MBS

Assets Creation Guide

version 0.2

made by

Roman Ponomarenko

Kazakhstan, Ekibastuz

roman.indiedev@gmail.com | roman-indiedev.com
youtube.com/@roman.indiedev

questions? bugs? wishes? send me an email

Structure

Disclaimer

User can create any prefab/3D model he wants, with any geometry, vertex count, texture, material, render pipeline, any scripts attached, and so on.

At the same time, all responsibility for the performance of user assets remains on the user.

The developer (Roman Ponomarenko) is not responsible for user created assets, i.e. 3D models, scripts, textures, and others.

For example, let's say some user created or imported some prefab, then added a custom script to it, but due to the lack of programming experience, the script went out not so good and it caused Unity Editor to work slowly, to freeze, and so on. But he placed this prefab using MBS, and now the user thinks that the MBS is the problem.

So in case of similar situations, please contact me via email and attach screenshots, a short video clip, and other available details about the problem and I will try to help.

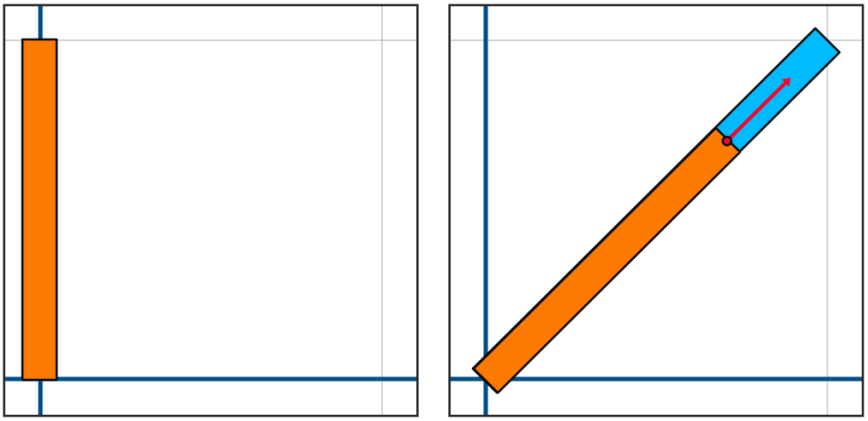
How MBS works

To design better assets it is good to know how the grid system in MBS works.

1. Walls

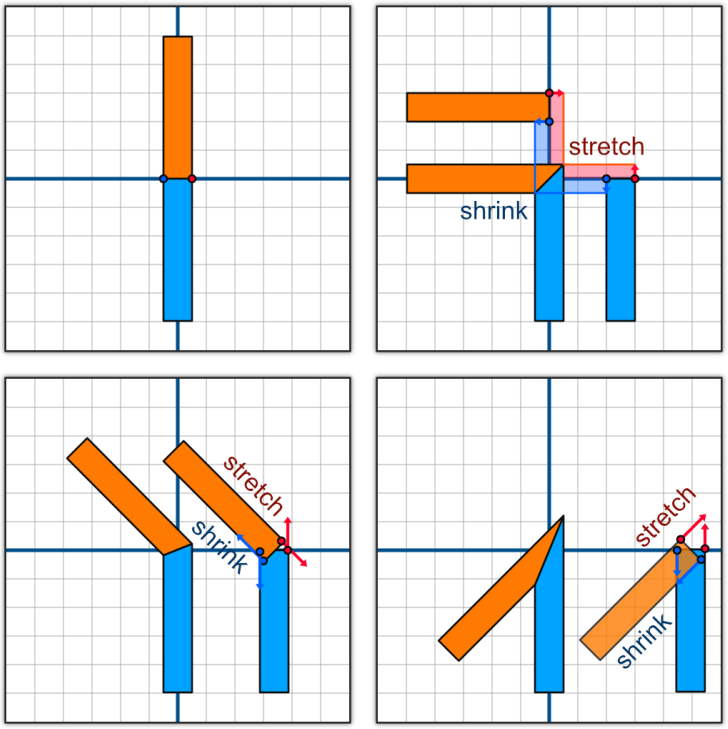
A grid-based system is good for creating basic shapes out of modular parts, and particularly walls. But it has its nuances.

- **First,** is angle constraint. Walls can be rotated only with 45º steps.
- **Second,** when the wall is placed under 45 degrees it stretches up to the nearest diagonal point XY(0; 0) -> XY(1; 1). The amount of stretching equals: 1 / sin(45º) = 1.4142+. It needs to be kept in mind.
  Now MBS can use two prefabs, default and extended ones. Default one is for regulat placement, and extended, which should have **length = default prefab length / sin(45)**, for diagonal placement at 45º. This especially useful for models that use texture maps, because in this case it will help avoid overstretching the applied texture.

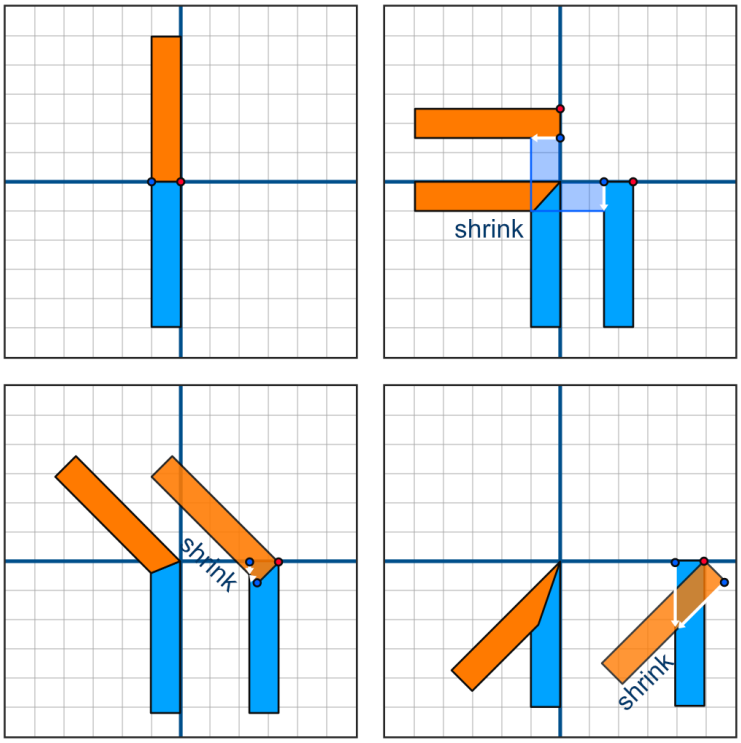


- **Third**, another stretching/shrinkage occurs when the walls are connected with a nonzero angle. In this case, stretching/shrinkage occurs not with the entire model, but with the corners that participate in the connection.
  The amount of stretching/shrinkage depends on the offset of the vertex relative to the pivot point (origin) along the Z axis.

Stretching/shrinkage with default pivot point.

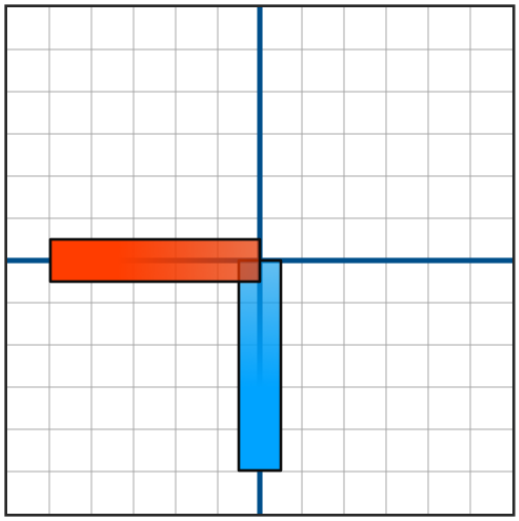


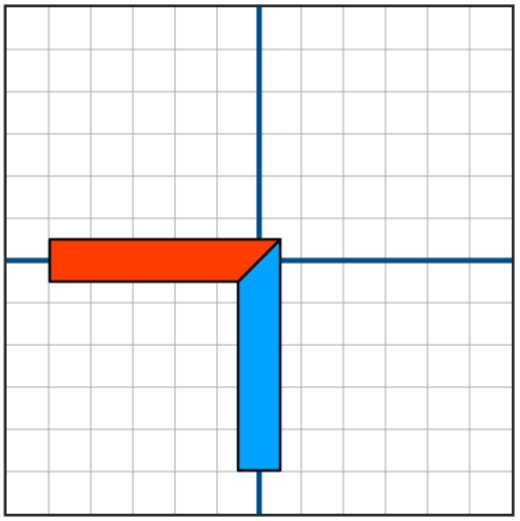
And with the shifted pivot point. In the shown case, the outer side of the wall will not be stretched at all, but the inner side of the wall will be shrunk 2 times more because the ratio was shifted with the shifting of the pivot point.



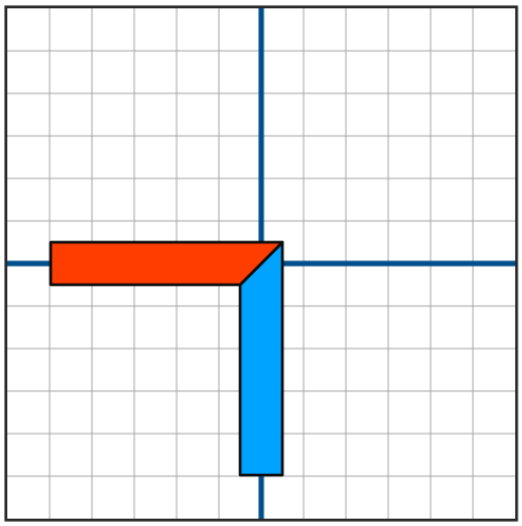
NOTE: By default, the pivot point for wall models should be in the center of the bottom, but if you shift it you will change the ratio of stretching/shrinking of the wall sides.

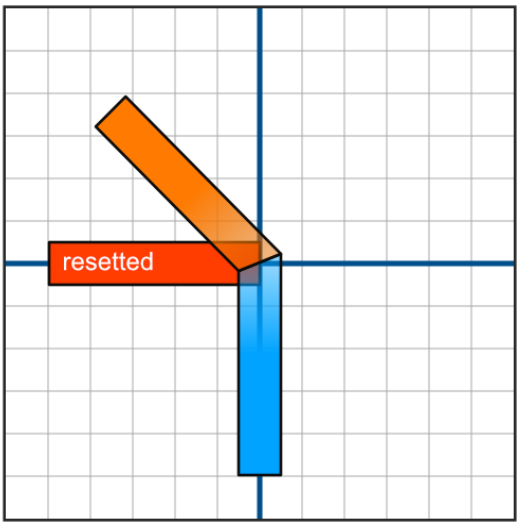
If walls are prepared correctly to work with MBS then at connection points (between two or more walls) they could be modified to fill the gaps and fix overlaps.



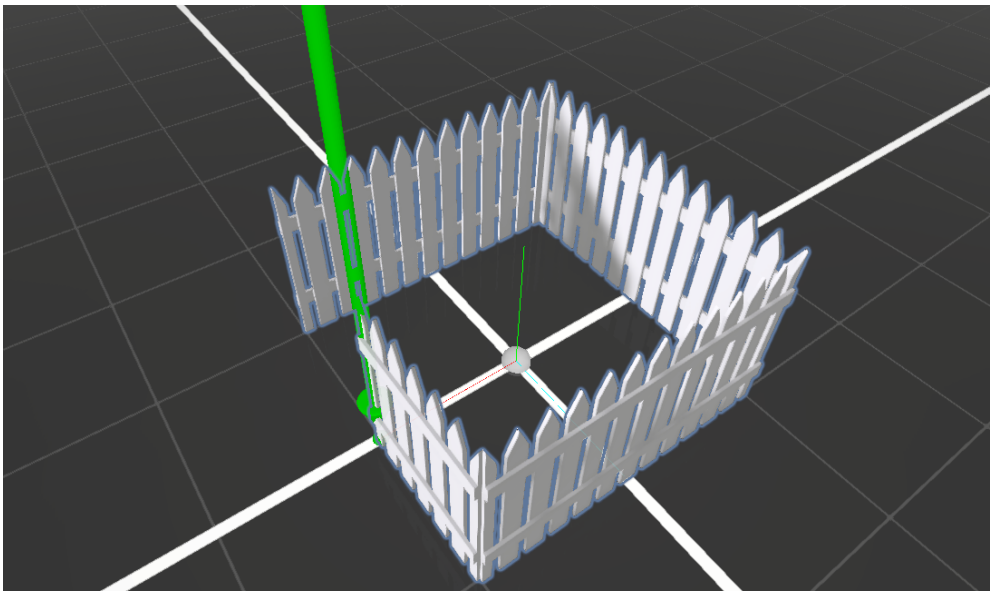


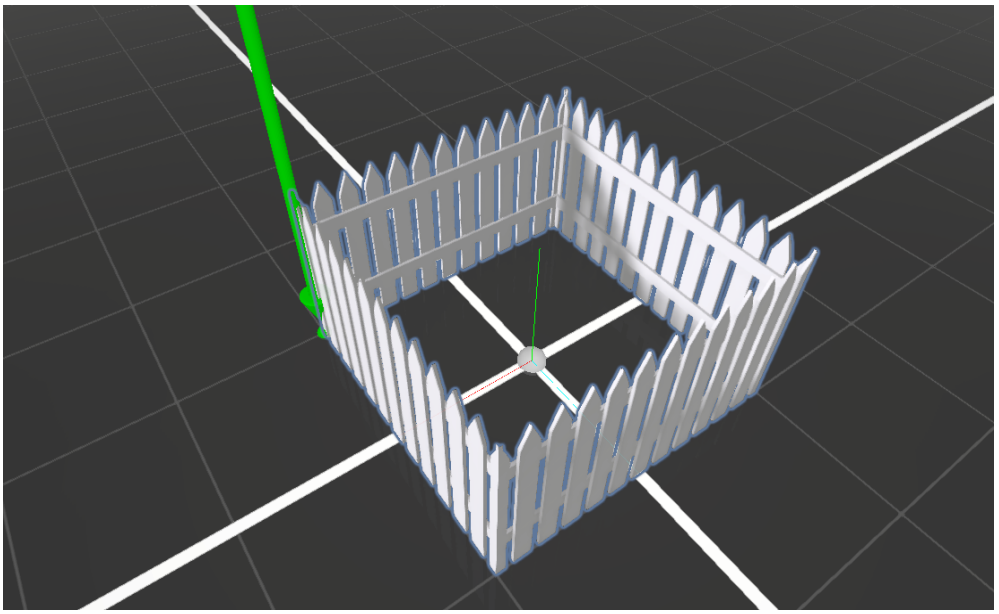
MBS modifies only two walls in connection (even so if there are 3 or more walls) where an angle between is bigger, the sides of the other walls in connection will reset.





When walls are connected into the closed loop they will automatically change their facing inside the formed area. It means that their forward direction / z-axis / **blue arrow** will point **inside** the area they form.





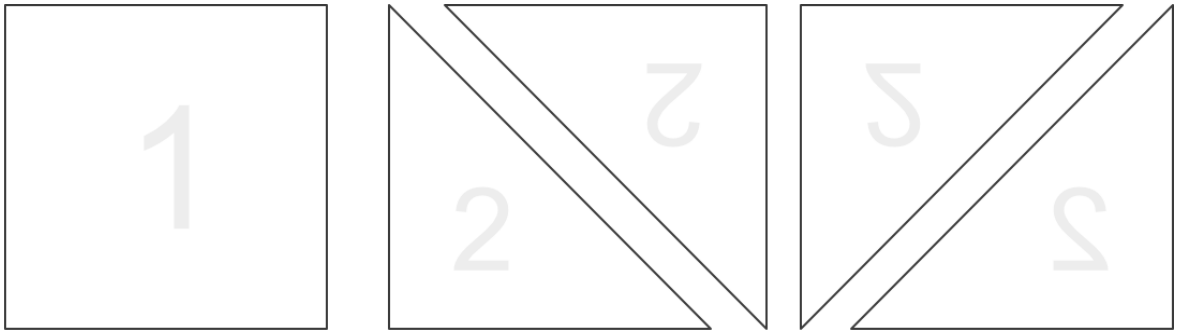
2. Floors

To place the floor module MBS is using two different models,

- square
- triangle (square cut in half.)

MBS is not using a boolean cut for floor tiles because two model method gives more flexibility (in terms of tiles geometry and texturing) and does not generate extra vertices or triangulation errors at the cut place.

To place the triangular model in 4 different positions MBS does not rotate it but flips it. This method allows to keep the direction of the applied texture (for example, a wooden floor) but can cause duplication of the pattern at the seams. Below you can see how it works.

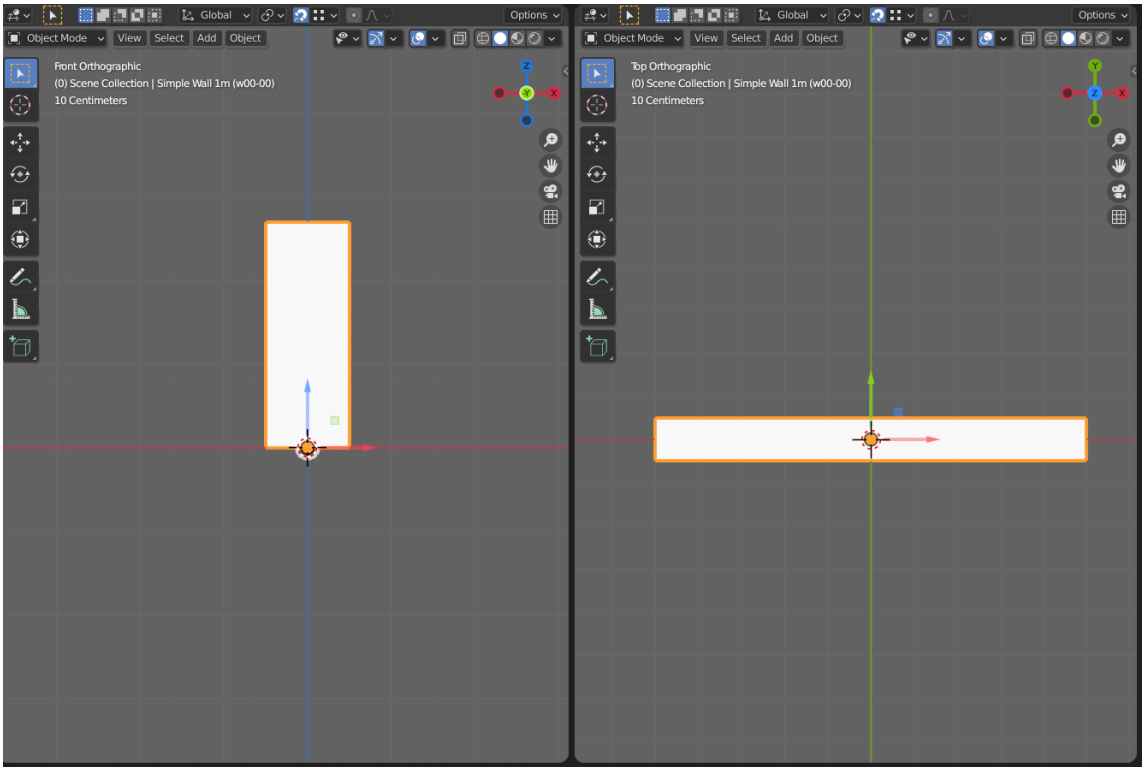


Wall assets creation

To prepare walls to work in MBS please follow next rules:

1. Pivot Point (Origin)

The **default** position of the pivot point (origin) is the **bottom center**. You can change it to achieve special results.



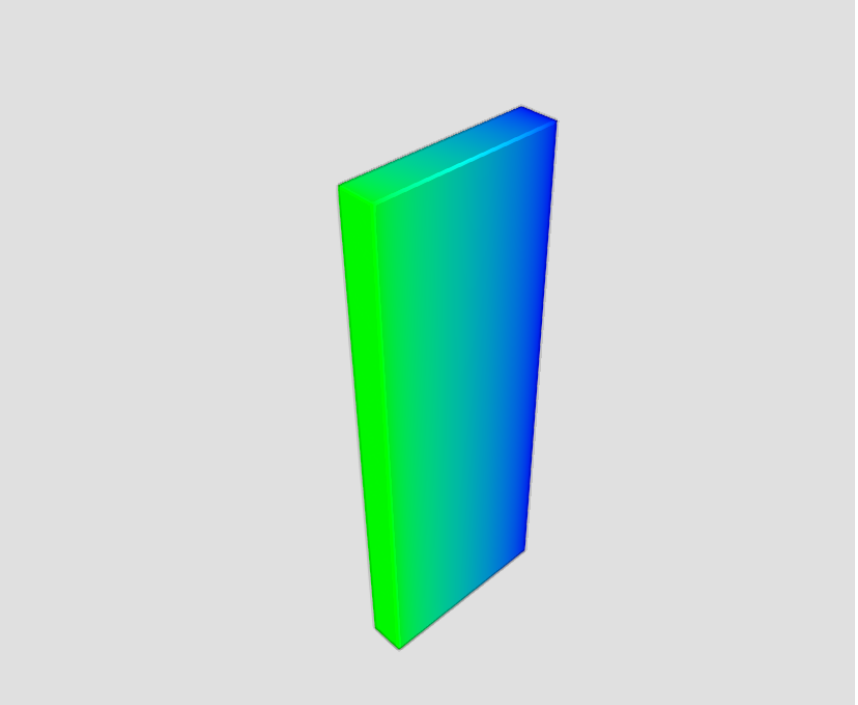
2. Face direction

If you’re creating a model with different geometry or texture on the sides (outer/inner and others) make sure that the **inner side** is facing the **+Z axis** (-Y Blender).

3. Vertex Painting

MBS can shrink or stretch wall ends to connect them to hide the gap that occurs at the point of connection. To understand what vertices to touch MBS uses vertex colors.

So, for both ends of your wall, you need to paint the vertices in two different colors, **one color for one end, and one for another**. For example - the front end will be RGB(255; 0; 0), and the other end will be RGB(0; 0; 255). The key thing is that one end should have only one color, and each vertex of that end should have this color, even small differences like RGB(0; 0; **255**) and RGB(0; 0; **254**) will be treated like different colors, i.e. different sides.



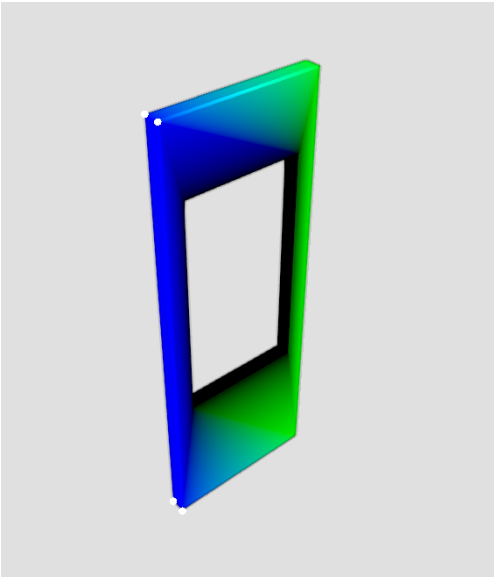
* In the image above you can see a simple 3D model with painted vertices. You can see that in this particular case, the whole model looks painted, but this is only because the model has a small number of vertices and the shader interpolates the colors to align along the surface of the face. In the case of more complicated 3d models, some parts of the model will not be painted i.e. will be white RGB(255; 255; 255).

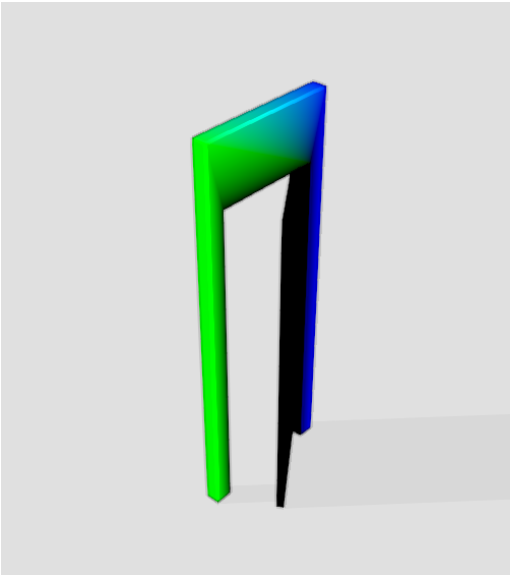
4. Windows and Doors Vertex Painting

Since MBS stretches wall models that are placed under 45º (grid space) stretching doors, windows, and similar things can negatively affect the visual or functional part. To avoid this, there is **no effect color** - black **RGB(0; 0; 0)**.

If your model has parts that shouldn't be modified due to stretching or something else, paint them in black.

If your prefab consists of several separate models such as doors, windows, or any interactive parts, paint in black too.



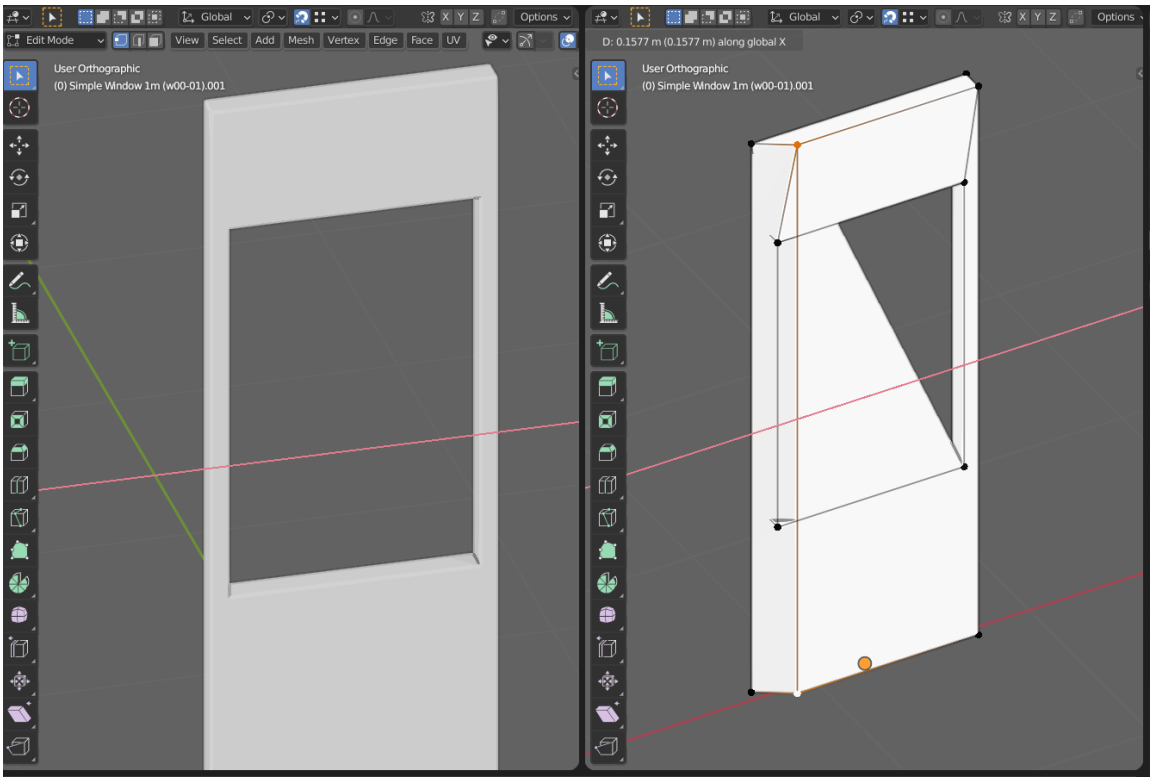


5. **Spacing**

As mentioned earlier, how much the vertices will be displaced depends on the offset of the vertex along the z-axis relative to the pivot point, or, in other words, it depends on the **wall thickness.** This means that **the thicker the wall, the greater the displacement will be.**

When you are creating a modular wall with a window, or some hole, or a doorway, make sure that the wall has enough space from the sides up to this part. So, when MBS will move sides vertices it would not cause overlapping geometry as in the image below.

For example: *in the image below you can see there is a lack of space on the side of the window and if we'll try to move the corner (as MBS will do) we get overlapping geometry issues.*

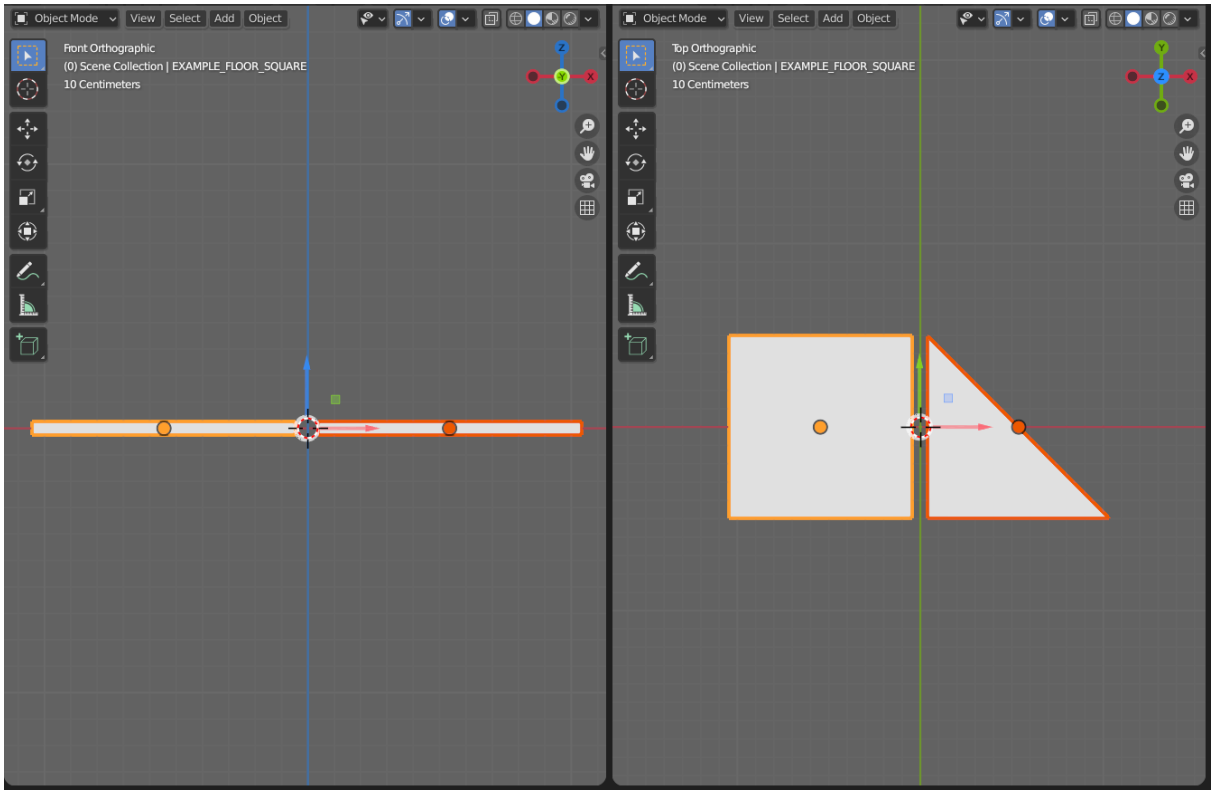


Floor assets creation

To prepare floors to work in MBS please follow the next rules:

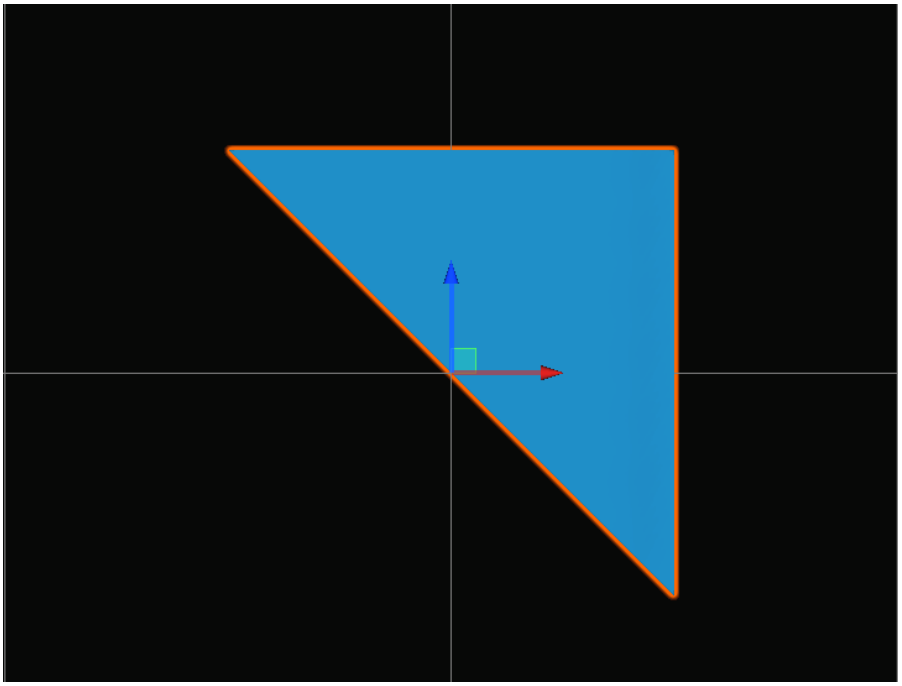
1. Pivot Point (Origin)

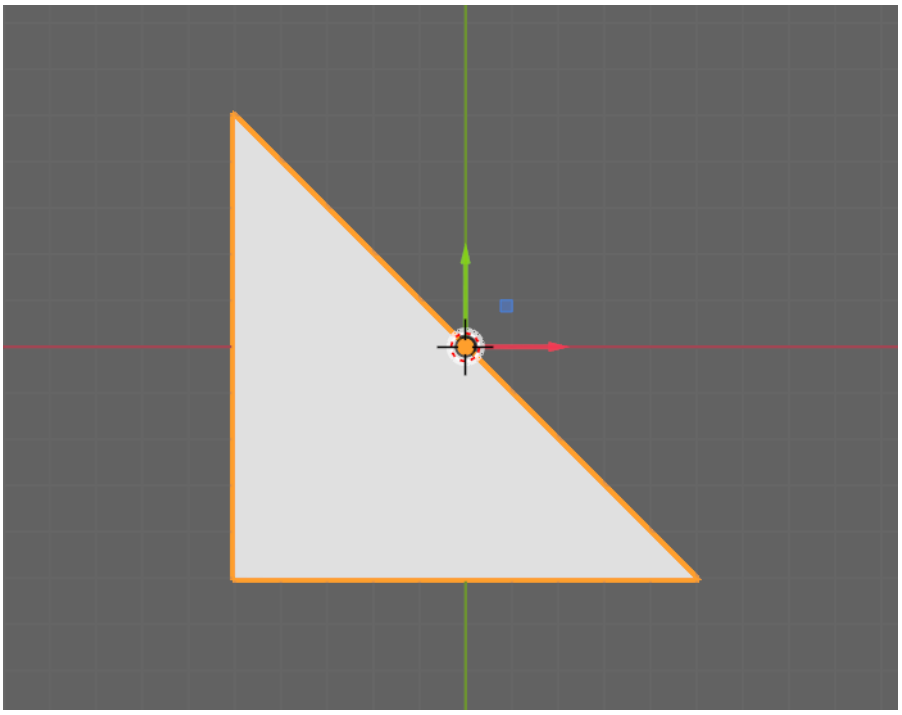
The pivot point of floor tiles should be in the **center** horizontally for **both** square and triangle models. But vertically you can change it to achieve some special results. The best practice is to set it in the middle vertically.



2. Triangle orientation

There is no special setting for the **square** model, but for the **triangular model**, make sure that the filled part of the triangle lies in **+X and +Z** space (-X and -Y Blender).





Decorator assets creation

To prepare decorator assets to work in MBS please follow the next recommendations:

1. Pivot Point (Origin)

The Decorator Tool is the least demanding in terms of pivot points. But even so, it is better to place the pivot point closer to the point of contact with another surface. For example, for a chair, it is better to place the pivot point in the bottom center, for a painting to the center but on the back, where it will be attached to the wall.

From Developer

- If you have question, feel free to send me an email, I will try to help as much as I can.
- Also check my youtube channel, I will publish a video tutorial about assets creation soon.
- I'm not a native English speaker, and to write docs and other things in english I use my own experience in English and Google Translate app, so, if you found some errors or unusual, incorrect useage of language or something that is hard to understand - please inform me about this via email.