Parametric Space Frame Tutorial using PanelingTools Add-On to Grasshopper

Overview

This tutorial shows how to create a parametric space frame based on a curve. While it is possible to create similar definition using standard Grasshopper components, using PanelingTools for GH makes the definition easier to write, read and edit. It also enables better control over dimensions and shape.

Where to find PanelingTools Add-On to Grasshopper

Download, examples and forum is found here: http://www.grasshopper3d.com/group/panelingtools

Step by Step Space Frame Tutorial

1- This is how the final definition looks.
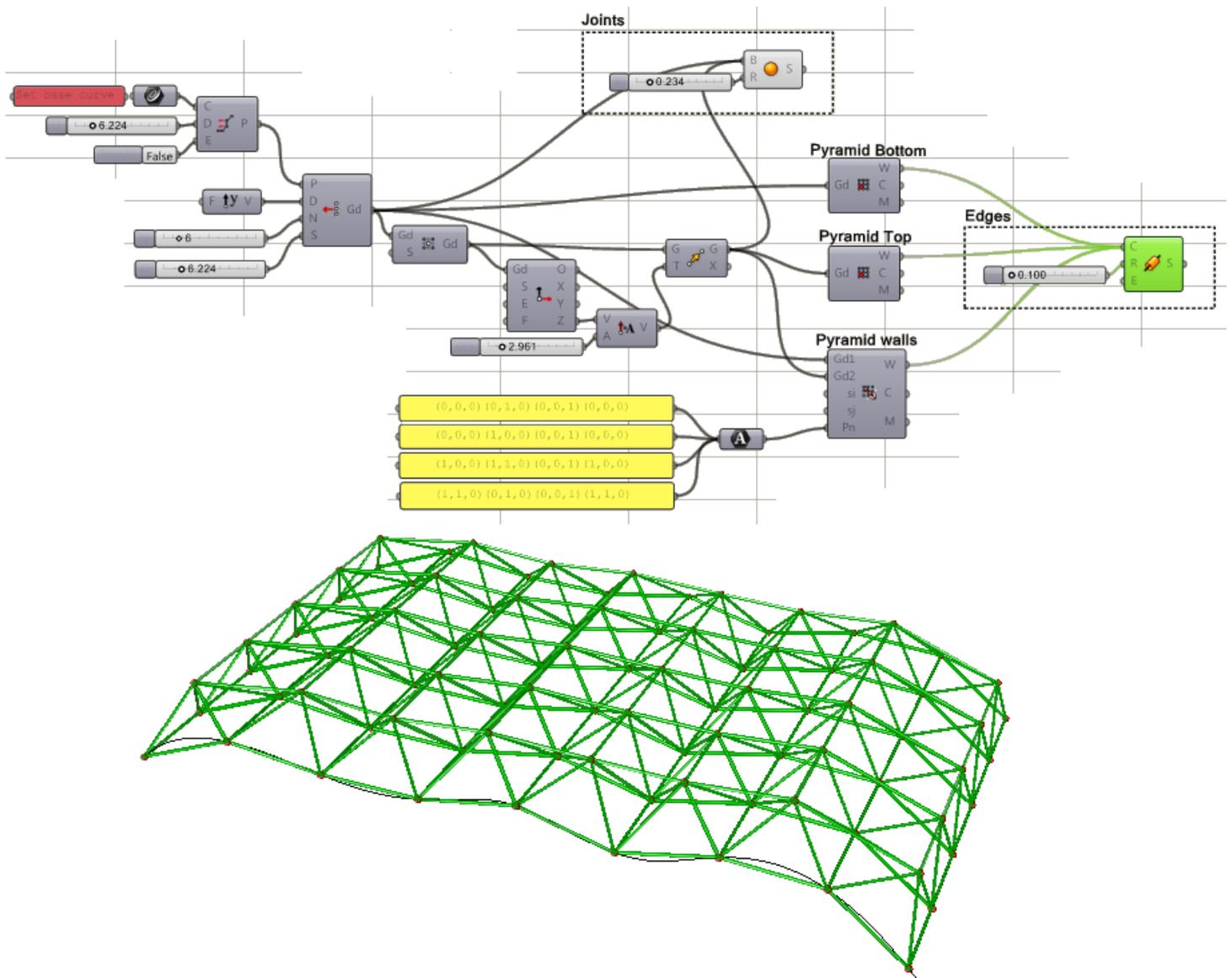
2- First step is to divide a given curve by distance that represents the width of the base cells of the space frame.
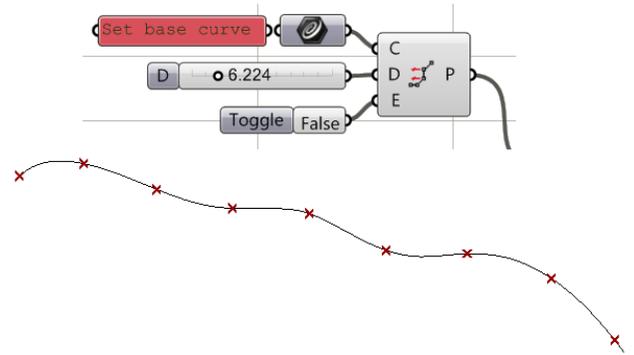
3- Now that the curve is divided, we generate the grid using the **Planar Extrude** grid component under **Grid** tab of the **PanelingTools** menu.

Grid components in PT-GH generate two dimensional grids of points, which are nothing but a simple GH tree structure where each branch contains a list of points or a row in the grid. There are many different ways to defining these points:

a- Directly as planar or polar grid.
b- Extruding curve planar or polar
c- Extract intersections of curves.
d- Use base surface and divide its domain by number, distance or parameter list (for variable distance) using surface uv structure.
e- Divide base surface by distance regardless of its uv structure.
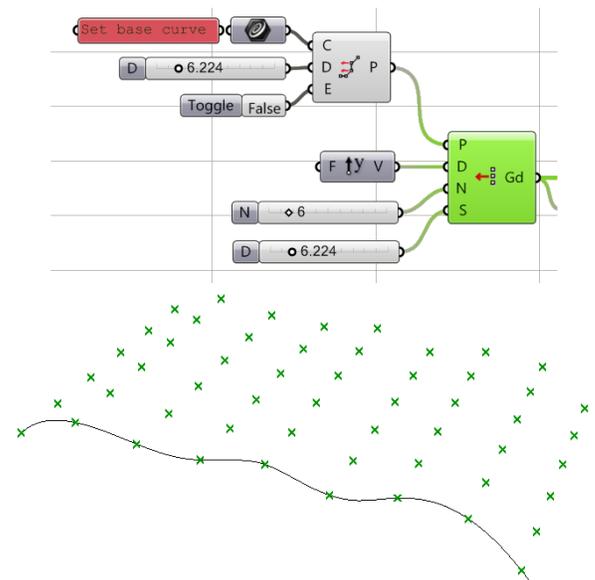
4- Next we need to extract center grid then move in the normal direction of that center grid. There is a center grid component in PT-GH to extract center grid.
In order to move in normal direction, use the coordinate component extracts origin of each grid cell and x, y and z directions.
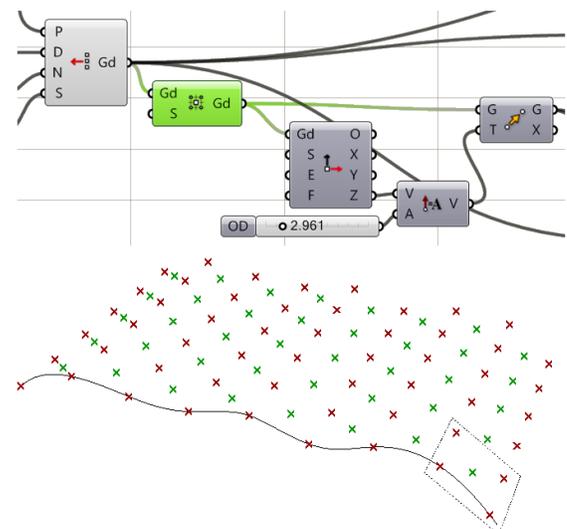
5- Next we create small spheres to mark the joints. Use GH Sphere component and input both the base grid and moved center grid.
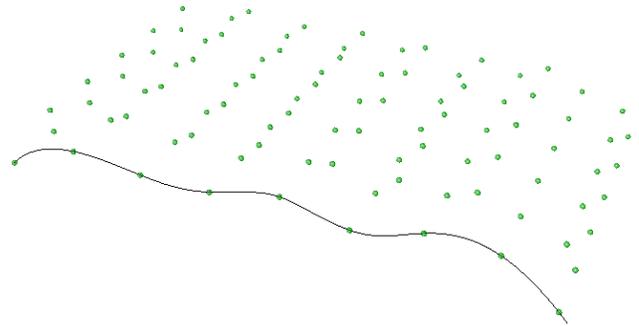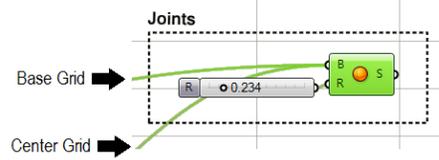
6- Use cellulate component in PT-GH to generate the bottom and top wires.
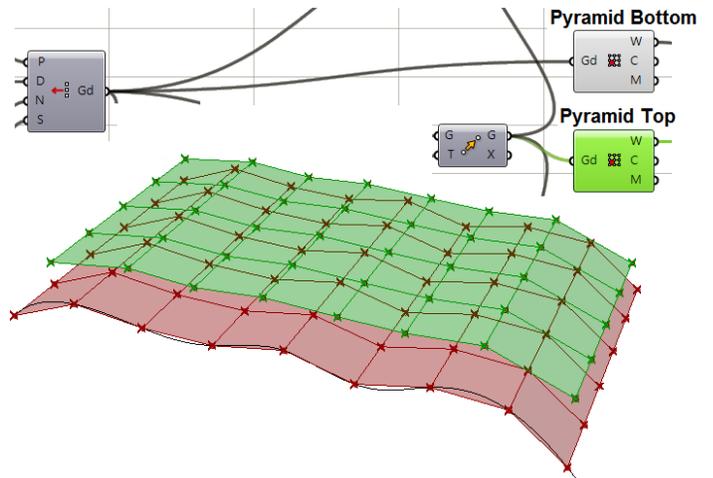
7- Wall wires and faces of the space frame is created with the managed 2D panel component where each face is defined with a string. The string defines indices of grid to connect. These connections are repeated throughout the grid.
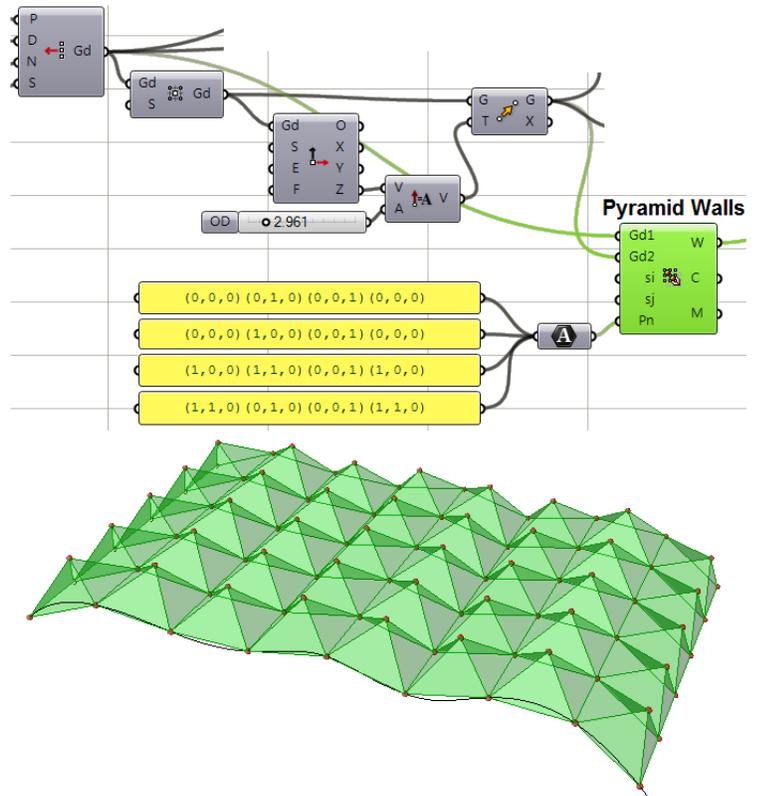
8- Wires from the top, bottom and walls are then used to generate edge pieces of the space frame using cylinder GH component.