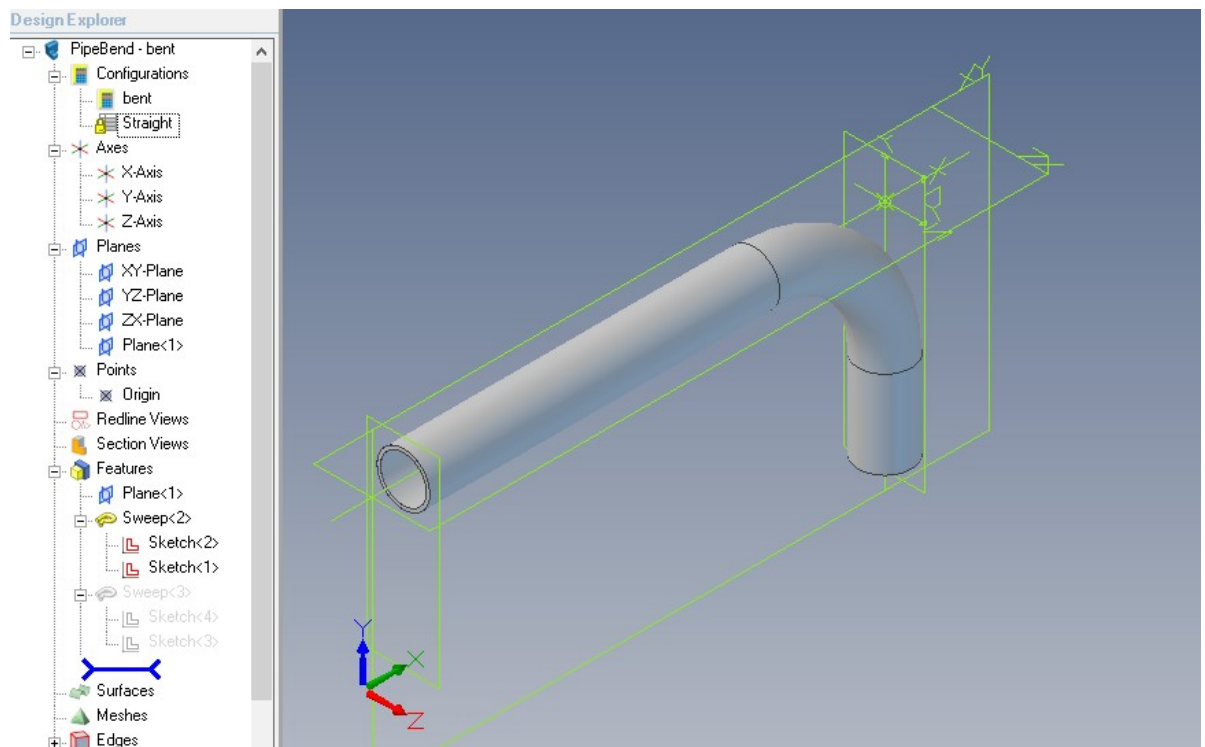*Most of the standard 3D Cad applications do not come standard with the ability to straighten bent pipe similar to the sheet metal tools we use to produce flat patterns of bent sheet and plate parts. We can make use of the configuration feature we find in most of our Cad applications, to approximate this process and display bent and straight pipe*


I have used Alibre Design here but the same basic method will work with Solid Works, Solid Edge and Inventor. I have modelled a section of a bend in a pipe and made two different configurations. This is the configuration I have named bent.
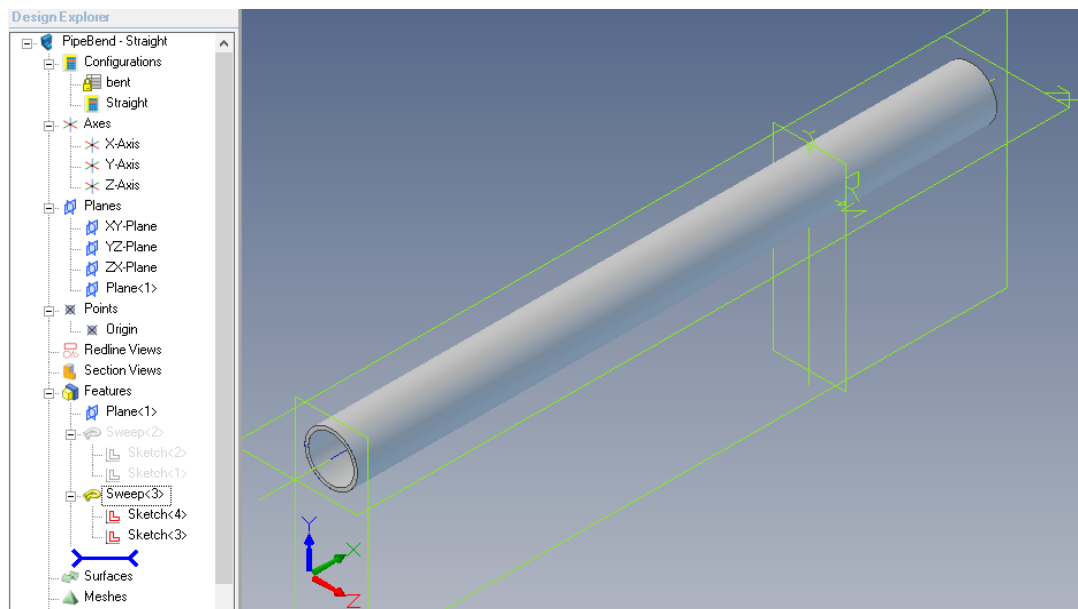

This configuration I have named straight. By switching between the different configurations I can display the pipe bent or straight.

I have created the part using a swept profile, that is sweeping a cross section of the pipe along a path. The first path is as below.
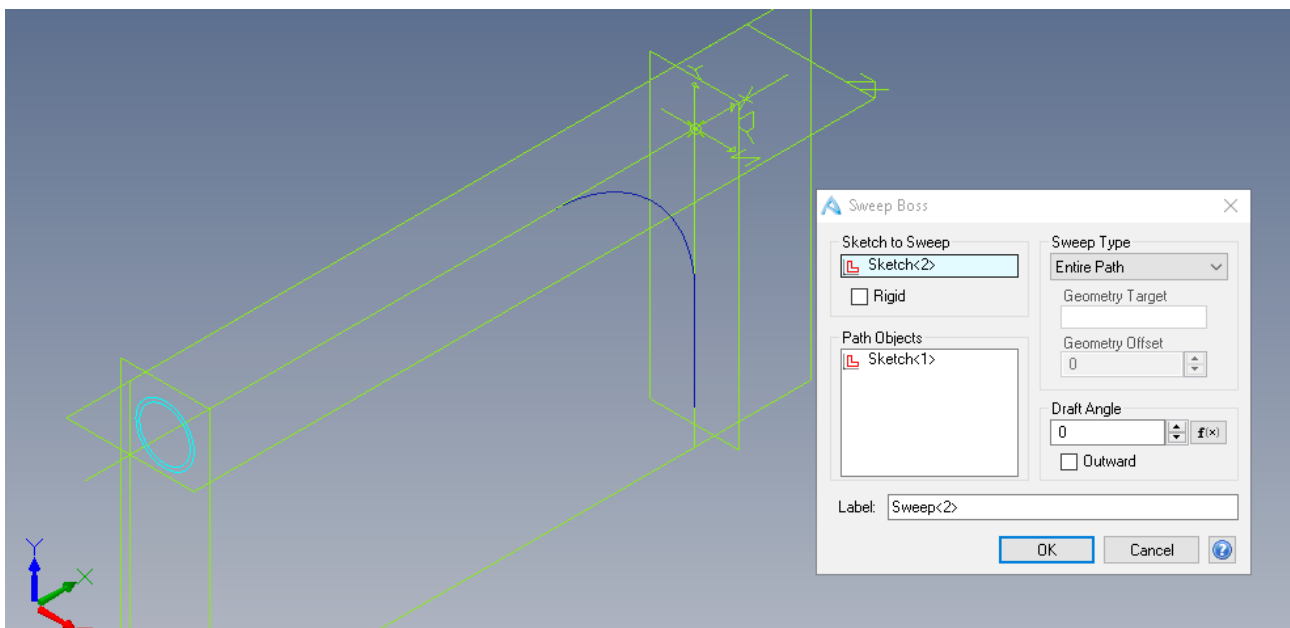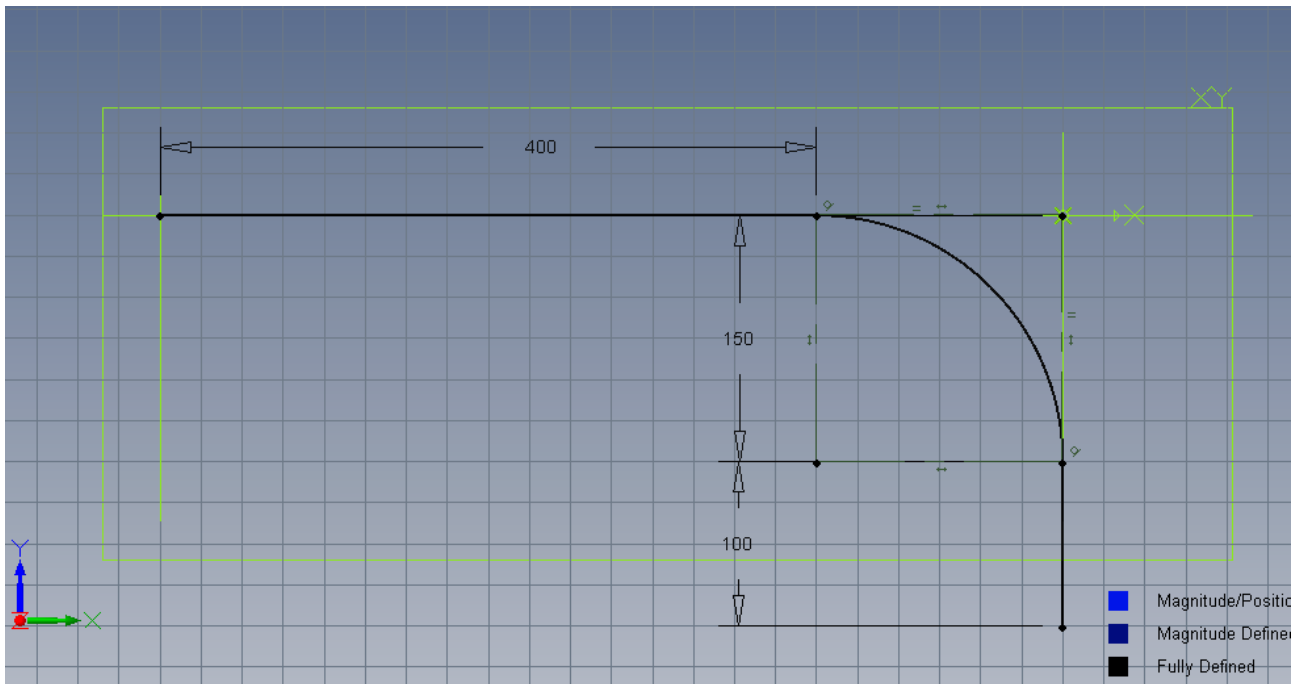
I have made the cross section of pipe based around a standard 50NB heavy pipe. This sweep becomes the configuration " bent "

For the straight section of pipe I have made another path to sweep the profile along. With Alibre Design I also am required to produce a duplicate of the pipe section as I am not able to use a sketch for more than one feature. If I was using Solid Edge I can use the same sketch profile and sweep along both paths
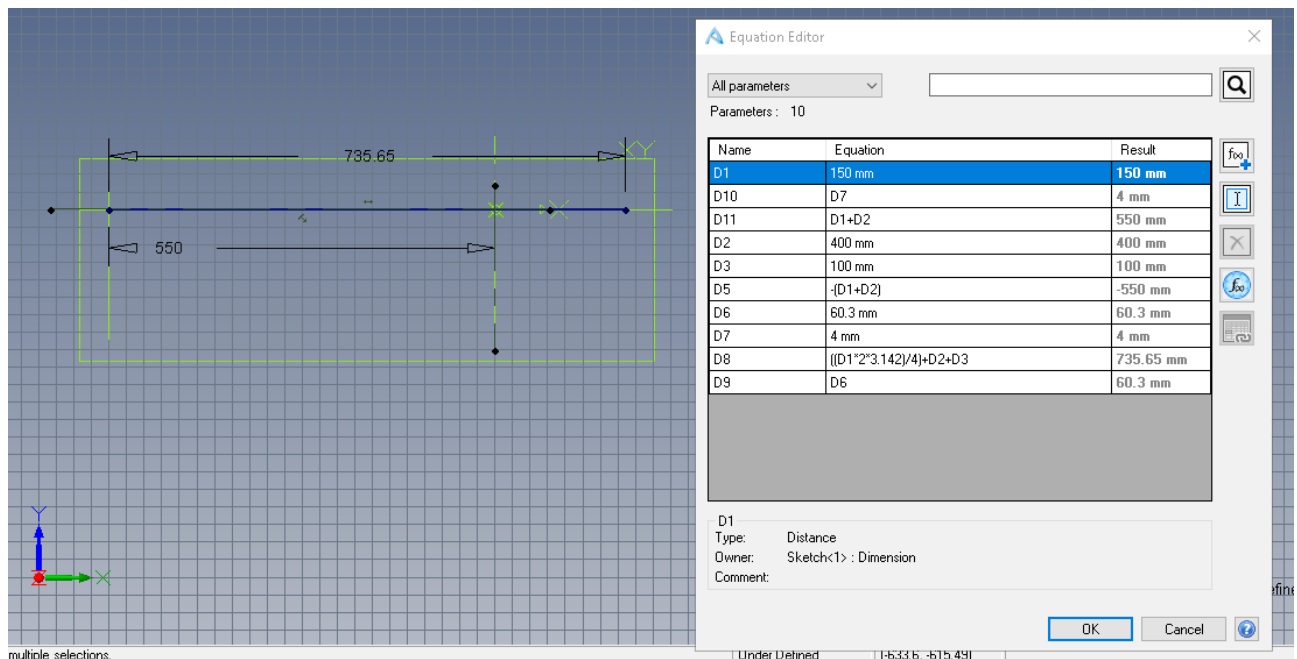
The total length of the line I have used for the sweep path has been calculated from the dimensions used in the sketch used in making the path for the bent version of the pipe. This is the formula in D8 :
((D1 *2 * 3-142)/4) + D2 + D3 – the length of ¼ bend circumference along neutral axis plus D2 plus D3.
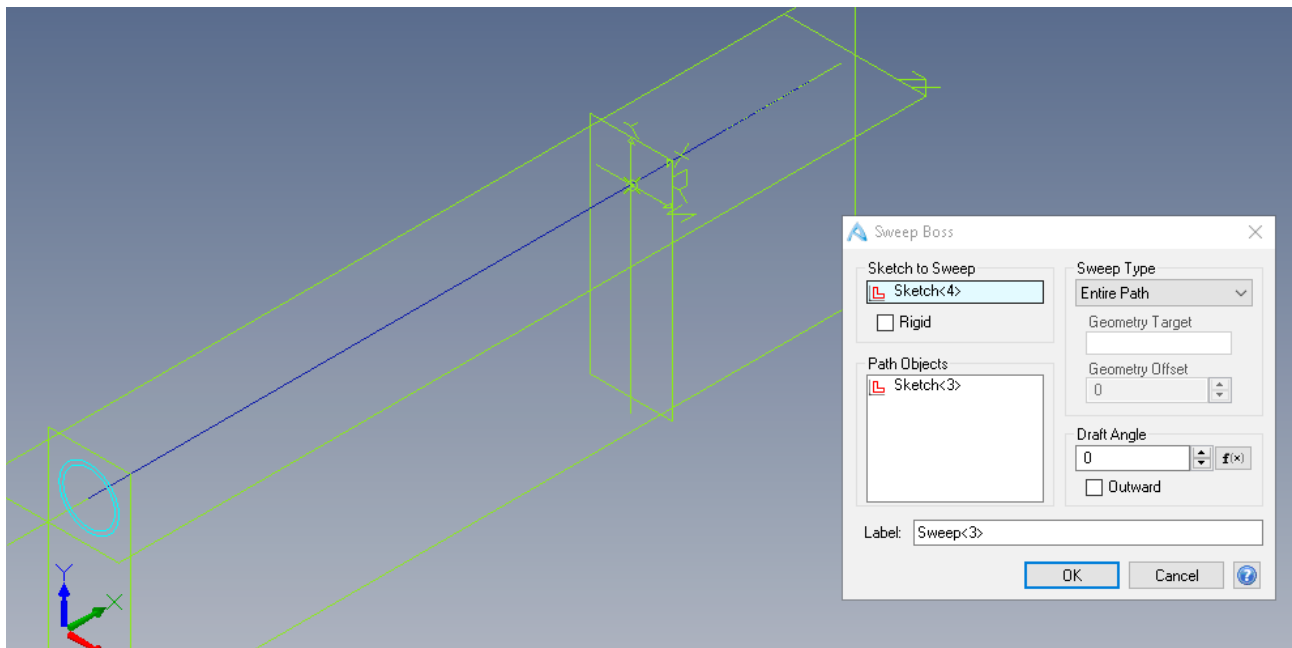
By swapping between the first configuration and the second configuration we can show the bent pipe or the pipe before it has been bent. With the actual real world version of the pipe, especially in a manufacture – production environment, where you may be required to

cut to length many pieces of pipe to the developed length, it pays to check this calculated length against a test bend. This is because to bend an actual pipe the part undergoes some distortion, the exact amount may depend on the actual tooling you are using.

This example is quite simple, there being only one bend in the length of pipe. For more complex pipes with more bends, the developed pipe length configuration would be produced by using the same process to straighten out each bend. For complex bent parts this may not be worth the effort. In these cases it may be better to work out the theoretical length along the pipe neutral axis and just make the straight pipe with a simple extrusion using this calculated length.