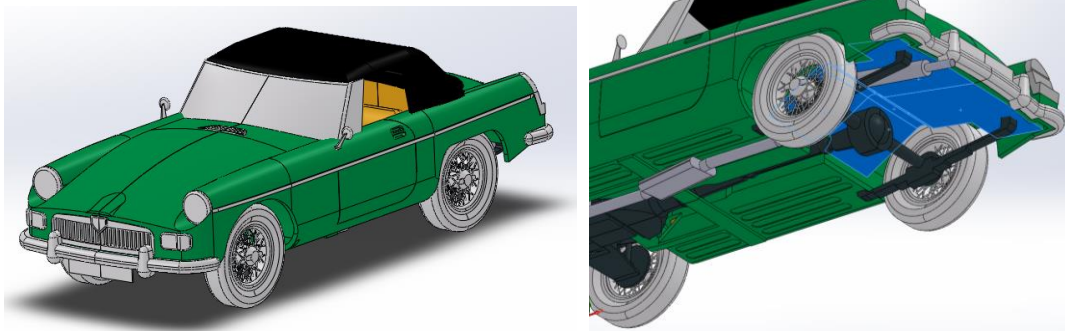
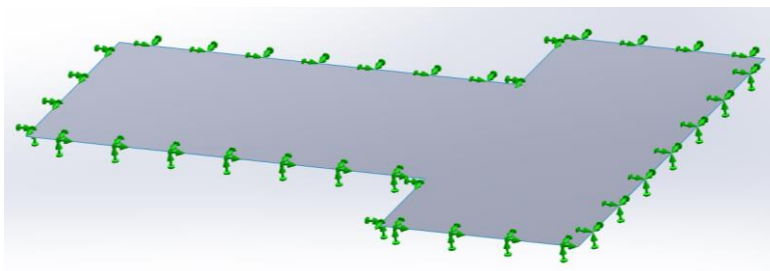


Topography optimisation – floorpan example

The below shows the rear floorpan of a vehicle

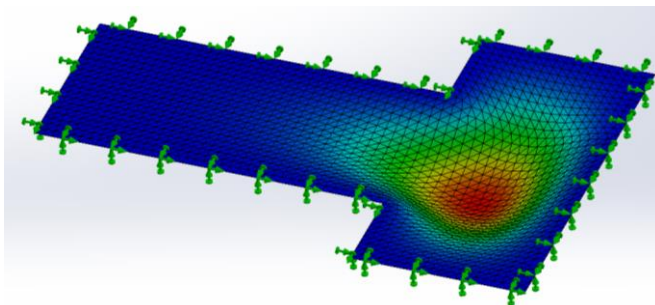


A representation of this floorpan is shown below. This is made from 2mm steel and is constrained at the edges where it is connected to the rest of the BIW.

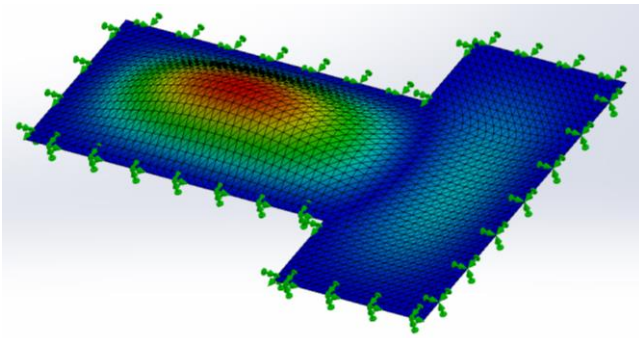


From an NVH point of view the natural frequency of this panel is of interest. As such the first 5 modes of this panel have been assessed and are shown below;

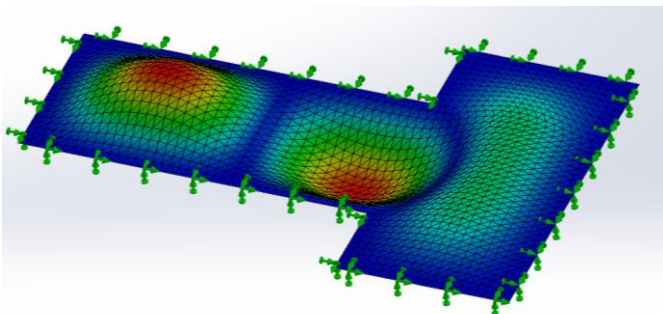
Mode 1 = 908hz



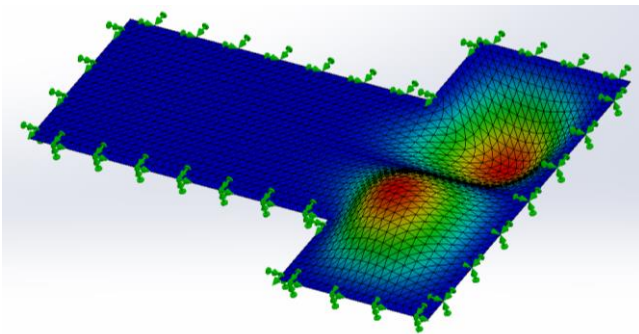
Mode 2 = 1090hz



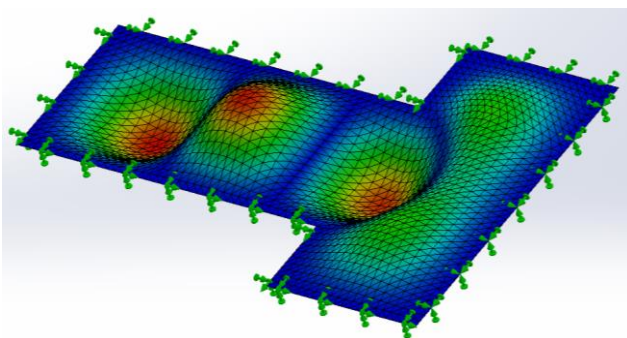
Mode 3 = 1404hz



Mode 4 = 1505hz

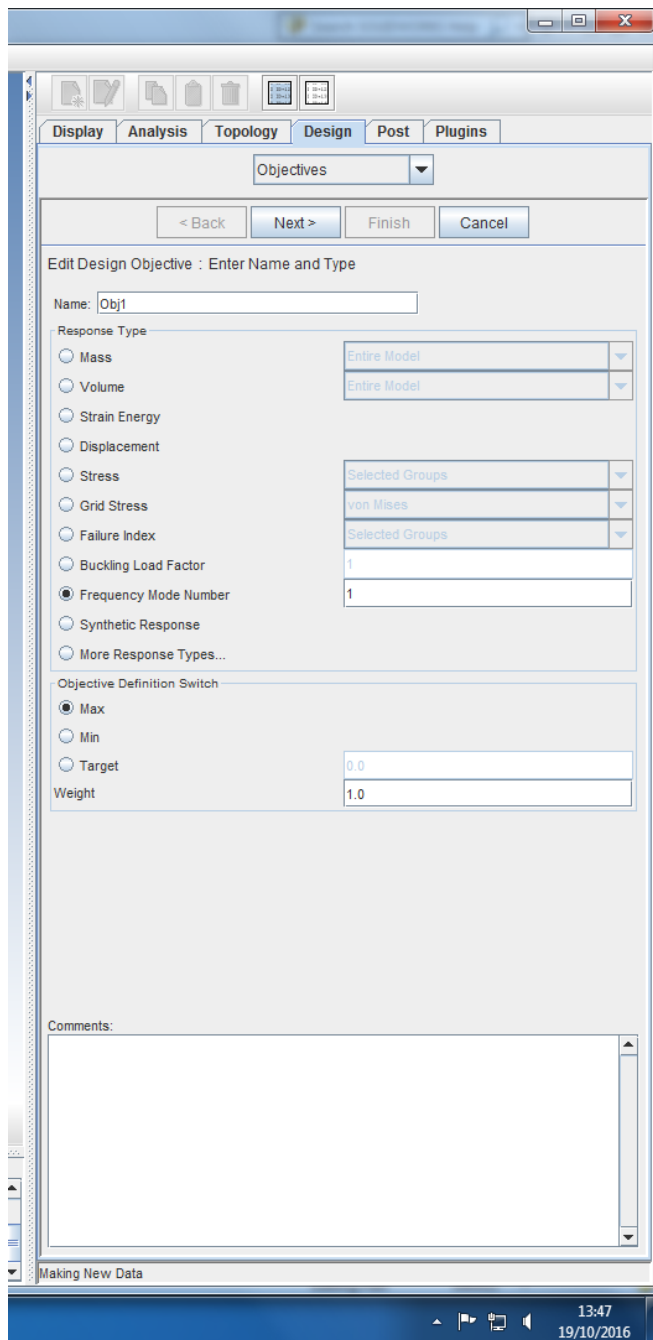


Mode 5 = 1742hz

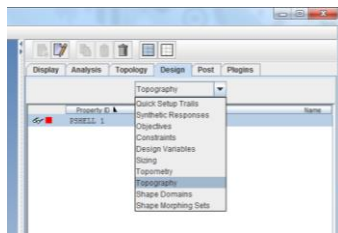


The purpose of this exercise is to use Topography optimisation to design a swage pattern such that swages up to 5mm may be added to the structure to increase the frequency of the first mode.

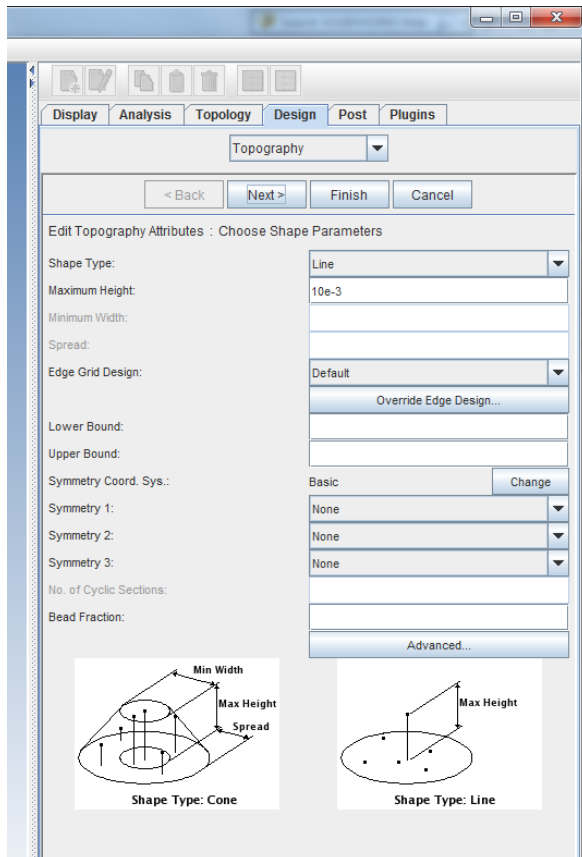
Firstly we must set out OBJECTIVE – maximise the frequency of mode number 1



Next we must set up our topography variable

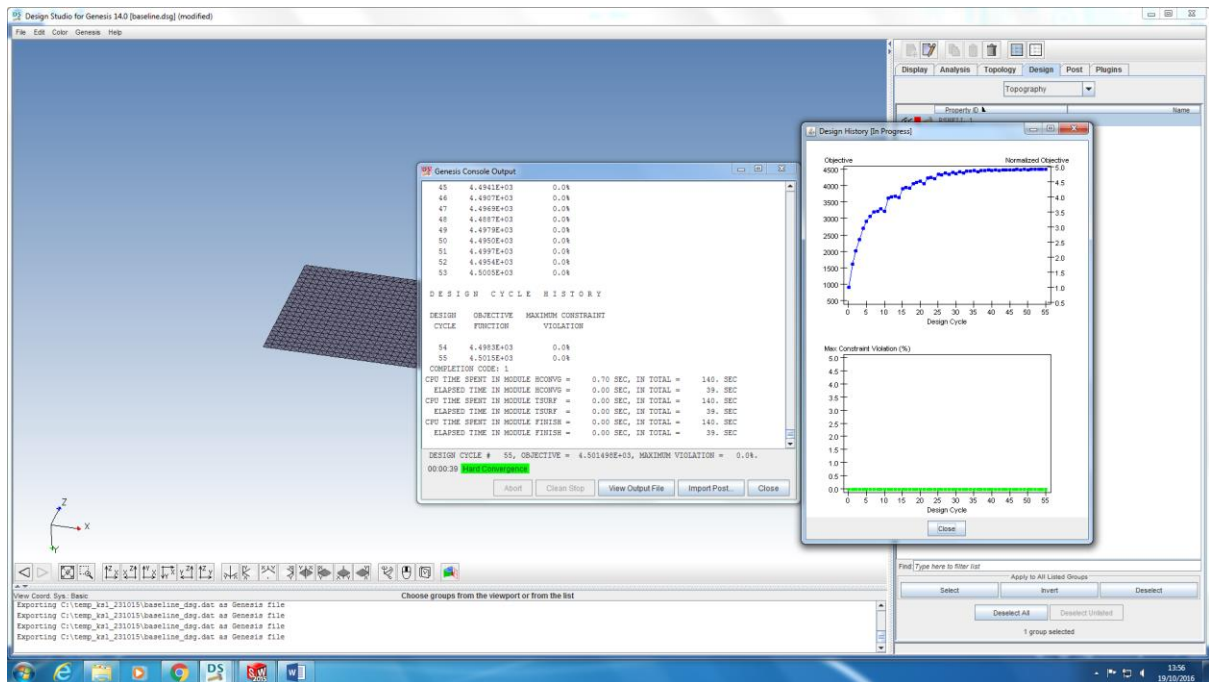


MODIFY



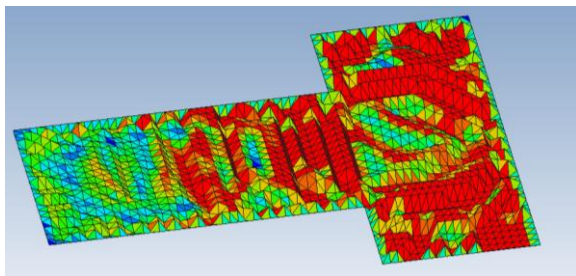
Change the type to line and set the maximum to 5mm

Set the maximum number of iterations to 100

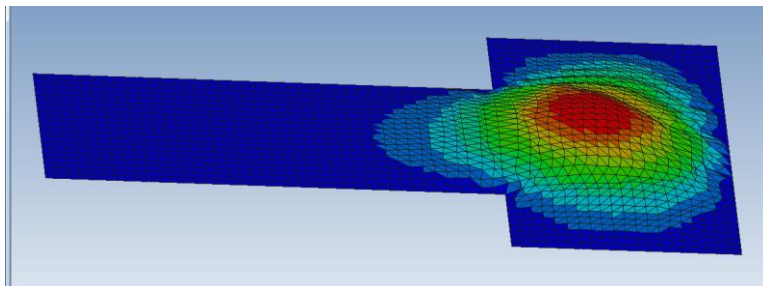


View the post files

Note the final design

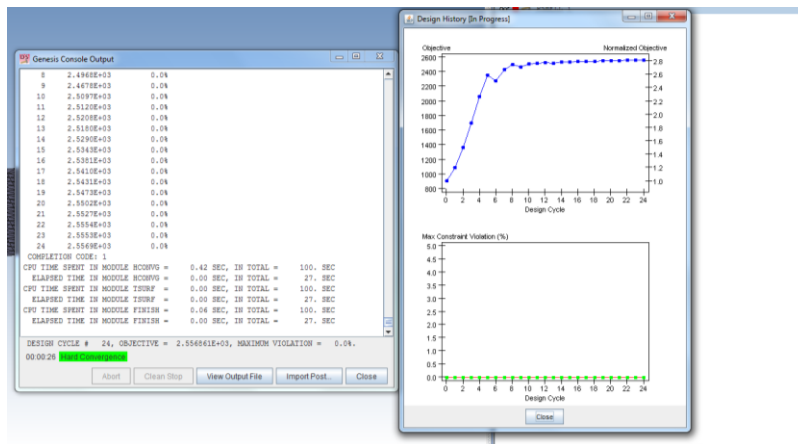


Note that the fist mode has now increased to 3098Hz

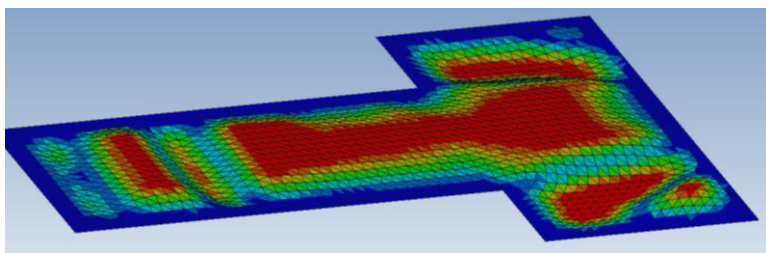


Would this be manufacturable?

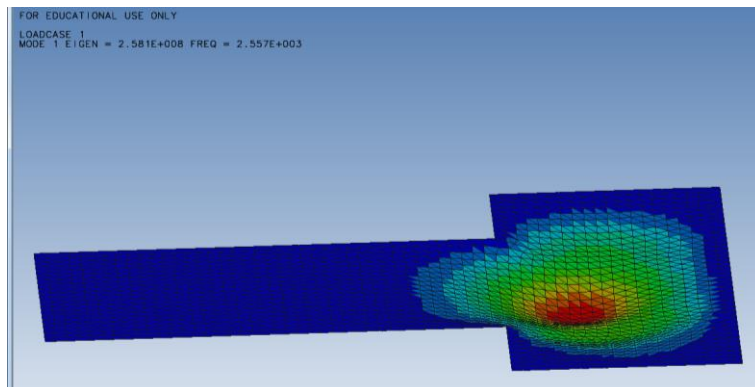
Go back and change the topography type to cone and use a max height of 5mm, a min width of 10mm and a spread of 10mm. You should see the following...



Your final design should look as below



Note that you first mode has increased from 908Hz to 2557Hz



So for basically zero weight and material usage we have increased our first mode from 908Hz to 2557Hz.