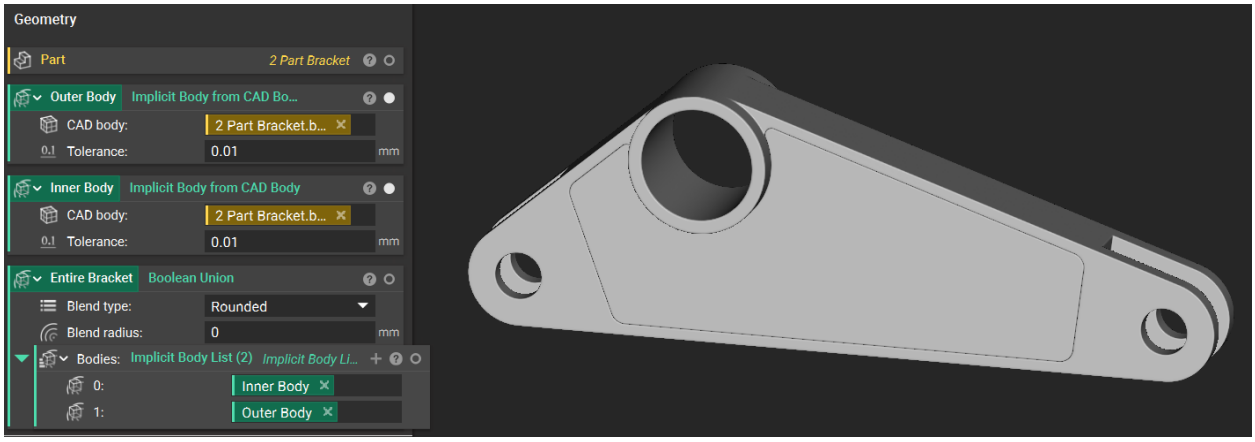
Follow Along: Periodic Lattice on Faces

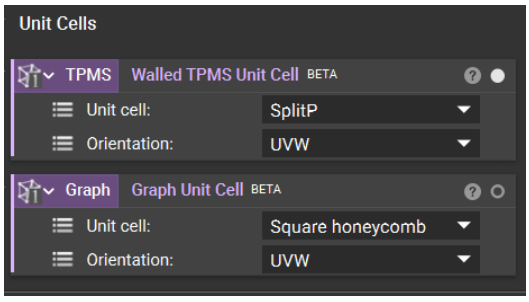
In this video, we walk through an example of using the **Periodic Lattice** to add periodic lattices to an implicit body and periodic texturing to faces. We will discuss creating Cell Maps using CAD faces and quad meshes.

Please download the nTop File below to follow along with the tutorial. This file is the same file used in the previous lesson, "Follow Along: Periodic Lattices," so you can also use that same starting file. The only differences between the two are that there are different section titles in these two download files.

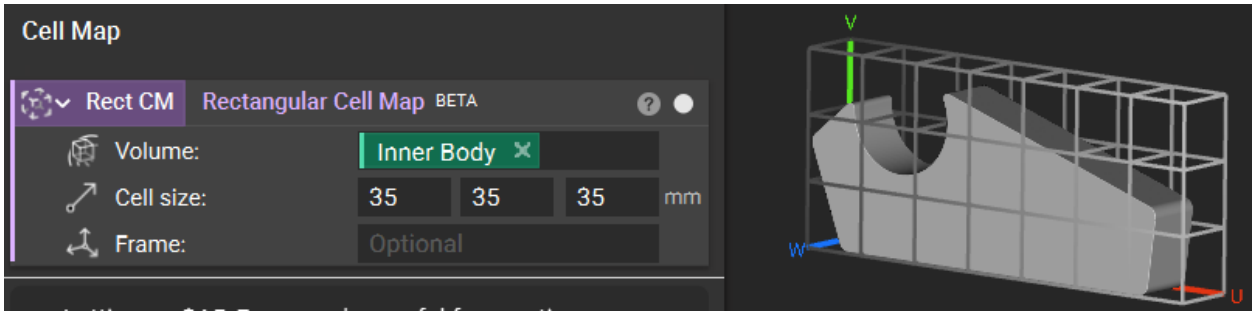
Step 1: The starter file has an embedded two-part CAD bracket in the *Geometry* section. Use two **Implicit Body from CAD Body** blocks to convert to implicit bodies, and make these into variables, *Inner Body* and *Outer Body*. Add a **Boolean Union** block, and merge the two implicit bodies to create a third variable, *Entire Bracket*.



Step 2: Define the Unit Cells we will use in this workflow using a **Walled TPMS Unit Cell** and a **Graph Unit Cell**.

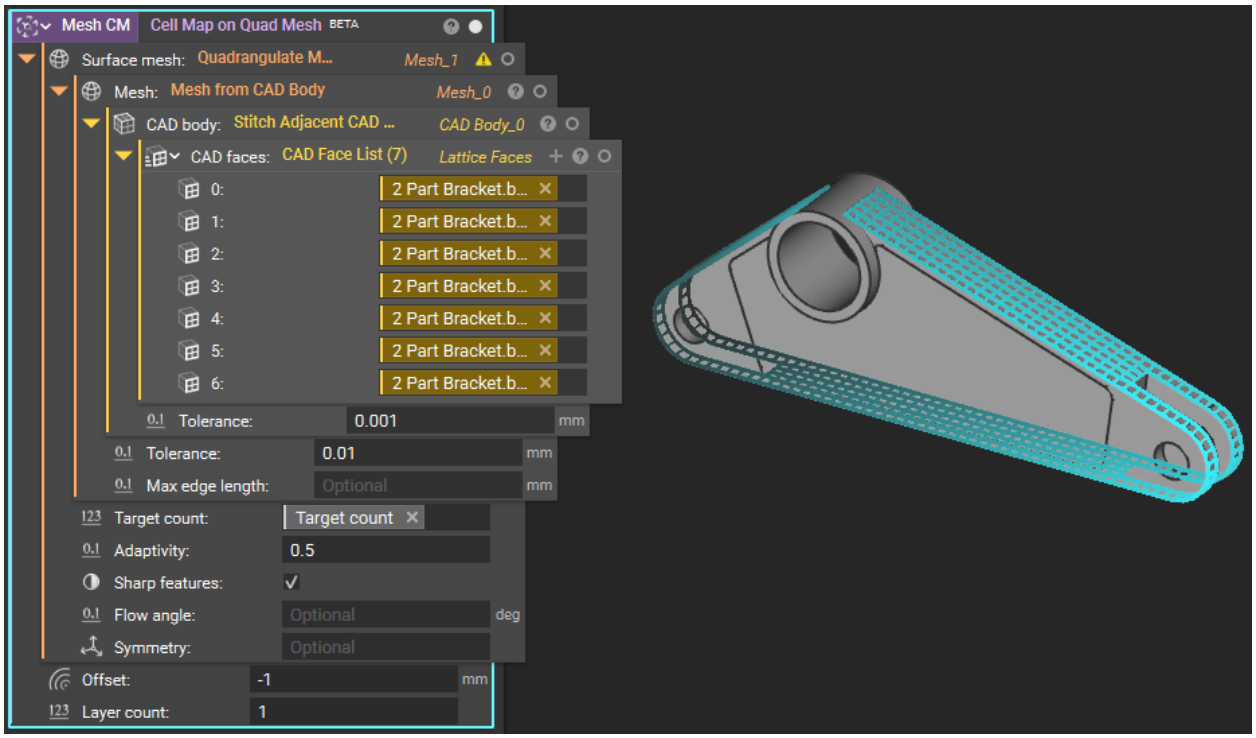


Step 3: We also need a Cell Map to create our Lattice Body, and we will use the **Rectangular Cell Map, Cylindrical Cell Map, Cell Map on CAD Face** and **Cell Map on Quad Mesh** found in the Beta Tab. Let's begin with the **Rectangular Cell Map** and add it to the Notebook. The **Rectangular Cell Map** is very similar to the result we had in the previous lesson. Place the Inner Body in for the Volume, the cell size of 35x35x35. We can rotate the cell map by changing the x and y axis of a **Frame**. Convert this to a variable by right clicking on the block and selecting "Make Variable" and label this *Rect CM*.

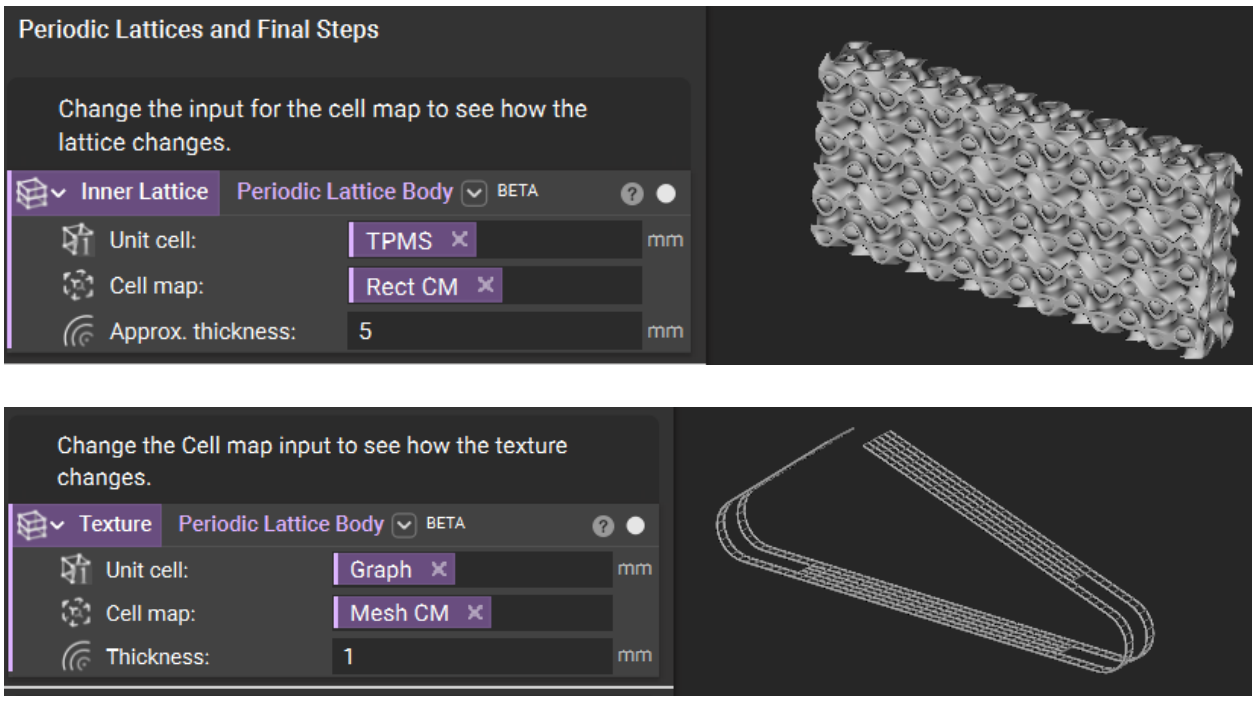


Step 4: Add a **Cell Map from CAD Face** block, and select the CAD face to apply a Cell Map. Set the Height as negative, so material will be removed when we use the periodic lattice made with this Cell Map. Convert this to a variable by right clicking on the block and selecting "Make Variable" and label this *CAD CM*.

Step 5: Now, let's use a **Cell Map from Quad Mesh** block to generate a Cell Map on a series of connected CAD faces. Select the CAD faces you want to map, and stitch them to a single CAD body using **Stitch Adjacent CAD Faces**. Then, use a **Mesh from CAD Body** and a **Quadrangulate Mesh** to generate a quad mesh for the Cell Map. Adjust the Target count input to control the number and size of the cells. For this example, set the Target count at 500.



Step 6: Use **Periodic Lattice** blocks to apply the *TPMS* Unit Cell to the *Inner Body* and the *Graph* Unit Cell to the *CAD CM* or *Mesh CM*. You should see a TPMS lattice for lightweighting and a grid-like lattice for texturing.



Step 7: Use a **Boolean Intersect** block to trim the *Inner Lattice* to the *Inner Body* volume. Then, **Boolean Union** the result with the *Outer Volume*. Finally, use a **Boolean Subtract** block to remove the *Texture* lattice. Make this a variable called *Final Part*.