



Line Patterning Along a Curve

Revit

Guide by: Dennis Collin

Introduction

A common question often asked is, 'is it possible to draw a line that has a complex line type pattern such as text, or another complex symbol like AutoCAD?' The usual answer is that it is possible, but it is not an easy thing to show in a typical new user's course. However, once users develop a certain skill with Revit, several workflows become apparent, especially with the use of families, nested and adaptive components. This concept is what is used to get an annotation (or any family) to follow a curve or spline element and get a patterned line output like user's legacy CAD program. The process is outlined here on a simple diagram. Using a nested annotation family in an adaptive component can provide a patterned line tool.

Process Diagram

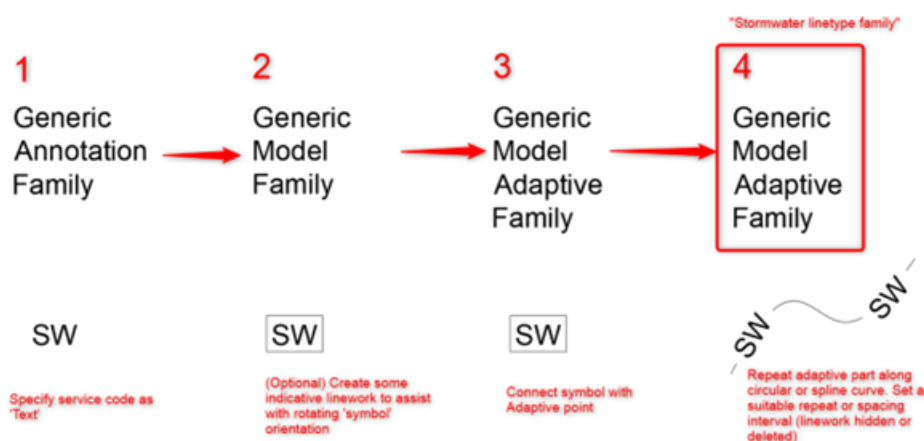


Fig 1. Creating a curved line with repeated symbols requires using nested families.

Stage 1

Firstly, a Generic annotation component needs to be created, this will form the initial line type pattern symbol. As with any annotation symbol it will resize according to view scale.

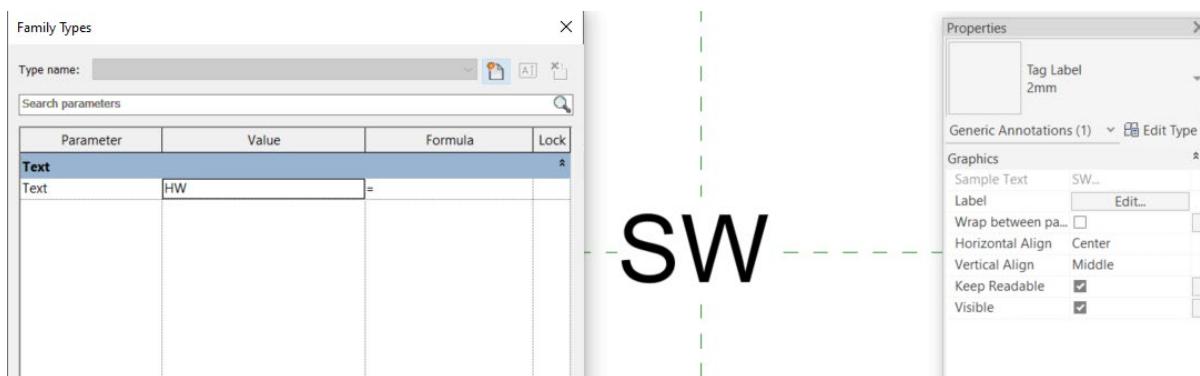
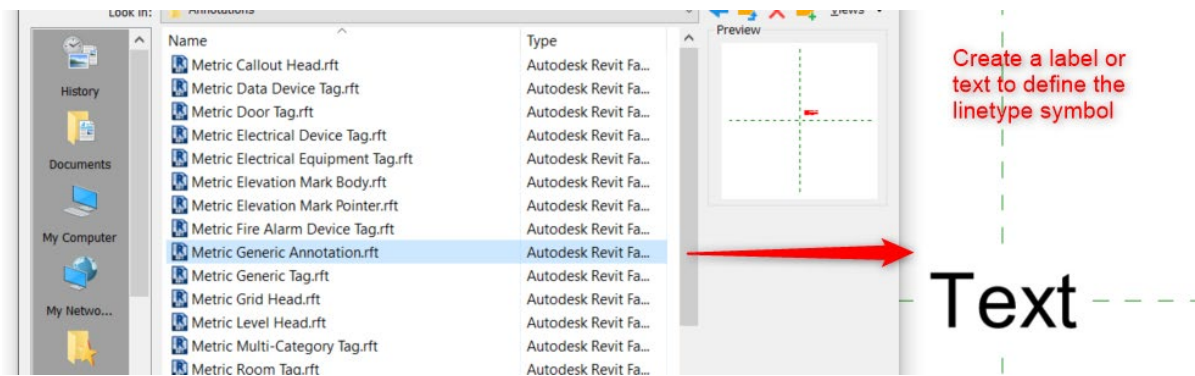


Fig. 2. Creating a generic annotation family

Create a label, and add a new parameter called 'Text', of the type category. Ensure the label is set to kept readable so that the 'line type' is always right reading.

This family can then be saved as the base annotation family. (Stage 1, Figure 1).

STAGE 2

Create a new Generic Model family using the standard template, then load the generic annotation label into the new generic model family.

It may be beneficial drawing some model lines to help identify the orientation of the element in later stages. These lines can be placed into a suitable sub-category to be turned off once loaded into a project. Ensure the family is set as shared and untick the keep vertical option to aid in the later rotation process.

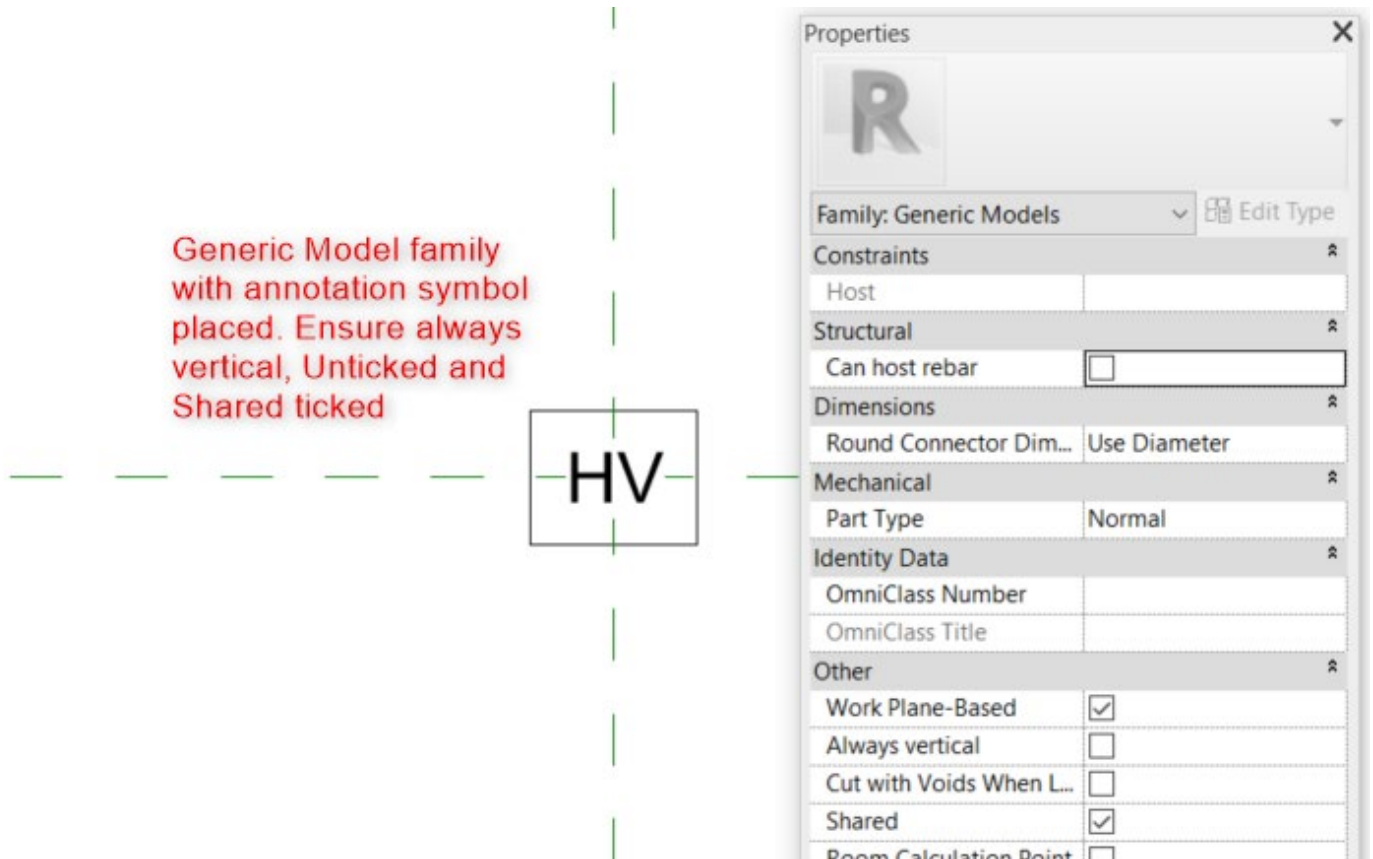


Fig 2. Generic annotation family loaded into a generic model component family.

The second family is then saved, ready to be placed into a Generic Model Adaptive component family. (Stage 3)

STAGE 3

Create a new family using the Generic Model Adaptive Component template.

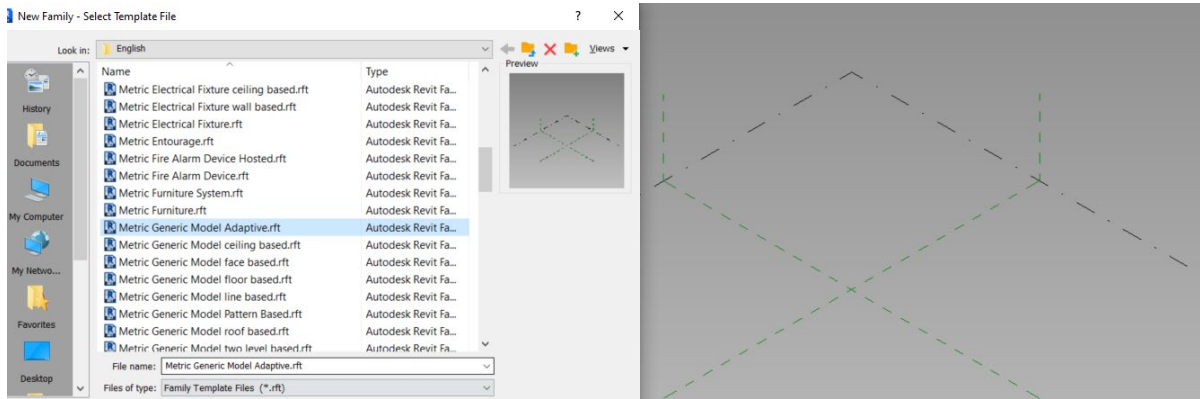
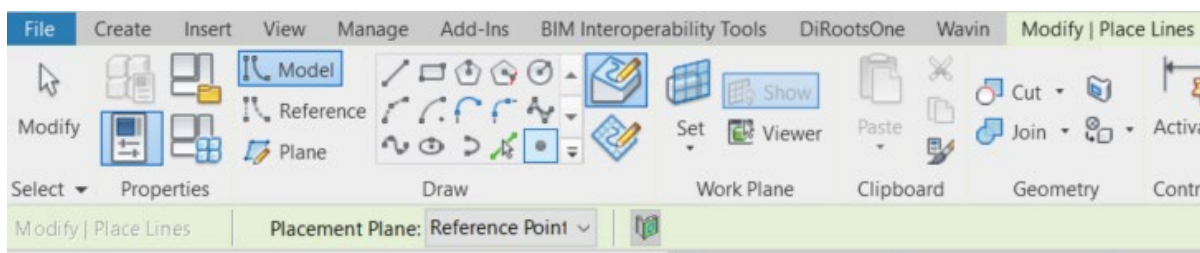


Fig 3. Creating an adaptive component from the standard template list.

In this family create an adaptive point within the 3D canvas.



Select this point and ensure its orientation properties are set to Global Z then host XY. This will ensure the element will position correctly when ultimately placed on a construction curve.

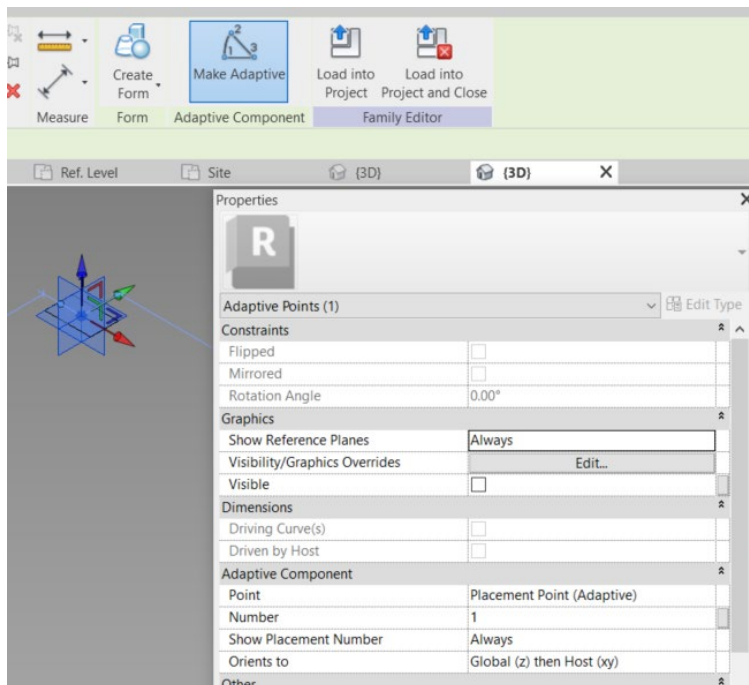


Fig 4. Creating and configuring the adaptive point

In the same family, create a second non-adaptive point snapping to the Adaptive points horizontal work plane.

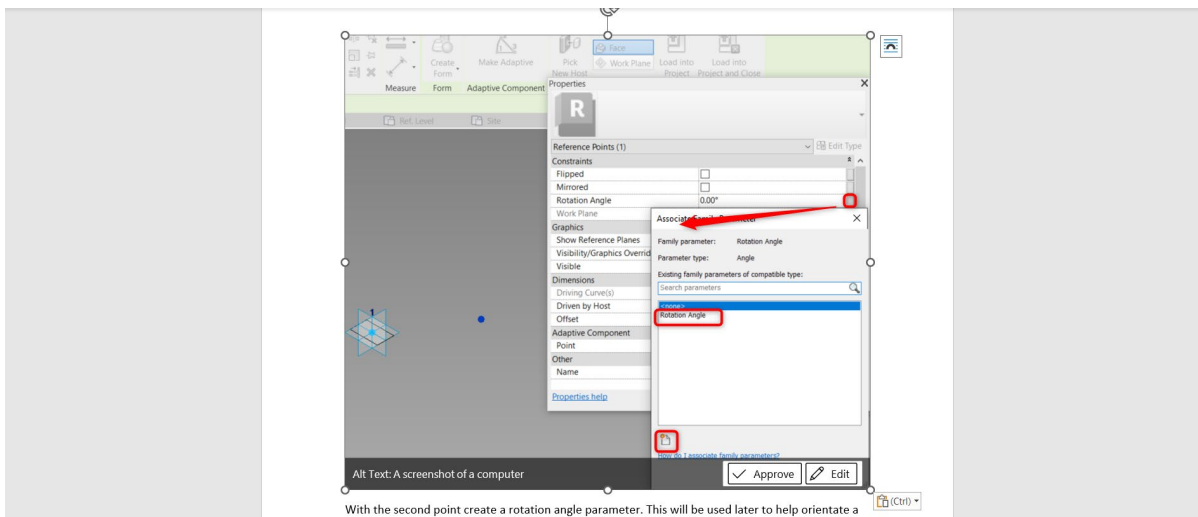


Fig 5. Adaptive part helps to orientate the annotation to the curve in Family #4.

With the second point, create a rotation angle parameter. This will be used later to help orientate a nested family.

The next step is to load in the nested symbol family (the faced based generic model family – No.2) into the Adaptive part family (No.3). Set the active workplace to the adaptive point and ensure that the family is snapped to the second point (the one with the rotation parameter).

To check everything is working at this point, adjust the rotation parameter driving the point and if the nested family has been placed correctly, the family should rotate with the reference point as per the animation below:

<INSERT ROTATING GIF HERE!>

Fig 6. Adaptive Part Rotating

If everything works up to this point, well done! The hard part has been accomplished.

Once this step has been completed, save the family with a suitable name. (Stage 3, Fig. 1).

Stage 4

Create another family using the generic model adaptive template. This will be the fourth (and final!) family.

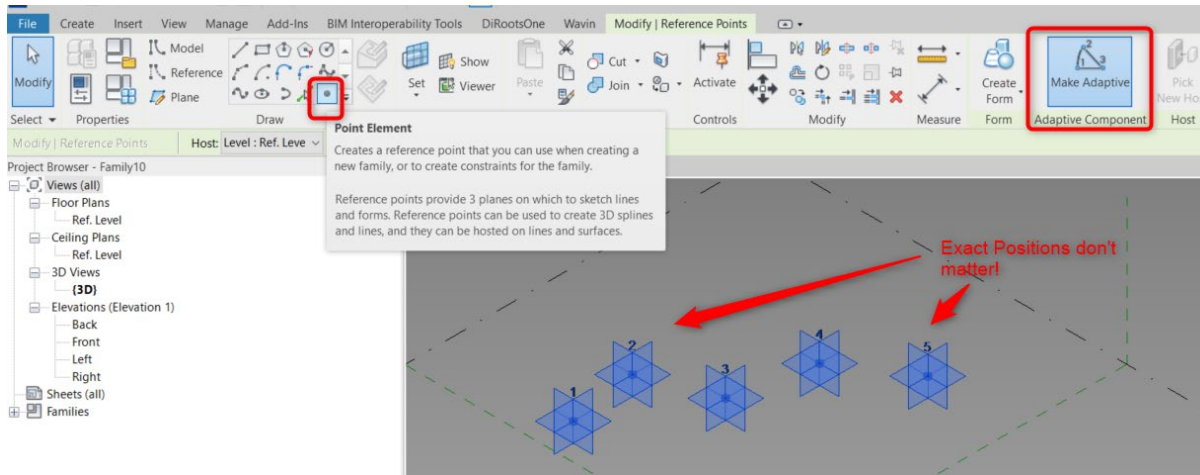


Fig 6. Placing Adaptive points in the main adaptive family (#4)

Create a sequence of points, in this spline example I have created 5 adaptive points, but if producing a simple circular curve arc 3 adaptive points will be sufficient.

From the draw panel create a connecting spline entity snapping to the adaptive points.

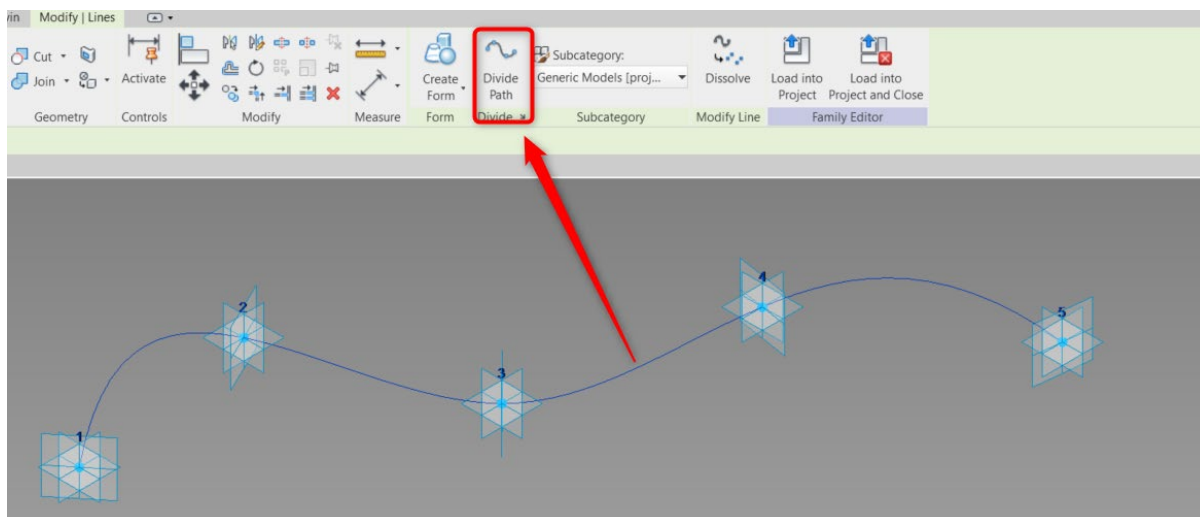


Fig 7. Drawing a Spline entity and dividing the path

Once the curve is drawn, select it and choose the divide path option. Change division options within the property's palette. Like all settings it can be made into a parameter. For the distribution of symbols, we will stick with a simple number. This will control the number of symbols along the curve.

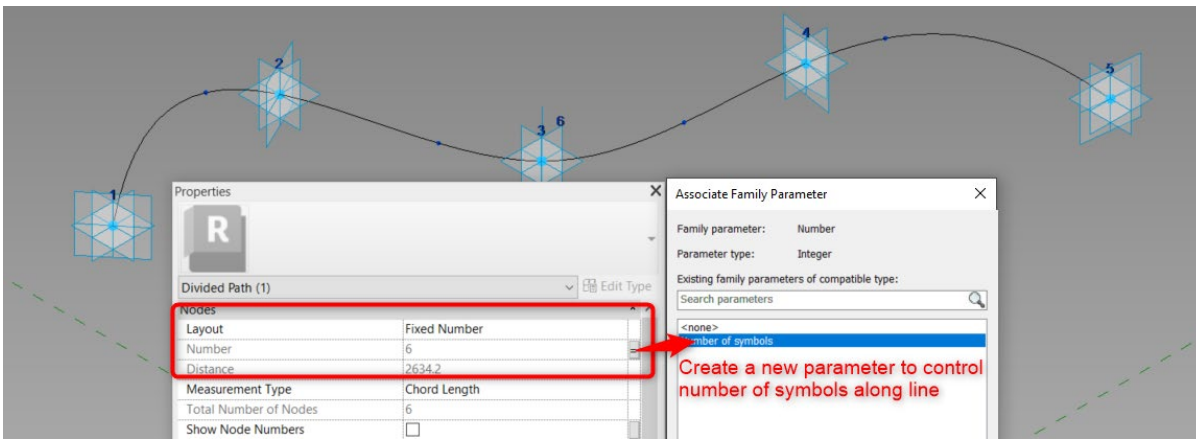


Fig 8. Assigning a parameter to the divided curve

We can now load and place our adaptive part (Family No.3) into this family.

Place the family onto the first point using 'Place on face' option. The part should snap and orient to the curve.

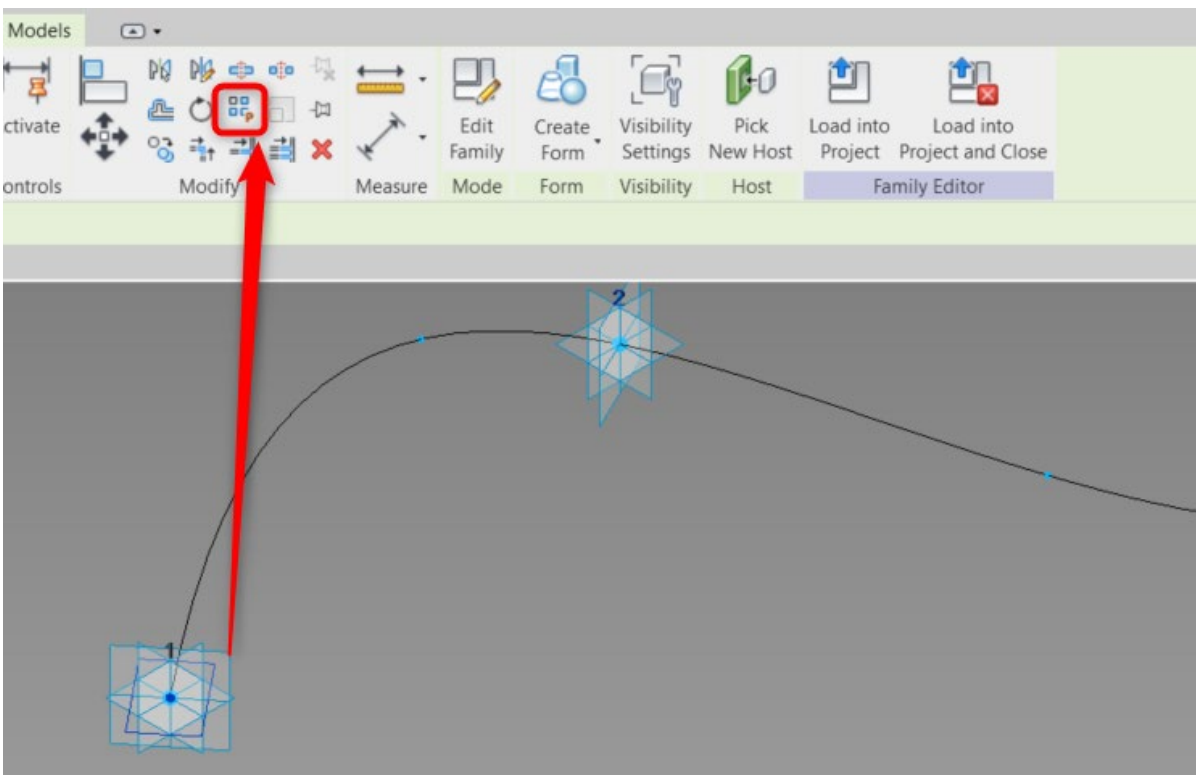


Fig 9. Placing our annotation family and repeating along the curve.

If snapped correctly to the curve, once the family is selected, the option to 'repeat' should be available from the ribbon menu. This should result in the part following the curve as below, with the number of elements controlled by the 'Number of Symbols' parameter.

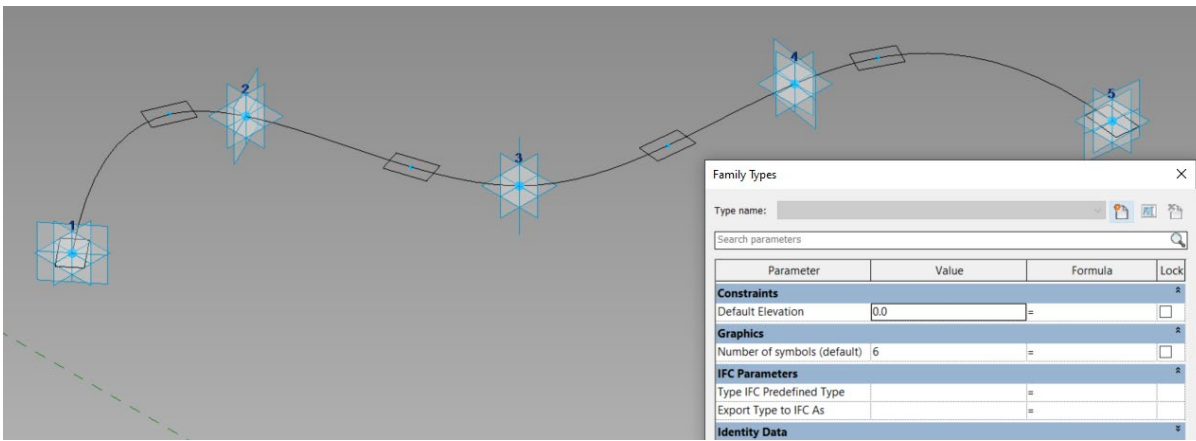


Fig. 10. The completed family, ready for testing!

Save the family as a suitable name and into a suitable location and test in a project!

(Refer to Figure 1, Stage 4)

Testing!

Use the place component command to place our complex line feature.

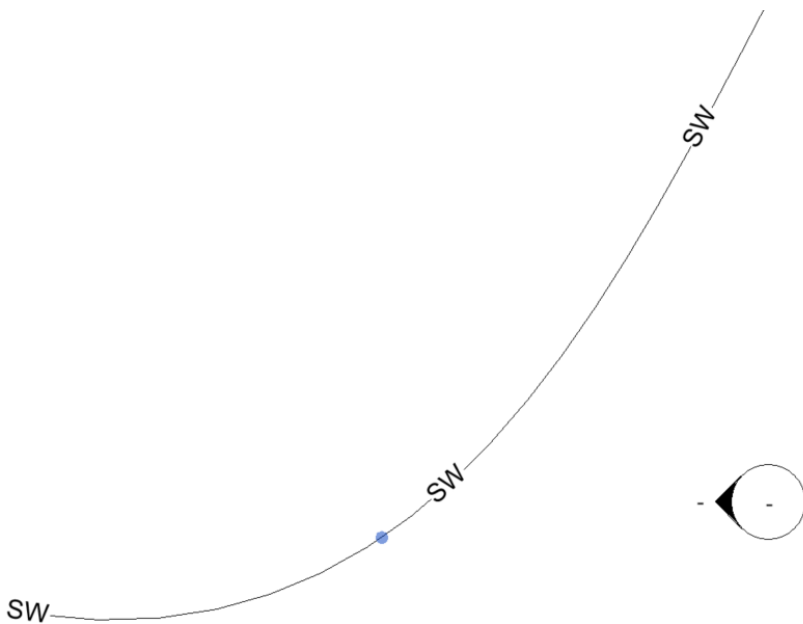


Fig 11. An annotated, bending, flexible, Revit line entity!

All points will need to be placed when drawing the line. Line type symbols will follow the line and maintain readability. To manipulate the 'line' use the tab key or move the mouse over a blue node control point and drag and move to suit. Annotation will reorient themselves to maintain readability.

<input checked="" type="checkbox"/>	Food Service Equipment					<input type="checkbox"/>	By View
<input checked="" type="checkbox"/>	Generic Models					<input type="checkbox"/>	By View
<input checked="" type="checkbox"/>	<Hidden Lines>						
<input checked="" type="checkbox"/>	Frame	Override...		Override...			
<input checked="" type="checkbox"/>	Ironmongery						
<input checked="" type="checkbox"/>	Masonry Quoin Stone						
<input checked="" type="checkbox"/>	Rainwater Downpipes						
<input checked="" type="checkbox"/>	Window Cill						

Fig 9. Place the additional lines on a subcategory for easy view control.

At certain scales construction lines may show, either edit the nested family to remove them or turn off the previously designed subcategory “Frame” using visibility graphics overrides commands. The text won’t show in 3D views, in that case, either use the linework ‘symbol’ as a substitute or lock the view and use tags to label the geometry.

NB.

In certain instances, it may also be worth adding a shallow view depth value in the View Range command in the event of lines having delta zed (height) properties specified.

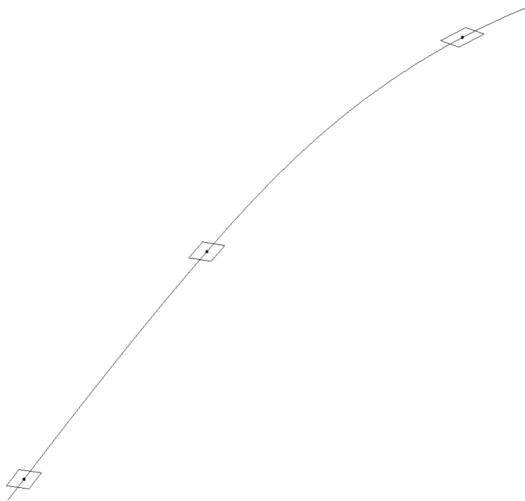


Fig 12. Linework could be used to annotate lines within 3D views, which could be useful in representing heavy duty cabling in models. Note the dots which are the nodes used to place the annotation family.

One final point is that in 3D views the divide nodes display. If this is not desired, go back into the adaptive line family (#4) and select the dividing curve.

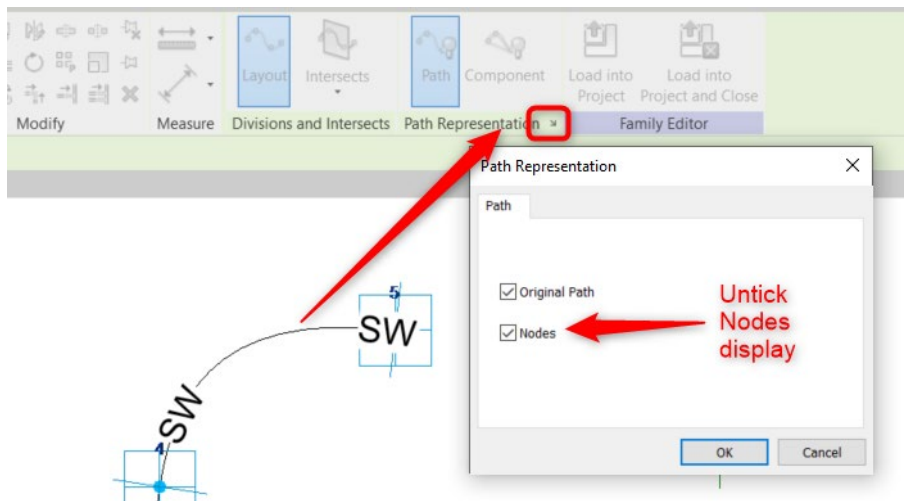


Fig 13. Editing the family to remove the display of curve division nodes.

Click the path representation options and untick Nodes for display. Save and update the family and reload into the project. In 3D views the divide node geometry will disappear.

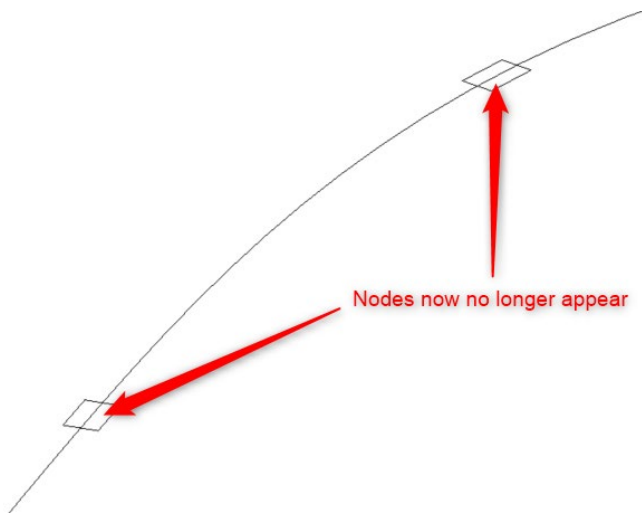


Fig 14. Annotated line family in a 3D view without the division nodes being displayed.

This approach can also be used to layout seating along a curve or lighting fixtures along a corridor. This workflow will be covered in a future whitepaper.