Follow Along: Adding Roughness

In this lesson, we will walkthrough how to add roughness to a surface in nTopology using the **Simplex Noise 3D** block and the **Ramp** block. If you are unfamiliar with the **[Ramp](#) block**, please visit our Intro to [Field Driven Design Course](#) before reviewing this lesson.

Please download the nTop file below to follow along with the tutorial.


The starter file already has our geometry section completed as well as the inputs we will use for our ribbing.

Step 1: Add the **Simplex Noise 3D** block into the Texture Roughness Section of your notebook. Right click on the Frequency input, make this a variable, and input 100 for the Frequency. If you view the simplex noise 3D field with the Field Viewer (Type F), our values range from -1 to 1 and are unitless. We will use this field to create roughness on our part.
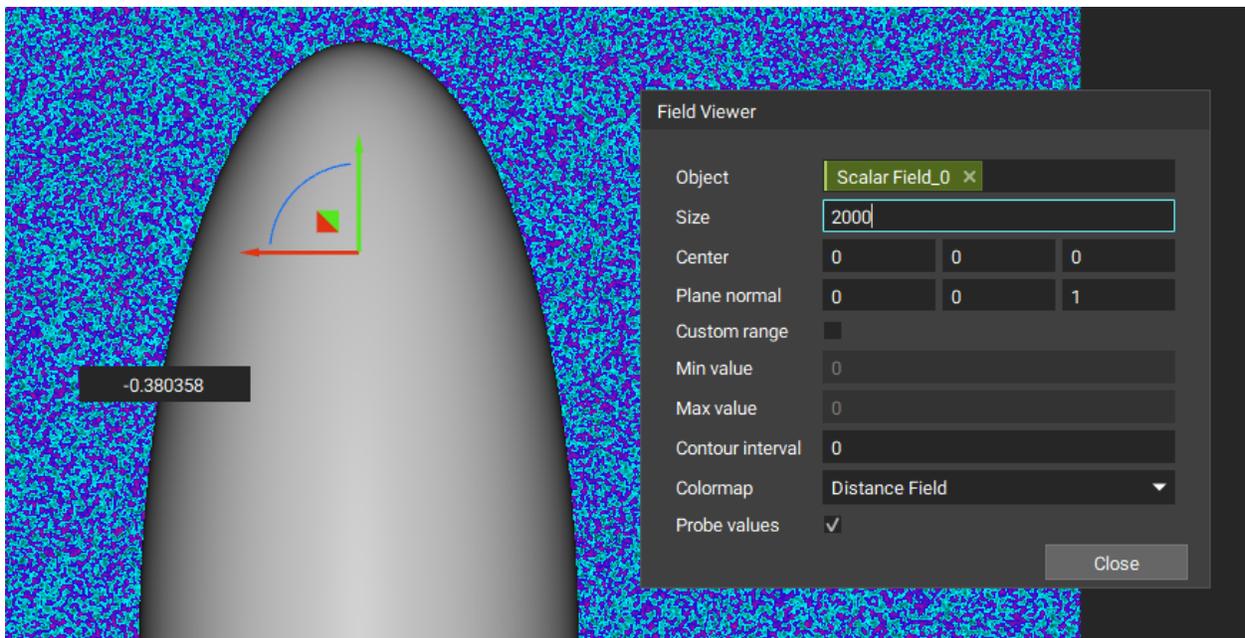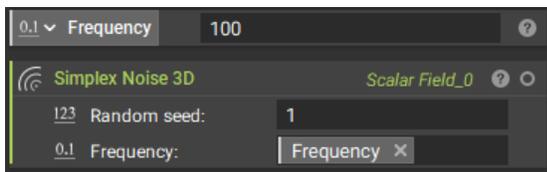

Step 2: Add an **Offset Body** block to our notebook. For the body, input the "Smooth Part" variable. Because the simplex noise 3D field is unitless, we need to first multiply the field by 1mm to use this for the Distance input. Add a **Multiply** block in the Distance input and add the

Simplex Noise 3D block above to the input as well as 1mm. Now, the body will have a rough surface. Right click and make this a variable labeled "Rough Part".
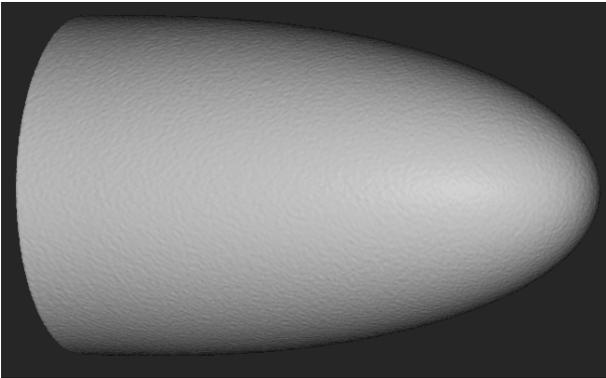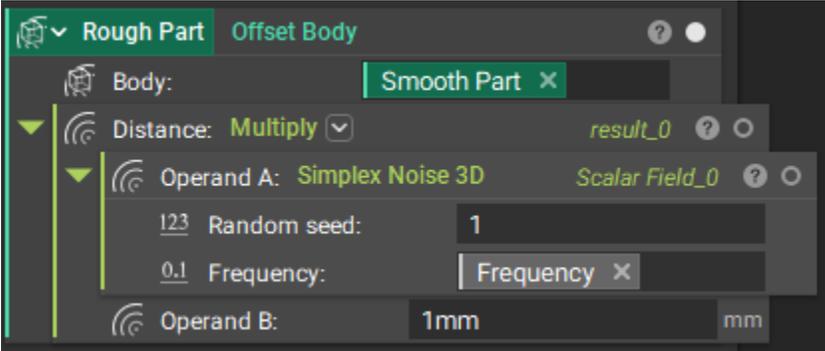
Step 3: To transition from a smooth to a rough surface, we can use a **Ramp** block. If you are unfamiliar with the **Ramp** block, we recommend first reviewing this Ramp lesson. First, duplicate the "Rough Part" by right clicking on that block and relabel it "Roughness Varying Amplitude". Then, replace the 1mm in the **Multiply** block with a **Ramp** block.
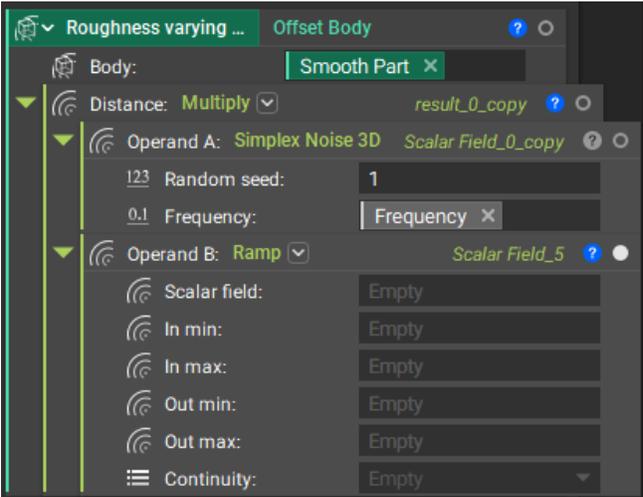
Step 4: For the Scalar Field option of the ramp, use a **Plane** with the inputs shown below. The goal is to have a smooth surface below this plane which slowly transitions into a rough surface farther from the plane. For the In min, use 0mm (starting location of the transition) and for the In max, use 1000mm (ending location of the transition). Place in 0mm for the Out min (smooth surface) and 5mm for the Out Max (maximum roughness). Use Geometric Continuity. Now we gave this part a rough surface that varies based on the plane.