

Creating a Plaque/Sign using the BoxZY CNC Mill



Rev 1.0

October 11, 2016





ALWAYS

- Read the BoxZY operation manual prior to using the BoxZY
 - General manuals
 - <http://boxzy.dozuki.com/Guide/1.3+Using+your+BoXZY/110>
 - CNC Milling specific manual
 - <http://boxzy.dozuki.com/Guide/CNC+Milling+with+BoXZY/134>
- Wear EYE protection
- Wear EAR protection
- Turn off the BoxZY when not in use
- Use the Emergency Stop – if you hear or see anything that does not look correct

NEVER

- Never place your hands or other body parts inside the BoxZY while it is operating
- DO NOT LEAVE BOXZY UNATTENDED
- NEVER hit Z home button when anything in on build plate OR attachment is attached (boxZY software, discussed in detail below)

CNC Mill a Wood Plaque/Sign

Overview

This guide will step you through creating and milling a sign or plaque using BoxZY. An example of a wood plaque is below – STEM Shack Sign with NCAC Logo. This sign takes 10-15 minutes to design and approximately 35-45 minutes to mill (carve).



BoxZY is a versatile machine which enables one to mill, 3D print and laser engrave a variety of materials and designs. Learn more here - <http://www.boxzy.com/>

BoxZY's maximum millable (carvable, useable area) are is 165mmx165mm (approx. 6.5"x6.5").

Suggested Sign Sizes

- (1" or ½") x 4 x 9.5"
- (1" or ½") x 6 x 9.5"
- (1" or ½") x 8 x 9.5"

CNC Mill a Wood Plaque/Sign

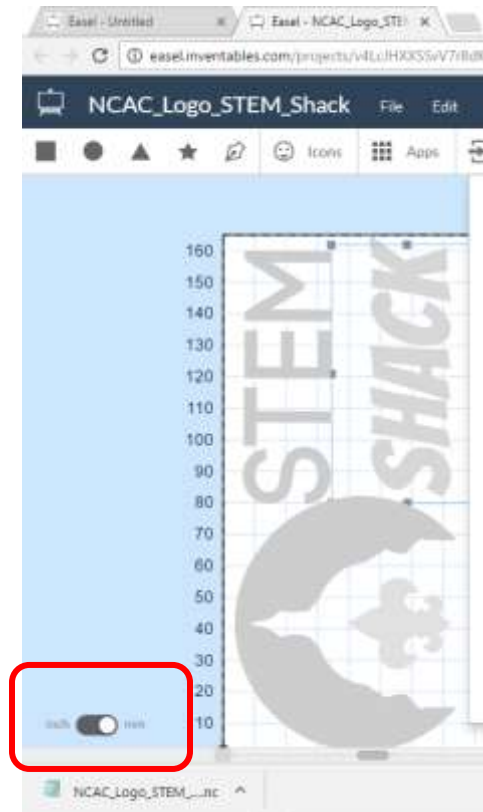
Step 1 – Setup Easel (CAD/CAM)

There is a plurality of tools one can use to design your sign. Generally speaking you will need to use a Computer Aided Drawing (CAD) tool to design the sign and then a Computer Aided Manufacturing (CAM) to generate the toolpath (g-code) which determines and directs how the design is actually carved.

We recommend using either Inventable's Easel or Autodesk's Fusion 360 – both of which are free to students/non-commercial users.

For this sign we will be using Easel.

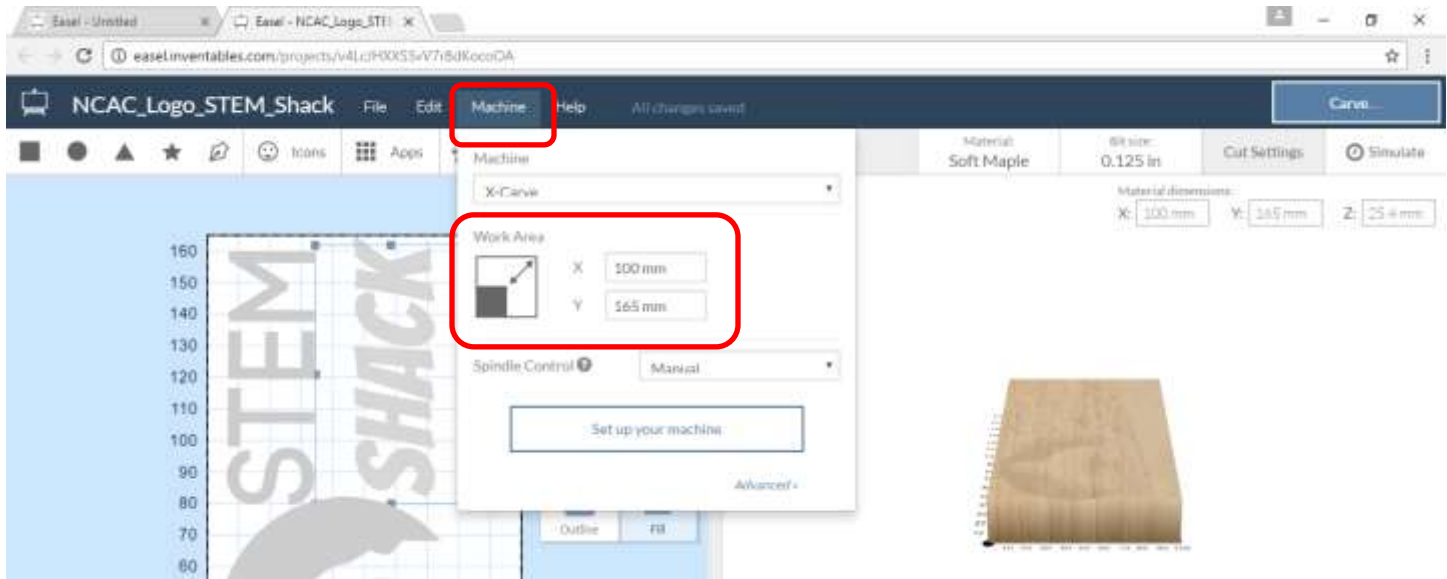
1. Launch & Login to Easel
 - a. Create an Inventable's account - <https://www.inventables.com/login>
 - b. Launch Easel and Login - <https://www.inventables.com/technologies/easel>
2. File - New
 - a. Create a new design
3. Set the dimensions to mm



CNC Mill a Wood Plaque/Sign

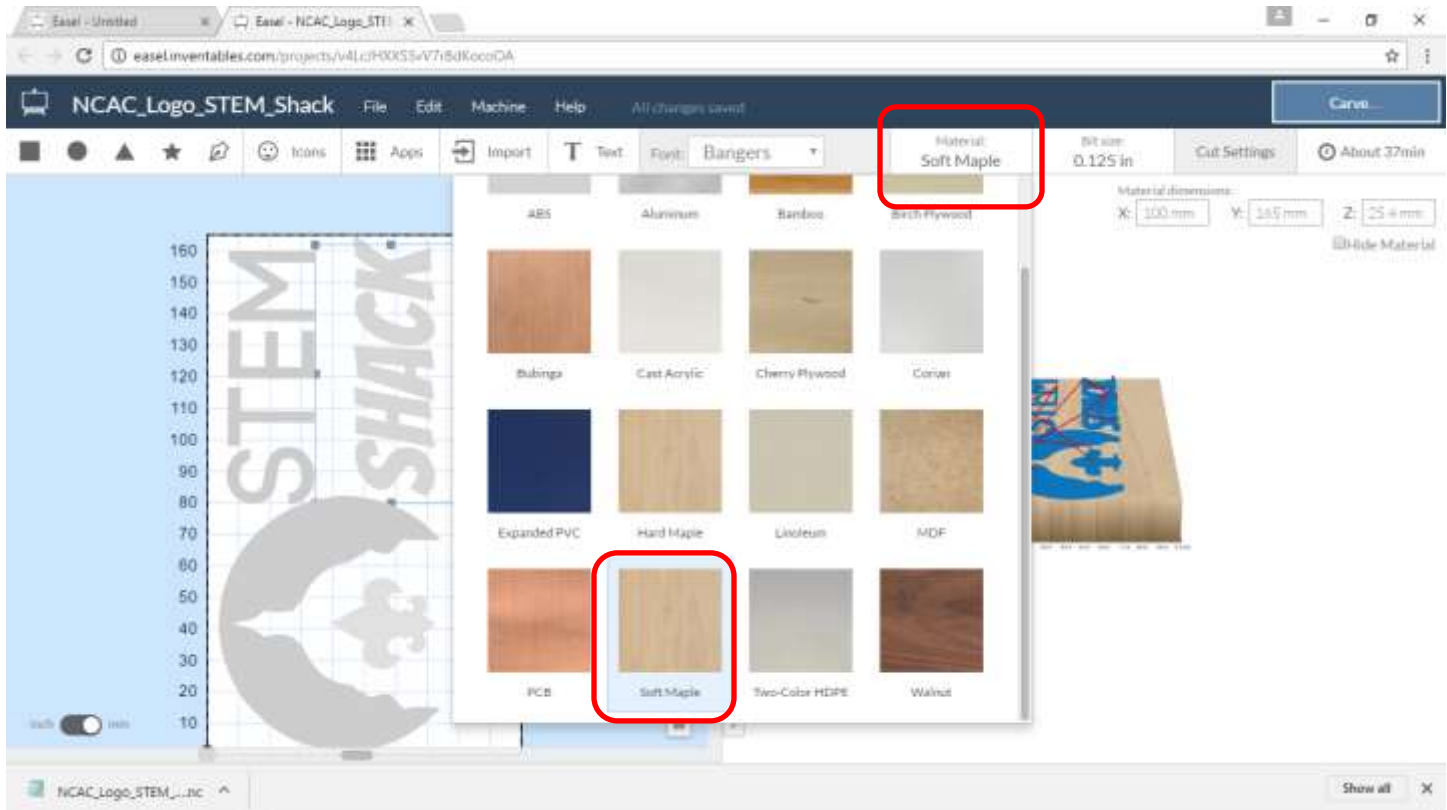
4. Setup Machine

- Machine menu (upper left)
- Enter work area X: 100mm Y:165mm



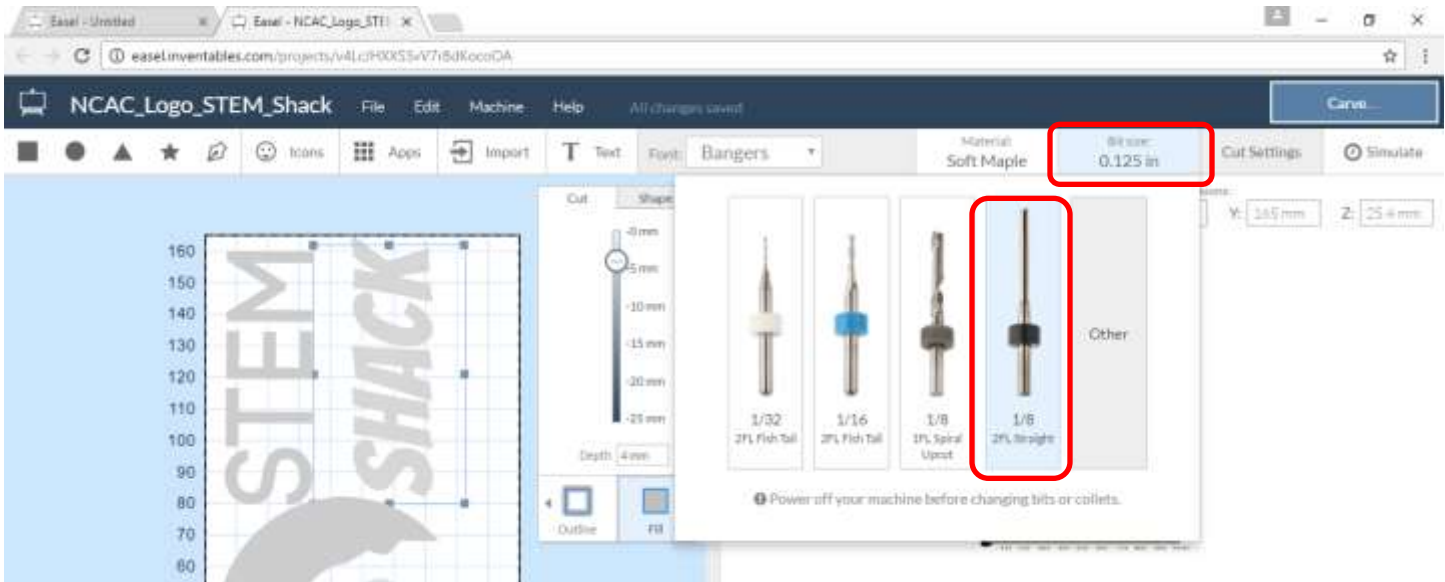
5. Select Material

- Select Soft Maple from Material Tab (top right menu bar)
- Be sure to select the appropriate material you are going to Mill

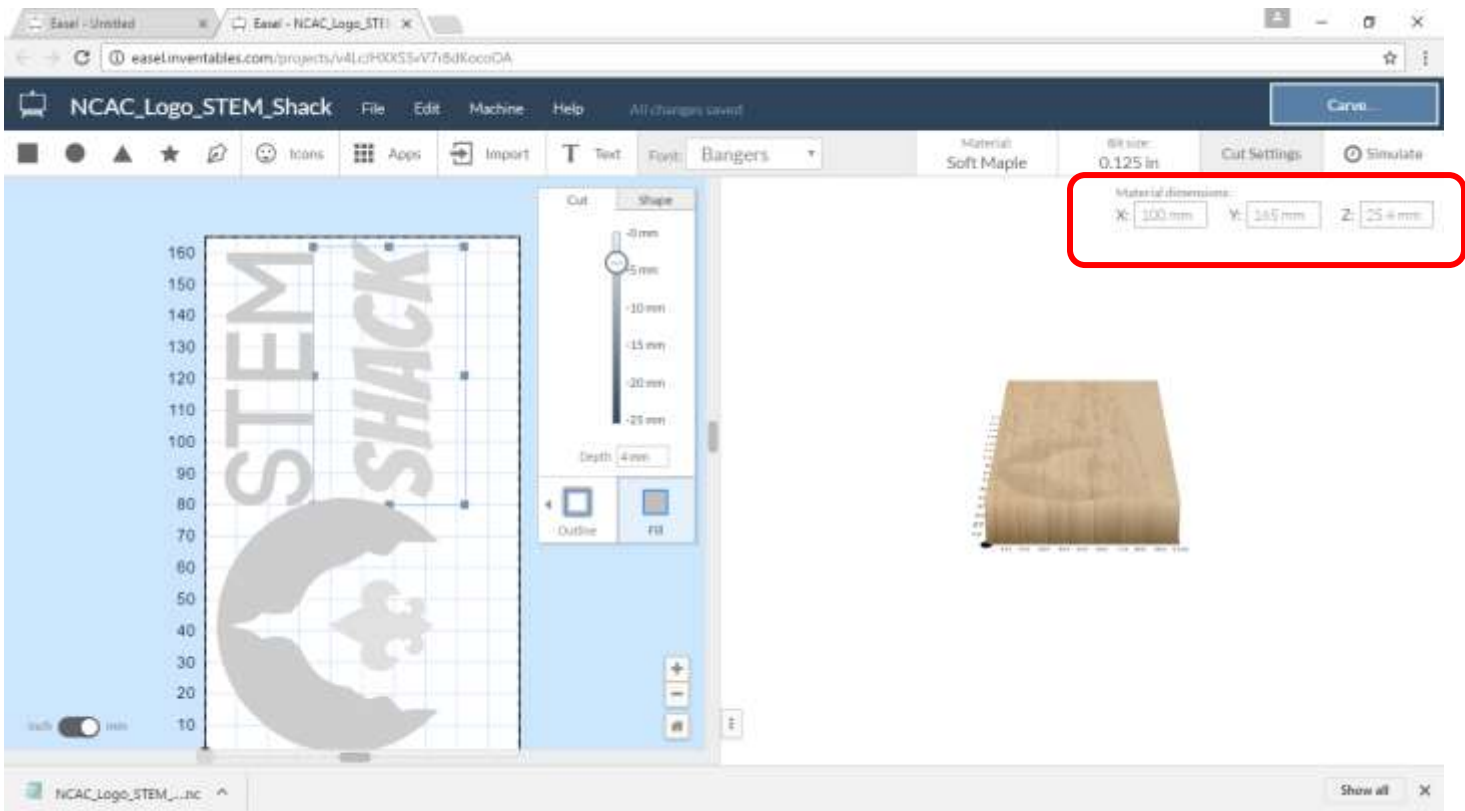


CNC Mill a Wood Plaque/Sign

6. Select Bit size:
 - a. Select Bit Size
 - b. This design using a 1/8 2FL Straight



7. Enter Material dimensions
 - a. The size of your sign will dictate the material dimensions.
 - b. Note the Max size that BoxZY can carve is 165mmx165mm
 - c. This project we are using a 1"x 4" x 8.5" piece of pine wood
 - d. Enter X: 100mm Y: 165mm Z: 25.4 (1 inch depth)

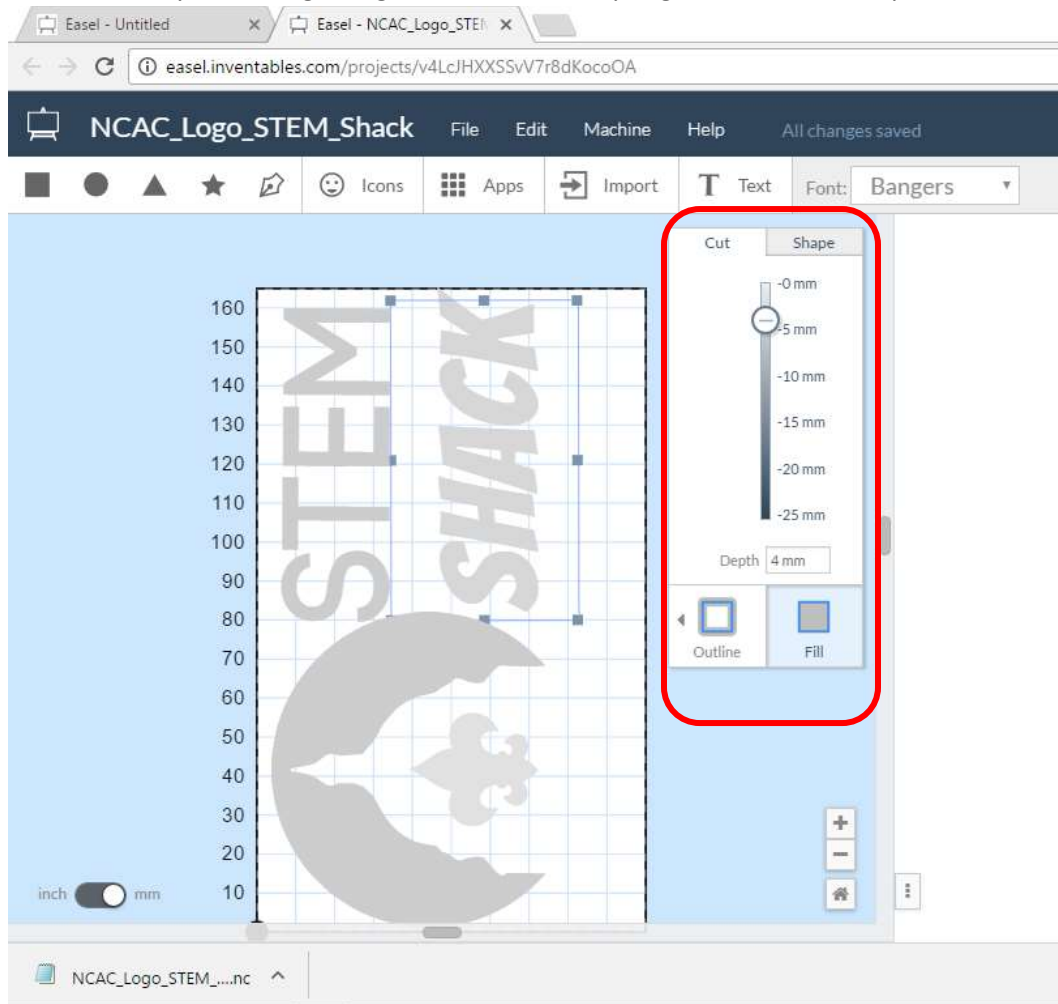


CNC Mill a Wood Plaque/Sign

2. Create Design

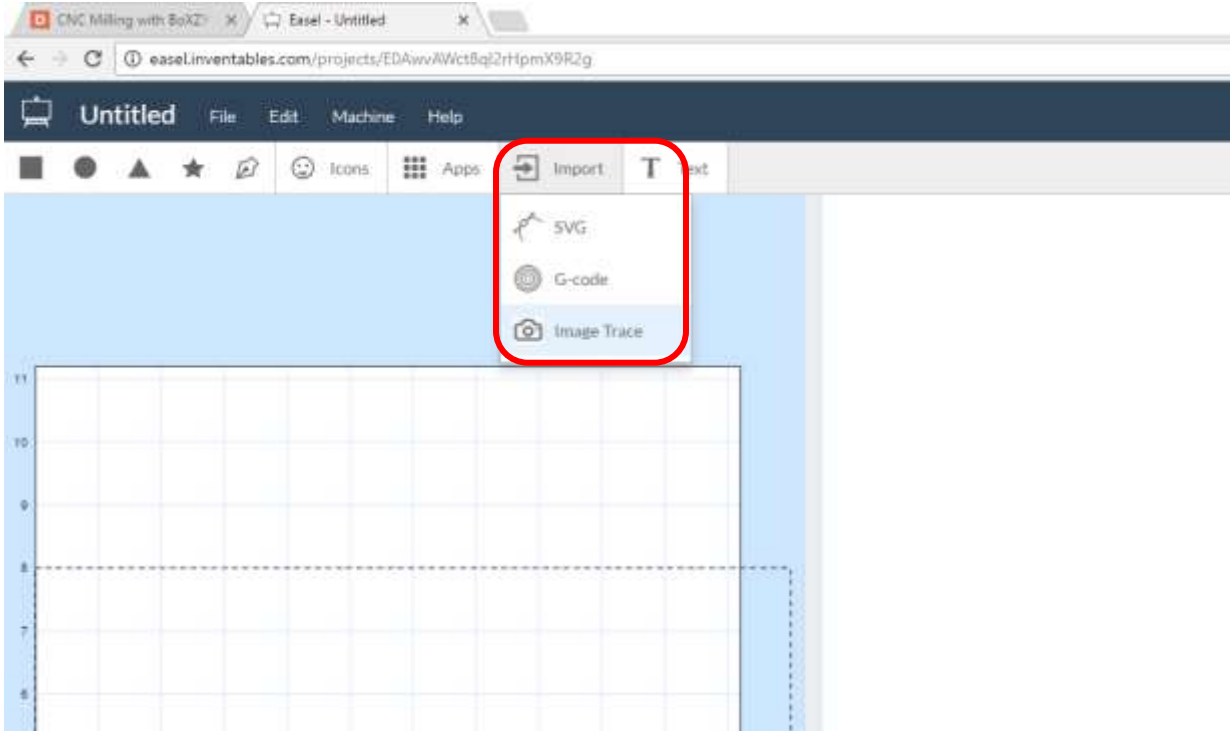
Now that Easel is all setup and ready to go it is time to get creative. Use the various tools to create whatever sign you would like. Play with Icons, Importing images, and

1. File Rename
 - a. Give file meaningful and unique name (include your last name)
2. Note – the Sign Layout seems sideways
 - a. See how STEM Shack looks like it is sideways? This has to do with how the material is attached to the BoxZY for milling.
 - b. Please use this orientation for this example – you can experiment later.
3. Click on the TEXT button to add text to your design
 - a. Play with the different fonts. Some work better than others.
 - b. Simply click and drag the text around to place it where you want it
 - c. You can change the size by clicking and dragging one of the corners of the text box
4. Change the Milling Depth
 - a. You can change how deep each part of your design is milled.
 - b. If you are engraving never choose a depth greater than the depth of the material you are milling.

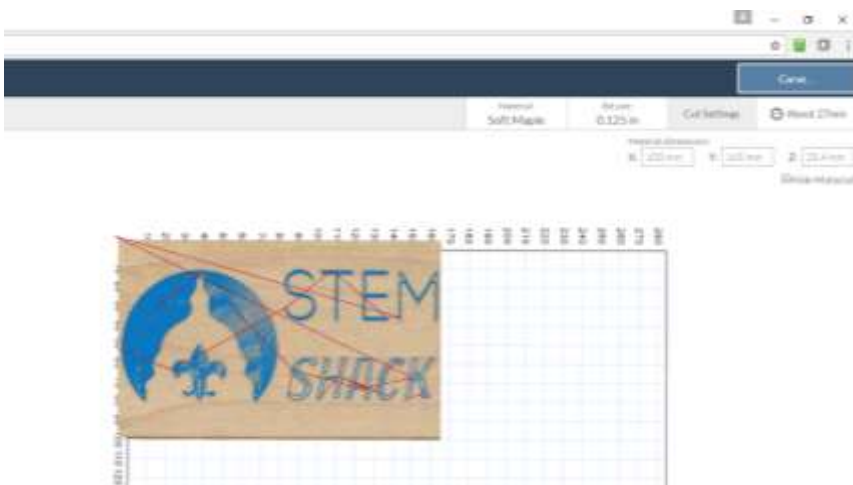


CNC Mill a Wood Plaque/Sign

5. Import an Image
 - a. Click on the Import button
 - b. Choose the Image Trace option
 - c. Click Upload file
 - d. Drag/Browse for the image you wish to import
 - e. Click Import



6. PREVIEW Your design
 - a. As you go be sure to look at the preview in the right window pane
 - b. Any areas in RED mean that your design is not going to mill correctly.
 - c. This usually means usually the bit is too big for that level of fine detail you are attempting to mill- try enlarging the font/image or get a smaller bit (if we have one)
7. Simulate
 - a. Time to see what your design will look like when it is carved and how long it will take to mill.
 - b. Click the Simulate button -upper right

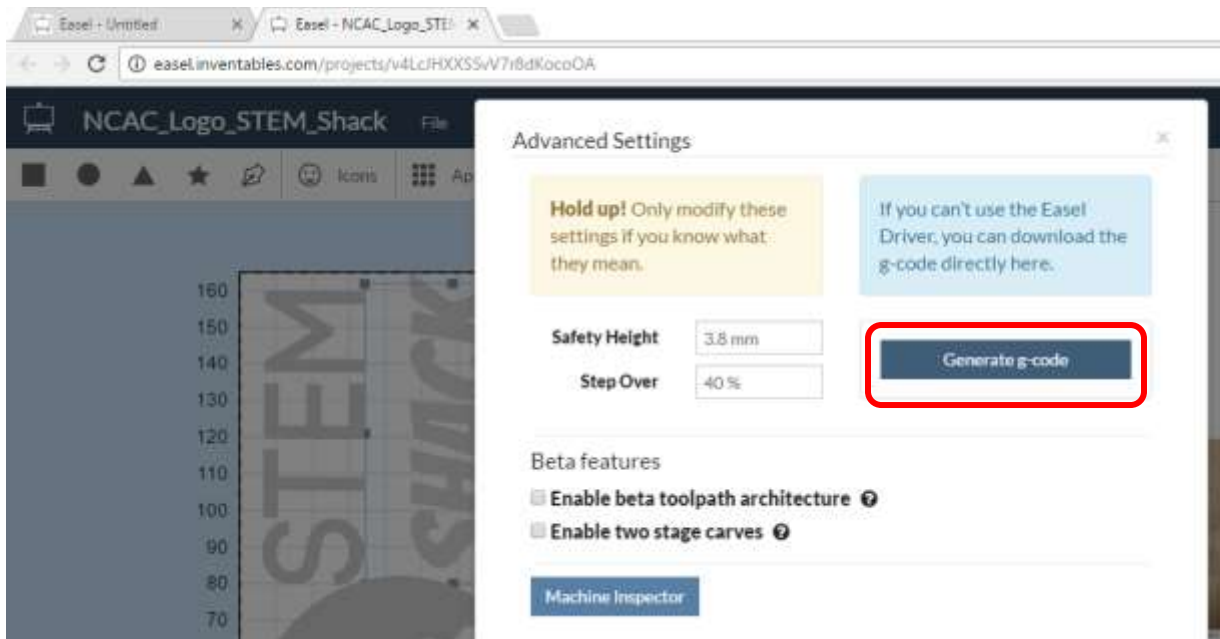


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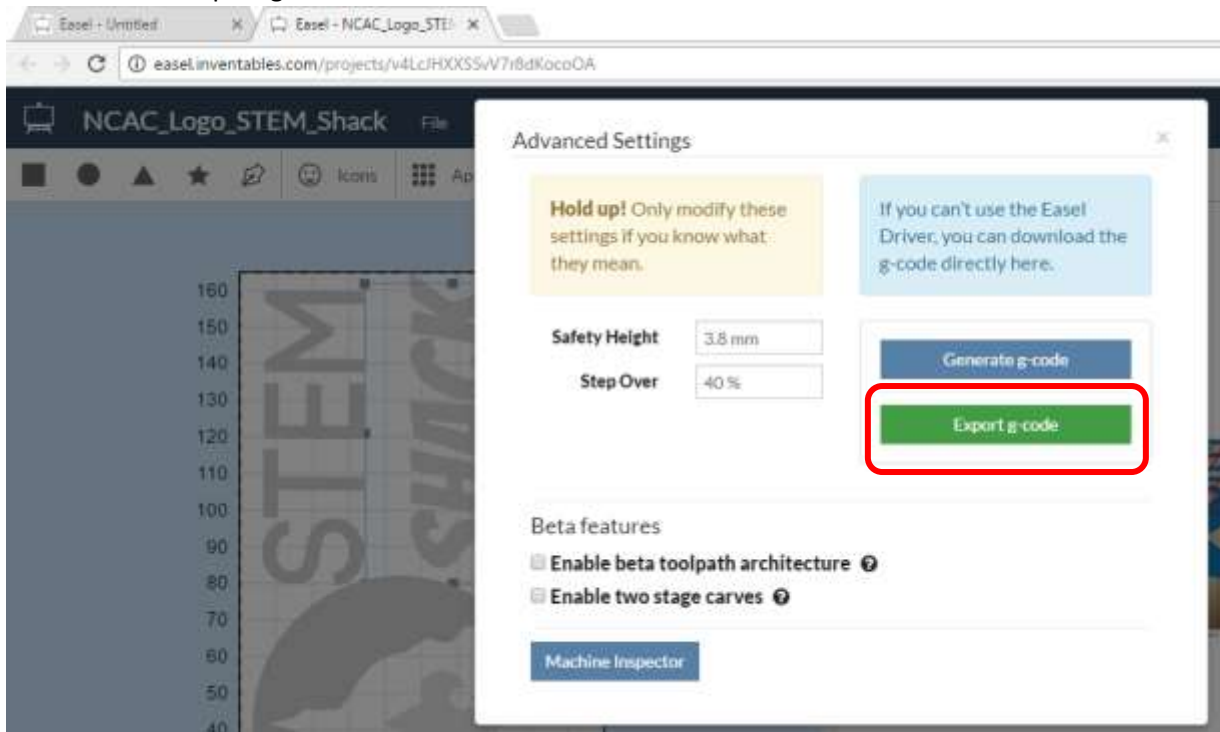
3. Export Design

Once you have completed, reviewed and simulated your design it is time to generate the toolpaths (CAM file) that BoxZY needs in order to mill your design.

1. Click on Machine
2. Click on Advanced (blue text in lower left corner)
3. Select the Generate g-code button



4. Select the Export g-code



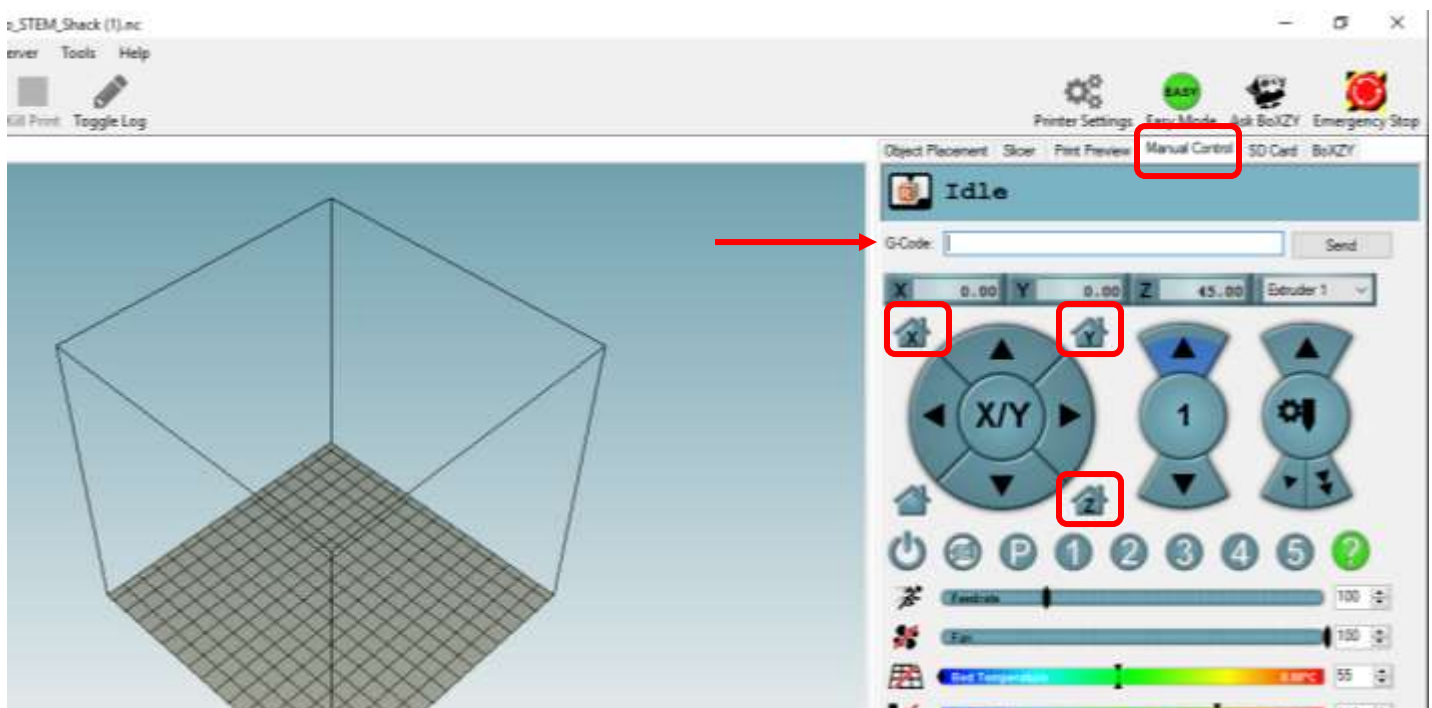
5. Save the g-code to a folder you will remember

CNC Mill a Wood Plaque/Sign

4. BoxZY Setup

Now that you have completed your design it is time to setup the boxZY.

1. Close or minimize Easel from previous steps
2. UNPLUG and REMOVE any attachments from the boxZY
3. Clear build bed/plate of everything
4. Connect USB & Power to boxZY (if not already connected)
5. Turn ON boxZY
 - a. Rotate E-Stop knob counterclockwise – will spring up when disengaged
 - b. Turn key to ON position
6. Launch boxZY software/interface on laptop – double click on boxZY icon
7. Connect the boxZY software to the boxZY hardware
 - a. Connect USB from boxZY to Laptop
 - b. Click Connect button in upper left to connect to boxZY (Connect icon will turn green when successful)
8. Place sacrificial build plate onto bed of boxZY
9. Zero mill
 - a. Click on the Manual Control Tab
 - i. Click the X Home button (turns from red to black when complete)
 - ii. Click the Y Home button (turns from red to black when complete)
 - iii. Click the Z Home
 1. NEVER hit Z home button when anything in on build plate OR attachment is attached
 2. Turns from red to black when complete
10. Set mill for Z height of sign material
 - a. Enter into Command Line:
 - i. G1 Z45 (this is correct position for 1" thick material, MUST adjust for any different material thickness)
 - ii. G92 Z0



11. Attach material to be milled onto the build plate

CNC Mill a Wood Plaque/Sign

- Place metal clamps in corners away from carving area
- Check to ensure that your sign is square
- Check to see that $X=0$, $Y=0$ of your material matches the $X0$, $Y0$ marked on the build plate (Lower Left Corner)





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Setup Mikata Router

1. DO NOT PLUG IN - DO NOT Attach to BOXZY
2. Place 1/8" milling bit, 2flute, straight - into Mikata Router
3. Open attachment ring and slow lower router unto the bit touches the material
4. Rotate router until power switch is facing to right (power cord hangs over left side of boxZY)
5. Slight lift router until bit is barely not touching material & clamp into place
6. Plug in Router
7. Set router power/speed to max 6 (red dial)
8. Turn ON router (if you are ready to mill your sign)
9. No material should be being carved/milled

CNC Mill a Wood Plaque/Sign

Mill Sign

Now that the boxZY is all setup and ready to go – it is time to mill your sign!

1. Navigate to Print Preview tab of the boxZY software/interface
2. Place Emergency STOP button immediately under one hand
3. AIR PASS
 - a. Run a couple of seconds/minutes of your design WITHOUT the router being attached to the boxZY
 - b. Click Print button
 - c. WATCH Router movement
 - d. HIT Emergency STOP if anything looks out of place
 - e. You Can PAUSE the job at any time - just hit Pause button - upper left
4. Zero mill
 - a. Click on the Manual Control tab
 - b. Click on the X home button
 - c. Click on the Y home button
 - d. Enter the g-code command g1 z0
5. Navigate to Print Preview tab of the boxZY software/interface
6. Click Print button
7. WATCH the router



CNC Mill a Wood Plaque/Sign





CNC Mill a Wood Plaque/Sign

CARVE COMPLETE

Hit Emergency STOP

Turn OFF router

UnPlug Router

Unclamp and remove router from Boxzy

Remove material from build platebed