

PointFuse 2021.1

Quick Start Guide

PointFuse quickly and accurately converts point clouds into intelligent, classified mesh models.

Use the PointFuse wizard to classify surfaces, including IFC for BIM Model.

Use Space Creator to convert classified mesh models to BIM models. You can directly upload some or all classified surfaces to Autodesk BIM 360 or export to multiple formats to continue your workflow.

PointFuse runs on a physical PC.

With a full Standard or Pro license, you can also run it on a virtual machine.

With a Trial license, you must disable Hyper-V and Windows Sandbox, which use virtual machines. You **can** use PointFuse via desktop sharing, but Remote Desktop is **not** supported. TeamViewer is the suggested alternative.

The User Guide help has a Quick Start section, which is more detailed than this short Quick Start Guide.

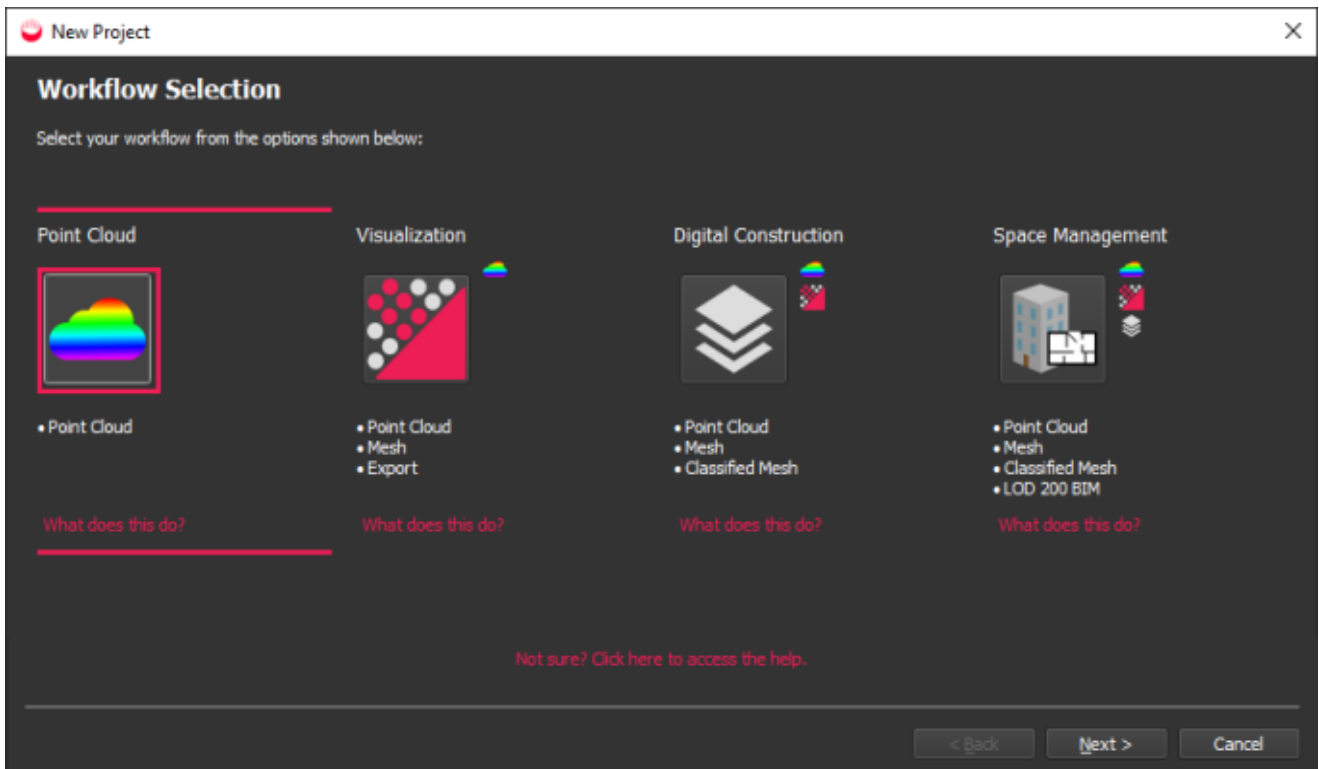
New Project Wizard

Start PointFuse and select **Create New Project**.

The wizard can import a point cloud, create a mesh model, and convert that to a classified mesh model.

When the wizard finishes, you see the results in the viewport and in the Project Explorer on the left.


Workflow Selection



1. Select a workflow (the option you chose determines how many of the subsequent steps you do):

- **Point Cloud**

View the point cloud to crop out a segment and/or test different mesh creation settings.

You can do the other steps later, from the Workflow Wizard .

- **Visualization**

Create a mesh model to visualize your point cloud data more easily. A point cloud is created in the project so that you can view it.

This workflow includes the option to **Export** mesh models from the wizard.

- **Digital Construction**

Create a classified mesh model, a recommended step for coordination and as-built modelling workflows. It imports the point cloud, creates a mesh, applies your classification template and runs an auto-classification of large planar surfaces.

- **Space Management**

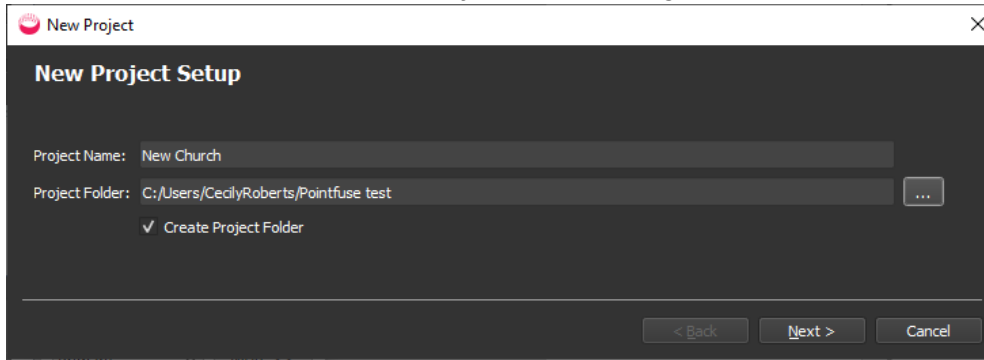
Produce an LOD 200 BIM model from your point cloud. It imports the point cloud,

creates a mesh model, applies your classification template and runs an auto-classification of large planar surfaces. You will then need to perform some validation and classification before running the **Space Creator** tool.

2. Click **Next**.

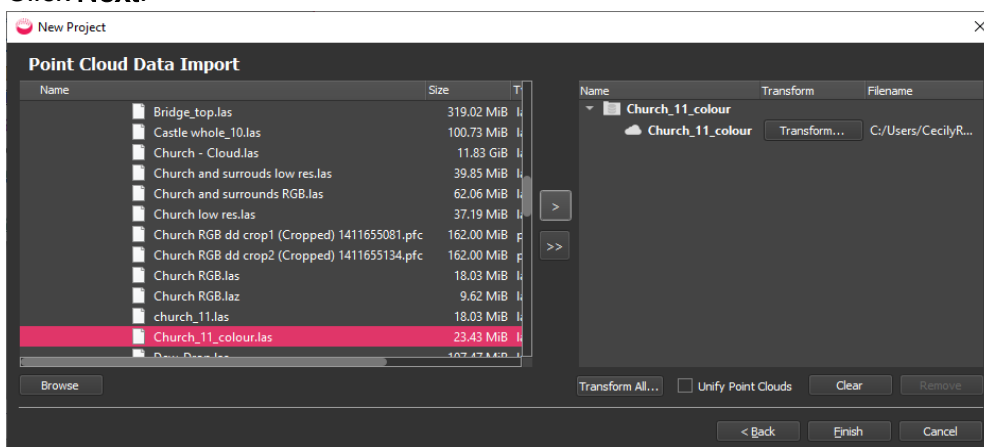
New Project Setup - to Import Point Cloud



1. All the workflows start with New Project Setup dialog:



2. Specify a **Project Name** and optionally a **Project Folder**.

3. Click **Next**.

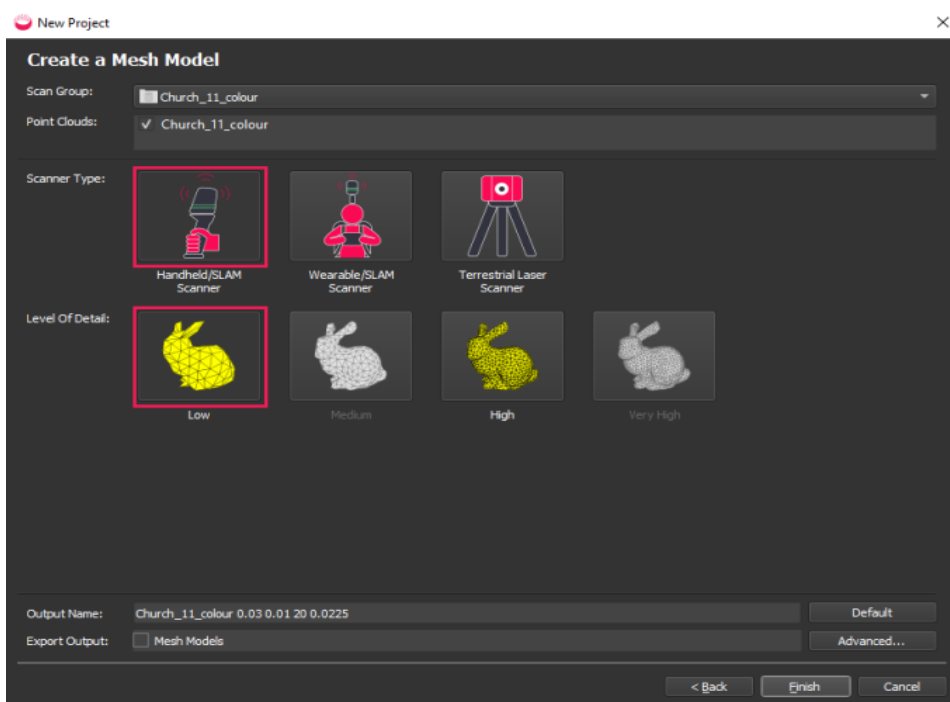


4. Navigate to point cloud data in the left panel, and drag and drop to the import panel on the right. If you select multiple point clouds you can click **chevron**  to import them into a single scan folder or **double chevron**  to import them to a single folder.
5. To combine multiple point clouds into a single scan, import them in the same folder and check **Unify Point Clouds**.
6. Click **Next** or **Finish**, depending which workflow you chose.

If **Finish**, you can do other steps later, from the Workflow Wizard .

Create a Mesh Model - to Visualize Point Cloud and Optionally Export It

1. The point cloud is listed in the Create Mesh Model dialog, with options to select resolution to match the source data.

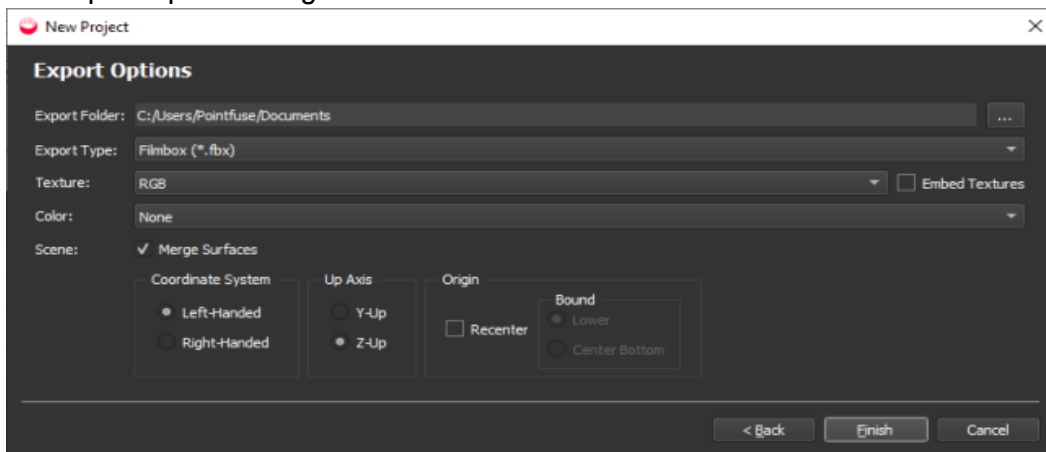


2. Choose a **Scanner Type** and **Level of Detail**. For visualization, choose a low Level of Detail. If you are building a classified mesh model or BIM model, choose a higher one.
3. If you selected the **Visualization** workflow, you can check **Export Output Mesh Models**.

Optional:

- Click **Advanced** to configure individual processing values, using custom processing profiles. This is described in the User Guide help.
4. Click **Next** or **Finish**, depending which workflow option you chose.

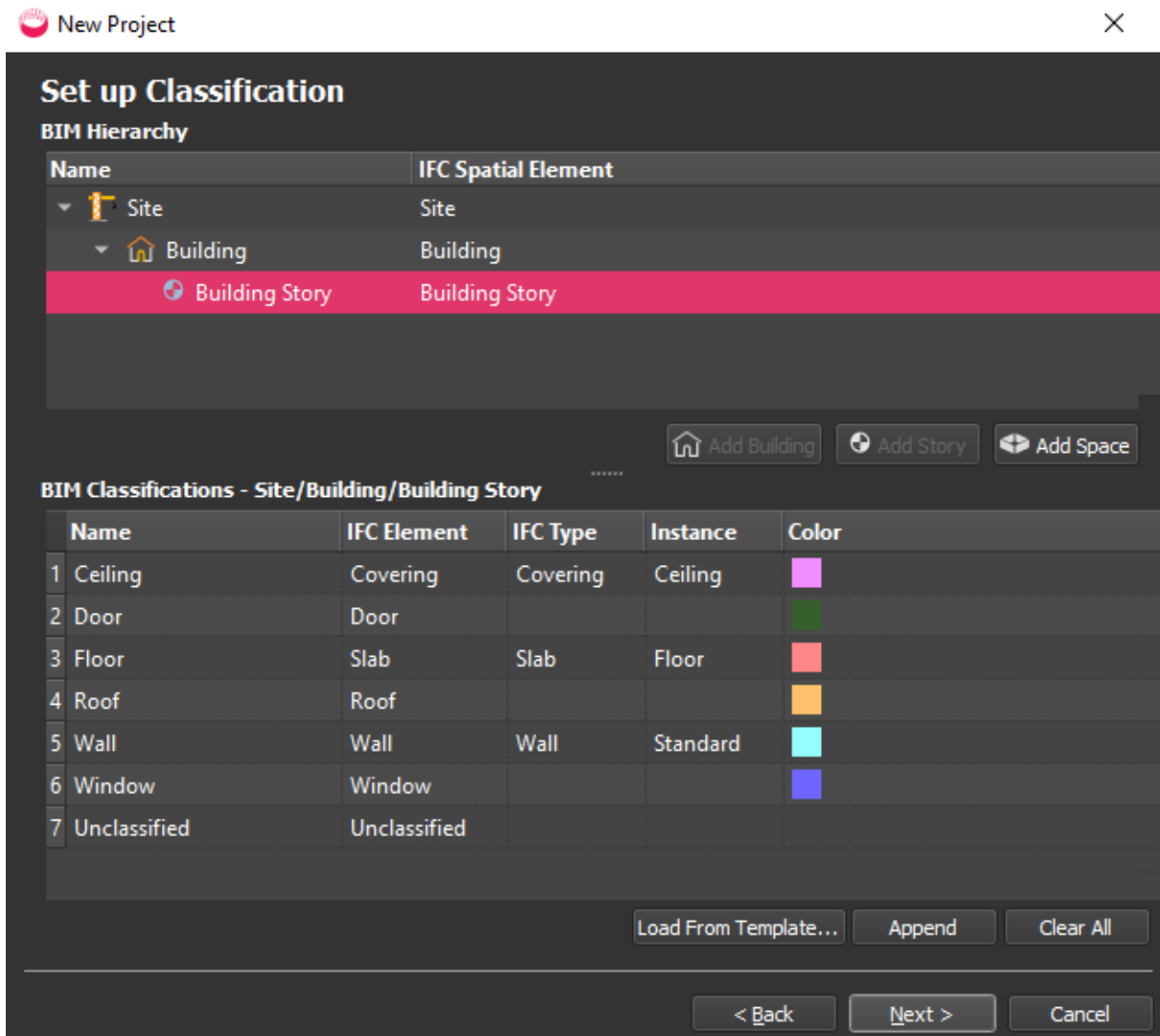
5. If you selected the Visualization workflow and checked **Export Output Mesh Models**, you see the Export Option dialog:



- Whether or not you can select and embed textures depends on the **Export Type** you select.
 - Use the fields in the **Scene** section to specify whether to **Merge Surfaces** and to define the **Coordinate System**, the **Up Axis**, whether to recenter the **Origin**, and where the **Bound** should be in the export.
6. Click **Finish** to create and export the model.

Set up Classification - for Classified Mesh Model

1. The dialog highlights the Building level.
Select the **Building Story** to see or amend the BIM Classifications:



Optional:

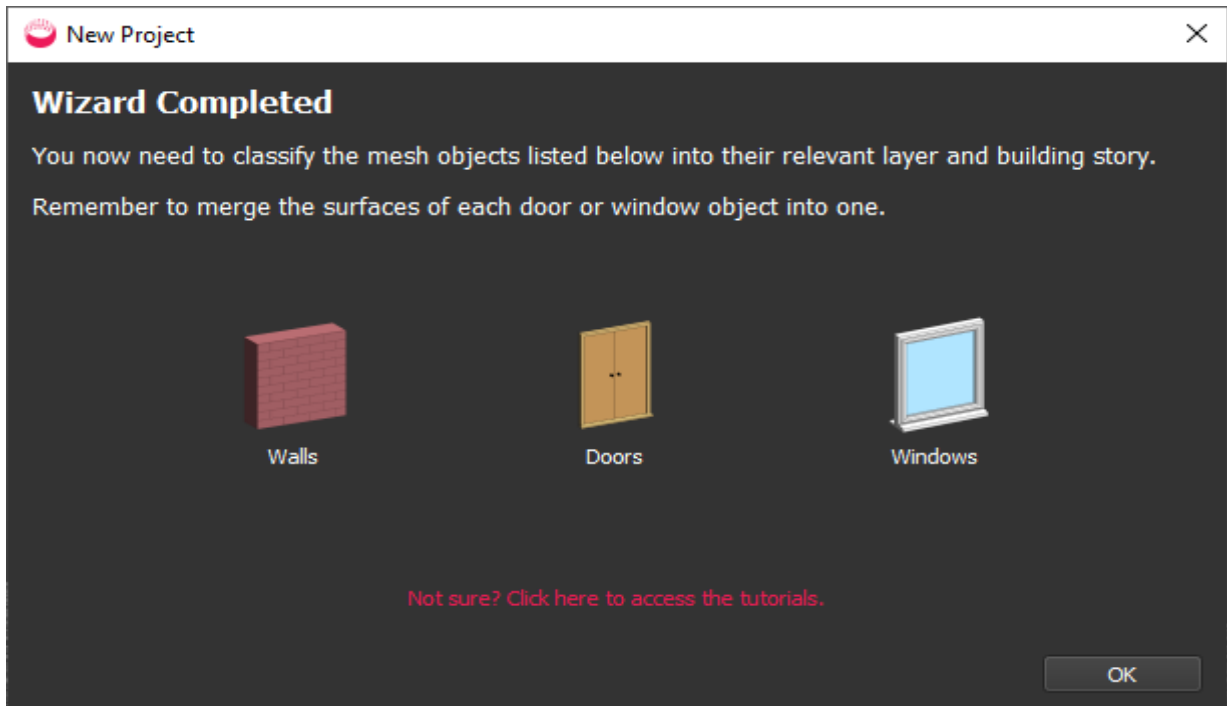
- Create the site hierarchy, with one story for each different floor elevation. For example, click a **Building** and select **Add Story**.
- To choose a different classification template, select a story and then select **Load from Template**.

In the Template Selector dialog, select a template, optionally edit it, and click **OK** to return to the main wizard.

2. Click **Next** or **Finish**, depending which workflow option you chose.

Next Steps

1. The final page tells you to classify and merge walls, doors, and windows to layers for each building story when the wizard finishes:



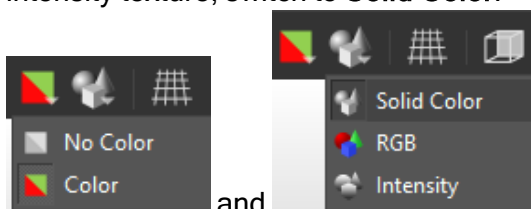
2. Click **Finish**.
3. PointFuse processes the data, then displays the Wizard Complete screen.
4. Click **OK** to see the classified mesh model in the viewport and the point cloud, mesh model, and classified mesh model listed in the Project Explorer.

Refine Classification and Merge Surfaces

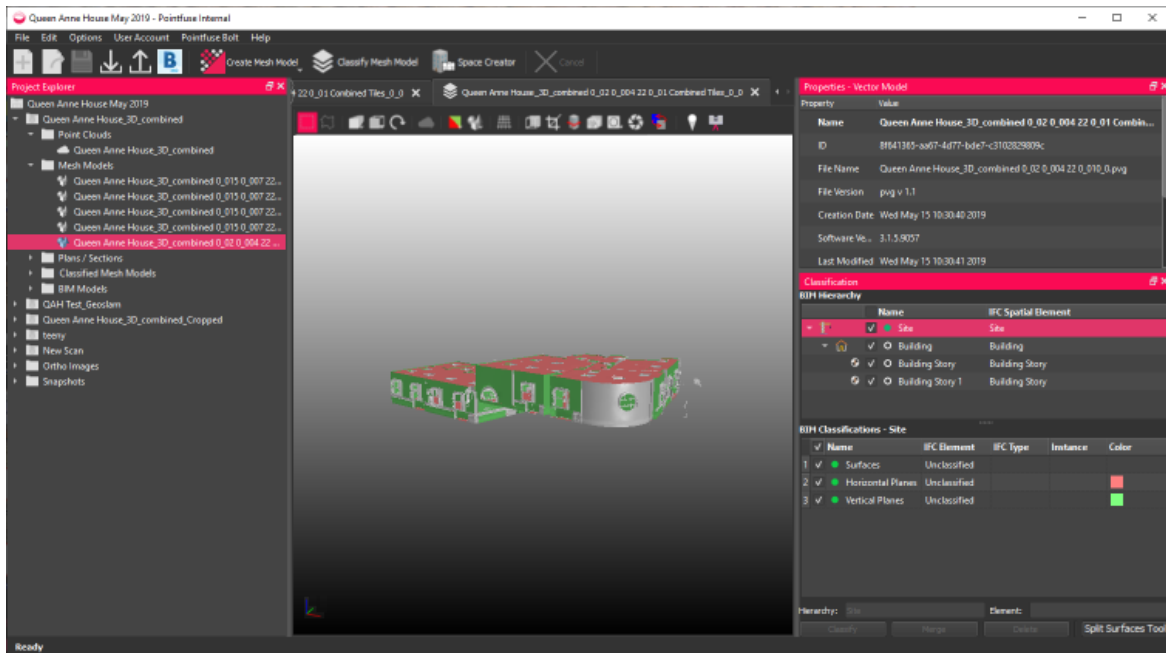
You must classify walls to associate each with its building story before you create a BIM model. Where possible, **Merge** multiple surfaces to create single objects and optimize the model.



View and Select Surfaces

1. After the final page of the wizard, the classified mesh model is displayed.
2. To see classifications clearly, select **Color** for classifications, and if the model has RGB or intensity texture, switch to **Solid Color**:



3. The model is color-coded by auto planar classification, as indicated in the Classification window in the bottom right, which initially shows the classifications for the Site (the highlighted row):

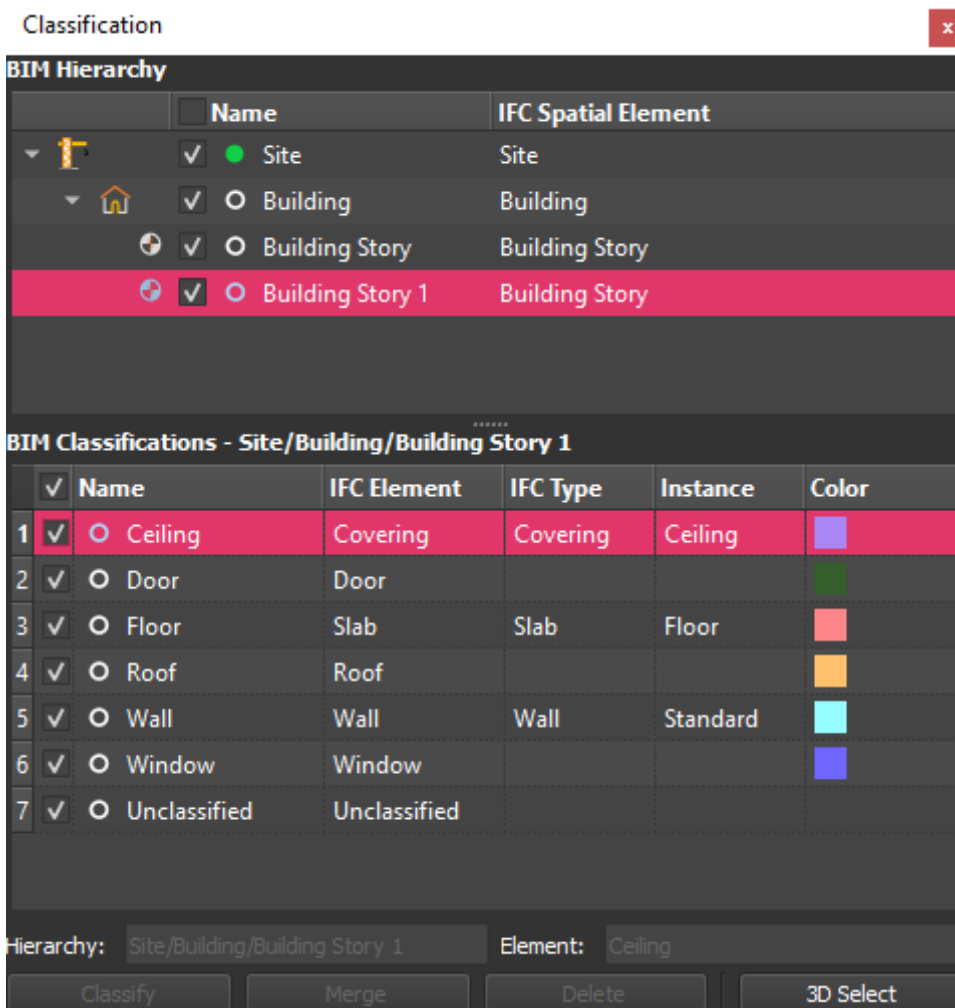


4. Select one or more surfaces to classify as a specific element in a specific story:
 - Select a single surface: **Ctrl+Click**.
 - Select multiple surfaces:
 - **Ctrl+Click** each surface.
 - Click the **Split Surfaces Tool** button in the Classification panel to use a 3D selection box for splitting surfaces.
 - Click Rectangle Select  and hold **Ctrl** to drag select.
 - Click Polygon Select  and **Ctrl+Click** to define nodes of a polygon selection.
 - Deselect: **Ctrl+Click** individually, or from the right click context menu, select **Clear Selected Geometries**.

Classify and Merge Elements

1. Click **Classify** to classify them, but retaining separate surfaces, or **Merge**, to merge and classify them.

- In the Classification window, click on the **Story** and **IFC Element**:



Classification

BIM Hierarchy

	Name	IFC Spatial Element
✓	Site	Site
✓	Building	Building
✓	Building Story	Building Story
✓	Building Story 1	Building Story

BIM Classifications - Site/Building/Building Story 1

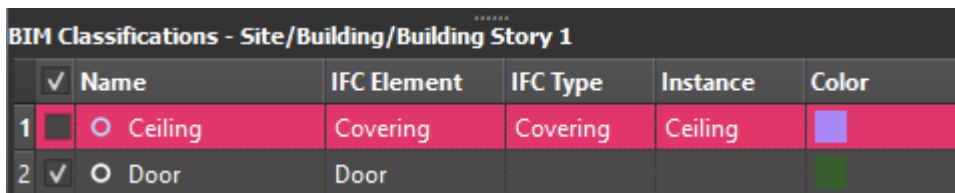
	Name	IFC Element	IFC Type	Instance	Color
1	✓ Ceiling	Covering	Covering	Ceiling	Blue
2	✓ Door	Door			Green
3	✓ Floor	Slab	Slab	Floor	Red
4	✓ Roof	Roof			Yellow
5	✓ Wall	Wall	Wall	Standard	Cyan
6	✓ Window	Window			Blue
7	✓ Unclassified	Unclassified			

Hierarchy: Site/Building/Building Story 1 Element: Ceiling

Classify Merge Delete 3D Select

Where possible, **Merge** multiple surfaces to create a single object. Removing unnecessary segmentation optimizes the model and file size for export. Merging is permanent, so save frequently.

- It's useful to have a noise element for people, furniture etc before classifying objects of interest. You can then uncheck that element, to hide it from view. As you classify other elements, you can hide them too:




BIM Classifications - Site/Building/Building Story 1

	Name	IFC Element	IFC Type	Instance	Color
1	☐ Ceiling	Covering	Covering	Ceiling	Blue
2	✓ Door	Door			Green

You can also right click on the selected row and, from the context menu, select to show, hide or toggle that element from all levels.

- Repeat until you have classified all surfaces.
- Click **File > Save All**.

Surface Flipping

To optimize the model for virtual reality, select surfaces to flip, so they are front-facing. You use the **Surface Flipping Tool** , described in the User Guide help.

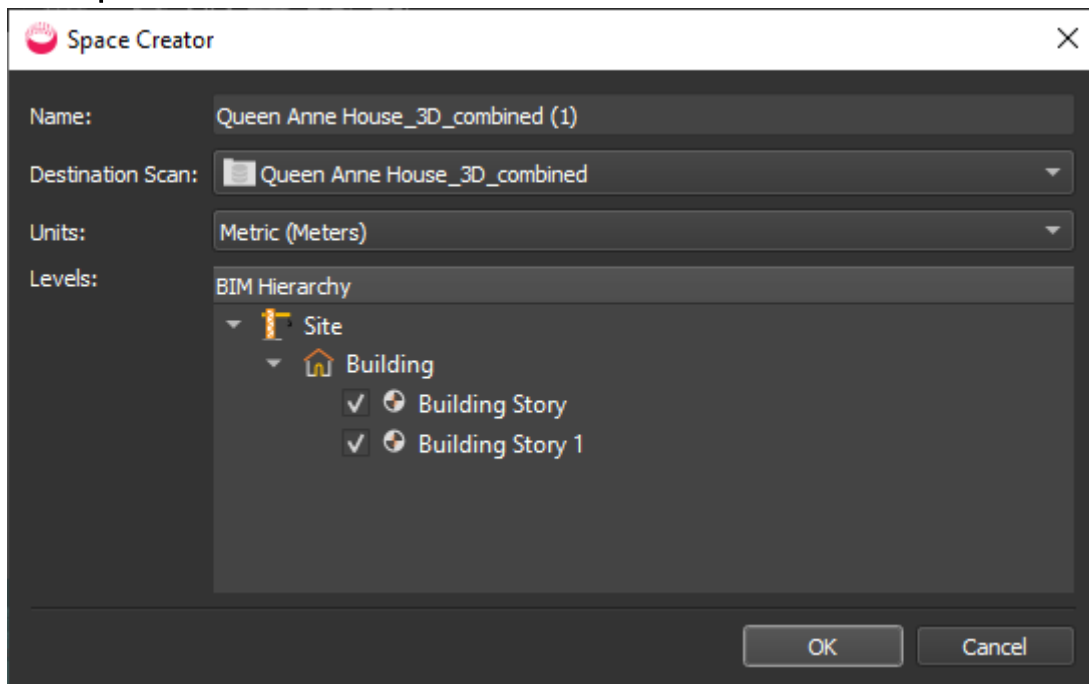
Space Creator - Create BIM Model

The Space Creator toolset is only available with a PointFuse Pro license. See www.pointfuse.com for details.

Before you can create a BIM model, you must have classified the walls of the classified mesh model to associate each with its building story.

Create and edit floor plans for each story to refine the model before exporting for the next stage of your workflow: for example, in IFC format for Revit.

1. Click **Space Creator** :



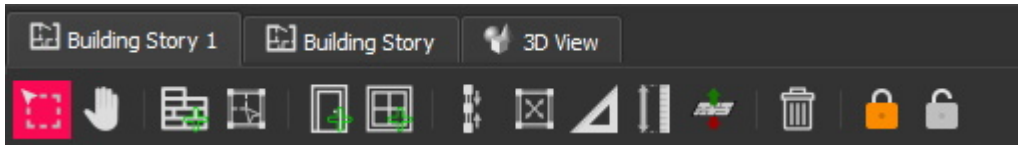
2. After a few seconds, you see a floor plan of one story, with tabs for other stories, one for 3D preview, and a toolbar below. These tools are for editing the BIM models by editing the floor plans.

Edit BIM Models

When you open BIM model in the viewport, there is a tab for each 2D story, and another for the 3D model. All tabs have a toolbar, context menu, and navigation instructions at the bottom.

You typically do initial editing in 2D, then refine in 3D. Edits you make to one view are immediately applied to the other.

Edit Building Story Tools in 2D View





In a 2D view, switch between **Select**  and **Pan** .

Use the tools to refine the BIM model: combine walls and make them square; split walls; add and delete walls, partitions, doors, windows; equalize wall heights, define rooms, for example.

Edit Walls in 2D View

Lock and Unlock Walls

In a 2D view, you can select one or multiple walls and **Lock**  them so you they are unaffected by changes you make to surrounding walls.

Locked walls have black nodes and are shaded grey: .

Select and click **Unlock**  to enable editing.

Move End Nodes

You can move the start and end points of a wall by selecting and dragging the nodes at either end.

Where the nodes of two or more elements are at the same point, they are pink; if they are just near, they are gray. To connect existing nodes, roll the mouse wheel to zoom in, then click and drag one of them until it overlays the other:



You can then **Combine**, **Make Square**, or just drag the shared node.

Shift Wall Position

By default, nodes are at the center of each end. When you select a single wall, you see clickable triangles to cycle through shifting walls in, out, or centered. You can also press **Spacebar**.



Change Wall Width

Hover over a wall edge and when you see a pinky-orange highlight, drag the edge. Whether the wall widens or narrows in one direction or both depends on whether the nodes are centered or on corners (whether the wall has been shifted).

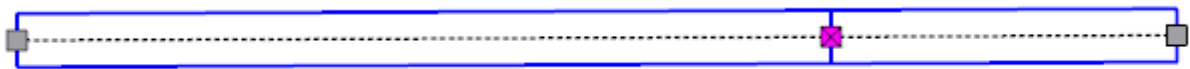


Split Wall

Just double click where you want to create new, overlapping nodes.

Combine, Extend and Join Walls

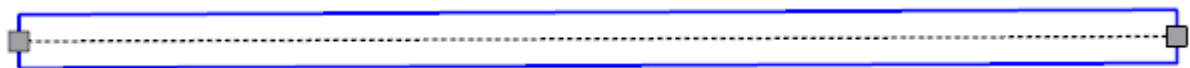
1. To combine walls, they must have a node in common (indicated pink):



2. Click one wall and **Ctrl+Click** the other:



3. Click **Combine Walls**  :




Where the ends of two walls are close, but **not** joined, select both, then right click anywhere in a floor plan and select **Extend and Join**.


Show Intersection Angles

To display the angles of wall intersections, right click anywhere in a floor plan and check **Show Intersection Angles**.

Make Square

1. To align contiguous walls that are nearly at right angles, as right angles, select with **Ctrl+Click**.
2. Click **Make Square** .

Equalize Wall Heights

1. In a 2D view, select some walls and click **Equalize Wall Heights**  to open the dialog.
2. Choose a height for the selected walls and click **Use**.

Edit, Copy, and Paste Object Properties

1. In a 2D view, select a wall, door, window etc.
2. In the **Properties** window, change the values for **Width, Height, Thickness, Elevation** etc.


Copy and Paste Object Properties

You can select a wall, door, or window and copy its dimensions to other objects of the same type.

1. In a 2D view, select an object and press **Alt+C** (or right click and select **Copy Object Properties**).
2. Select other objects of that type, and press **Alt+V** to paste those properties (or right click and select **Paste Object Properties**).

PointFuse remembers the most recently copied properties for each object type in the current session of the project, so you can switch between pasting properties to walls, doors, and windows, without having to copy again.



Set Story Elevation

1. In a 2D view, right click to see the context menu and select **Set Story Elevation** . (There is an equivalent tool on the 3D view toolbar.)
2. In the dialog, change the current value and click **OK**.



Add Objects in 2D View

Add Wall or Partition

Partitions create boundaries for rooms where there are no walls. Partitions are not visible in the 3D view.

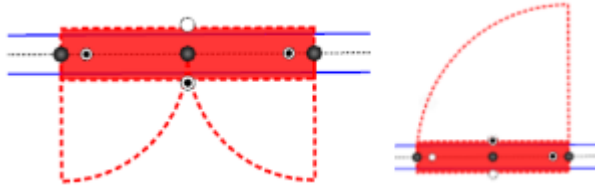
1. In a 2D view, click **Add Wall**  or **Add Partition** .
2. In a 2D view, left click once for the start point, again for the end point of that wall or partition - which will also be the start point of the next wall or partition.
3. Press **Esc** to stop adding walls or partitions.

Add Door or Window

1. In a 2D view, click **Add Door**  or **Add Window** . (There are equivalent tools on the 3D view toolbar.)
2. Click once on a wall or partition at the center point of the door or window.
3. **Doors** are red and **windows** are green:




4. Slide the position by dragging from the center node, or change the width by dragging the nodes at either end.
5. To add opening directions to a door, click on it to see additional controls. Click in one or both white nodes at the end to specify single or double door, and click one of the nodes along the edge to show the direction of opening:




Identify Rooms (fit floor slabs and ceilings)

Rooms must be fully enclosed by walls and/or partitions. The tool either identifies all the rooms in a story, or, if you have selected some walls/partitions, just the rooms enclosed by those walls/partitions.

The floor area is indicated by shading in 2D view, and the walls are shifted outwards so the nodes intersect at the inside corners.

1. In a 2D view, click **Identify Rooms** . The dialog has checkboxes:
 - **Shift Walls:** external walls will be shifted so the nodes intersect at the inside corners.
 - **Lock Wall Heights:** All walls are made the same height, to fit the room/space height.
 - **Fit Ceilings:** If wall heights are locked, you can fit ceilings as well as floors.
2. Where rooms are not created, check for gaps in walls/partitions (gray nodes instead of pink), connect them, and rerun **Identify Rooms**.
See the User Guide for details of other cases where a slab may not be fitted, for example, where there is a room within another room **and** connected by a single wall.
3. Delete any unwanted floor slabs, and shift or adjust wall positions if necessary.

Remove (Delete)

1. In a 2D view, **Click** (single element) or **Ctrl+Click** (multiple elements).
2. Click **Remove** .

Edit 3D Models

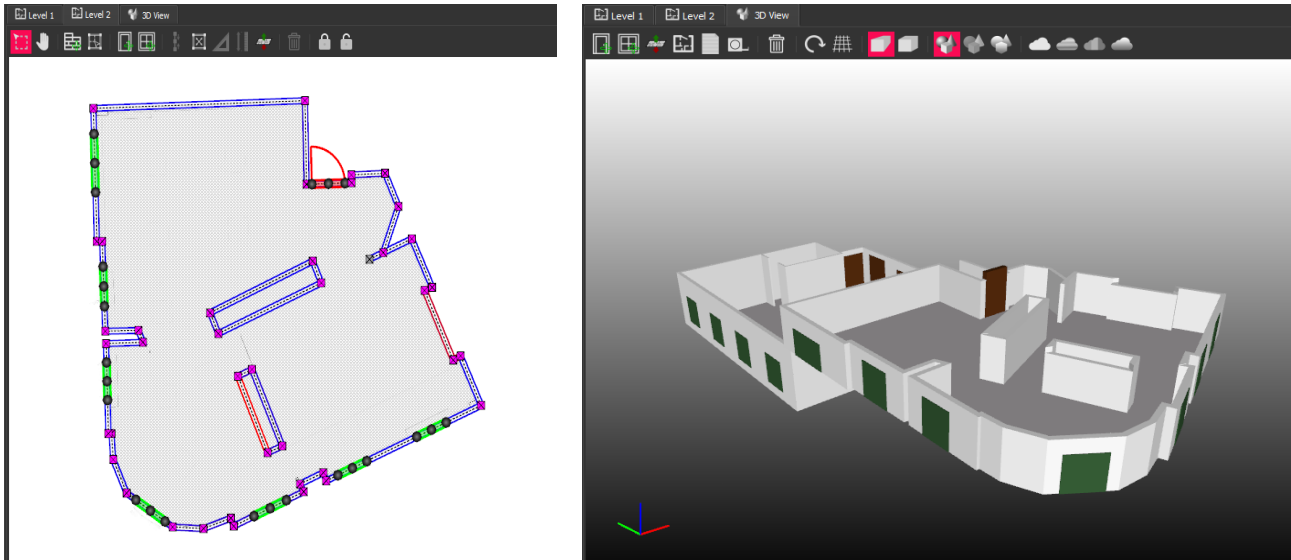
To check the accuracy and positioning of features like walls, doors, and windows, compare the 3D model with the original mesh model and with the 2D floor plan of each story.

Compare BIM Model with Mesh Model

With the BIM model in a 3D view, locate the mesh model in the Project Explorer, right click, and select **Add to Classified Mesh Model**.

Compare 3D and 2D



Partitions are not visible in the 3D view, and the toolbar and mouse navigation are slightly different.



Transparency and Depth Peeling

In the 3D view, to adjust the transparency and toggle depth peeling, right click and select **Transparency Settings**.


Add Door or Window

1. In the 3D view, click **Add Door**  or **Add Window** .
2. Click once on a wall at the center point of the door or window.
3. **Doors** are brown and **windows** are green.

Edit Wall, Door, or Window

1. In the 3D view, **Ctrl+Click** to select a wall, door, or window.
2. Drag the nodes to reposition or resize the object. For walls, you can only change the height.
3. **Ctrl+Click** to unselect.

Set Story Elevation


1. In the 3D view, click **Set Story Elevation** .
2. In the dialog, select one of the stories and click **OK**.

3. In the viewport, raise or lower the selection box corners, or click on the upper or lower planes, to set the lower and upper bounds of the story, then click **OK**.

Create Floor Plans and Reports

To export a model, see "Export Models " below.


Create DXF Floor Plan of a Story

1. In the 3D view, click **Create Floor Plan** .
2. A dialog is displayed. Select a story and click **OK**.
3. In the viewport, adjust the height of the selection plane and click **OK**.
4. In the popup dialog, choose whether to display **Room Names, Room Areas, Floor and Ceiling Elevations**, and choose the **Measurement Units**. Then click **OK**.
5. Choose a file location and name and click **Save**.
6. Open the floor plan in a DXF viewer. It will include room names.

Walls are exported without color, so if viewing with a white background, you will need to change the setting in the viewer to a dark color, so you can see them.

Create Report of BIM Model

You can create a report in PDF, HTML, or CSV. It summarizes the number of levels, rooms, doors, and windows, as well as the total room area for the site. It has a floor plan for each story, and states the room, door, window and area totals for each.

1. In the 3D view, click **Create Report** .
2. In the **Create BIM Report** dialog, customize the report, including adding metadata, choosing **Measurement Units**, and which **Surface Area Statistics** to include, then click **OK**.
3. In the File Save dialog, navigate to a location, specify a **File Name** and **File Type** (PDF, HTML, or CSV), and click **Save**.
4. Open the report. (If you chose CSV, you will have one folder containing CSV files for different components.)

Export Models

It is quick and easy to export models or selected surfaces for the next stage of your workflow, in Autodesk, Teckla Structures, Revit, or ArchiCAD, for example.

The Trial version of PointFuse lasts 15 days and limits you to exporting three mesh models (whether to Autodesk BIM 360, Procore, or files on your PC), and up to 3,000 square feet of BIM exports. After that, you need to buy a Full license to use PointFuse.

Export to Autodesk BIM 360 or Procore




The process and dialogs for BIM 360 and Procore exports are almost the same, and both vary according to what you are exporting.

If you've selected and classified surfaces, the classification hierarchy will be uploaded with the model.

Prerequisites

- An Autodesk BIM 360 account with admin rights: add PointFuse as an app, as explained in the Autodesk article [To Add Apps & Integrations](#). Or a Procore account.
- A full PointFuse license or PointFuse trial with at least one of the three exports remaining.

Export Single Mesh Model to BIM 360 or Procore

1. Before exporting, click **Save**  on the toolbar.
2. To upload the whole model, or selected surfaces, select **BIM 360 Export** , and sign in to your Autodesk account and Project Files Folders or **Procore** account .
 - a. Select the destination folder and click **Next** to open the upload page.
 - b. Select the **File name**, the **Export file type**, and for FBX, whether to include a **Texture** or **Color**.
 - c. Click **Next** to upload the model.
 - d. When done, select **Show file in BIM 360** or **Show file in Procore** to view it in your default browser.
 - e. Browser functions include: preview (with markup tools), download, move, copy, rename, lock, share, and delete.

Export Single Classified Mesh Model to BIM 360 or Procore

This is essentially the same as for a mesh model, but the lower part of the dialog where you select items has additional fields relating to the BIM classifications.

There are two IFC formats for exporting classified mesh models and BIM models:


IFC Absolute Positioning (Recommended): All geometry in the IFC output is positioned relative to a zero-based origin, according to their absolute position in space. This may cause issues if the geometry is located far from the origin.

IFC Relative Positioning: All geometry in the IFC output is positioned relative to the lower bound of all the classified mesh models contained in the classified mesh model group. This may cause issues when combining geometries from different or external output formats.

Check and uncheck **BIM Hierarchy** stories and **BIM Classification** elements to determine exactly what will be exported.



Export to Files on Your Computer

The Trial version of PointFuse lasts 15 days and limits you to exporting three mesh models (whether to Autodesk BIM 360, Procore, or files on your PC), and up to 3,000 square feet of BIM exports. After that, you need to buy a Full license to use PointFuse.

You can export the model currently in the viewport by selecting **Export**  from the main menu and then **Export** or **Batch Export**, or you can right click in the Project Explorer and select Export or Batch Export.

The dialogs vary according to what you are exporting.

Export Single Mesh Model

1. Click **Save**  on the toolbar.
2. Display the mesh model in the viewport, select **Export** .
3. In the dialog, choose a **File Name** and click the Browse button to select an export format: DAE, FBX, IFC, NWC, OBJ, SKP, STEP, STL, or X3D.
 - If you've selected and classified surfaces, FBX and IFC retain the classification hierarchy.
 - There are two IFC formats for exporting classified mesh models and BIM models. See [Export Single Classified Mesh Model to BIM 360](#), above.
 - If exporting to OBJ, DAE or FBX, you can include RGB or intensity texture in the export.
 - For single (not batch) you can choose whether to export the whole model or selected groups and layers.
4. Click **OK** to create the export files. You can open them in a CAD or similar program, but not in PointFuse.

Export Single Classified Mesh Model

This is essentially the same as for a mesh model, but the lower part of the dialog has additional fields relating to the BIM classifications. Check and uncheck BIM Hierarchy stories and BIM Classification elements to determine exactly what will be exported.


Batch Export

If you have a **Full** license, you can export multiple files of the same type, but you can't select which surfaces and layers to include. Select the models in the Project Explorer, right click, and select **Batch Export**.

Import IFC to Revit

1. Open a new or blank Revit project.
2. Open the IFC file in the project.
3. In Windows Explorer, navigate to the folder containing the IFC file.
4. You can open this .RVT file in Revit in the normal way.

Create CSV Report of Classified Mesh Model

1. Display a classified mesh model.
2. On the main menu select **Export**  and then **Create Report**.
3. Click **Next** and specify a **Report File Name**, whether to **Generate Headers**, and choose **Levels and Layers** as well as **BIM Classifications** to include.
4. Click **Next** and select what Properties to include in the report and summary report.
5. Click **Finish** on the final page to create the report and a separate, summary report.