




(40 pts) Approx. 3 days

The third option in this unit is to learn how to program G-Code. This is the most mathematical of our options, and it will allow you to program very specific tool paths for machines like our CNC Plasma cutter, CNC Router, and the Tormach mill. We'll start nice and simple here using the machine to draw pictures with G-Code, but once you get a design you like we can turn it into a physical product using one of our G-Code driven tools!

1. Start by watching the introductory videos on our website, *G-Code Overview*, *Basic G-Code*, and *Using the CNC Machine*. Take at least a full page of notes on the ideas presented; make sure your notes include details about how G-Code commands G0, G1, and G2 work! Also include details on uploading your G-Code to the CNC machine.
2. Next, create each of the following G-Code challenge pictures by first drawing out your idea by hand on graph paper, then creating the G-Code to draw the image.
  - a. Your first and last initials
  - b. A star
  - c. A smiley face
3. For each of the images you should first draw it out carefully on graph paper using only circles (or parts of them) and straight lines. Think about how the machine will have to move to create the image you are drawing.
4. Then, when your drawing is finished you need to think about how the pen will move with the machine and create each line using a G0, G1, or G2 command. You can take the coordinates right from the graph paper!
5. Now, write your G-Code in Microsoft Word or Google Docs. You'll need to save your document to your jump drive when it's complete
6. Upload your G-Code to the CNC machine using the process described in the *Using the CNC Machine* presentation.
7. Have our CNC machine draw out the patterns you've created with G-Code. Make any adjustments needed to perfect your images.

Part 3: Tasks	5 points	4-3 points	2-1-0 points
 G-Code Notes	+ You took a full page of notes on G-Code and the use of our CNC Machine + Your notes include details on how to use the G0, G1, and G2 commands	- Your notes are less than a full page - Your notes do not include details on the G0, G1, and G2 commands	- Very brief or no notes in your engineering notebook
	<b>15-11 points</b>	<b>10-5 points</b>	<b>4-0 points</b>
 Plan Project Assembly	+ You drew out your design by hand for all 3 designs + You wrote out your G-Code for each line in the design	- Your plan is missing for one of your three designs	- More than one set of plans is missing
	<b>20-15 points</b>	<b>14-10 points</b>	<b>9-0 points</b>
 Create G-Code Drawings	+ You wrote your G-Code on a computer and uploaded it to the CNC Machine + You created all 3 of your drawings from your G-Code	- You only created 2 drawings with your G-Code	- You made fewer than 2 drawings

