Synthetos gShield + Arduino with grbl
Stepper Motors

Four Phase Unipolar Stepper:
https://learn.adafruit.com/all-about-stepper-motors
3-Axis CNC Machine
Terminology

• NC – Numerical Control
• CNC – Computer Numerical Control
• CAD – Computer Aided Design
• CAM – Computer Aided Manufacturing
G - Code Programming

- G – Code Programming
- Originally called the “word address” programming format
- Processed **sequentially, one line** at a time
Common Format of a Block

Sequence #

Individual Words

Preparatory Function

Dimension Words

Feed Rate

Spindle Function

Tool Function

Misc. Function

N50

G90 G01

X1.40 Y2.25

F10

S1500

T01

M03
G Word

• **G words or codes** tell the machine to perform certain functions.
• Most G words are modal which means they remain in effect until replaced by another modal G code.
Common G Codes

• G00 – Rapid positioning mode - move along the shortest route to the programmed X,Y,Z position. Usually NOT used for cutting.

• G01 – Linear interpolation mode - move along a straight-line path at programmed rate of speed.

• G02 – Circular motion clockwise (cw)
• G03 – Circular motion counter clockwise (ccw)
Common G Codes ..

- G17 – XY plane
- G18 – XZ plane
- G19 – YZ plane
- G20 – Inch Mode
- G21 – Metric Mode
- G28 – Return to axis machine zero (go home)
Universal G-Code Sender

https://github.com/winder/Universal-G-Code-Sender