

LIVE WEBINAR + Q & A

AN INTRODUCTION TO REVIT ADAPTIVE COMPONENTS

THINK TECHNOLOGY, THINK A2K

The infrastructure, building, mining, construction and manufacturing industries are the cornerstone of our world. Great cities and nations are defined by the vision of architects, engineers, planners, designers and builders to shape our community.

A2K Technologies plays a vital role in helping these industries reach their full potential by delivering complete technology solutions and support services such as;



CONSULTING



EDUCATION



IT MANAGEMENT

WHY ADAPTIVE COMPONENTS?

Added to Revit around 10 years ago.

Designed to solve former limitations of Revit – Moving beyond ‘square’ shapes.

Adaptive Components were born from the massing environment.

Massing still plays an important role in the Adaptive Component workflow.



WHAT ARE ADAPTIVE COMPONENTS?

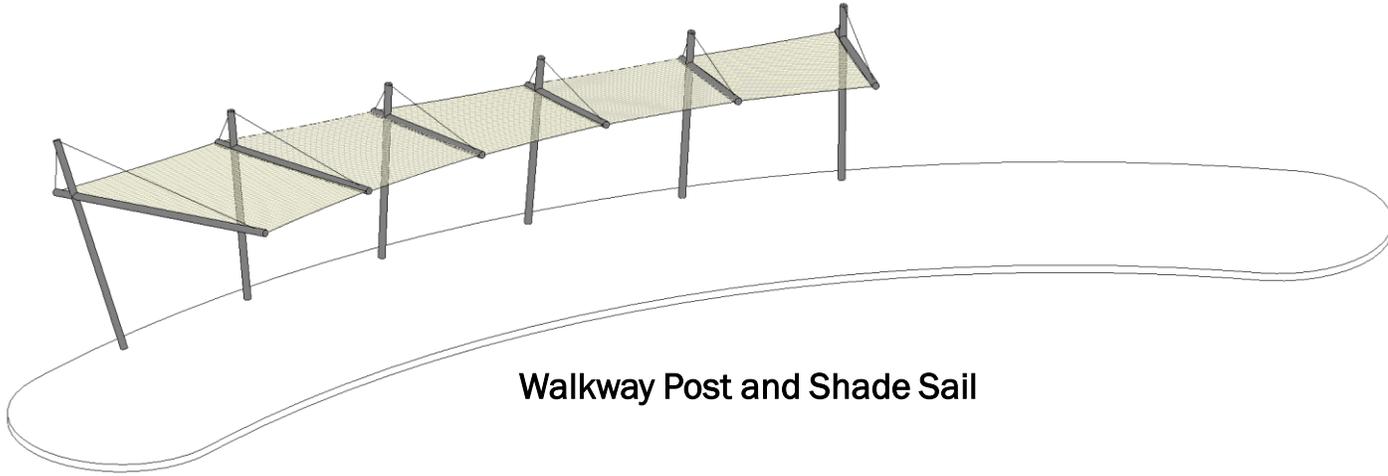


Components that flexibly adapt to many unique contextual conditions.

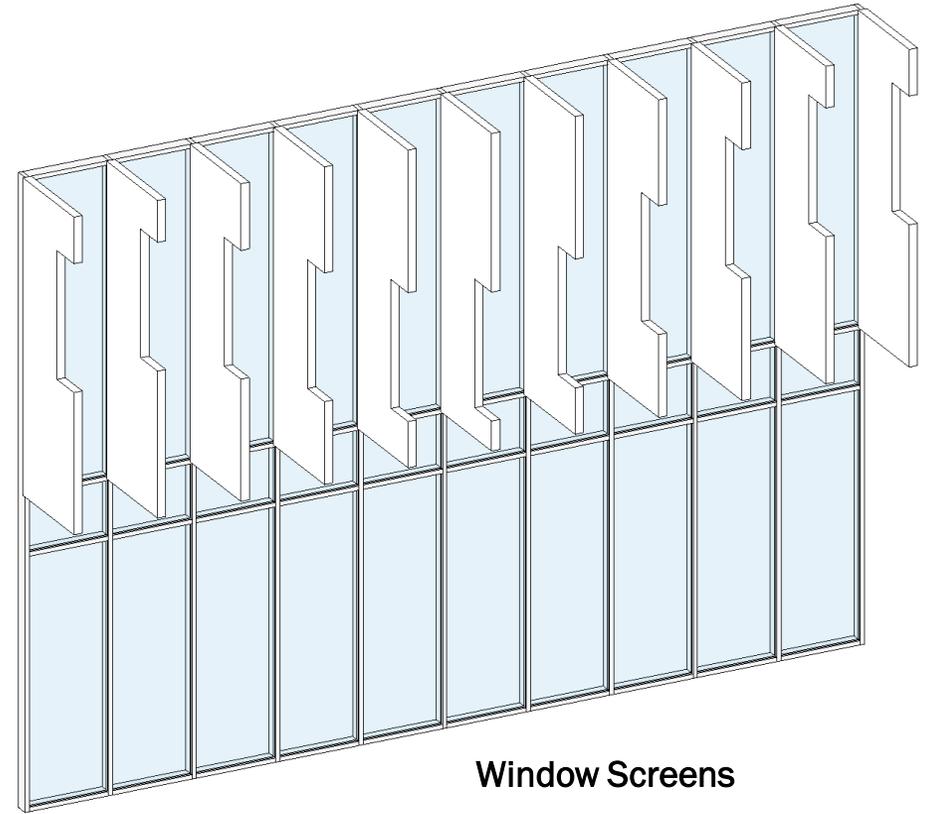
- Autodesk



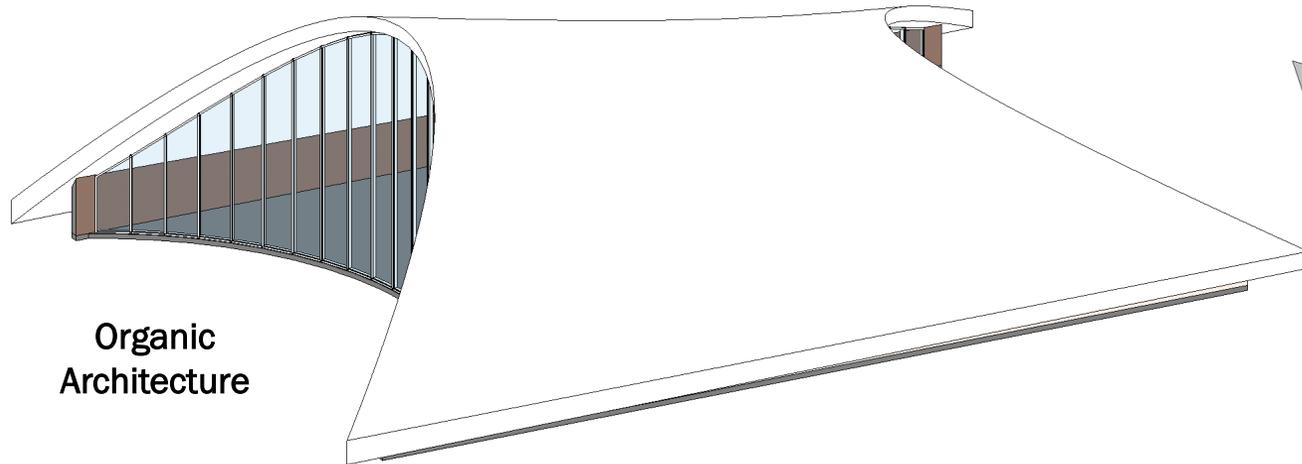
WHAT ARE ADAPTIVE COMPONENTS?



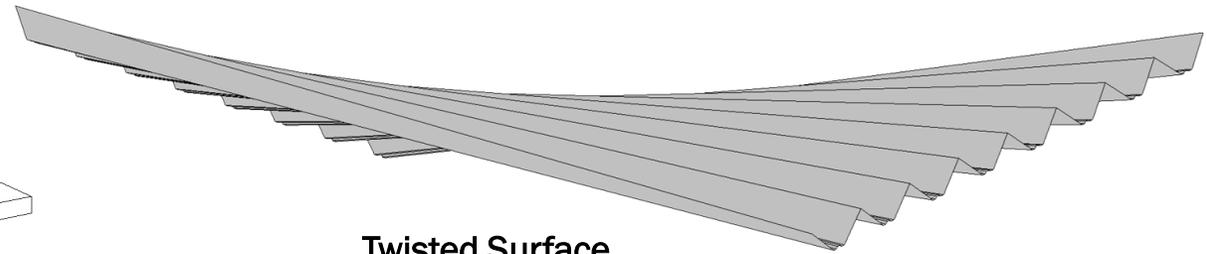
Walkway Post and Shade Sail



Window Screens



Organic Architecture



Twisted Surface

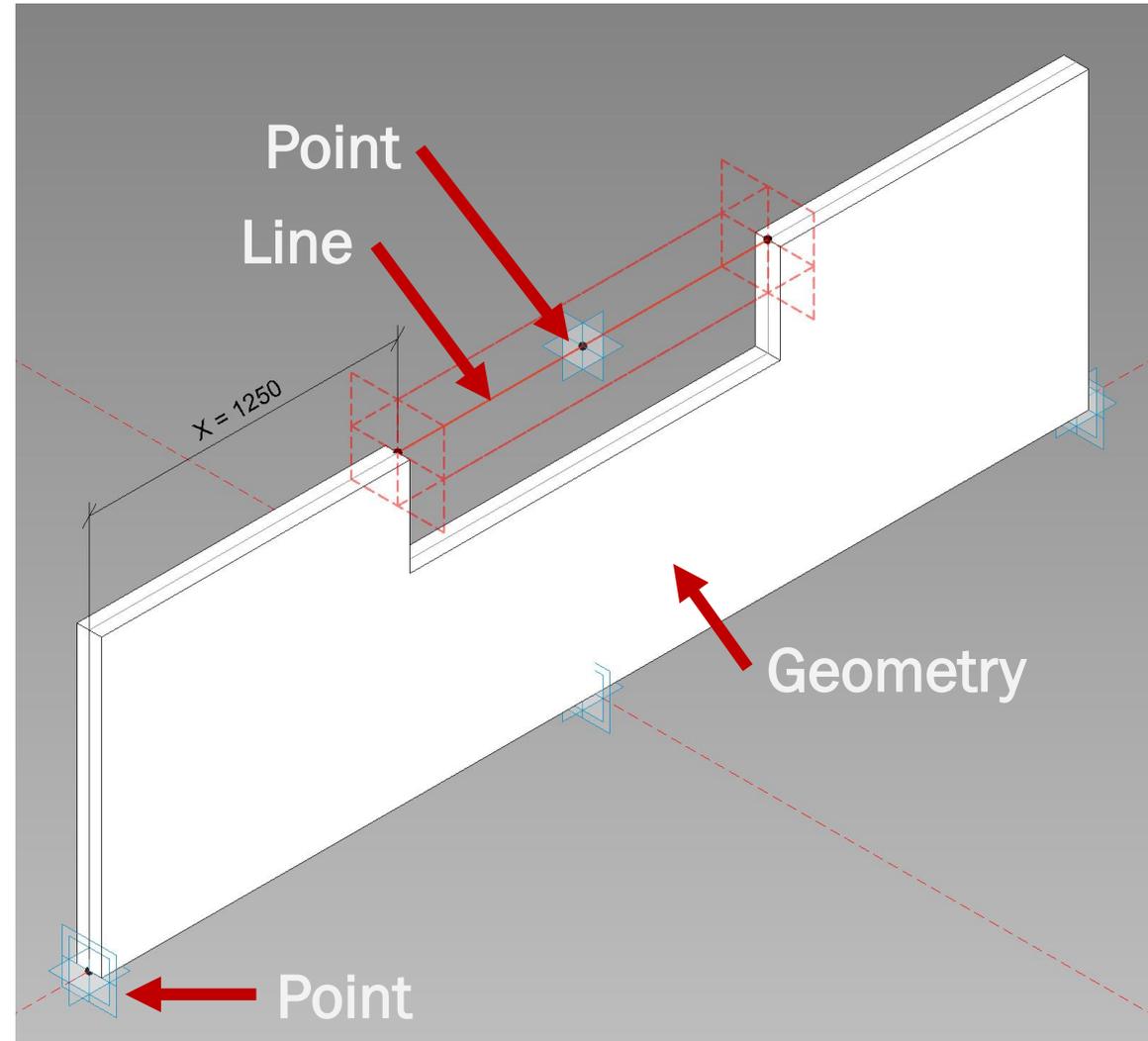


HOW ARE ADAPTIVE COMPONENTS MADE?

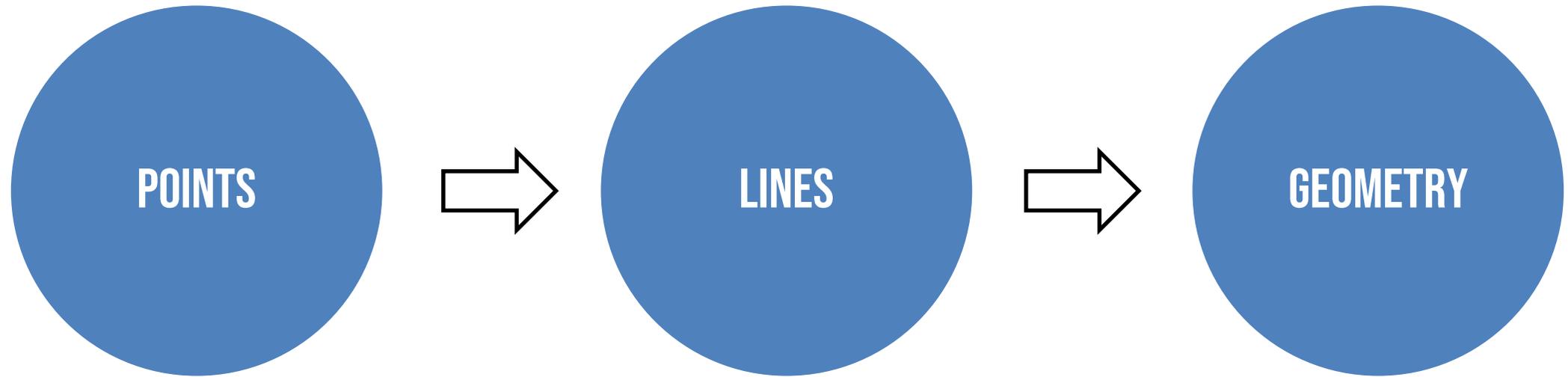
Not made in the same way as a regular family.

Feels more familiar to massing.

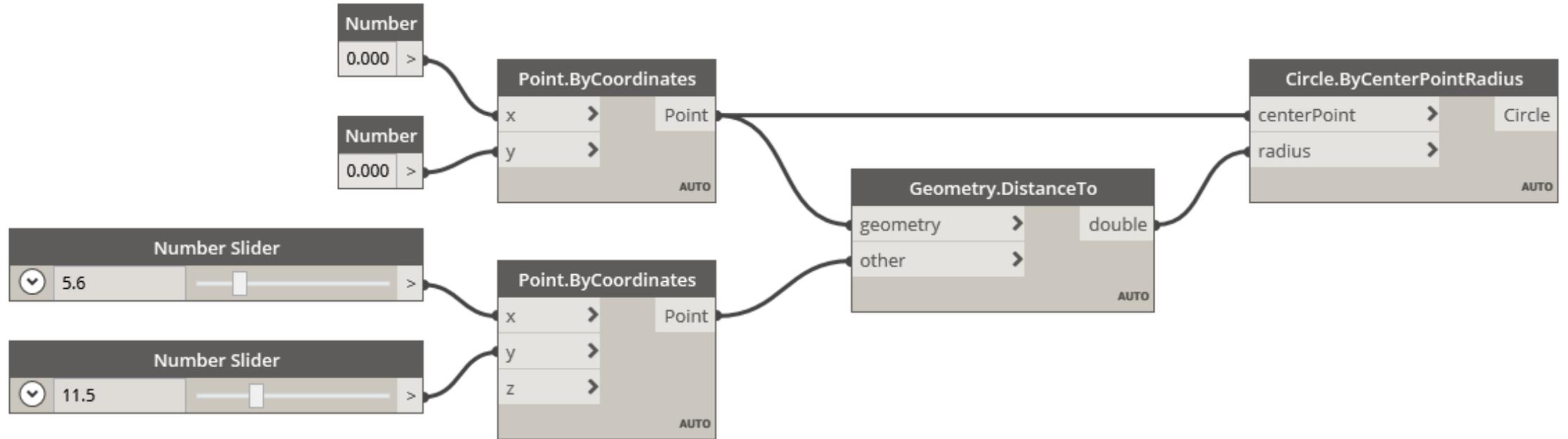
Relies far less on parameters. However, parameters can still be added.



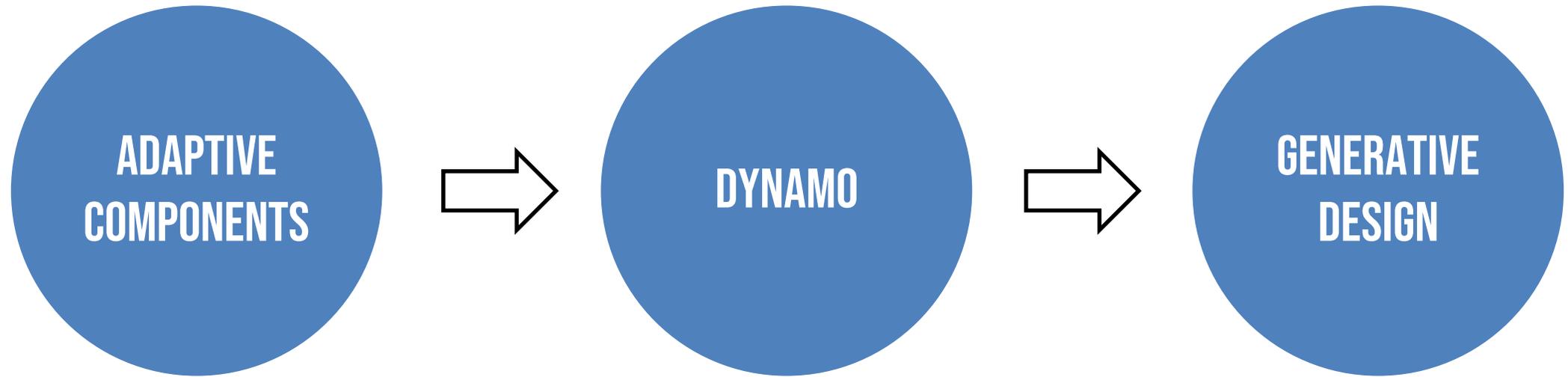
HOW ARE ADAPTIVE COMPONENTS MADE?



PRECURSOR TO DYNAMO



LEADS ONTO GENERATIVE DESIGN



LEADS ONTO GENERATIVE DESIGN

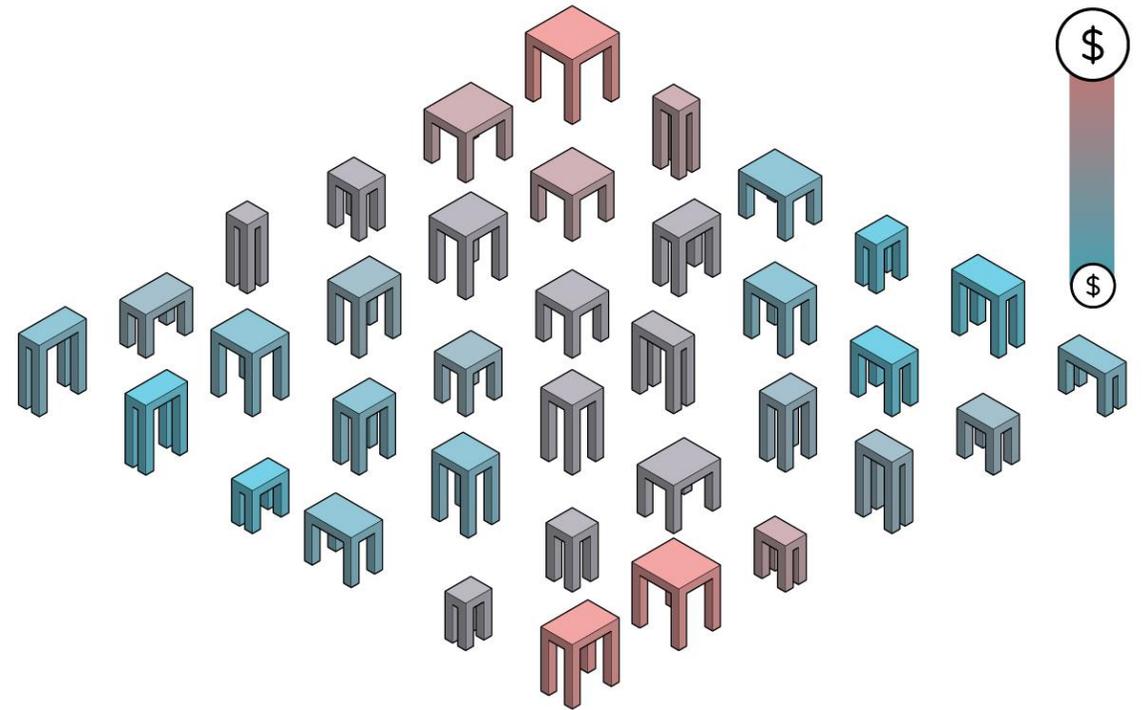
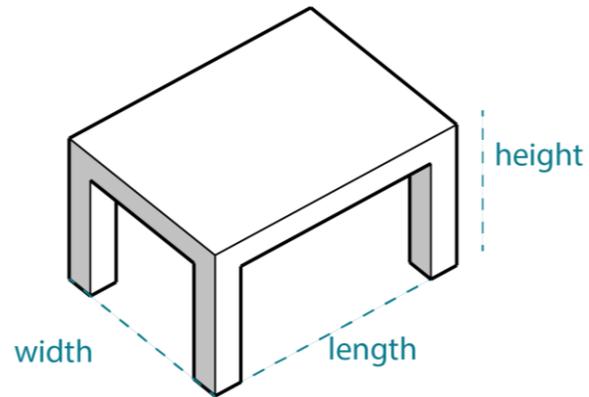
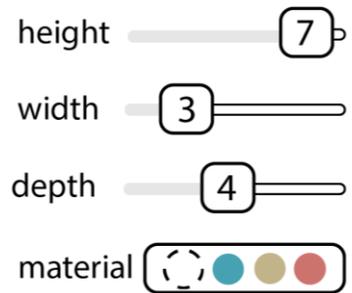
Think about the parallels with a consumer mapping system that optimises travel.

Find the optimal outcome.



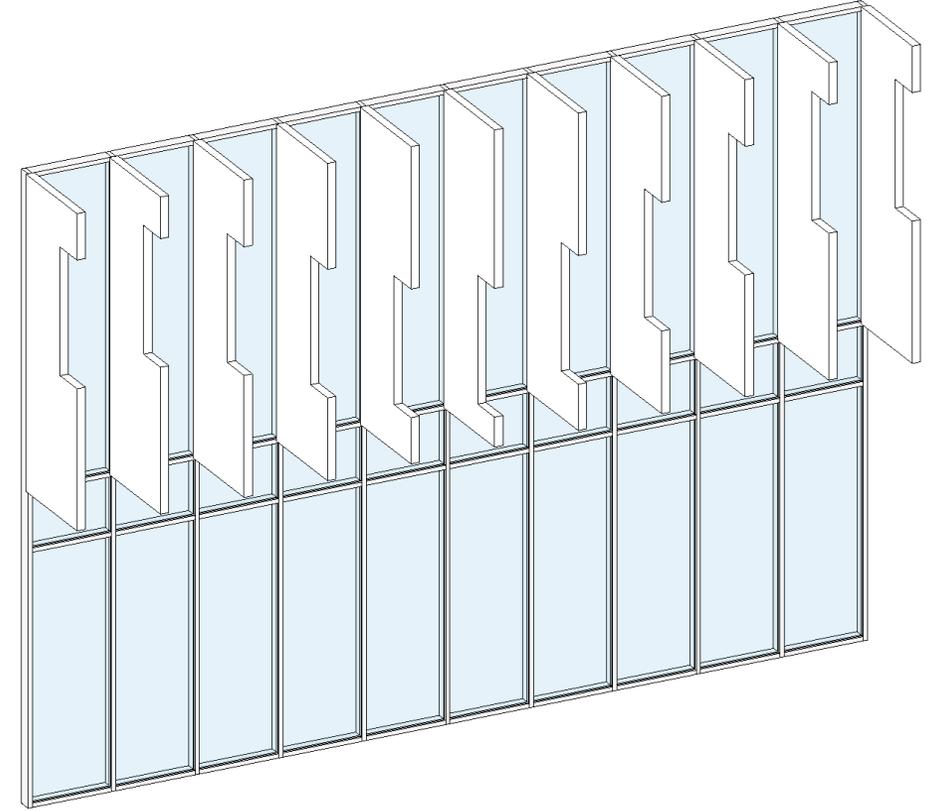
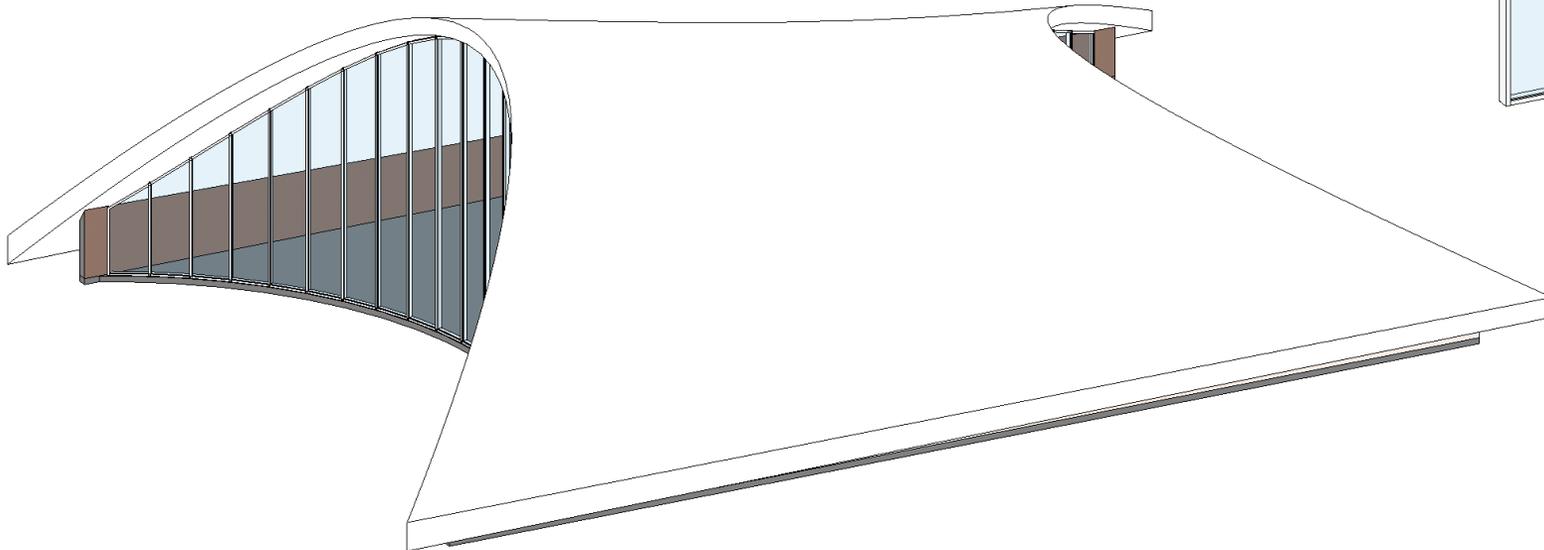
LEADS ONTO GENERATIVE DESIGN

Build parameters into your Adaptive Components.



LEADS ONTO GENERATIVE DESIGN

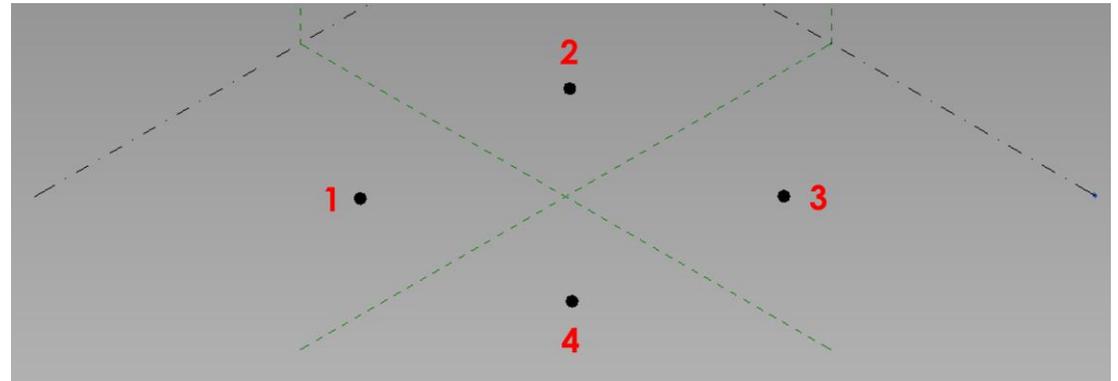
Find the optimal design for these Adaptive Components.



LIVE DEMONSTRATION

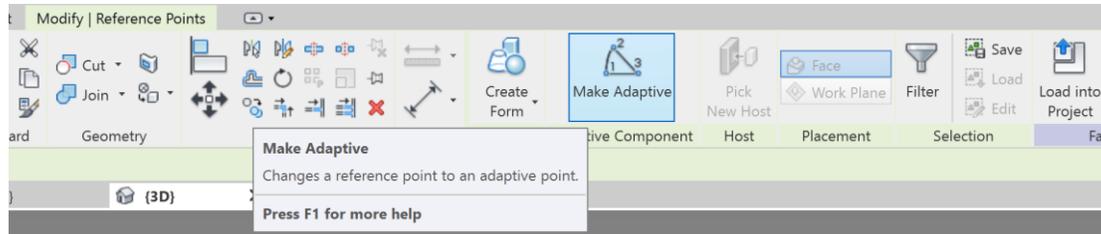
ADAPTIVE COMPONENT (SHADE SAIL)

1. Start a new Adaptive family from, Application Menu > New > Family, then selecting **Metric Generic Model Adaptive.rft** from the list of templates.
2. Go to **Home > Point Element**, roughly place four points in a clockwise direction. Accuracy of Adaptive Points isn't important since their position will change when loaded and placed in a project.



ADAPTIVE COMPONENT (SHADE SAIL)

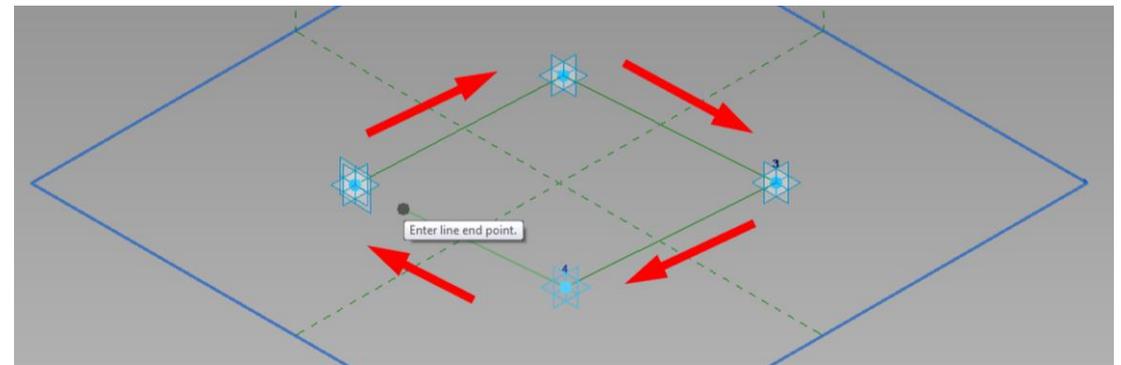
3. Select all four Points, then **Modify | Reference Points > Make Adaptive**



Notice how the Adaptive Points are numbered in the order you placed them.

The order is important, because this is the order in which you will place the points when placing the family in the model. We will test the family later in the exercise.

4. Go to **Home > Reference > Line**, making sure that **Options Bar > 3D Snapping** is checked, and **Options Bar > Make surface from closed loops** is unchecked. Join all four Adaptive Points with the Reference Lines so they form a closed loop.

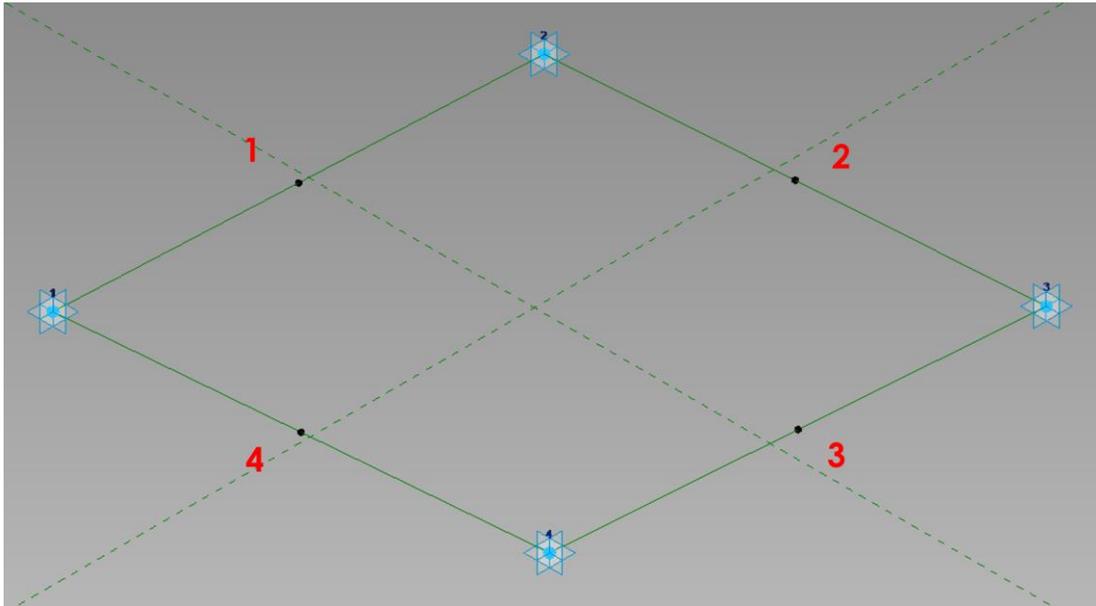


Using the 3D Snapping option makes the ends of the Reference Lines stay connected to the Adaptive Points.

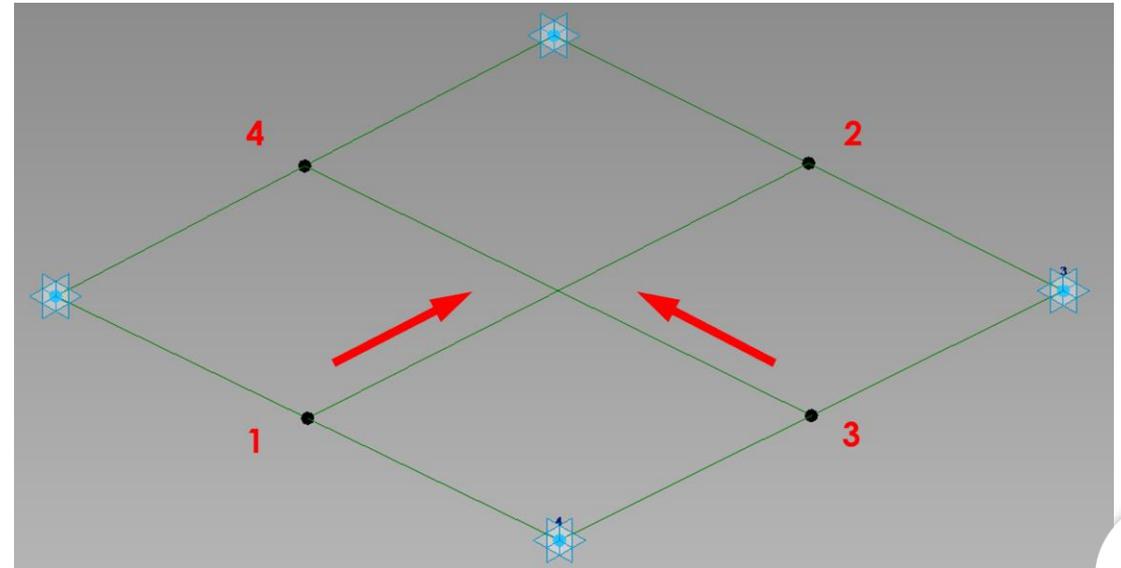


ADAPTIVE COMPONENT (SHADE SAIL)

5. Go to **Home > Point Element**, then place a point at the Midpoint of all four Reference Lines.



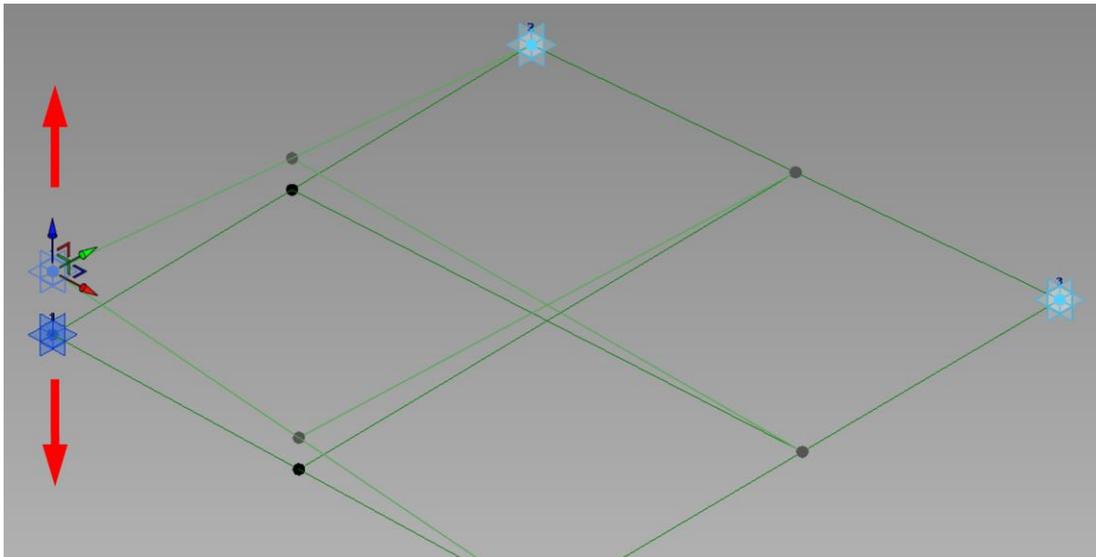
6. Go to **Home > Reference > Line**, connect a Point on one side of the perimeter with the Point on the opposing side, press ESC once, then connect the points in the other direction so that the new Reference Lines cross in the middle.



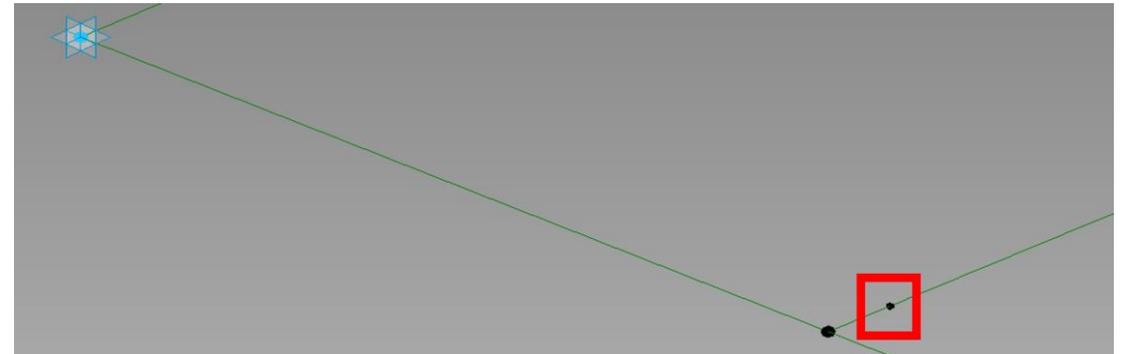
ADAPTIVE COMPONENT (SHADE SAIL)

7. At this point it would be wise to flex the framework. Select one of the Adaptive Points and drag it up/down.

Notice how the Reference Lines which are attached flex with it.



8. Now Save the family as **ShadeSail.rfa**.
9. Go to **Home > Point Element**, place a point towards the ends (not at the ends) of each of the two new Reference Lines.

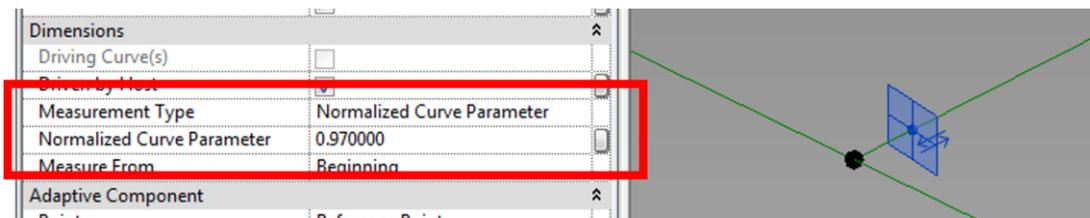


ADAPTIVE COMPONENT (SHADE SAIL)

10. Select one of these points and look at the Properties. Notice the parameters **Measurement Type** and **Normalized Curve Parameter**.

Both of these parameters work together to drive the distance at which the point is located along the length of the Reference Line.

The **Normalized Curve Parameter** value is between 0 and 1, in other words a percentage. We will now refer to these new Reference Points as *curve points*.



Set the **Normalize Curve Parameter** value of each of the curve points to either **0.05** or **0.95**, which-ever is the closest.

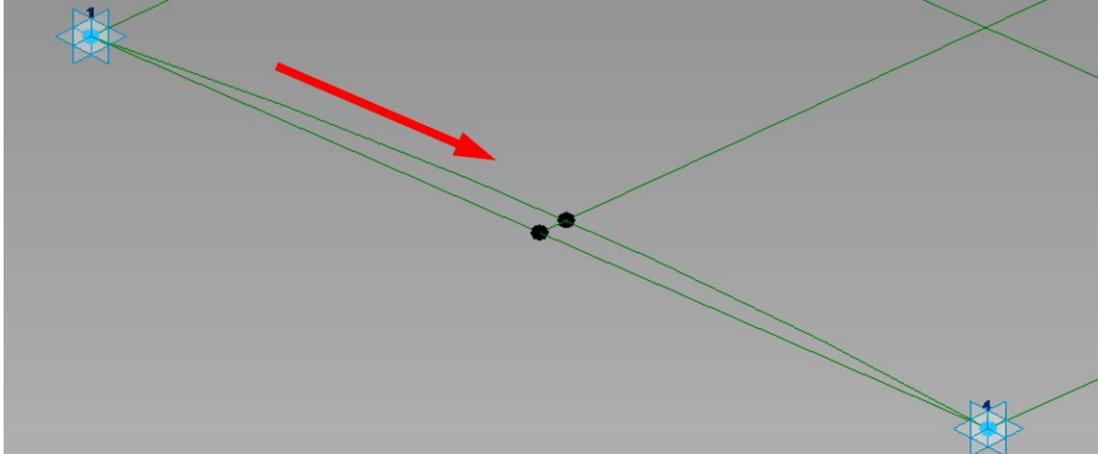
Flex the framework again and notice how the curve points change location on the Reference Lines, i.e. the shorter the Reference Line, the closer to the end the curve points are located.

Also notice the behaviour of the points we placed at the midpoint of the perimeter Reference Lines. They always remain at the midpoint.



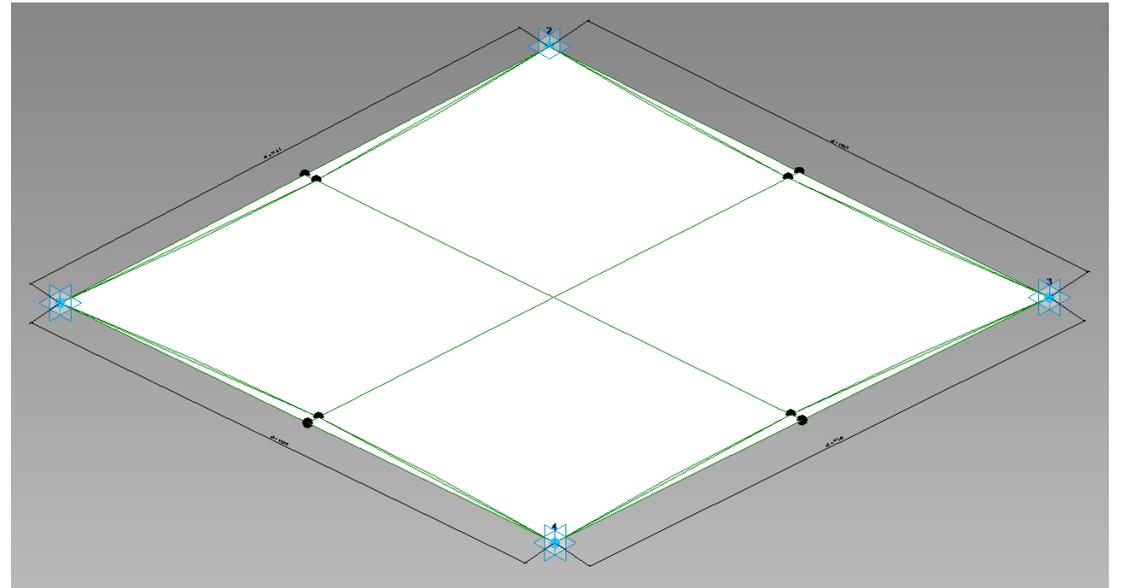
ADAPTIVE COMPONENT (SHADE SAIL)

11. Go to **Home > Reference > Spline Through Points**, then draw the spline from one Adaptive Point, through the curve point, then to a second Adaptive Point. After the second Adaptive Point, hit ESC to cancel the spline.



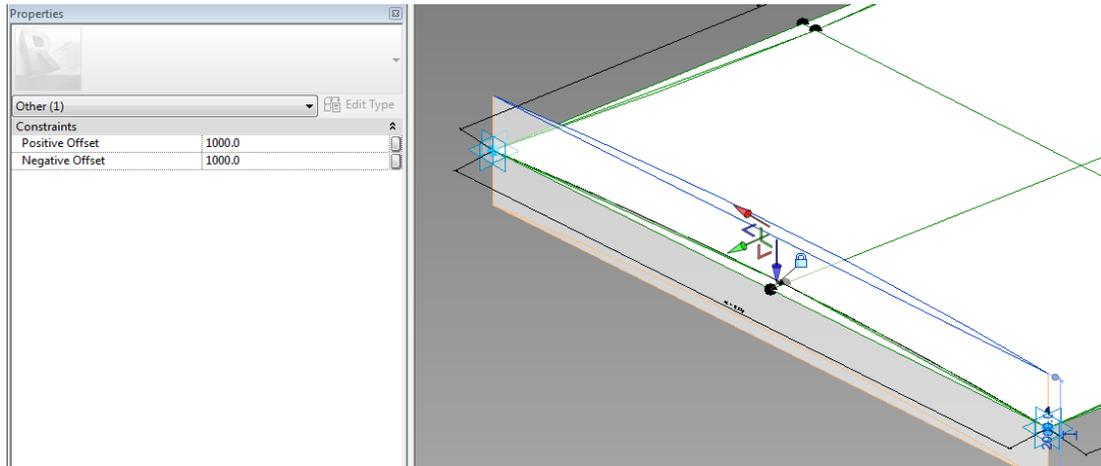
Do the same process for the remaining three sides. Note that you must press ESC after each Reference Line that you model.

12. Save the family.
13. Select the four perimeter Reference Lines, then **Modify | Reference Lines > Create Form > Solid Form**, then select **Surface**.

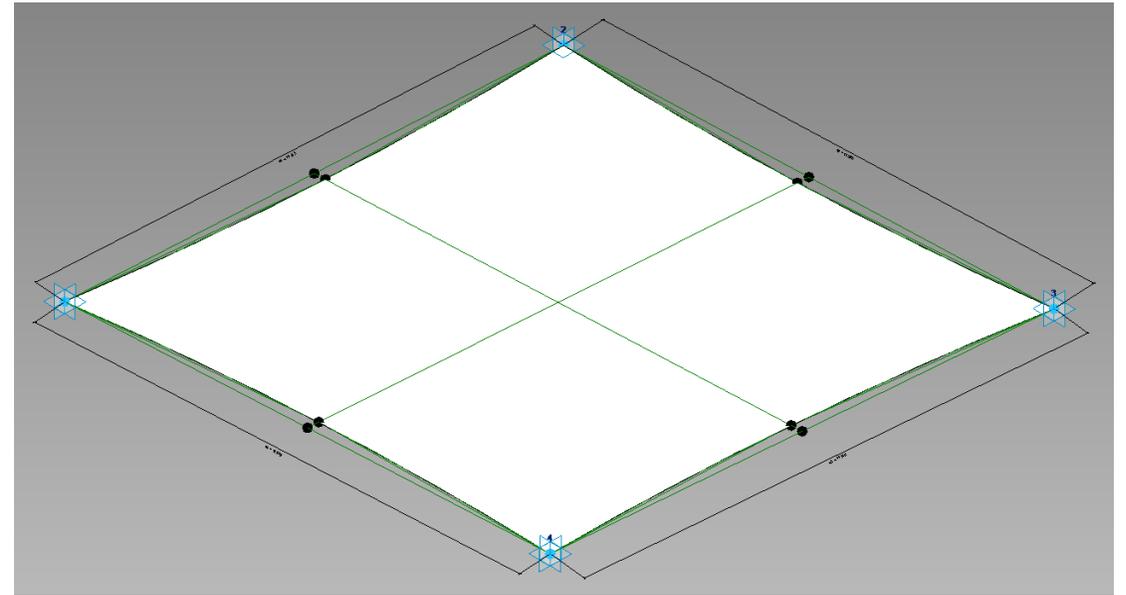


ADAPTIVE COMPONENT (SHADE SAIL)

14. On one side, select the perimeter Reference Line and the curved Reference Line, then **Modify | Reference Lines > Create Form > Void Form**, then select **Solid**, then immediately in the Properties set both the **Positive Offset** and **Negative Offset** to **1000**.



Repeat for the remaining three sides.

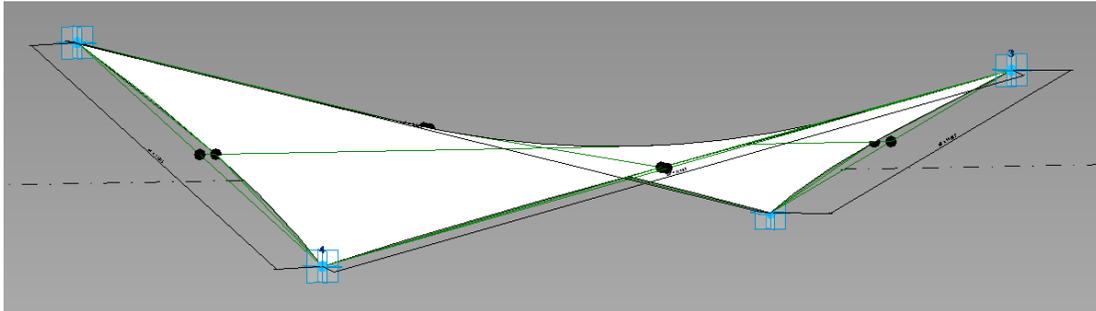


Sometimes the voids will not cut, in which case use **Modify > Cut Geometry** on the solid and the void.



ADAPTIVE COMPONENT (SHADE SAIL)

15. Flex the model by selecting one or more of the Adaptive Points and dragging them up/down.



16. Save and Close the family.

WRAP UP - BASIC PRINCIPLES

1. Sketch out what you want to achieve – Plan!
2. Add control Reference Points, Reference Lines and Parameters **first**, then generate the modelled geometry - Like you would with a regular family.
3. You can achieve most of your work in 3D.
4. Control Reference Points from other Points by using the ‘Offset’ parameter.
5. Set the correct Work Plane.
6. Take advantage of ‘Spline Through Points’.
7. Keep an eye on the ‘3D Snapping’ option.
8. Choose carefully between Reference Lines and Model Lines.





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