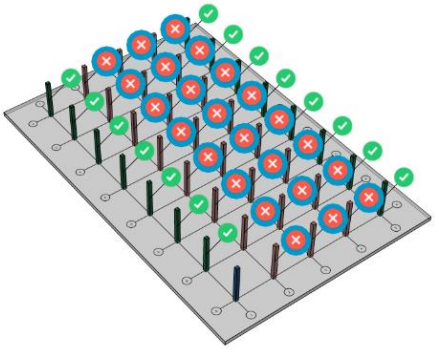
We already saw some use cases of Propagate in the basic training. In this section, we'll use propagate to copy the column to every grid intersection.



1. Highlight the floor slab, and in the Quad under the **Model** tab, click **PROPAGATE** .



2. Select the column **solid** as your detail, and press **Enter**.
3. You will be automatically zoomed into the 3D detail. We don't want the detail to be copied as a Block, but as a **Copy**, so press **C** and then press **Enter.**
4. Propagate automatically detected that a grid was attached to the slab. It will make the first suggestion (see image).
5. Hover over the green checkmark and click *Bim Grid* in the little dialog window.
6. Then, click *Explode,* and the entire grid will be exploded in a set of suggestions. We can now manually toggle off individual suggestions. Create a pattern as shown in the image. Make a selection set over the checkmarks you don't need and toggle them all off at once by clicking one of the checkboxes you just selected.



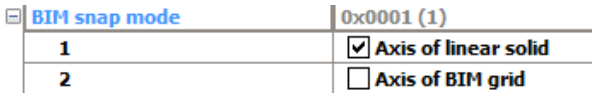
7. Press **Enter** twice to accept.

B. Creating the trusses

a. Creating one truss

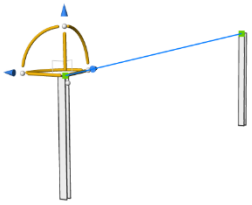
1. In the Ribbon, go to the Structural/MEP tab. At the far right, make sure *Display Sides and Ends* is toggled **off**, and *Display Axes* is toggled **on**. You can also do this via the Command Line: DISPLAYSIDESANDENDS = 0, DISPLAYAXES = 1.

2. In the Settings dialog, search for *bimosmode* and find the setting **BIM snap mode**. Expand this setting and make sure the first suboption (*Axis of linear solid*) is checked **on**. This setting will override snapping for linear solids such as steel column and beams, so you can more easily snap to the axis of the solid instead of snapping to e.g. profile corners.
Close the settings dialog.



3. Isolate the two columns of the first row.

4. Draw a line (select **LINE** from the **Annotate > Draw** tab) between the top end points of the column axes.



5. Move down the line **400** mm by long left-clicking it and thus activating the **MANIPULATOR**. Choose the vertical bar, move it downwards and type in **400**.

6. Press **Esc** to exit the Manipulator.

7. Draw another line, this time from the midpoint of the previous polyline upwards for **1400** mm.

8. Draw another line, this time from the endpoint of the previous polyline to the top end point of the left column axis.

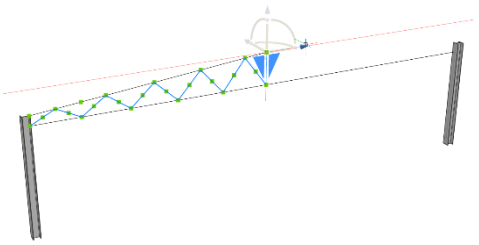
9. Divide the bottom horizontal line into 20 segments and the upper one into 10, by using the **DIVIDE** command (Quad: **Draw** tab) and entering **20** for the bottom line and **10** for the upper one.

10. Draw lines again. This time creating a truss pattern as specified on the image to the right.

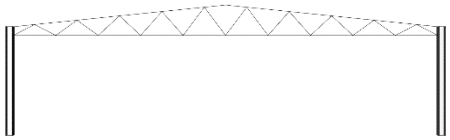
11. Delete the points that were created by going to the **STRUCTURE BROWSER** and selecting them and hitting the **Delete** button.

12. Select the truss pattern and upper line and bring up the **MANIPULATOR** (Quad: **Modify** tab).

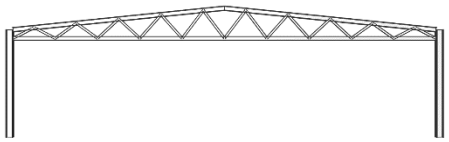
Drag the Manipulator to the right spot by using the little white grips. Stand on the little blue **Flip along X-axis** icon and flip the truss.



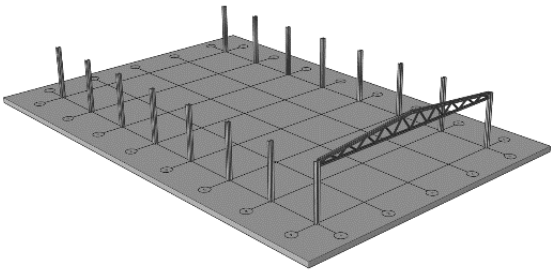
13. Enter **C** for Copy and enter the distance **0**.
14. Press **Enter** to accept and **Esc** to go out of the command.
15. Delete the midlines.
16. Search the **EURO IPE 240** beam by typing in **IPE** in the search box.
17. Drag it to the bottom line. The line changes into the profile. Click **Enter** to accept if it is rotated correctly.



18. Select the top lines.
19. Search the **EURO IPE 200** beam.
20. Drag it to the top lines. The lines change into the profile. Click **Enter** to accept if it is rotated correctly.



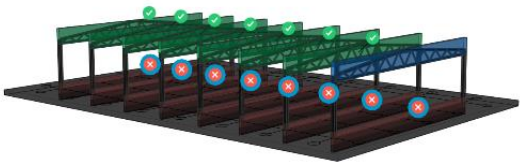
21. Select the truss lines.
22. Search the **EURO IPN 100** beam by typing in **IPN** in the search box.
23. Drag it to the truss lines. The lines change into the profile. Click **Enter** to accept if it is rotated correctly.

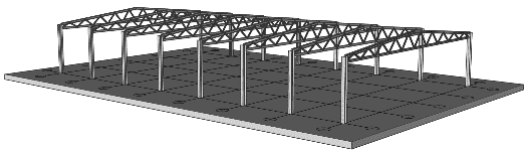


24. The truss is created.
25. The top beams were probably classified as members. **BIM CLASSIFY** them **AS BEAMS** .
26. Delete the line entities via the Structure Browser.
27. Show all entities.

b. **Propagating the truss**

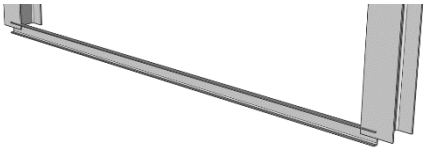
1. Launch **PROPAGATE** .
2. Select the two front columns as reference solids.
3. Select the truss as detail solids.
4. Press **C** to copy as solids. Press **Enter**.
5. Toggle off the bottom suggestions.





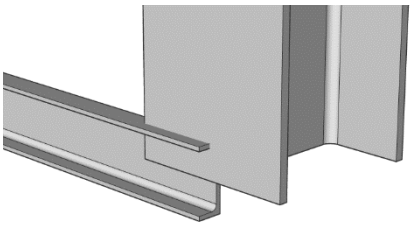
6. Press **Enter** twice to accept.

c. **Adding sidebars**



1. Hide the slab and the grid.

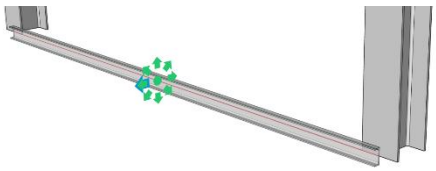
2. Search for **EURO UPN 120** in the PROFILES PANEL by typing in **UPN** in the search field.



3. Drag and drop the profile in empty space.

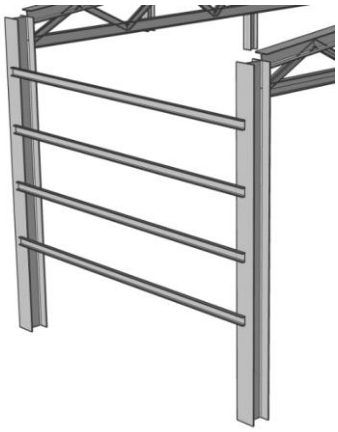
4. Set BIMOSMODE = 0

5. Make the profile from the outer bottom midpoint of the first column to the outer bottom midpoint of the second column (in the Y direction). Quarter turn by pressing **Q** during the command, to get the profile turned like in the picture to the right.



6. Highlight the U-shaped profile, and in the Quad under the **Model** tab, click ADD ECCENTRICITY .

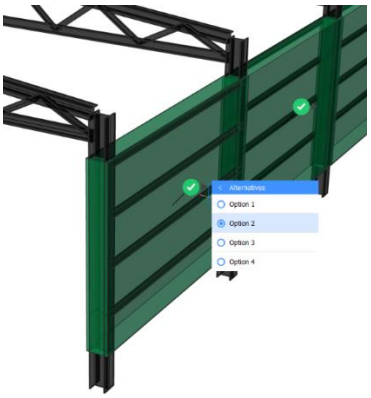
7. A widget appears. Click the *Outer* arrow to make sure the beam moves outwards with respect to its axis. Press **Enter**.



8. Long-click the U-shaped profile to get the MANIPULATOR and press the vertical bar to move the beam upwards by **1500** mm.

9. Press the up bar of the Manipulator again. Press **R** for Repeat. Enter the height of **900** mm. Move the cursor upwards until you have 4 bars. **Click** in the space above the 4 bars. Press **Esc** to exit the command.

10. Launch PROPAGATE .



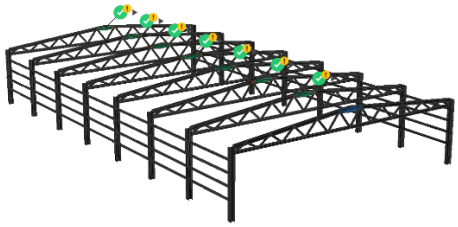
11. Select the two first columns as reference solids.

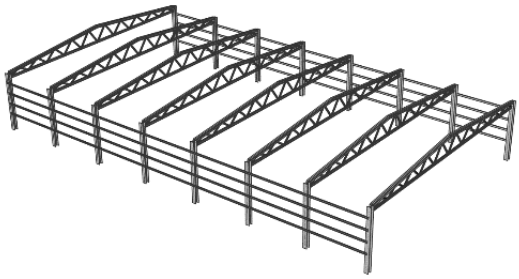
12. Select the bars as detail solids.

13. Press **C** to copy as solids. Press **Enter**.

14. Select **Option 2** for all the suggestions at the other side of the construction.

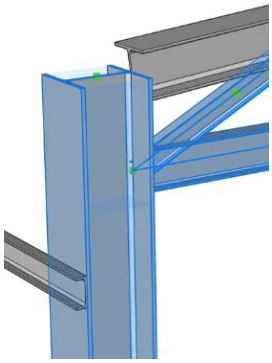
15. Press **Enter** to accept.

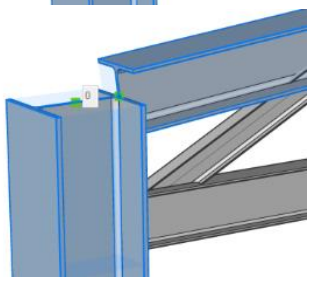




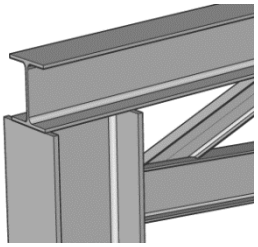
C. Detailing

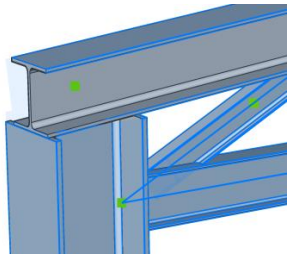
a. **Cleaning up some details**

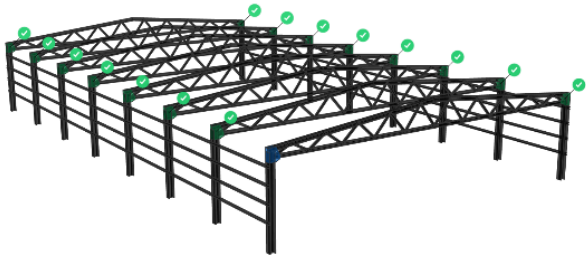




1. Show all entities again.
2. Select the two top beams of the first portal.
3. **L-CONNECT** (Quad: **Model** tab).
4. Press **Enter** to accept.
5. Launch **PROPAGATE** .
6. Select the two top beams of the first portal as reference solids.
7. Press **Enter** three times to accept.
8. Select the three elements of the first portal that are indicated in the right picture.
9. **STRUCTURALCONNECT** (Quad: **Model** tab).
10. Select the column and top beam of the first portal.
11. **L-CONNECT** (Quad: **Model** tab) them like on the picture to the right by pressing **Ctrl** two times during the command.
12. Launch **PROPAGATE** .
13. Select the elements as in the right-hand picture.
14. Press **Enter** three times to accept.







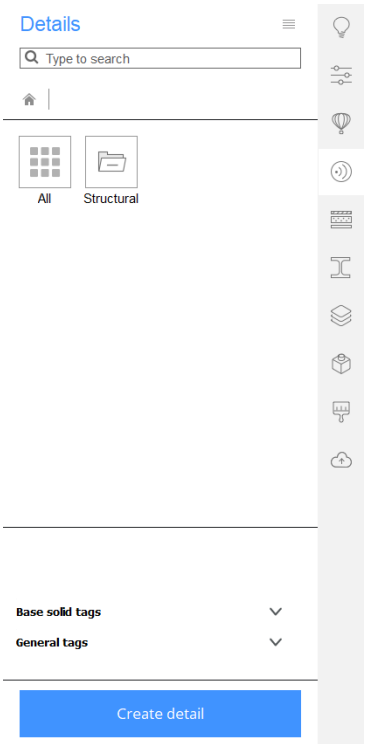
b. **Add details to the details library**

1. Go to **Manage libraries** under the hamburger menu in the **DETAILS PANEL** .

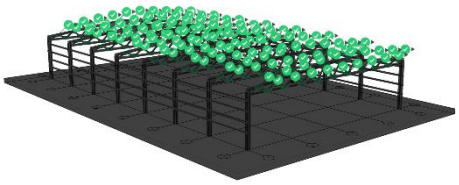
2. Under Details Directory Path, click the three dots, click **Add Path** and choose the DetailsStructural folder under C:\Users\<user>\Documents\Bricsys247\<training folder>\Documents\Starter files\08. Structural modeling\DetailsStructural

3. Close the settings.

Now you should see a thumbnail of the Structural folder in the Details panel.

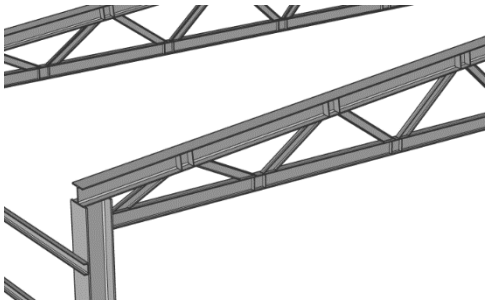


c. **Detail the truss connections**



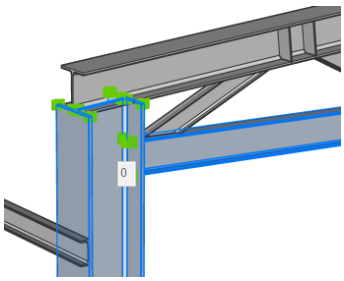
1. Drag and drop the detail **TrussConnection** from the DETAILS PANEL (in the **Structural** folder) to your workspace.
2. Click **Enter** to accept.

The trusses are now nicely detailed.

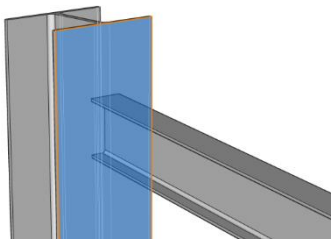


d. **Creating a more detailed connection**

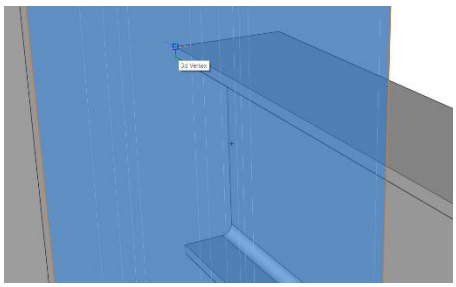
BricsCAD BIM is not a structural detailing and calculation software, however, it is still possible to create steel connections using a combination of direct modeling and our library of mechanical parts. To be able to work properly on a connection detail, there are a few things we need to do first:



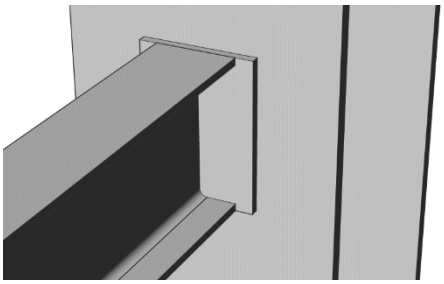
1. We need to add the standard mechanical parts to the LIBRARY PANEL. You do this by going to the DROPDOWN MENU on the top right side of the panel and making sure the option *Bricsys Mechanical Library* is turned **on**.



2. Let's design the connection between a beam and the flange of a column using an end plate bolted to the column. We'll ISOLATE the beam and the column so it's easier to see what we're doing (see image).



3. First, we'll create an endplate, welded onto the beam. Start the BOX command and hover the cursor over the side face of the column. Then press **Shift** once, so that this side face is highlighted in blue (see image). Start in the outer corner of the beam as shown in the image, and then click the opposite outer corner. Give the plate a thickness of **10** mm, so we end up with something like is shown in the fourth image.

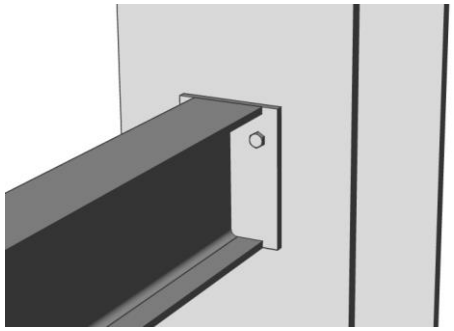


4. PUSH/PULL the vertical sides of the plate outwards by **20** mm.

5. Open the **LIBRARY PANEL** and go to Standard Parts > fasteners > BOLT > HEX HEAD > ISO.

6. Click and move **the ISO 4015** onto the plate and position it precisely using the Dynamic Dimensions. Remember, you can press **Tab** to switch between dimension field.

7. Give it a distance of **30 mm** from the side, and **55 mm** from the top of the plate.



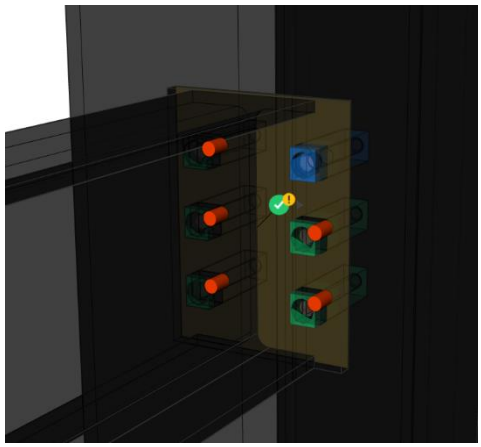
8. We'll use the propagate tool to distribute more bolts over this plate evenly. Highlight the plate, and in the Quad under the **Model** tab, click **PROPAGATE**

9. Select the bolt as the detail objects and press **Enter**.

10. Press **Enter** again to accept the suggestion. Now a blue question mark should appear. Click it and it turns into a green checkmark.

11. You can edit this suggestion by hovering over the checkmark and clicking *Grid*.

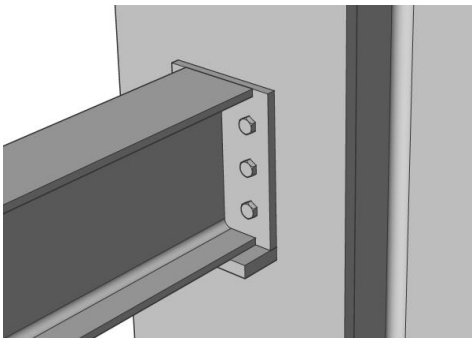
12. Add one row, so you end up with a suggestion as shown in the image. Press **Enter** to accept the suggestion.



13. To finish this detail, we will create a little plate, welded onto the column beforehand, on which our beam can rest during the construction phase of the steel structure.

14. **EXTRUDE** the bottom face of the endplate with a distance of **15** mm.

15. **PUSH/PULL** the front face of the new plate by **40** mm.



16. We can now give the elements a correct classification. Highlight the plates and in the Quad under the **BIM** tab, click **CLASSIFY MANUALLY**. In the pop-up menu select **Plate** from the *Building Structure Elements* drop-down. Select all the bolts and classify them as well, this time select **Mechanical Fastener**.

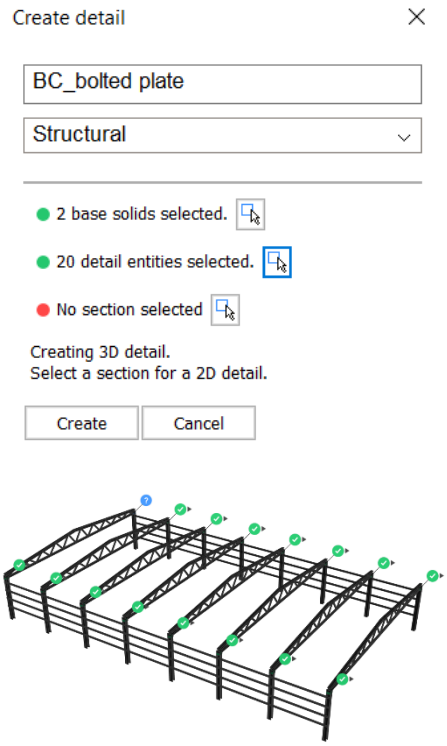
17. The last thing we want to do is classify the entire bolted plate as a building element. So select the plates and the bolts and in the Quad under the **BIM** tab, click **CLASSIFY MANUALLY**. Choose **Building Element** and check **Convert to block and**

classify the block reference. Give in a name for the block and click OK.

The result looks like in the picture to the right.

e. **Saving and propagating a detailed connection**

We can again use the **DETAILS PANEL** to save this detail and then copy it over to the rest of the drawing.



1. Click on the **Create Detail** button.
2. Give it the name *BC_bolted plate* (BC for BeamColumn) and the category *Structural*.
3. Select the column and the beam as reference solids.
4. Select the block as detail solids.
5. Don't select a section element, as this will allow us to create a 3D detail.
6. Click onto the **Create** button.
7. Press **Enter** to accept the detail.
8. Edit the thumbnail by pressing the pencil icon, if you don't like the current preview.
9. Click the **Save** button.
10. In the Quad under the **General** tab, click **SHOW ENTITIES** .
11. Drag and drop the detail you just created into your drawing.
12. You should see suggestions as shown in the image.
13. Turn the question mark in a checkmark and press **Enter**, to propagate this detail.

Now this detailed connection has been propagated to every possible location in your drawing.

15. Advanced documentation sets

This chapter explains how you can add more information and modifications to your sheets and schedules to meet your drawing criteria. This includes using templates to customize and suit your generated drawings.

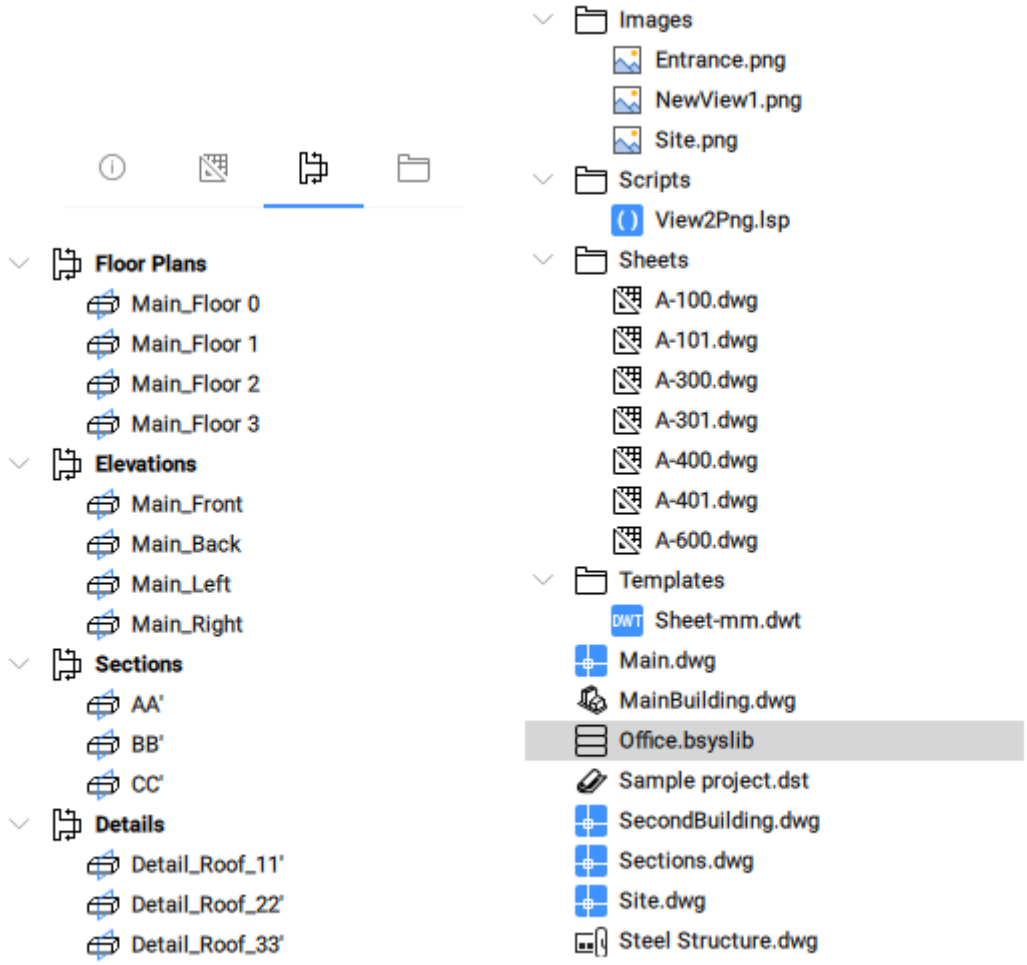
A. Sheets and Drawings Management

a. Open starter files

1. Open the following file: **Main.dwg** from the Exercise folder in the '**Drawing documentation advanced**' folder.

b. Open the Project Browser panel

1. The **PROJECT BROWSER** should display a set of 14 sections, 7 sheets, and 5 models.
2. Inside the project folder, you will find an extra file: an **Office.bsyslib** file. This file links together all these drawings and sheets. In the following sections, we will mostly use the Project Browser to navigate and manage our project and the associated documentation.



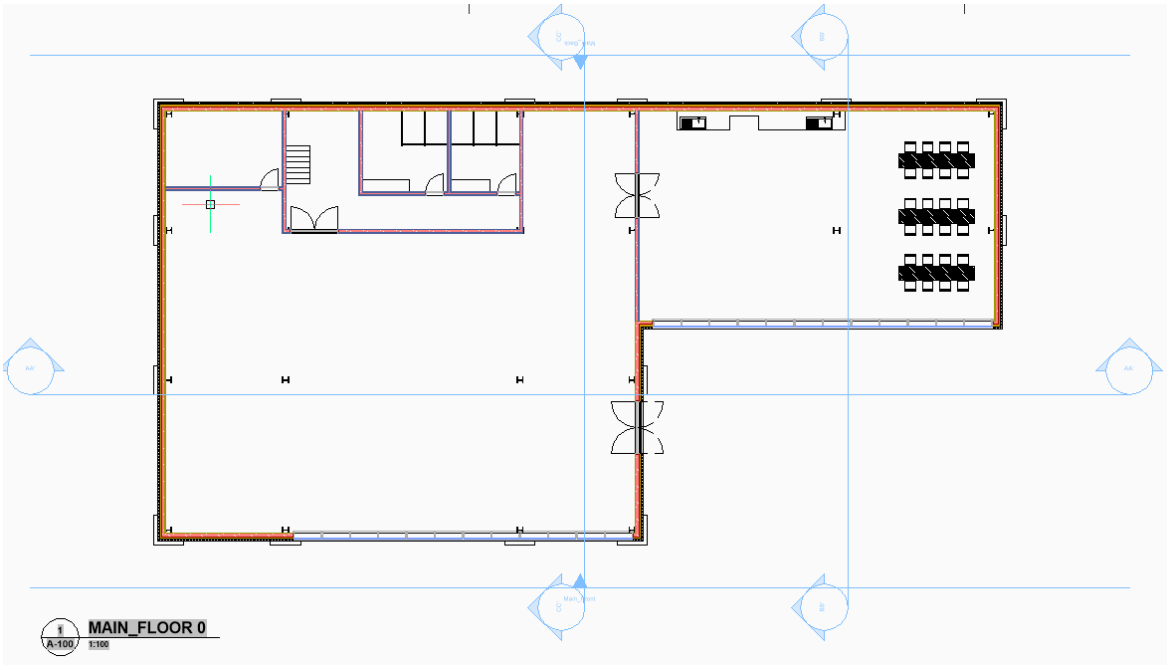
c. **Check generated drawings**

1. To see the generated drawing of the section Ground Floor, double-click **A100, 1 - Main_Floor 0, Main_Floor 1** in the Project Browser.

   Note: If your viewport is not set to **Update In Background**, make sure you hit "**Update Now**" by right clicking like how you did earlier.

2. The floor plan displays the cut through a representation of walls, windows and doors etc.

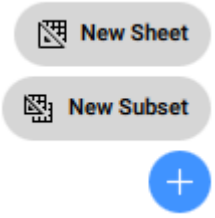
   Wall plies are shown with their respective hatch patterns and colours, as well as the furniture symbols. We will discuss in detail how these different elements are created in the next steps of this module.



d. **Creating a new sheet**

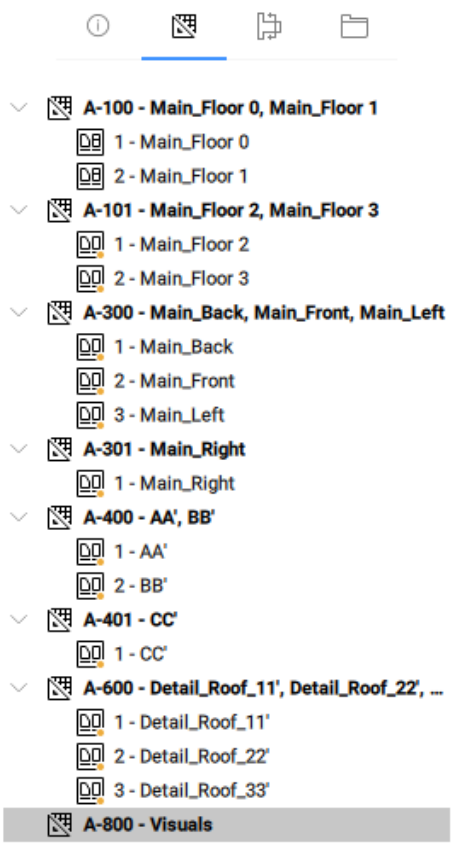
1. At the bottom of the PROJECT BROWSER , you should see a icon. It allows you to add a new sheet or subset.

2. Click the icon and select **New Sheet**.

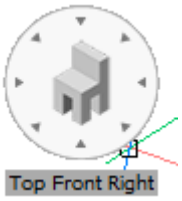


3. Right click the sheet and select **Sheet Properties**. Under the **Name** field, rename the value as "V**isuals**" and **Number** field as "**A-800**". Once done, hit OK.

4. Now, with new sheets/ placeholders set up, you can next place section views, schedules, images or any other applicable information to the drawing pack.



e. **Using LISP routine to generate 3D visuals**



V22 now supports the hosting and running of **scripts** in the PROJECT BROWSER . One quick and semi-automated workflow using scripts that users might find useful is to generate and export 3D views out of BricsCAD into a PNG image.

The image can later be placed onto a **sheet** within the **sheetset** as part of the drawing pack.

1. Hover over the LOOKFROM cube and select **Top Front Right direction**.

   Note: If you imagine that as a clock face, it would be at the 4 o'clock direction.

2. **Right-click** the cube to access more controls.

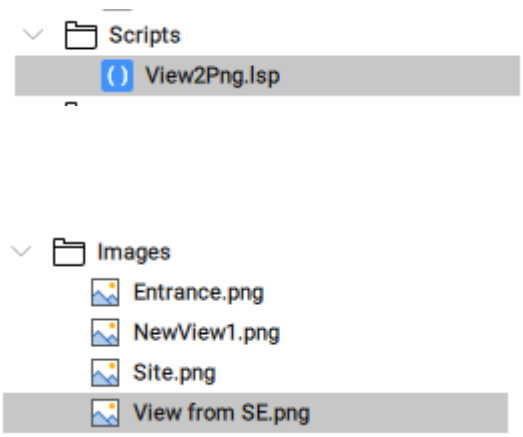
   Note: Make sure it is at **Perspective** mode.

3. Go to **View** – **New** to start creating a view based on this angle.

4. Type '**S**' for **Save** and name it as "**View from SE**". Hit **Enter** to confirm.

5. Now, go to **Files** and expand the **Script folder**. You should find a **View2Png.lsp** file present.

   This script is shipped with BricsCAD V22 and it is designed to **export a screenshot of your saved views from your model file** as images in .png format. Those images will be **named based on your view names** and **saved in an automatically created folder called Images**.



6. **Right-click** the script, and select **Load Script**. This will run the script automatically.

7. Refresh your Project Browser by clicking on the **menu** (previously known as the hamburger menu) and select **Refresh**.

   You should now see those .png images (or png image in this case) as described above.

f. **Putting views on sheets**

1. Return to **Sheets** and **double-click** sheet "**A800 – Visuals"** to open sheet.

2. Now return to **Files** in your **PROJECT BROWSER** to access your images.

3. Right-click the **View From SE.png** image and select **Attach Image**.

4. If you bring your cursor to the paper space, you should see a preview of the image hosted against your cursor.

5. To place the image, simply **click** into the **paperspace/sheet** – this will mark the **base point** which would be the bottom left edge of the image.

6. The next action would be to **scale** the image – the image is locked in its **default aspect ratio**, having been screengrabbed from your display monitor.

   Note: if you are doing this on an unusually wide or square monitor, the image generated from the script in the previous sub-chapter may influence your output. Therefore, please be wary about these features before you place them on your sheets.

7. If you are unsure about the desired scale, or would not like to manually scale the image, simply hit **1** to apply a scale of 1 onto the sheet.

8. The next action would prompt a rotation to the image. Make sure the image is snapped against the X-axis.

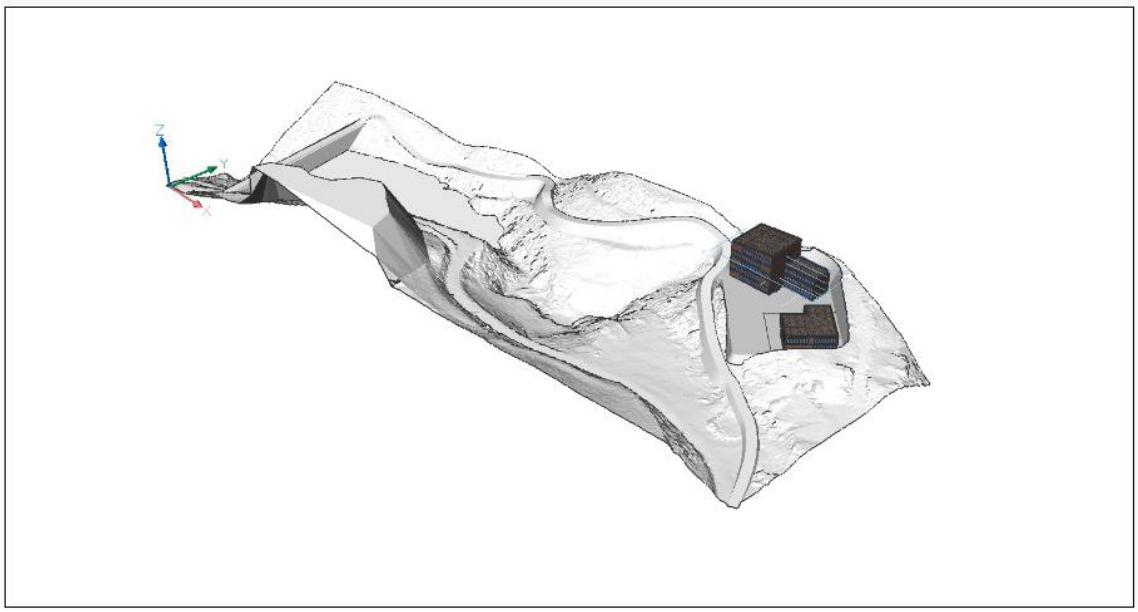
   Note: Please make sure **Polar Tracking (F10)** is turned on.

9. Alternatively, hit **0** for **rotation angle**. The image should now be attached onto the sheet.

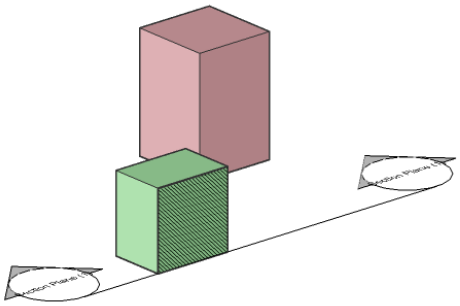
10. This could be done the same for other sections and drawings.

11. Return to **Sections and Views** of the **PROJECT BROWSER** . You should find a new view called **View From SE** under **3D View**. You can place that view on the current sheet, or any other sections that have already been set up to support the information on the current sheet.

12. Similarly, for **drawings** such as Floor Plans, you can **right-click** them and select **Generate on current sheet** to bring them into your current paperspace drawing you have open.



B. Understanding layers



a. **Understanding the layers created during section generation**

If you look at the **LAYERS PANEL** in the **A-100.dwg** drawing, you will find that an entire set of layers was created to structure this drawing.

They are mainly grouped into three groups: **Background**, **Boundary** and **Fill**.

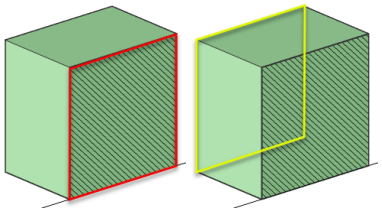
The way this is set up is as follows:

1. Imagine having two objects in your 3D model, each on their own layers: **Layer1** and **Layer2**.

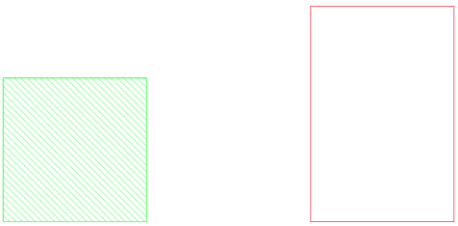
2. A section plane is cutting through the object on Layer1 (the green object in the image on the right). The section plane is not cutting through the object on Layer2 (red object in the image).

3. In the resulting section drawing, some layers will be created for the green object: **Boundary_Layer1** for the boundary of where the section plane slices

through the object (indicated with a red line in the image on the right). A **Fill_Layer1** layer will be created containing a hatch of where the section plane cuts through the object. Finally, a **Background_Layer1** layer will be created that contains sub-entities (e.g. vertices of solids) that are not sliced by the section plane: in this case, the vertices indicated with a yellow line in the image on the right.



4. For the red object, only one layer will be created. Since the section plane does not cut through this object, only a **Background_Layer2** layer will be created. Thus, the section result will look like the image shown here.



5. This logic is extended when a physical material is assigned to an object. Take a look at the  COMPOSITIONS PANEL in **MainBuilding.dwg**. Double-click **Cavity Wall, Brick**, this composition consists of 4 plies, each with their own material. Each physical material is associated with a hatch pattern, which will be shown when creating a floor plan or vertical section.

6. When a physical material or composition is applied to an object, this material name will overwrite the name of the layer which the object is on, when creating the **Fill_**, **Boundary_** and **Background_** layers in the resulting section drawing. So let's say you have an object on Layer Wall, and it has a composition that consists of two plies: **Brick** and **Insulation**.

7. Instead of creating **Fill_Wall**, **Background_Wall** and **Boundary_Wall**, it will create the layers **Fill_Brick**, **Background_Brick**, **Boundary_Brick**, **Fill_Insulation**, **Background_Insulation** and **Boundary_Insulation**.

8. For objects without a composition, the colors of the **Fill_**, **Background_** and **Boundary_** layers will be copied from the layer in the 3D model.

9. For objects with a composition, the default colors and line weights are set by a template found by typing in SUPPORTFOLDER and browsing to **Bim/Sections/_SectionSettings.dwg**. Thus, it's possible to create your own templates for material colors.

10. The way these **Fill_**, **Background_** and **Boundary_** layers are set up can be controlled in the drawing that contains the section planes; i.e. Building 2.dwg in this case. Open this drawing and type in SECTIONPLANESETTINGS in the command line.

This will open the drawing explorer in the **Section Planes** tab. Here you can control per section plane how certain types of lines are plotted, and on which layer they are created. This should give you full control over which layers are created and what your generated 2D drawings will look like. We will not go into full detail here, but it is worth exploring the different options and settings if you want to create templates for your own workplace.

b. **Understanding the created BRX_2D layers**

1. In the drawing with the generated 2D sections, open the LAYERS PANEL  . In the search bar, type in '**BRX**'. You can see that there are a couple of so-called **BRX_2D** layers. We already met them in the 'Drawing documentation basic' module, but we will explore them further here.

2. Note that objects on **BRX_2D** layers will only be displayed in a section result if the section plane is parallel to these objects.

3. You can create your own **BRX_2D** layers in custom objects, so long as they have the correct syntax: **BRX_2D_** or **BRX_2D+_** as a prefix.

4. Open **MainBuilding.dwg**.

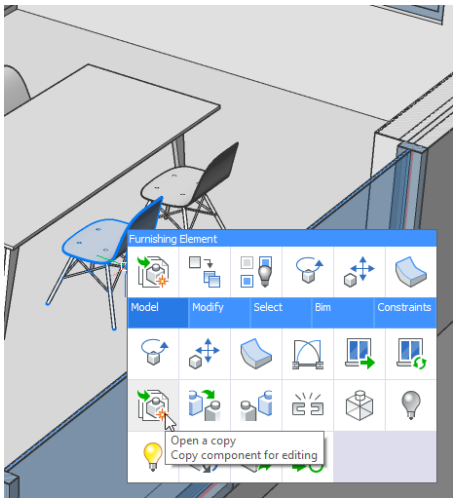
5. Activate the horizontal floor plan section **Main_Floor 0** by **double-clicking** it.

6. In the room, highlight one of the chairs **Furniture_Schoolchair** and in the **Quad**, click OPEN A COPY  .

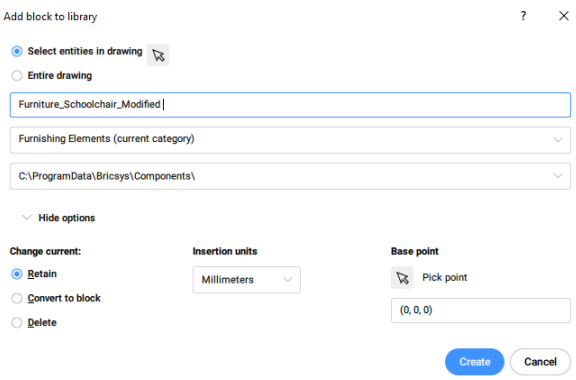
7. In this drawing, you can see that there is a layer named **BRX_2D_Symbols**, containing some polylines and splines, if you have it turned on. Therefore, when generating 2D sections, this chair is represented by those polylines and splines on this **BRX_2D_Symbols** layer, rather than a simple representation of its 3D solid geometry.

8. Let's change the representation of the chair to your standard. Make sure to put your symbolic representation on the **BRX_2D_Symbols** layer and to not use regular Lines but **Polylines**, as these will not be displayed upon section generation.

9. Save this copy of the component by hitting the button **Create Component**, in the COMPONENTS PANEL  , while nothing is selected. Give it



a name, for example, **Furniture_Schoolchair_Modified**, and a category, here Furnishing Elements.



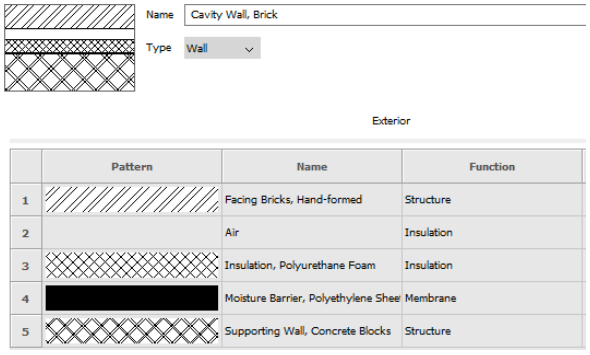
10. Go back to **MainBuilding.dwg**.

11. Replace the old chair with the new one by selecting the chair and clicking **REPLACE**  from the Model tab of the Quad. Click Enter to fetch the new component from a file. Browse to the **C:\ProgramData\Bricsys\Components** folder. This is the folder where new components are stored that are made via the **Components Panel**. If you browse to the **Furnishing Elements** folder, you will find the **Furniture_Schoolchair_Modified** component. Select this dwg to replace the chair with.

12. Now save **MainBuilding.dwg**.

13. Click **Update** on the Ground Floor section in the Sheets tab of the Project Browser and then click **Display View**. You will now see that the **BRX_2D_Symbol** has changed to the new representation.

c. **Updating section hatch patterns**



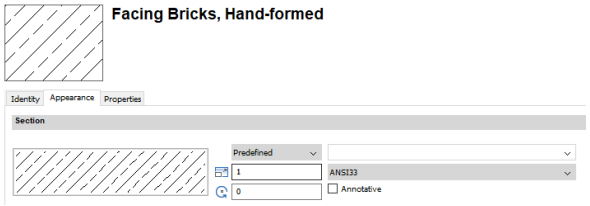
1. When changes are made in the 3D drawing, these changes can be easily updated in the 2D section result.

2. Open **A-100.dwg** (called **A100, 1 - Main_Floor 0** in the Project Browser).

3. Check out the created plan view **1 - Main_Floor 0**. Notice the different hatch patterns in the section.

4. Go to **MainBuilding.dwg**.

5. Open the **COMPOSITIONS PANEL**  and double-click **Cavity Wall, Brick.**



6. Double-click the hatch pattern of the **Facing Bricks, Hand-formed.**

7. In the appearance tab, double-click the hatch pattern under the Section header, and change it to **ANSI33**.

8. Click **OK** to close the compositions dialog

9. **Save** this drawing

10. In the **PROJECT BROWSER**  , right-click **1 - Main_Floor 0** and click **Display View**.

11. Right-click it again, and this time click **Update Now**.

12. You should see the changes you made in the 3D model being reflected in this 2D section as well; the hatch pattern of the facing brick is updated to **ANSI33** instead of the default hatch pattern.

C. Annotations

a. **Adding dimensions (manually)**

1. Open the **1 - Main_Floor 0** drawing.

2. Go to the **Annotate** tab and select **DIMENSION**  from the **Dimensions** category.

3. **Click** a line (without snapping to a point) of the wall that is dimensioned in the image to the right.

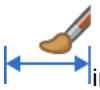
4. **Click again** to place the dimension's text adjacent to the wall.

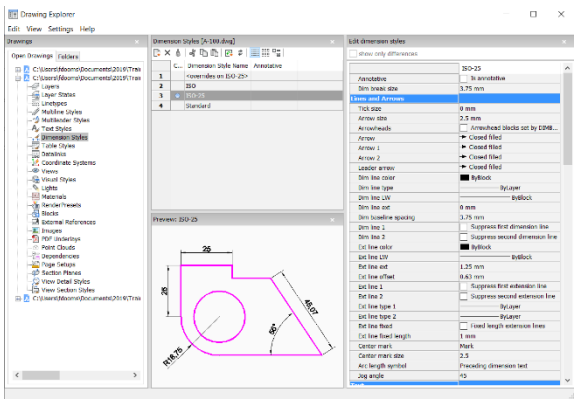
5. **Save** the file A-100.dwg.

6. Open **MainBuilding.dwg** and **clip** the horizontal section.

7. Upon changing the length of the wall in the model, the dimension line will adjust itself based on the new length of the wall.

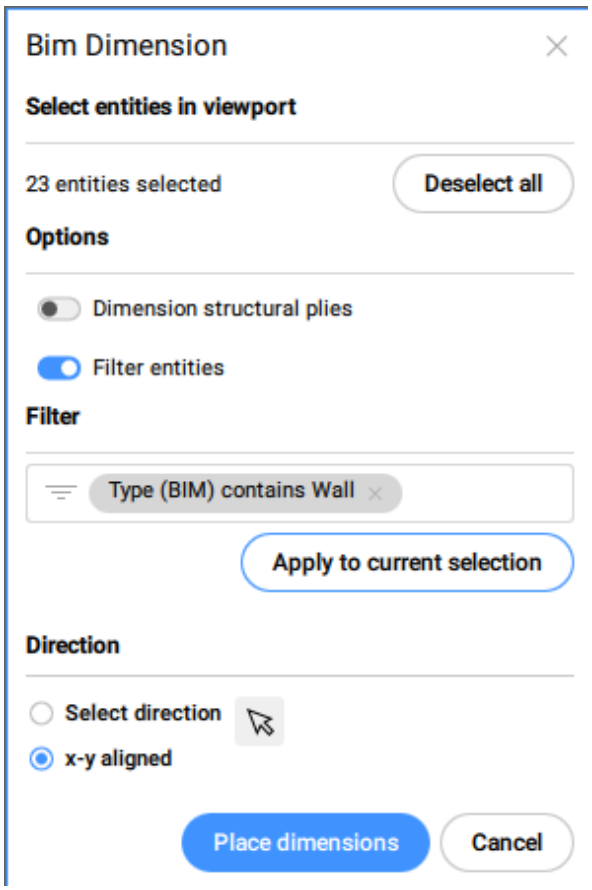
8. If you want to add some more annotations, you can do so, but in this training, this is the only type of annotation that we will discuss.

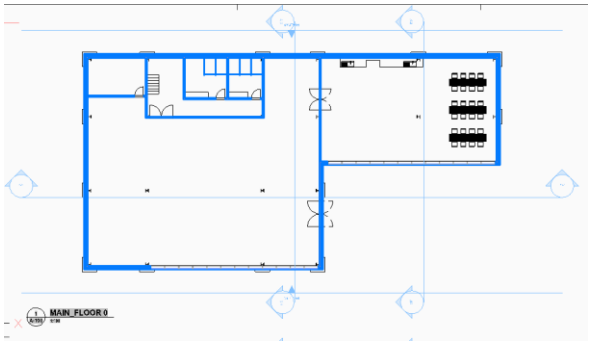
9. You can customize and save dimension styles in the **Dimensions** section of the **Drawing Explorer**. You can go there by typing in **DIMSTYLE**  in the command line.



10. Note that if you want to store dimension styles for future drawings you can do so by adding them in a **.dwt template** file. The process of adding things to a template file will be discussed in one of the next steps.

b. **Adding dimensions (via BIMDIMENSION)**





1. The command BIMDIMENSION semi - automatically dimensions selected entities in the viewports on **paperspace**, based on your custom rules.
2. Let's do a setting-out drawing, documenting the dimensions between walls.
3. Go to the file **A-100.dwg** (Plan – Building 1 – Ground Floor).
4. Go to the **Annotate** tab and select BIMDIMENSION from the **Dimensions** category.
5. **Select** entities by using your selection box.
6. Filter "**Type (BIM)**" contains "**Wall**".
7. Click This immediately narrows down the selection to just Wall Types.
8. Apply to current selection.
9. (Optional) Dimension Structural Plies
10. Since our drawings are placed to Project North, we can simply use **x-y aligned** for the direction. Otherwise, if you have a wall you wish to dimension but on a different angle, i.e. 45deg, choose **Select Direction** and select that wall for reference.

c. **Tagging building elements**

1. The command BIMTAG allows you to add tags on section results in **Paperspace**. You will be prompted to do so either manually or automatically on selected entities.
2. Go to the **Quad**, under the **Model** tab, click TAG and press **Enter**.
3. You see a bunch of **Multileaders** on your sections. To understand which information those

Multileaders show, type MLEADERSTYLE in the command line. This opens the **Drawing Explorer** in the **Multileader Styles** tab.

4. Select the **_WallTypeStyle**; it gives you a preview of what the tag will look like. We will change the tag style, so it contains different information with a different appearance.

5. Change the Type from '**Straight**' to '**None**'. Now it won't have a line connecting the building element and the tag itself.

6. In the **Content** tab, you see that the **Source Block** is called **_WallTag**.

7. Click '**Regen**' in the MLEADERSTYLE ribbon at the top of the overview of multileader styles inside the **Drawing Explorer**. This makes sure your changes will already be applied.

8. Close the Drawing Explorer.

9. In the command line, type BEDIT and choose to edit the **_WallTag** block definition

10. Select the **WallType Attribute Definition**, and in its PROPERTIES PANEL, change the '**Tag**' value from **WallType** to **Composition.**

11. Copy this **Attribute Definition** and paste it a bit lower. Change this new **Attribute Definition's Tag value** to **Quantity/Thickness** (see image on the right)

12. **Delete** the rectangle.

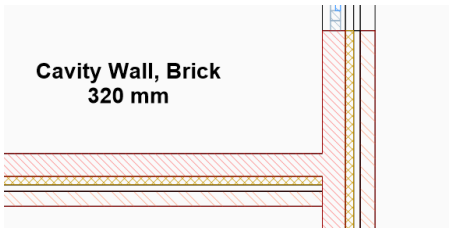
13. In the floating **Block Edit** toolbar, click the BCLOSE AND SAVE icon, or type BCLOSE in the command line and choose the **Save** option.

14. Highlight the viewport containing the floor plan again.

15. In the **Quad**, under the **Model** tab, click UPDATE SECTION

16. The wall tags should now have a different appearance: they should show the composition name as well as the thickness. The box and the

Composition
Quantity/Thickness



leader connecting it to the building element should no longer appear.

17. Note: these **block definitions** and **multileaderstyles** are saved in a template drawing in the support folder. Type in **SUPPORTFOLDER** and browse to **Bim/Sections/_SectionTag**. Thus, it is possible to create your own templates for tag styles, using the same method as described above in the template file.

18. Note: the syntax to be used is as follows:

    @PropCatName/@PropName. If "/" delimiter is not present in the tag, "BIM" category is assumed.

    Base property name should be separated from the child name with ":" character, e.g. mass/ucs elevation:minimum.

d. **Inserting title block properties and sheet list tables**

1. Go to the file **A-100.dwg** (Main_Floor 0, Main_Floor 1).

2. Define some **Project Properties** in the **PROJECTBROWSER**  under Info.

3. Once complete, click **RE** to refresh the paperspace. Normally the fields are now updated automatically.

4. If the fields would not update automatically, you can go to the Annotate tab, select the Title block, then click the **UPDATE FIELDS**  tool button in the **Text** tab under the **Fields** drop-down.

5. Now let's **insert** a **sheet list** table.

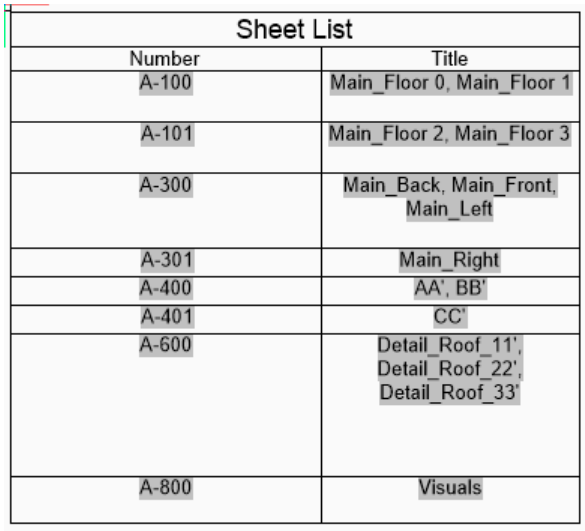
6. A Sheet List table can be inserted on any sheet of the sheet set.

7. Right-click the sheet set name in the **SHEET SETS PANEL**  and choose **Insert Sheet List Table** in the context menu.

8. **Specify** a point in the drawing to place your table.

9. Change the **numbers or names** of the sheets by going to each individual sheet in the **SHEET SETS PANEL**  . Run the **UPDATE FIELDS**  command onto the table to **regenerate** the table.

10. Note that if you want to store the title block for future drawings you can do so by adding it in **a**



Sheet List	
Number	Title
A-100	Main_Floor 0, Main_Floor 1
A-101	Main_Floor 2, Main_Floor 3
A-300	Main_Back, Main_Front, Main_Left
A-301	Main_Right
A-400	AA', BB'
A-401	CC'
A-600	Detail_Roof_11', Detail_Roof_22', Detail_Roof_33'
A-800	Visuals

.dwt template file. The process of adding things to a template file will be discussed in one of the next steps.

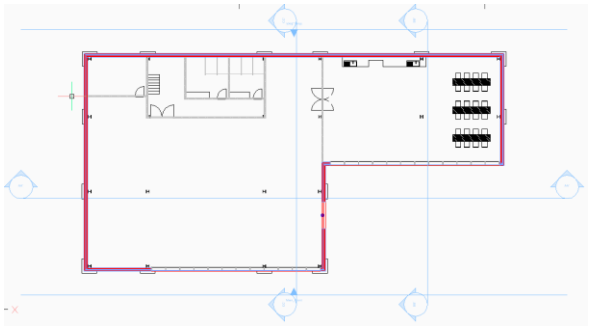
D. Typed Plans

a. Introduction

You can import Typed Plan templates shared from your design team which you can apply to selected viewports on sheets afterwards. These templates are helpful to ensure certain graphic standards are applied uniformly across different set of drawings, and across other projects, based on your desired entities' BIM properties and their values. It can also be useful to check if the 3D model elements and its metadata have been correctly created. For this training exercise, we will import pre-created Typed Plan templates.

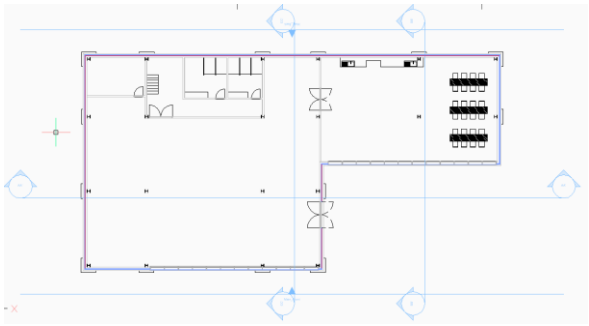
Those templates include:

1. External Elements Strategy
2. Insulation Line Strategy
3. Area Plan



b. Importing Typed Plan templates

1. Open A-100.dwg (Main_Floor 0, Main_Floor 1).



2. Click to select PROJECT BROWSER  on the side panel.
3. Navigate and select FILES 
4. Click  at the bottom of the panel and select Import Typed Plan 

.
5. Navigate to the exercise folder and select those folders ending with a .tp file extension.

   Note: If you do not see the file extensions, please make sure you have enabled file name extensions on your Windows Explorer.

6. Click Select Folder in the dialog and you will see the template imported into the PROJECT BROWSER  .

7. Repeat the last step to make sure all 3 Typed Plans templates as stated above are imported.

8. You will find that these folders are stored in your Project Folder under a new Typed Plans Folder. Double-clicking them will open those folders in Windows Explorer, where you will find individual settings.dwg and .json files for both drawing and tag customizations.

   Note: Modifying those files, including renaming them, is strictly not advised as they will cause the Project Browser to misbehave.

9. Open the A-100.dwg sheet via the Project Browser.

10. Ensure the PROPERTIES  panel is turned on and is displayed.

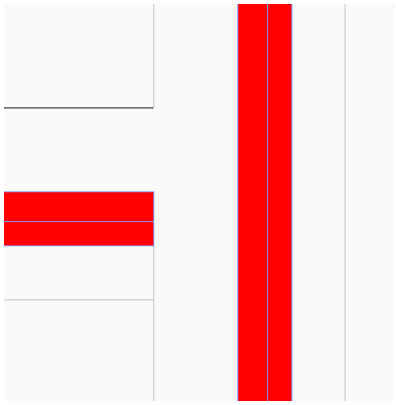
11. Select Main_Floor 0 viewport and in the PROPERTIES  panel, go to the Drawing Customization property and select External Elements Strategy from its drop-down selection.

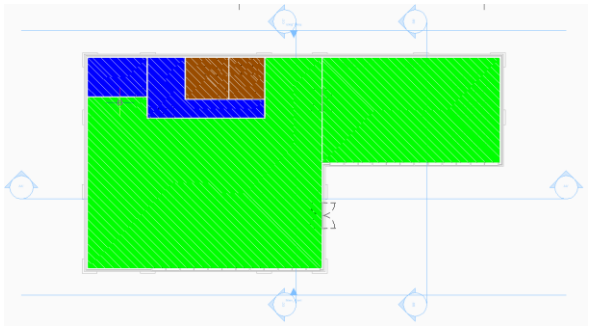
12. Hover over the selected viewport and select UPDATE SECTION  in the Quad under Model tab.

13. You should see a refreshed viewport with the graphical changes as per your Drawing Customization settings.

14. Repeat the last 3 steps but cycle to apply the other 2 templates on the same viewport. You should see graphical changes accordingly.

15. Tip: Typed Plan templates are not restricted to Plan drawings only. They can used on any BIM viewport, subject to the contents. For example, you can create a new section on Building 2 to apply the Insulation Line Strategy template. For this scenario, it is useful to see that the Ground Floor Slab is uninsulated and there are wall-to-roof joins where the insulation line is not continuous, leading to a cold bridging scenario.





16. Advanced schedules

This chapter explains how you can add more information and modifications to your sheets and schedules to meet your drawing criteria. This includes using templates to customize and suit your generated drawings.

A. Creating Schedules

Creating schedules is an essential step in any part of a BIM process, especially when producing it as part of production information drawing pack. They display multiple counts and description of various items, for the purpose of counting, easy references, cost quantifications etc. by the respective stakeholders involved in the project. Examples of schedules can include door, window, curtain wall or even equipment schedules.

Let's add some schedules to the project by making a door schedule.

a. **Open starter files**

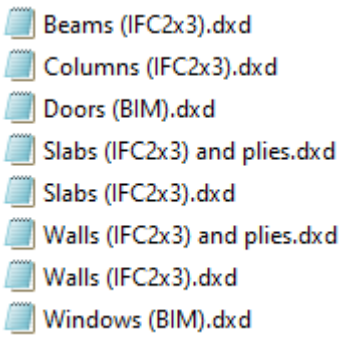
1. Open the following file: **Main.dwg** from the Exercise folder in the **'Schedules advanced'** folder.

b. **Open the Project Browser panel/ Import Schedule**

1. Go to the PROJECT BROWSER  , hit the bottom  and select Import Schedules.

2. A dialog with .dxd files should appear – it is a list of basic schedule templates shipped in V22. If you do not see anything of those, make sure the dialog is pointed to the right directory at **C:\Users*userprofile*\AppData\Roaming\Bricsys\BricsCAD\V22x64\en_US\Support\Bim\Schedules**

3. A .dxd aka data extraction definition file contains a customized pre-set of data types you would like to include in your schedule.



4. Let's select **Doors(BIM).dxd** and hit **Open**.

5. You should see your Project Browser refresh with a newly created Folder called Schedules, with a drop down value of **Doors(BIM).dxd.** This means that this dxd with its default settings is now loaded into your project.

c. **Generating a Schedule**

1. If you choose to generate a schedule based on its default settings, simply navigate to your desired sheet.

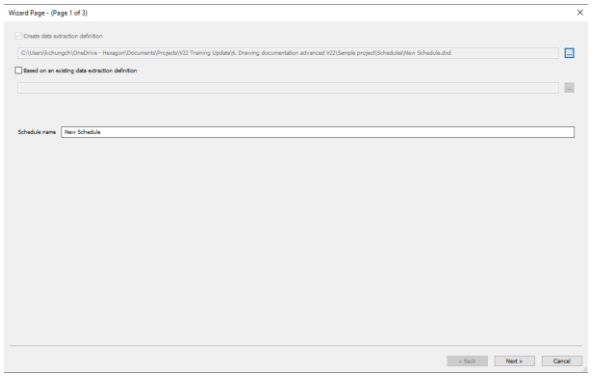
2. For this example, let's go to drawing **A301.**

3. Navigate to **Doors(BIM).dxd** and right-click for more control options.

4. Select **Generate on Current Sheet** and you should find the schedule generate at the bottom of the sheet for review in a few moments.

5. The schedule appears as a table entity with the sizes of rows and columns adjustable to fit onto your sheet.

d. Creating a New Schedule



Whilst it may be possible to create schedules based on default, shipped or past .dxd files, there are scenarios where entirely new schedules are called for. For example, let's make a Room Schedule out of Spaces.

To do so we need to access the Project Browser again.

1. Go to the PROJECT BROWSER , under the **Files** tab, hit the bottom and select **New Schedule.**

2. A dialog for the Schedule Wizard page should appear.

3. As we are creating a completely new schedule, let's rename our Schedule to **Room Schedule_Training**

   Note: This name will appear as your main header for the schedule.

4. Click **Next**.

5. On this page (Page 2 of 3), you can choose whether you want to extract entities from blocks and xrefs.

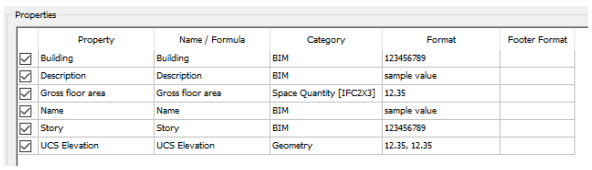
   We **don't** want to extract entities from blocks so turn this **off**. Leave the rest of the checkmarks as they were ('Extract entities form xrefs' on, the rest off).

6. Click to **Include current Project.**

7. Most importantly, before we move on, we need to make sure the right filters are being specified. To do so, click Edit Filter.

8. A Filter Editor text box should appear and within the field, type **Type == BIM_SPACE.**

   To learn more about .dxd syntax, please visit the Help Guide.



9. Once done, click Apply. Now, the schedule format is tuned to filter out BIM elements classified as Spaces.

10. Click **Next**.

11. On this page, you can choose the properties to be included in the schedule.

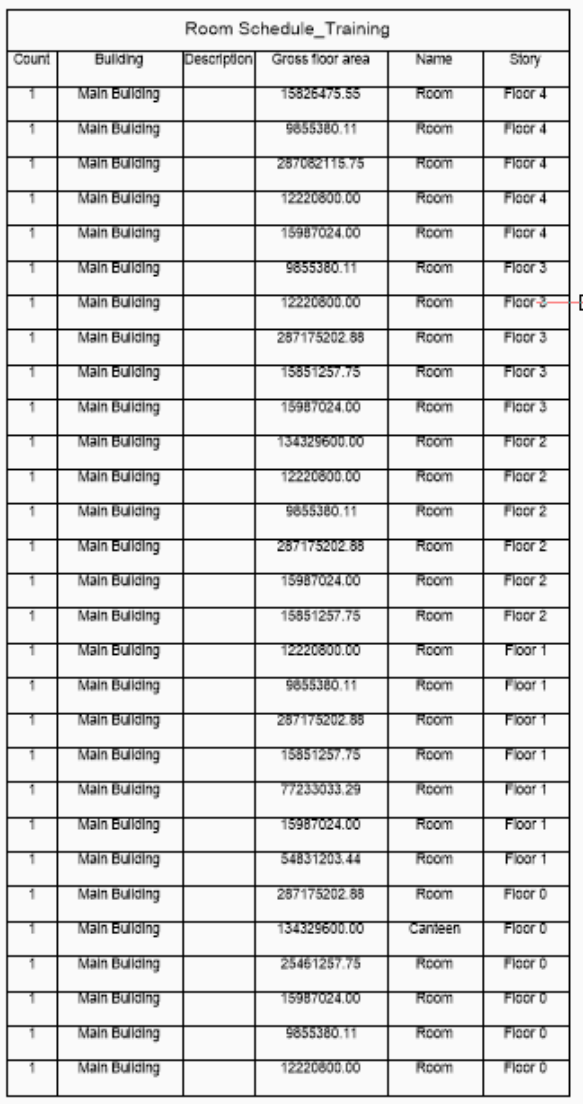
12. Space or Room schedules are usually generated for purposes of understanding their area properties or even material properties. For this exercise, we will be going for the former, but to accompany those figures, we need to make sure other fields to be included, should be relevant too.

13. Pick **Property = Building, Property = Gross Floor Area, Property = Name, Property = Story** as a start.

14. Click **Finish** to acknowledge the settings.

15. This is now saved into the .dxd file within your project folder.

16. Click **Refresh** on the **PROJECTBROWSER** to make sure those changes are finalized.



Room Schedule_Training

Count	Building	Description	Gross floor area	Name	Story
1	Main Building		15826475.55	Room	Floor 4
1	Main Building		9855380.11	Room	Floor 4
1	Main Building		287082115.75	Room	Floor 4
1	Main Building		12220800.00	Room	Floor 4
1	Main Building		15987024.00	Room	Floor 4
1	Main Building		9855380.11	Room	Floor 3
1	Main Building		12220800.00	Room	Floor 3
1	Main Building		287175202.88	Room	Floor 3
1	Main Building		15851257.75	Room	Floor 3
1	Main Building		15987024.00	Room	Floor 3
1	Main Building		134329600.00	Room	Floor 2
1	Main Building		12220800.00	Room	Floor 2
1	Main Building		9855380.11	Room	Floor 2
1	Main Building		287175202.88	Room	Floor 2
1	Main Building		15987024.00	Room	Floor 2
1	Main Building		15851257.75	Room	Floor 2
1	Main Building		12220800.00	Room	Floor 1
1	Main Building		9855380.11	Room	Floor 1
1	Main Building		287175202.88	Room	Floor 1
1	Main Building		15851257.75	Room	Floor 1
1	Main Building		77233033.29	Room	Floor 1
1	Main Building		15987024.00	Room	Floor 1
1	Main Building		54831203.44	Room	Floor 1
1	Main Building		287175202.88	Room	Floor 0
1	Main Building		134329600.00	Canteen	Floor 0
1	Main Building		25461257.75	Room	Floor 0
1	Main Building		15987024.00	Room	Floor 0
1	Main Building		9855380.11	Room	Floor 0
1	Main Building		12220800.00	Room	Floor 0

e. **Generating a Schedule**

1. If you choose to generate a schedule based on its default settings, simply navigate to your desired sheet.

2. For this example, let's go to drawing **A301.**

3. Navigate to **Room Schedule_Training.dxd** and **right-click** for more control options.

4. Select **Generate on Current Sheet** and you should find the schedule generate at the bottom of the sheet for review in a few moments.

The schedule appears as a table entity with the sizes of rows and columns adjustable to fit onto your sheet.

B. Updating Schedules

a. **Editing an existing schedule**

A .dxd (Data Extraction Definition) file is **editable** via the **wizard** as shown or via a **text editor**. This advanced training exercise will cover the former, as there is a lesser chance of mistyping or running into a mistake. Doing it via a text editor may be briefly covered in the Customised training.

1. Right-click **Room Schedule_Training.dxd** and click **Edit**.
2. The **wizard dialog** as we encountered before should appear.
3. Filters or how XREFs are extracted can be changed, but we will be covering the fields instead.
4. Click **Next.**
5. Keeping with the existing fields, select **Property = UCS Elevation (Mass), Property = Description.** Those extra fields could support a basic area schedule, giving the viewers more information and context to the spaces.
6. Once done, click **Finish.**
7. The .dxd file is updated in the background, but to see the latest changes in the schedule, hover over the Table to activate the **QUAD**  .
8. Select **UPDATE DATALINK**  under **Modify**. The updates should appear in a few moments.
9. Alternatively, use the command **DATALINKUPDATE**. Hit **U** for update and **select the Table**. You should see the same results as the steps above.

b. **Adjusting the schedule to fit the sheet**

1. The rows and columns can be adjusted manually based on your preferences.
2. However, in a schedule with multiple rows and columns such as this above, it can take too long to do so.
3. **Select** the table and go to the **PROPERTIESPANEL**  .
4. Under the field **Height**, you can adjust the value accordingly. For eg. 500mm.

   Note: Since an A1 sheet is 594mm in Height, a 500mm “high” schedule should fit snug onto the drawing.
5. The style of a schedule can be adjusted under **Table Style** in the **DRAWINGEXPLORER**  . Like all styles such as dimensions etc., their graphic appearances can be adjusted to suit accordingly.