MachineApp - Path following

Contents

MachineApp Path Following - User Guide

Overview

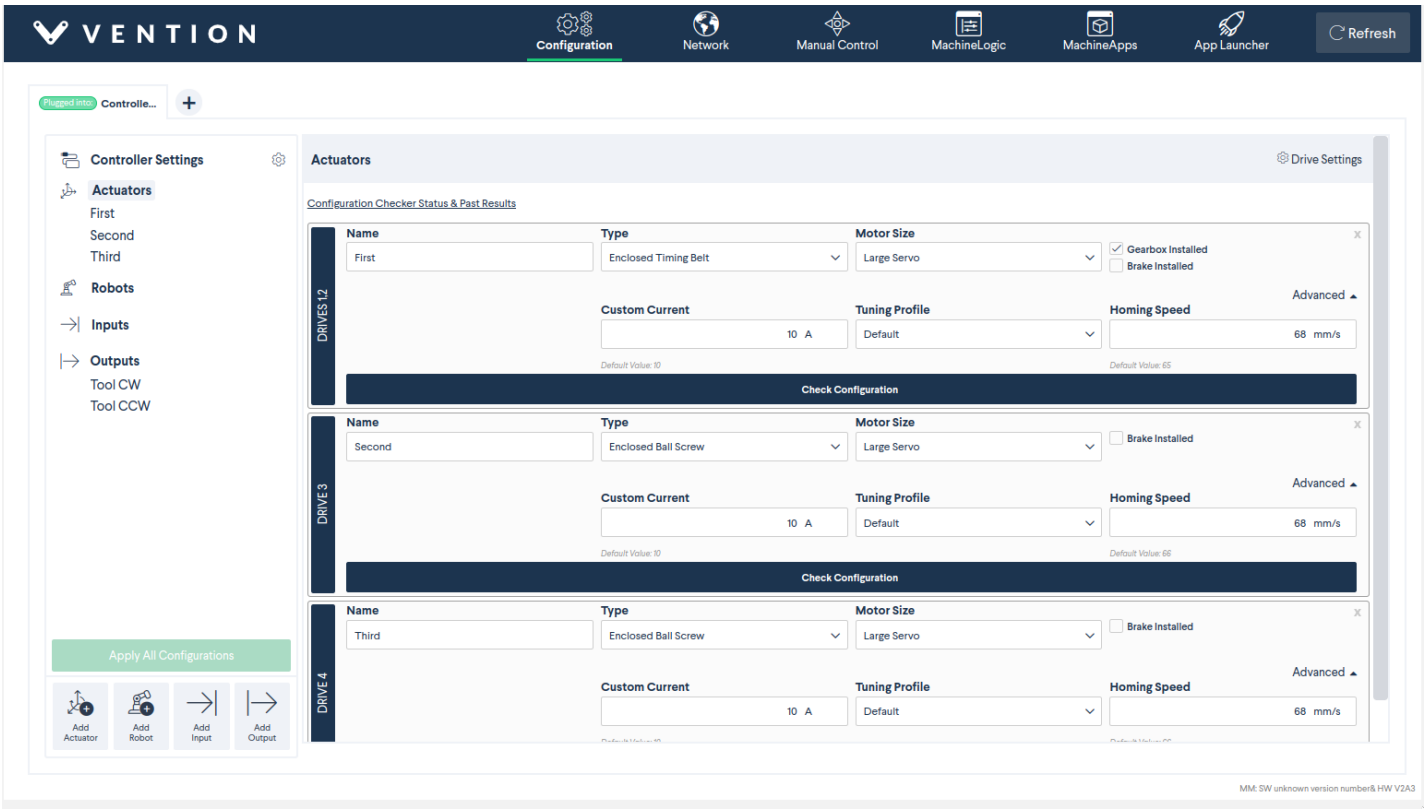
The following is a comprehensive user guide for the configuration and operation of the Path Following MachineApplication.

In this guide, you will learn how to:

- Define your Path Following Machine based on your MachineLogic configuration
- Upload a GCode File
- Arrange your GCode file(s) within your workspace
- Create a new Path Following Application and augment it with custom behavior
- Run your Path Following Application

Prerequisites

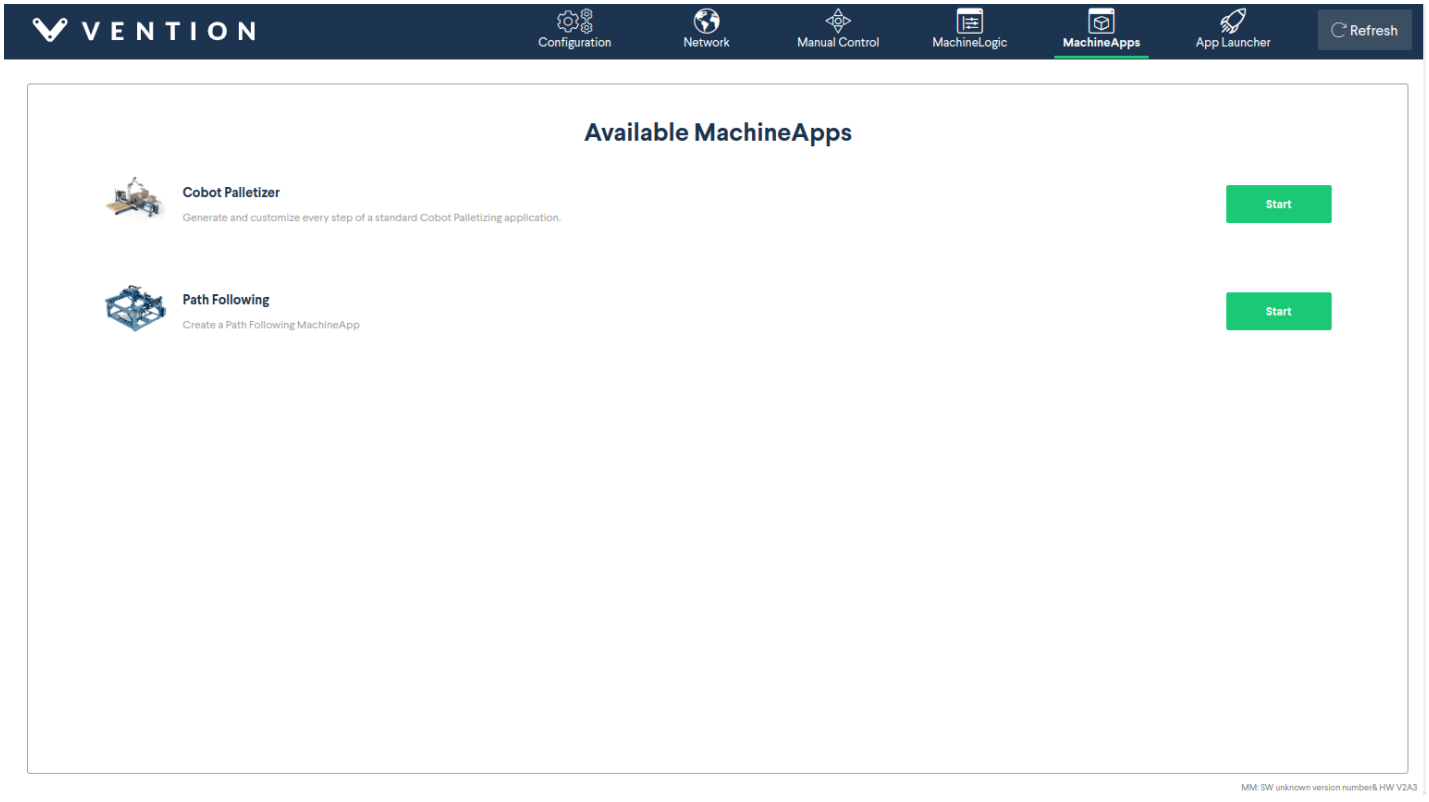
- You have configured your machine in the MachineLogic “Configuration” page, e.g.:



- Afterward, navigate to the “Manual Control” tab on the top bar to ensure that your actuators are behaving as expected.
- When everything looks correct, select the **MachineApps** tab on the top bar to begin the Path Following configuration process.

Available MachineApps Page

When you first enter into the “MachineApps” tab, you will be shown a list of the available MachineApps. Select **Start** on the “Path Following” option:



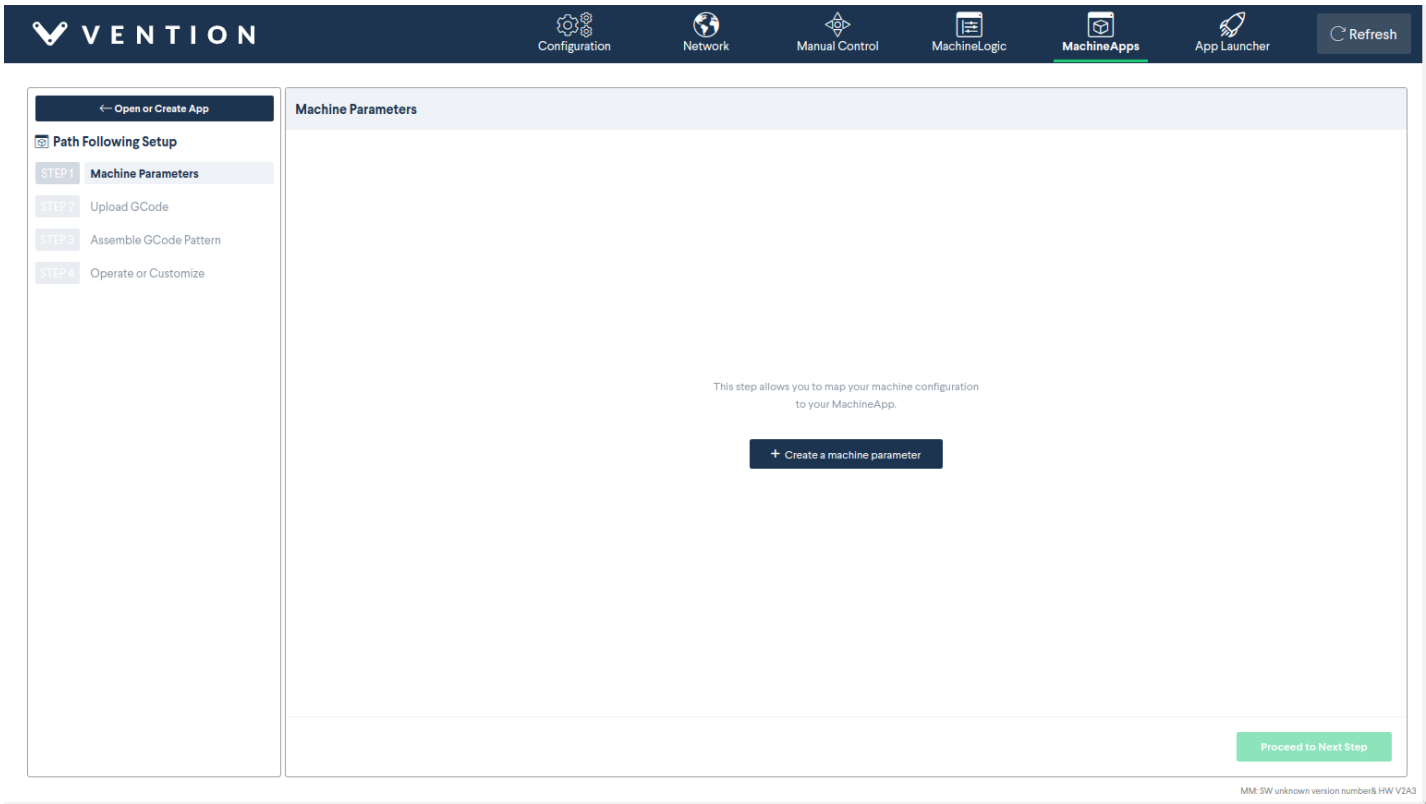
You will then be brought to the first step: Machine Parameters.

Machine Parameters

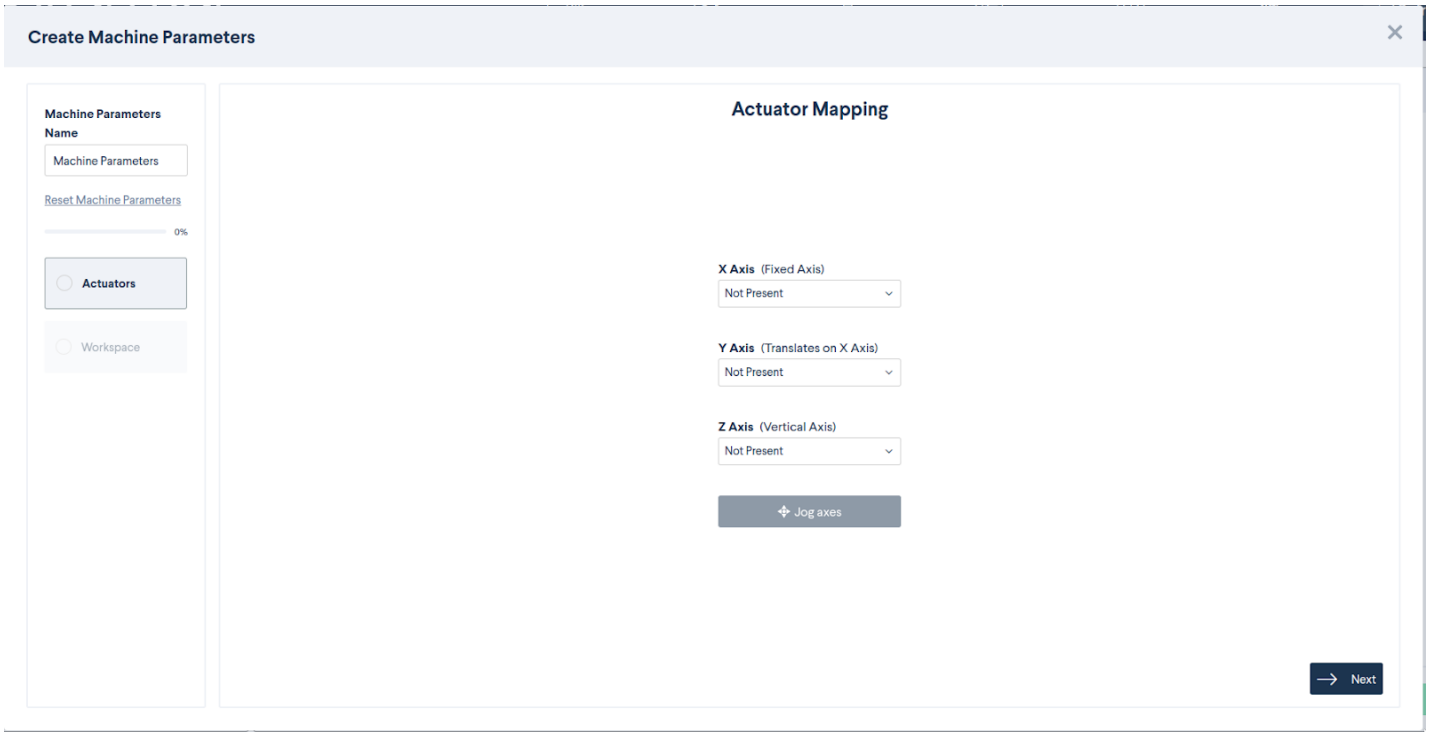
In the **Machine Parameters** view, you will map your MachineLogic configuration onto your Path Following MachineApp. The reason for this step is as follows:

You will upload files that define some 2D or 3D path. Within a file, you will find commands like G0 X100 Y200 Z300. This tells the Path Following Machine to move to point (100, 200, 300). Unfortunately, we cannot predict which of your actuators corresponds to X, Y, and Z, so we need you to provide us with this information. We will also ask you to provide the dimensions of your workspace.

When you first arrive in the **Machine Parameters** view, you will be greeted by an empty configuration. To begin your Machine Parameters, select **Create a machine parameter** in the center of the page.

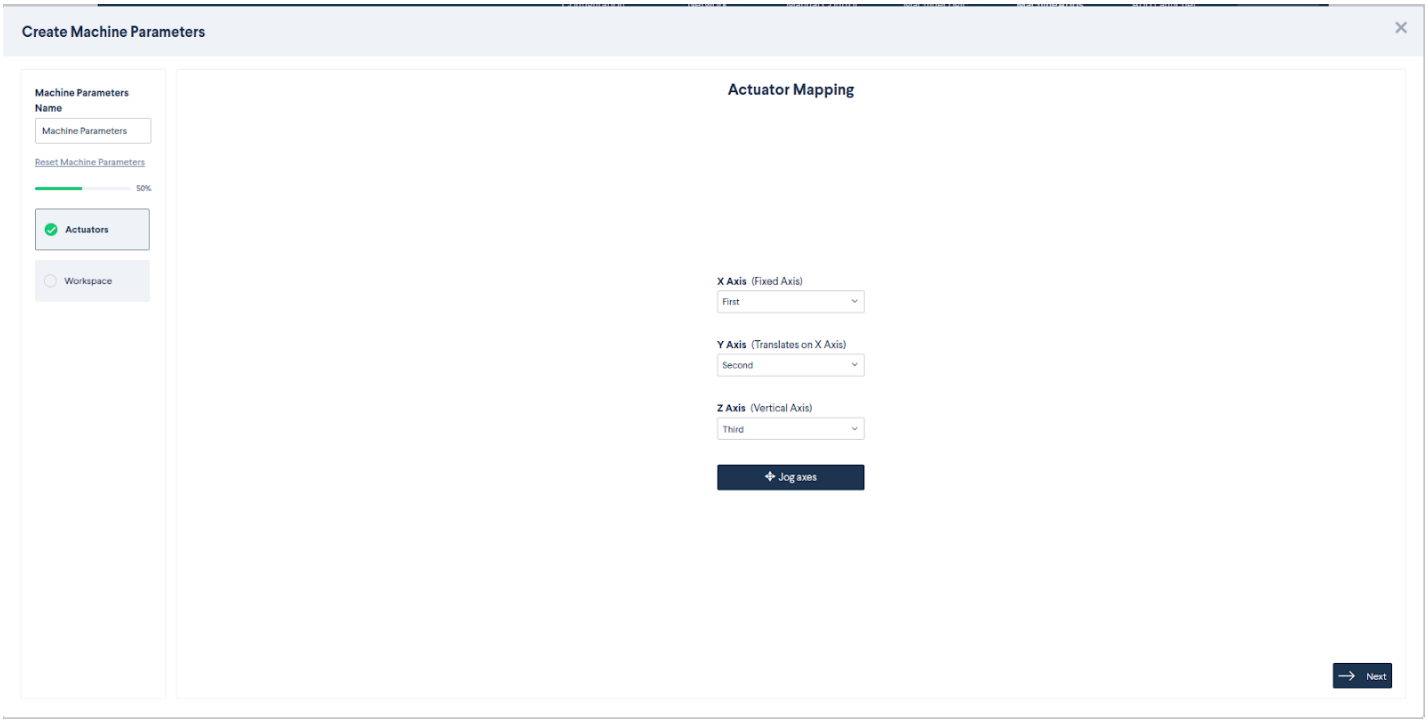


A modal window will appear where you will see three inputs. In this step, **map the actuators from the MachineLogic configuration to the axes defined by your** .

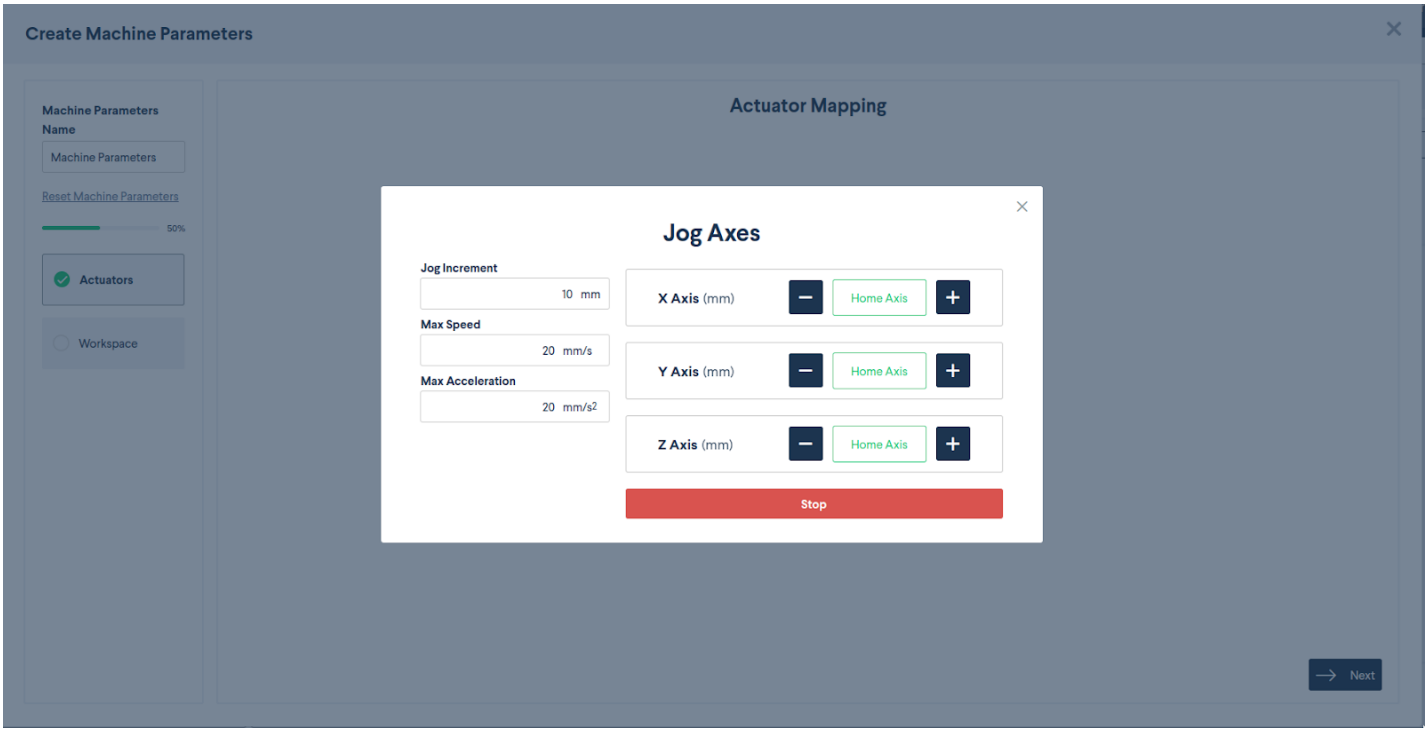


For each letter in your file (X, Y, and Z), you will map a single actuator from your MachineLogic configuration. You must map a minimum of 1 actuator and a

maximum of 3. If you are only doing 2D path following, you would map only X and Y, leaving Z as “Not Present”. In our example, we will map all 3 axes:



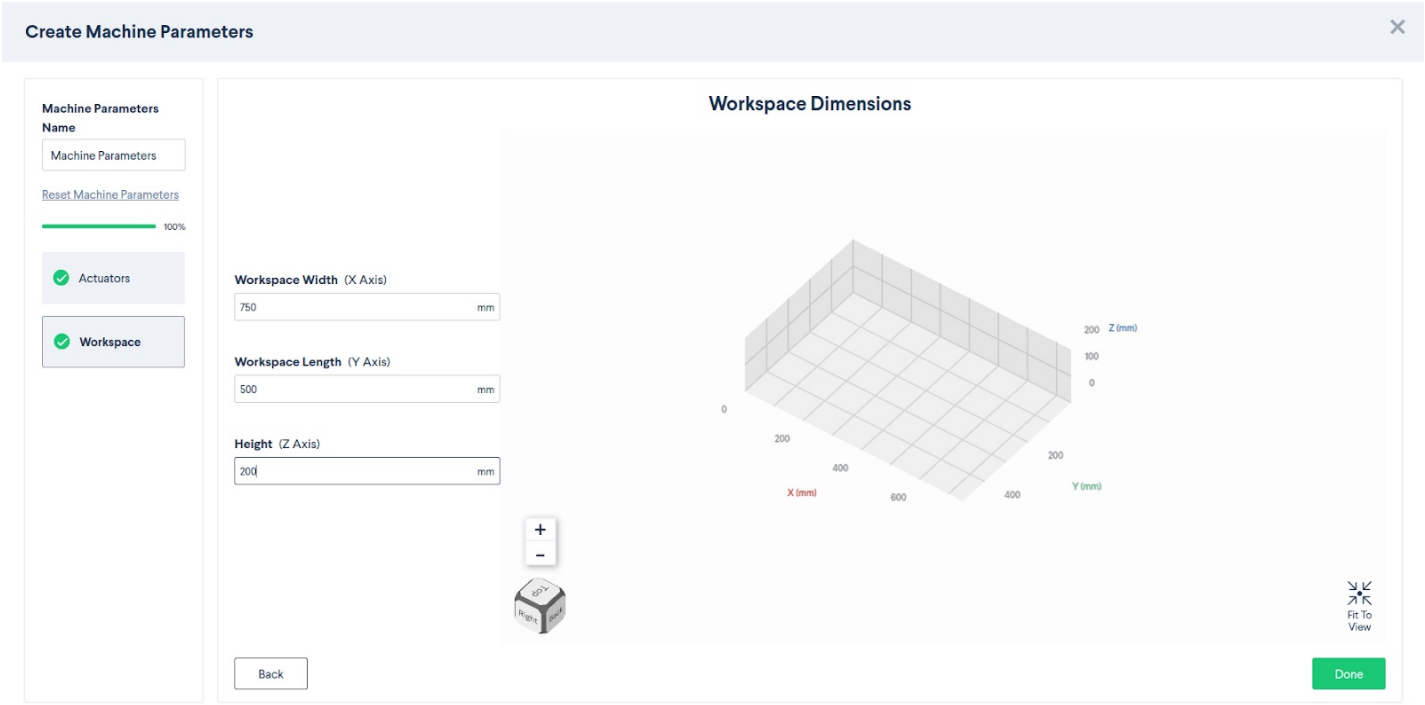
Once satisfied with your selection, select **Jog axes** to test that you’ve mapped the correct actuators to the correct X, Y, and Z axes.



When satisfied, close the **Jog Axes modal** if it is still open and select **Next** in the bottom right-hand corner of the screen.

In the following step, you will define your **Workspace Dimensions**. The “workspace” is defined as the maximum travel distance along each axis.

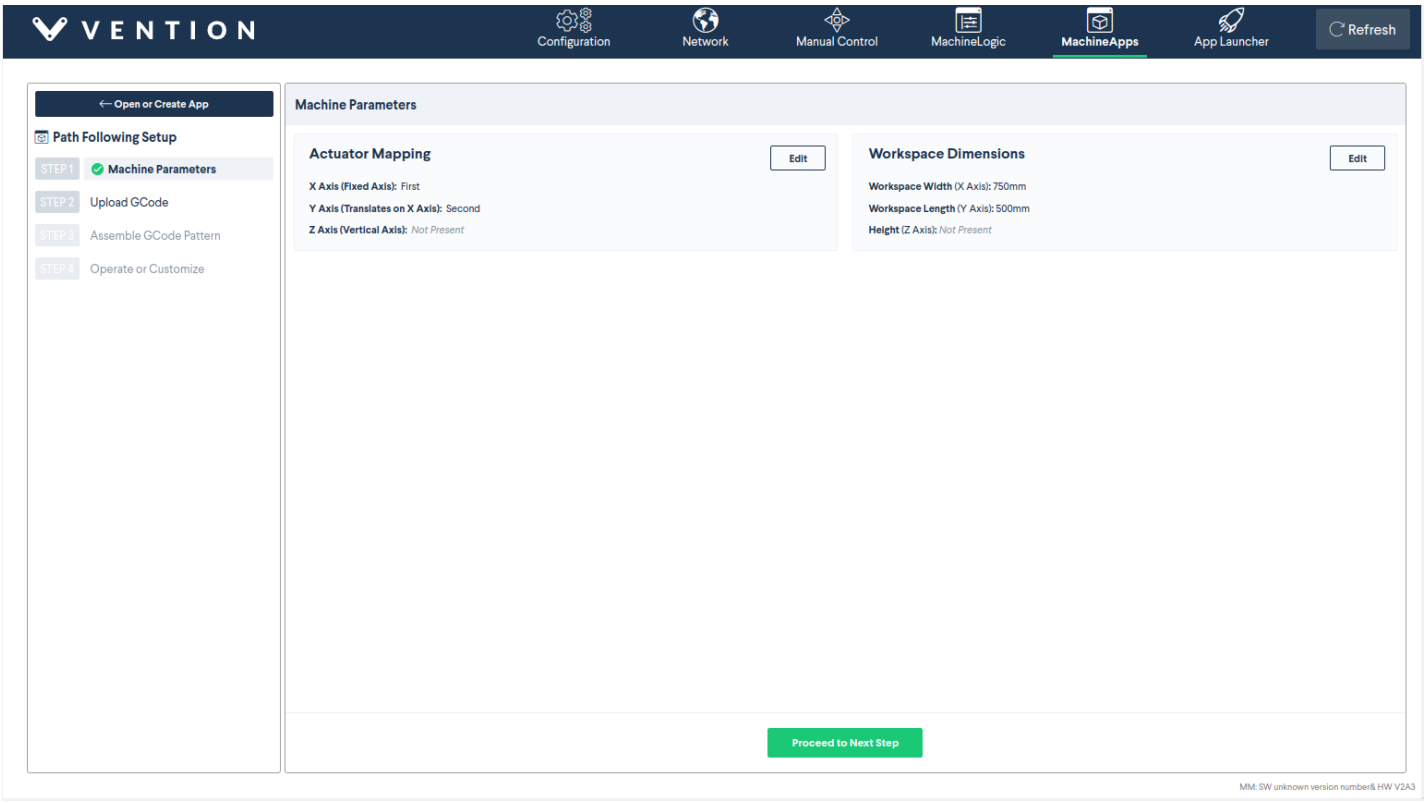
TIP: A great way to find this value is to go to the **Manual Control** tab. For each axis, send the axis to home and then to end. Record the current position of the axis. That value should be entered in this screen.



As you update the value in the textbox, you will see the 3D view of your workspace adjust accordingly on the right-hand side of the screen.

TIP: This 3D view can be **rotated with the left mouse button, panned with the right mouse button + drag, and zoomed with the mouse wheel.** At any point in time, you can select **Fit To View** to refocus your camera to the center of the screen.

When you are satisfied with your workspace dimensions, select **Done**. The modal will close, and you will be greeted with the following overview of your Machine Parameters:

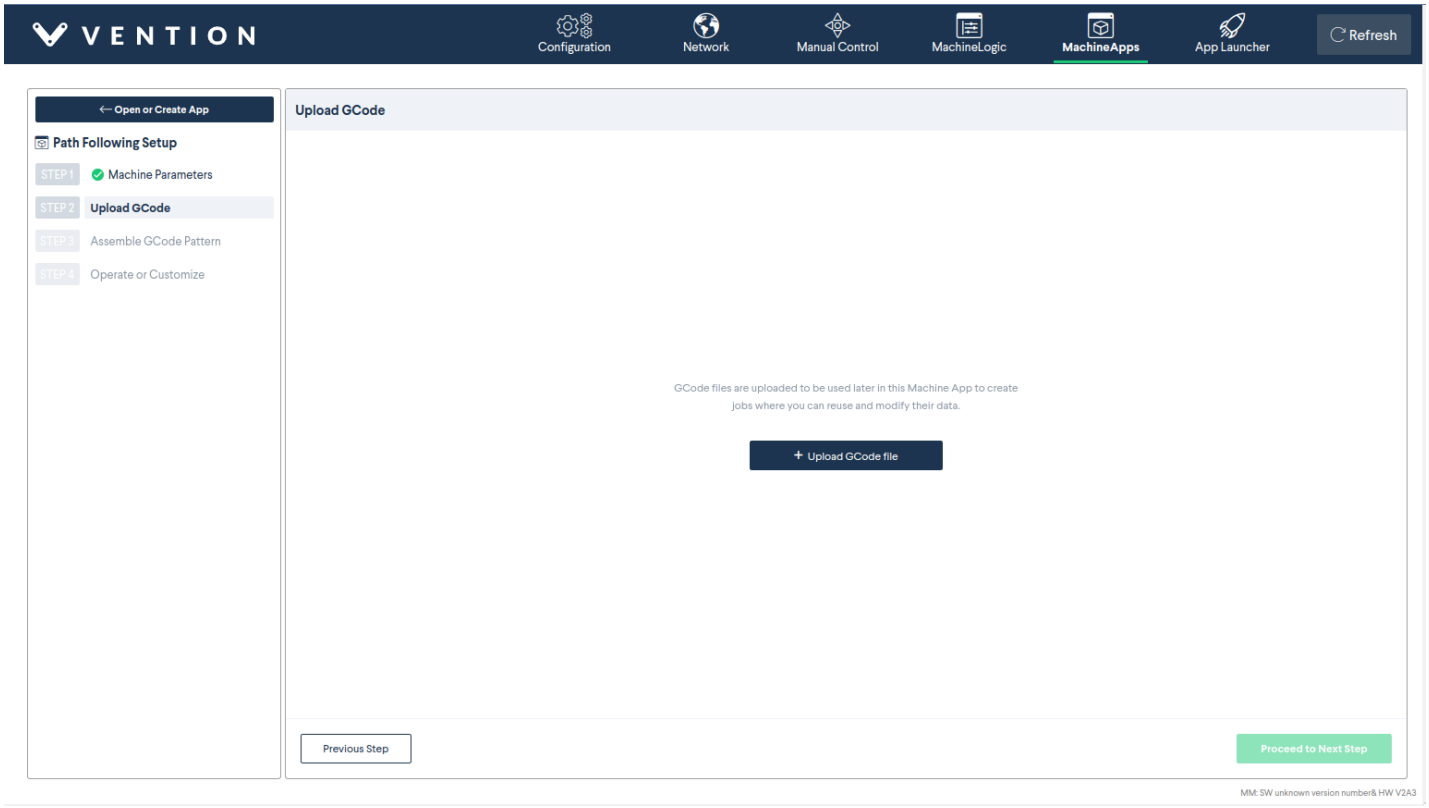


You may select **Edit** on either of these steps to modify them again. However, if you are satisfied, you can select **Proceed to Next Step** to begin uploading a file.

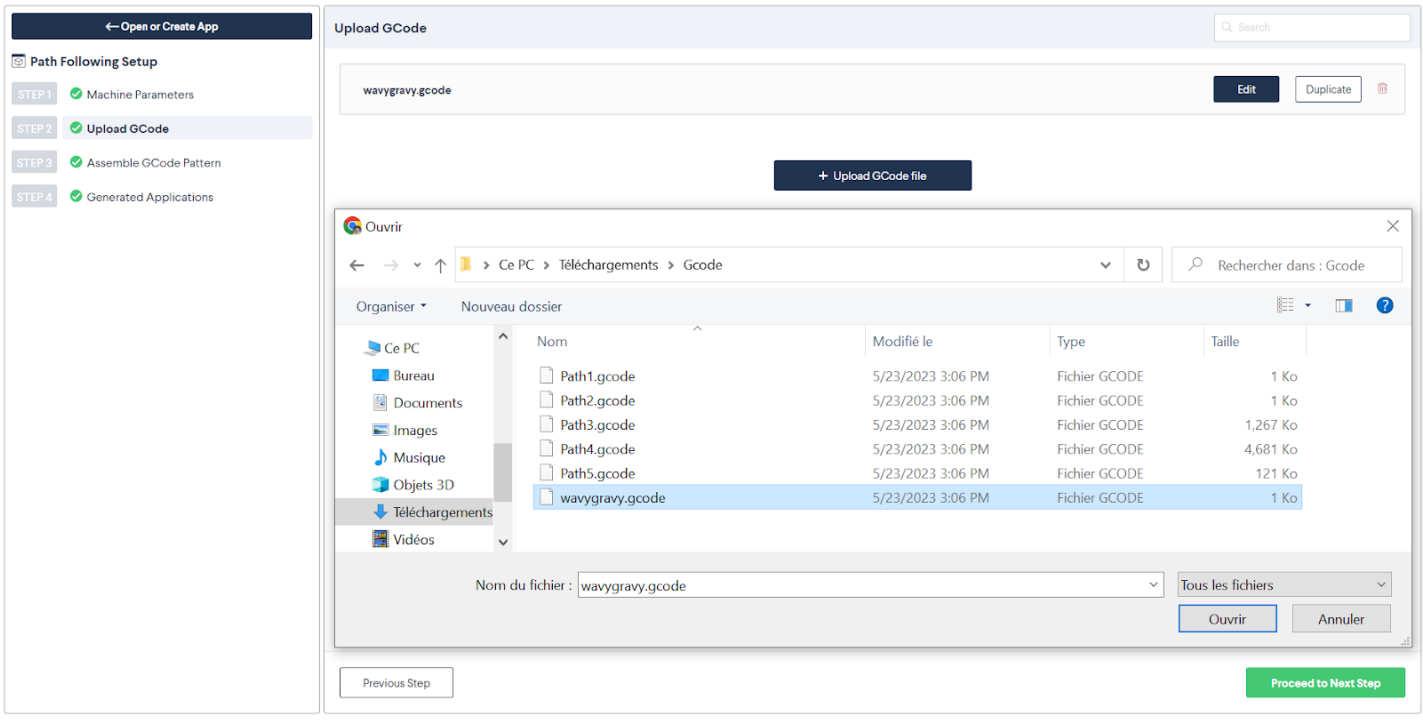
Upload

In this step, you will **Upload a File**. It is assumed that you already have a file that you wish to run.

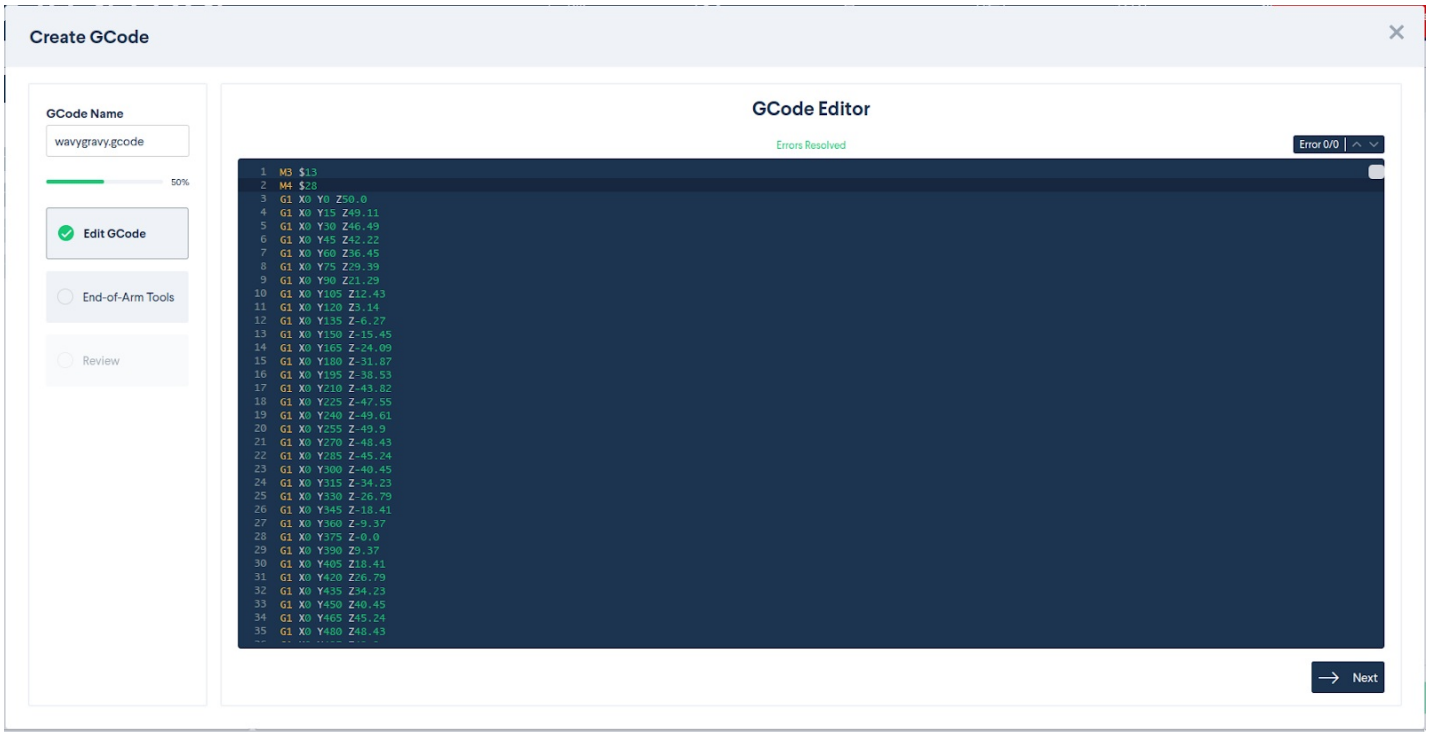
When you enter the step, you will be greeted by this screen:



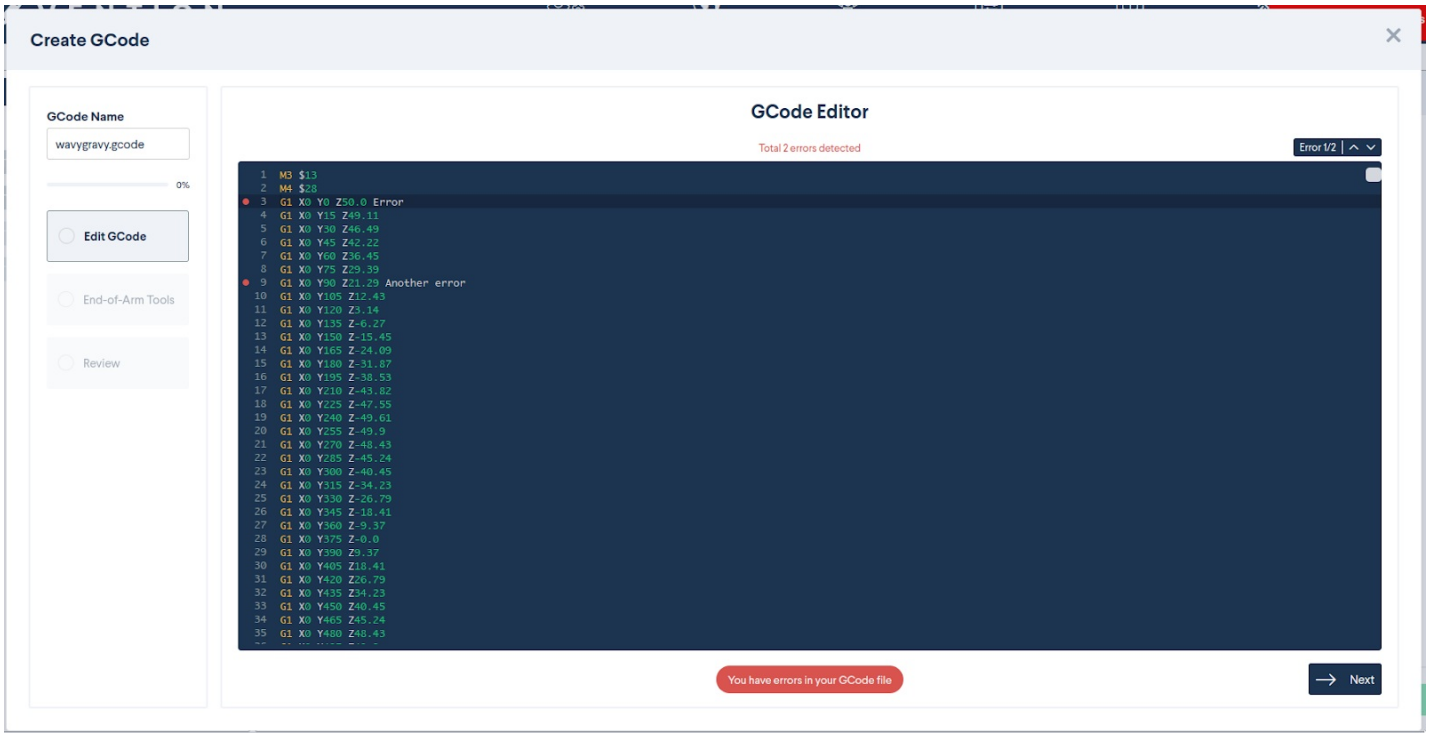
Select **Upload file** to get started. A file selector should appear:



If you cancel at this point or upload an unparseable file, nothing will happen. However, if you upload a valid file, you will be greeted with a text editor. As an example, I will upload “wavygravy.”



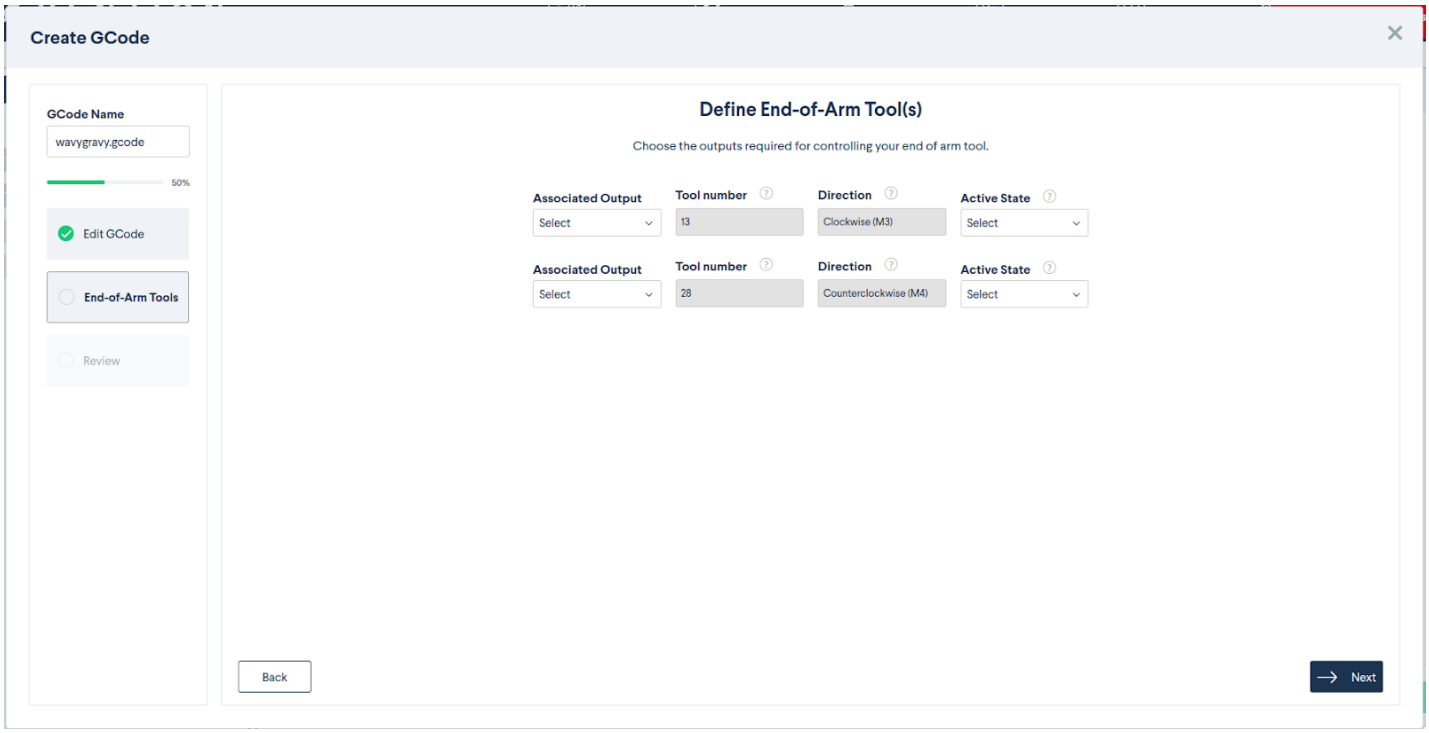
In this screen, you can modify the to your liking. If for some reason your contains a syntax error, you will be notified like so:



You will be unable to proceed to the next step while the errors exist. You can cycle between the errors using the **Up and down arrows** on the top right corner of the modal.

After all the errors have been resolved, select **Next** in the bottom right corner of the screen.

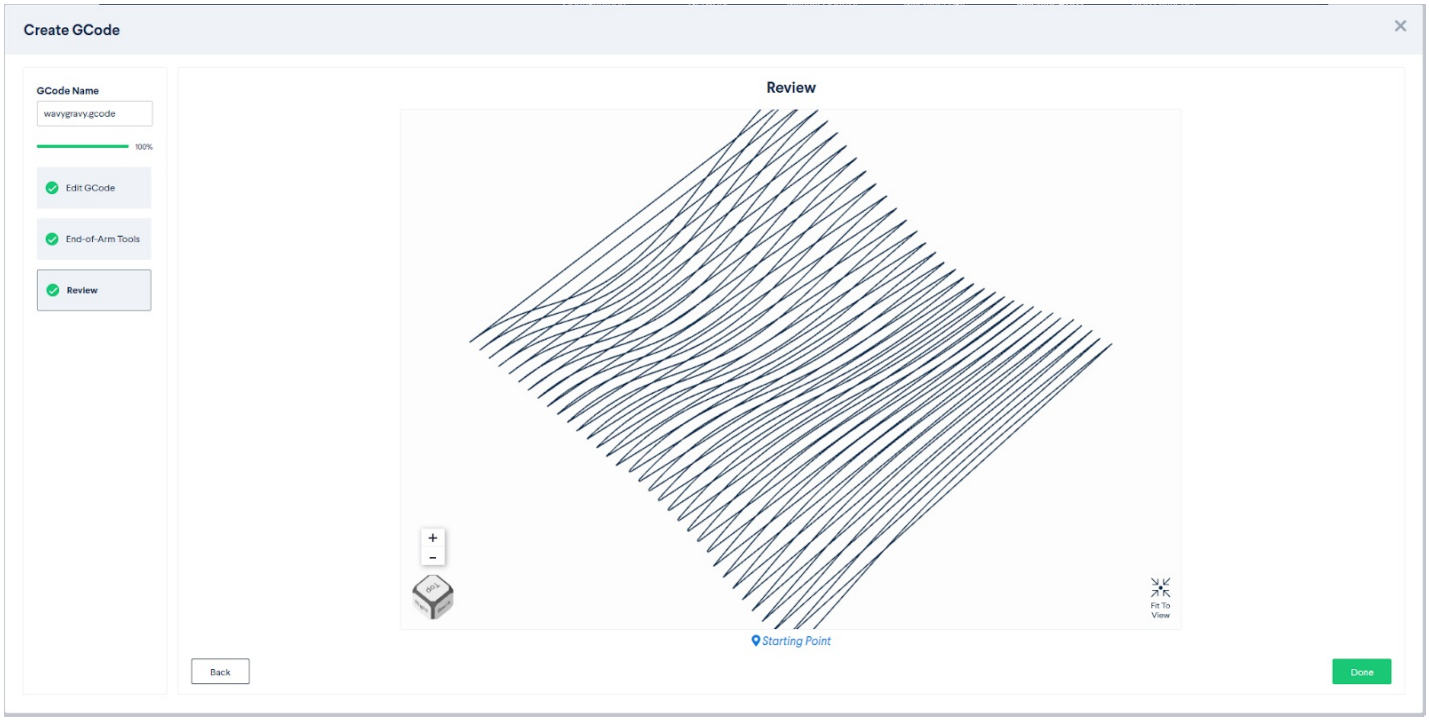
In the next step, you will **map your MachineLogic outputs to your tools** . As you may know, the M3 and M4 commands can be used to define your tools. You can then select these tools using the T command. In this step, we will ask you to map these tools that you defined in your to tools that you defined in your MachineLogic configuration:



- The **Associated Output** will be the output defined in your MachineLogic configuration.
- The **Active State** will define *what value must be written to the output for the output to be ON* . Some outputs are “On” when we set it high; others are “On” when we set it low. This is something to test on the “Manual Control” page if you are unsure.

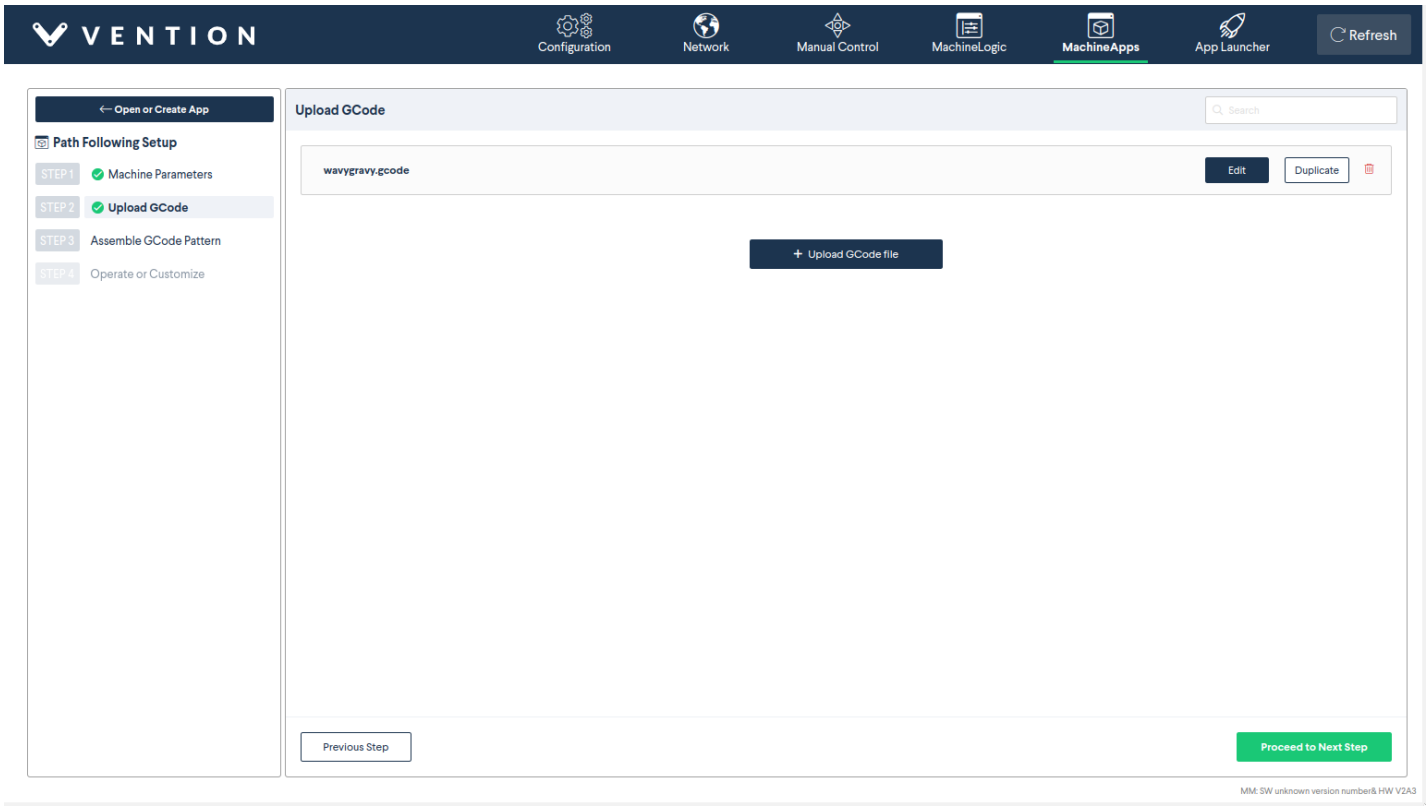
Once you have associated an output to each tool *and* defined the active state for each tool, you can select **Next** to proceed to the **Review step**.

In the **Review step**, you will have a 3D rendering of your file:



This is simply a visualization to confirm that you uploaded the correct file. The **Starting Point Indicator** defines the origin of the . When you are satisfied, select **Done** to complete your file upload.

After you select **Done**, the modal will disappear and you should see your in the list:

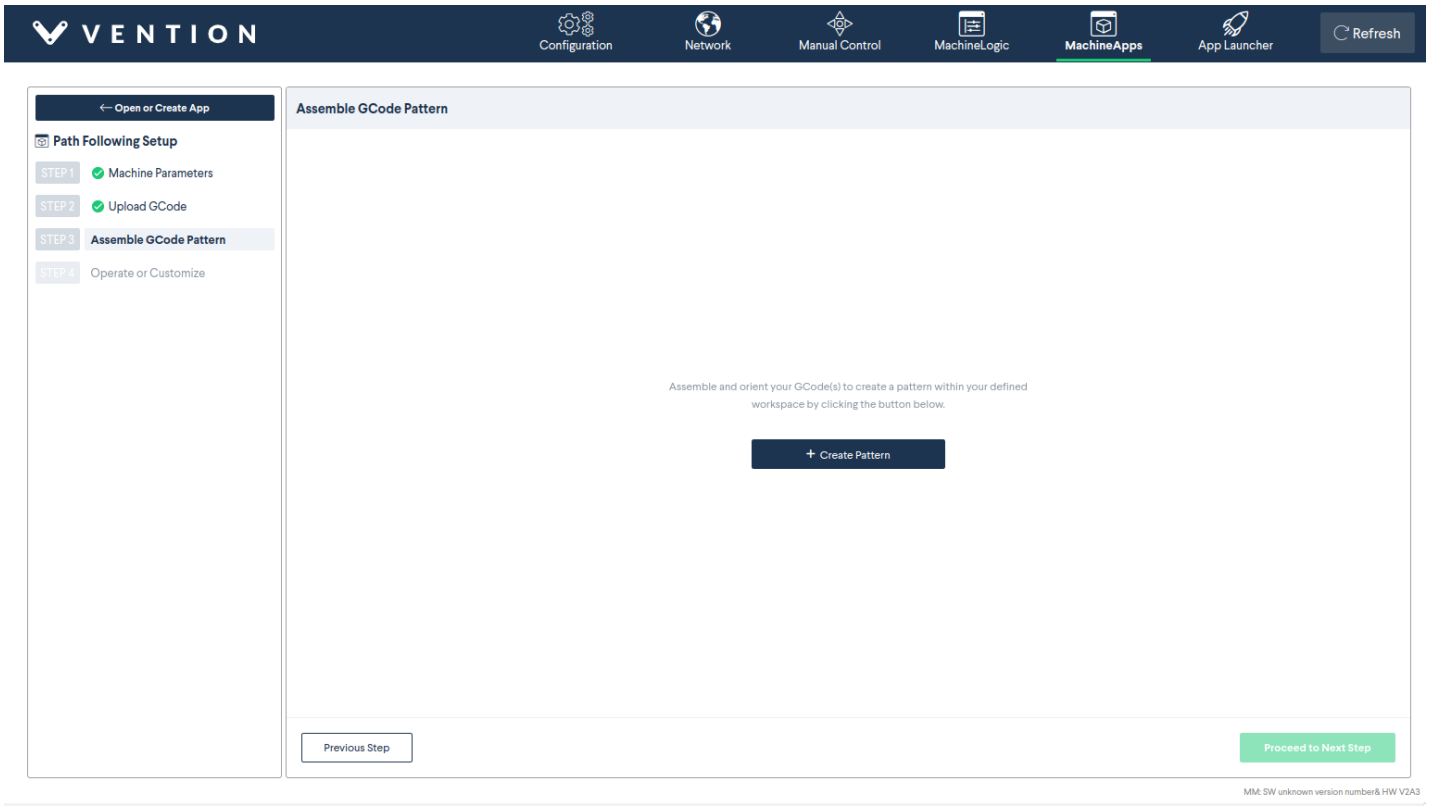


At this point, you may upload another file if you wish, or you may select **Proceed to Next Step** to continue.

Assemble G-code Pattern

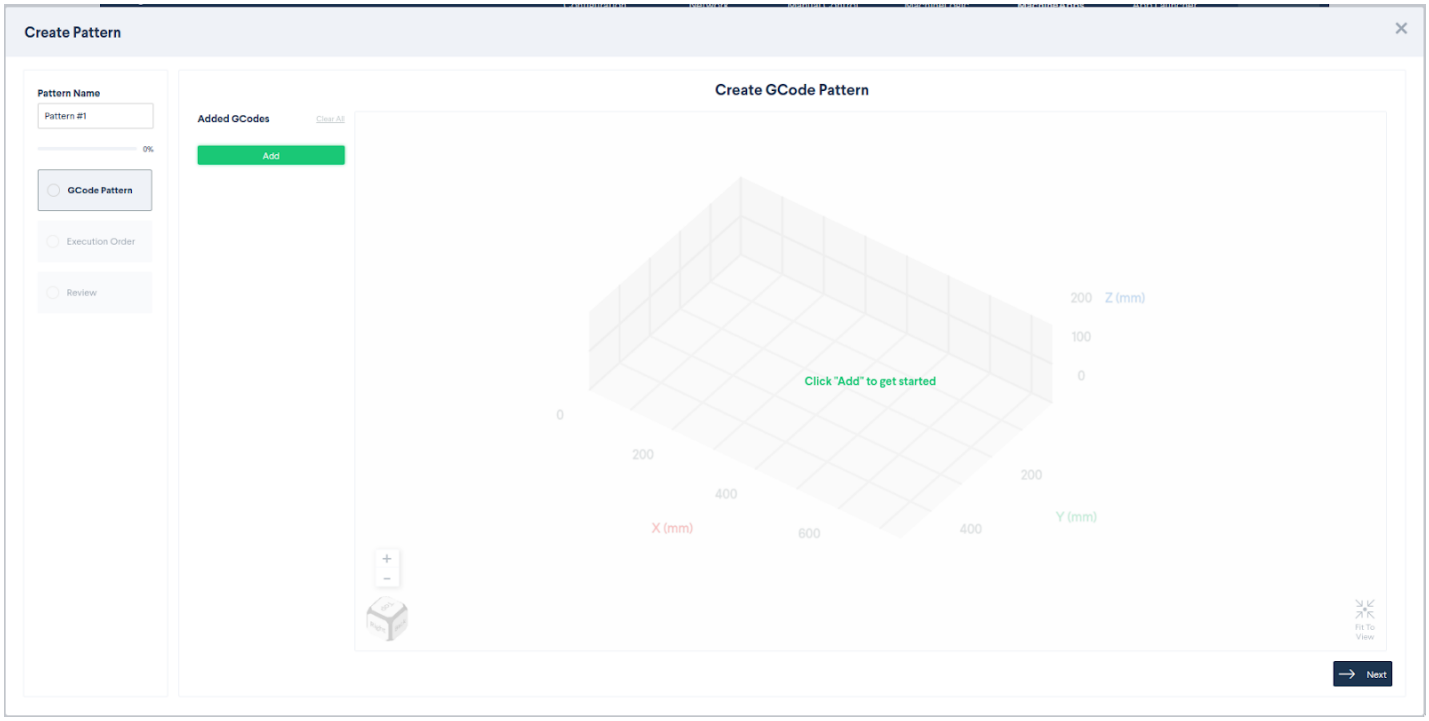
In the **Assembler G-code Pattern** step, you will arrange the G-code files that you uploaded in the previous step within your workspace. This workflow is especially useful if you plan to run multiple G-codes back-to-back.

When you first arrive at this step, you will see the following screen:



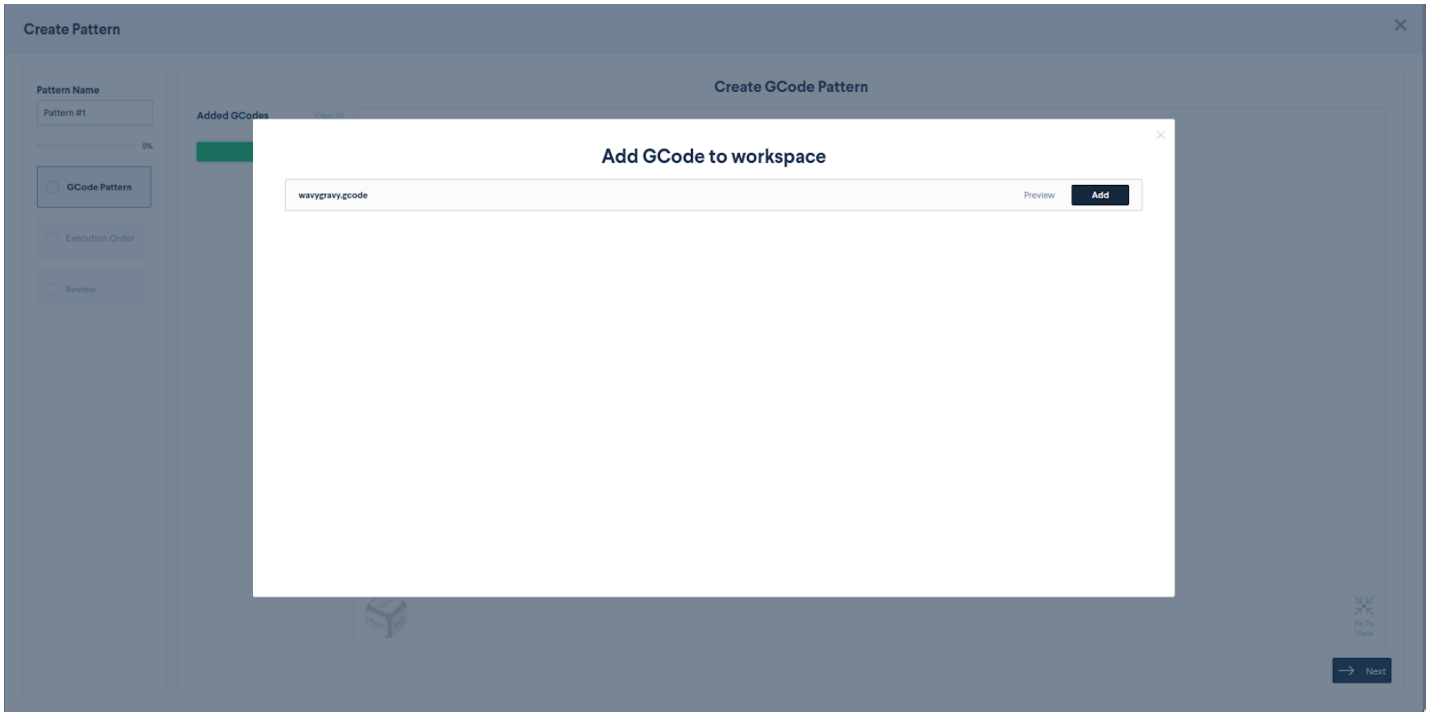
Select the **Create Pattern button** to begin a new pattern.

You will be greeted by the following modal:



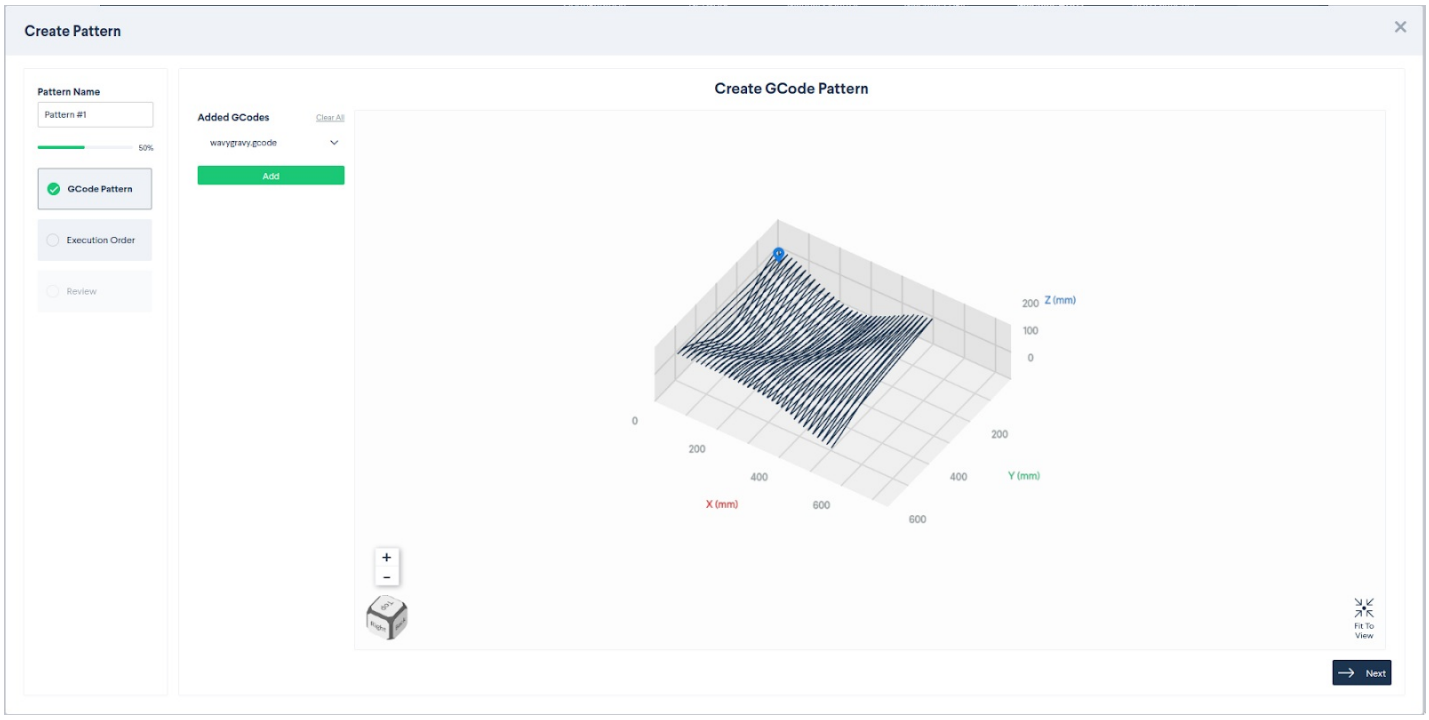
In the **Pattern step**, you will add and arrange your s within your workspace. First, select the **Add button** in the top left corner of the screen:

A modal will appear containing a list of the files that you've uploaded:

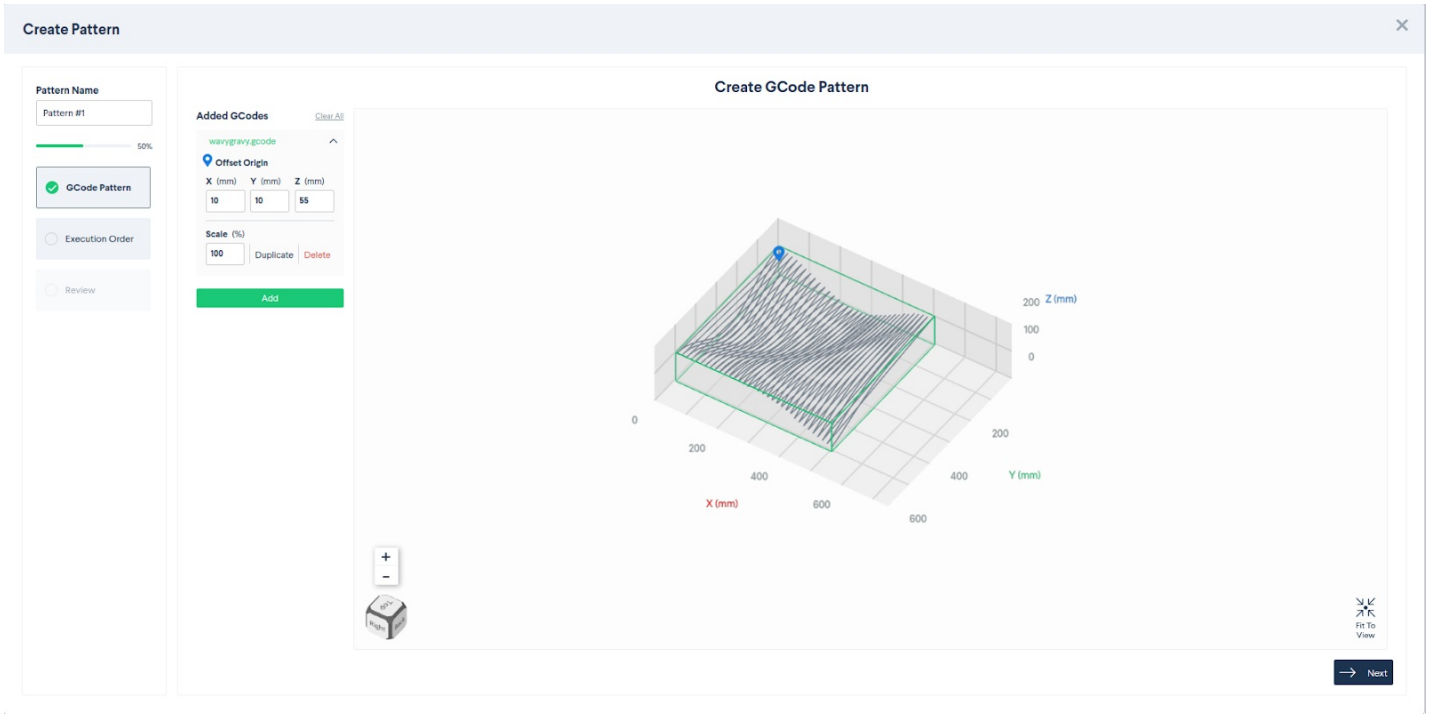


You can click the **Preview button** if you want to view the 3D render of that file.

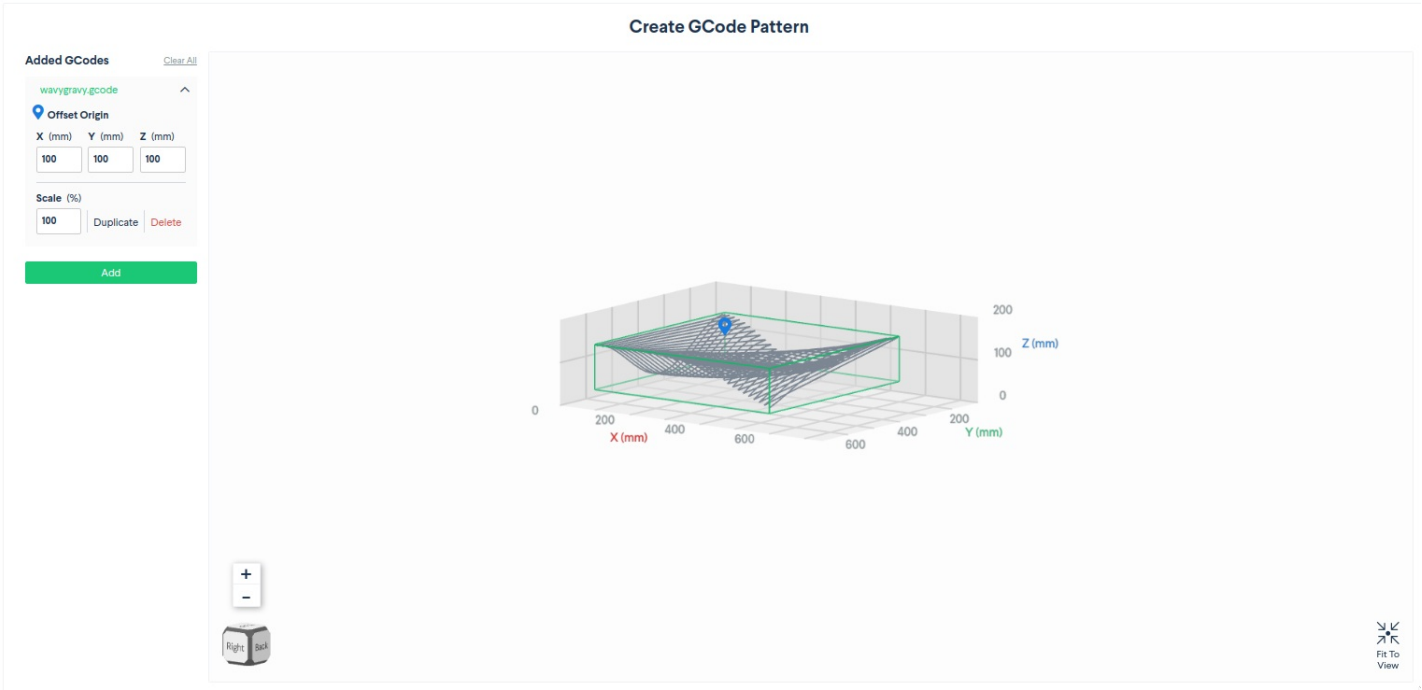
When you want to add the file to your pattern, select the **Add button**. After you click the **Add button**, the modal will close and you will see the pattern rendered in the 3D scene:



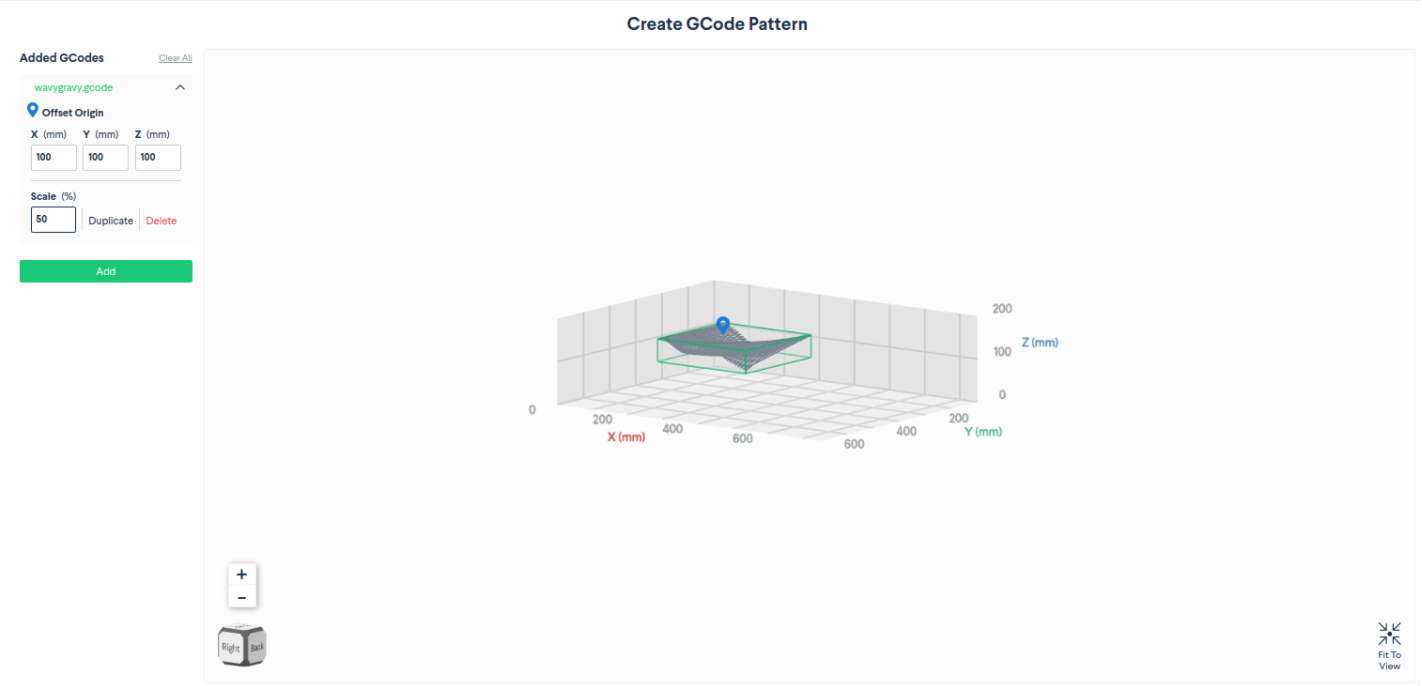
Select your file name on the left-hand side of the screen (e.g. wavygravy. in this example). The options will expand down from the name:



You can use the X, Y, and Z inputs to translate the file in 3D space:



You can scale the using the scale option:

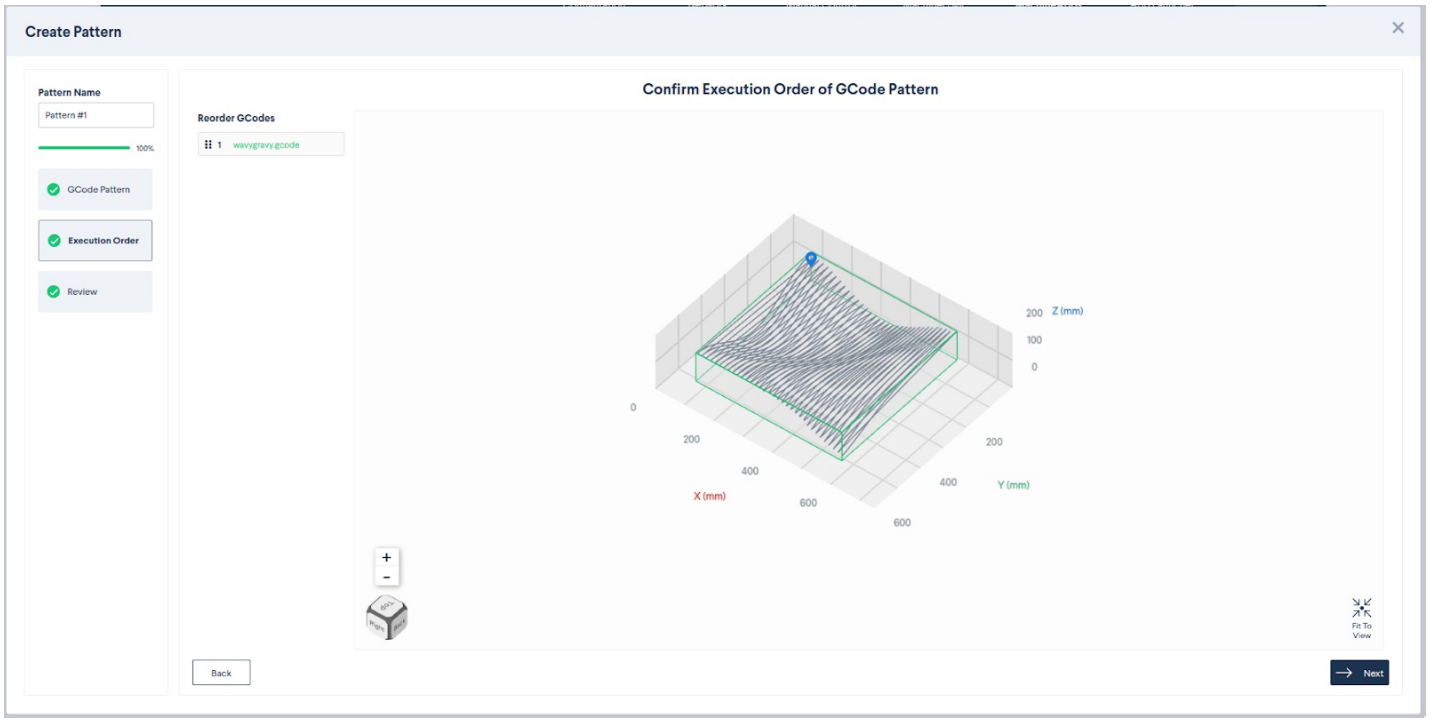


You can also duplicate or delete the file.

You may add as many files as you like to your pattern. The **Clear All** button at the top will delete all of the s in the pattern.

Once you are satisfied with your pattern, select **Next** at the bottom of the screen to proceed to the **Execution Order step**.

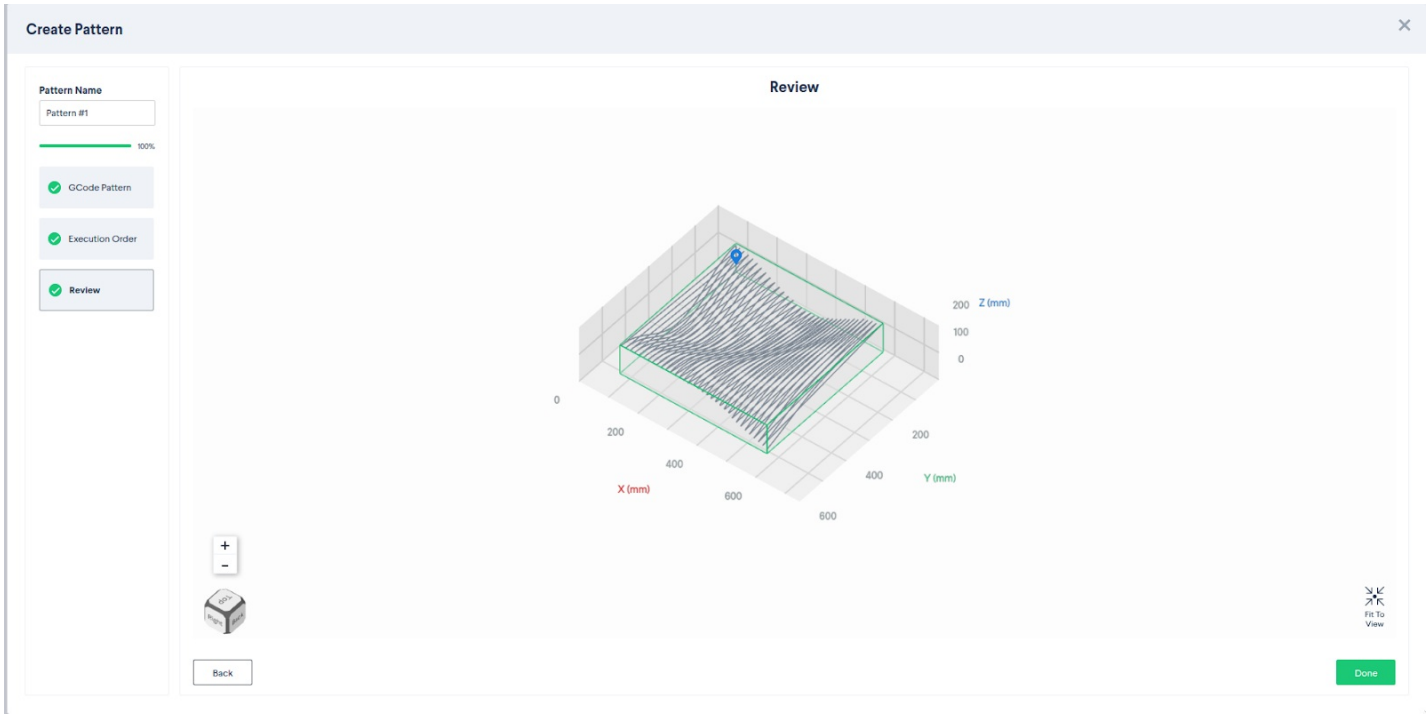
In the **Execution order step**, you will arrange the order in which your files will be run. For example, if you want to run a circle and then a square back-to-back, you can select which one runs first here.



NOTE: If you have a single file, *you can safely skip this step.*

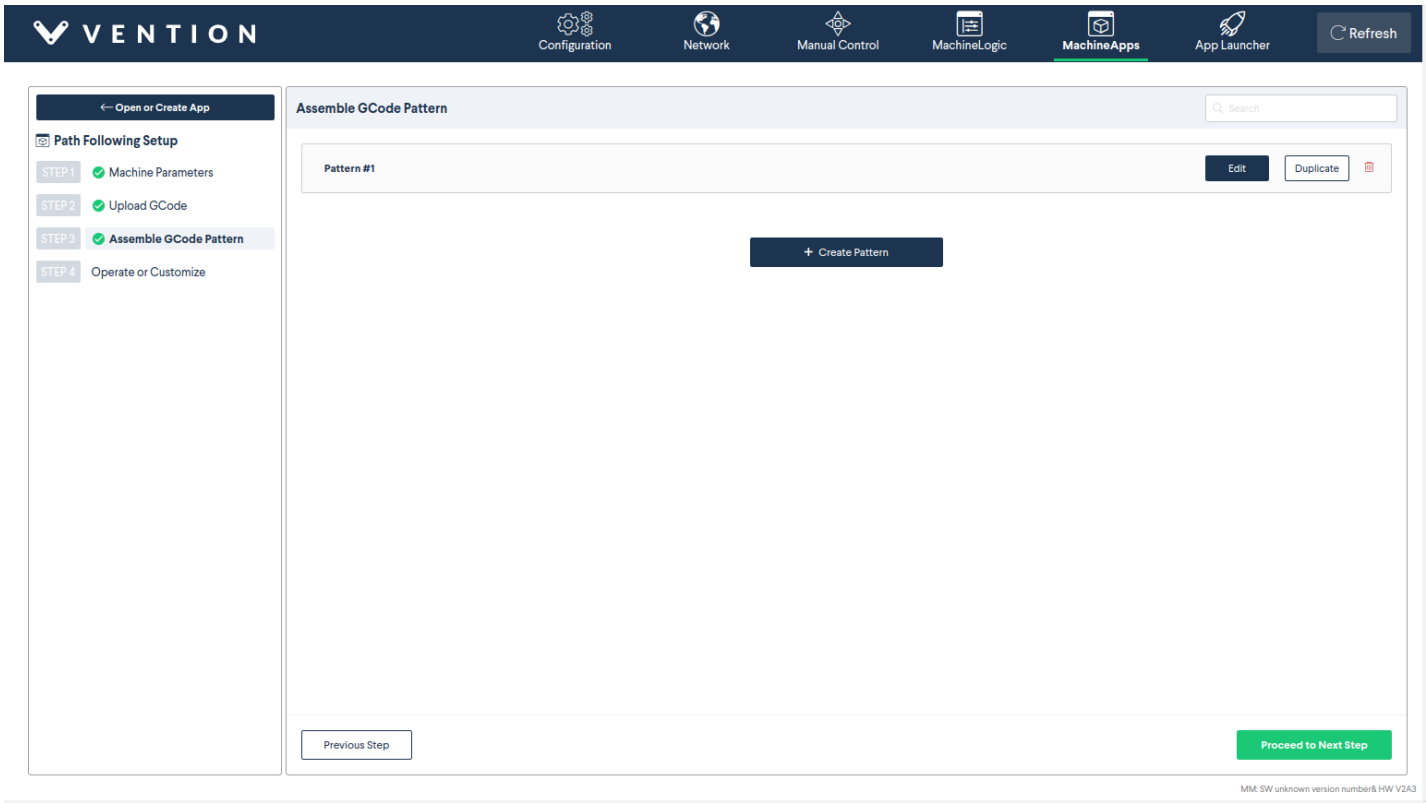
When you are satisfied with the order of your files, select **Next** to get to the **Review step**.

In the review step, you will simply see a 3D render of your pattern:



When you are satisfied with how it looks, select **Done** to complete your pattern.

After selecting **Done**, the modal will close and you will see your pattern in the list of patterns:

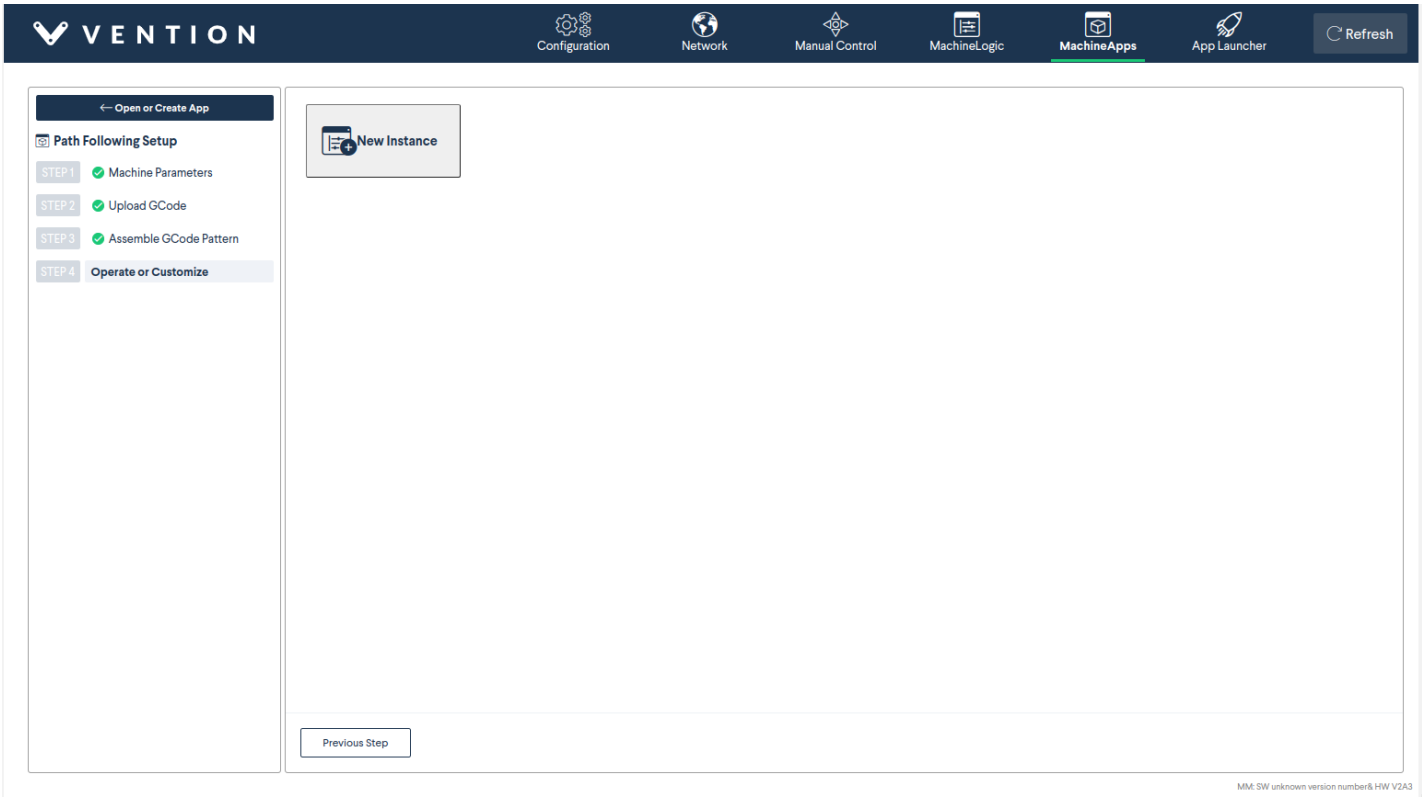


At this point, you can either elect to create another pattern using the **Create pattern button**, or you can **Proceed to Next Step** to begin customizing your application.

Operate or Customize

In this step, you will create an **Application Instance** that can be used to run any one of the patterns that you assembled in the previous step. Conveniently,we provide you with hooks within your Path Following Application in which you can safely execute custom behavior. The 3 hooks are:

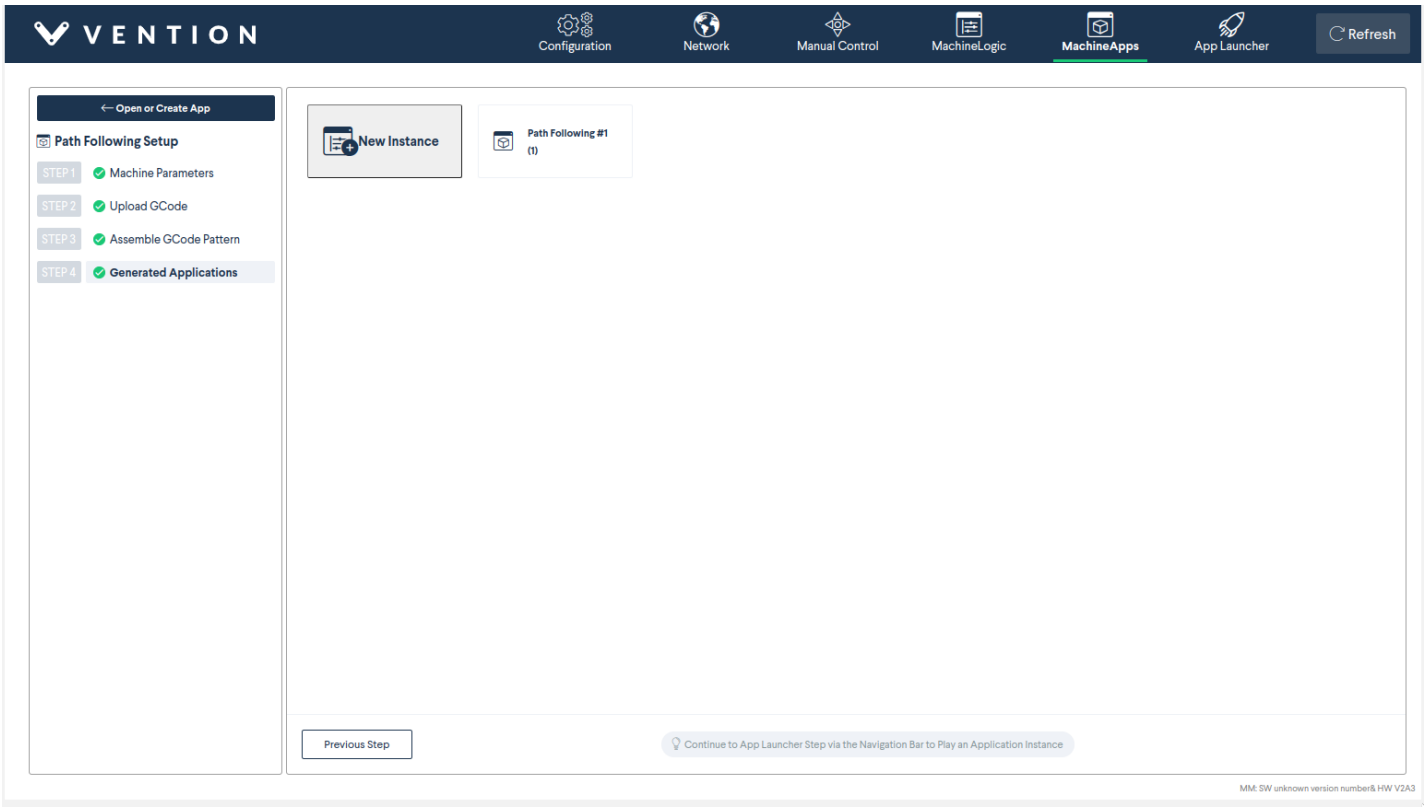
- **Application Start**: Run this MachineLogic code *before* anything else in the Path Following application.
- **Between G-codes**: Run this MachineLogic code between each one of your G-code paths.
- **Application End**: Run this MachineLogic code *after* you run everything else in the application.



When you first enter this step, you will see the view on top.

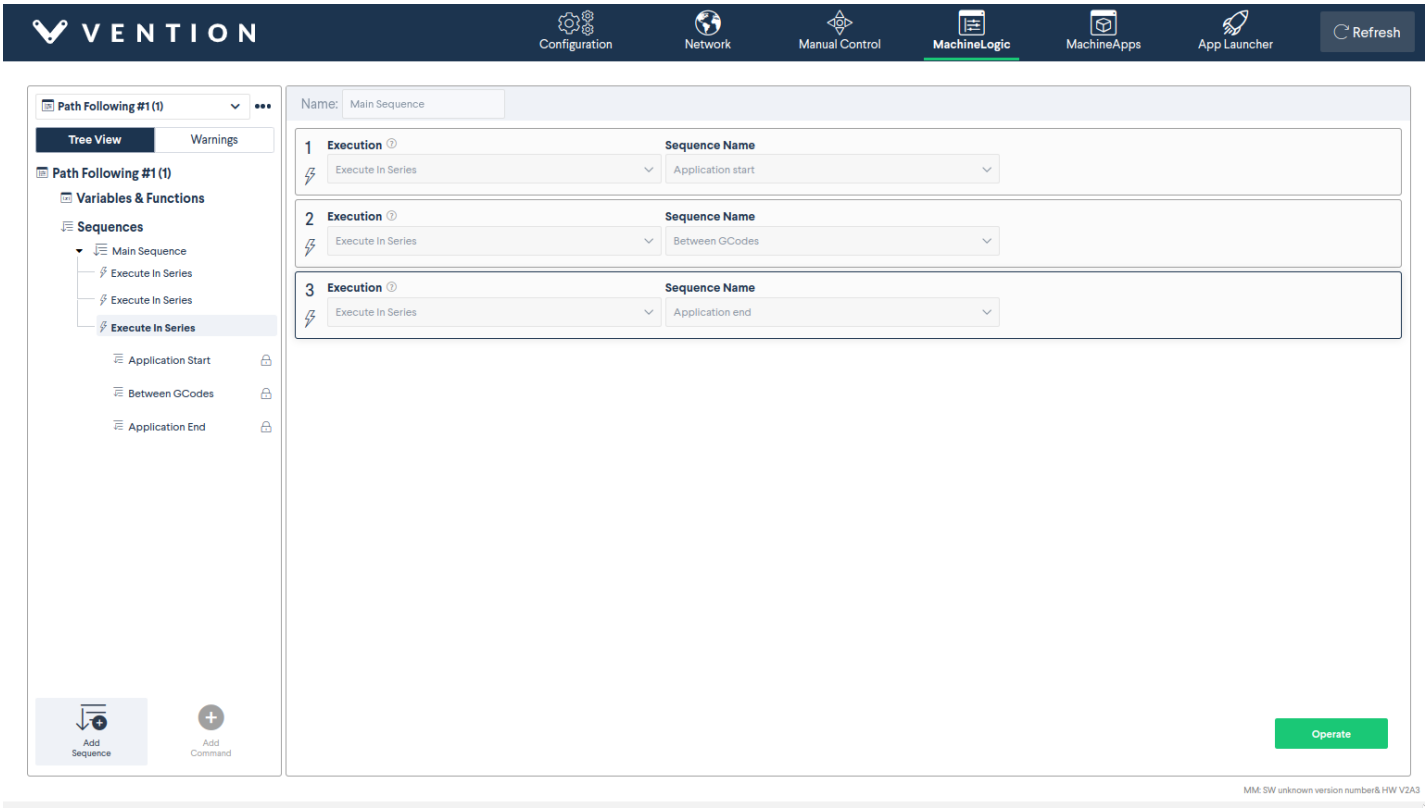
Select **New Instance** to create a new Path Following Application.

TIP: Unless you are doing something very specific, you will only ever need a single instance.



After you create it, select the card of the instance that you've created (e.g. "Path Following #1" in our example).

You will be brought to a highly-modified MachineLogic program view:



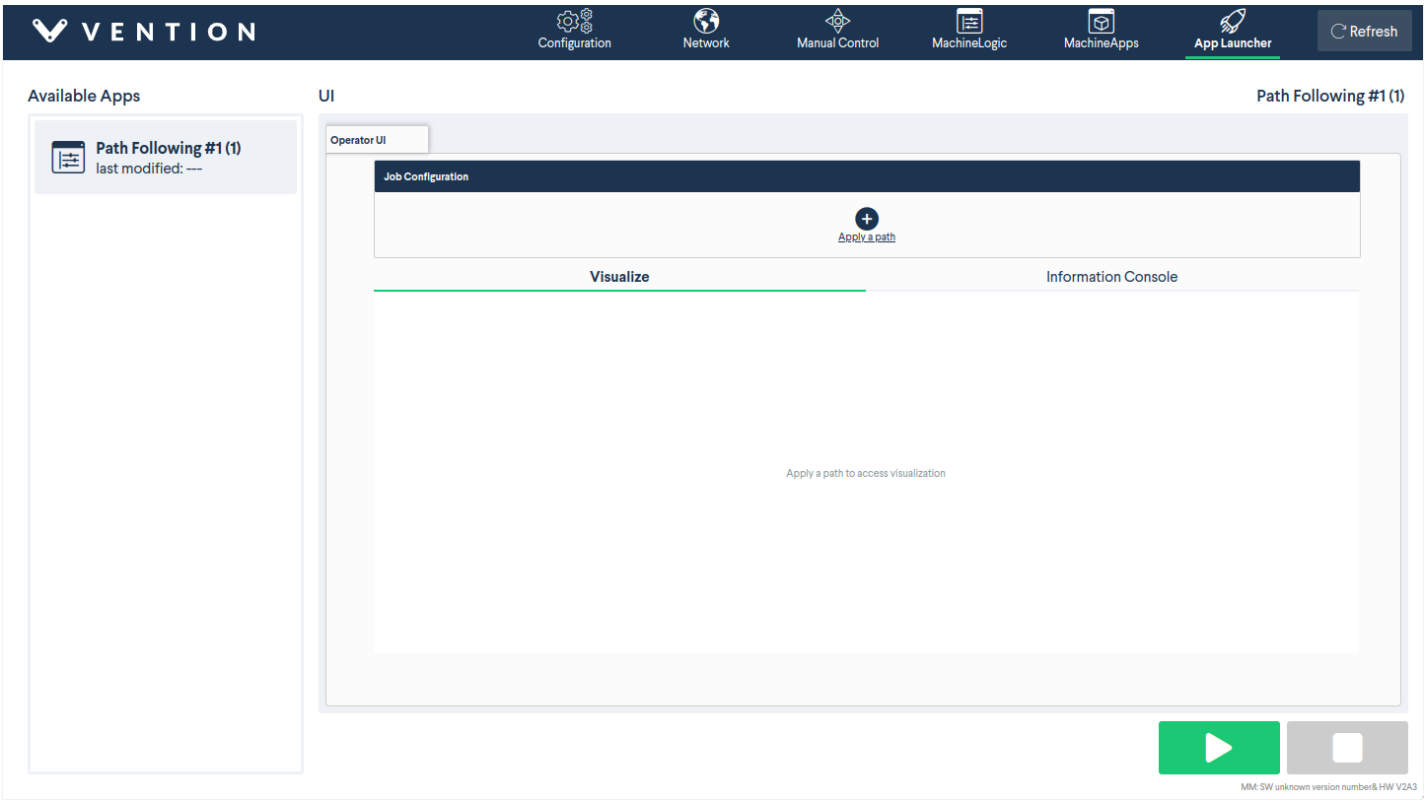
As described previously, you can modify the **Application Start**, **Between s**, or **Application End** sequences to insert custom behavior at those points. You may also add variables, functions, new child sequences, and whatever else you like. However, the **Main Sequence** is completely unmodifiable, as this contains the core of the Path Following Application.

TIP: This step is entirely optional.

Once you are satisfied with your custom behavior, select the **Main Sequence** and thenselect the **Operate button** in the bottom right corner of the screen. This will take you to the Operator UI.

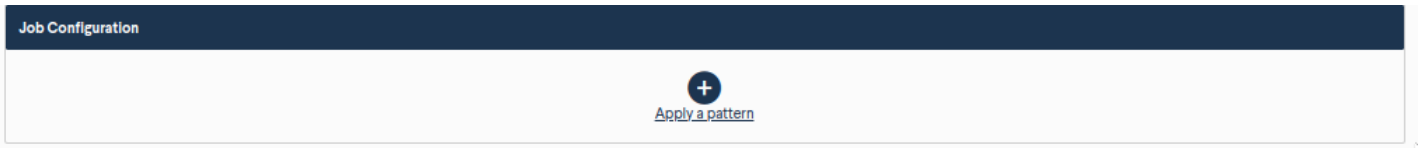
Operation

When you select **Operate**, you will be brought to the **App Launcher tab** at the top of the page. You will be greeted with the following screen:

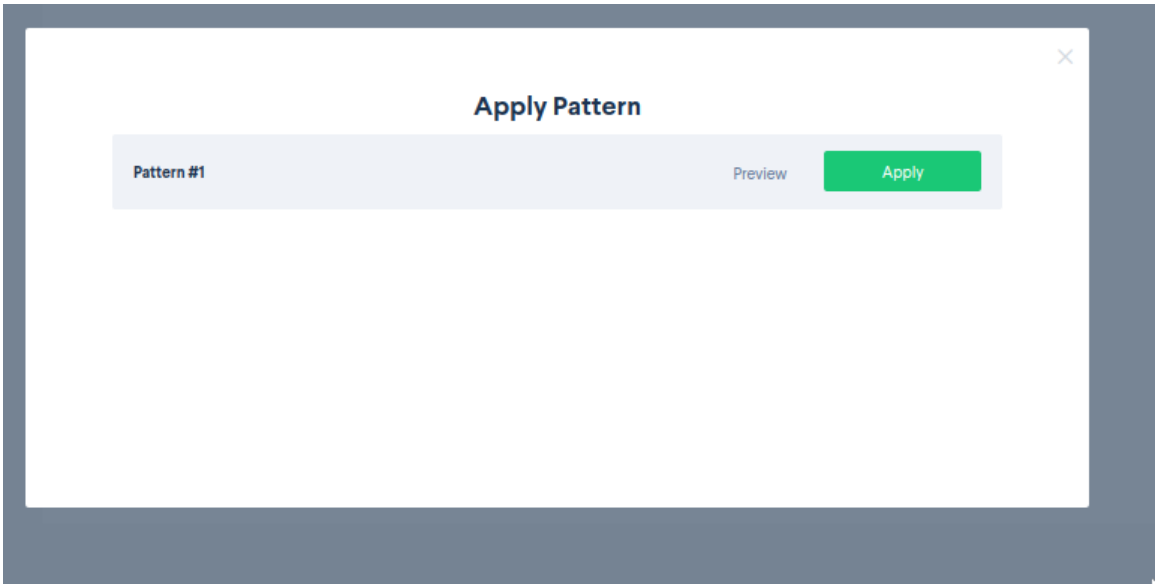


If not already selected, please select the Path Following Application in the left-hand pane that you previously created in the **Operate or Customize** step.

At the top, you will see the **Job Configuration box**. This box will allow you to select a pattern that you assembled in the **Assembler Pattern step** and play it on this Path Following Application.



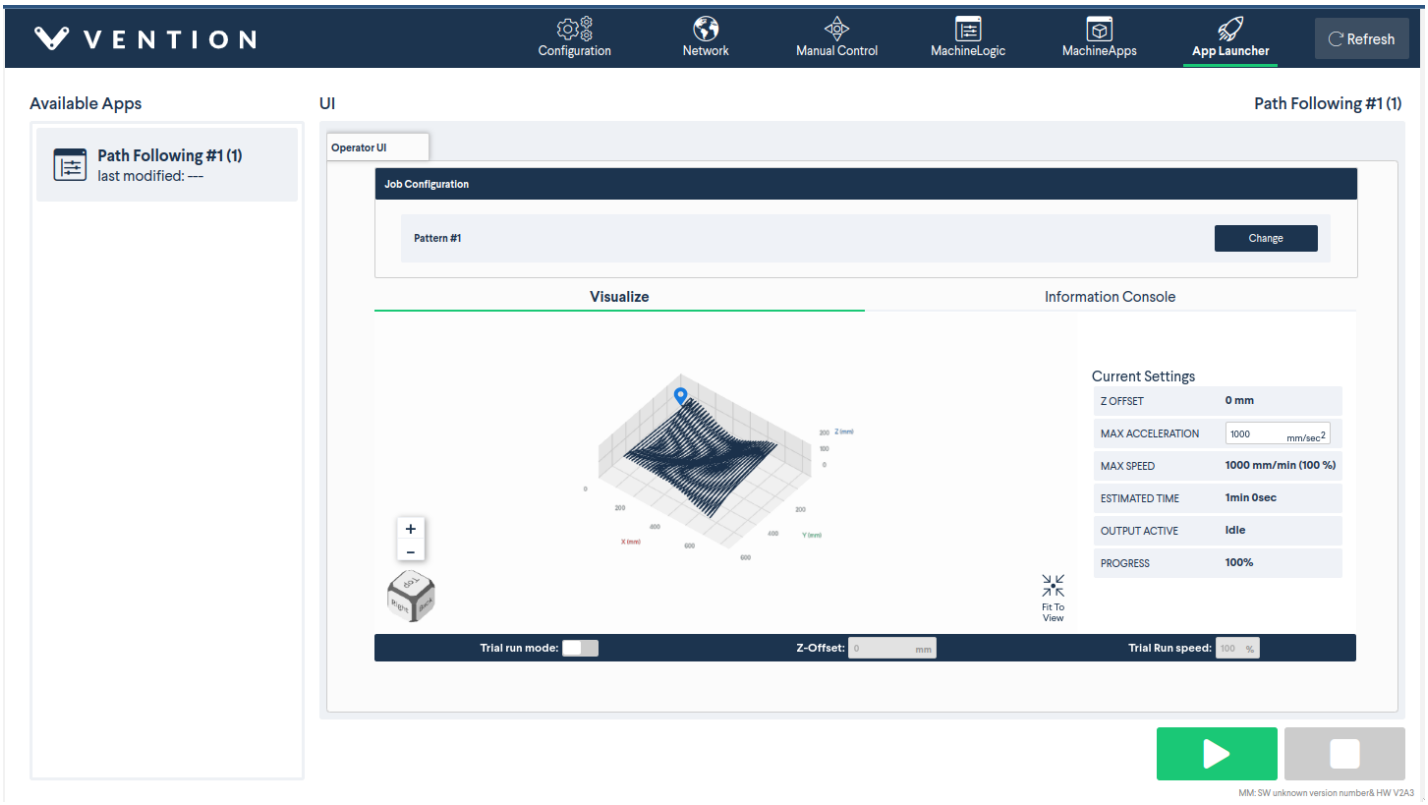
If you select **Apply a pattern**, you will see the following modal:



You can preview the pattern using the **Preview button** if you like.

If you would like to run that pattern, select **Apply**.

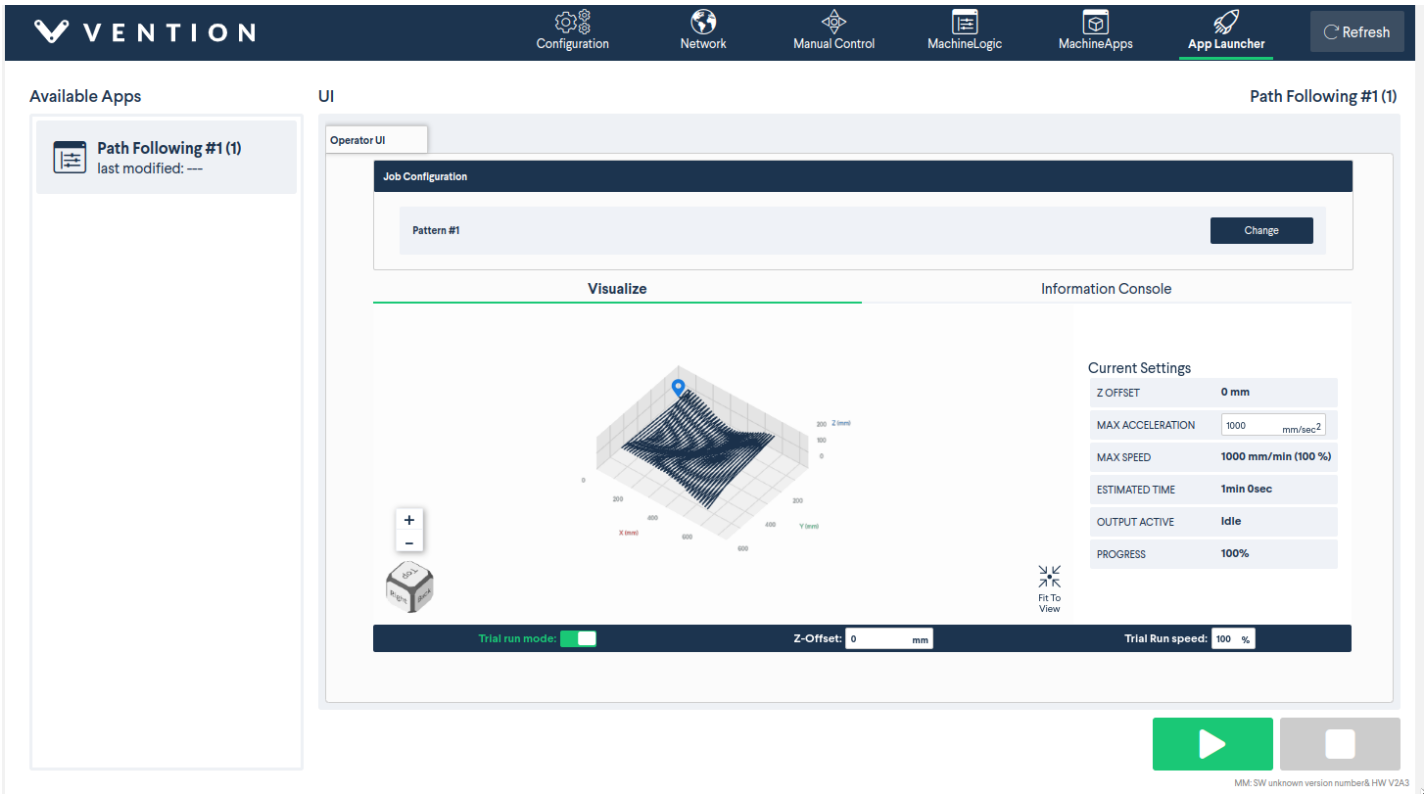
After applying the pattern to the application, the UI will populate:



On the left side, you will see the 3D render of your pattern. This is just for inspection purposes. On the right side, you will see your **Current Settings**. In this section will be:**Z Offset**: The Offset in Z that your file will operate at. This can ONLY be set when in trial mode.

- **Max Acceleration Input**: You can enter a number in this input to set the max acceleration for your pattern.
- **Max Speed**: This is the maximum speed in mm/min discovered from the files that are in your pattern.
- **Estimated Time**: This is an estimate of how long it will take to run the file given your current settings
- **Output Active**: If an output is currently triggered, this will be true, otherwise it will be false.
- **Progress**: A percentage of how many lines you have completed.

At the bottom of the page, you will see the **Trial Run Panel**. You can select **Trial run mode** to enter trial run mode. In this mode, you can enter a Z offset and a speed percentage at which you would like your pattern to operate:



TIP: Trial run mode is only useful for debugging purposes.

To play your application, select the big green **Play button** at the bottom right of the screen. As your Path Following Application runs, you should see the 3D render being updated in real-time, and the **Progress indicator** increasing over time.

Below is a quick overview of the operations that will happen when you click play:

1. Application Start custom behavior will execute
2. Your actuators will home in the order Z, Y, X
3. The machine will perform a move relative combined in XY to get to above your first start position
4. If Z is present, the machine will descend in Z
5. The first file in the pattern will begin
6. When the file finishes, the Between s custom behavior will run
7. The machine will then move to the starting position of the next file in the pattern. WARNING: This is a direct move! If you expect that you might run into something, please HOME the Z-AXIS using custom behavior beforehand
8. Repeat steps 5, 6, and 7 until all files in the pattern have been run
9. When all files in the pattern have been run, execute the Application End custom behavior
10. Finish

To stop your application, select the big blue **Stop button** at the bottom right of the screen.