

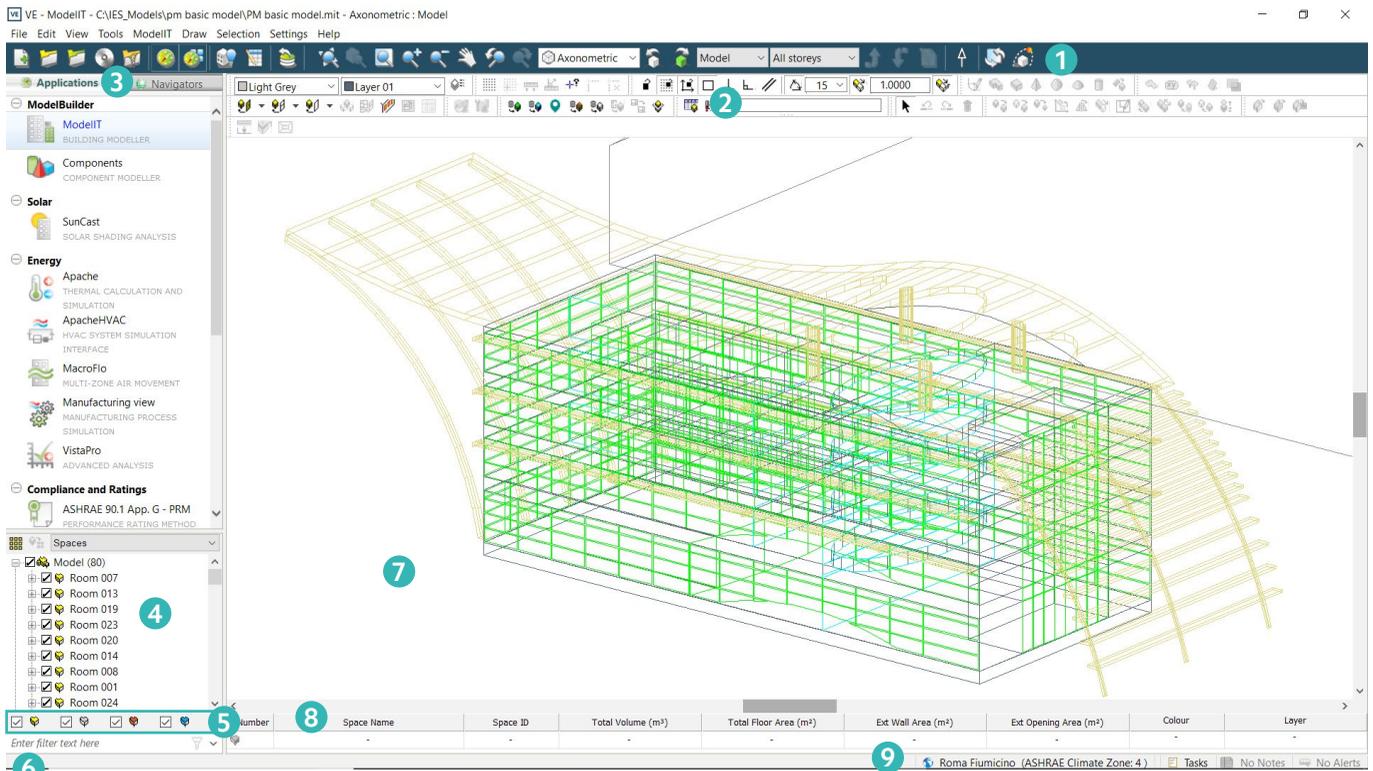


IESVE
Trial Support
Material

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ModellIT

ModellIT: Geometry in the IESVE



When you open or create a project, the IESVE will always open to the ModellIT application.

1. VE Toolbar
 - a. The top blue toolbar contains the Open/New/Save options
 - b. It displays shortcuts for displaying the model (zoom tools, views)
 - c. It lets you set the North orientation quickly – in IES you do not rotate the model.
 - d. You can open Model Viewer for 3D views
2. The white toolbars below contain the geometry tools for drawing and editing
 - a. There are icons to set the model grid and locks for improved accuracy, and to set Location/Weather files
 - b. The Key-In Field is used to manually enter co-ordinates, or to enter shortcut key-ins listed here
 - c. You can also measure within the model, or import other files.
 - d. There are many icons for creating and editing the geometry, including ones to quickly create a simple model for early stage analysis.
3. You can toggle between the Applications list and the Navigators list by clicking on the relevant tab on the top left. Applications are used to build or edit the model geometry (ModellIT) and then perform different calculations or simulations as required, such as thermal simulations (Apache); solar shading (SunCast) or ventilation (MacroFlo). Navigators offer a systematic step-by-step approach to perform a certain task, with the ability to add notes for team members and audit purposes.
4. The Model Browser on the bottom left:
 - a. This lists the spaces, shading devices, adjacent buildings and components in the model
 - b. It enables room information management, grouping and template creation. You can view it according to the groups and zone groups you have created or applied in your model, and sort by various criteria.
 - c. You can toggle visibility of rooms; voids; return air plenums; and supply air plenums
5. A row of icons representing the different Building Space sub-types (Room, Void, Return Air Plenum and Supply Air Plenum) is displayed below the browser. The browser displays only spaces of the sub-types that are selected. Find out more about Space Groups here.
6. Beneath this is a filter that can, for example, be used to find space names in large models.
7. The Drawing Window displays the model geometry in plan, elevation or axonometric views.
8. The Object Bar is displayed beneath the model window, and will change depending on the level of composition. This gives a quick summary of model data.
9. The Status Bar, at the very bottom, displays the current location, co-ordinates in the active model space and the alert notifications.

Open and Save

When you save your new project, a project folder will be created. It will have sub-folders for the various applications within IES. The easiest way to open a project is through the start page. If you choose to open your project from a folder, you will need to select the file of type "VE Document" within the model folder.

You can set your project to auto-save by going to Tools -> Auto-Save and choosing a suitable frequency.

You can also auto-archive your project. This creates an archive folder which will compress the project for back-up purposes and also allows a model to be sent via email to colleagues or clients.

https://help.iesve.com/ve2019/activating__archiving_projects.htm#

Models for Simulation

ModellT enables you to build a 3D analysis model, with or without data from other BIM packages. It is the principal modelling tool within the IESVE, used for modifying or importing building geometry, and for dynamic visualisation, with both pre-set and custom views. The level of detail can suit any stage of the design process; from simple to fully developed detail.

It creates a single, central, 3D model that is at the heart of the VE, providing geometry and data that is easily shared and manipulated across all IESVE applications. The model incorporates all geometry: the building itself, shading devices and adjacent buildings or significant topography.

Model Accuracy



The correct choice of settings can improve the accuracy of your model. This will speed up your work flow by reducing errors due to misaligned surface or spaces within the model.

When you run a simulation, the IESVE will identify any surface that does not have an immediately adjacent space as being an external surface. This means that if you have small gaps between spaces, the simulation will treat their interface as 2 external walls, both exposed to exterior conditions, rather than as adjacent internal spaces.

To avoid this, we recommend that you always create geometry that is aligned to the grid within the VE, by using the tools shown above. Use the **grid settings**  to fix the size of your grid. This can be changed constantly, to suit what you are editing. By always using the grid, you are less likely to get slivers between spaces – remember to zoom in when picking points on a small grid. Slivers are tiny gaps that occur between spaces, usually due to unmatched adjacent surface. They are too small to see, and should be avoided as they can cause errors.

Use the **locks**  dialog to set which locks you will snap to while creating geometry. We recommend using grid, axis, and model endpoint at all times. You can also set the angular lock, and the drag dimension, which determines the steps by which you can drag a selected face. We would not suggest you use DXF endpoint, as what appears as a single line in a DXF file, could be a series of line segments, so you could be locking to a point that is slightly to the side of, or not quite at the end of, the visible line.

Views and Levels of Decomposition



When you are working on your model, notice how the options which are available for editing the geometry change dependant on your view.

Some commands are only available in plan or elevation view, and not in axonometric view.

Other commands change based on the level of decomposition of your model. You can move between the levels of model, surface and opening, either by using the arrows next to this drop-down box, or by selecting spaces from the model within the drawing window, or within the model tree.

- The top level, shows as **MODEL**: this is where you can see the whole model. Most things can be done at this level. Glazing can be applied on a percentage basis. The Model drop-down also has options to edit **Openings** while viewing the whole model, or to create **HVAC Zones** within the model. The Space name can be changed, space ID checked and areas checked in the object bar. Layer details can be quickly changed to edit appearance
- The middle level, shows as **SURFACE**, and is where you can see a single space within the model. At this level you can drag a single surface of the space to modify it. You can also assign thermal constructions or textures, if they vary across the space. You can add openings as on the top level. The Surface drop-down also has options to **Edit** a surface, or place a **component** in all views except axonometric. The object bar can be used to check the surface area, tilt and orientation.
- The bottom level, shows as **OPENING**, and here you can see a single surface within a space. The object bar can be used to check the opening area of individual windows. At this level you can add openings that are not rectilinear, or switch to **Adjacency** mode to check the conditions adjacent to your selected surface.

Model Viewer



The ModelViewer is used to view the geometry in a 3D solid form.

This is useful for visual checks: i.e. there are no spaces between zones or floating rooms.

Images can also be saved or videos created and shown to clients.

The output will be determined by which controls are toggled on/off, including

- turning the ground plane on/off
- toggling a grid on/off
- showing data such as room names or components
- choosing a view such as x-ray, hidden line, shaded or textures
- choosing a suitable sky as a backdrop
- real-time shadows can be turned on and off and the time set
- solar arcs can be turned on and off and their size changed
- And views can be switched between top, sides and your choice of perspective

Scenes can be saved and named by right-clicking on the scene tab at the bottom of the ModelViewer window to help you create consistency in reports.

Site Rotation



This tool lets you change the rotation of the site by altering which direction the North arrow is pointing in, rather than by editing the geometry. The default cardinal directions have North to the top of the screen, South to the bottom, East is right and West is left.

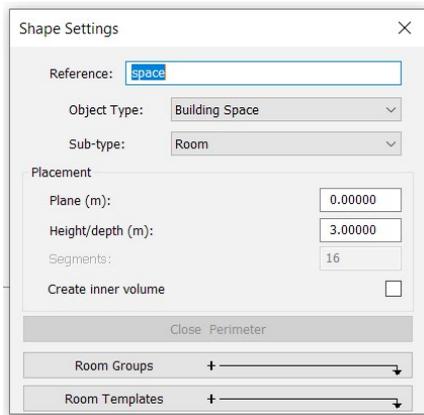
Creating Geometry

Geometry is easily started by choosing a suitable option on the start page, but if you choose the quick-create option, geometry can also be quickly built within ModellIT.



IESVE works only with 3-D spaces with enclosed volumes: To create a volume in IES, you choose its basic shape and draw an outline with an assigned height – the depth is not added later to a 2D object.

Start by choosing what shape you would like to create: click on that icon, then input the shape settings.



- The object type can be a building space, adjacent building, topographical shade or local shade.
 - More info here https://help.iesve.com/ve2019/drawing_shapes.htm?ms
- The sub-type is either a room (conditioned space), a void (non-conditioned space), or a return/supply air plenum.
- The plane is the x-value at the bottom of a shape drawn in plan view, or the y-value for one drawn in elevation.
- The height/depth is the distance from the plane to the top of the shape.
- It is optional to create an inner volume, which will show the wall thickness based on the constructions used.
 - You will see this change if you change your construction thickness.

 Having created some spaces, you can quickly generate roofs for selected spaces, by first selecting the spaces, then clicking on this icon and setting the slope, or pitch, of the roof, its overhang, and whether or not it is a hipped roof.

If you want to draw a space with a sloping ceiling, switch to an elevation view and draw the section of the room where you can see the slope, with the room extruding along the x or y-axis.

The Spaces area on the bottom left of the screen, is used for room information management, grouping and template creation, linked to the properties you have just defined. As you draw, space names will be listed here.

Other than these basic shapes, you can also add landscaping objects, such as planes, trees, free-standing PV panels, translucent shades or labels.

 Translucent shades are used to model any glazed shades or to represent semi-opaque shading devices such as mesh structures which are not necessarily connected to the building. They can be used in conjunction with dynamic shading for blind/shutter control to simulate the dynamic behaviour of the shading device.

The solar algorithm will have to be switched on / chosen (via User Preferences Simulation Engine Preference) if you want to include the effect of solar transfer between non-connected spaces

You can also extrude along a path to create more complex geometry: find out more at https://help.iesve.com/ve2019/create_slice_scale__extrude_.htm#



Adding openings to the model is covered in the section on adding windows, doors and holes [here](#).

Select and assign is covered in the document on MacroFlo.

If you do not wish to create geometry from scratch, or use the starter geometry or import a BIM file options when you start, you also have the option to import a .dxf file as an underlay to create your geometry on.

To do this, go to:

ModellIT -> DXF file(s) -> Attach DXF File

Your file will then be attached as an underlay in IESVE which you can then “trace” over in 3D shapes.

When you are done, use the same method to detach the underlay

ModellIT -> DXF file(s) -> Detach DXF File

Editing Geometry

Once you have geometry, it is also easy to make changes to assess different design options.



From left to right, once you have selected a space within your model, you can then choose to copy, move, scale, rotate, mirror or extrude it. Extrusion lets you drag a single face: you can improve accuracy by locking this action to the increments set in the adjacent menu box.

You can also partition, connect/merge 2 existing spaces, or separate previously connected spaces (but not previously merged spaces).

Or you can:

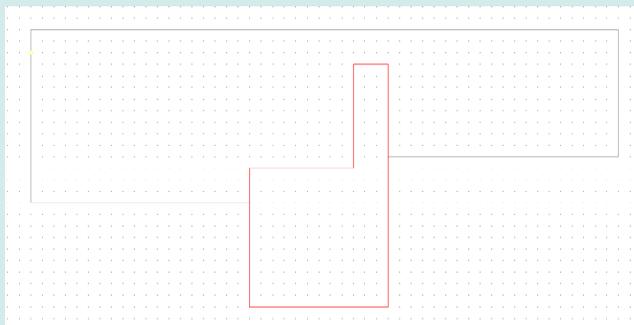
- Edit attributes of the colour and layer for a selected space
- Edit the selection set inner volume representation to switch the representation of inner volumes on/off
- Edit element heights for selected spaces as a quick way to alter the height of selected spaces

You can also:

-  Add voids/split spaces vertically, to create ceiling/floor voids/plenums or spaces for modelling thermal stratification
-  Create Storeys (2 to 250) by specifying how to replicate the currently selected space(s) to create a multi-storey building
-  Create perimeter zones of a specified depth, with or without partitions, labelled relative to the selected space

Or you can:

- Assign thermal constructions before progressing to Apache
- Assign landscaping constructions to modelled elements
- Assign textures to building surfaces for enhanced rendering in Model Viewer II



Partition drawn through a T-shaped space

An alternative approach to building up your geometry using multiple blocks, is to start by drawing the footprint of the building, then breaking it into its component parts.

When in plan view, use the draw partitions tool to draw complex partitions across any space, and choose whether they generate sub spaces or new separate spaces, and whether or not you want partitions drawn along these divisions. When drawing these partitions, the line drawn must touch or extend past 2 outer edges. Note that they do not have to cut the space in a single line: they can zig-zag through it in any pattern.

Adding Windows, Doors and Holes

Windows are drawn in a few different ways, for different levels of detail.

They can also be edited, depending on the chosen view and level of composition within IESVE.



Add Windows or Doors on a Percentage Basis: Edit Glazing

This is the simplest way to add windows for an early-stage analysis.

Choose to add either glazing, or doors/louvres, which are opaque openings.

Select one of 3 methods for adding the windows, either

- Add by Percentage Area
- Add by Percentage Area/Height
- Add by Height/Width/Spacing

Or you can choose to remove any existing windows.

Find out more at https://help.iesve.com/ve2019/edit_glazing_doors_louvres#

Each option can be analysed, to determine the daylight and energy impact of each, both visually and in tabular format.

The size and shape of the glazing can later be easily adjusted in the 3-dimensional model.

To revise the amount of glazing use the same "Edit Glazing" tool in ModellIT.

Adding Windows or Doors in Plan or Axonometric View

When you click on this icon, choose from the drop-down to add doors, windows, or holes. Enter the size of the opening and its height above floor level then drag to position and click to drop. In plan view this lets you quickly place windows as per a .dxf underlay, and in axonometric view you can easily see their position in the model.

Only windows and doors can be used on the building exterior – holes are used to permit air exchange between spaces. Windows are any opening that will allow light to pass through, while doors are opaque constructions.

A window is shown in green, a door in magenta, and a hole in cyan.

This is the default colour coding scheme for the VE, which can be changed in the preferences.

Adding Windows or Doors in Elevation

This can only be done in the bottom level of composition. Openings of any shape can be created.

A .dxf file of the elevation can be brought in and traced over (clicking to the grid) to draw a group of openings, but remember that it will need to be the mirror image of an architectural elevation, as the view is from inside the building.



When the window is selected in elevation, two additional icons become available to edit it, by dragging the selected vertices, or by dividing the window (if rectangular) horizontally and/or vertically into more panes.

Model Checking

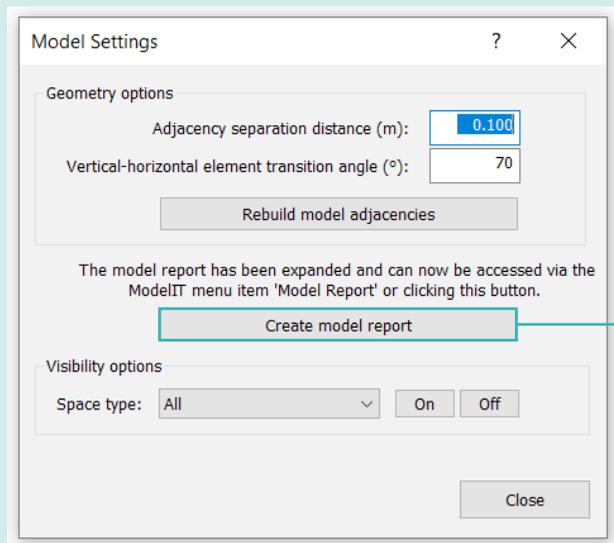
You can also undertake a number of model checks and archive functions within ModellIT.

These are useful to ensure clean geometry before you start assigning data to your model.

Running a Model Check

A model check allows you to check the geometry, identifying any issues, for example, intersecting zones, external holes or unmatched adjacencies.

Go to **Settings -> Model** to open the dialog.



Running a Model Report

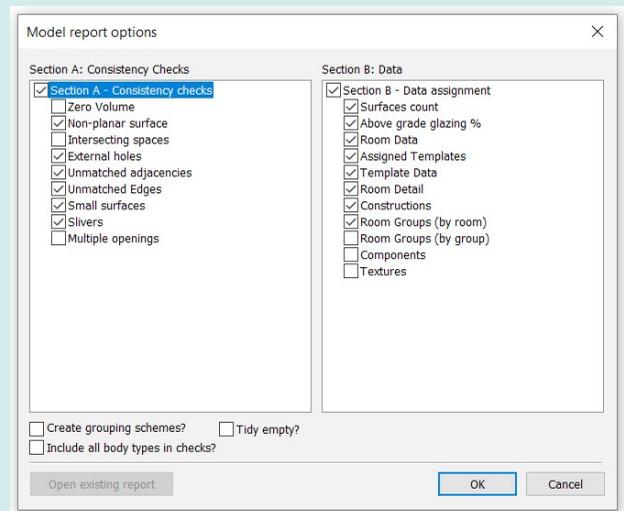
This gives a more comprehensive report and can be accessed by clicking the link in the dialogue box above, or by clicking on **ModellIT >> Model Report**

Select what you would like to check, and the report lists all areas that pass, and gives descriptions of errors, noting the space ID so that you can find and repair any problems.

The report also lists useful information such as the window to wall ratio on all four orientations.

It is a good trouble-shooting tool to ensure clean geometry before progressing the project.

It is also a good check list to bear in mind when creating geometry to avoid these errors.



Model Report

Go to Space

If an error is listed for a particular space in the model, you can find that space quickly by right-clicking anywhere on the model browser and choosing **Go To Space**, then typing in the full space ID.

The Tidy Command

The tidy command can quickly repair small geometry errors in a single space.

Select the space you need to repair, then type **“tidy”** into the key-in space.