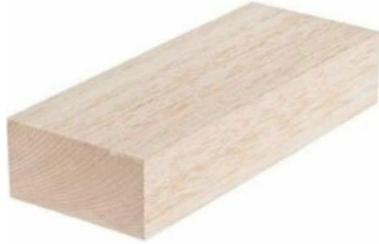


3D ENGRAVING WITH CNC MILL (CUBED)

- CNC mill will carve 3D shapes using STL files commonly used with 3D printers.
- You can use cubed pieces up to 10.7" long, 4.33" wide, and 1.57" tall.
- Note the exact measurements of your material (in inches, such as 2.3" x 4.0" x 8.1").



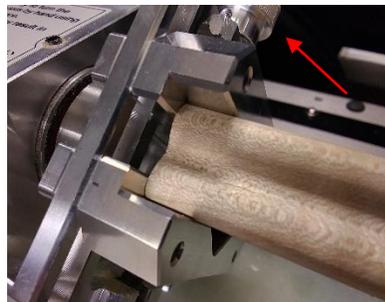
Insert your material

1. If flat, brown bed is currently installed in machine, replace with rotary axis unit as per separate instruction sheet.

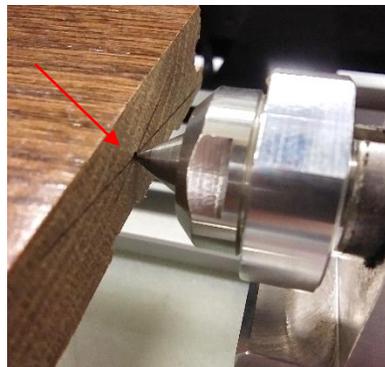
2. Loosen:
 - a. Black tailstock knob on right side of rotary.
 - b. Black tailstock lever.
 - c. Silver vice knob on marked center on one edge of material.



3. Insert material into vice (marked edge facing right), then lightly tighten silver vice knob to secure it.



4. Slide tailstock so that its point touches material. Nudge material until tailstock point touches your mark.



5. Tighten silver vice knob and black tailstock lever.

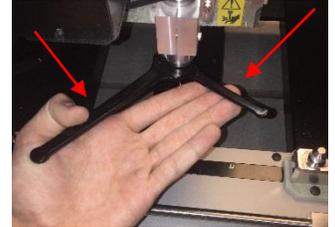
6. Rotate silver tailstock wheel until its point *slightly* digs into material.

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7. Tighten black tailstock knob.

Insert milling bit

1. Remove existing bit from toolhead with two black wrenches. Squeeze wrenches toward each other to loosen.



2. Find desired bit from "long reach" bag of bits.
 - a. **It's best to start with 1/4" bit to quickly remove material, then switch to smaller bit later for fine carving.**

3. Insert bit into collet.
 - a. Bit shaft faces threaded collet end.



- b. Bit shaft has a slight mark; insert into collet to this mark (about halfway).
 - i. **Bit should extend no more than 1.69" from collet.**
- c. Screw collet-with-bit into machine's toolhead. Use two black wrenches to tighten it (do not over tighten). Push wrenches apart to tighten.

4. Close lid.

Turn on mill

1. Turn on machine via switch in back.

2. Hold down small, black & green power button on front of machine until Modeling and Scanning lights are lit.

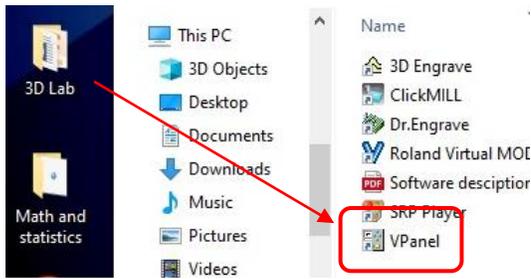


3. Press View button on front of mill. Rotary access unit will move toward you.



(flip page)

- On computer's desktop, open 3D Lab > Roland CNC machine > VPanel.



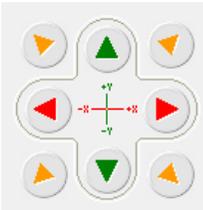
Level your material

- Click the army-green arrows in VPanel to level your piece.
 - Use small bubble level in black plastic tool tray to help with leveling.
- In "Set ___ Origin here" field, click down arrow to choose "A Origin", then click Apply.

Set Z axis

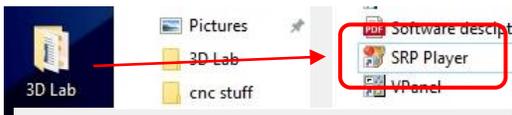
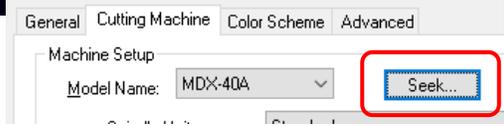
- In "Set ___ origin at center of rotation" field, click down arrow to choose "Z Origin", then click Apply, then Continue.
 
- When machine finishes setting Z axis, click OK.
- The Current Jig area should show red arrow with red "YZ" above it. If not, you **must** follow "Calibrate tool sensor" and "Calibrate rotation origin" sections on rotary instruction sheet, then repeat all of these instructions.
 

Set X axis

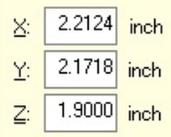
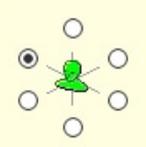
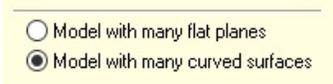
- Use red & green arrows to carefully move toolhead to right edge of material. **Do not let bit strike material!**

- In "Set ___ Origin here" field, choose "X Origin", then click Apply.
 
- To verify XY axis, choose "XY Origin" in "Move to ___" field, then click Move. The
 

toolhead should move to right and center edge of material.

Load your design

- On computer's desktop, open 3D Lab > Roland CNC machine > SRP Player.
 
- Click File > Preferences > Cutting Machine > Seek > Apply > OK to detect rotary axis unit.
 
- Click File > Open, then chose "STL Files" in lower-right corner of the window (replacing "SRP Player Files").
- Locate and choose STL file that you wish to use.

Choose milling settings

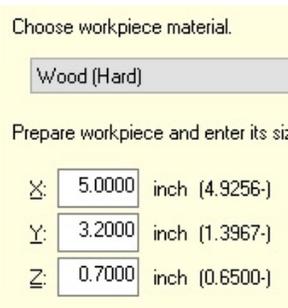
- On right, set X, Y, Z to the size of shape you need, yet less than material size. X=width, Y=length (depth), Z=height.
 
- Click one radio button encircling green head to align STL along red dotted line (represents material length).
 
- Click "2: Type of Milling" on bottom-right.
 
 - Choose quality:
 - If STL is curvy, "Model with many curved surfaces".
 
 - If STL is block-like, click "Model with many flat planes".
 - Choose "Block workpiece > Cut top only" to carve design into top of material only (creating a cavity in material)
 - Or choose "Cut top and bottom" carve shape from both sides of material (material is flipped automatically). **Supports are needed for this option, requiring larger material size.**

Choose tool path settings

- Click "3: Create Tool Path".

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a. Choose material type in “Choose workpiece material”



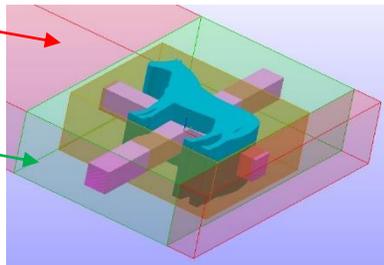
b. Enter material size in X, Y, and Z fields

i. Dimensions in parenthesis indicate minimum size needed by design w/supports.

c. If design is too big to fit material size

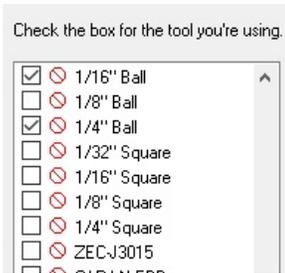
- i. Click Section 2: Type of Milling, then Section 1: Model Size.
- ii. Reduce model size.
- iii. Complete Sections 2 & 3 again.

d. In preview, **red** area indicates total material size, **green** indicates material to be removed.



e. Click Options > My Tools menu.

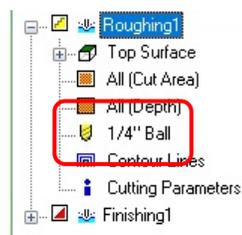
f. In list of bits, click bit(s) you will use, then click OK.



i. The bits' plastic cases indicate their size & type on label

g. Click Edit on right.

h. Open Roughing1 section, replace “ZCB-150” bit with bit installed in machine, then click Apply.

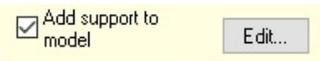


i. Ignore “The tool has been changed...” message.

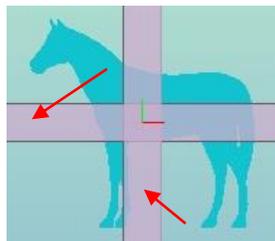
i. Open Finishing1 section, replace “ZCB-150” bit with bit you will use later for detailing, then click Apply, then Close.

j. If carving both sides, you will see Finishing2 and Rough2 sections. These are for the bottom of material. Set the bit sizes for these sections, too.

k. Go back to Section 2, click “Add support to model,” then Edit.

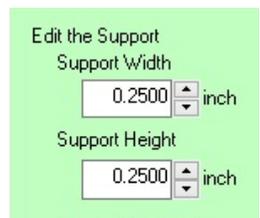


i. Optionally, move and resize purple supports with mouse.

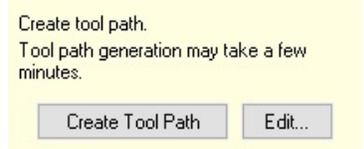


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- ii. Optionally, enter “0.25” for width and height.
 - iii. Click Apply and Close.
- l. Go back to Section 3.



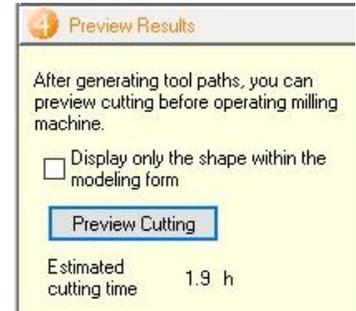
m. Click Create Tool Path. Wait while toolpath is generated.



Preview results

1. Click “4: Preview Results”.

- a. Note estimated cutting time.
- b. Click Preview Cutting button.
- c. If preview looks what you expect, continue to next step.



Begin cutting

1. Click “5: Perform Cutting”.

- a. Click Start Cutting to begin milling.



b. **If mill is malfunctioning, immediately press red STOP button on top right of machine!**

c. If you chose different bits for roughing and finishing, the program will prompt you to change bits when needed.



When milling has finished

- 1. After toolhead stops moving and rotating, press View button on front of mill.
- 2. When bed slides forward and stops, open lid.
- 3. Loosen black knob and black lever on right side of tailstock.



(flip page)

4. Loosen silver knob on left side of vice.
5. Carefully remove material from rotary axis unit.
6. Remove collet & bit from tool head, store each in respective bags.
7. **Please cleanup debris inside the machine with the Shop Vac under the table.**