



Laser Manual  
PLS 6.150D  
ILS 12.150D

D  
AN  
IELS  
DIGITAL  
FABRICATION



You can see the section you are currently in.

# Using this manual

Each page in this manual follows a general layout of three columns. Read left, to right, to the bottom of each column, then move to the next.

Important keywords are **bolded**, values are **highlighted** in red. On images, areas of interest are highlighted with red arrows or squares/circles. External links will precede a ↗.

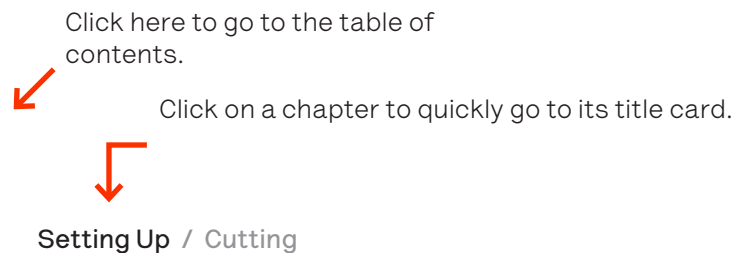
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## Chapter cards

Clicking on chapter titles along the bottom bar will also take you to its chapter card. The section titles are hyperlinked, and to the right, corresponding timestamps are hyperlinked for the accompanying video for that chapter.

This manual was last updated on March 5, 2022 1:42 AM



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# Setting Up

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# Basics

## Hours of Operation

Monday - Friday: 10 am to 10 pm.  
For weekend hours, refer to the [website](#).

## Pricing

Laser cutting costs **33 cents** per minute (**\$20/hour**). Allowable daily cutting time changes based on demand. It can range from 1 hour to 3.5 hours.

## Materials

The Daniels wood shop sells various materials pre-cut to laser bed size, the price and materials list is [located on the website under the laser cutting page](#).

Refer to the **Power & Speeds** chart to see what you can cut on the laser cutters safely.

### WARNING:

**DO NOT** cut or engrave glass, metal, foamcore, MDF, or polycarbonate. Inappropriate materials may produce harmful fumes. If in doubt, ask the Fabrication Technologist/Coordinator.

## Booking Your Test

Everyone who uses the laser cutter **must pass the mandatory test**. If you passed last year, please read over this manual before using the laser cutters.

The mandatory tutorial/test is offered regularly. Head to [training.daniels.utoronto.ca](http://training.daniels.utoronto.ca) to sign up for a session.

The screenshot shows the website interface. At the top, there is a navigation bar with a home icon and the URL 'training.daniels.utoronto.ca'. Below the navigation bar, there is a 'Home' link and a 'Log in' button, which is highlighted with a red box. Below the 'Log in' button is a text input field. Below the input field, there is a section titled 'Trainer Sessions' with a 'Date' header and an upward arrow. The sessions are listed in a table, with the first four rows highlighted by a red box:

Date	Session
10/11/2021 - 10:00	Laser Cutter Training- Kyrillos Morcos- 30 Mins
10/11/2021 - 10:45	Laser Cutter Training- Kyrillos Morcos- 30 Mins
10/11/2021 - 11:30	Laser Cutter Training- Kyrillos Morcos- 30 Mins
10/11/2021 - 12:15	Laser Cutter Training- Kyrillos Morcos- 30 Mins

You must first login, then select one of the sessions and sign up. Please read this manual before signing up for a session.

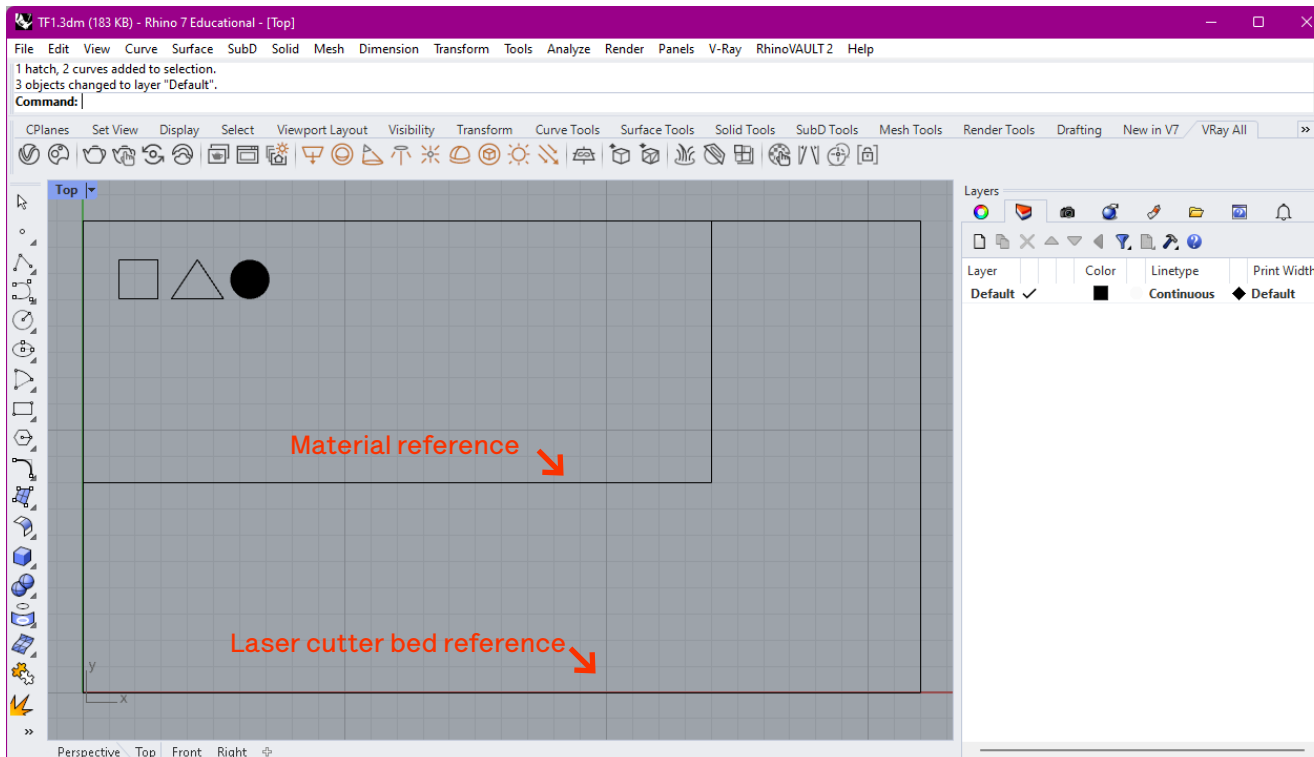
# Rhino

## Create References

Once your cut geometry is ready, create the laser cutter bed reference (larger rectangle) which can be either **32" x 18" (812 mm x 457 mm)** for the smaller laser cutters, or **48" x 24" (1219 mm x 609 mm)** for the larger laser cutter. Then create your material reference, which should be smaller than the laser cutter bed.

The laser cutter origin is located in the top left corner. Place your geometry inside your material reference - ideally in the corner so you can reuse the rest of your material.

In this example, we will be cutting the square, scoring the triangle, and engraving the filled circle.

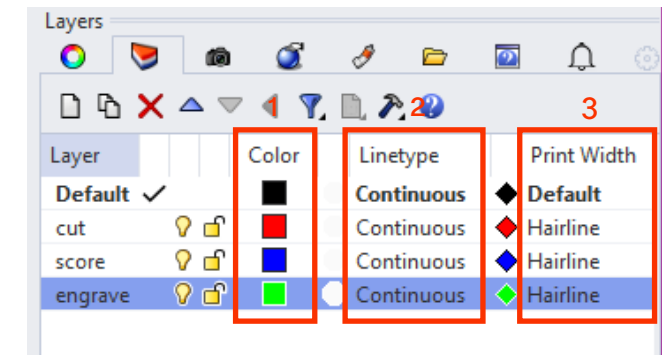


## Setup Layers

Layers will allow you to easily separate power & speed settings for your curves inside Rhino.

You can add up to 8 layers for 8 different power & speed settings, but most projects tend to use just 1 or 2. In general, one layer will be for cutting, and one or more layers will be for different amounts of scoring/hatching.

Create and name layers according to what you intend to do with the laser cutter. The “cut” layer will be for cutting, “score” will be for scoring lightly without cutting through the material, and “engrave” will be for engraving a solid fill.

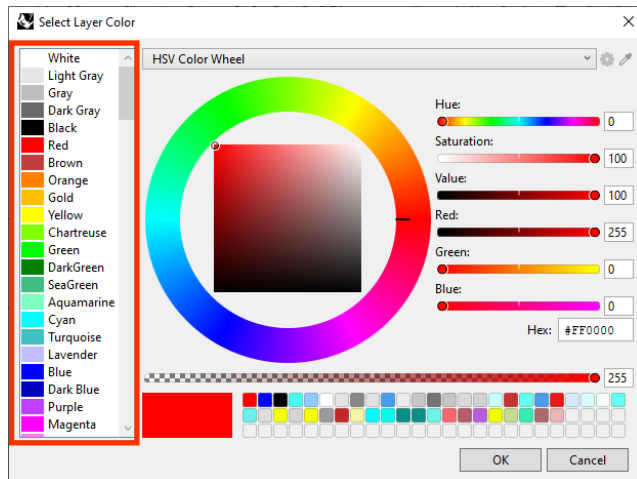


Once layers have been created, the **Color**, **Linetype**, and **Print Width** of each layer must be set as shown on the next page.

## Set Layer Color

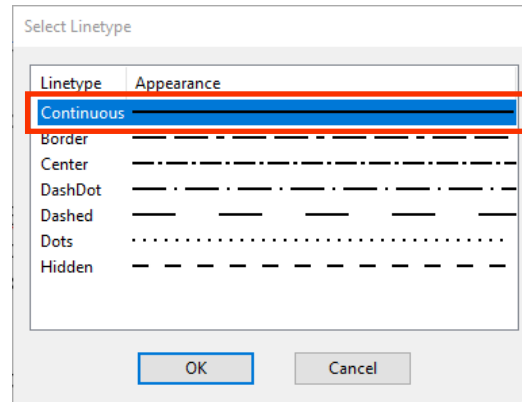
Double-click on the **Color** beside the layer name to select the layer color. Each layer must have a unique color from the following list of 8 colors: **Black (0,0,0)**, **Red (255,0,0)**, **Green (0,255,0)**, **Yellow (255,255,0)**, **Blue (0,0,255)**, **Magenta (255,0,255)**, **Cyan (0,255,255)**, **Orange (255,127,0)**.

Pick the colors from the list on the left. The laser cutter software will only recognize the colors from the above list.



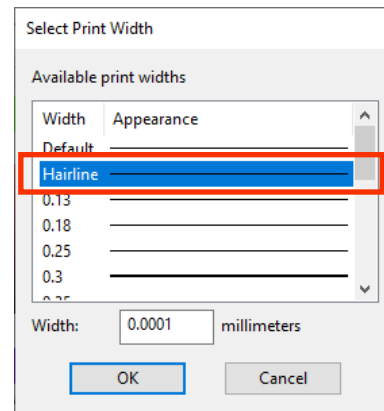
## Set Layer Linetype

Double-click on the **Linetype** beside each layer and set them all to "**Continuous**".



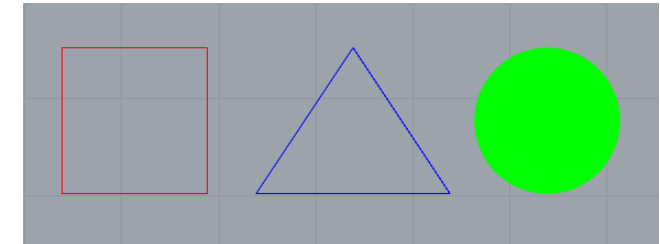
## Set Layer Print Width

Double-click on the **Print Width** beside each layer and set them all to "**Hairline**".



## Assign Curves to Layers

Assign the curves to the layers you have created. Your curves should display the layer color in the viewport. In this example, they are red (cutting), blue (scoring), and green (solid fill).



First, ensure your curves are on the Rhino **XY Plane**. Select your cutting geometry, and enter "**ProjectToCPlane**" as a Rhino command. Choose "**yes**" when it asks to delete original input geometry.

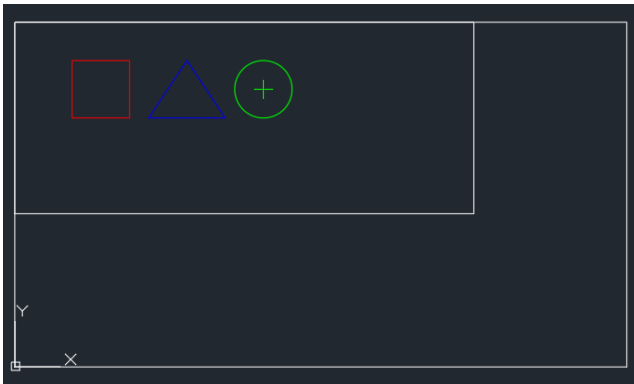
Then, make sure there are no duplicate curves in your file. Deselect everything and enter "**SelDup**". If any duplicate curves were selected, simply delete them.

Save and close your Rhino file.

You are now ready to add yourself to the laser cutting queue. Refer to **Signing Up for the Queue** for instructions.

# AutoCAD

## Create References



First, draw the laser cutter bed, and your material reference. The laser cutter origin is located in the top left corner. Bed sizes that can be used:

Small laser cutter (PLS 6.150D):

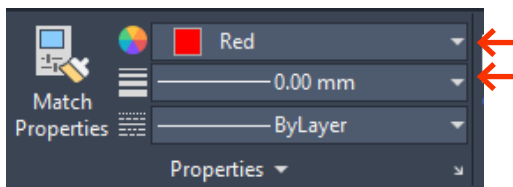
32" x 18" or 812 mm x 457 mm

Large laser cutter (ILS 12.150D):

48" x 24" or 1219 mm x 609 mm

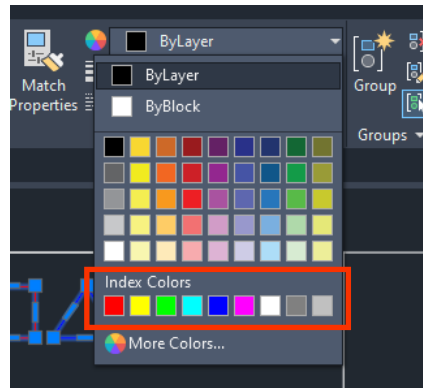
## Set Color & Lineweights

These settings can be changed from the Properties section of the Home tab in AutoCAD.



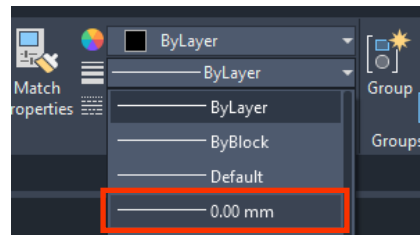
## Set Color

Then, set colors to differentiate cut power & speed. Use the true RGB colors: Black (0,0,0), Red (255,0,0), Green (0,255,0), Yellow (255,255,0), Blue (0,0,255), Magenta (255,0,255), Cyan (0,255,255), Orange (255,127,0).



## Set Lineweights

Select all cut geometry, then from the Lineweight drop-down, choose "0.00 mm".



Save and close your AutoCAD file.

You are now ready to add yourself to the laser cutting queue. Refer to [Signing Up for the Queue](#) for instructions.



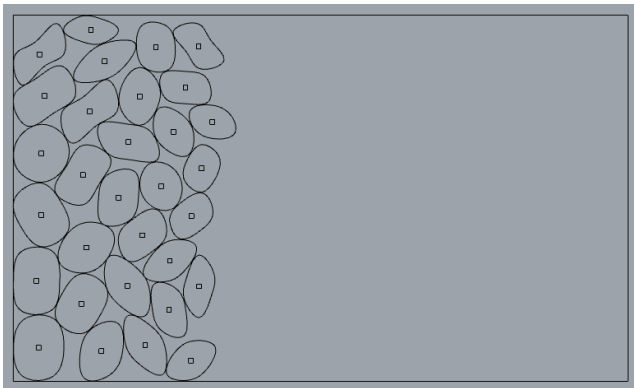
# Nesting

Watch the [video tutorial](#) ↗

Nesting will reduce material waste and save you money by making the most out of a sheet of material.

It is especially useful when cutting multiple geometries generated via Grasshopper, as it can number your pieces too.

You can do this automatically using **OpenNest** - a free plugin for **Grasshopper**, but it can be done manually in any program.



## Installing OpenNest

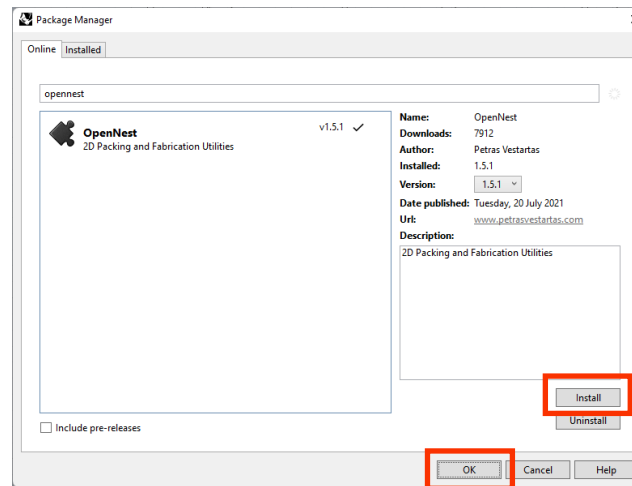
The following instructions will only apply to Rhino 6 & 7.

Head to [www.food4rhino.com/en/app/opennest](http://www.food4rhino.com/en/app/opennest) ↗

Scroll to the download section, click “Install”. If you do not see this option, first log in using your Rhino account. Click “Open Rhino 7” on the pop-up prompt that appears immediately afterwards.

Title	Platform	Description	
OpenNest 2021-Jul-20	Rhino 7 Mac Rhino 7 Win Rhino 6 Win Rhino 6 Mac	2D Packing and Fabrication Utilities	Install
OpenNest Windows 2021-05-11	Grasshopper 6 Win	OpenNest Windows For Rhino Grasshopper 6 and 7 Note: the first download link is used only for Rhino 7 Package Manager, this link is used for manual typical installation.	Download
OpenNest MAC 2021-07-18	Grasshopper 6 Mac	First Version for Mac only. For Rhino Grasshopper 6 and 7 Note: the first download link is used only for Rhino 7 Package Manager, this link is used for manual typical installation.	Download
Examples 2021-07-20	Grasshopper 6 Win	For Windows and Mac	Download

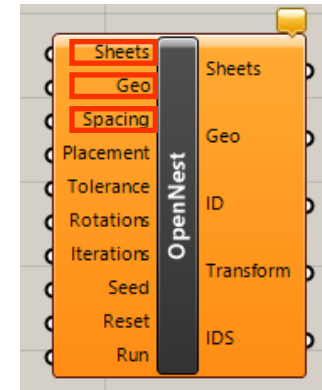
The package manager will open inside Rhino 7.



Click “Install”, then “OK”, and then restart Rhino.

## Using OpenNest

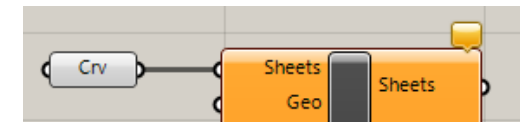
OpenNest runs inside Grasshopper. Search for “OpenNest” to bring in this component.



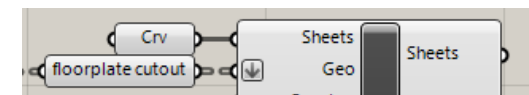
OpenNest requires “Sheets” which will be your material boundary and “Geo” which will be your geometry to nest. The “Spacing” input is optional, but should be increased from the default in order to account for laser kerf.

### Assign Sheets & Geometry

First, reference your material boundary curve from Rhino using the **Curve** component in Grasshopper.

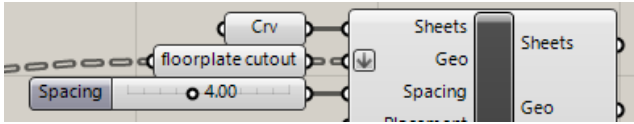


Next, connect your curve geometry to the “Geo” input. The input must be flattened.



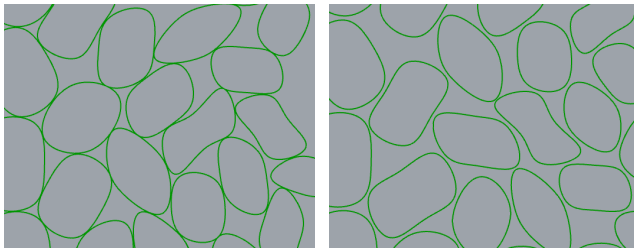
## Spacing

Connect a number slider to the “Spacing” input to change the gap between nested objects.



Note: The spacing is based on your Rhino units. In this example, the file is set to mm. If your units are in inches, your spacing amount would not be **4.00**, but instead **0.16** for the same amount of spacing.

Below is an example of **1 mm** spacing vs **4 mm** spacing.

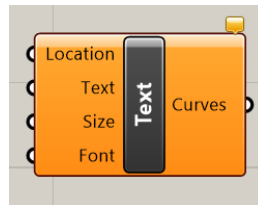


When your spacing is too low (less than 2 mm), the laser kerf may intersect with neighboring nested pieces.

## Numbering

Once OpenNest has nested your geometry, it may be difficult to tell which floor plates are which as OpenNest dynamically positions and rotates the pieces.

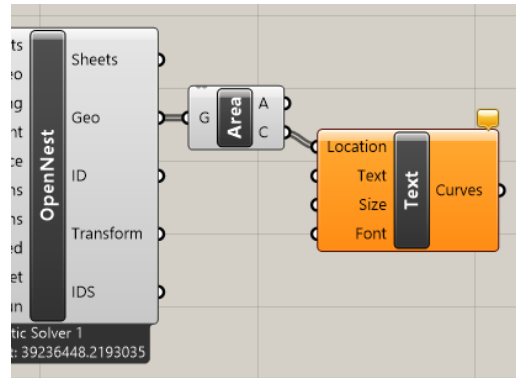
In order to identify floor plates after they are nested, you can use the **Text** component from OpenNest.



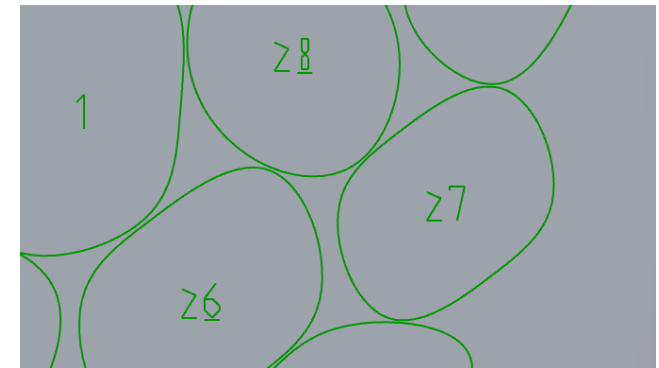
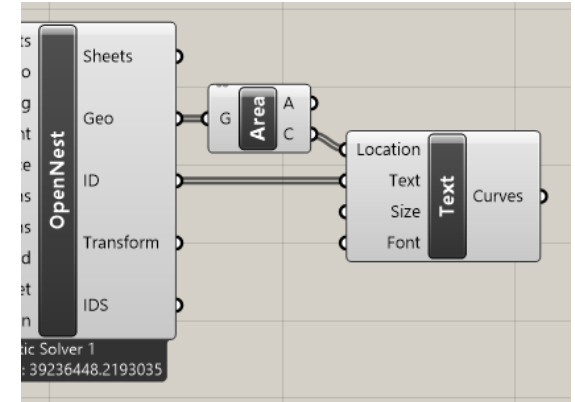
This text component generates curves that are designed to be laser cut quickly.

It requires the **Location** to place the text, and the **Text** itself. Optionally, you can change the **Size** and **Font**.

We can use the **Area** component to get the center-point of our nested curves, to connect to **Location**.



For text, we can use the **ID** output from OpenNest, to connect directly to the **Text**.



## Baking

Once you have successfully nested and numbered your geometry, it is time to bake them to the appropriate layers.

For example, the “**Geo**” output from OpenNest would go to the “**Cut**” layer, and the **Curves** from the **Text** component would go to the “**Score**” layer.

Refer to **page 5**.

# Beginning to Cut

[video ↗](#)

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# The Laser Cutters

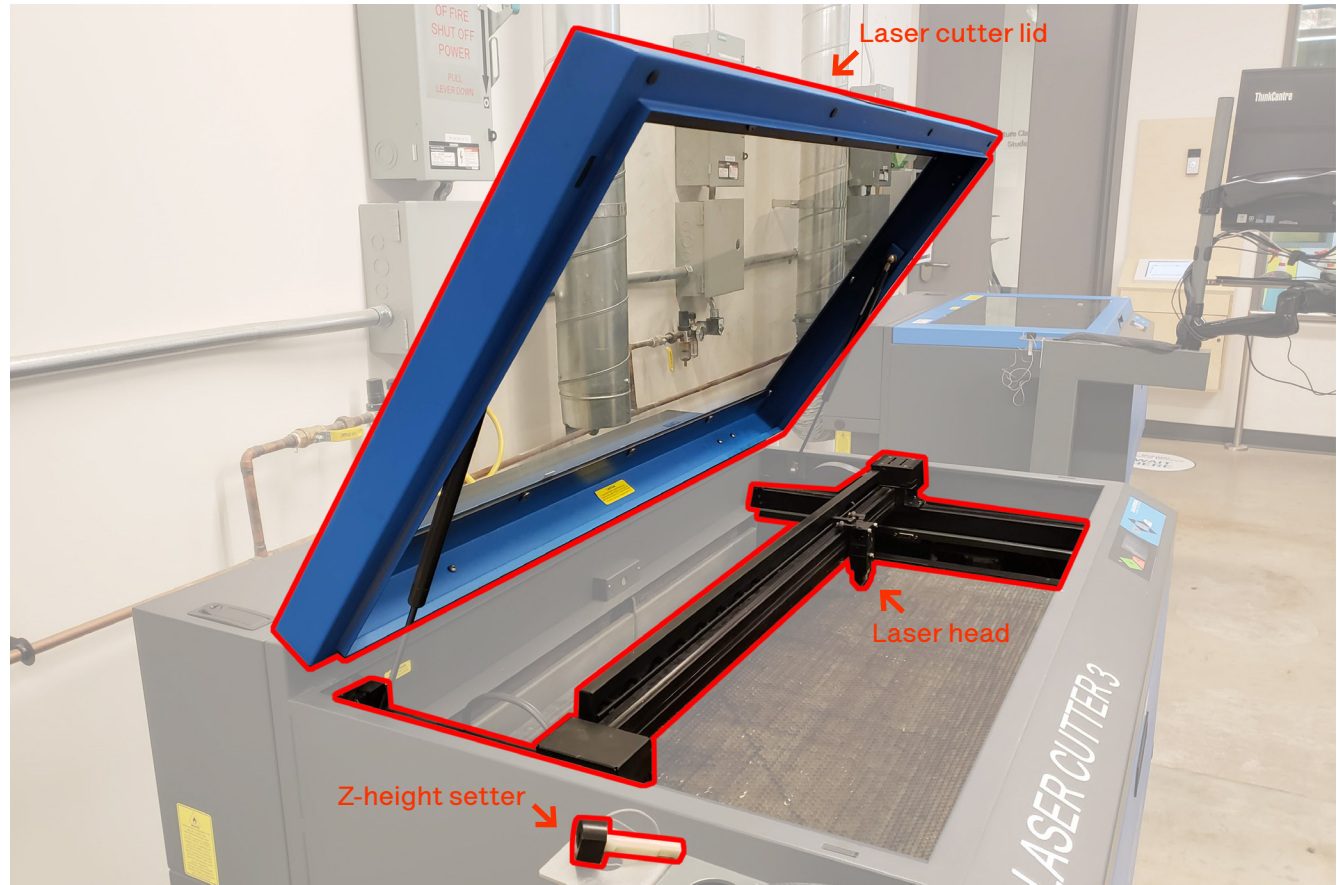
The Laser Cutting Lab contains 5 PLS6.150D machines, and 1 ILS12.150D. The ILS12.150D has a larger bed, and a slightly more powerful laser compared to the blue PLS6.150D.



PLS bed size: 32" x 18" (812 mm x 457 mm)



ILS bed size: 48" x 24" (1219 mm x 609 mm)



## Laser cutter lid

Make sure to close this lid completely closed, otherwise the laser will not turn on.

Opening the lid during operation will cancel the job. Pause first using the UCP, then open the lid if required.

## Z-height setter

This tool is used to set the laser head height for optimal cutting. Refer to the next page.

## Laser head

This is the cutter head that moves around to focus the laser beam on the part that you are cutting.

Avoid staring directly into the laser point.

## Laser cutter computer

This computer is where you will open your Rhino or AutoCAD file to send to the machine. Please do not make changes / work on your file on this computer. Only use this computer for setting up the laser cutting settings.

## Exhaust pipe

The laser cutter produces toxic fumes during cutting. The smoke exhaust will leave through this pipe. You will hear the overhead ventilation system running loudly when one or more machines are turned on.

## Compressed air in

Compressed air is required to cool the laser lens. The yellow lever should be parallel with the pipe.

## Emergency cut-off

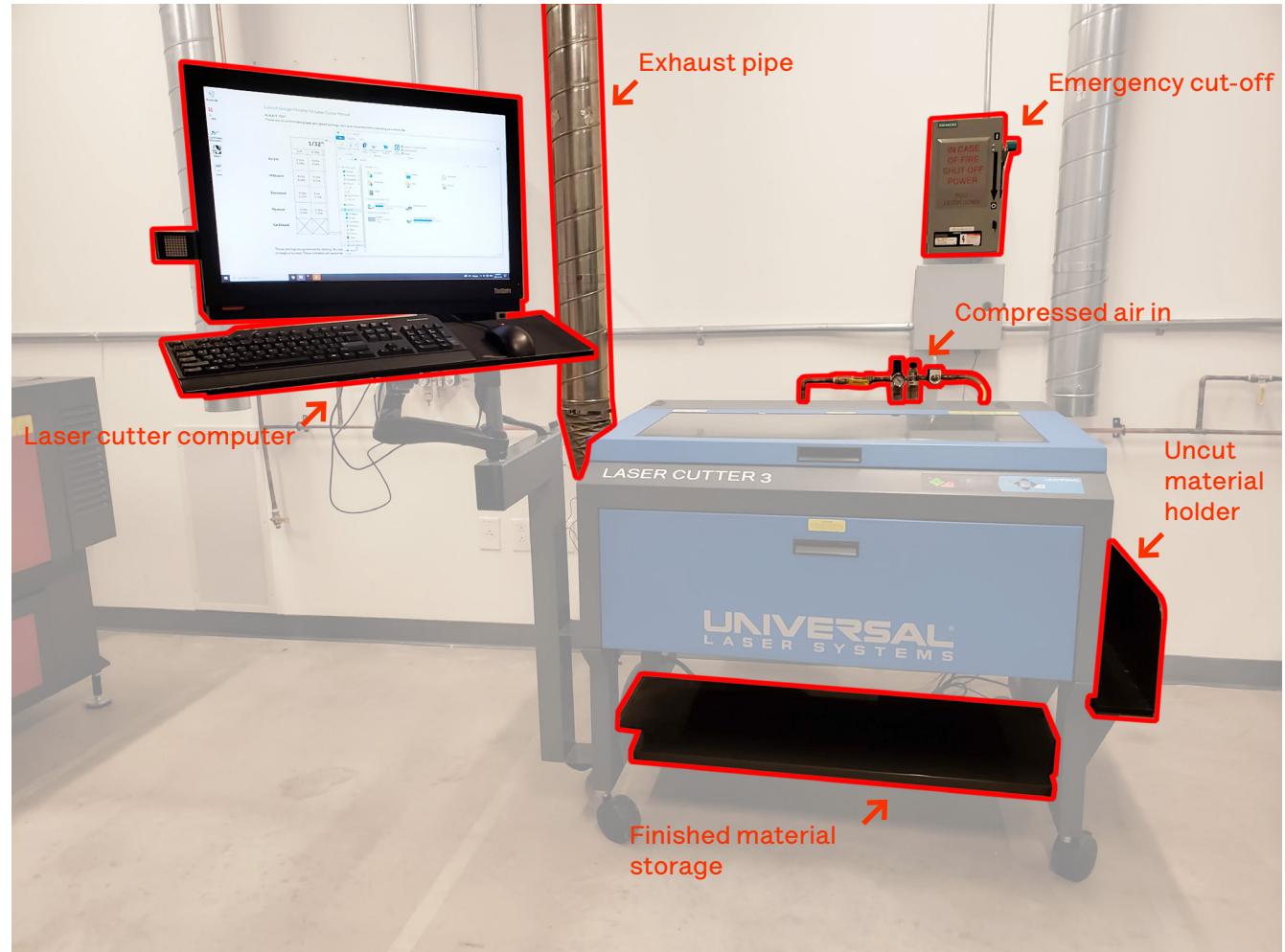
This panel controls all electricity and air to the machine. In case of a fire, pull this switch to shut off the machine.

## Uncut material holder

When cutting multiple sheets of material, you can organize yourself by storing uncut material on the side.

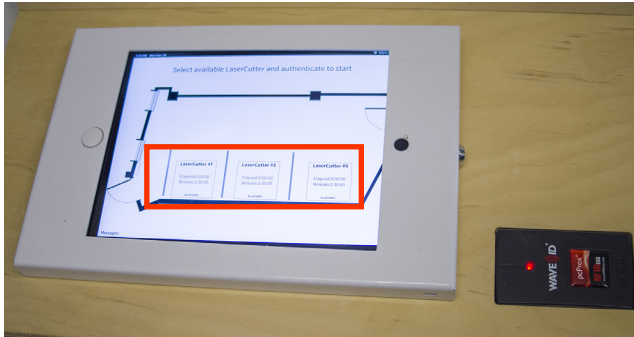
## Finished material storage

Place your cut sheets on this tray.



# Starting Up

Once inside the room, use the kiosk to select the laser cutter you were assigned, then tap your key fob on the reader to turn it on. The laser cutter will take around 1 minute to turn on.



# Setting Z-height

Once the laser cutter has turned on, you will see the following screen on the laser cutter display.



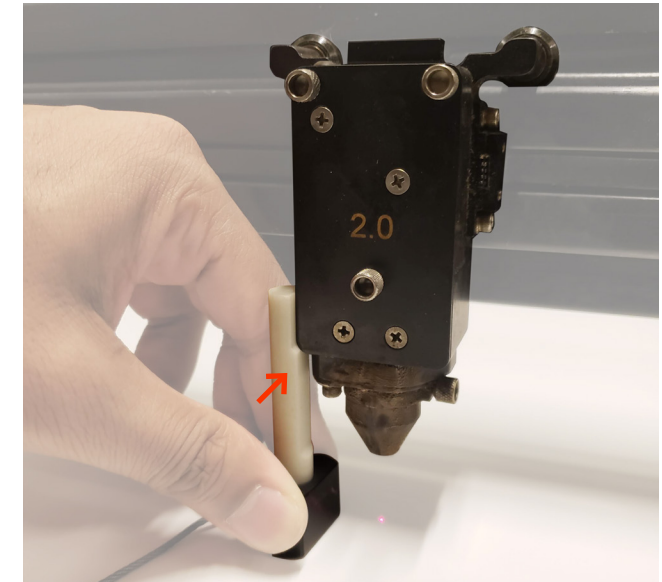
Navigate to "Z" using the buttons beside the screen.



On this screen, use the up and down buttons to raise or lower the laser cutter bed.

The left and arrow keys can be used to choose the adjustment step size, i.e. 0.100, 0.010, or 0.001 in. The check-mark under the digit is the current step size.

Using the **z-height setter** placed on top of your material, and beneath the laser head, use the up and down buttons to set the correct z-height.



An incorrect z-height may cause fires, or cause the laser to not cut through your material.

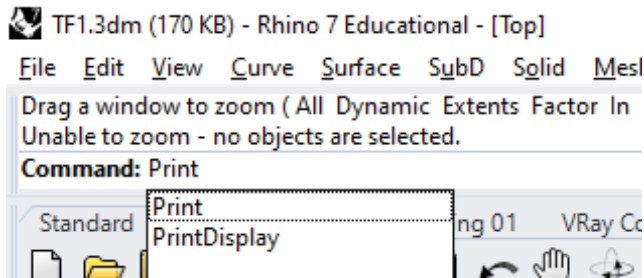
Once you have set the z-height, close the laser cutter lid.

# Sending Your File to the Laser Cutter

Once the machine has been set up, open your Rhino/AutoCAD file on the laser cutter computer.

## Rhino

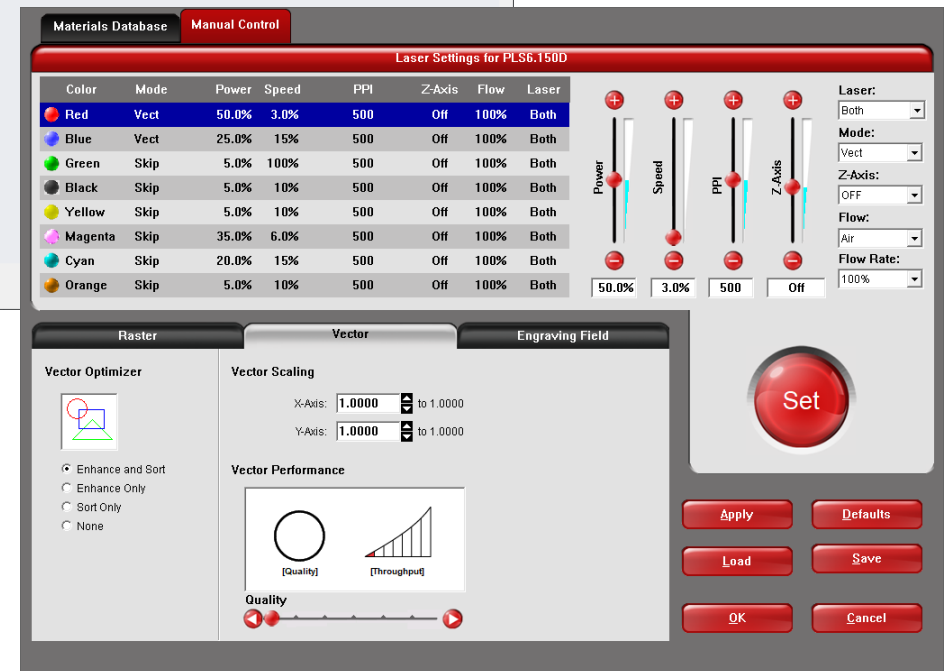
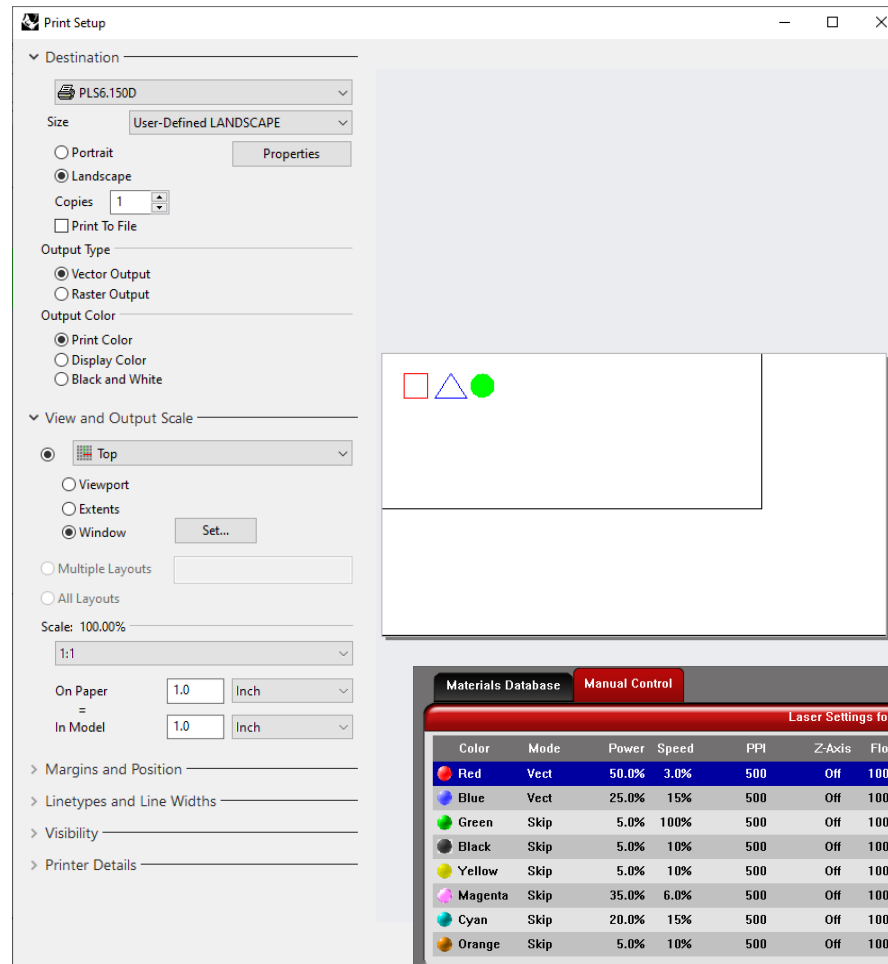
From the Rhino Top view-port, enter "Print" as a Rhino command.



The Rhino Print Setup dialog will open.

Destination & View and Output Scale are the two main tabs you need to pay attention to. In most cases, you will need to set the power & speeds using Properties, and set your window using "Set..."

The next few pages will go over how each of these tabs should be set up, so that if you face any issues during printing, you will have something to refer to.



## Rhino ctd.

### Destination

Select “**PLS6.150D**” from the print driver drop-down. Set **Size** to “**User-Defined LANDSCAPE**”. Ensure page orientation is set to “**Landscape**”.

Set the **Output Type** to “**Vector Output**”, and **Output Color** to “**Print Color**”.

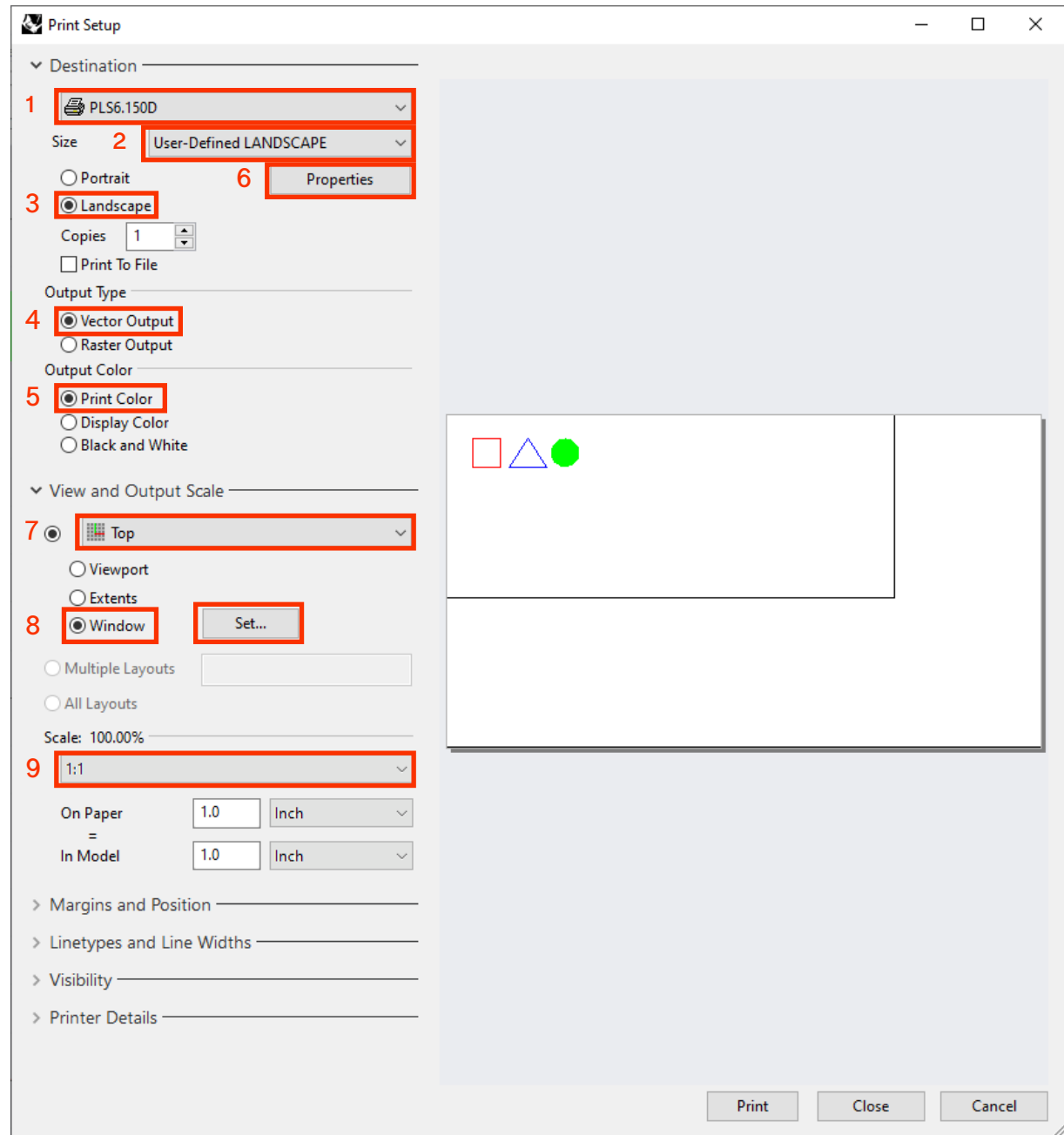
#### IMPORTANT:

Click **Properties** to open the **Power & Speeds** window. Refer to **page 22**.

### View and Output Scale

Ensure the “**Top**” viewport is selected. Select “**Window**”, then set the window to the laser cutter bed reference rectangle using “**Set...**”.

Your scale should be **1:1**. Always scale your cut geometry prior to cutting. Scaling afterwards in the **Universal Control Panel (UCP)** may not yield desirable results.





## Rhino ctd.

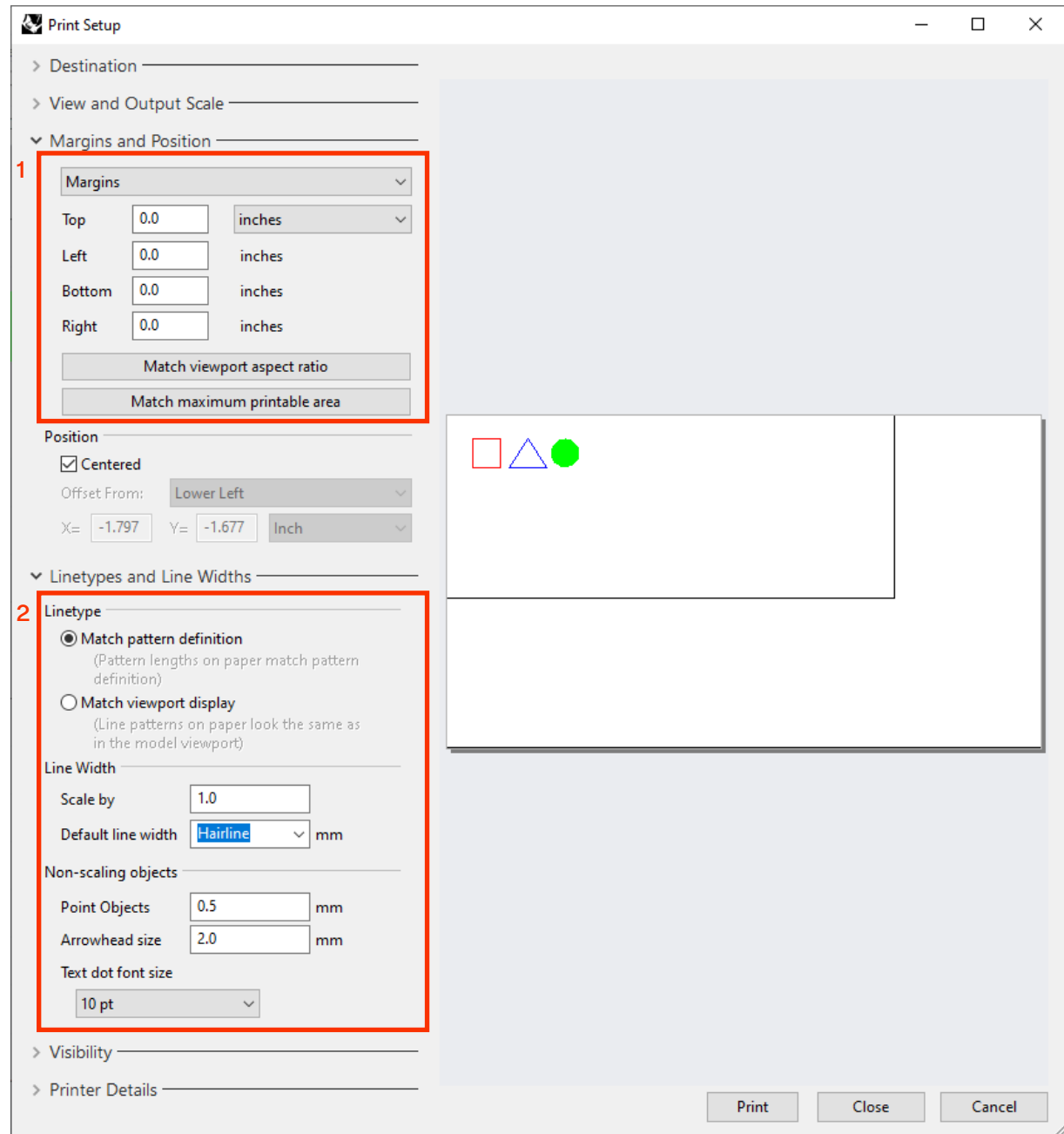
### Margins and Position

The margins should all be set to **0**.

### Linetypes and Line Widths

Under **Linetype**, choose “**Match pattern definition**”.  
Under **Line Width**, set “Scale by” to “**1.0**”, and  
**Default line width** to “**Hairline**”.

The remaining settings can be set as shown.



## Rhino ctd.

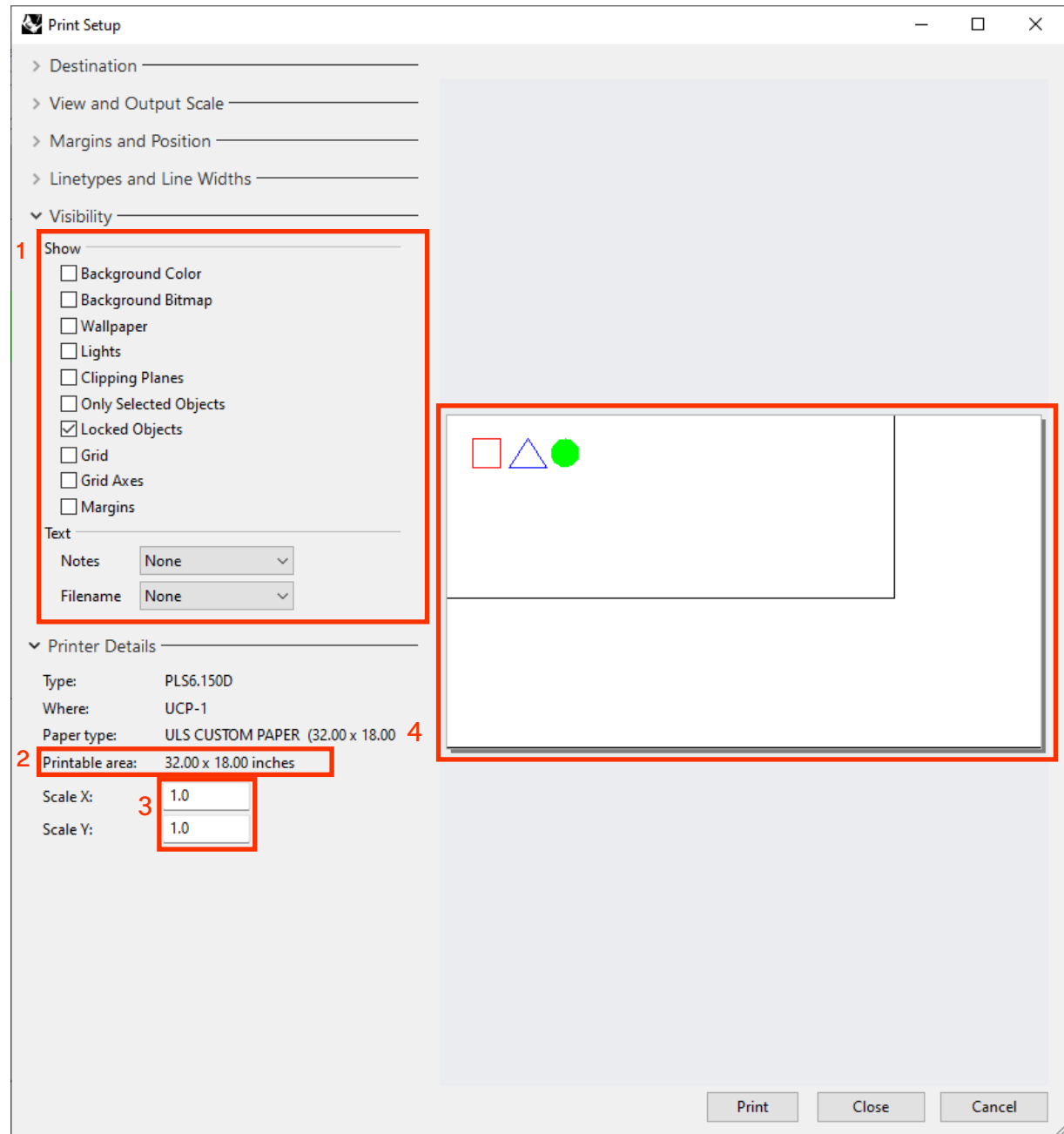
### Visibility

Everything except Locked Objects should be un-checked.

### Printer Details

In this section, verify **Scale** is set to **1.0** for X, Y and that the printable area is correct for the laser cutter you have selected.

If every tab is set up correctly, and you have verified your print preview on the right, click **Print** to send your file to the UCP (Laser cutter software).

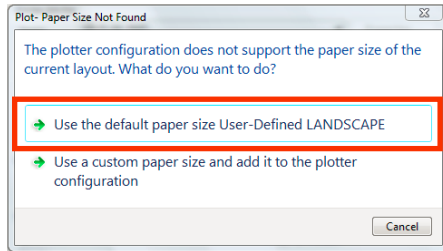


## AutoCAD

Once you have logged onto the laser cutter computer during your scheduled cut time, begin by opening your file in AutoCAD.

Enter “Plot” into the command bar to open the Plot window.

Choose “PLS6.15D” from the plotter name drop-down menu. When prompted, choose the first option:

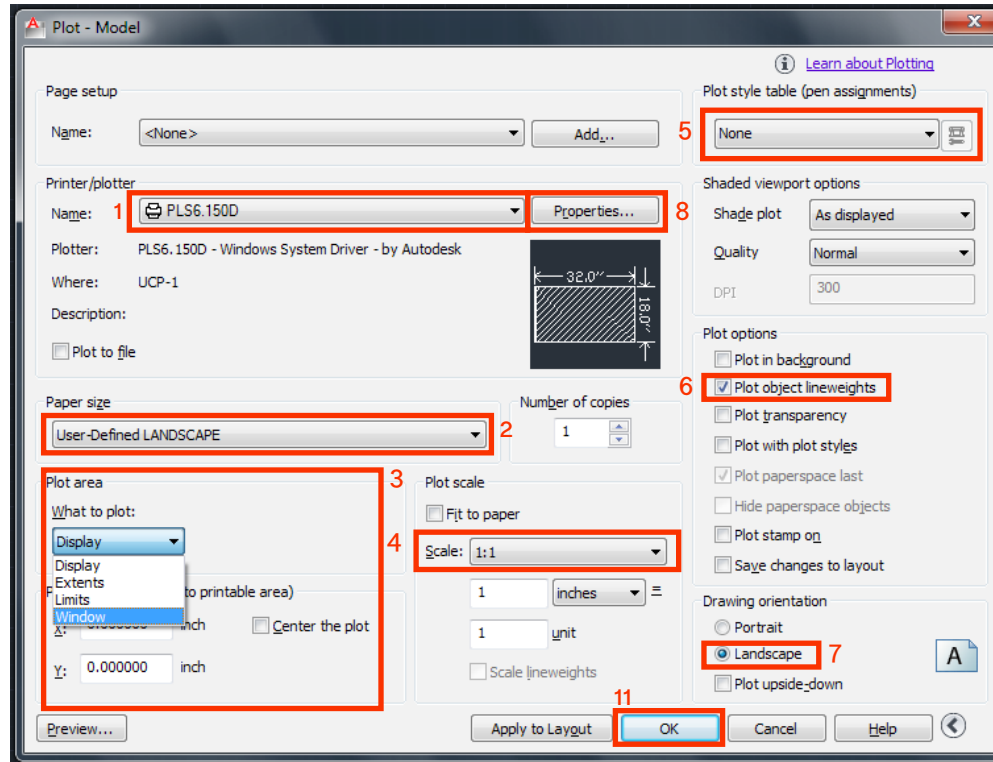


From the “What to plot” drop-down, choose “window”, and draw a window from one corner of the bed rectangle to the other.

Plot offset should be “0” for both x, y.

Scale should be “1:1”.

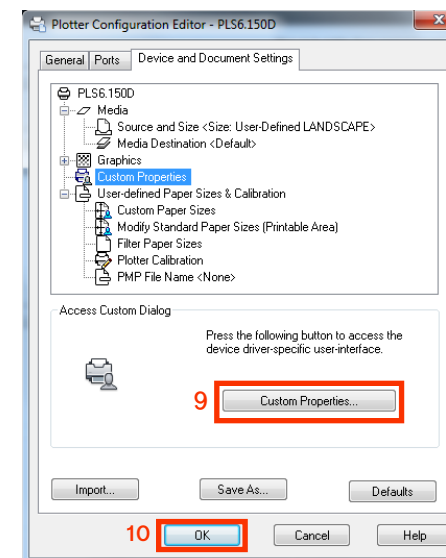
Set Drawing orientation to “Landscape”.



Ensure plot style table is set to “None”.

Click “Properties” beside the plotter name drop-down, then on the next window, click “Custom Properties” to access the Power & Speeds menu.

Refer to Power & Speed Settings.



Click “OK” once you have set everything up to send your file to the laser cutter.

# Power & Speed

## Cutting/Scoring

Clicking on the printer properties button will bring up this screen. Select each color used in your project individually, and set the power and speed percentages. These values change for different materials and thicknesses. Refer to the **Power & Speeds** chart for your chosen machine, material, and thickness.

Set Laser to “Both”  
 Mode to “Vect”  
 Z-Axis to “OFF”  
 Flow to “Air”  
 Flow Rate to “100%”

### WARNING:

You must set Flow to Air, and Flow Rate to 100% for every color, even those set to “Skip”.

Set PPI to 500. If you notice a jagged edge, this may be alleviated by increasing the PPI to 1000.

Click on the large circular **Set** button to save settings for each color. If you do not click **Set**, your settings will revert to previous.

Repeat the above steps for the remaining chosen colors used in your project. Set every other color mode to “Skip”

Color	Mode	Power	Speed	PPI	Z-Axis	Flow	Laser
Red	Vect	50.0%	3.0%	500	Off	100%	Both
Blue	Vect	25.0%	15%	500	Off	100%	Both
Green	Skip	5.0%	100%	500	Off	100%	Both
Black	Skip	5.0%	10%	500	Off	100%	Both
Yellow	Skip	5.0%	10%	500	Off	100%	Both
Magenta	Skip	35.0%	6.0%	500	Off	100%	Both
Cyan	Skip	20.0%	15%	500	Off	100%	Both
Orange	Skip	5.0%	10%	500	Off	100%	Both

Under the **Vector** tab, select “**Enhance and Sort**”, and set the **Quality** slider all the way to the left. Ensure the scaling values are set accordingly. If you modeled 1:1, set both X and Y to **1.0000**.

Once the power and speed values have been set up, click “OK”.

The above window will close, and the previous **Print Setup (Rhino)** or **Plot (AutoCAD)** window will be back in focus. If all other settings have been setup as shown in the previous page, click “**Print**” (**Rhino**) or “**OK**” (**AutoCAD**) to send your file to the **Universal Control Panel (UCP)**.

## Engraving Solid Fills

These additional instructions are to be followed only if you are engraving a solid fill.

Set **Mode** to “**Rast**” for the color you have set to solid hatch.

Set **Speed** to “**100%**”.

The **Power** will depend on how light or dark you want to engrave. The scoring power values for your chosen material is a good starting point.

Under the **Raster** tab below, you can set the **Image Density**. A higher density will produce a more even fill, but will take longer. For most cases, you should set this value to 4 or 5.



Under **Print Direction**, set the direction to “up” to engrave from bottom to top. This will prevent the laser from cutting through smoke.

Color	Mode	Power	Speed	PPI	Z-Axis	Flow	Laser
Red	Vect	50.0%	3.0%	500	Off	100%	Both
Blue	Vect	25.0%	15%	500	Off	100%	Both
Green	Rast	25.0%	100%	500	Off	100%	Both
Black	Skip	5.0%	10%	500	Off	100%	Both
Yellow	Skip	5.0%	10%	500	Off	100%	Both
Magenta	Skip	35.0%	6.0%	500	Off	100%	Both
Cyan	Skip	20.0%	15%	500	Off	100%	Both
Orange	Skip	5.0%	10%	500	Off	100%	Both

Once everything has been set up, click “OK”.

The above window will close, and the previous **Print Setup (Rhino)** or **Plot (AutoCAD)** window will be back in focus. If all other settings have been setup as shown in the previous page, click “**Print**” (Rhino) or “**OK**” (AutoCAD) to send your file to the **Universal Control Panel (UCP)**.

# Power & Speed Chart

	1/32" or 0.79 mm			1/16" or 1.6 mm			3/32" or 2.38 mm			1/8" or 3.2 mm			1/4" or 6.4 mm		
	Score Light	Score	Cut	Score Light	Score	Cut	Score Light	Score	Cut	Score Light	Score	Cut	Score Light	Score	Cut
Acrylic	P 5% S 10%	P 10% S 10%	P 25% S 10%	P 4% S 10%	P 8% S 10%	P 40% S 5%	P 5% S 10%	P 10% S 10%	P 25% S 10%	P 25% S 25%	P 25% S 15%	P 50% S 3%	P 50% S 20%	P 30% S 5%	P 100% S 1%
Aircraft Ply				P 10% S 15%	P 20% S 15%	P 50% S 8%									
Basswood	P 2% S 15%	P 4% S 15%	P 15% S 15%	P 5% S 15%	P 10% S 15%	P 20% S 10%	P 5% S 15%	P 20% S 15%	P 65% S 15%	P 25% S 25%	P 25% S 15%	P 40% S 10%	P 25% S 25%	P 25% S 10%	P 40% S 5%
Plywood	P 5% S 15%	P 10% S 15%	P 25% S 10%	P 10% S 10%	P 25% S 10%	P 35% S 5%	P 5% S 15%	P 10% S 15%	P 25% S 10%	P 25% S 25%	P 25% S 10%	P 40% S 5%			
Cardboard				P 10% S 10%	P 35% S 25%	P 30% S 10%				P 25% S 25%	P 25% S 10%	P 40% S 20%			
Matboard							P 10% S 15%	P 20% S 15%	P 50% S 15%						
Veneer	P 5% S 20%	P 10% S 20%	P 20% S 20%												

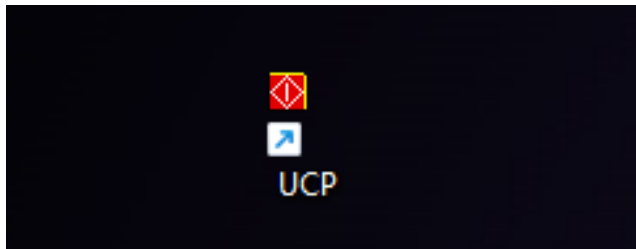
These settings are guidelines only.

**Always test power and speed settings every time you lasercut.**

# Universal Control Panel (UCP)

This is the software that controls the laser cutter. When you print or plot your file to the laser cutter from either Rhino or AutoCAD, it will appear here.

You will find the UCP icon on the desktop, or pinned to the task-bar.

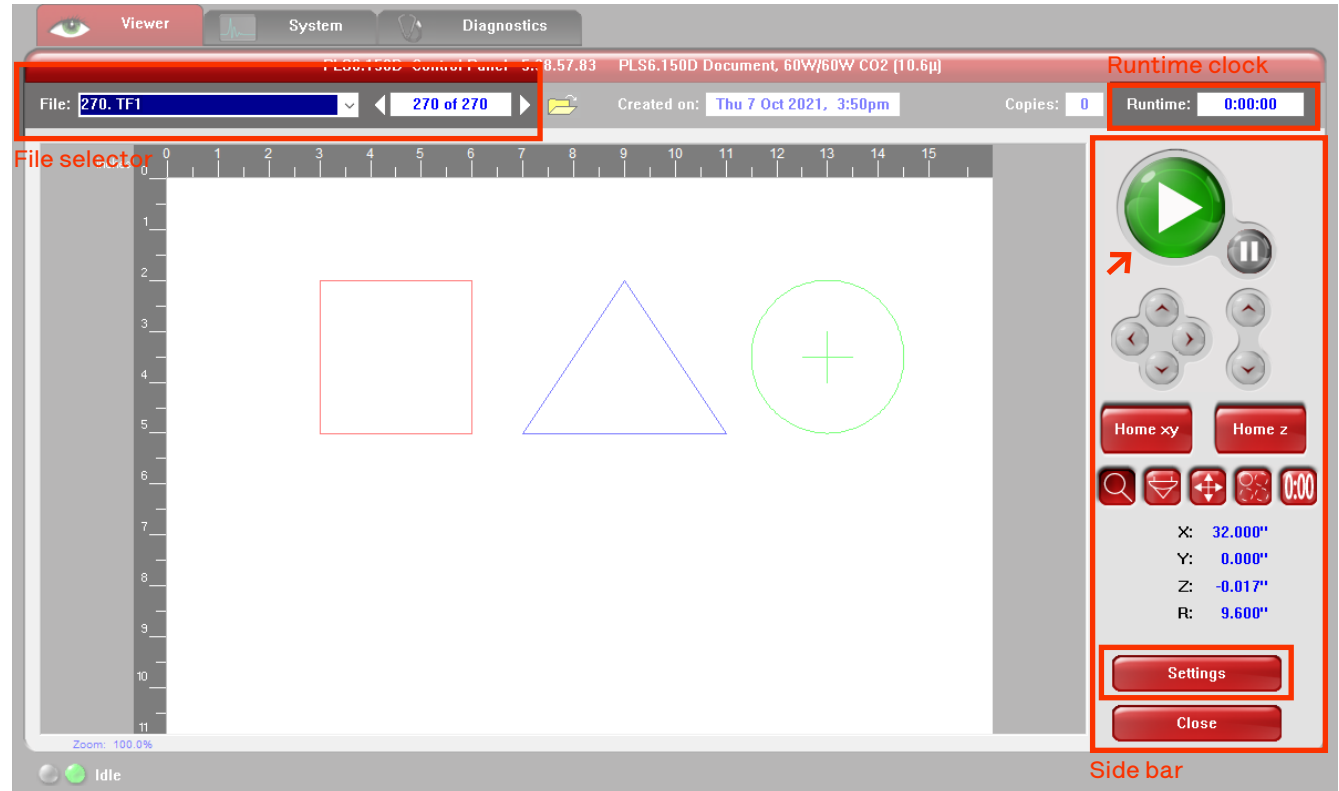


## To Start the Cut

Assuming you have set up the laser cutter by following the instructions on **page 13**, you can press the green play button to start cutting.

## The UI

This next section will cover some of the features and functions of UCP.



### Runtime clock

This counts how long you have been cutting for. This is not the clock that determines how much you are charged. You will be charged from the moment you tap your key fob until you tap out.

### WARNING:

**The laser cutters will stop immediately when your time runs out, or when the lab is closed at 10 PM.**

**Before you start cutting, use the time estimate tool shown on the next page.**

### File selector

The files sent to the laser cutter will appear here. The last file is automatically selected.

### Side bar

This bar has several useful buttons including the Start/Pause, jog, homing, time estimator, and other useful functions.

The **settings button** in the side bar will bring up the Power & Speeds window where you can double check your power & speed settings, or make adjustments while the machine is paused.

## Sidebar Buttons

### Start/Pause



The larger button will start the lasercut job from the beginning. The smaller button becomes active while cutting, and can be used to pause/resume the cut.

### Manual Jog



These buttons can be used to manually move the laser head in small increments.

### Homing Buttons



These buttons will home the machine. Do not home the z axis. Refer to **page 13** to set the z-height.

### Zoom



Left-click to zoom in, right-click to zoom out. Useful in inspecting fine areas of your geometry.

### Focus



Click anywhere to move the laser head to that location. Useful for determining whether the laser will stay within uncut areas when cutting from a used sheet, or from smaller sheet.

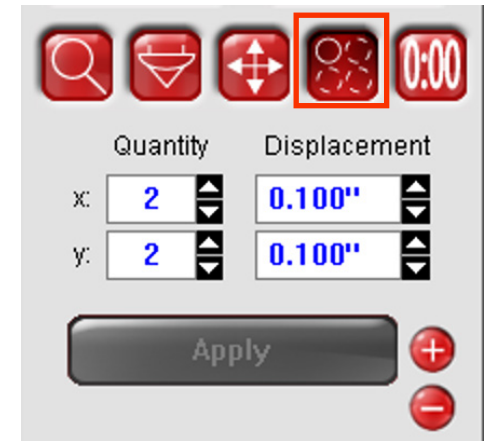
### Move



Click and drag your geometry as it appears in the preview window to move it somewhere else on the laser bed. Useful for creating test cuts on your material without having to print again.

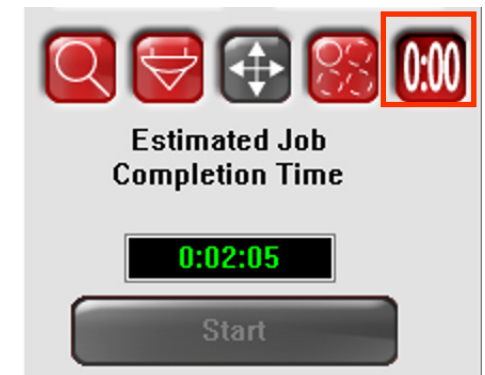
If your sheet material is smaller than the laser bed, be wary of moving your cut geometry outside your material.

### Duplicate



Create duplicates of your geometry in the x and/or y direction. Be wary of cutting outside your material boundary.

### Time Estimate



Estimate the cutting time. Run this before a long cutting operation to determine if you have enough time to cut.



# Finishing Up

## Removing Material from Bed

As a tip, use masking tape to tape over the cut pieces so they do not fall out as you are lifting out your sheet material.

Always clean up after laser cutting, remove all materials from the laser cutter and take any USB drives you plugged into the computer.



## Checking Out

Once you have finished cutting, removed your material, and cleaned your laser cutter, make sure to select your laser cutter on the kiosk and tap your key fob to sign out.

You will be charged for the time you check-in to the time you check-out. If you forget to sign out, you will be charged for the maximum time for the day.

Please leave the room with all the materials you came in with.

## Disposing of Scrap Material

If you are finished with your lasercut project and there is still usable space in your sheet material, consider donating it to the freecycling area in the undergraduate studio (middle of studio).

If there is no usable space on the sheet, or if you need to dispose of small pieces, you can do so in the brown bin marked for "Plastics/Acrylic" or "Wood" in the west side of the building, past the doors to the recycling area.

# Troubleshooting

## 1. Print Preview Incorrect

Check your scaling, page orientation, x/y offset, and color settings. Ensure the print window is set up correctly. Refer to [page 14 for Rhino](#), [page 18 for AutoCAD](#)

## 2. Not Cutting Through or Burning

Check your **Power & Speed** settings. Check the z-height to ensure focus is set correctly. Ensure **Flow** is set to **"Air"**, and **Flow Rate** is set to **"100%"** in UCP. Refer to [page 19](#).

If the problem persists, stop immediately and contact Nicholas (during day) or on-duty laser work-study (after hours).

## 3. Cutting Odd or Extra Shapes, or Going Back Over the Same Lines

Check for duplicate curves. Enter **"SelDup"**, then delete duplicate curves in Rhino. If no duplicate curves automatically selected, zoom in to verify.

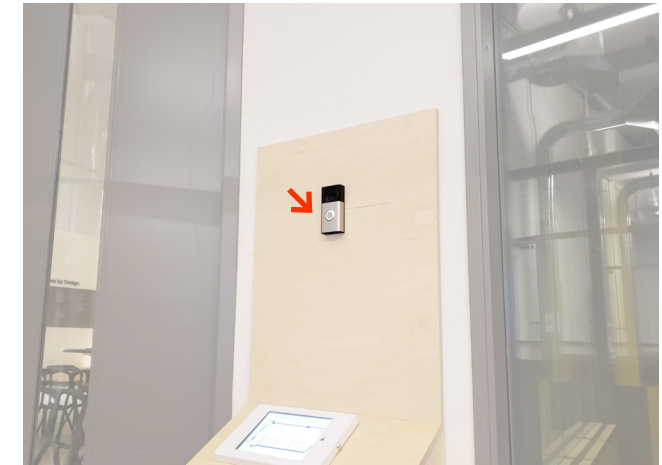
## 4. Power & Speed Settings Read as "0" or Display. Raster / Pen Data is Empty Error

Lineweights not set correctly. Refer to [page 6 for Rhino](#), [page 7 for AutoCAD](#).

# Asking for Assistance

If you have any questions or concerns, visit the Digital Fabrication office in room 167.

Alternatively, use the video doorbell to reach out to the Digital Fabrication office from inside the Laser Cutting Lab.



# End of Manual

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[Watch the videos ↗](#)