



Photo © Ronald Tilleman

# TUTORIAL TRACKING

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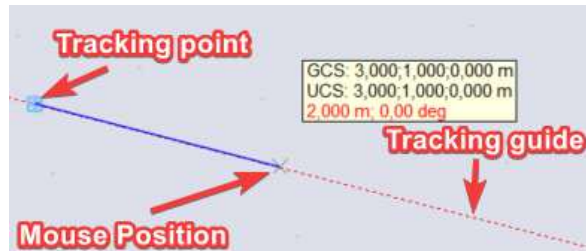
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## Chapter 1: How to use tracking – simple solution for quick modelling

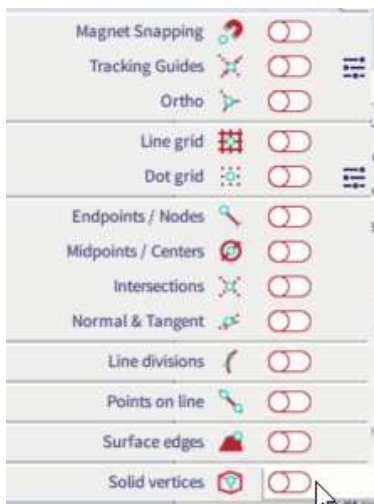
### 1.1. Some definitions

The image below shows some common terms used for tracking.



**Tracking point** – The point from which the tracking guides are displayed. A tracking point is always visible with a blue rectangle around it.

**Tracking guides** – Guiding lines in the x- (red), y- (green) and z- (blue) which will show while drawing from a tracking point. It is also possible to define your own tracking guides.



**Magnet snapping** – The cursor will only snap to points from the model and not to the dot or line grid. This function will only work together with other settings like ‘Endpoints’.

**Ortho** – You can only draw orthogonal relative to the active workplane

**Line grid** – You can snap to the points from a line grid

**Dot grid** – You can snap to the points from a dot grid

**Midpoints / centers** – Snapping points are created in the middle of lines or elements

**Intersections** – Snapping points are created in the intersections of two lines or elements

**Normal & Tangent** – Snapping points are created on the spot where the new line and an existing member are normal or tangent to each other

**Line divisions** – Snapping points are created so the line or element is divided in a number of equal parts

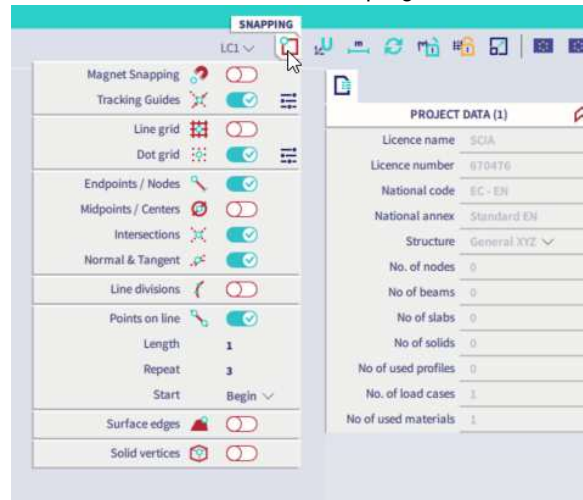
**Points on line** – Snapping points are created on a specified length from the beginning or end of a line

**Surface edges** – Snapping points are not only created on the system line but also on the edge of surfaces. ‘Show surfaces’ should be toggled on to use this.

**Solid vertices** – Snapping points are created on vertices from solids

## 1.2. Definition of settings for tracking

The tracking settings are all found in the status bar on the top right corner of the screen.

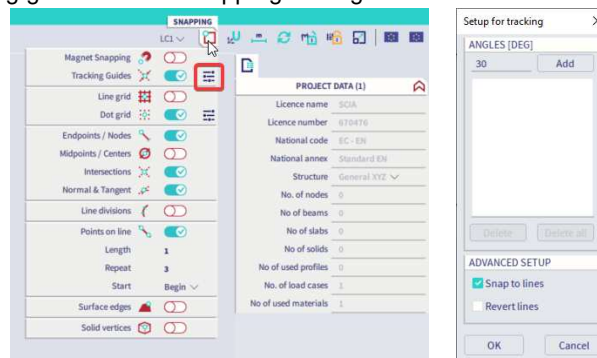


### 1.2.1. Tracking guides

By default there are three tracking guides following the direction of the axis's from the UCS. These tracking guides are only shown if the option 'tracking guides' is turned on in the snapping settings. These tracking guides are colored dashed lines that show up while drawing.

#### Adding tracking guides

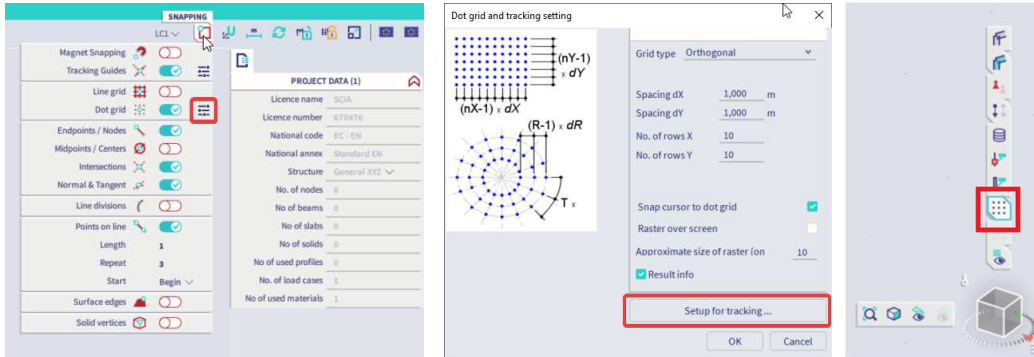
You can add different tracking with the dialogue 'setup for tracking' which can be opened using the three lines shown next to 'tracking guides' in the snapping settings.



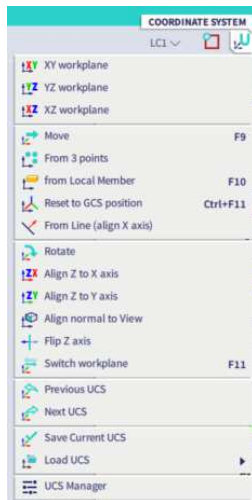
With this dialogue you can add an angle for which a tracking guide should be shown. The defined angle is relative to the X-axis when working in the XY or XZ workplane and relative to the Y-axis when working in the YZ workplane. You can't set up a tracking guide with the angles 0°, 90° or 180° because these tracking guides already exist.

### 1.2.2. Dot grid

If the 'dot grid' is checked on in the snapping settings, your mouse will snap to the points of the dot grid to make modelling easier. You can set up the dimensions of the dot grid with the "dot grid and tracking" settings. You can hide the dot grid with the view settings shown next to the Navicube.

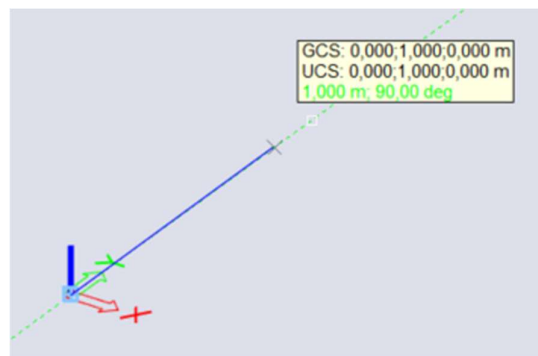


If you are snapping to the dot grid for modelling, you are always drawing in the active workplane. The workplane can be changed in the coordinate system settings (next to the snapping settings) and is shown with two big arrows on the UCS.



### 1.2.3. Tracking tooltip

The tracking tooltip is shown next to your mouse when the tracking guides are toggled on in the snapping settings. This tooltip shows the coordinates of the point your mouse is snapping to if you are drawn along a tracking guide. The tooltip also shows the length of the element you are drawing and the angle of the tracking guide you are using.



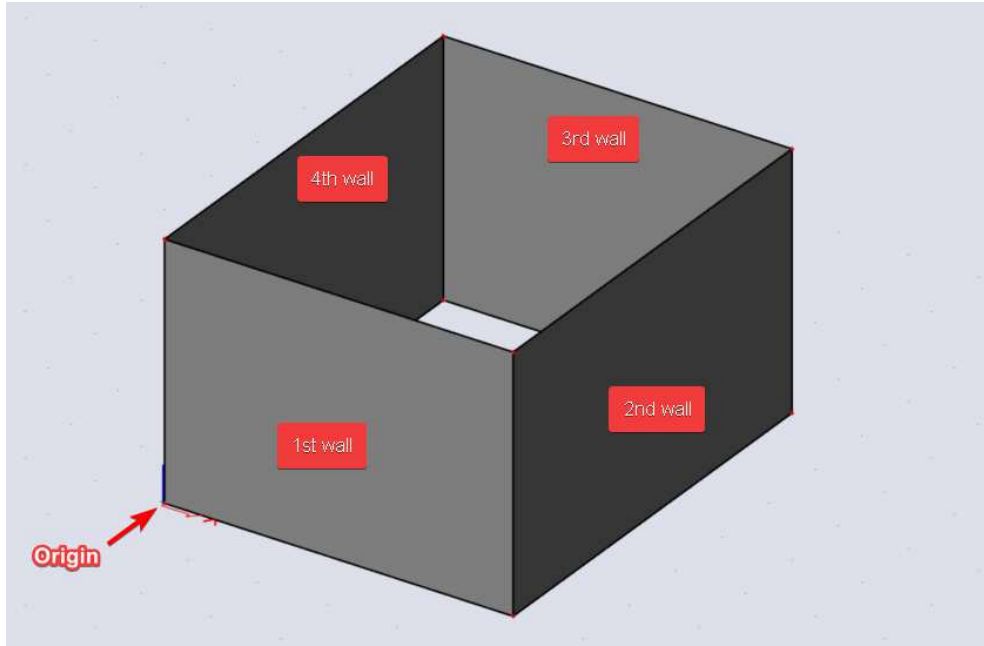
## Chapter 2: Modelling

In this chapter of the tutorial you will model a simple structure to learn how to use the tracking options.

### 2.1. The first level

#### 2.1.1. The walls

The first level consist of four walls:



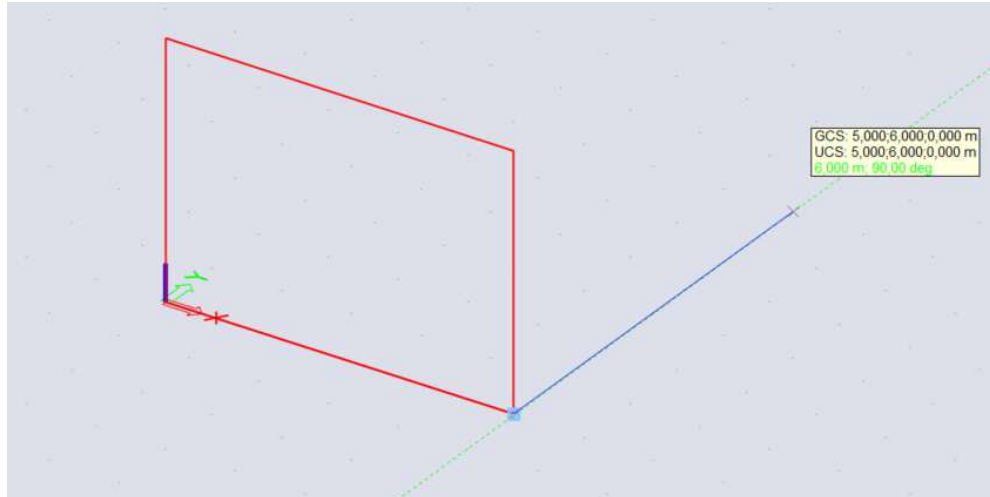
Use the following steps to model the four walls:

1. Make sure you are drawing in the XY workplane
2. Toggle the following snapping settings on:
  - a. The tracking guides
  - b. The dot grid
  - c. End points/nodes
3. Set the settings of the dot grid on 1m in both directions
4. Start the function 'wall', if you want, you can change the properties of the wall.
5. Draw the first wall starting in the origin of the UCS in the positive direction of the x-axis. This wall is 5m long

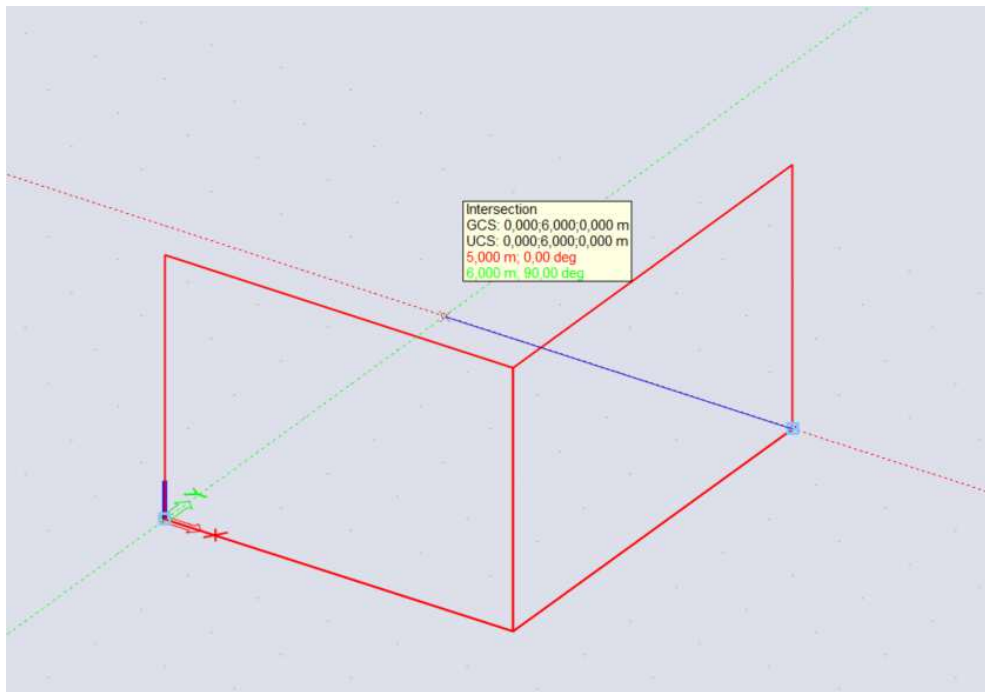




6. Draw the second wall in the positive y-direction starting from the endpoint of the first wall. This wall is 6m long.

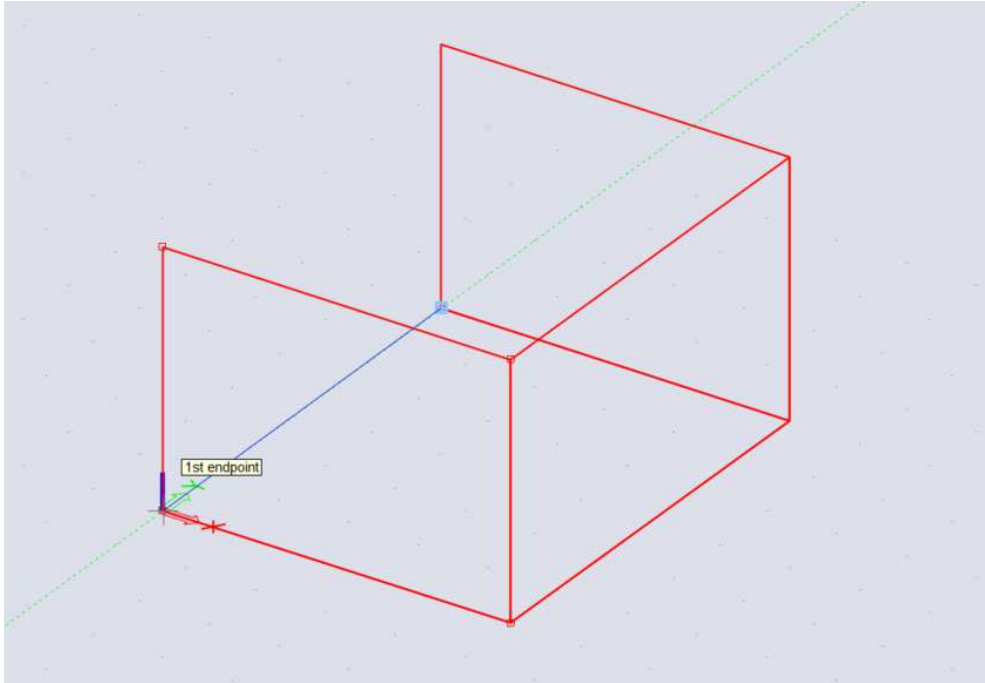


7. Draw the third wall from the endpoint of the second wall in the negative direction of the x-axis. This wall has the same length as the first wall. Draw this wall while using **a second tracking point**.
  - a. Insert the first point of the third wall
  - b. Hold your shift button and hover over the origin with your mouse.
  - c. Now a blue rectangle should be shown around the node in the origin, you can release your shift button. This tracking point will also generate tracking guides
  - d. Draw the second point of the wall in the intersection of the two tracking guides which will be shown with a cross.



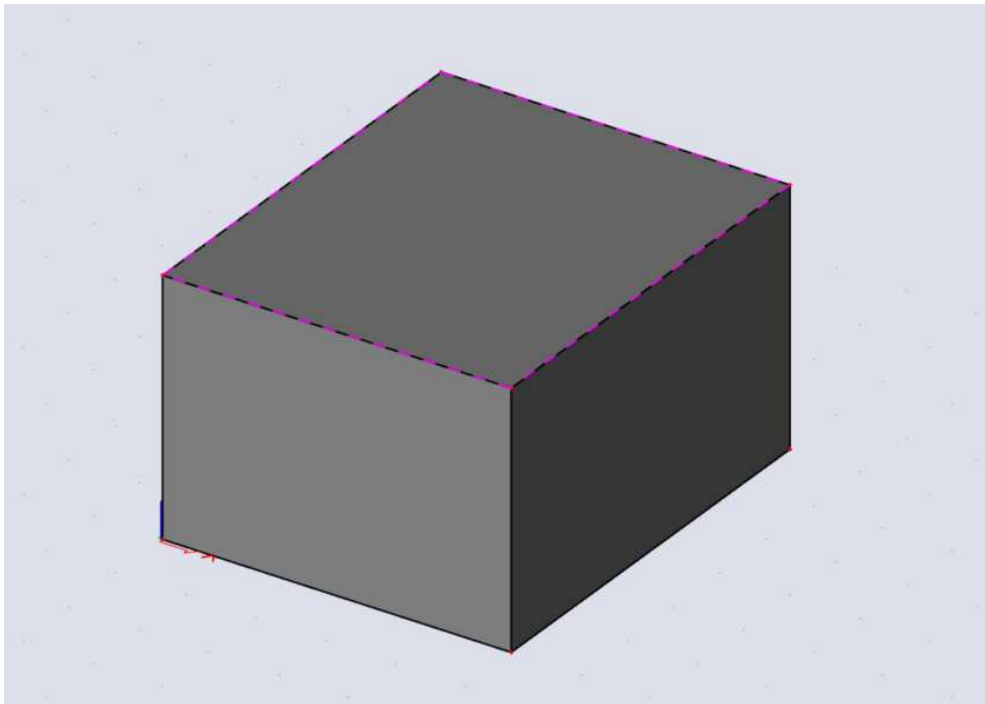


8. The fourth wall can be drawn using the end nodes of the first and the third wall



### 2.1.2. The plate

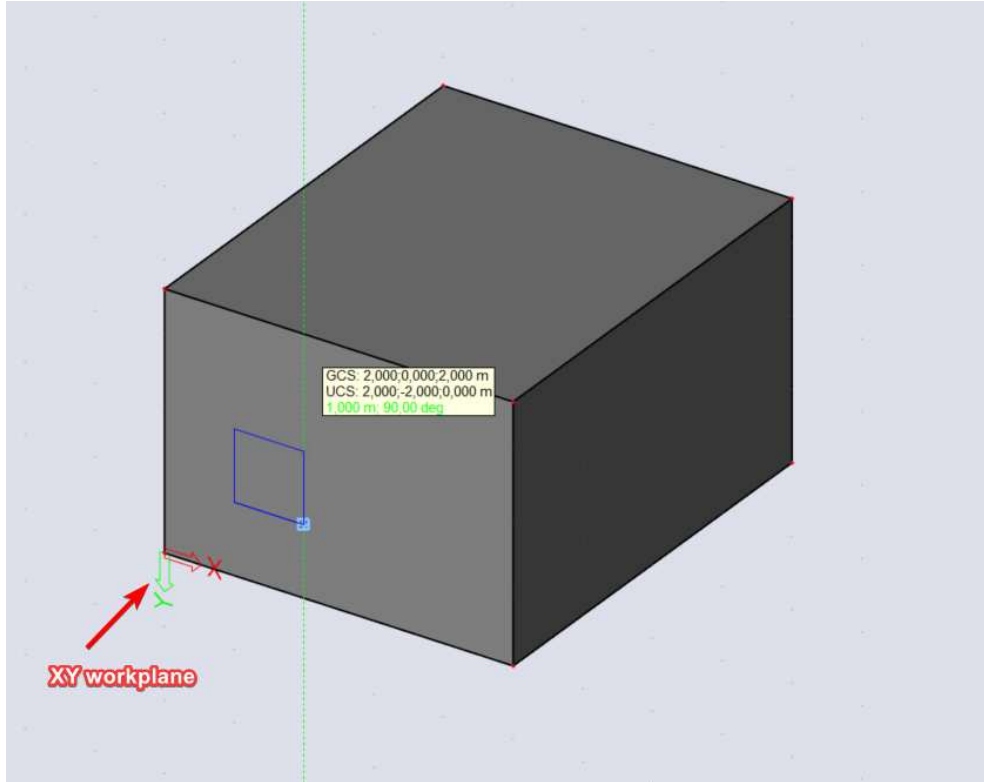
Add the plate on top with the top end nodes of the four walls. You can choose the properties of the plate if wanted.



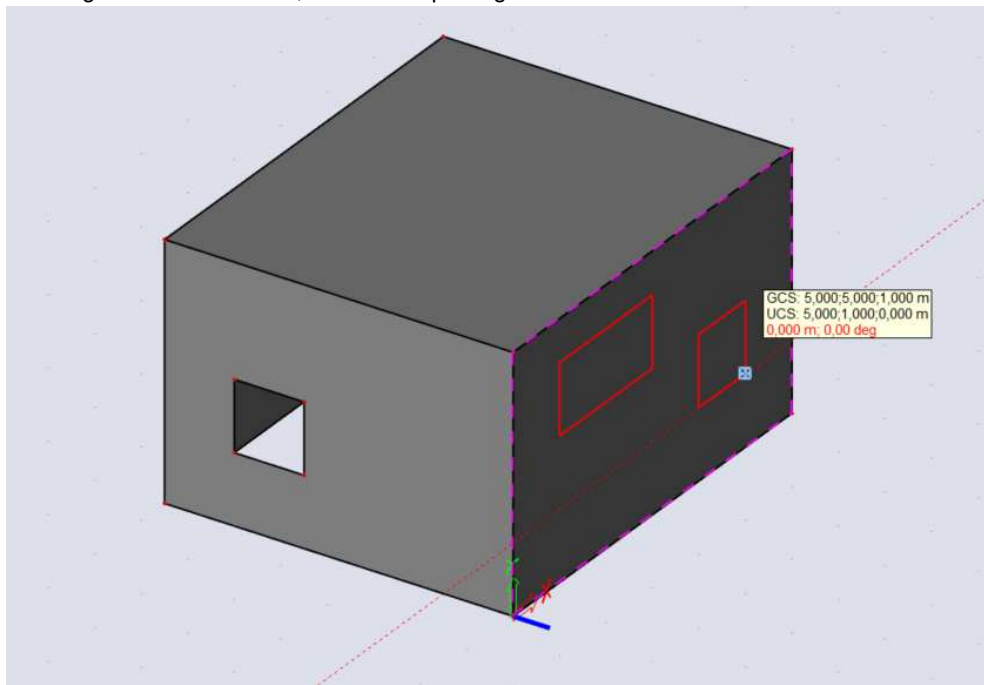
### 2.1.3. The openings

Add three openings in the first and second wall using the following steps:

1. Start the function 'opening'
2. Select the first wall, the workplane will automatically change to XY workplane from the chosen wall which means the dot grid can be used to draw an opening.
3. Use the dot grid to draw an opening of 1m by 1m on a location of your choice.



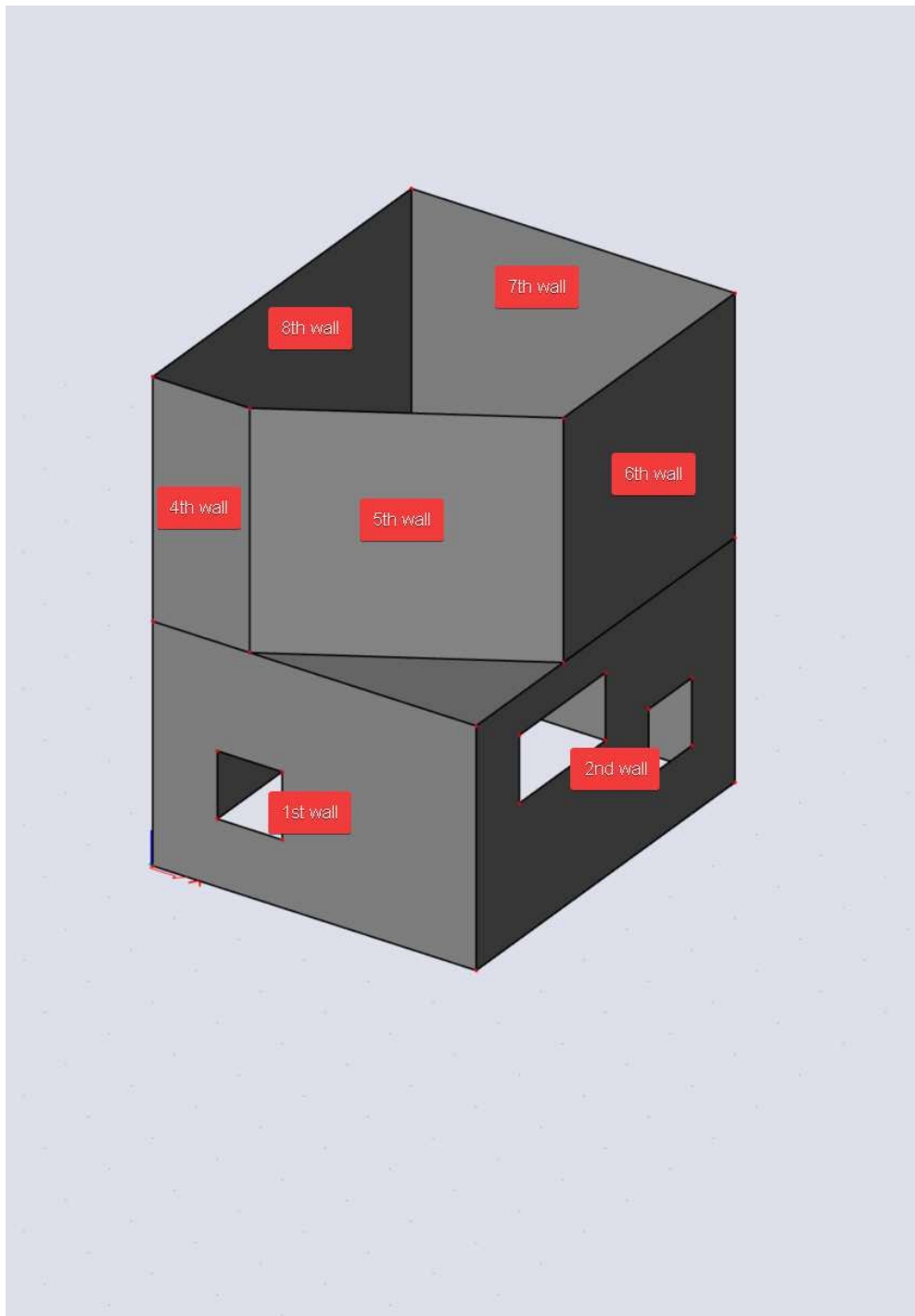
4. Using the same method, draw two openings in the second wall.



## 2.2. The second level

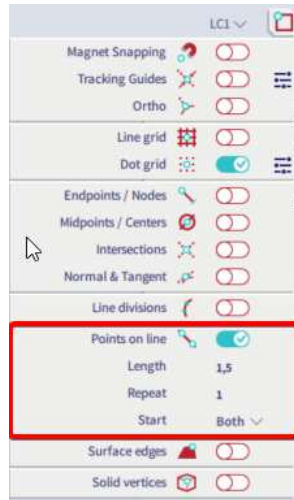
### 2.2.1. The walls

The second level consists of five walls.

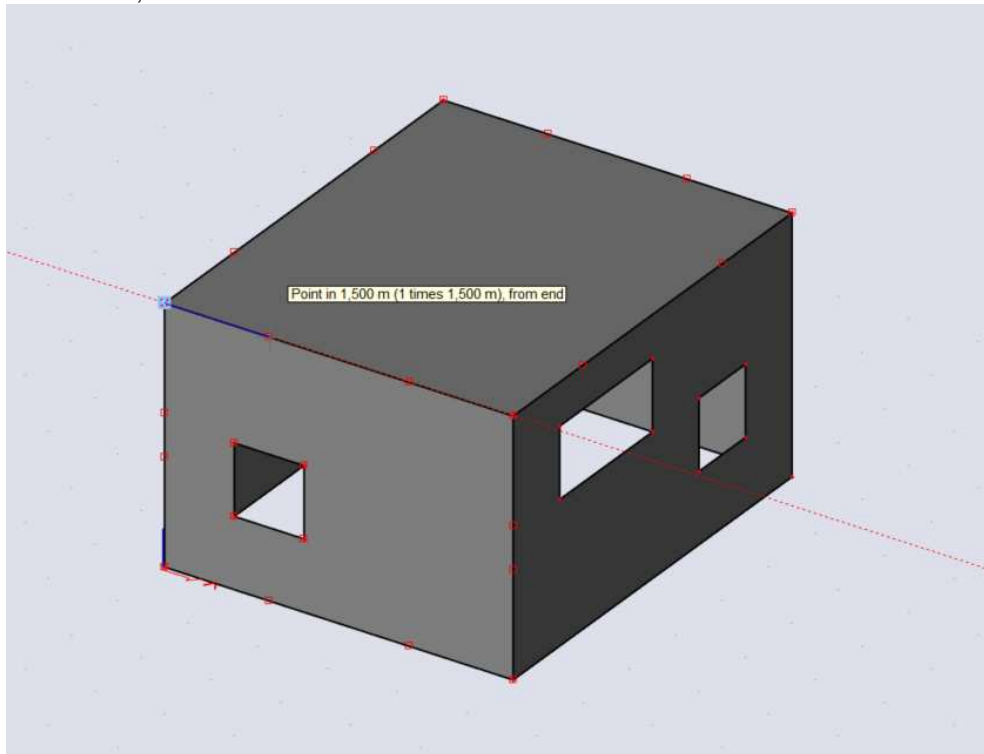


Use the following steps to model the four walls:

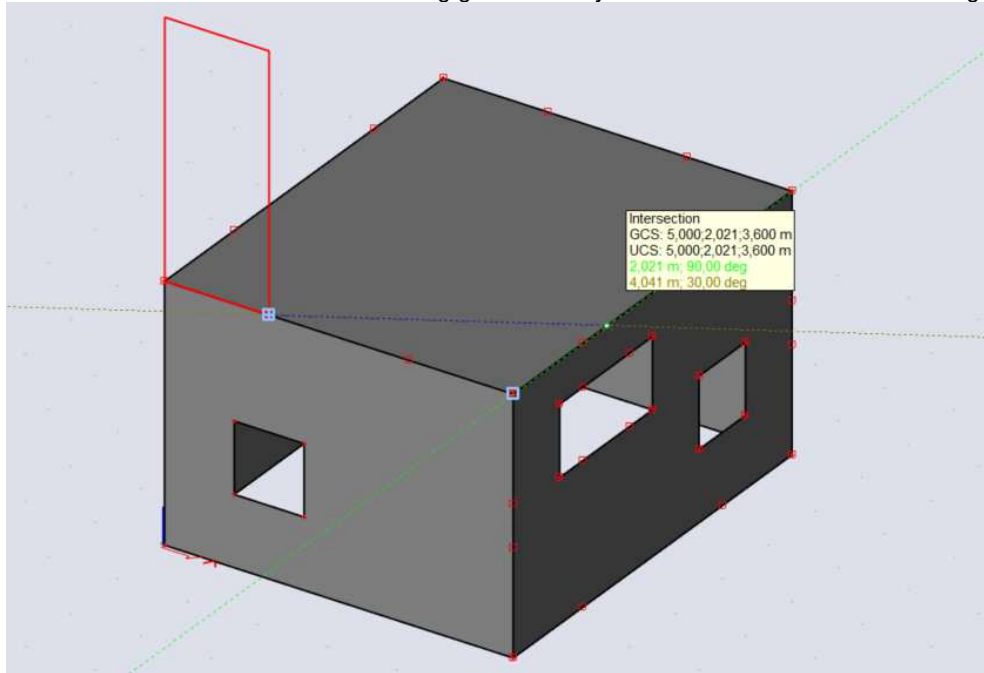
1. Add a tracking guide with an angle of 30° as shown in the first chapter.
2. The fifth wall starts on top of the first wall above the origin. This wall has a length of 1,5m. Draw this using **'Points on line'** from the snapping settings. This settings will add snapping points on every line in a model on a defined length.
  - a. Toggle the function 'points on line' on
  - b. Set the length on 1,5m
  - c. Set the repetition on 1
  - d. Set the start on both ends



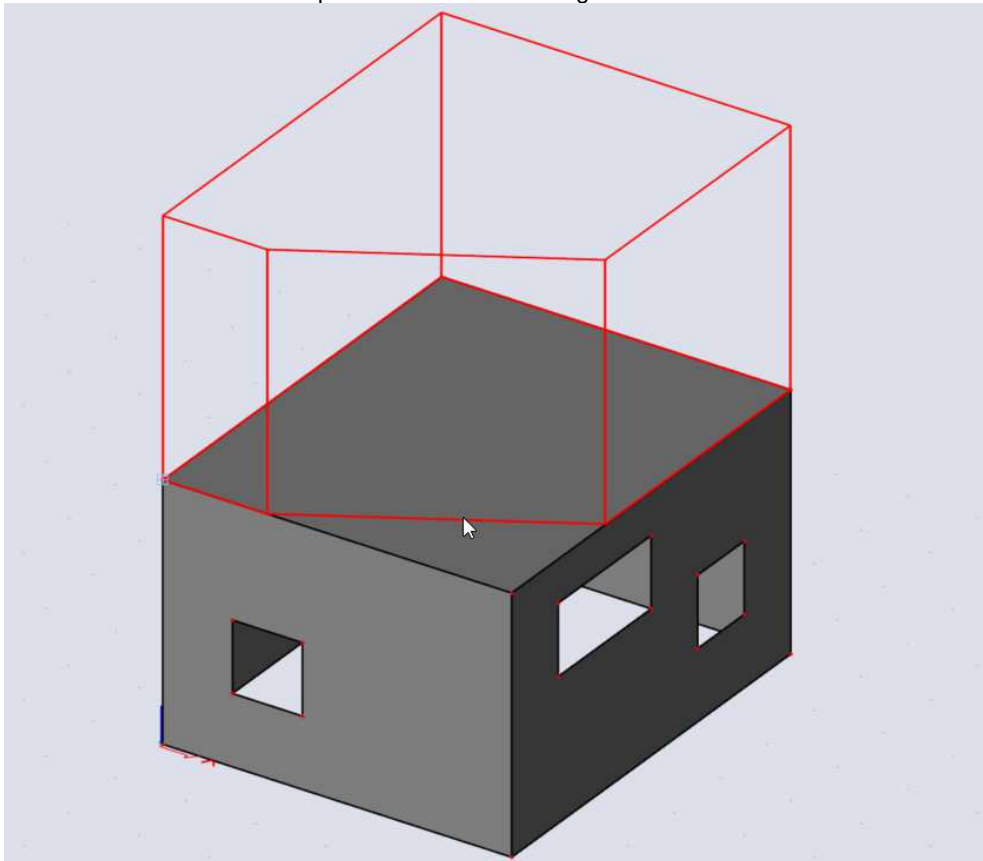
- e. Draw the fifth wall starting from the end node of the first wall to the snapping point on 1,5m.



3. The sixth wall has an angle of 30°.
  - a. Start the sixth wall in the end point of the fifth wall
  - b. Add one of the top nodes of the second wall as tracking points in the same way before
  - c. End the sixth wall at the intersection of the tracking guide at 30° from the starting point of the sixth wall and the tracking guide in the y-direction from the added tracking point.



4. Draw the seventh wall using the end node of the sixth wall and the end node of the wall underneath.
5. Draw the eighth wall on top of the third wall using the end nodes.
6. Draw the ninth wall on top of the fourth wall using the end nodes.

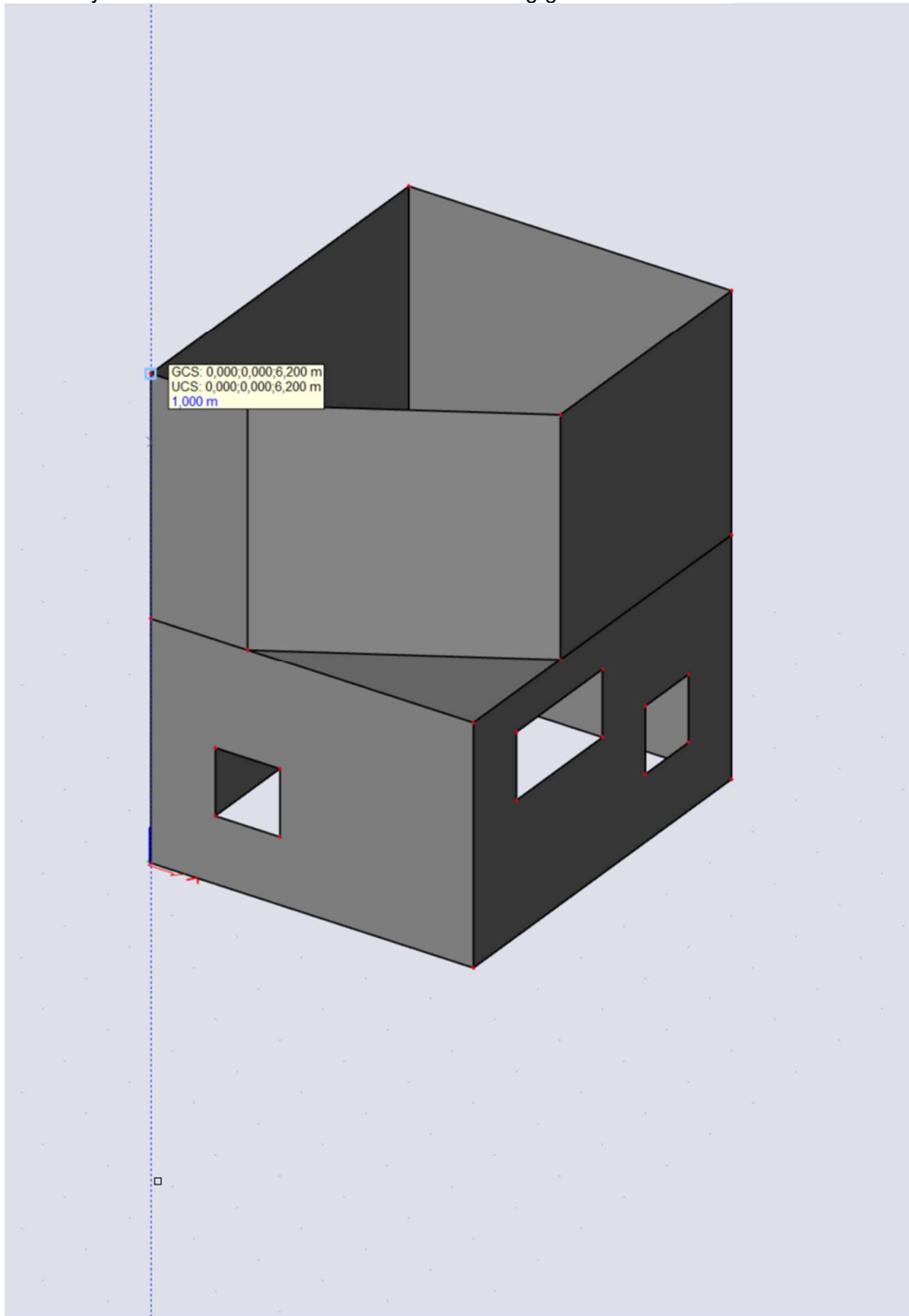


### 2.2.2. The roof

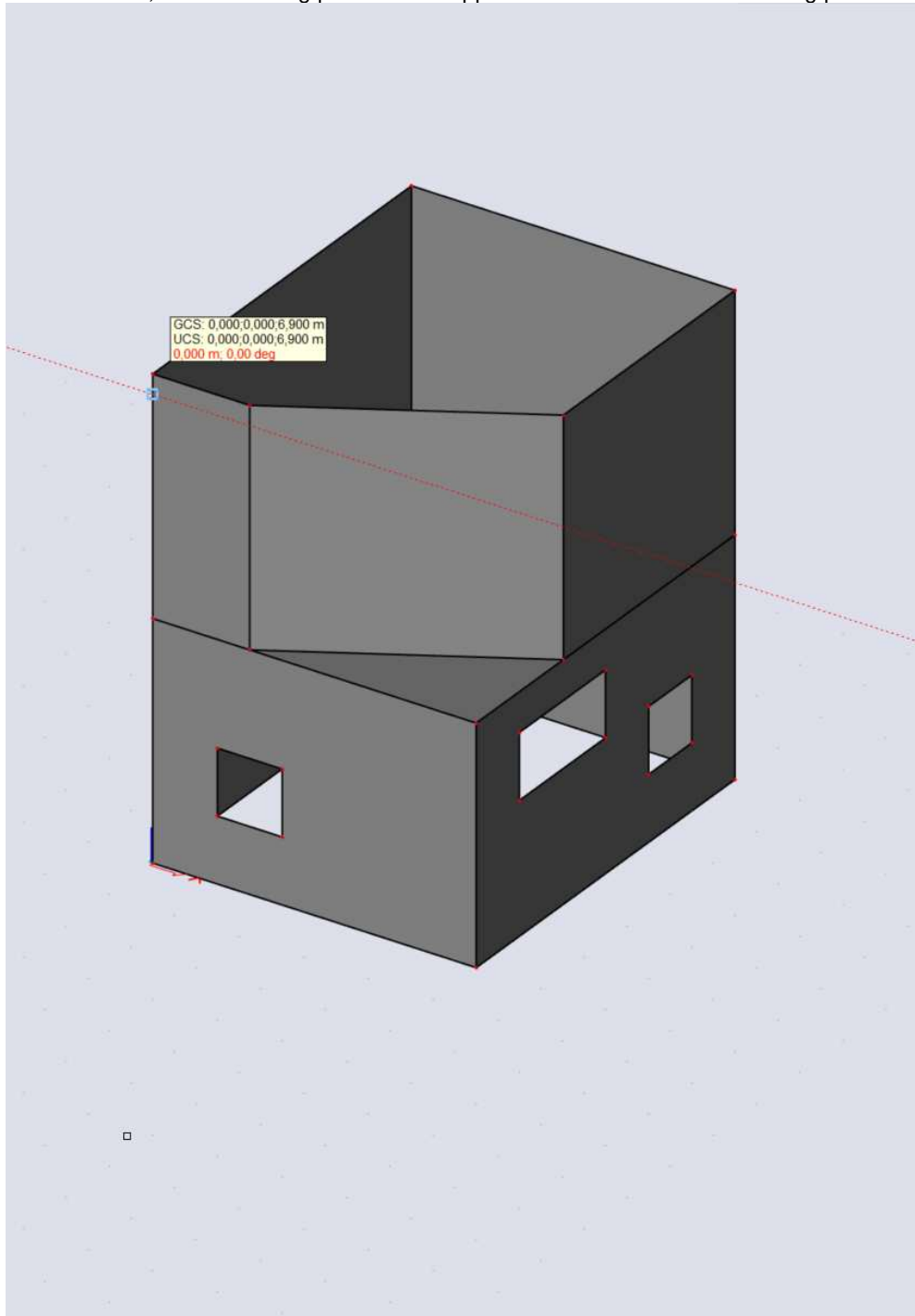
The roof is located 0.3m below the top of the walls on the second level.

Add the roof following the next steps:

1. Turn the snapping settings 'normal & tangent' on. This will add snapping points on lines in the model where the existing line and the line you are drawing are orthogonal.
2. Start the function 'plate'
3. Add a tracking point on top of the fifth wall using the shift button the same way as before, do not start drawing the wall yet.
4. Move your mouse downwards so that the tracking guide in the z-direction is shown.

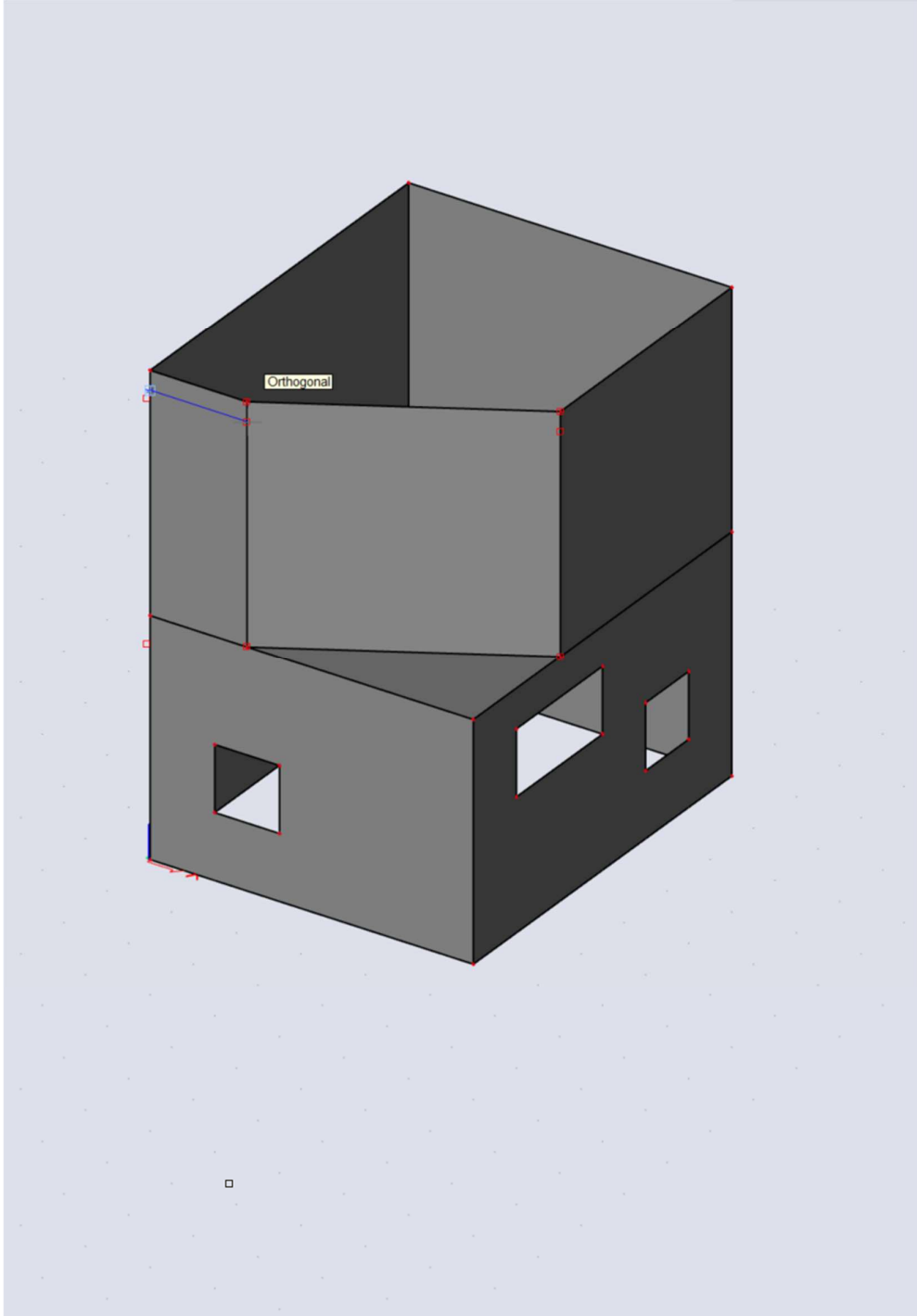


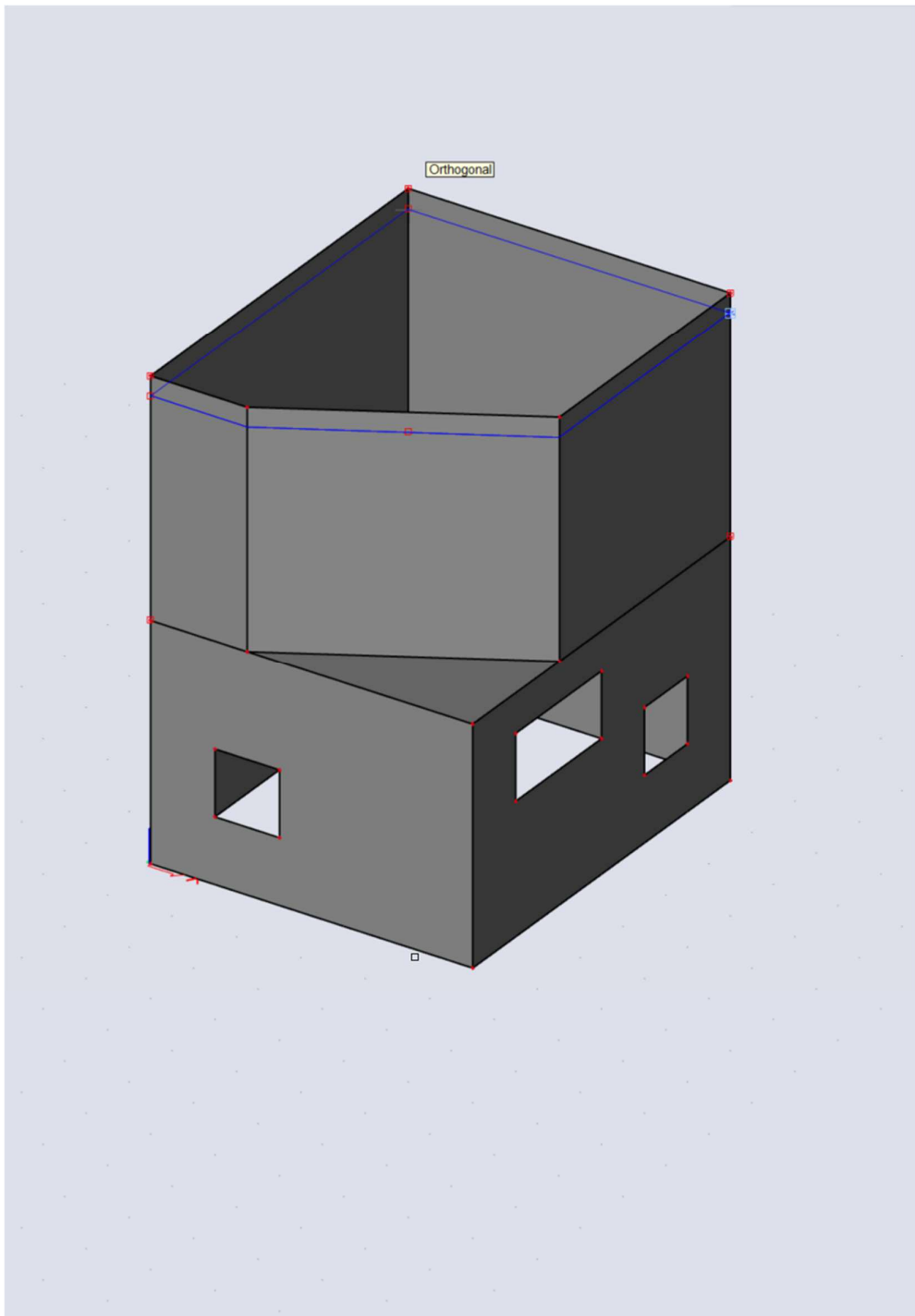
5. Press the spacebar to start writing in the SCIA spotlight
6. Type: **0.3**
7. Press enter, a new tracking point should appear 0.3m below the first tracking point





8. Start drawing the plate in this new tracking point
9. Draw the roof using the orthogonal tracking points along the five walls on the second level.

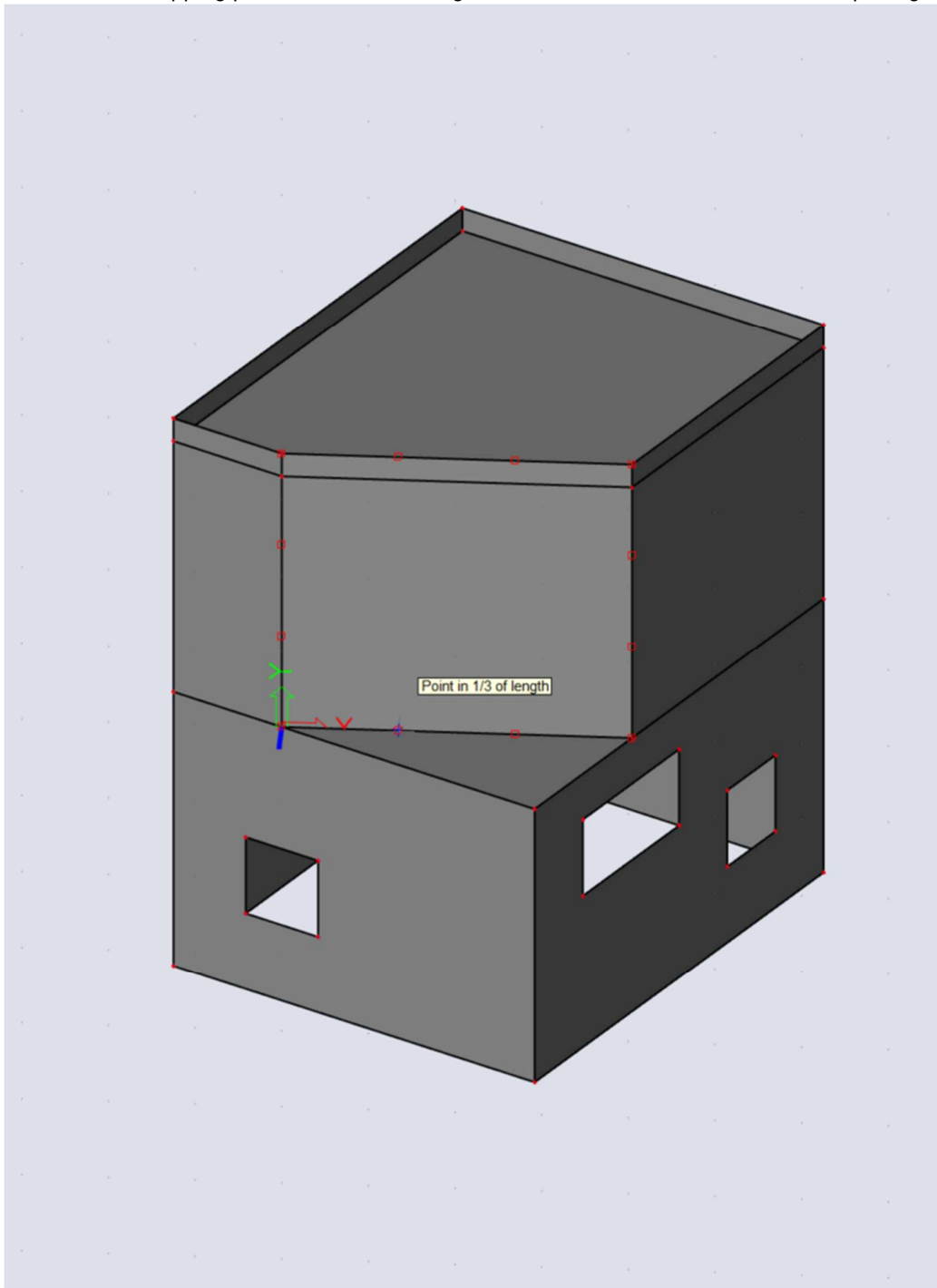




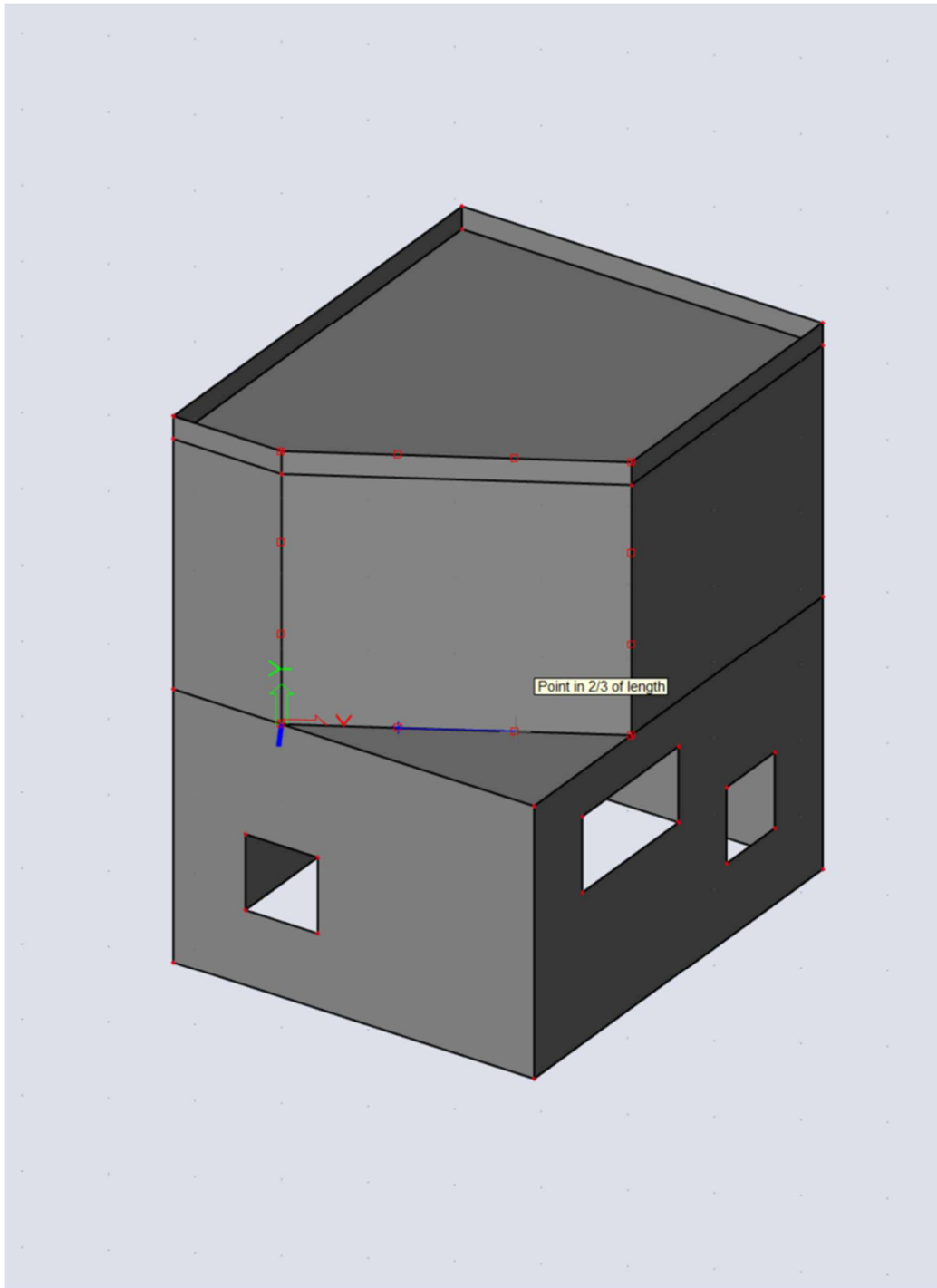
### 2.2.3. The openings

This time you are going to add an opening for a high window in the sixth wall. This window has the size of  $\frac{1}{3}$  of the length of the wall and is located in the middle of the wall the height is the same as the wall. To add this wall you will use **'line divisions'**. This function divides every line in equal parts.

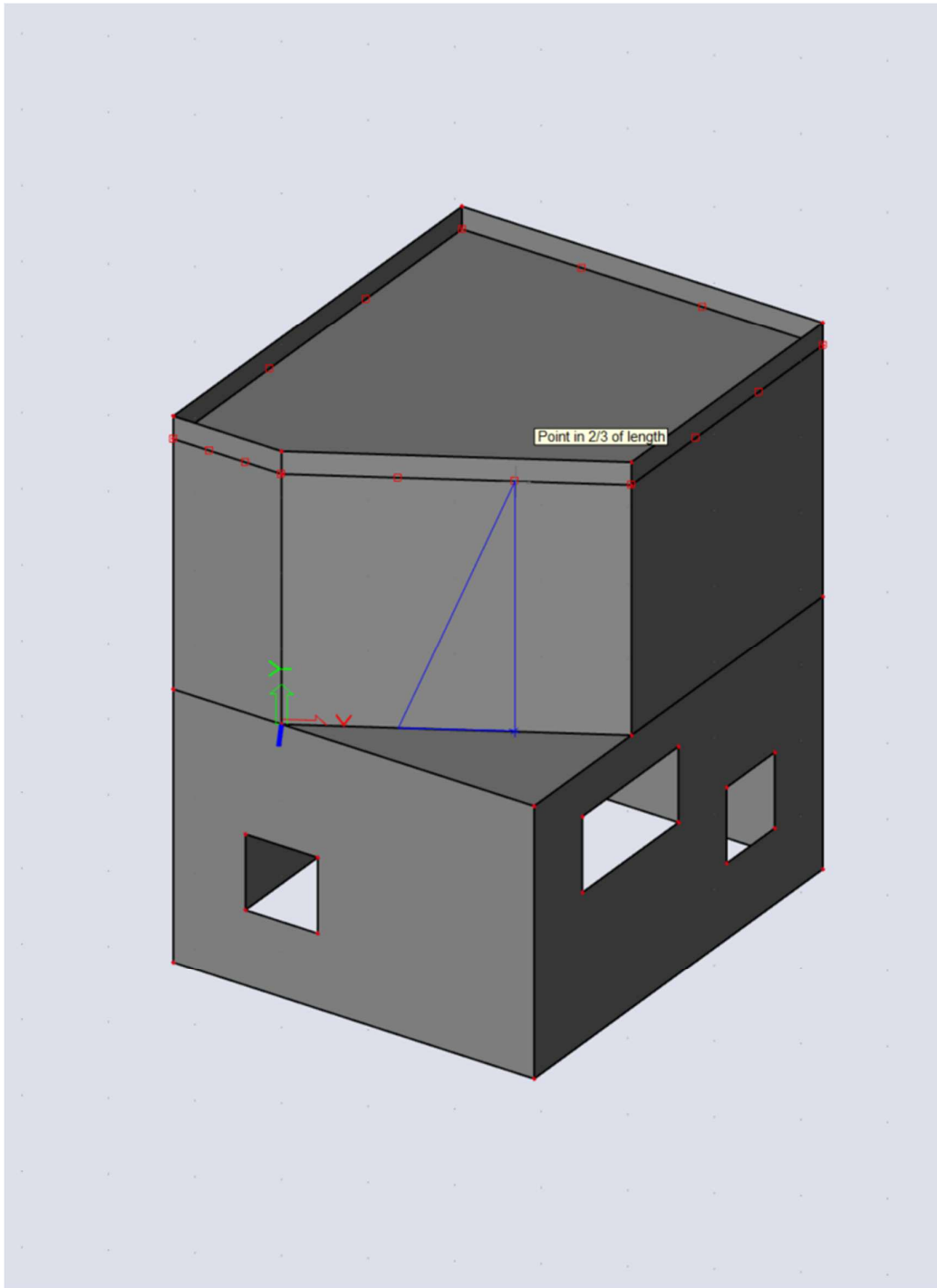
1. Toggle the function 'line divisions' on in the snapping settings
2. Set the repetition on 3, this will divide every line into three equal parts and will add a snapping point in between those parts
3. Start the function 'opening'
4. Select the sixth wall
5. Use the snapping point on  $\frac{1}{3}$  of the length from bottom of the wall to start the opening

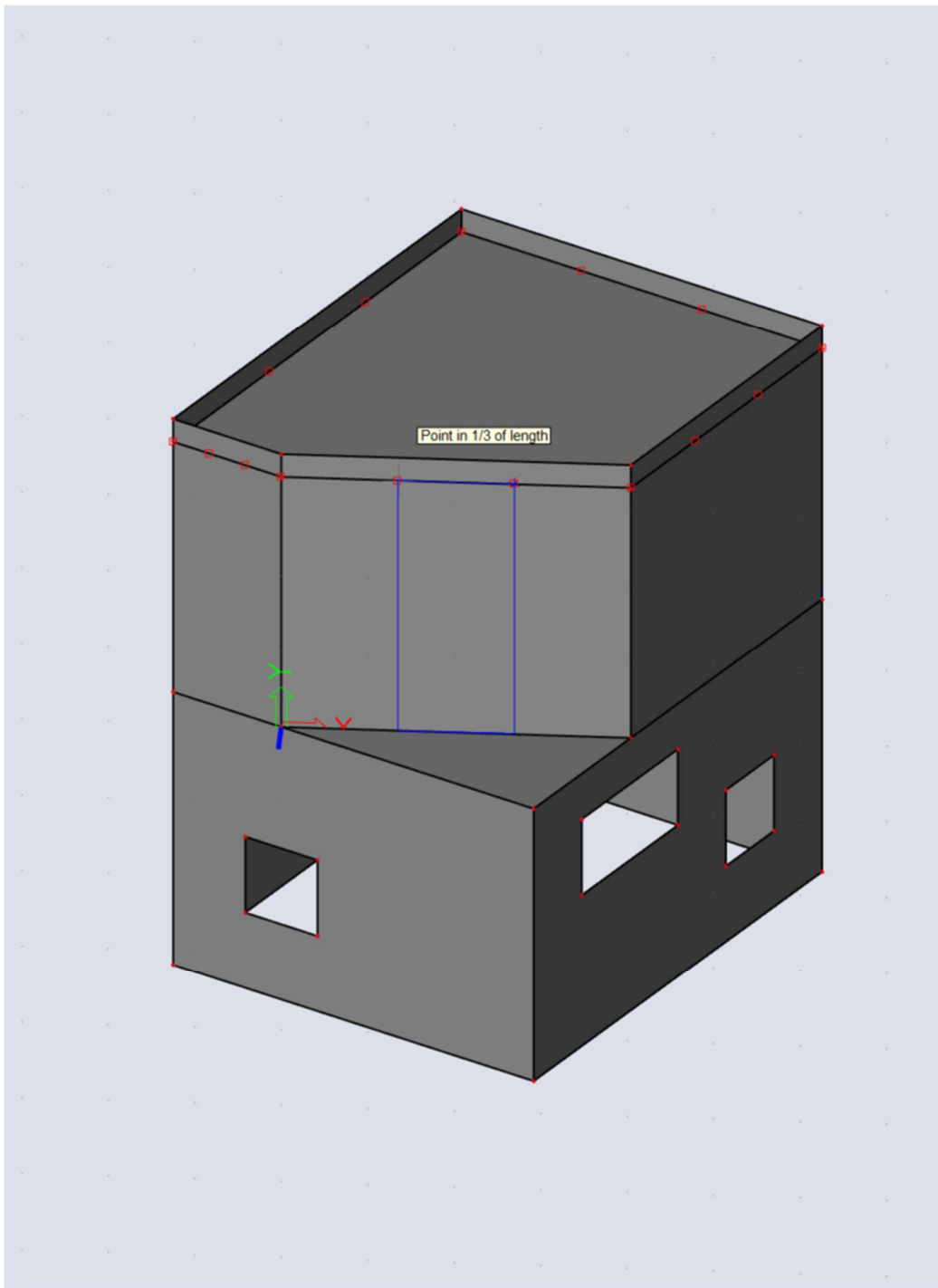


6. Use the snapping point on 2/3 of the length on the bottom of the wall



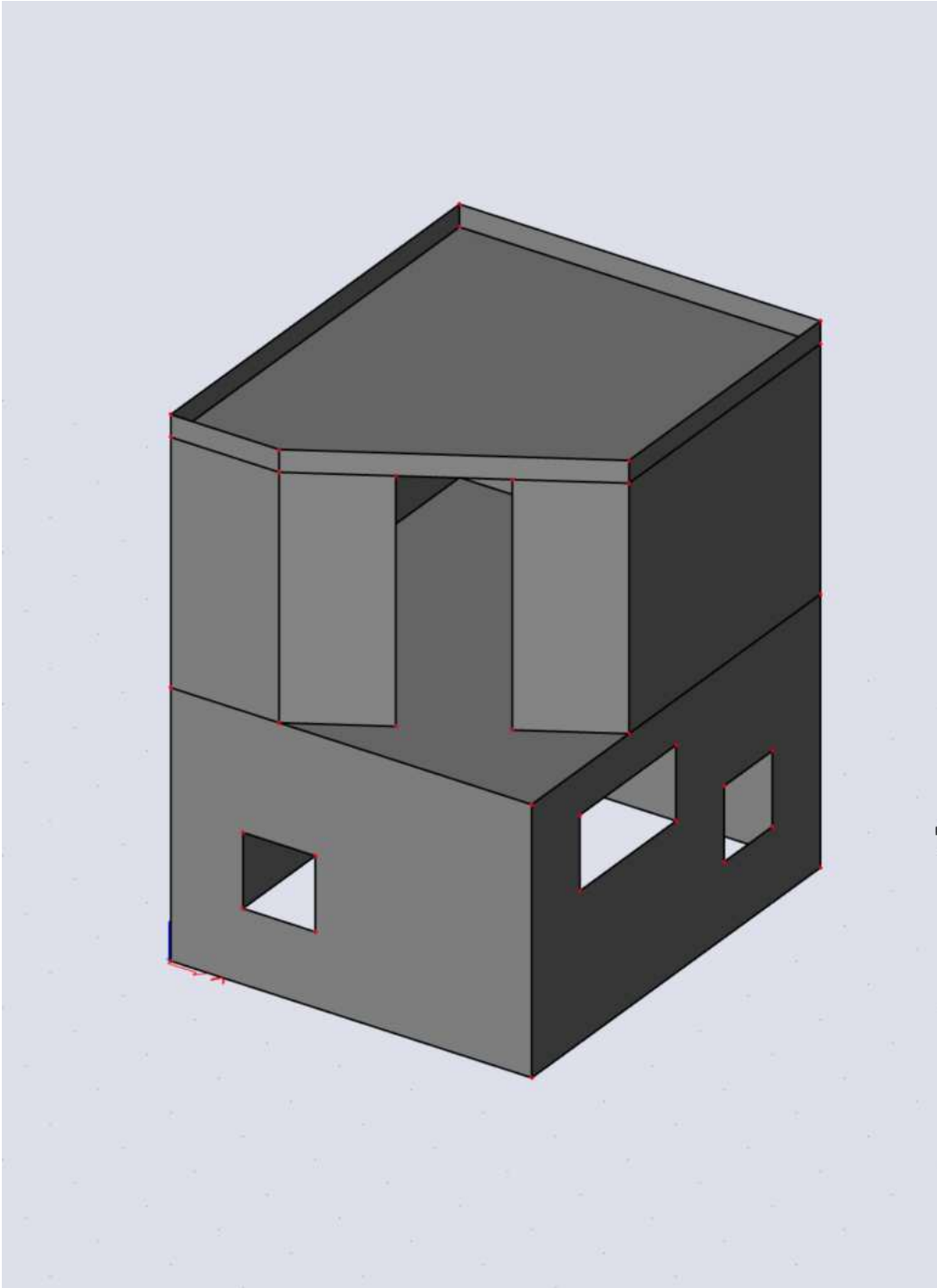
7. Use the same snapping points on the top of the wall to create the opening





### 2.3. The end result

When you followed all the steps, you can view the end result:





## Chapter 3: Other snapping settings

This chapter will discuss a few settings you didn't use in chapter 2.

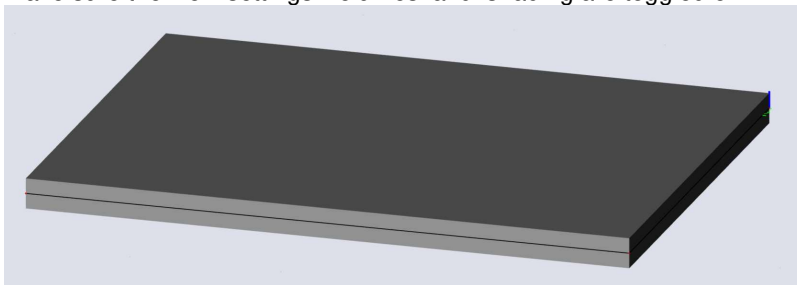
### 3.1. Surface edges

When using the snapping settings when this function is toggled off, you will always snap to the system lines of an element. This function will make it possible to snap to the edges of the volume of a member. To do this, the view setting 'volumes' should be toggled on. You can also toggle on 'shading' if necessary.

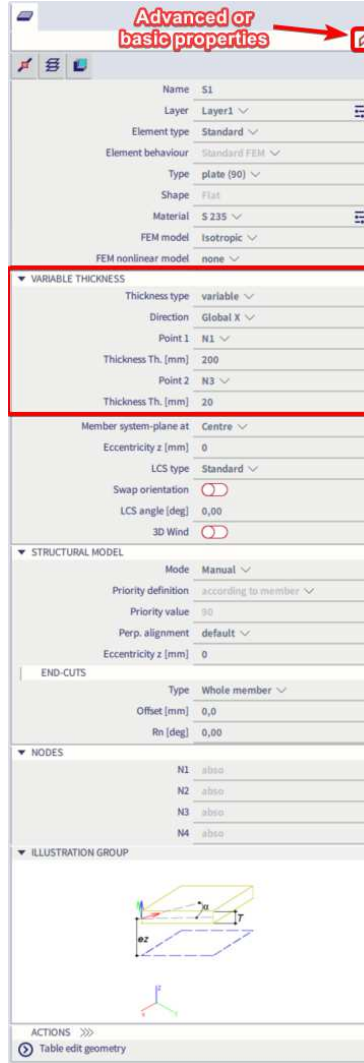


You will use this function to measure the thickness in the centre of a slab with variable thickness

1. Open a new file
2. Choose a material
3. Add a plate
4. Make sure the view settings 'volumes' and 'shading' are toggled on.



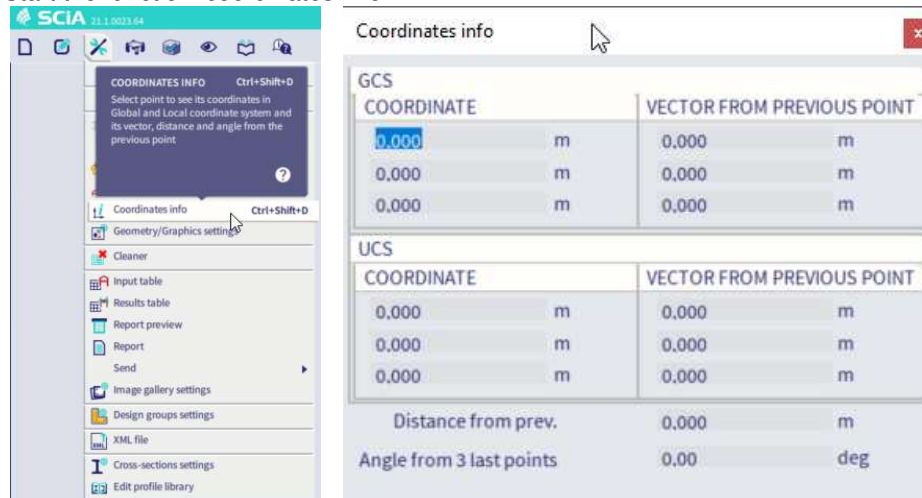
- Change the thickness of the slab to variable, you can use the same 'properties' as shown in the image below. To do this you need to look at the advanced property panel.



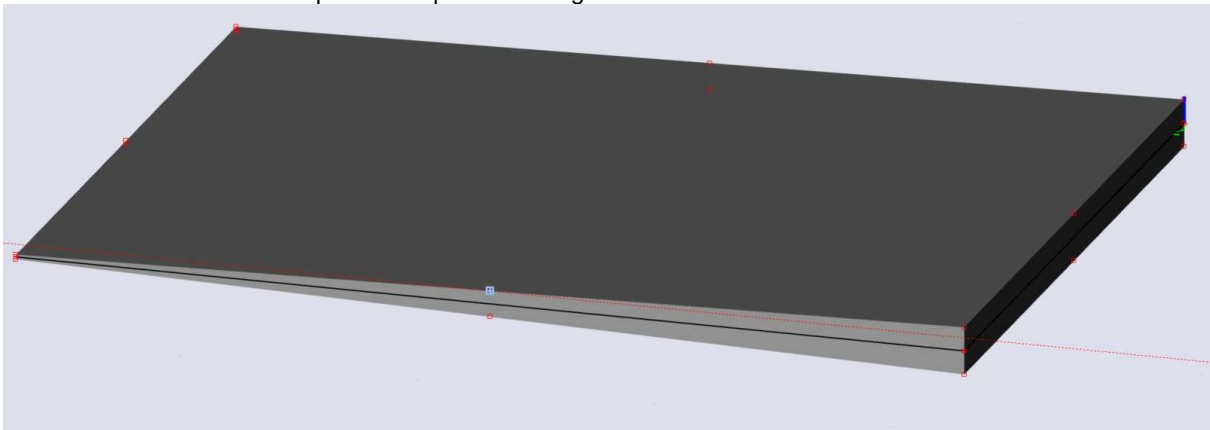
- Toggle on the following snapping settings



7. Start the function 'coordinates info'



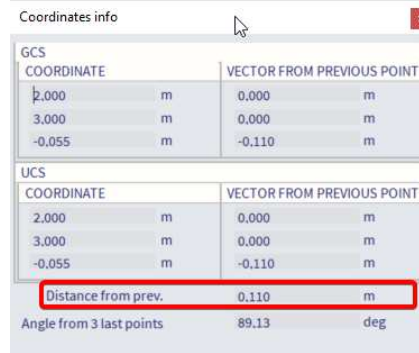
8. Click on the midpoint on top surface edge



9. Click on the midpoint on the bottom surface edge



10. Read the thickness in the coordinates info



All the used snapping settings in chapter two can be used on surface edges.

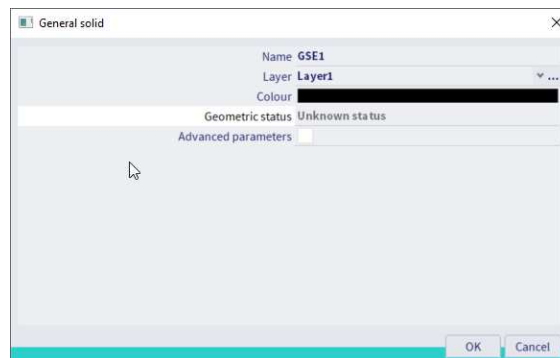
### 3.2. Solid vertices

This snapping mode can be used to snap to characteristic points on 'general solids'. You will test this function by creating a solid cylinder.

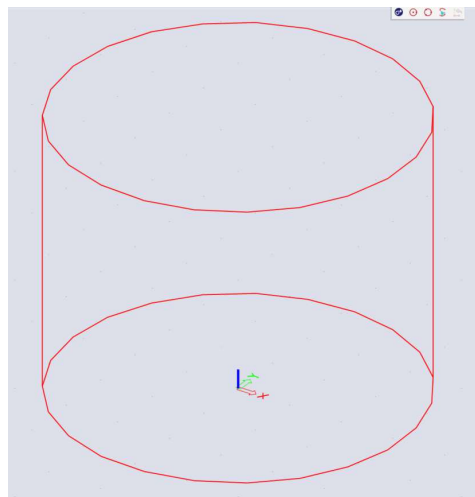
1. Open the function 'Cylinder' in the Input panel or type 'solid - cylinder in SCIA spotlight.



2. Click 'OK' in the dialogue that opens.



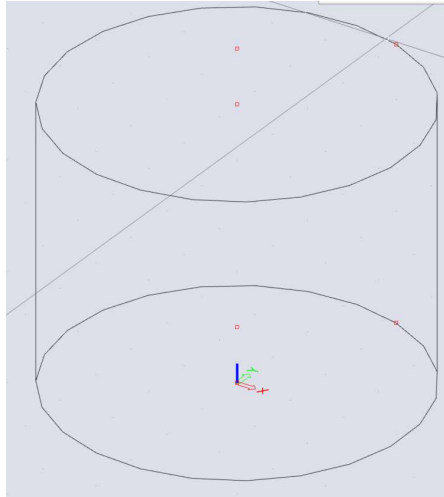
3. Draw a cylinder by choosing a CenterPoint, a radius and a height.



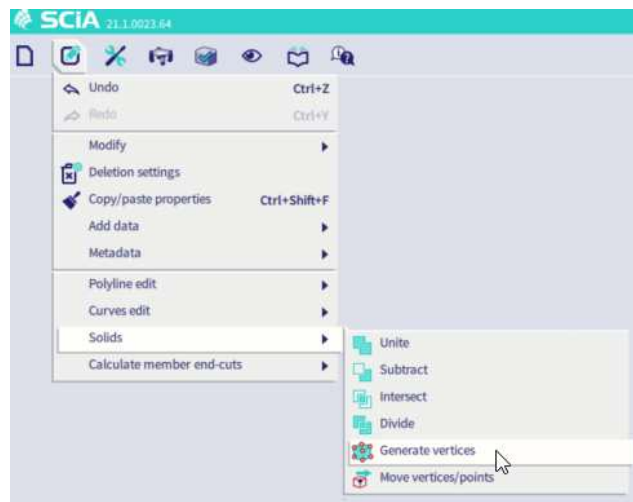
- Set the snapping points to 'solid vertices' and the amount of vertices to 100. It is important the setting 'surface edges' is toggled off because this functions interfere with each other.



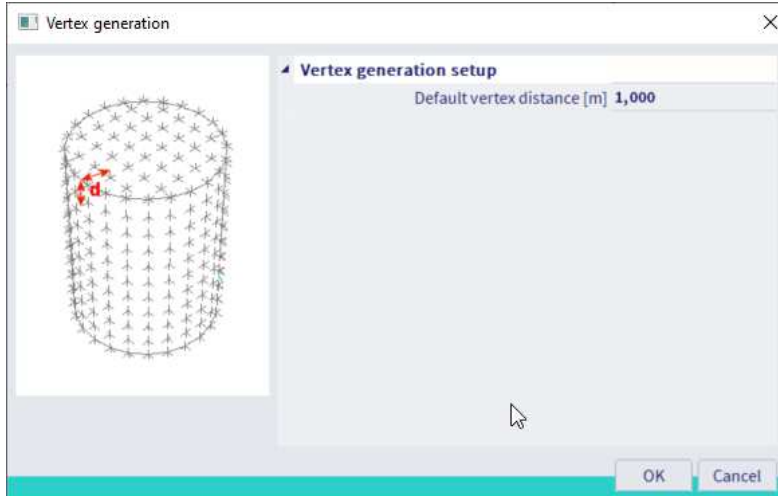
- Start drawing a member, you will notice there are not 100 vertices.



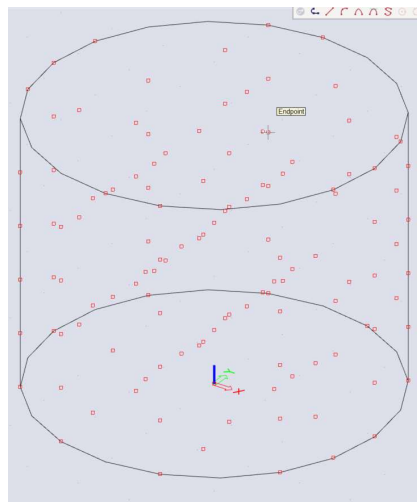
- Use the function 'generate vertices' to create more snapping points on the solid cylinder.



7. Select the solid cylinder, press 'escape' and choose the distance which will be used to create the vertices.



8. Start drawing a member and take a look at the snapping points.



9. The snapping function chooses 100 snapping points from all the created vertices. If you need more snapping points you can increase the value of vertices in the snapping settings.

