Parametric 2D Truss Tutorial using PanelingTools Add-On to Grasshopper

Overview

This tutorial shows how to create a parametric truss that is based on a curve. It is based on David Fano's truss tutorial. The main advantages of using PanelingTools Add-On (PT-GH) over GH standard components are:

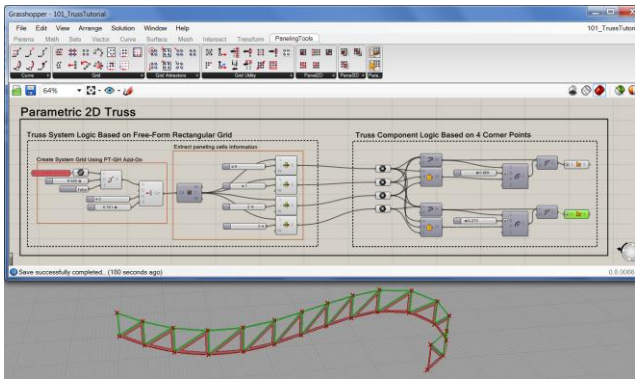
- System logic is easier to understand, put together and edit.
- System logic is more flexible. It is not restricted to surfaces and their iso-curve directions which greatly limit user control over dimensions and orientation of truss components.
- The truss component logic is based on points, rather than surfaces, which is lighter.

Where to find PanelingTools Add-On to Grasshopper

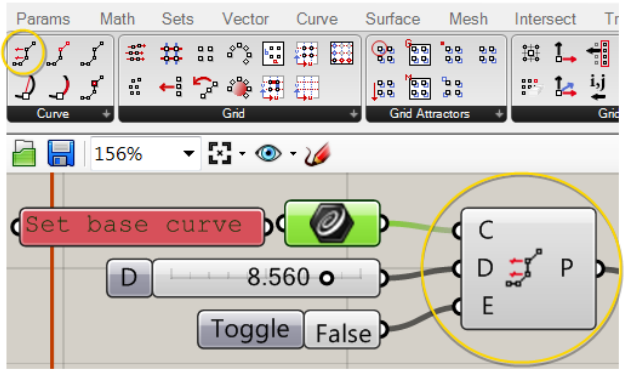
Download, examples and forum is found here: http://www.grasshopper3d.com/group/panelingtools

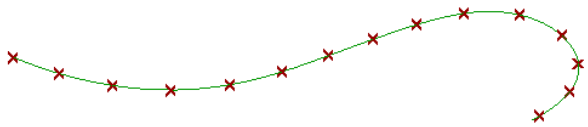
Step by Step Truss Tutorial

1- This is how the final definition looks. The truss component logic uses standard GH components based on four corner points. The system logic defines a rectangular grid of cells using PT-GH as will be illustrated below.



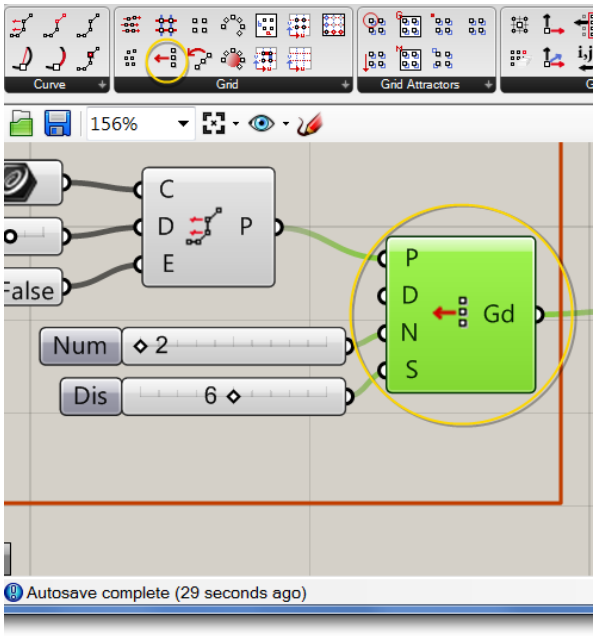
2- To define the system logic, first we need to create a grid. In this case our grid is based on a curve[1]. First step is to create a reference a curve in Rhino, then divide the curve by distance which represents the width of the truss.





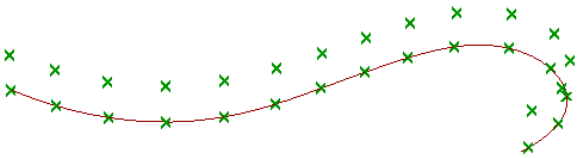
[1] There is a variety of ways to generate the basic grid of cells using grid tab in PT-GH or simply by feeding a tree structure of points using GH standard components. One way to create a tree or grid of points using GH components is to divide series of curves.

3- Now that the curve is divided, we generate the grid using the **Planar Extrude** grid component under **Grid** tab of the **PanelingTools** menu.



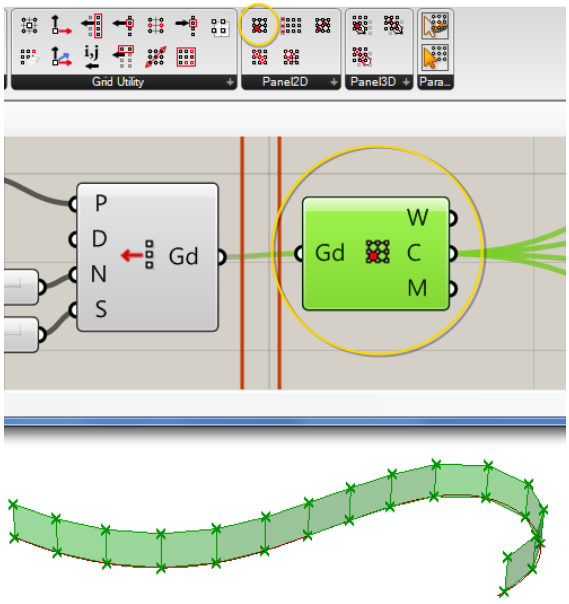
Grid components in PT-GH generate two dimensional grids of points, which are nothing but a simple GH tree structure where each branch contains a list of points or a row in the grid. There are many different ways to defining these points:

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.

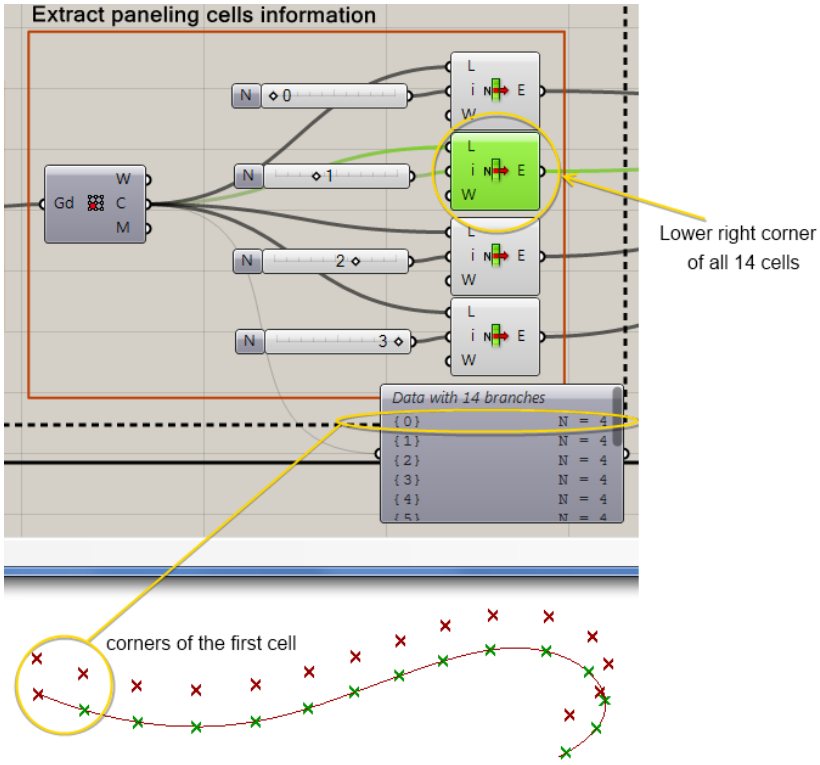


4- Next we need to extract individual cells of the grid. To do that we use the **Cellulite a Grid** component. This component in under Panel2D tab. It outputs three components:

a- **W** (Wires): a list of all edges.
b- **C** (Cells): a list of the four corners of each cell (this is what we need here).
c- **M** (Meshes): a list of mesh faces of all cells.



5- In this case we have 14 cells, each has 4 corners. We need to get a separate list of each corner to feed into our component logic. We used GH list component to separate corners.



6- Create custom component logic that is based on 4 corners and feed system grid or cells corners into the component logic.