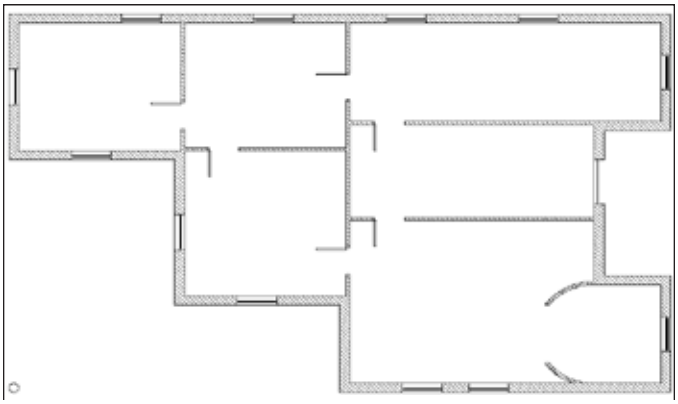
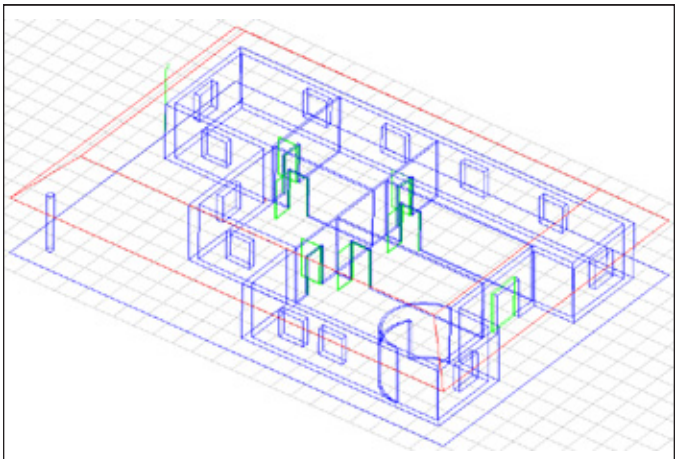
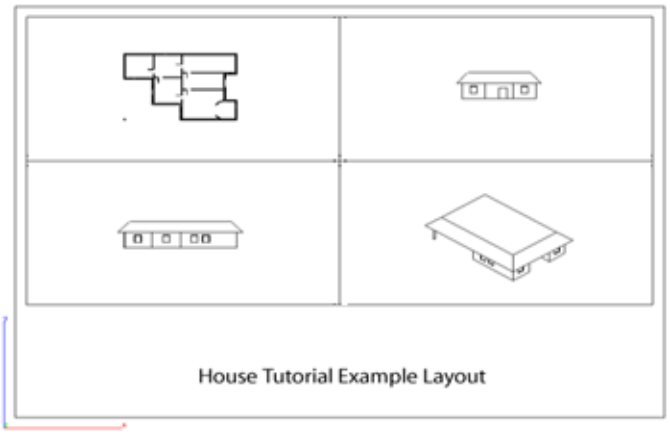
Tutorial: House

Topics Covered in this Tutorial



- *Work area*
  - *Snap*
  - *Grid*
  - *Layers*
  - *Edit Objects*
  - *View*
  - *Select Mask*
  - *Preferences*
- *Modeling*
  - *Line*
  - *Arcs*
  - *Rectangle*
  - *Text*
  - *Hatch*
  - *Primitives*
  - *Extruded solid*
  - *Thicken solid*
  - *Surfaces*
- *Editing*
  - *Move*
  - *Rotate*
  - *Offset*
  - *Array*
  - *Remove section from solid*
  - *Boolean operations*
  - *Shell solid*
  - *Model to Sheet*
  - *Section cut*
  - *Drawing views*
- *… and more.*

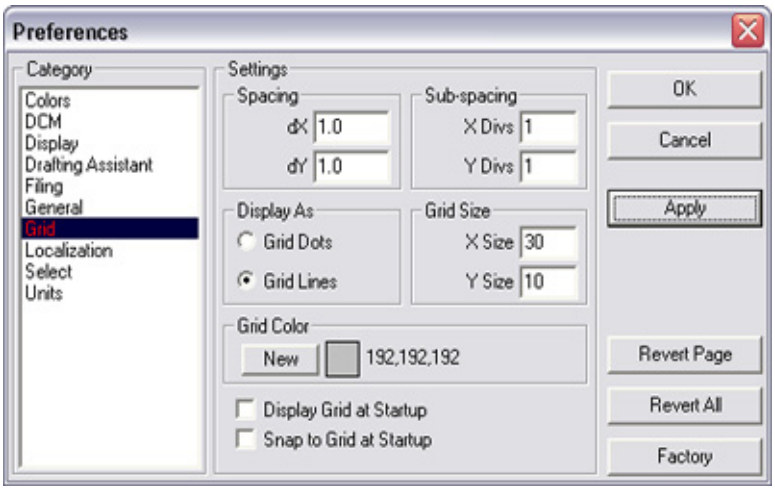




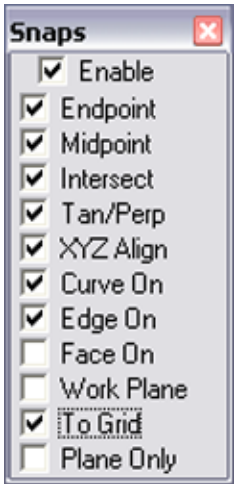
In this tutorial we will construct a house starting with 3D modeling and finishing with 2D illustrations or layouts.

Setting up the Drawing

1. Most newer computers will not have CPU speed problems so go to **File>Preferences>Display.** In the Object Type pull down menu, set the Resolution for Curve, Surface and Solid to **Super Fine**.
2. In the Preferences menu select **Grid,** set the Spacing values to ***1*** **m**, Sub-spacing to ***1*** and the Grid size to ***30*** by ***10***.



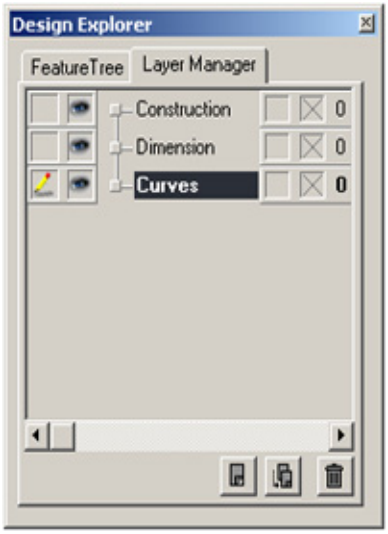
3. Also, if you don't already have it open, show the Snap Option palette (**Window>Snaps**). Check the **To Grid** option.



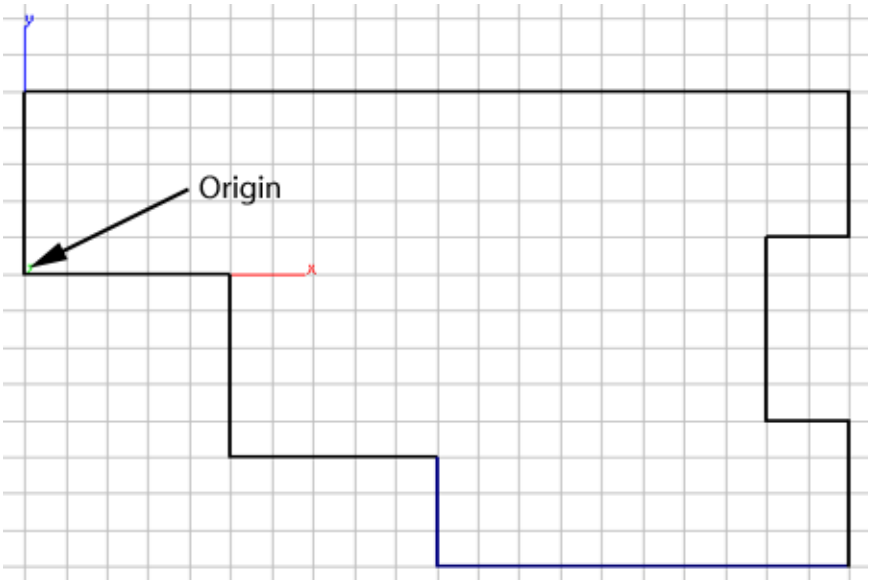
Note: units used in this tutorial are meters.

Walls

1. In the Layer Manager, change the name of Layer 1 to ***curves***.

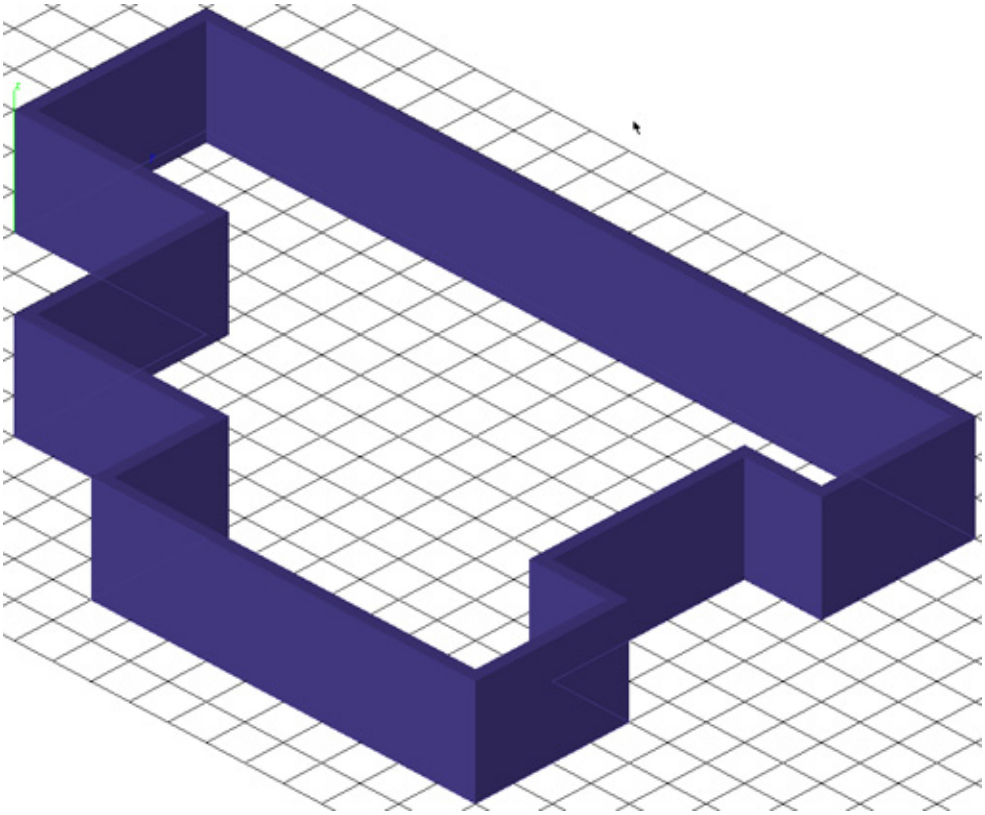


2. Starting at the **Origin,** reproduce the series of **Connected Lines** shown below. The overall size of the building is 20 meters by 13 meters.

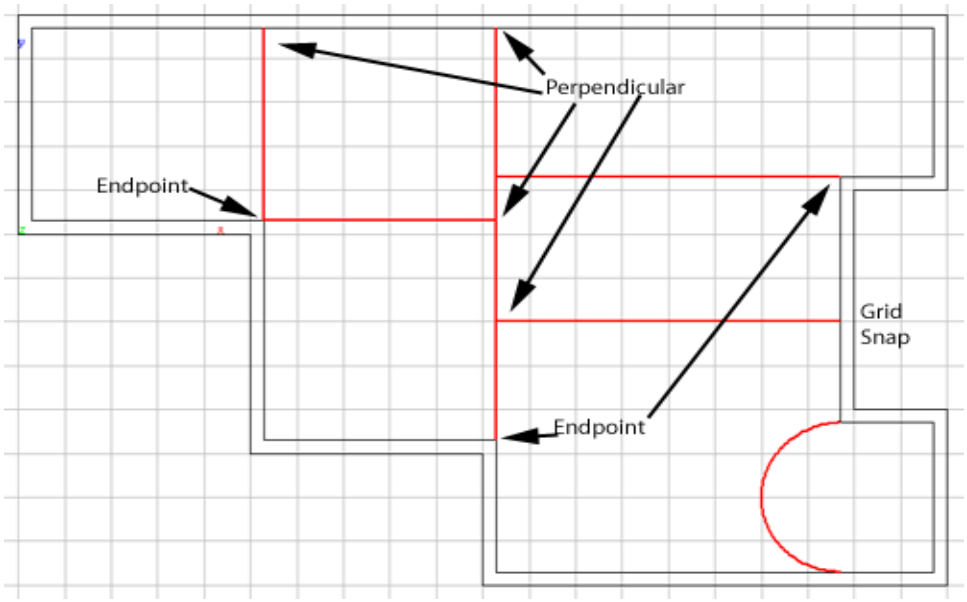


3. Switch to the Isometric View (**"f"**).

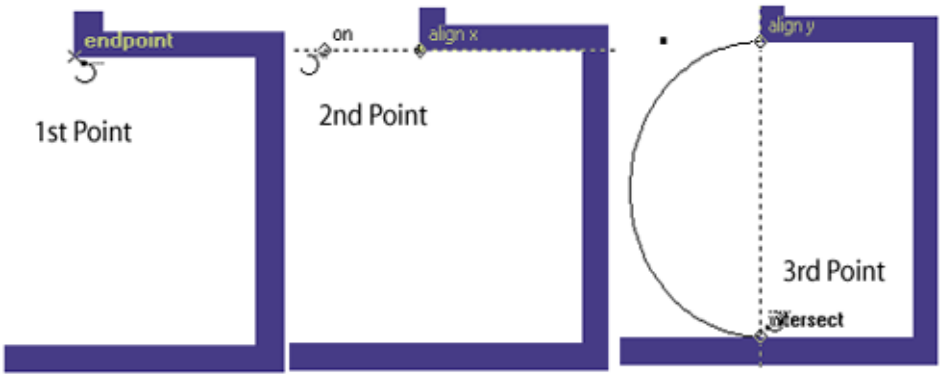
4. Select the Solid Extrude tool, using the by Thin Extrude option in the Message Line. The extrude Distance is **3m** with an **Offset** of **.3m**.



5. Switch back to the Top View (**"d"**).
6. Now using the snap points indicated below, create lines for the internal partition walls.

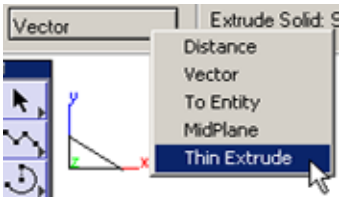


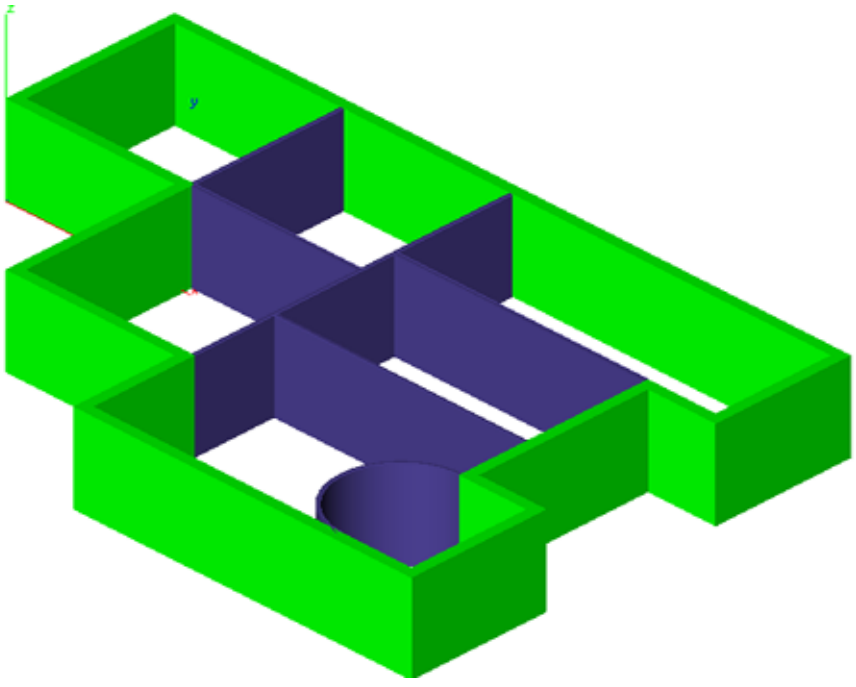
7. To create the arc, select the **Tangent Arc** tool. Locate the arc using the snap points shown below.



8. Switch back to the **Isometric view** (**"f"**).

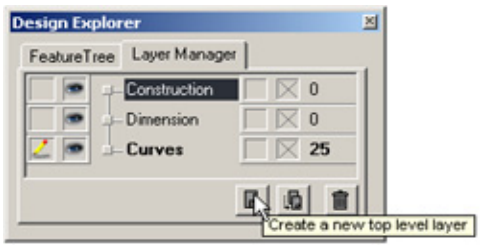
9. Select the Solid Extrude tool. Using the **Thin Extrude** option in the Message Line, extrude all of the internal walls by **3m** and an **Offset** of **.1m**.



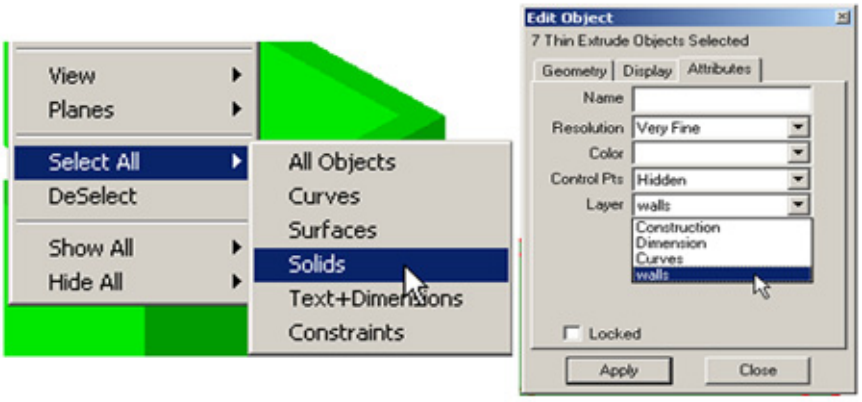


When using the Thin Extrude tool, the alignment of the extruded solid can be changed by tapping the Ctrl (PC) or the Option (Mac) key. There are three alignment points for the solid to the wireframe geometry: Centered, Inside & Outside.

10. In the Layer Manager, create a new layer, rename the layer to *walls*.



11. Place all of the walls onto the *wall* layer. **Right Mouse** click in the white-space of your drawing, choose **Select All>Solids**. This operation will select **only** the solids in the drawing. Show the Edit Objects dialog box **(Ctrl + i or Command + i),** under the Attributes Tab, choose **walls** in the **Layer** drop down menu.



Save your work.

Creating the Windows

1. Create a new layer, rename it to *windows*, make it current and turn off the visibility of the other layers.

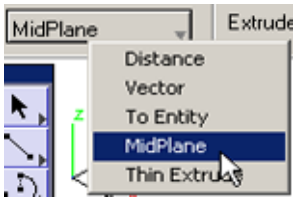
2. Switch to the Front View (**"s"**).

3. Draw a **Rectangle** starting at the **Origin**, with a **Width** of ***1.2*m** and a **Height** of ***1.4*m**.

4. **Offset** the rectangle to its inside by ***0.05***.

5. Switch to the Isometric View (**"f"**).

6. **Extrude** all these objects using the **Mid-plane** option in the Message Line. The **Distance** is ***0.1***.



7. Create a second Midplane Extrusion using the internal rectangle, the **Distance** is **.05**.

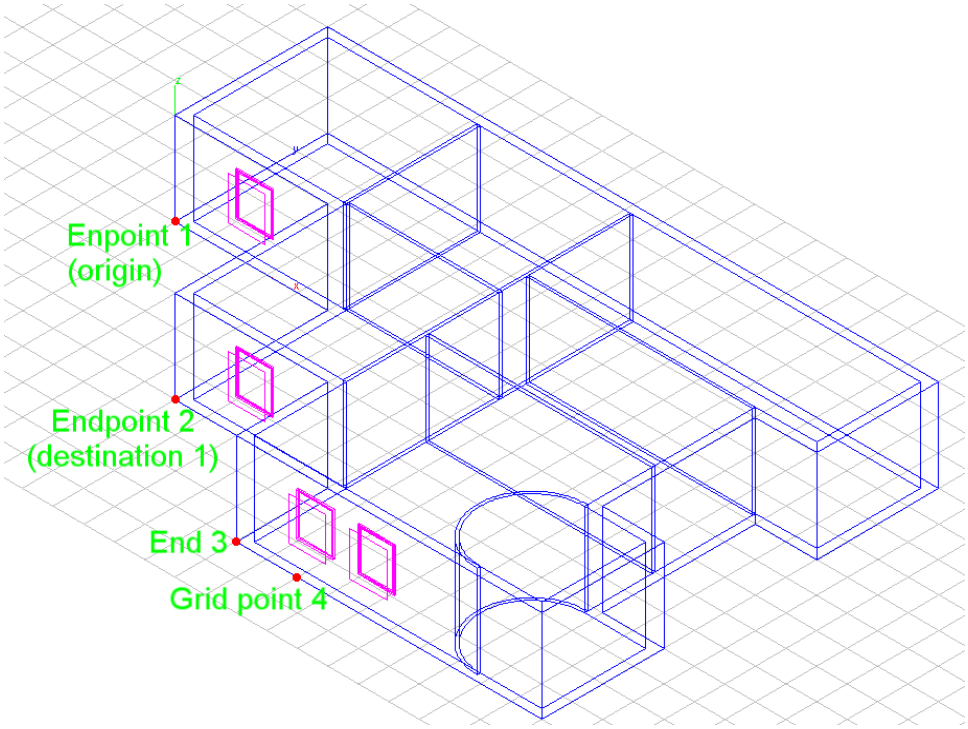
8. **Move** a copy of the external rectangle by ***0.3*m** in negative ***y*** direction (hold down the **Ctrl** [PC] or **Option** [Mac] key).

9. **Move** all of the window objects to this location **dX** = *1.9*; **dY** = *0.125*; **dZ** = *1*.

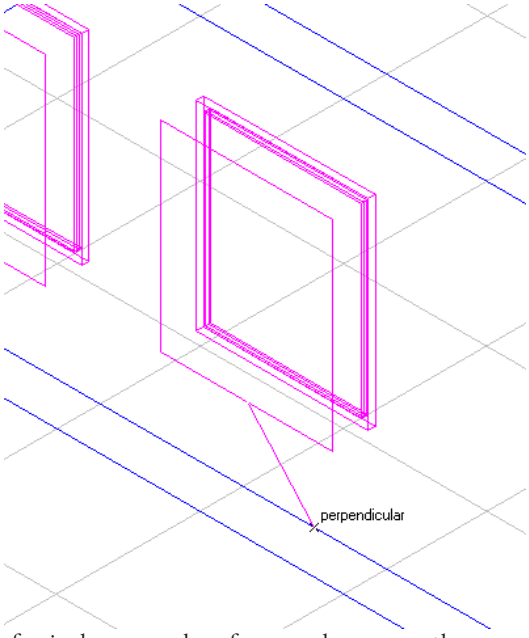
10. Turn on the *walls* layer.

11. **Show Grid** and check the **To Grid** option in **Snaps** palette.

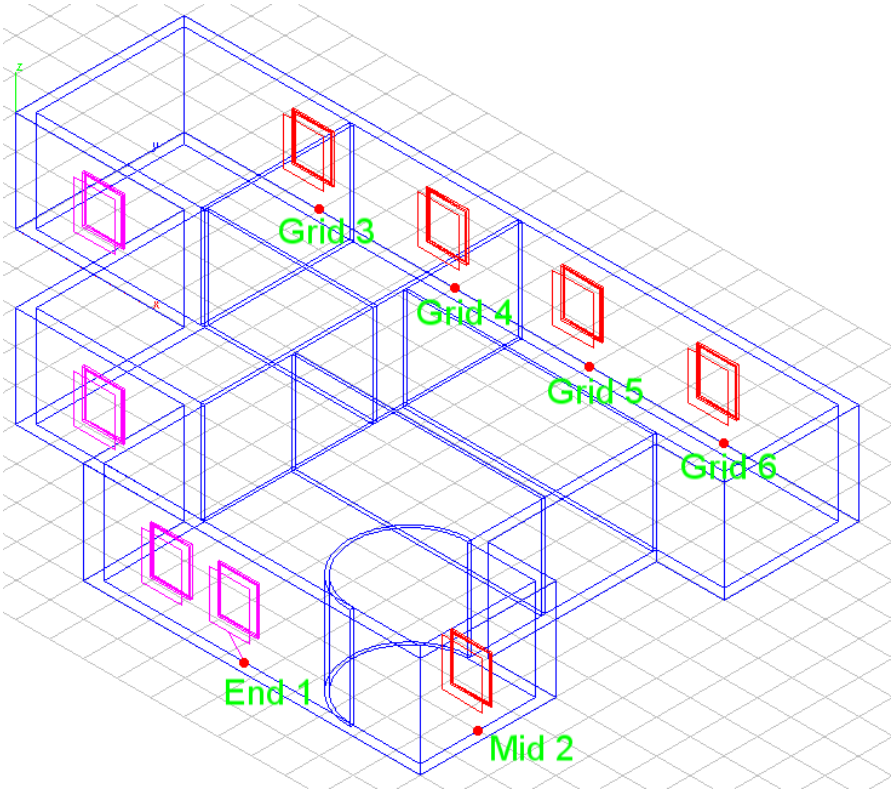
12. **Copy** this set of elements following the scheme illustrated in the picture below.



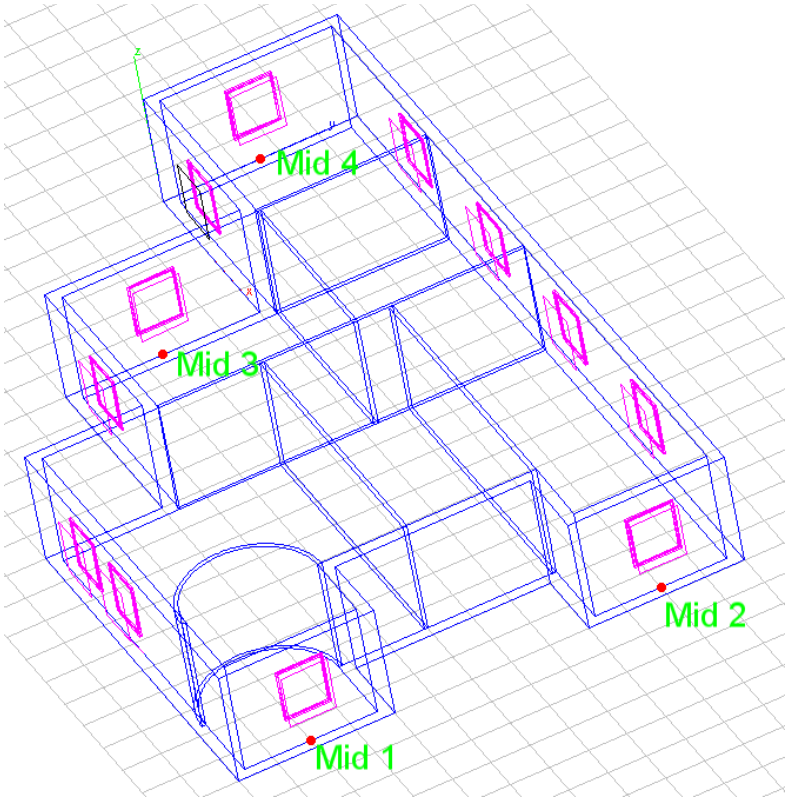
13. We need a location marker for placing the next set of windows, so draw a **Line** from the **Midpoint** of the rectangle on window number four (Grid point 4) perpendicular to the internal profile of the wall.



14. Select all parts of window number four and arrange them as shown below (pay close attention to the location of the line endpoint).



15. **Rotate** the window located at Mid 2 above by ***90°***.
16. **Move** a copy of that window from that location to those illustrated below.

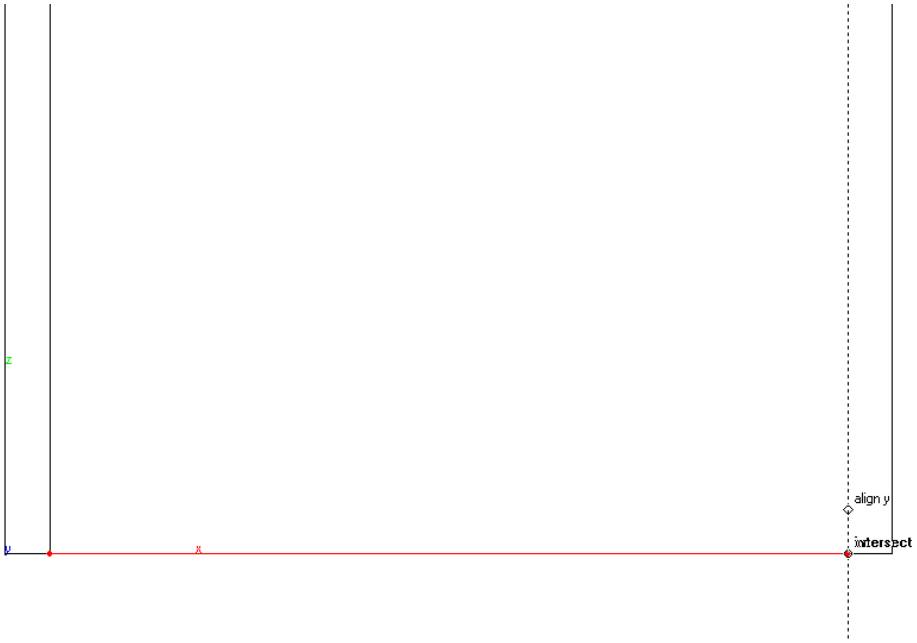


Save your work.

Doors

We will use the same method to create the doors that we used to create the windows with one slight variation. This variation has a huge time saving potential if you begin to incorporate it into your workflow.

1. Create a **new layer**, name it *doors*.
2. Switch to the Front View (**"s"**).
3. Draw a **Rectangle** from the **Origin** with a **Width** of *1* and a **Height** of *2.1*.
4. **Offset** the rectangle to the inside by ***0.05m***.
5. Draw a selection fence around bottom line of the internal rectangle and extend it to the bottom line of the external rectangle. Use the **selection** tool to move the lines together.



6. Switch to the Isometric View (**"f"**).

7. **Extrude** the external rectangle by ***0.1*m**. Repeat the extrude on the internal rectangle (use the same extrusion distance).

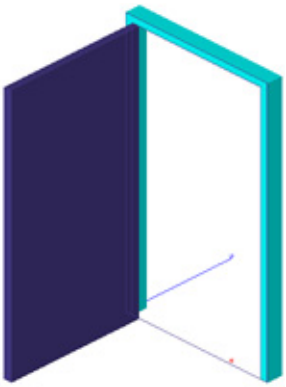
8. **Subtract** the second extrude from the first.

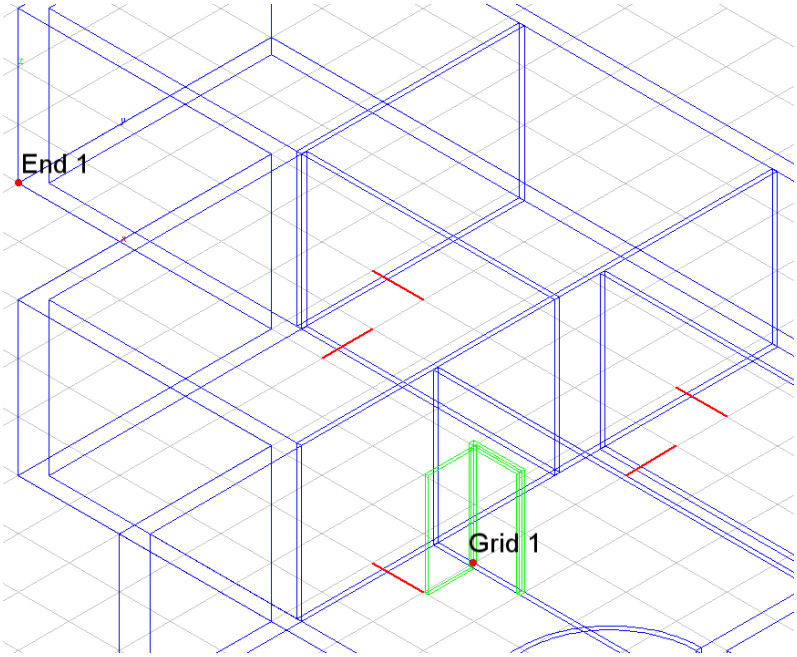
9. **Extrude** the internal rectangle again, this time with a distance of ***0.05m***

10. Change the work plane to **Global in the Planes Menu**.

11. **Rotate** it from lower left corner by ***-90°***.

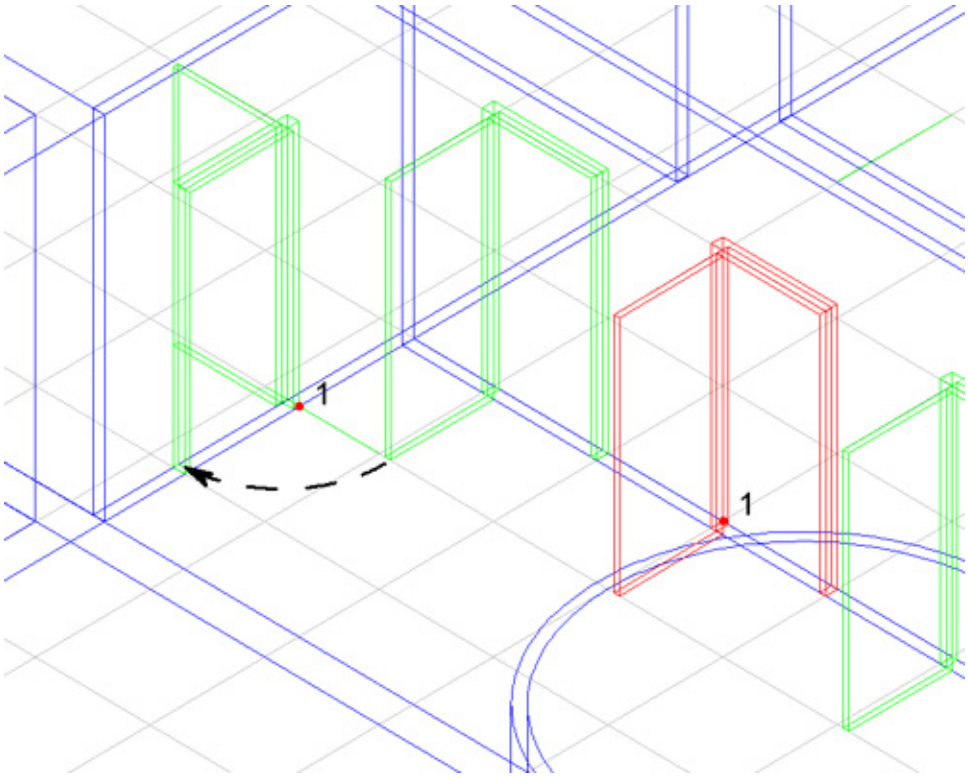
12. **Move** a copy (**Ctrl** [PC] or **Option** [Mac]) of the door to the location shown in the picture. Also create the **lines** shown in red as a reference for locating copies of the door.

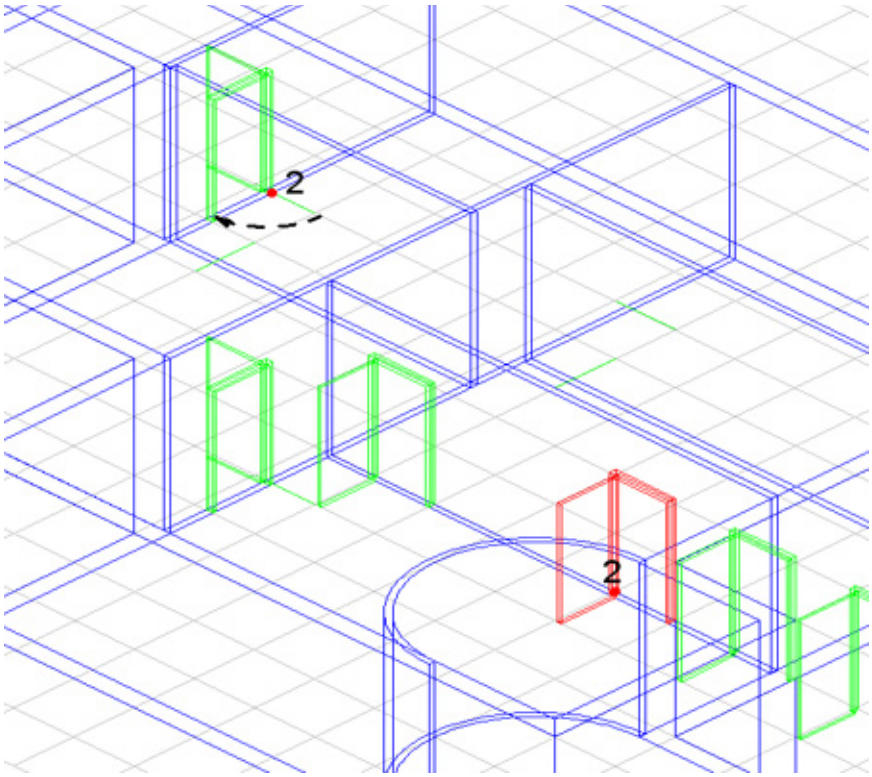


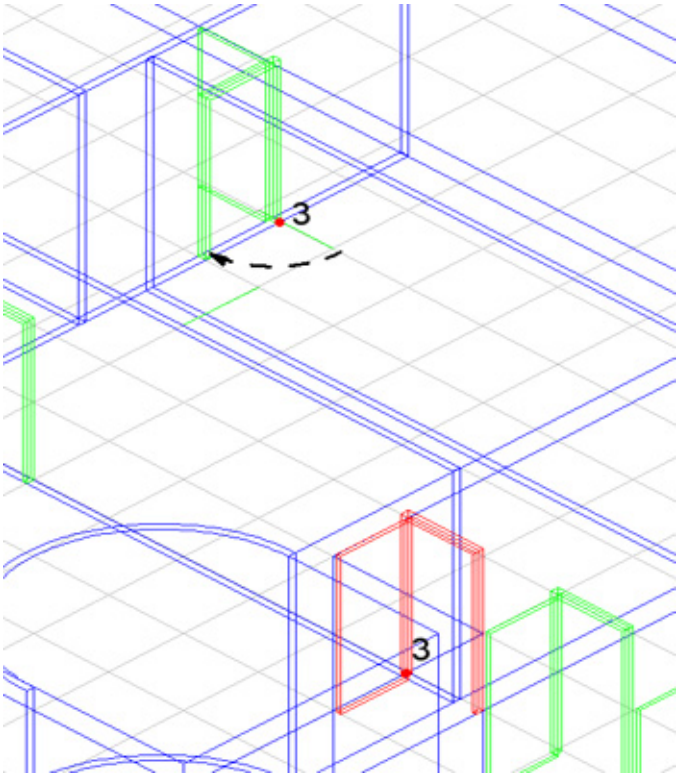


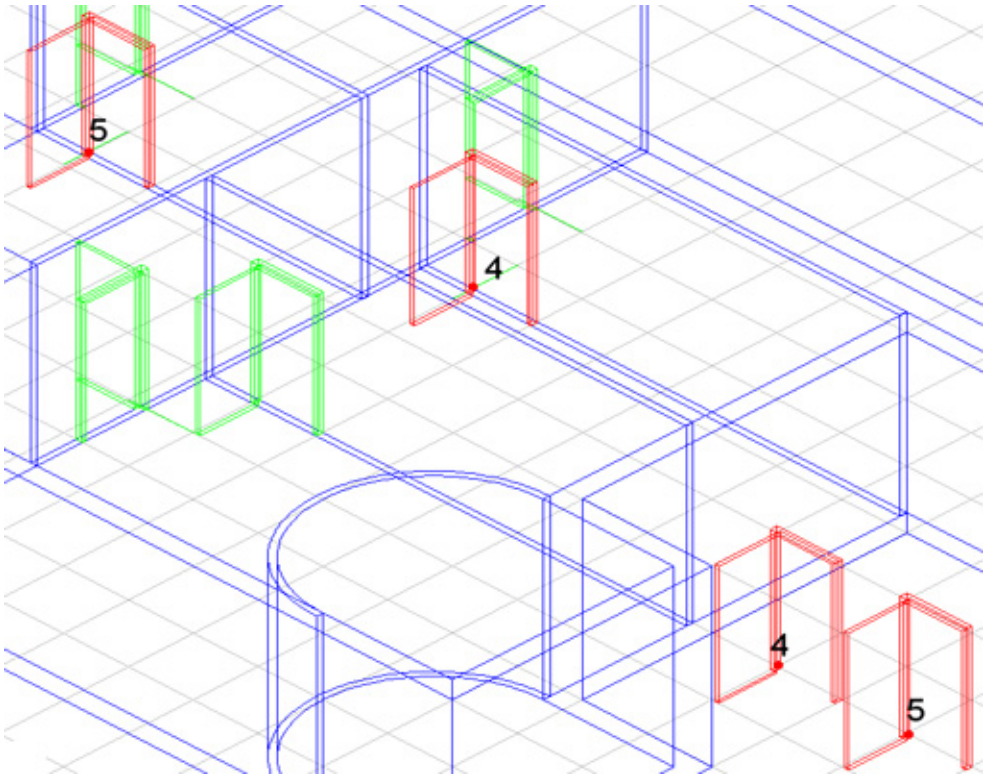
13. Select the door and choose the **Linear Duplicate** tool. Set the **Column** value to ***6*** and its **distance** to ***2***. Leave the **Row** value set to ***1***. Make sure the offset spacing is set to **Step Offset**. The most important thing is to have the **Associative duplicates** option checked.

14. Arrange the copied doors with a series of moving and rotating operations as illustrated in the figures below.




2
2


3
3



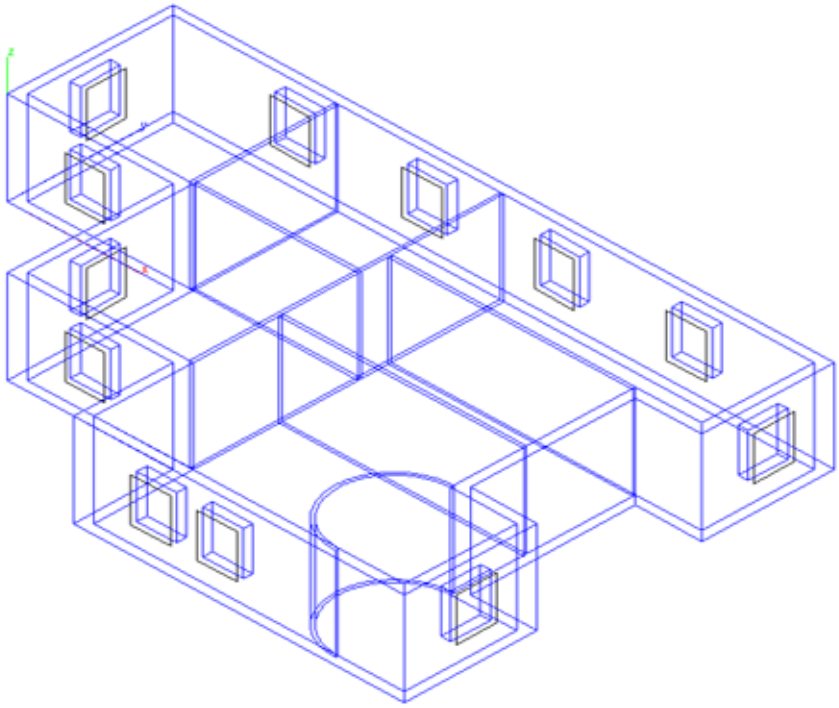
Window and Door Cutouts

Here are some simple operations producing holes in our walls that accommodate the windows and doors.

Windows.

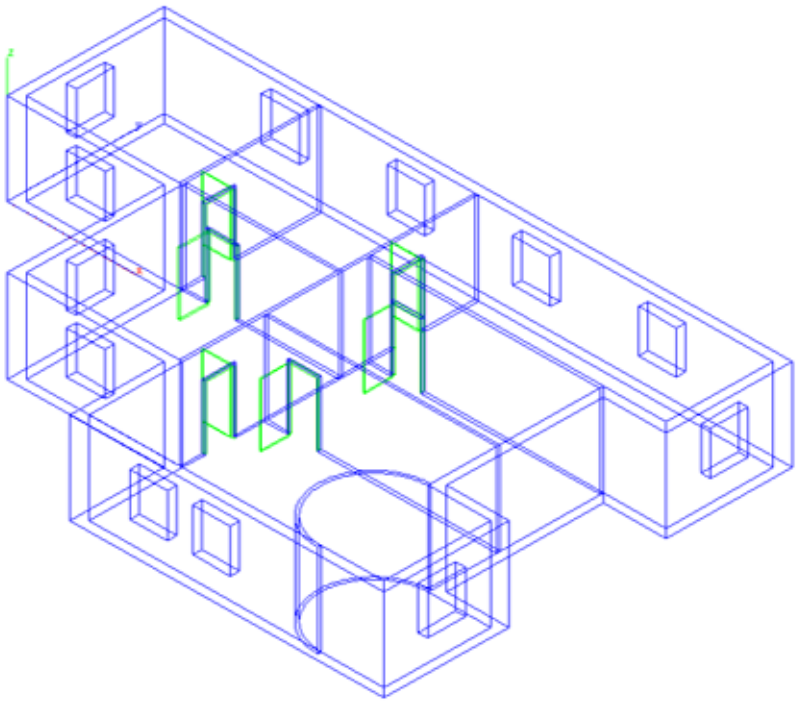
1. Choose the **Remove section from solid** tool. Select the exterior wall solid, next select one of the window rectangles that we moved .**3m** in the negative y direction, the last step is to specify the two points that the rectangle will use to cut through the wall. Repeat operation for all of the windows.

Note: You can select multiple cutout rectangles at one time, the only requirement is that the rectangles exist in the same plane.



Doors.

1. Use the **Trim solid** tool. Select the door frame as the trimming boundary and then select the wall as the object to trim.

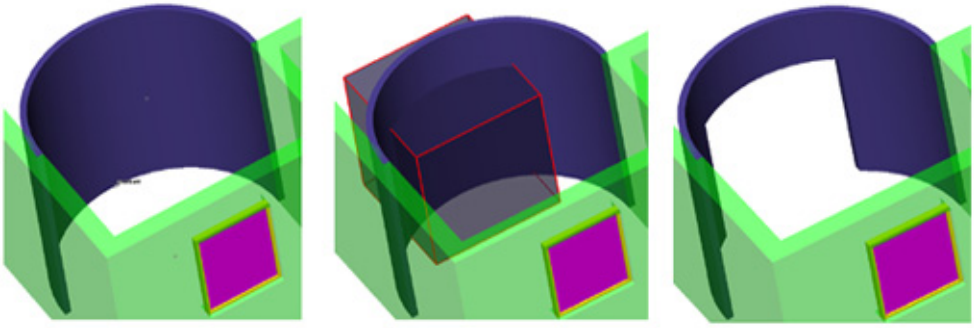


Finishing Details

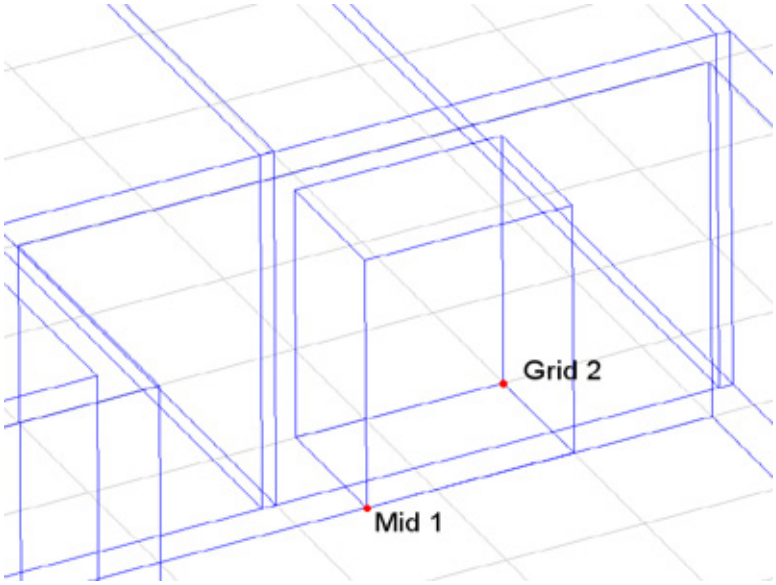
Now we will add some finishing elements to our model.

1. Draw a **Cylinder** using the **1 point** creation method, place **center** of the cylinder at the following location, **X** = *0.15*; **Y** = *-7.85*; **Z** = *0*; **Height** of *3*; **Diameter** of *0.3*. Create it in the *walls* layer.

2. Create a **Block** primitive using the **1 point** creation method. This point is located at the **Quadrant** on the base of our curved partition wall. The values of the block are: **L** & **W** = *2*; **H** = *2.1*.



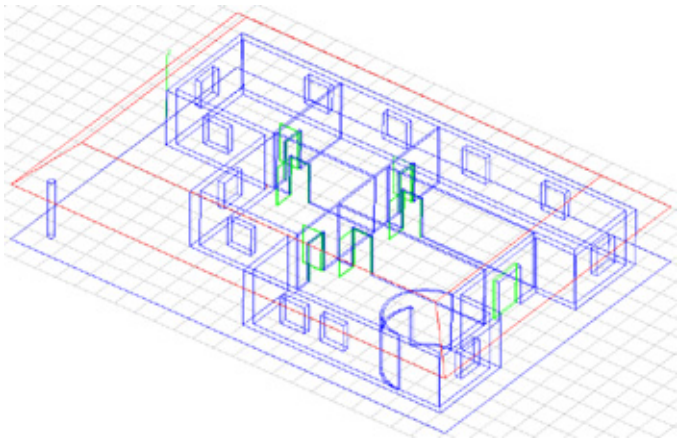
3. **Subtract** this solid from the wall.
4. Create another **Block,** this time use the **3 point creation method**. Specify the points located at *Mid 1* and *Grid 2* of picture, the **height** of the block is **2.1m**.



5. **Subtract** this block from the wall. Create a third block representing the front door. The **Length** is ***0.1*m**, the **Width** is ***1.50m*** and the **Height** is ***2.1m***.

6. Switch to the Top View (**"d"**).

7. To create the roof of the building, draw a **Rectangle** that is *1* meter large than the entire house. **Extrude** the rectangle by ***2m*** adding a **Draft Angle** of *-45˚*. **Move** the solid in positive *z* direction *3* meters.



Save your file.

Creating your own Model to Sheet Layouts

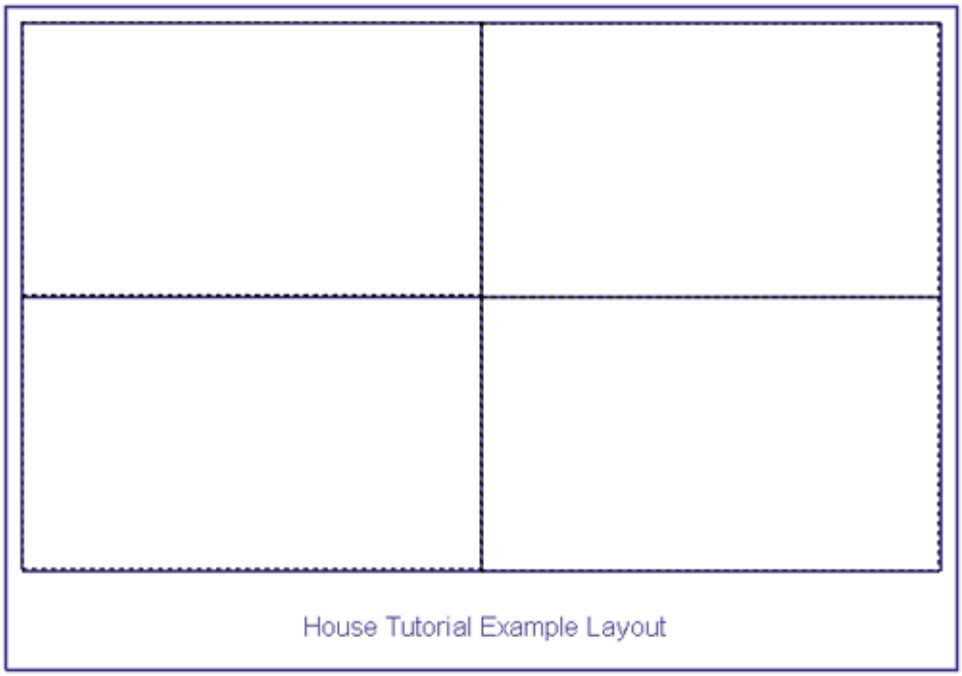
The following steps illustrate how to create your own Layouts. These steps are not always necessary because Ashlar's programs come with an assortment of pre-defined layouts.

1. Open a **new file** (**Ctrl + n** or **Command +n**) or Menu **File > New**.

2. Draw a **Rectangle** with lower left corner point at **X** = *1*; **Y** = *1*, the **Width** is ***57.40*cm** (***we have switched Units to centimeters***) and the **Height** is ***40*cm**.

3. **Offset** the rectangle to the inside by *1* cm. Draw a selection fence around the bottom offset line, **move** it in the positive **y** axis **5 cm**.

4. Using the Line tool, create one horizontal and one vertical line located at the **Midpoint** of the existing lines.



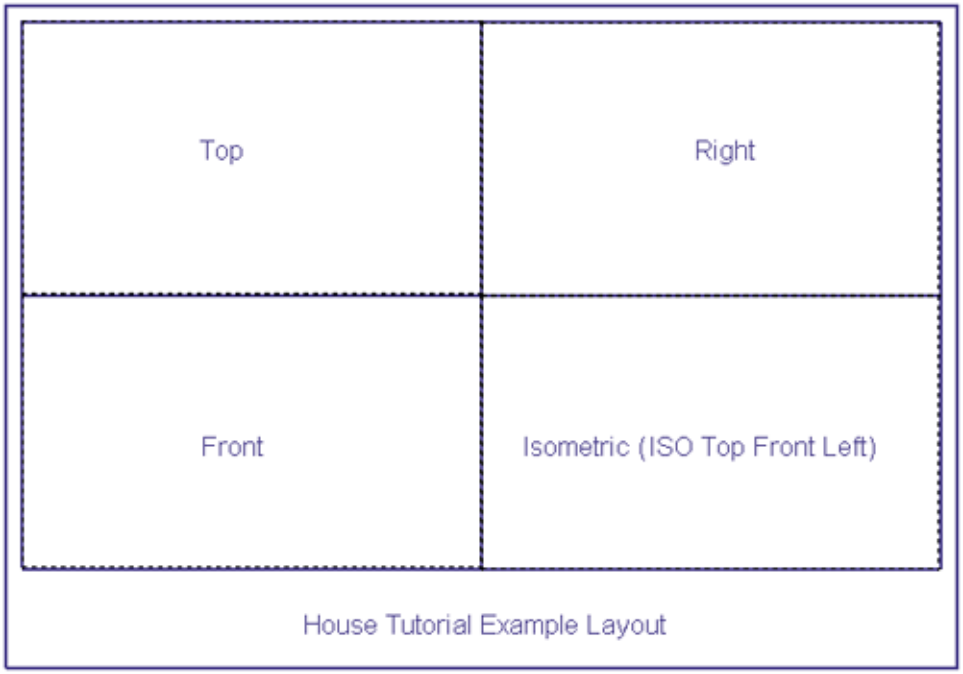
The next few step are critical in this process.

5. Go to **Window>Sheet tools**.

6. Select the **Drawing view** tool. Create four views that are aligned with each of the squares we drew.

7. Click on upper left view to activate it, then right-click and choose **Properties**. Change the **name** to *Top*, the **scale** to ***1*** and the **Visible Pen style** to **Use Object color**. Click Apply and then OK. Right-click again, this time choose **Change view**, change the view to **Top** from the drop down menu.

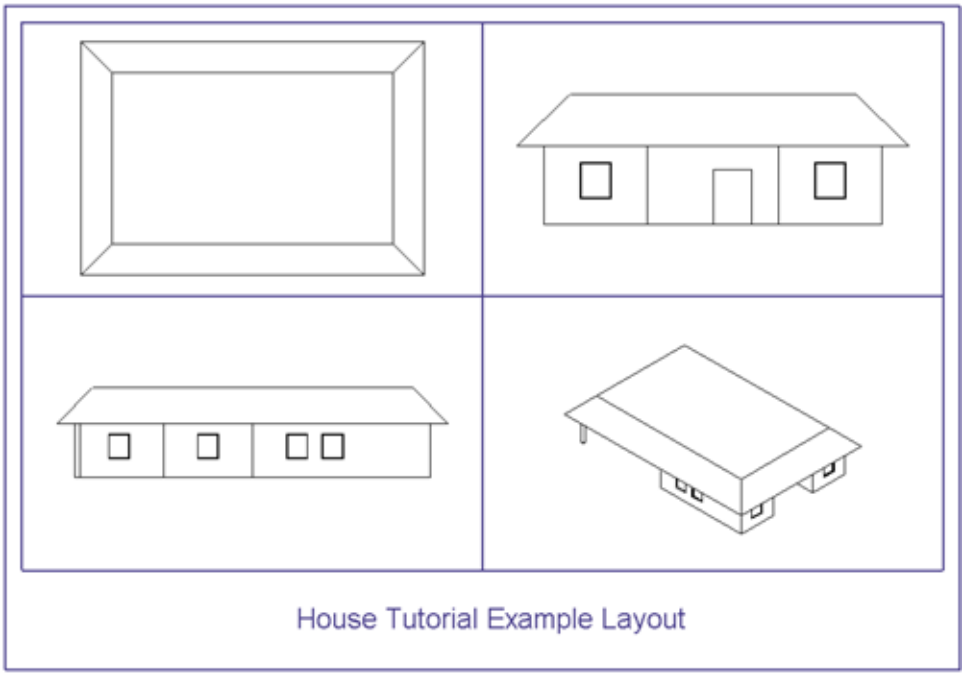
8. Repeat operation for the remaining views.



Save this file in the folder called *Layouts*. You can find this folder on your hard disk as a sub-folder of the Cobalt installation. Use the name *House_layout.co*.

9. Return to the file where you modeled the house.
10. While in **Top view**, make all layers visible except *curves*, select all and choose the **Model to Sheet** tool. (Make sure that all of the lines, arcs, etc. are on the curves layer. Right-Mouse-Click and choose **Select All > Curves**, open the Edit Objects dialog box and assign them to that layer.)

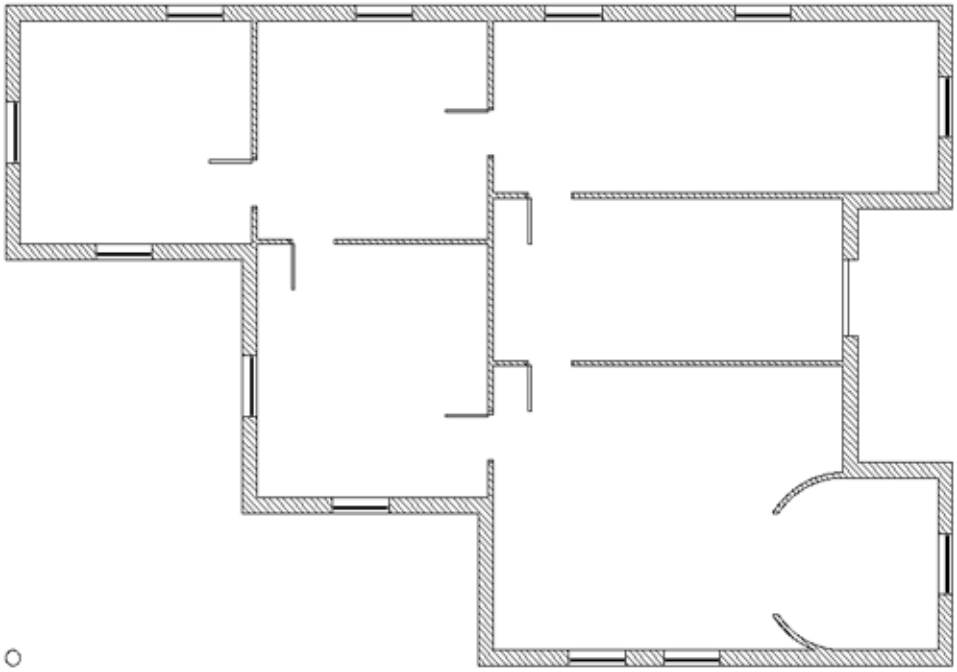
Select all of the solids (this should be the only items visible), choose *House_layout.co* from the **Layouts** drop down menu, **set the scale to 0.01** and choose *ignore* for all pen **styles** but **Visible**, set this to **Use Object Color**.



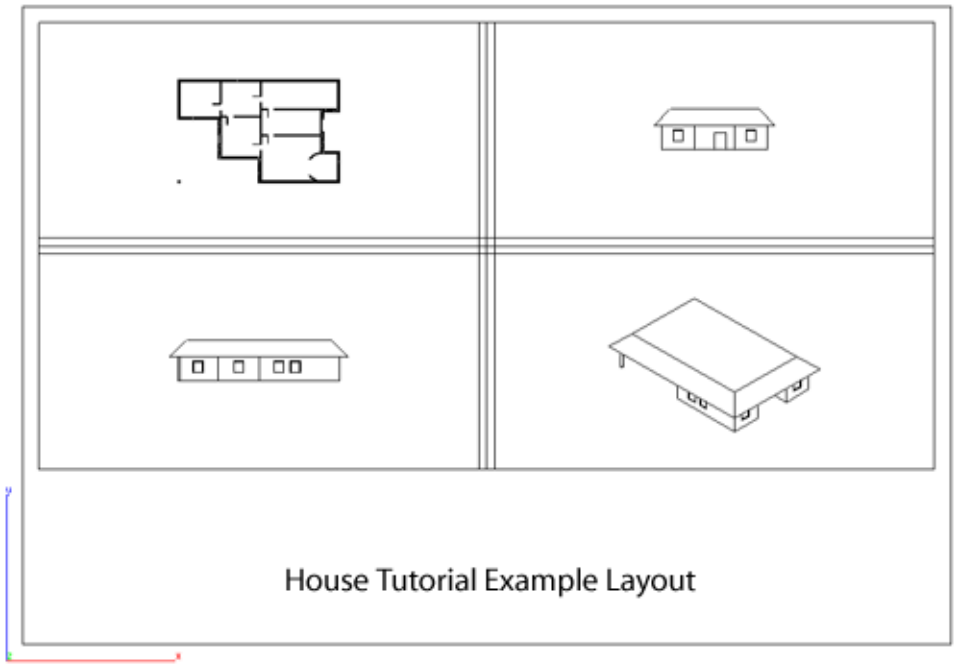
Now, let's modify our Model To Sheet drawing by deleting one view and adding a plan view.

11. Click on the Top view to select it, Right Click in the Top view to show the drop down menu, choose **Delete**.
12. Click on Front view to make it active.
13. Select the **Section cut through view** tool (It requires that a drawing view be selected before the tool will work). Choose the **Horizontal section** create mode from the Message Line. Choose the Midpoint of a wall for the cut through view, move the mouse up to place this new view where the Top view used to be.

14. Hatch is automatically generated for section views (unless you uncheck this option in **Properties** window of the view). The **scale** for the Hatch is too big, select the hatch and in the **Edit Objects** window set the scale to *0.04*.

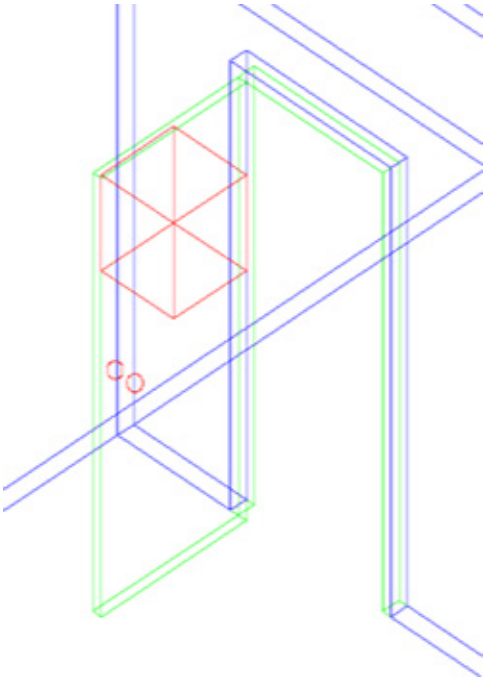


Now we have arrived at our goal. Objects in these view are linked to the 3D model and consequently any change to the model will be reflected directly on the sheet.

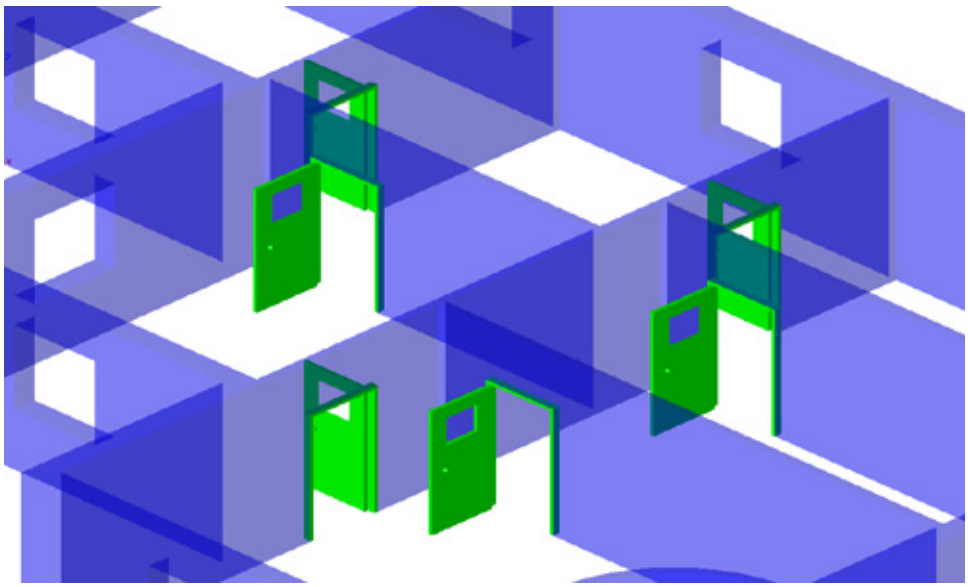


We are going to take advantage of this linking by modifying the door we used to create the Linear duplicates.

1. Turn off all layers except walls and doors. We have decided that the doors need to be modified to create a more realistic look. Find the door used to create the Linear duplicates.
2. Draw one **Circle** with a **Diameter** of 7 and a **Cube** (it doesn't matter what size the cube is) as shown in the picture below.



3. **Cutout** the circle profile from the door and **Subtract** the Cube from the door, all the doors are updated in the model and in the sheet, at the same time.



This completes the tutorial, save your work.