Using the CNC Router

File preparation

The router takes single-bit (black and white) bitmap images as input.

1. Measure the material you'll be using so that you can create an image that fits onto it correctly.
2. Create the image you want to engrave in Photoshop. The router will cut where your image is black and leave the white space.
3. Create a black border around your image that is at least 4 pixels across. You can do this by going to Select > All, then to Select > Modify > Border and entering 4 as the pixel width, and then filling in the selected area with black. This border will help tell the router's software where the edge of your image is.
4. Go to Image > Mode > Grayscale. When it asks if you want to discard color information, select "Discard".
5. Go to Image > Mode > Bitmap. From the "method" dropdown select "50% threshold." This will ensure that there's a clean cutoff between the black and white pixels, with no grey pixels.
6. Go to File > Save As and name your file. Under the "format" dropdown choose BMP. Click "Save." A "BMP Options" box will appear. Make sure that "Depth" is set to 1 bit and save the file.

Calibrating the router

The program "Vpanel" allows you to calibrate the router. This should be done every time you use the router.

1. With the router turned off, use double-sided tape to attach your material to the plate. For easiest calibration, align the material with the left front corner of the plate (closest to you, on your left when facing the machine)
2. Turn on the router using the power switch on the back, on the right-hand side.
3. Turn on the front power button as well. If it's off, the computer won't recognize that the printer is connected.
4. Open the program Vpanel.
5. VPanel allows you to move the router tool head using the arrows at the top of the window. Select "low speed."
6. Move the tool head until the bit is just above the left front corner of the material. This point will be the 'origin' point on the XY coordinates of the design you are cutting.
7. Under "Set Origin Point", choose XY origin from the dropdown and click "Apply."
8. Make sure the sensor is plugged into the router in the back on the left-hand side.
9. Place the sensor gold-side-up on your material. If the material is bowed or has uneven height, place the sensor on the highest point.

10. In VPanel, move the tool head so that it is directly above the sensor.
11. Select “Set Z Origin Using Sensor” and click “Detect.” The tool head will move downward until it touches the sensor, and then move back up. This sets the Z origin to the right height for your material.
12. Move the sensor back out of the way.
13. You can check your calibration by selecting “XY Origin” from the “Move To” drop down and clicking “Move,” and then selecting “Z Origin” and clicking “Move” again. The bit should be right at the left front corner of your material.
14. If your calibration looks correct, close VPanel.

Printing the file on the Router

The router software “Dr. Engrave” defines the paths that the router will cut along, how quickly it will move along those paths, and how deep it will cut.

1. Open the program “Dr. Engrave.”
2. Go to File > Import and bring in your bitmap image.
3. The program will detect the outlines of the black shapes in your image. If something looks wrong you can edit these outlines by selecting the “Edit Polygon Vertices” tool from the toolbar, and then dragging vertex points to move them. You can also delete the border that you added to the image earlier.
4. Switch back to the cursor tool and select your image. Go to Shape > Properties and set the dimensions to be the right size for your material.
5. Drag the image down to the lower left corner of the canvas.
6. Go to Shape > Fill. Make sure the “Fill” box is checked and the “Color” box is black.
7. The “Pitch” value should be approximately the radius of the router bit (not the diameter.) Pitch defines how far apart the router needs to carve lines in order to fill in a complete shape. Defining this is a little bit of guesswork, but you can look at the bit you’re using and see what value seems about right. When in doubt, set the pitch lower, since this just means that the router will go over some parts of the material multiple times.
8. Go to File > Print, choose the “Roland MDX” printer from the dropdown, and click on “Properties.”
9. In the “Size” tab, set the size of your image. Be sure to check that you’re using the correct units.
10. In the “Tool” tab, select the preset for your material from the dropdown menu.
11. The “XY Speed” value defines how fast the router will move through the material. The XY speed preset values are generally faster that they should be. For instance, the default XY speed for “wood (hard)” is 15 mm/s, but it will work better set at 9 mm/s. Consult the log of successful cut settings to find suggestions of good XY cutting speeds for your material.
12. The “Z Down” value defines the total depth that the router will cut. It should be a negative value.

13. The “Z Engraving Pitch” value defines how deep the router will cut with each pass through the material. It should be a positive value. For wood, 0.3 works well. Consult the log for suggestions for your material.
14. The “Z Speed” value defines the vertical speed of the router. The preset value for this should be fine.
15. The “Z Up Position” value defines how high the router will raise the bit when moving between engraved shapes. The preset here should also be fine.
16. The “Spindle RPM” value defines how quickly the bit spins. The default setting should be fine, but it you find that your cuts are not clean, you can raise it. For wood, 4800 RPM works well. Raising this value too much can cause your material to overheat, so try the default setting first.
17. When you have your settings entered, click ok, and then click print.
18. The router should make a steady, quiet “purring” sound. If it gets louder or sounds like it’s binding up, shut it down and try again with the “XY Speed” value lower and/or the “Z Engraving Pitch” value lower, or ask for assistance.
19. When the router has finished, use the vacuum cleaner to clear the dust and cutting debris away before you move your piece. This will keep the dust from getting everywhere.
20. When you are finished with the router, turn it off using the front power button and the power switch in the back.

For more detailed instructions and troubleshooting, visit rolanddga.com/support .