

CNC Router Certification

CNC Router Safety:

1. First thoughts-ask yourself:
 - Am I tired?
 - Am I distracted?
 - Am I in a rush?(if the answer is yes to any of these questions don't work on the CNC!)
2. Always wear hearing and eye protection when CNC in operation.
3. Insure that the nothing will impede the gantry from moving in all directions before powering up CNC machine. Check front, back and underneath bed!
4. Secure work material to CNC bed with hold-down clamps or vacuum system before starting cutting operations.
5. Never wear gloves, loose fitting clothes, keep hair tied back, and don't wear jewelry that can catch on the various components of the CNC machine.
6. Always stay with CNC Router while project is running!

Certifier Demonstrates:

1. The basic components of the CNC Router
 - CNC Table/Bed with T-track and hold-down clamps
 - Gantry
 - Hand-Held Controller (HHC)
 - Controller Box with Emergency Off Switch
 - Spindle with Collet Ring, Collet, and Router Bits
 - Spindle Water Cooling System (including water pump)
 - X/Y/Z Axis – Lead Screws
 - Dust Collector/Vacuum and Dust Shoe
 - Touch-off Puck (Z-axis zeroing device)
 - Laptop with CAD/CAM Software – Vectric VCarve Pro Makerspace
 - Location of router bits, collets, and various tools

Trainee Demonstrates:

1. Identify and describe their purpose of all the CNC Router components:

CNC Table/Bed with T-track and hold-down clamps	
Gantry	
Hand-Held Controller (HHC)	
Controller Box with Emergency Off Switch	
Spindle with Collet Ring, Collet, and Router Bits	
Spindle Water Cooling System (including water pump)	
X/Y/Z Axis – Lead Screws	

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Dust Collector/Vacuum and Dust Shoe	
Touch-off Puck (Z-axis zeroing device)	
Laptop with CAD/CAM Software - Vectric VCarve Pro Makerspace	
Location of router bits, collets, and various tools	

2. Design and Implement a CNC Router project using Vectric VCarve Pro:

A. Design

a.	Configure work material within VCarve (X, Y, Z (thickness)) and establish project orientation point
b.	Import a bitmap image and trace to create vector
c.	Use Circle or Rectangle tool to create border

B. Toolpaths

a.	Create a VCarve toolpath using a 30, 60, or 90 degree V-bit
b.	Create a profile toolpath with tabs using a ¼ inch End Mill. Cut Depth (Z + .01 inch)
c.	Save toolpath files to USB drive using Laguna post-processor (.mmg extension)

C. Implement G-Code (.mmg) files

	Start CNC machine according to start-up instructions
	Mount work material using the appropriate hold-down clamps or vacuum system
	Install first router bit into spindle with appropriate collet
	Establish X, Y origination points and set to zero
	Using Z-axis touch-off puck to establish Z zero
	Run first g-code file (.mmg)
	Install second router bit into spindle with appropriate collet
	Using Z-axis touch-off puck to establish Z zero
	Run second g-code file (.mmg)
	Shut-down CNC machine according to shut-down instructions

I certify that I understand the safe operation of the CNC Router.

Member Name: _____ Member Signature: _____

Certifier Name: _____ Certifier Signature: _____

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Laguna IQ CNC Router Operation

Starting Up

1. Turn on the **Laguna IQ** power: red switch on the side of the control box clockwise one click.
2. If it's off, start the **Hand Held Controller** (HHC): press the large green button on the control box.
3. Remove the HHC from the hanging nail and fix it to its platform.
4. Vacuum the **gantry drive screws**. Spray some DuPont Teflon Multi-Use Lubricant on a paper towel and wipe down the screws.
5. Press the green **Origin/OK key** on the HHC to move the gantry and set the XY reference at mechanical zero.
6. Press the X+ and Y+ keys to move the router generally to the center of the work area.

Making a Cut

1. Orient and secure the workpiece to the spoil board. Can use hold-down clamps or double-sided tape.
 - See separate instructions if using the vacuum pump.
2. Turn on the dust collector with the black remote clicker.
3. Insert the initial router bit in the collet and tighten in the router spindle with the two end wrenches.
4. Zero the X, Y reference:
 - a) Use the X, Y, and Z keys to center the router bit over the design origin of the workpiece.
 - b) Press the #4 key (XY → 0) on the HHC to set the X, Y origin to 0, 0.
5. Zero the Z reference:
 - a) Insert the red banana plug of the touch-off puck into the red jack on the gantry.
 - b) Place the puck on the workpiece directly below the center of the tool.
 - c) Simultaneously press the On/Off and Menu keys on the HHC to set Z = 0.
 - d) Remove the puck and store in its holder.
6. Attach the dust boot to the spindle frame.
7. Insert the toolpath thumb-drive into the HHC. Thumb-drive must be 8 GB or less.
8. Press the Run/Pause/Delete (RPD) key on the HHC.
9. Scroll (X+ ▲, X- ▼) to UDisk and press the OK key on the HHC.
10. Scroll to the desired toolpath file (xxx.mmg in 8.3 format) and press the OK key.
11. Press the OK key again to accept the cutting parameters. Cutting will begin in ~8 seconds.
12. After the cutting sequence stops, repeat from Step 8 for each toolpath using the selected router bit.
13. Change the router bit in the collet and repeat from Step 5 for all additional toolpaths.
14. Loosen the clamps or shut off the vacuum pump to unmount the workpiece.

Shutting Down

1. Remove the **router bit** from the collet and store properly.
2. Turn off the **dust collector**.
3. Turn off the **HHC**: press the large green button on the control box.

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4. Turn off the **Laguna IQ** power: turn the red switch on the control box counter-clockwise one click.
5. Remove the HHC from the platform and hang it on the nail.
6. **Clean up** the wood chips!!