



# Introduction to LightBurn software

Instructor: Whoever

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# Agenda

- Tour of the LightBurn Interface.
- LightBurn as part of the laser workflow
- Real-world example – pencil box
- Working with Images
- Configuring LightBurn on your own computer

# What is LightBurn?

LightBurn is the software ETA uses to control our new lasers.

- **IMPORT** shapes and arrange them into your project
  - Vector Files: .ai, .pdf, .sc, dxf, .hpgl, .plt, .rd, .scpro, .svg, .lmrn
  - Image files: .bpm, .jpg, .jpeg, .png, .gif, .tif, .tiff, .tg
- **CREATE** your laser plan.
  - Set cutting/engraving speed and power parameters.
  - Determine order of cutting/engraving objects.

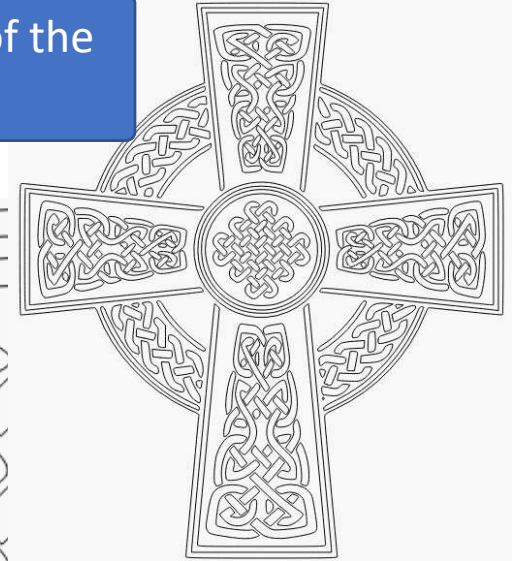
# Image (aka raster) vs Vector (aka lines)



.jpg file  
612 x 612 pixels

- Composed of rows of pixels
- Quality of image gets worse with enlargement.

Vector tracing of the  
same image



- Composed of many lines
- Quality of image Stays sharp with enlargement.

# Vector Graphics vs Images

## VECTOR GRAPHICS:

Definition: Points, lines, curves defined by math.

If you keep zooming in, the lines stay sharp.

Why do we care?

- We can enlarge or shrink vector images and not lose image quality.
- The laser can be easily guided along these lines to cut through the material.
- There are lots of programs that let us create designs we save as vector format.

## IMAGES (Raster graphics):

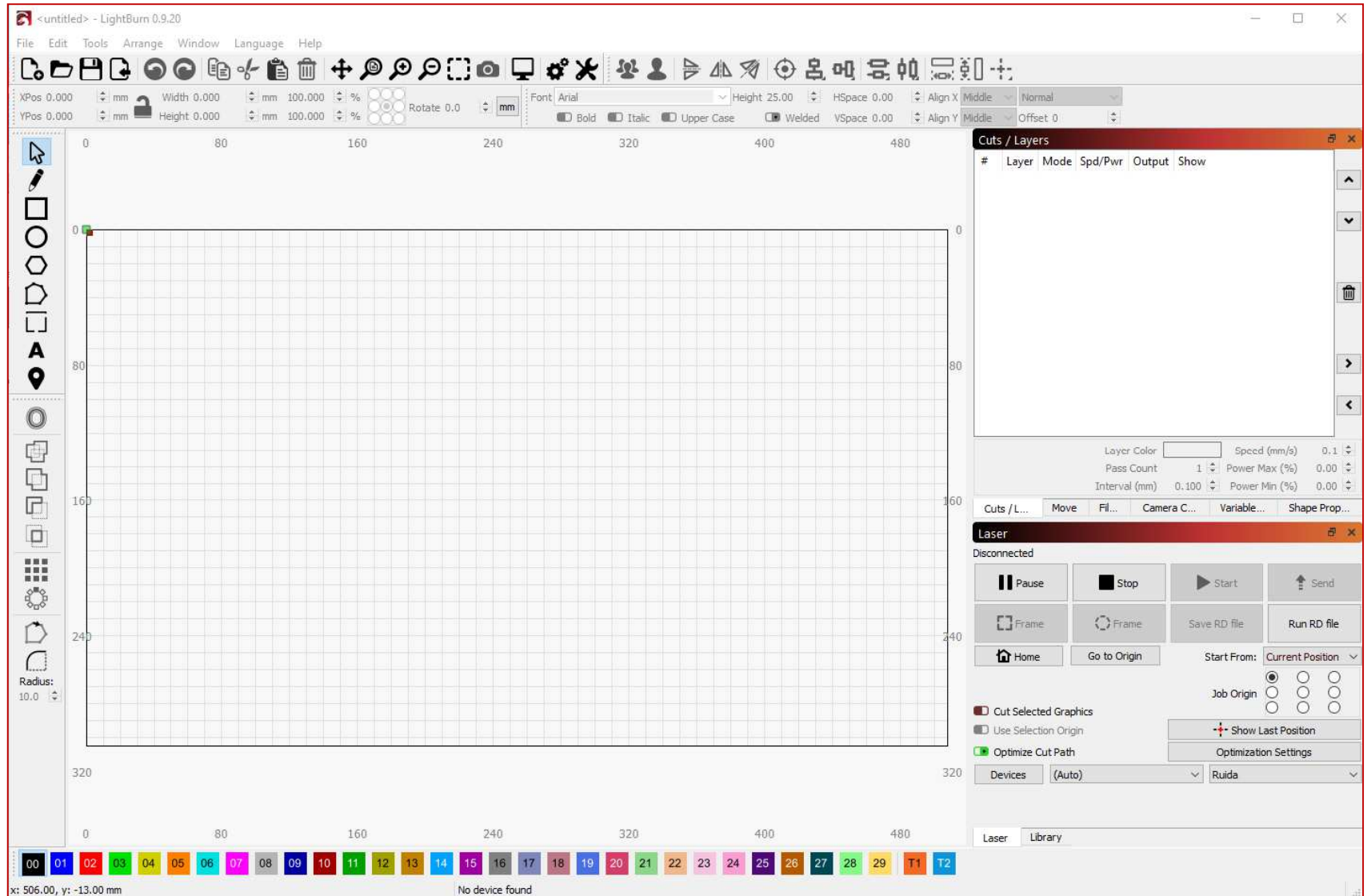
Definition: A group dots (pixels), each with a color , that make up an image.

If you keep zooming in, you eventually see the dots.

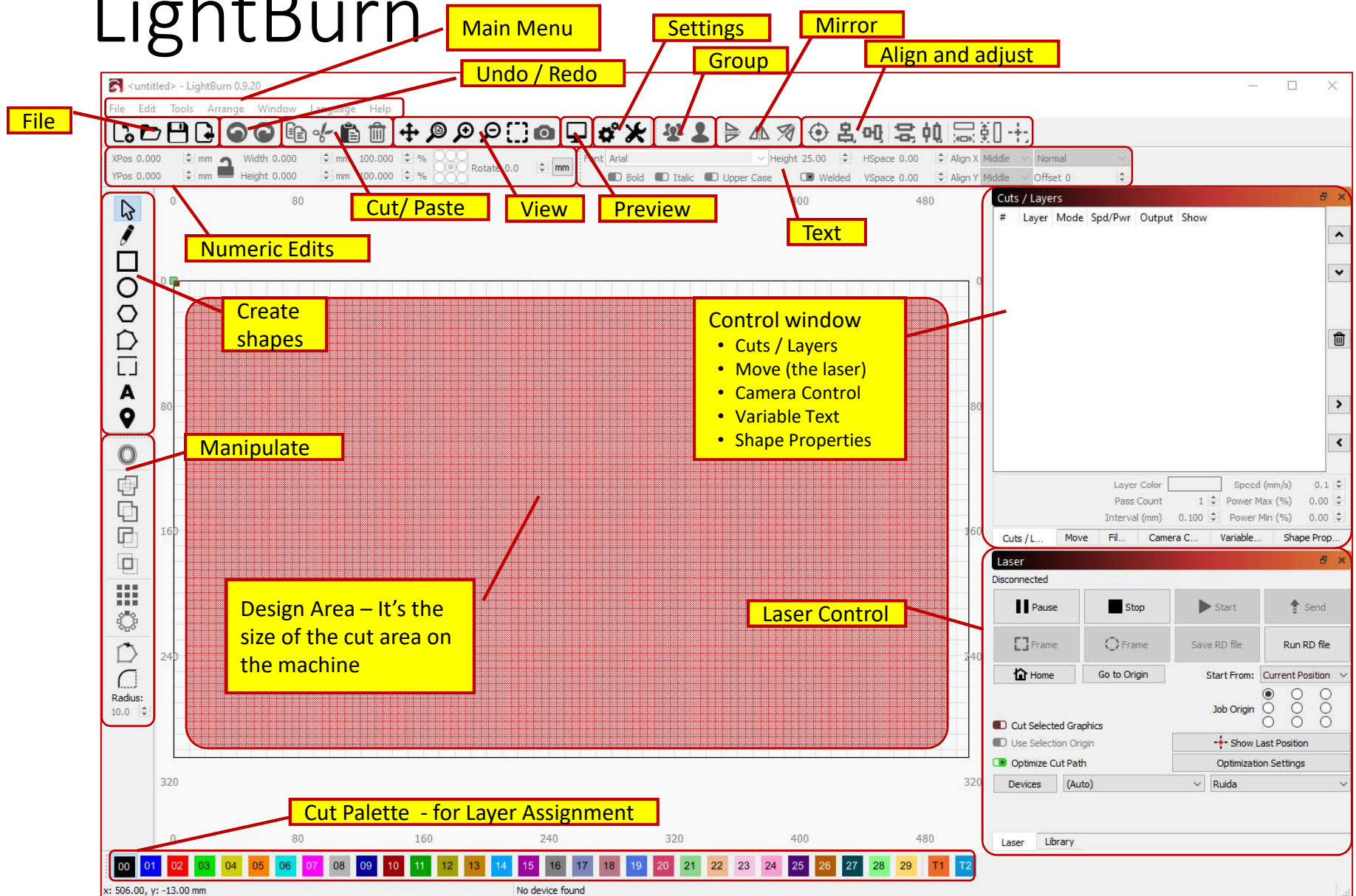
Why do we care?

- We can burn a picture of “Little Jimmy” on something we make.
- Since the laser needs to travel to each pixel location, and fire an amount of energy based on the color of the pixel, it can take a long time to render an image.
- We can cut through the material based on a raster image, but it’s tedious and impractical. Like cutting a piece of paper in half with a hole punch.

# The LightBurn Interface



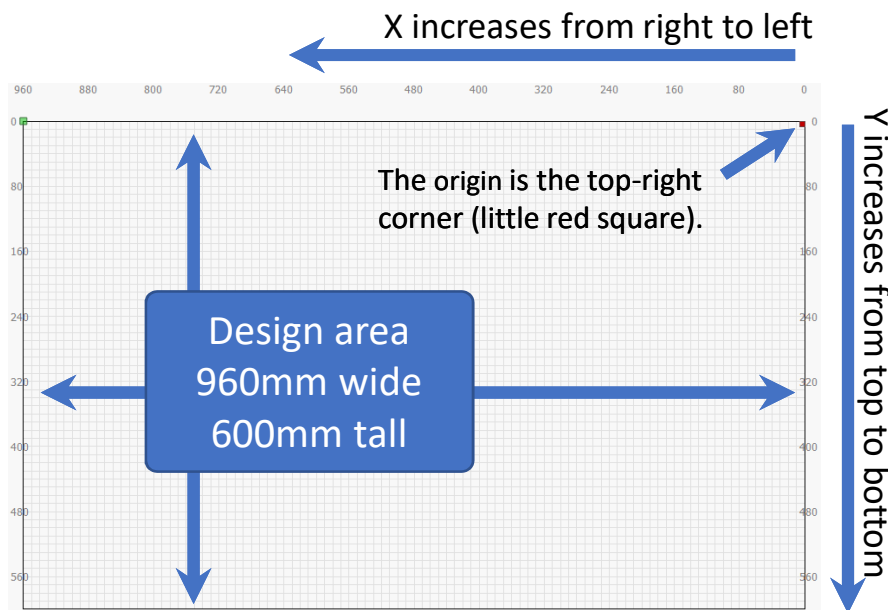
# LightBurn



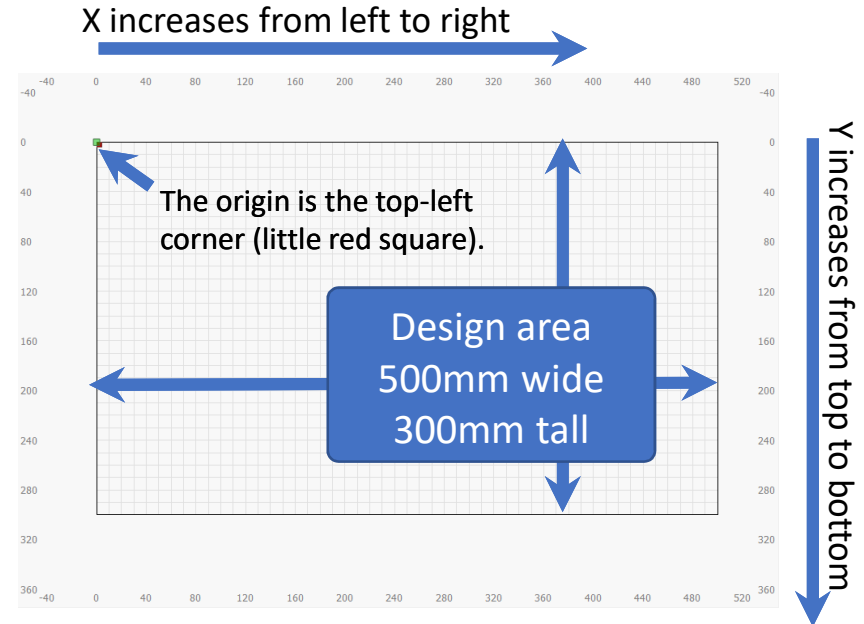


# The Design Area

When you start the LightBurn app, it will find the laser connected to it and import parameters associated with it. The important parameters are the size of the design area, and where the origin is (which sets the direction of X and Y).



Big Red

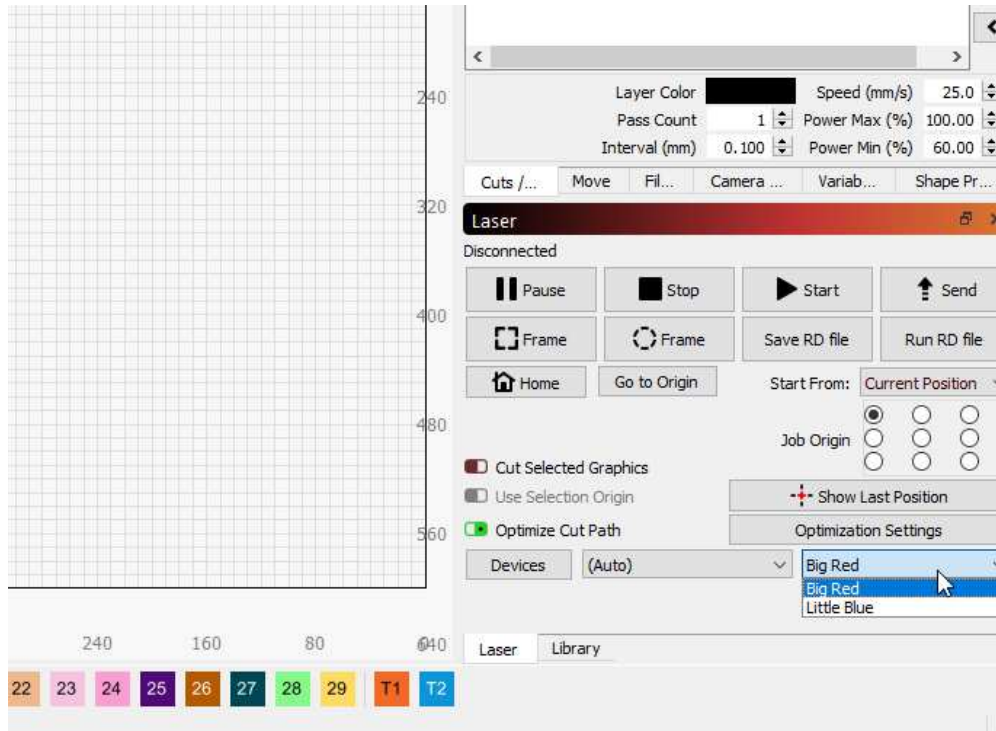


Little Blue



# Using the Studio workstations

If you are using a workstation in the main studio (or a personal copy of LightBurn), you should select the device (Little Blue or Big Red) that you plan to use when you go to the laser. Look in the bottom right corner of the Laser window and there is a dropdown with all the devices this copy of LightBurn has set up.

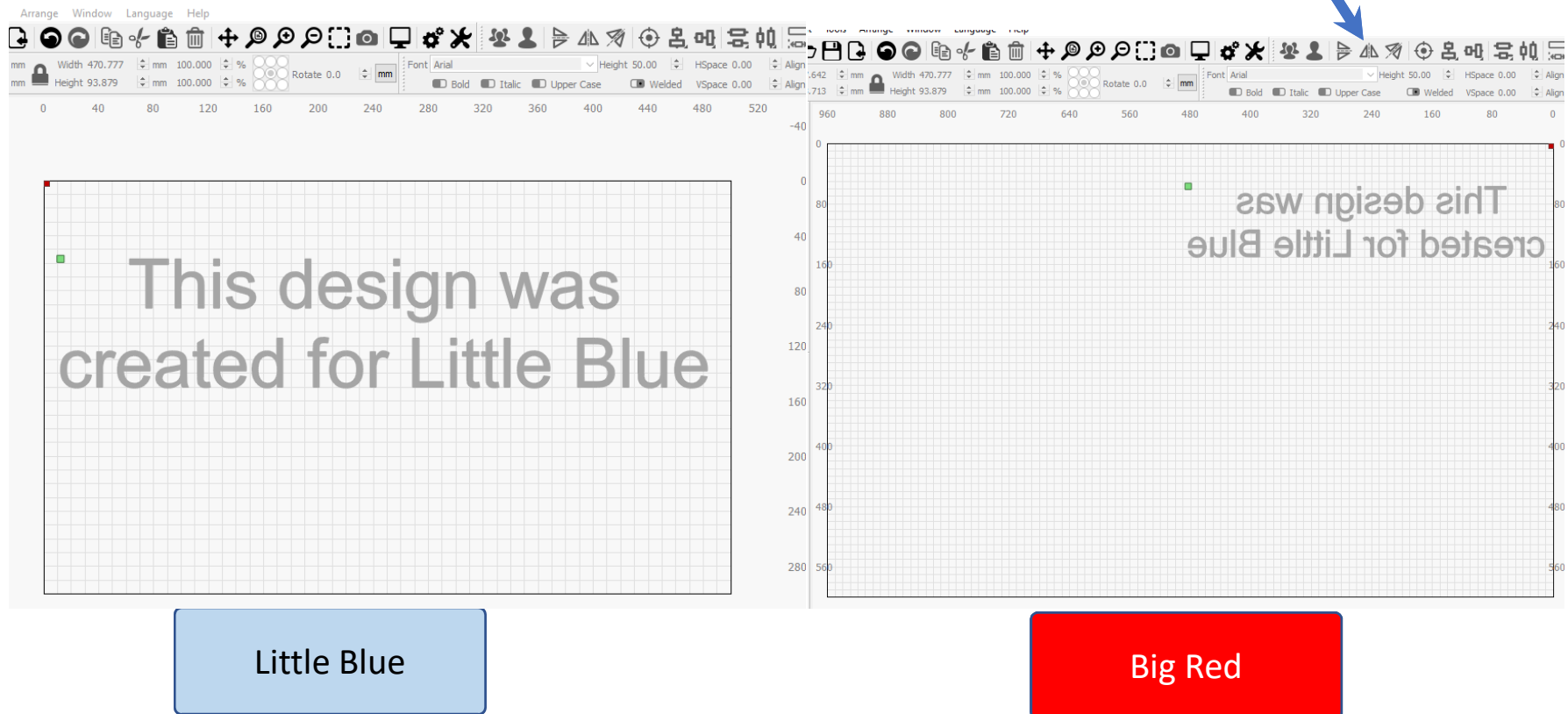


The Laser Window has a drop down for Devices. Pick the one you plan to use.

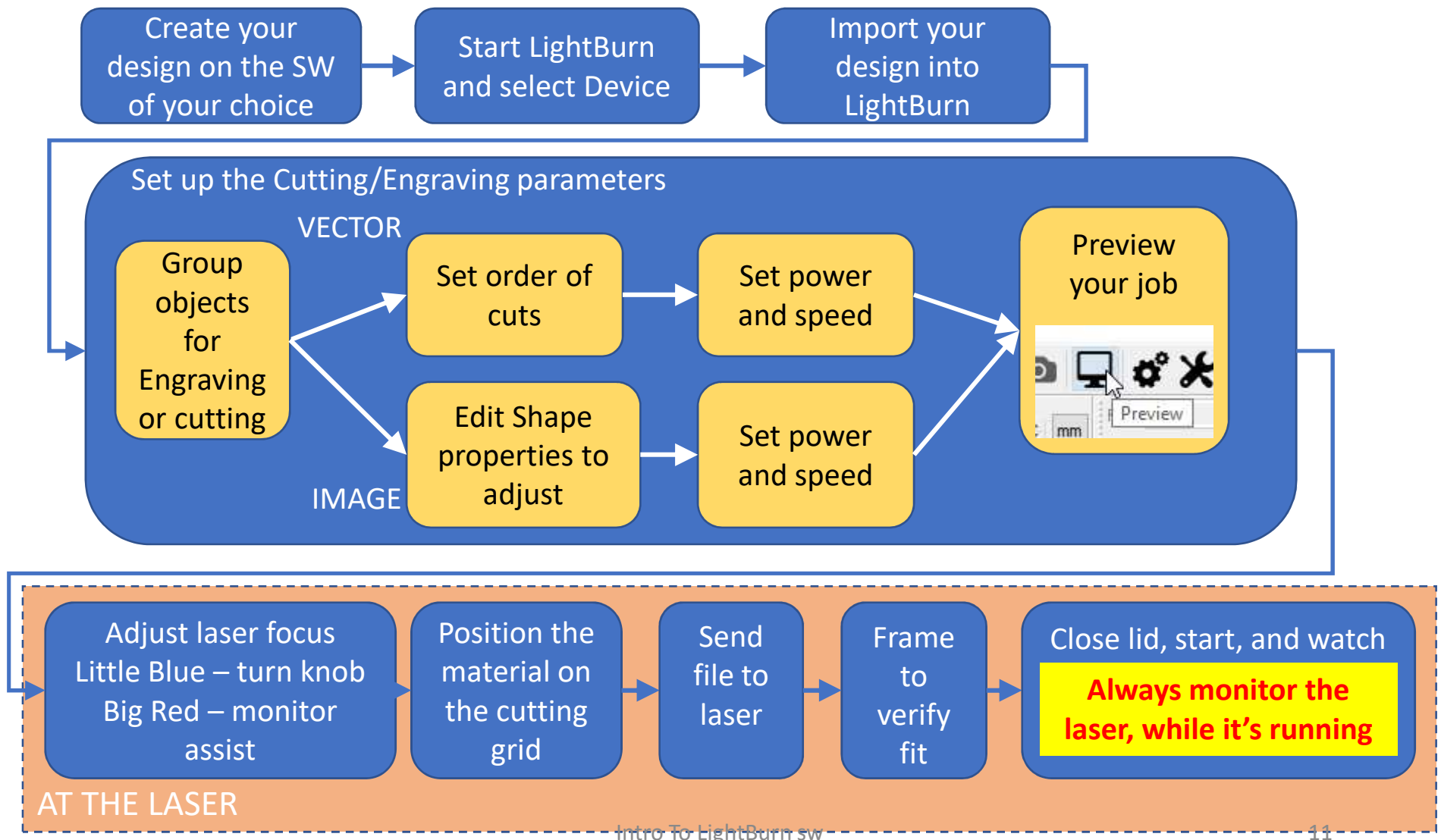
# Switching Machines

If you save your design on one machine and then open it on the other, the different directions of the Y axis will cause the design to be mirrored. The fix? Make sure Show is ON for all layers, select all objects and do a horizontal mirror

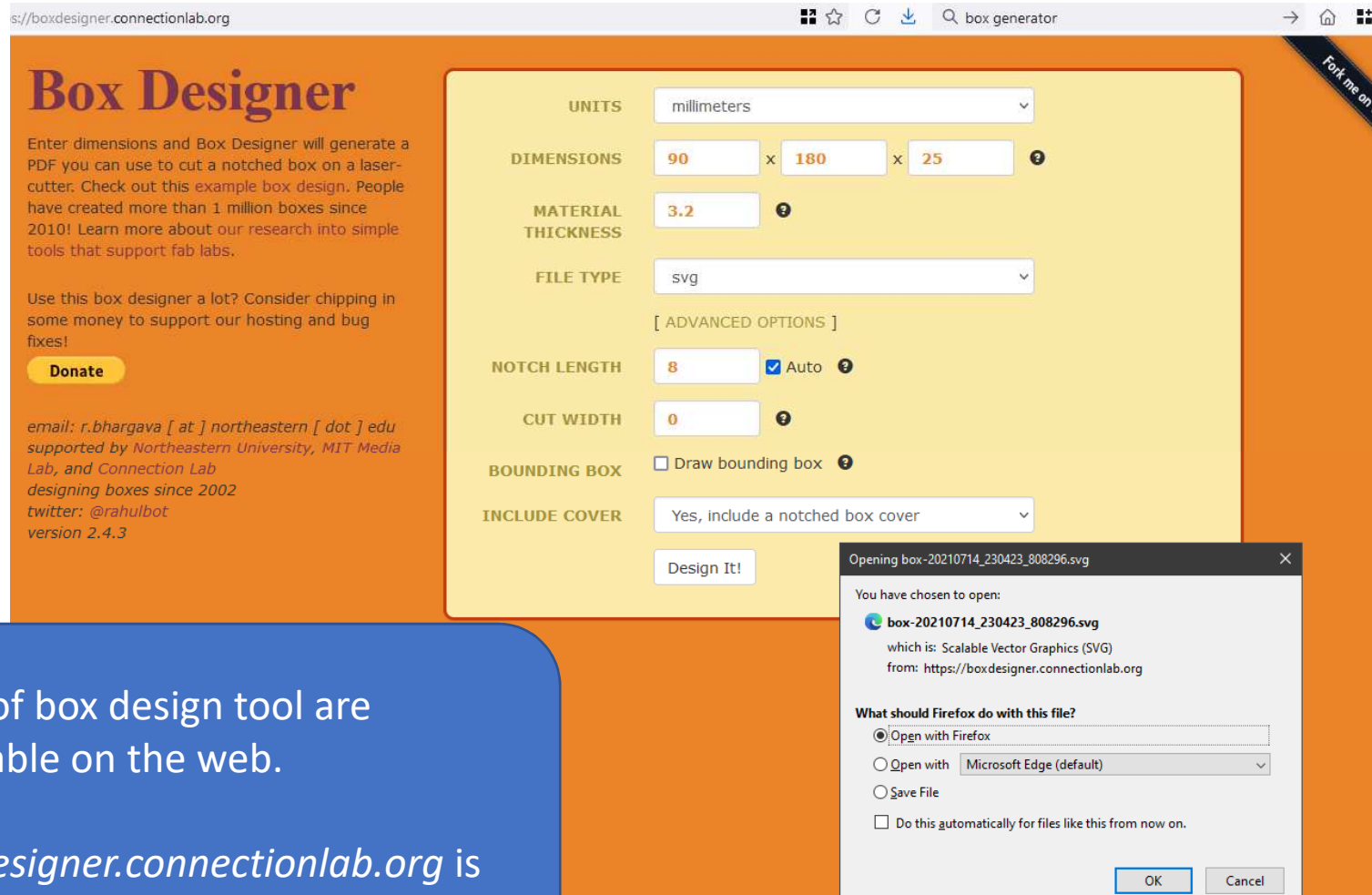
Horizontal mirror



# Typical Laser Workflow



# Design - Pencil box from the internet



Lots of box design tool are available on the web.

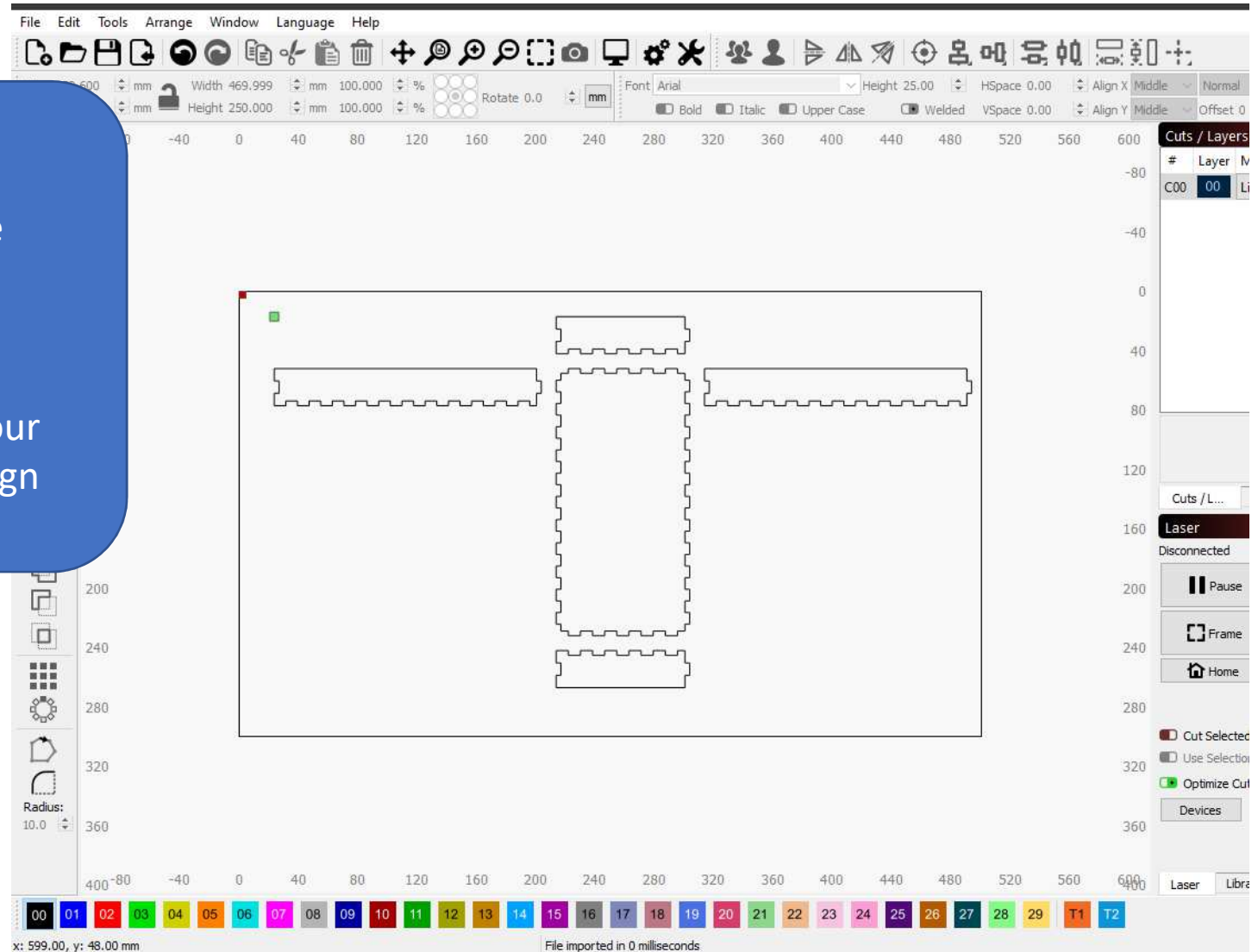
*boxdesigner.connectionlab.org* is one.

# Import your design

1. File Menu
2. Import
3. Select your file

OR

Drag and drop your file onto the design area.



# Positioning your design

Objects outside the design area may not be cut, but can drive where the laser tries to start from (green square), even if Output is OFF.

This shape is outside the design area

This shape is inside the design area

Best to keep all objects inside the design area to avoid unexpected behavior

This shape straddles the design area and will not be printed

Objects that straddle the design area will not be "partially cut"

Cuts / Layers

#	Layer	Mode	Spd/Pwr	Output	Show	Air
Side 2, Cut	00	Fill+Line	25.0 / 100.0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Layer Color ☐ Speed (mm/s) 25.0  
Pass Count 1 Power Max (%) 100.00  
Interval (mm) 0.100 Power Min (%) 60.00

Cuts / ... Move Fill... Camera ... Variab... Shape Pr...

Laser

Disconnected

Pause Stop Start Send

Frame Frame Save RD file Run RD file

Home Go to Origin Start From: Current Position

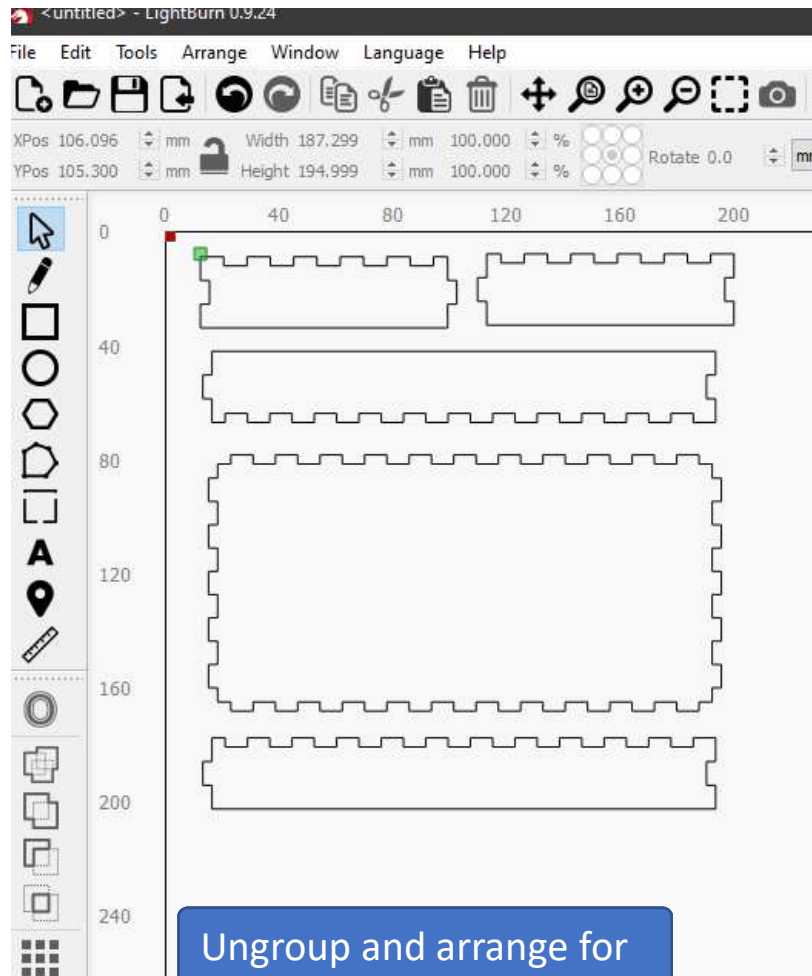
Job Origin ☐ ☐ ☐

☒ Cut Selected Graphics ☐ Use Selection Origin ☒ Show Last Position

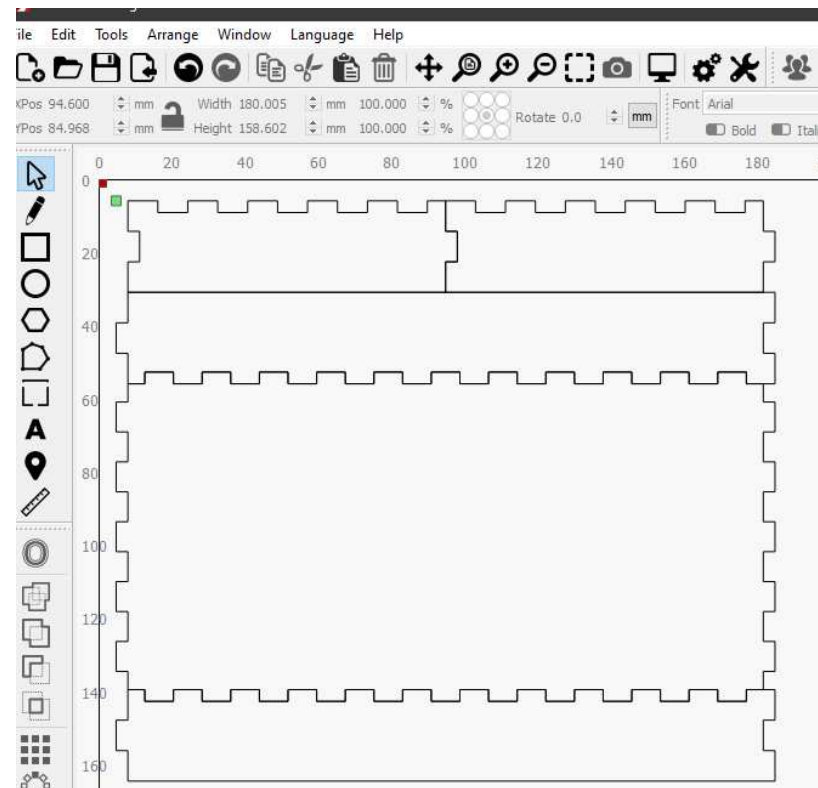
☒ Optimize Cut Path Optimization Settings

Devices (Auto) Little Blue

# Optimizing design position



Ungroup and arrange for better material utilization

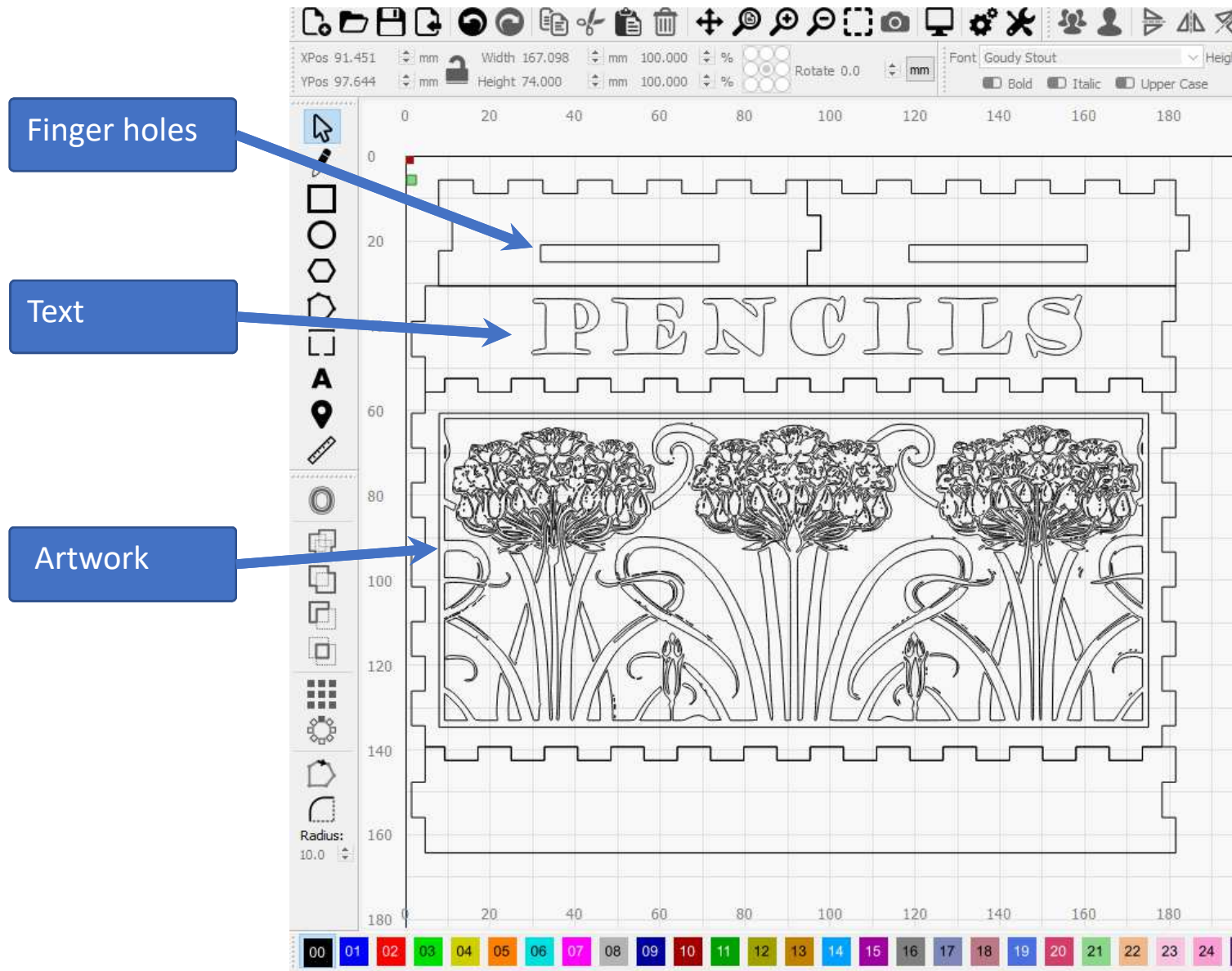


Share edges for faster cutting and best material utilization.

Note: If using Big Red, it's wider cut may make your box joints loose with this method. Assess your need for using "offset"

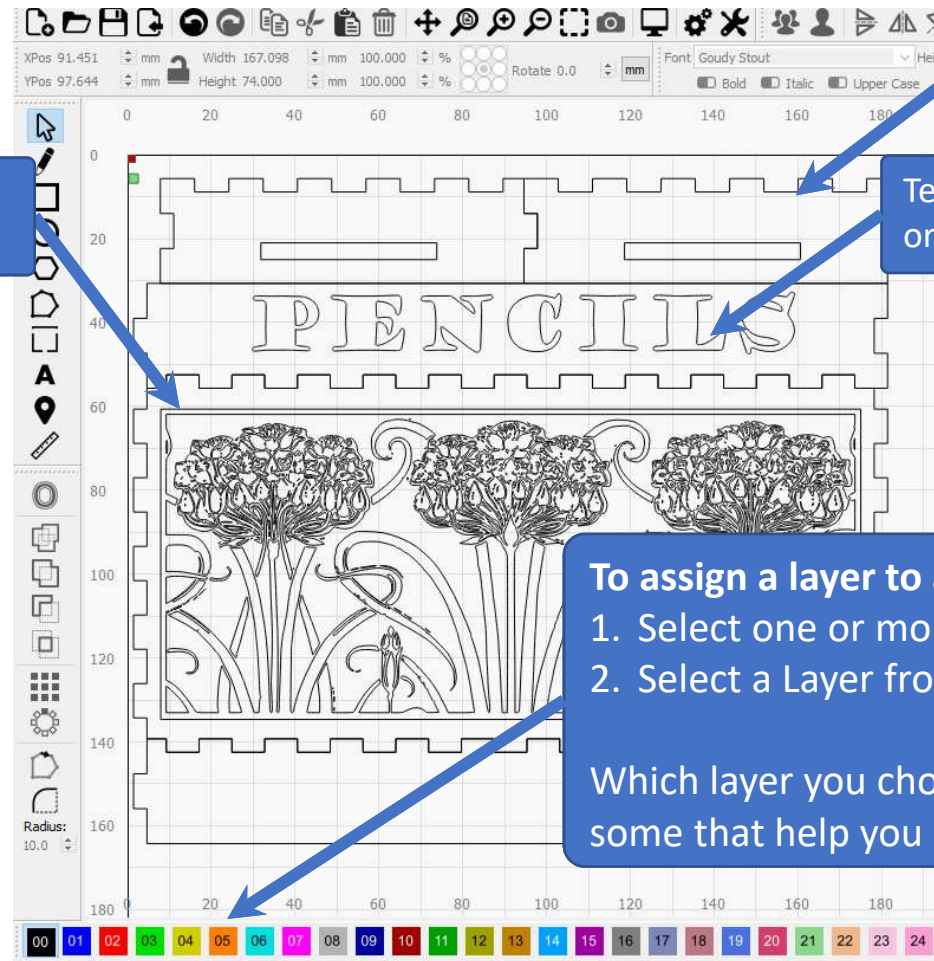


# Adding some embellishments



# Layers

“Layers” are how we collect things together to set the order of cutting and set different cutting properties.



Artwork might be outlined or filled

Outlines and holes are “through cuts”

Text might be outlined or filled.

## To assign a layer to an object:

1. Select one or more objects .
2. Select a Layer from the “Layer Palette”.

Which layer you choose does not matter. Pick some that help you see your design.

# Layers assigned

I left all the through cuts on Layer 00 (Black)

I put the text on Layer 02 (Red). I plan to outline and cross-hatch it

I put the artwork on Layer 03 (Green). I'll do an outline and solid fill on it

When a layer has been assigned to one or more objects, it appears in the Cuts/Layers window.

#	Layer	Mode	Spd/Pwr	Output	Show	Air
C00	00	Line	100.0 / 20.0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C03	03	Fill+Line	100.0 / 20.0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C02	02	Fill+Line	100.0 / 20.0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Layer Color:   Speed (mm/s):   
Pass Count:  Power Max (%):   
Interval (mm):  Power Min (%):   
Cuts / L...

☒ Cut Selected Graphics  
☒ Use Selection Origin  
☒ Optimize Cut Path  
Devices: (Auto) Optimization Setting: Little Blue  
Laser Library

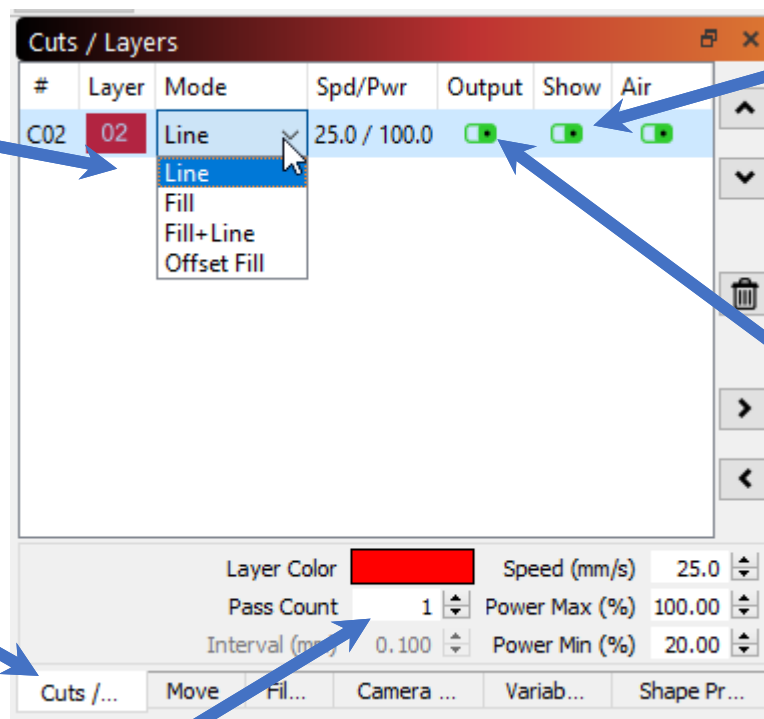
# Cuts / Layers Window

Each layer has “Cut Parameters” that control what the laser does with each object on that layer. The order of the layers can (usually does) control the order the objects are cut/etched. The common cut parameters on in the Cuts/Layers window.

Select a “MODE”  
*Line* – follow vectors  
*Fill* – raster fill the object, but no outlines  
*Fill + Line* – do both  
*Offset fill* – spiral fill (vs raster)

If the window is hidden, click on its tab

How many times to repeat this cut – rarely used



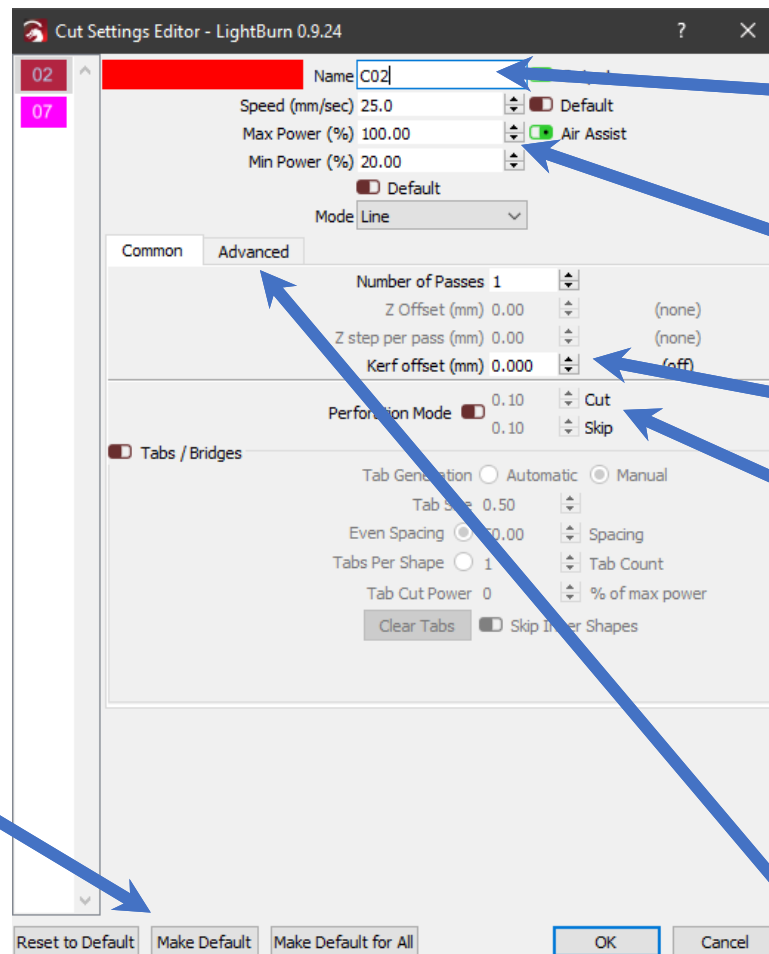
Show object on this layer in the design area?

Lase objects on this layer?  
Useful for adding notes

*Speed* – speed of laser  
*Power Max* - “normal” power  
*Power Min* - minimum power when the laser slows down at a corner.

# More Cut parameters

Double clicking on a layer in the Cuts/Layers window opens the full set of cut parameters. We'll only talk about a few here.



Naming your layers helps you keep track of things in your design .

Speed/Power/Mode settings

Offset the cut to account for the laser kerf

Make a dashed cut or etch line.

Please don't reset the defaults

If these are not enough, there is an Advanced Tab

# Library Window

We have created a library of cut settings for typical materials. These can be assigned to a layer. It's a great starting point.

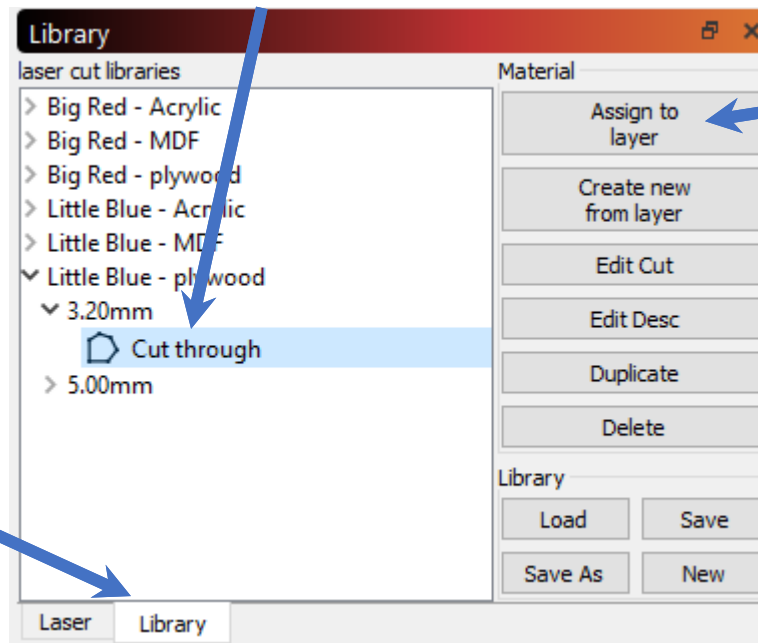
1. Select a layer you want to assign library cut parameters to

2. Select the Library tab if the library window is not visible. Normally the laser tab is visible.

3. Expand material, thickness, and select a named cut

**Important – pick for the machine you plan to use**

4. Click “Assign to Layer” to copy the cut parameters to your current layer

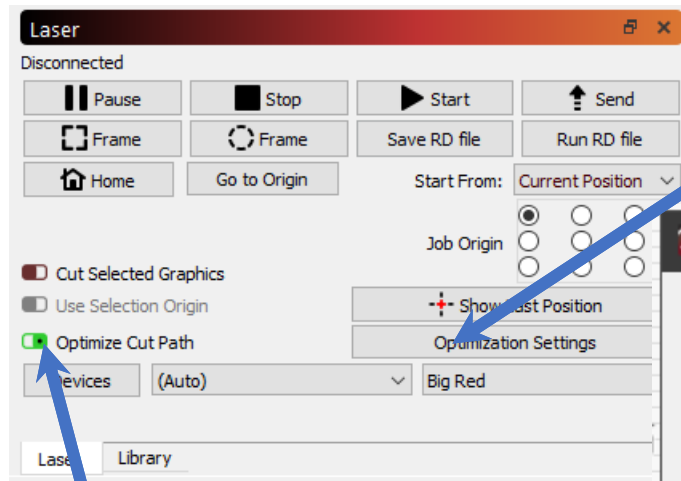


You can download the LittleBlue, BigRed, and CombinedETA libraries here:  
[https://github.com/BainbridgeArtisanResourceNetwork/LightBurn\\_Config\\_Files](https://github.com/BainbridgeArtisanResourceNetwork/LightBurn_Config_Files)

After assigning a library cut to your layer, you can modify the cut settings for that layer without affecting the library. - it's a copy operation, not a linking operation.

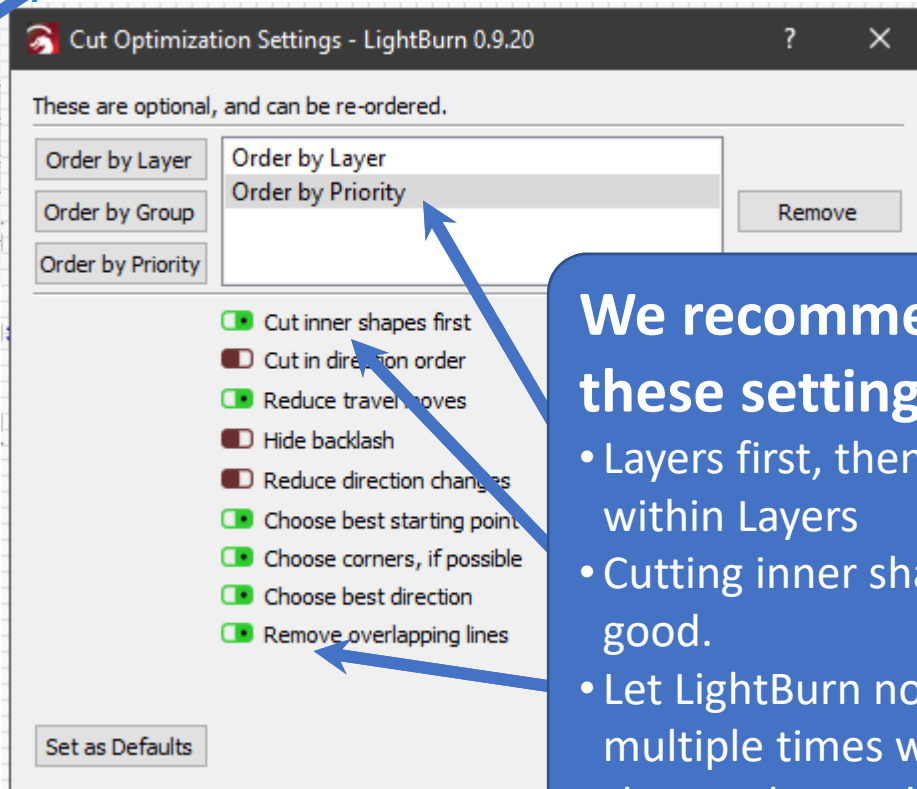


# Cutting order Priority and Optimization



LightBurn will optimize the cut order if you let it. You can turn it off in the Laser Window, but we like it left on.

To see or change the LightBurn Optimization settings, select the Optimization Settings button

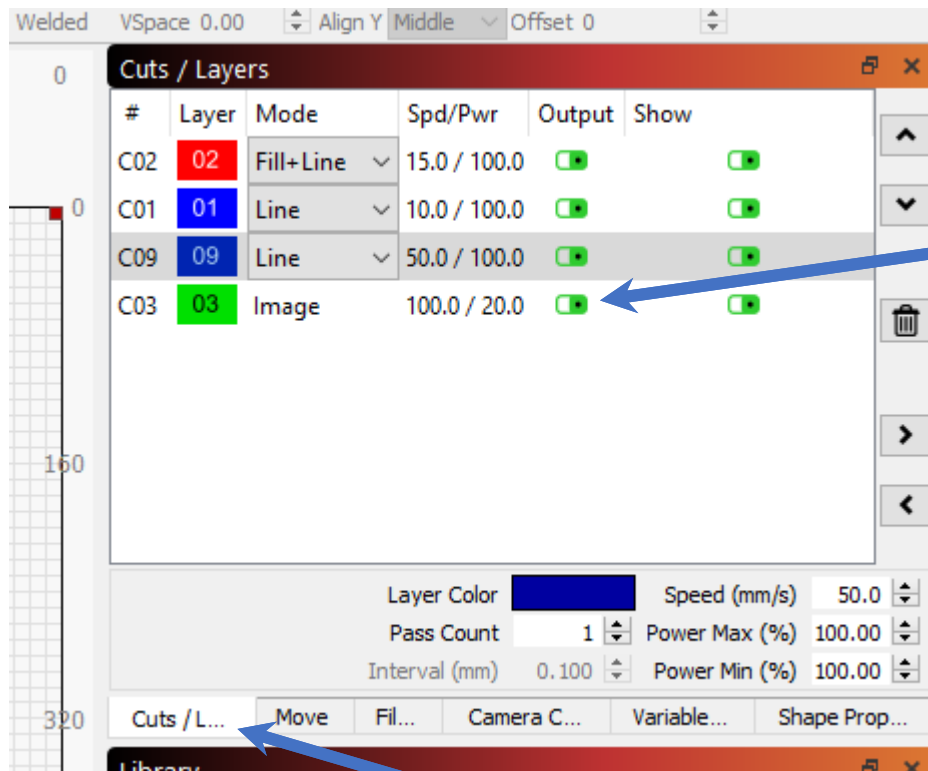


## We recommend these settings

- Layers first, then priority within Layers
- Cutting inner shapes first is good.
- Let LightBurn not cut multiple times when shapes share edges.

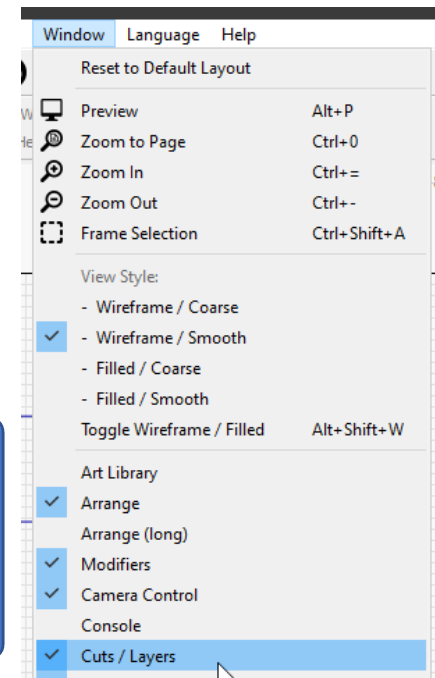


# Most used – Order by Layer



Most common - priority by layer order

- Move a layer up or down in priority with these arrow buttons
- Turning off "Output" means it won't be cut, so its order does not matter.



If the cuts/Layers tab or window is not visible, turn it on from the Window menu

# Cut order Planning 1 - layer order

I want the holes in the parts cut before the outlines

I want the artwork and text engraved before the parts are cut out.

I want to cut out the smaller parts first, and the biggest one last

I've reordered the layers to reflect my plan. But what about the order of the through-cuts?

#	Layer	Mode	Spd/Pwr	Output	Show	Air
C02	02	Fill+Line	100.0 / 20.0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C03	03	Fill+Line	100.0 / 20.0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C00	00	Line	100.0 / 20.0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

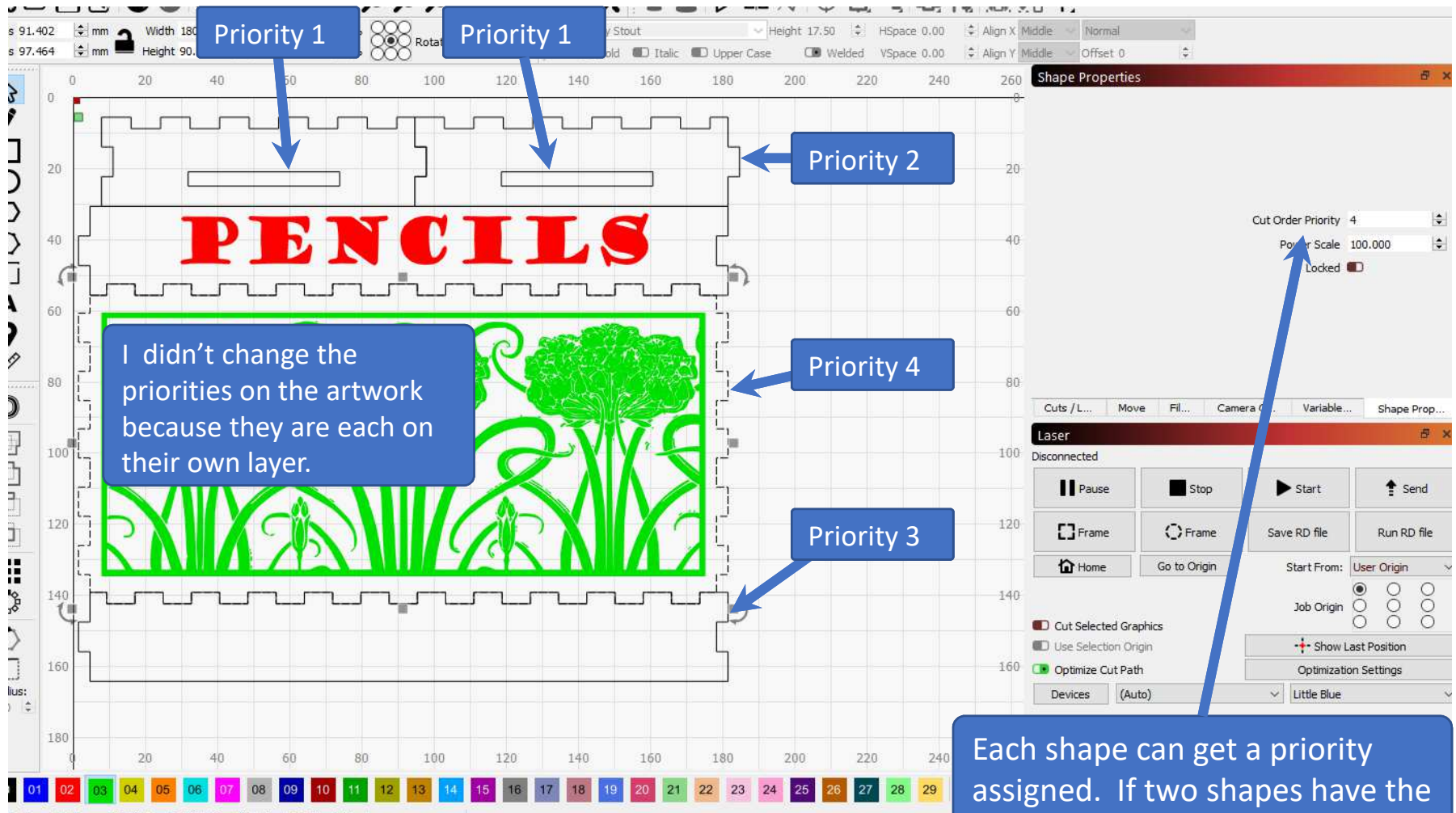
Layer Color: ☒ Speed (mm/s): 100.0  
Pass count: 1 Power Max (%): 20.00  
Interval (mm): 0.200 Power Min (%): 20.00

Cuts / L... Move Fill... Camera C... Variable... Shape Prop...

Laser  
Disconnected

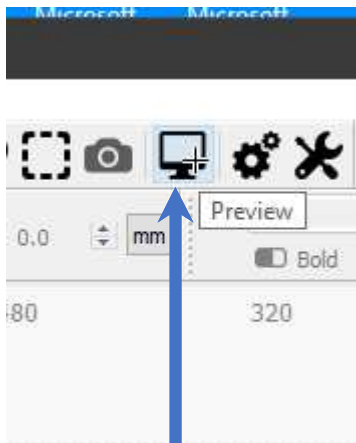
Pause Stop Start Send  
Frame Frame Save RD file Run RD file  
Home Go to Origin Start From: User Origin  
Job Origin  
Show Last Position  
Optimization Settings  
Devices (Auto) Little Blue

# Cut order – Shape priority

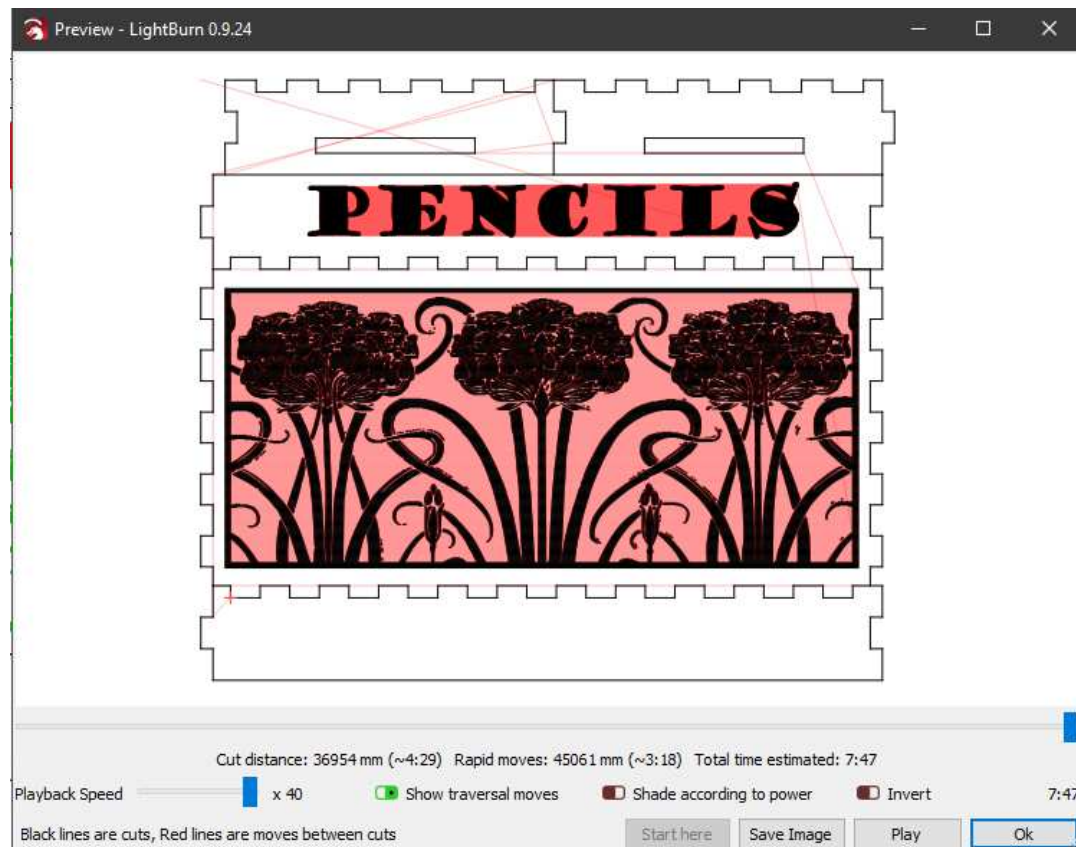


Each shape can get a priority assigned. If two shapes have the same priority, LightBurn will pick the order.

# Preview your cutting

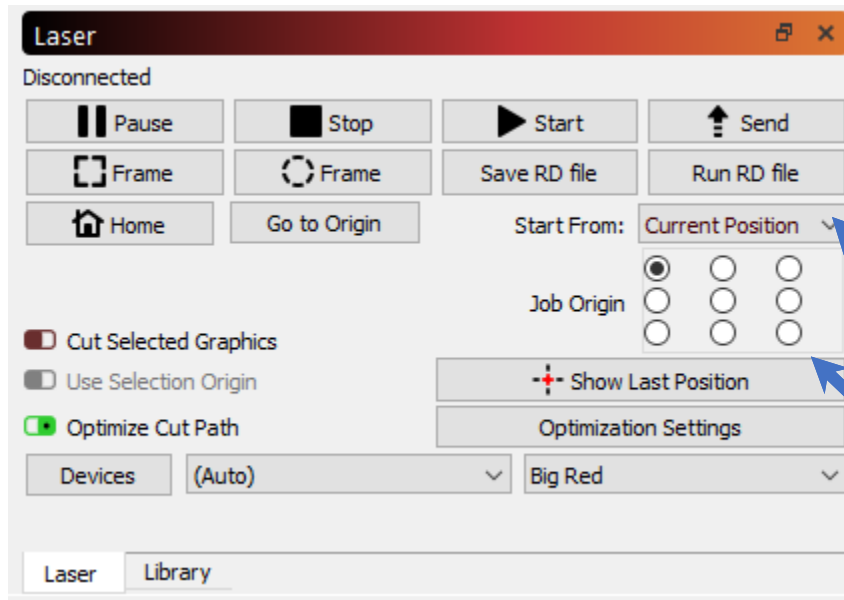


Select the Preview icon on the tool bar, or right click on the design space and select Preview.



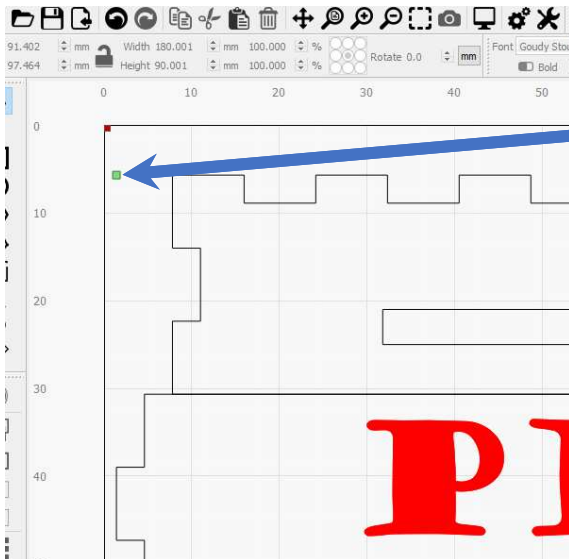
Black lines are laser-on moves and red are laser-off moves. Selecting Play will animate the job so you can see the order. A time estimate is also provided.

# Aligning LightBurn with the laser



You need to tell LightBurn where to start cutting from. This is done in the Laser window.

- We recommend moving the laser to the back left corner of the material, and the following settings
- Start from “Current position” (the place where you just positioned the laser).
- Then select the “Job Origin” to match which corner of the material you moved the laser to.
- LightBurn will put a little green square on the design to show where the laser will start.
- The Next step (Frame) will tell you if you got everything right.



# “Focus” the laser

Place your material on the cutting grid so that it is under the laser cutting head (you might need to move the laser over the top of your material) – use the buttons on the laser control panel – you can’t grab the laser and move it like on the old FS laser.

## BIG RED

This laser “autofocuses” by moving the material bed up and down. We are still developing procedures that will be sure the laser doesn’t accidentally crash into itself while moving the bed.

SO... Ask a monitor to help you with the focusing step on Big Red.

## LITTLE BLUE

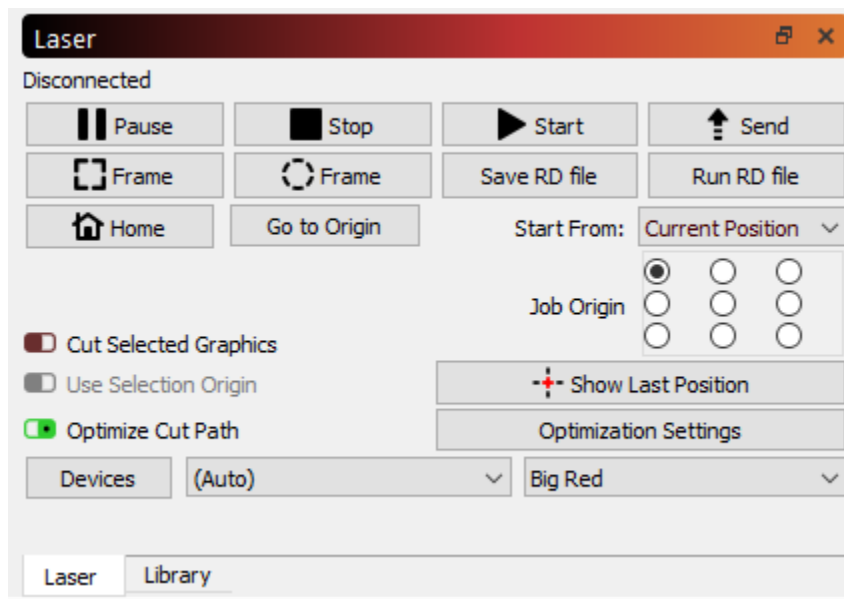
This laser focus is adjusted by moving the bed up and down (not fussing with the lens like the old FS laser). There is a knob inside the laser – front right corner – that moves the bed up and down.

1. Move the bed down so your material can be placed under the nozzle.
2. Move the bed up until the nozzle is 6mm from the surface of your material. There is a piece of 6mm plywood to use as a gauge. The setting is not too fussy. You can see when the nozzle just about touches.



# Frame

After you send your project to the laser and set the origin on the laser control panel, you can use the laser control panel “frame” button to frame your cut.

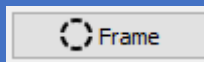


You can also use the Frame buttons in LightBurn

When you click one of the two frame buttons, the laser will move around the outside of the area where the cuts will take place. If the laser traces off your material, something needs to be changed.



The laser traces a rectangle that encloses all the cuts to be made.



The laser traces a “rubber band line” around the shapes it will cut.



# Working with Images

There are generally two destinations people are pursuing when working with images:

1. Burn a realistic picture onto something.
2. Extract from the image to create something to cut/engrave.

## Realistic pictures

1. Insert your picture.
2. Scale it up/down to fit your intended size.
3. Select the image, then Right click the image and select "Adjust Image" from the pop-up menu.
4. Select the "Image Mode" and adjust as desired. Click OK.
5. Modify speed/power in the Cuts/Layers menu.

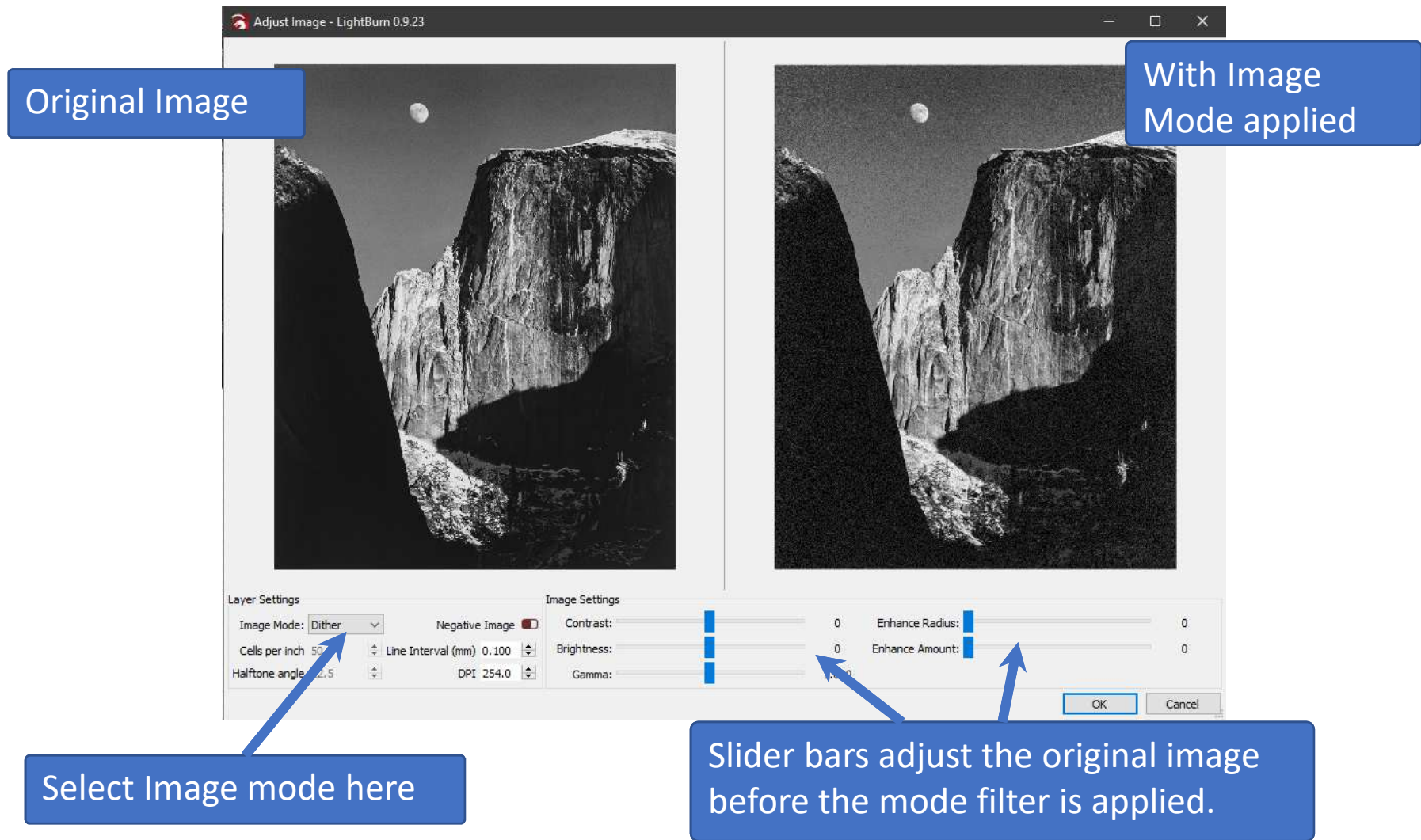
This is a trial/error process. Expect to spend time finding your artistic muse.

## Extracting vectors from images

1. Insert your picture.
2. Select the image, then Right click the image and select "Trace Image" from the pop-up menu.
3. Adjust with the sliders until you like it. Click OK.
4. Move or delete the original image. If not deleted, set "Output" off in Cuts/Layers window.
5. Scale it up/down to fit your intended size.

# Realistic pictures

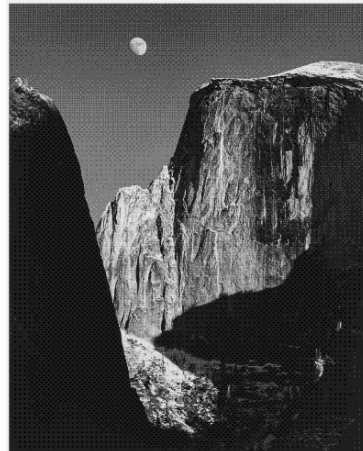
## Image Adjust window



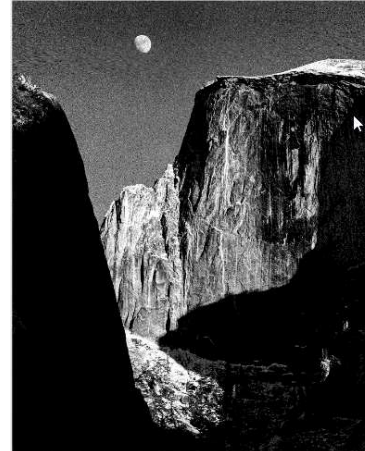
# Image adjust filters



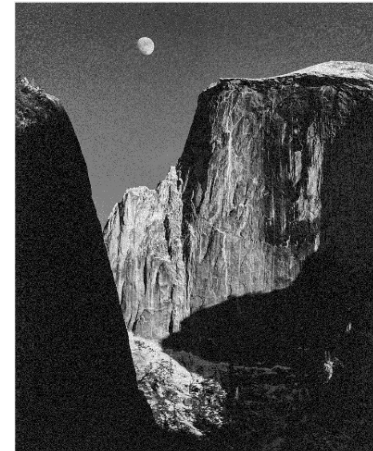
Threshold



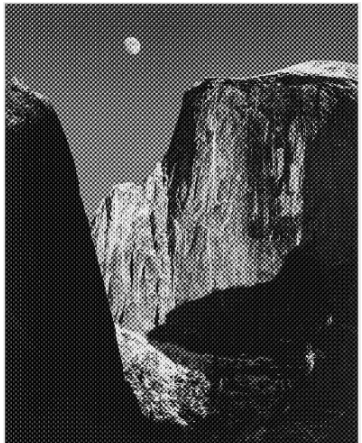
Ordered



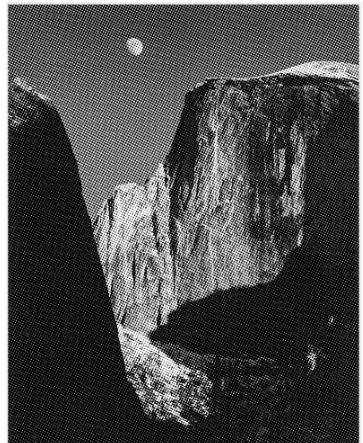
Atkinson



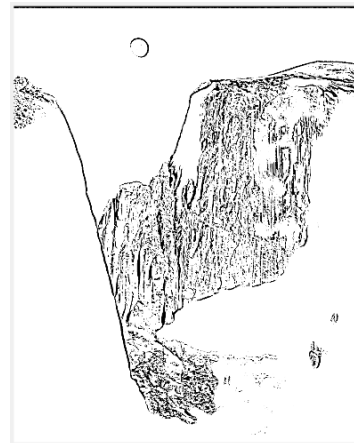
Dither



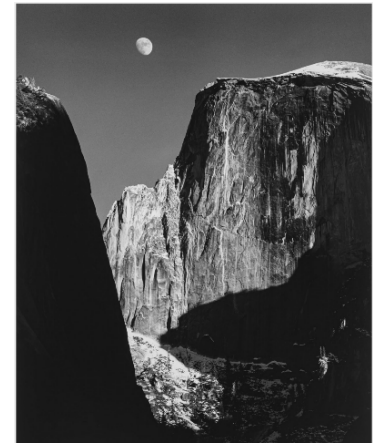
Newsprint



Halftone



Sketch



Grayscale

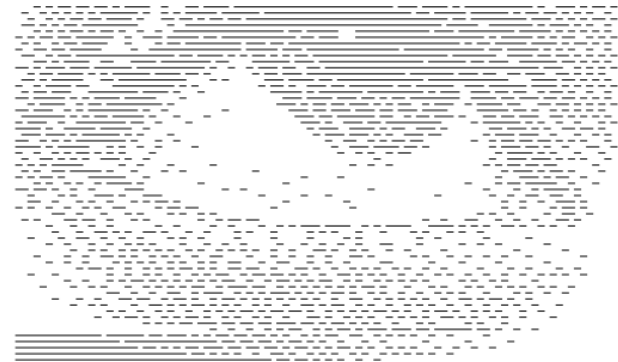


# Grayscale vs dithered

Original Image



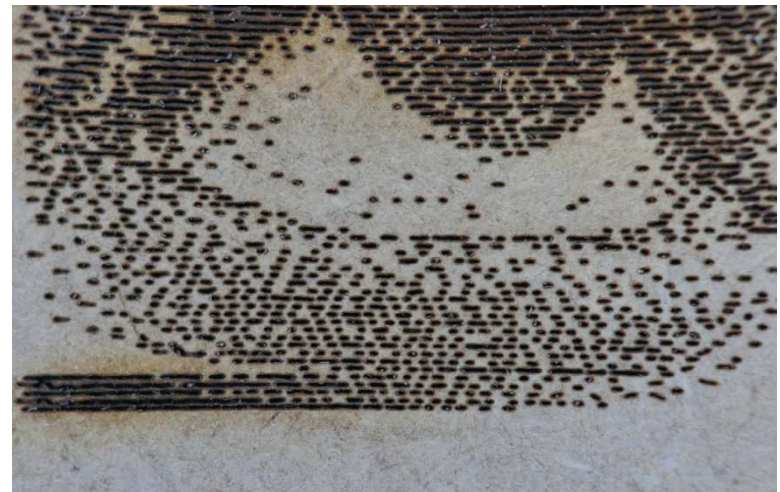
Preview of Stucki dithering



Close-up of **Grayscale** laser cut



Close-up of **Stucki** laser cut



# Photo Summary

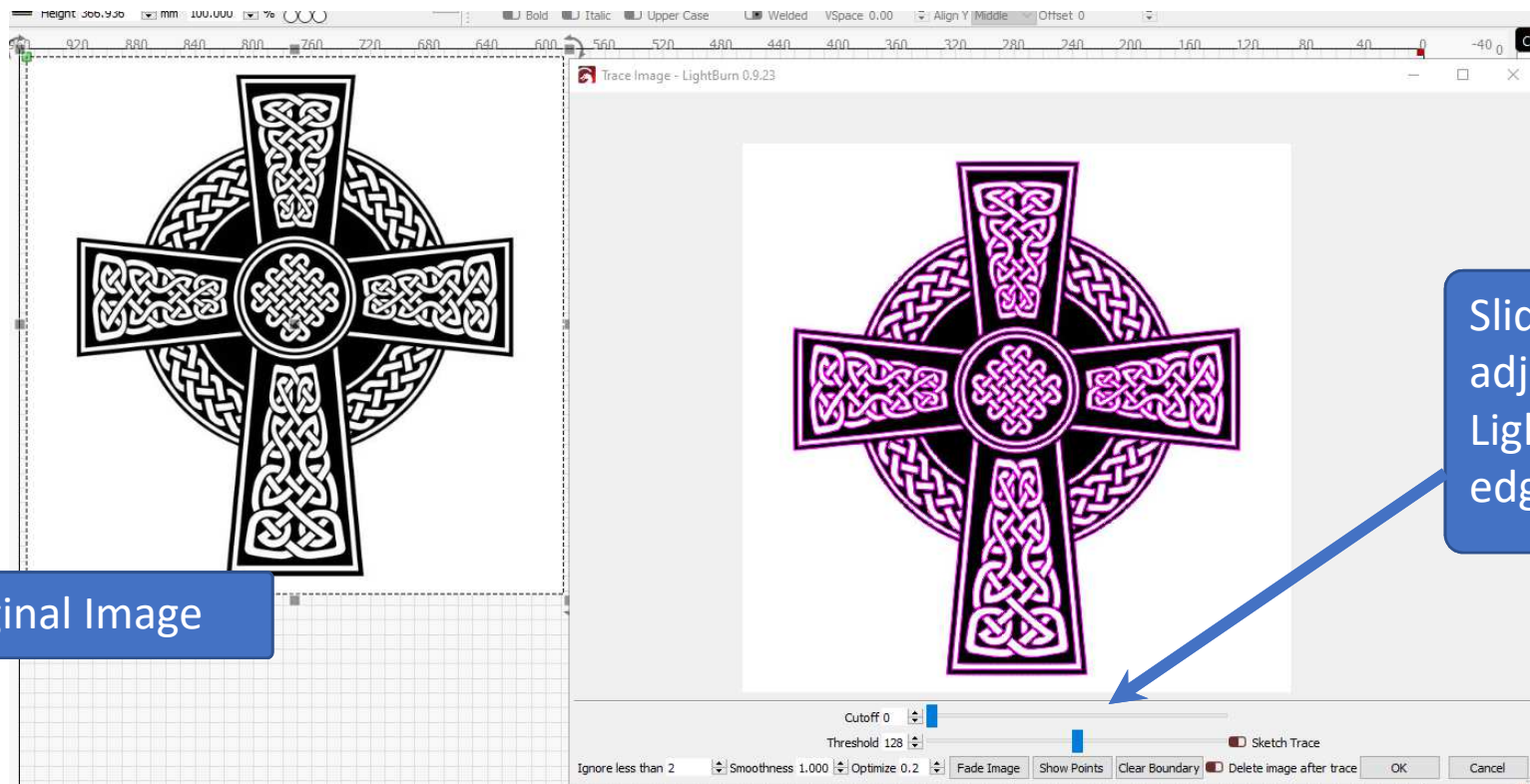
Expect to spend some time practicing with pictures before getting one you think is “just right”. When you do get there, please share what you’ve learned, maybe teach a class on the subject.

Getting your picture “just right” will likely involve applying filters, and adjusting photo parameters. You can use the LightBurn tools, but you can also pre-process photos in a lot of other applications before you import them to LightBurn, and those apps may have better filters. Don’t be afraid to pre-process your photos.

Other good advice to be added here once we learn it.

# Converting Images to vectors

You can convert images into vectors - this works better with graphics than pictures. After importing your image, left click to select it, then right click and select "Trace Image" in the pop-up menu.



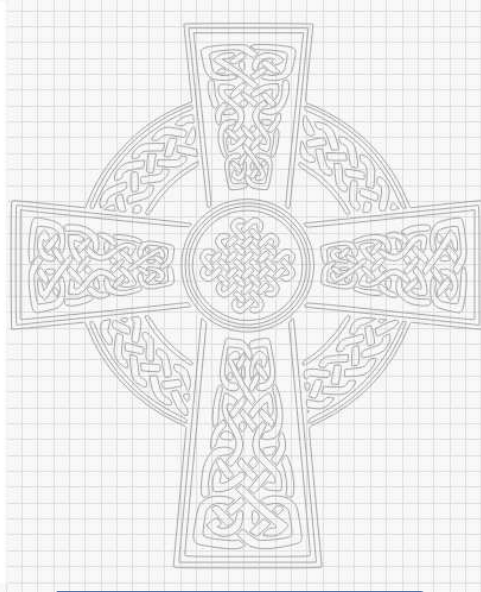
Slider bars adjust how LightBurn finds edges.

The traced image is left on top of the original. Move or delete the original to see the vector image

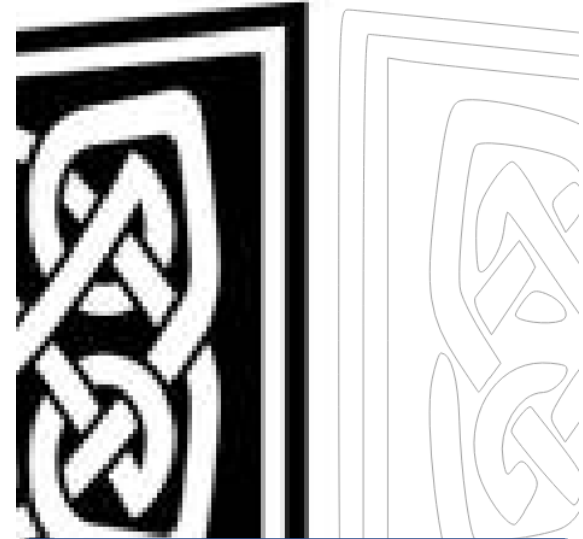
# Converting Images to vectors



Original Image



Vector Image



Close up of original image and vector lines.



# Other examples



# Configuring LightBurn

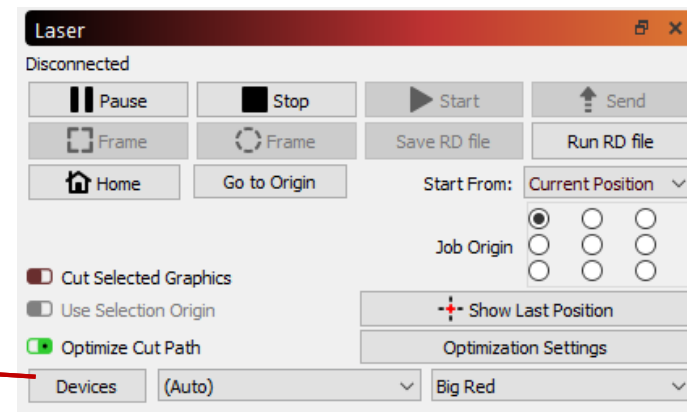
# Downloading LightBurn

You can run LightBurn on your own computer. Go to <https://lightburnsoftware.com/> and follow the “Download/Trial” link. The software is free for 30days.

Installation – When you first run LightBurn, it wants you to connect it to a Device.

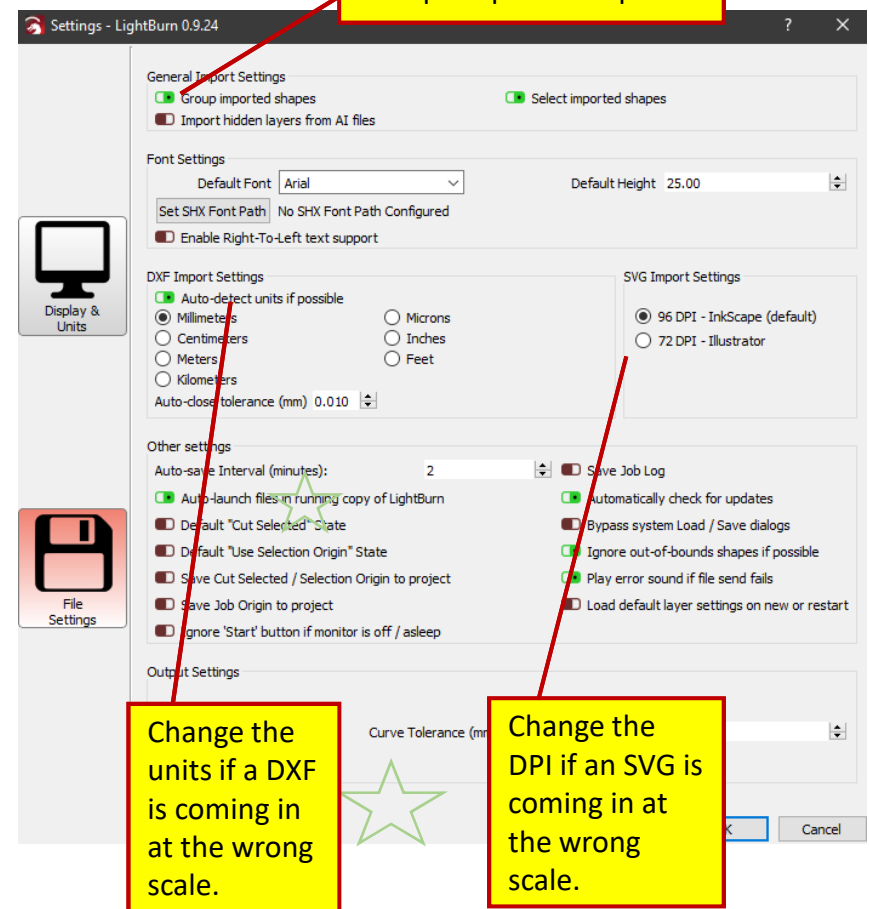
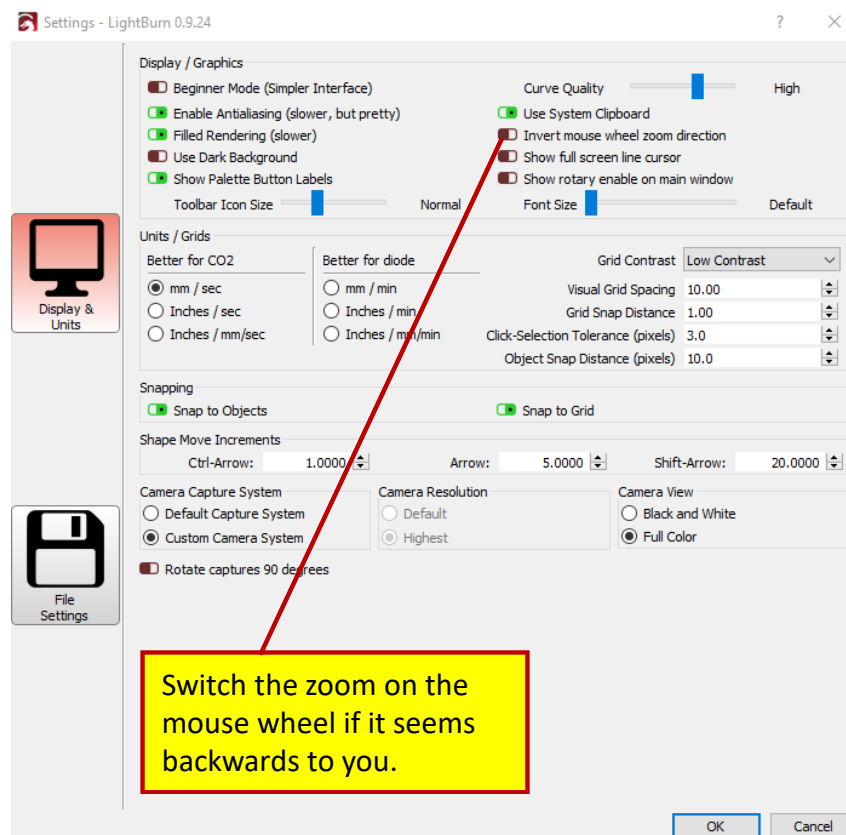
1. Select “Create Manually”.
2. Scroll down and select “Ruida” from the controller list, then Select “Next”.
3. Select “Serial/USB”, then Select Next.
4. A. Name your printer “Little Blue”, or “Big Red” – or whatever you want.  
B. enter the X and Y dimensions (X = 500mm, Y = 300mm for little Blue; X = 1000mm, Y=600mm for Big Red). Then Select Next.
5. Select the button for Laser’s origin. “Rear Right” for Big Red, and “Rear Left” for Little Blue. Then Select Next.
6. Select Finish. You are ready to go.
7. You can add another device (or edit the one you created) by clicking on the “devices” button in the Laser window. If you have two or more devices, you can select which to use in this window.

Select “Devices” in the Laser window to add or edit a laser



# Some user settings to know

Click Edit, then select “Settings” to open the Settings window. There are two sections, Display and Units, and File Settings.



# Q&A

Q: Why LightBurn/ what happened to RetinaEngrave

A: LightBurn enables you to access the full features available in the controllers of our new lasers. It's better than RetinaEngrave and easier to use.

Q: Can I run LightBurn on my own computer?

A: Yes, but you'll need to buy a license to use it for more than 30 days. One license can be used on up to two computers.

Q: Do I need to do all my project work on the computers connected to the lasers?

A: No, LightBurn is also available on the workstations in the ETA studio. It's best to prep there to give others access to the lasers.

Q: Can I still use Inkscape?

A: Yes, but you'll need to export your project and import into LightBurn to get it onto the laser.