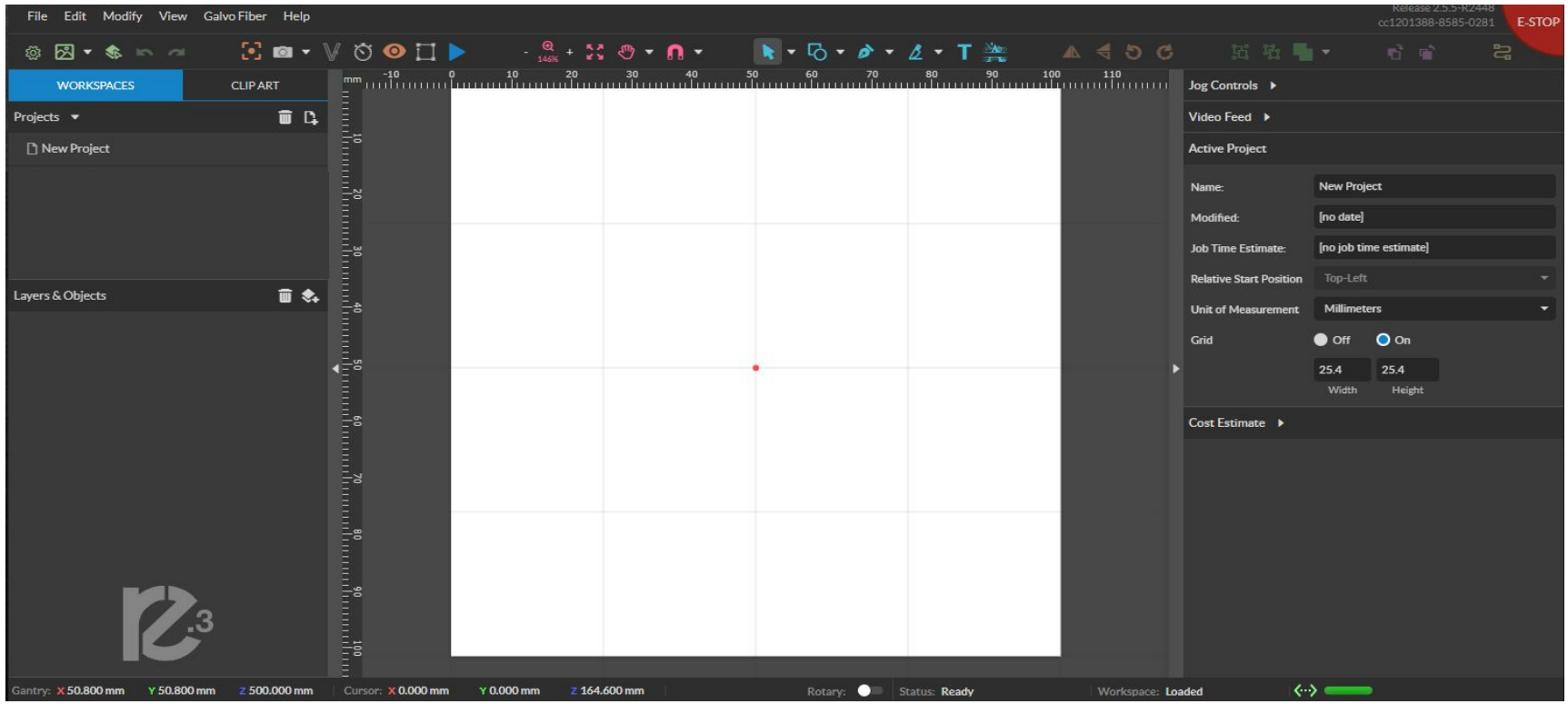
RE3
USER MANUAL

Full Spectrum
LASER

RetinaEngraveV3 (RE3):

RE3 can be accessed by entering your machines IP address into your web browser. When loaded RE3 will appear like so.

Main Toolbar | Workspace Tools | Viewing Tools | Drawing Tools | Orientation Tools | Grouping Tools



Project List

Project Information

Gantry Coordinates | Cursor Coordinates | Rotary Switch | Status Indicators

Main Toolbar

File: Create new projects,import and export existing projects, import image or drawing, and sync the workspace.

Edit: Select object, delete or duplicated objects, undo and redo changes, access setting and materials Library.

Modify: Arrange layers, move and modify images, and create compound objects and paths

View: Adjust magnification, canvas settings, and view other display settings

Machine Name: Use the camera functions, run a job and access the laser tools page from diagnostics.

Help: Access the user guide, support, tutorials, and the list of keyboard shortcuts mentioned in the previous section.

Workspace Tools

Focusing Test: Verify that your laser it in focus

Capture Workspace: Takes images of workspace

Clear Last Workspace Capture: Clears previous workspace image.

Trace Background Image

Estimate Job Time: Amount of time the job will take.

Show Bounding Perimeter of all Objects: Shows the space the job will occupy.

Run Job: Start Engraving

Viewing Tools

Zoom (-/+): Enlarges/Reduces workspace screen detail and size.

Fit All: Fits entire captured image on screen.

View

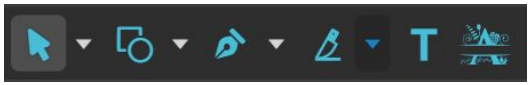
Pan (H): Manually pan project window using mouse.

Zoom (Z): Zoom project window using mouse.

Snap

Use Snapping (Shift+F10): Enable or disable the snapping feature.

Use Snap Zones: Enable or disable the snap zone feature.



Drawing Tools:

1. **Select: Pointer**
   - **Subselect**
   - **Lasso**
   - **Layer**
2. **Shape: Line**.
   - **Rectangle**
   - **Ellipse**
   - **Polygon**
   - **Triangle**
   - **Star**
3. **Path:Pen**
   - **Bezigon**
   - **Freehand**
4. **Knife:** Cuts out objects
   - **Freehand Shaping:** Initiates "freehand" mouse pointer for creating paths.
5. **Text**
6. **Monogram**

Grouping Tools:

Group: Group objects

Merge: Union: Combine layers into a single compound layer.

Difference: Combine non-overlapping layers into a single compound layer.

Intersection: Combine overlapping layers into a single compound layer.

Subtract: Remove and combine non-overlapping layers into a single compound layer.

Split: Split up a compound shape or object.

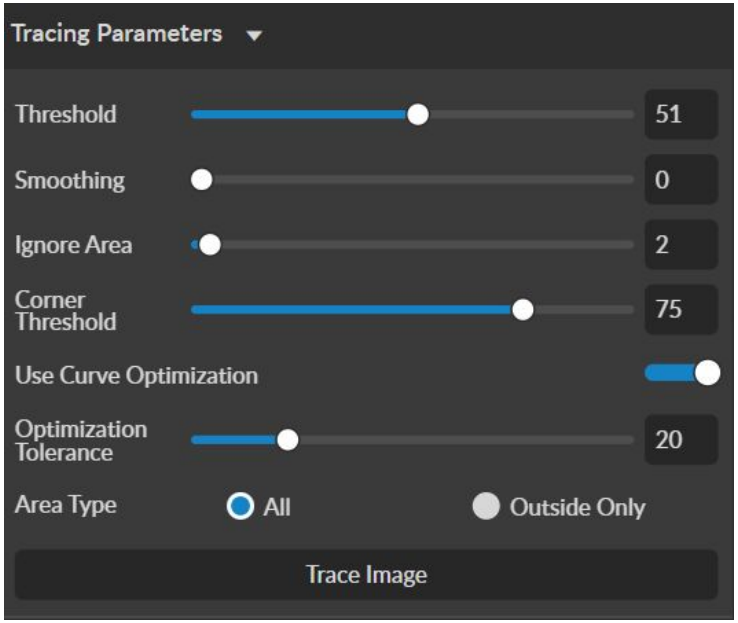
Orientation Tools:

Flip Horizontally: Flip object along horizontal axis.

Flip Vertically: Flip object along vertical axis.

Rotate CCW: Rotates 90 degrees counterclockwise.

Rotate CW: Rotates 90 degrees clockwise.



Tracing Parameters:

Tracing is used on rastered images to be made into vector lines for cutting.

Threshold- Pixels to include

Smoothing- smoothens the corners of the selected object

Ignore Area- how much speckling will be removed

Corner Threshold- how sharp corners will look

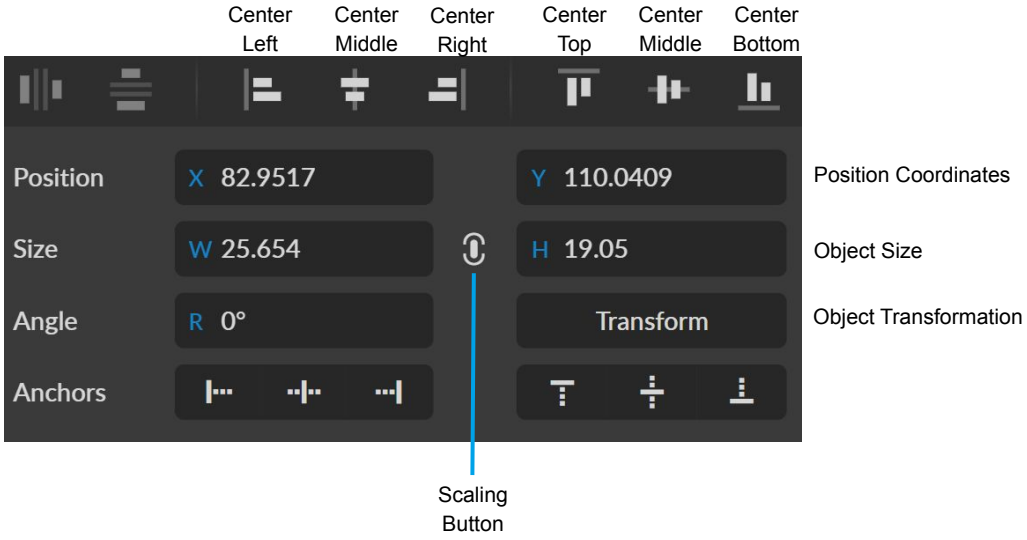
Optimization Tolerance- determines how many lines are in each curve.

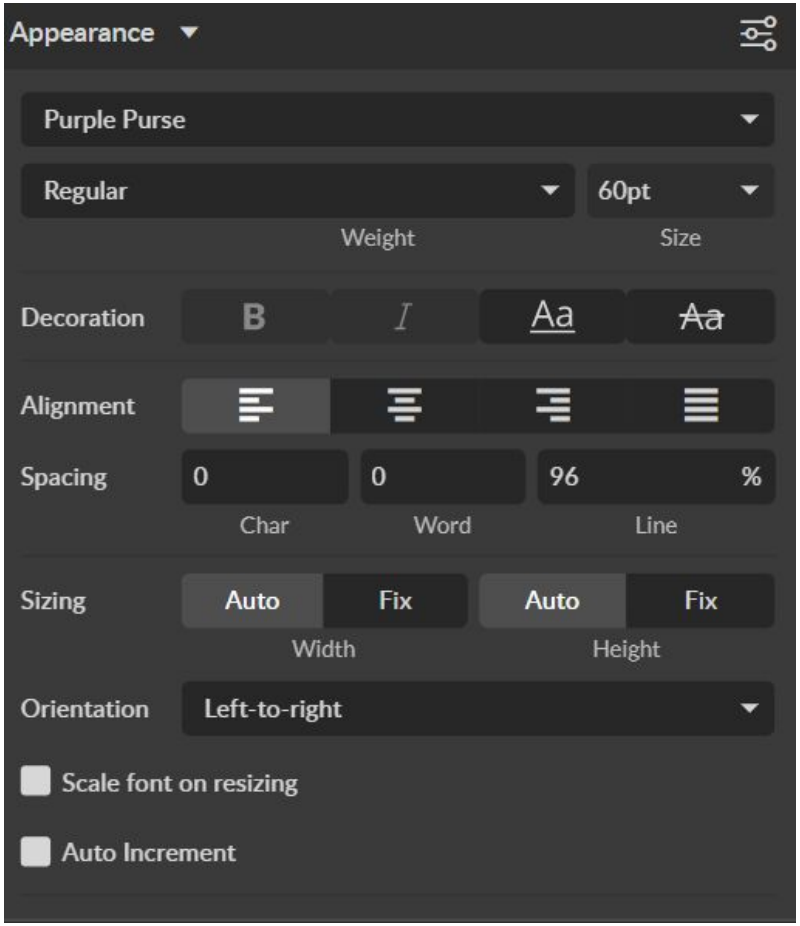
Ex. The greater the tolerance, the fewer lines but it affects accuracy.

Area Type- All- The entire picture is trace.

Outside Only- The border of the picture is traced.

Positioning Tools:





Text Appearance:
These tab only appear when text is place in workspace.

Font: Change the text font.

Weight: Choose bold and italic options. **Font Size:** The size of the text

Decoration: Alter the text by selection from the four options: Bolid, Italic, Underline, or Strikethrough

Alignment: Align text left, right, or center.

Spacing: Set spacing for characters, word blocks, and lines.

Sizing: Lock all sizing options (Fixed) or allow custom alterations (Auto). When in auto select text and use the mouse to manipulate corner nods to change size.

Orientation: Flips the text.

There are also two scaling options: scale to resize and auto increment.

Selecting the icon on the top right corner will open a secondary window (see below).

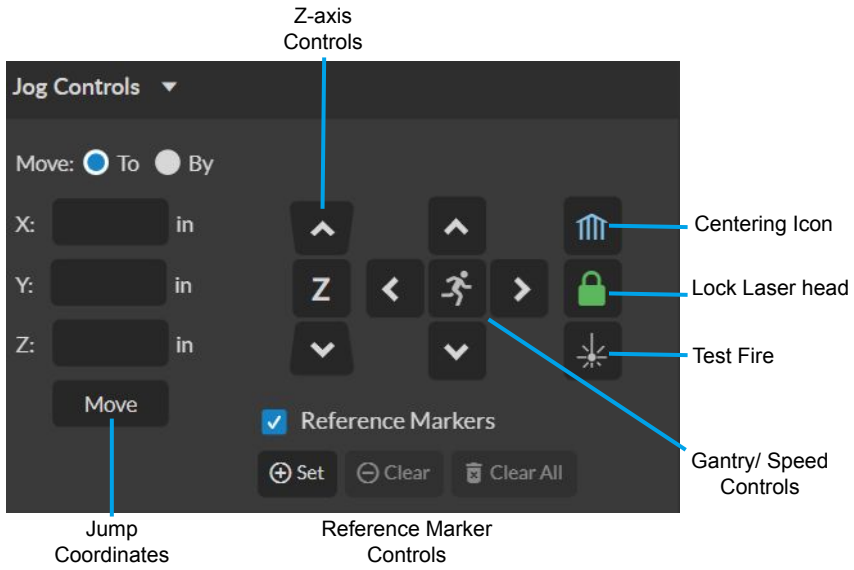
Typography- Switch between Subscript, Superscript, and Ligatures.

Transform- Switch between Uppercase, Capitalize, and Lowercase.

Paragraph- Adjust the indentation and the spacing between words.

Machine Specific Settings: CO2 Controls

CO2 Jog Controls:



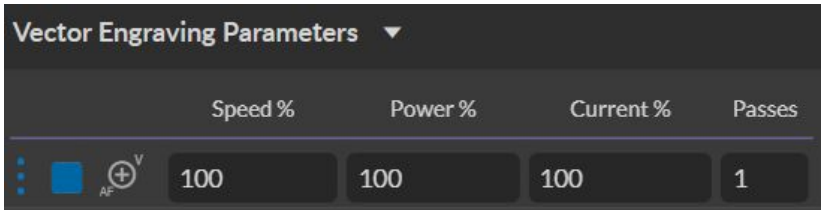
The Gantry Controls are use to move the Gantry around the work area. The **Speed Controls** have three speed settings, by selecting the running icon the speed at with the machine moves will change.

On CO2 machines the Z-axis controls the Laser Head. Additionally, the **Z** icon will move the laser head into to the bottom of the work area to locate the material before moving to the set focus position.

The **Move To** option makes it possible to move the gantry to specific coordinates. This option is used when the laser needs to be moved across the work area.

The **Reference Markers** are used to set points in the workspace that can be used a number ways. Reference markers can be set along the perimeter of the project to align it with the material or it can be set along the object to make sure the Image does not run off of it.

CO2 Settings:



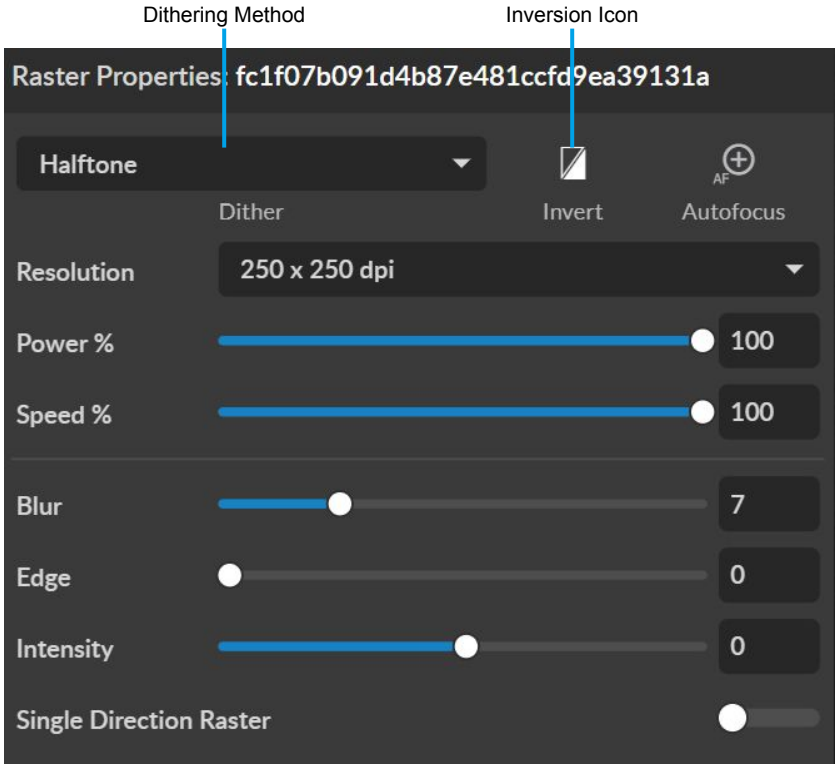
The **Vector Parameters** for CO2 machines have 4 setting.

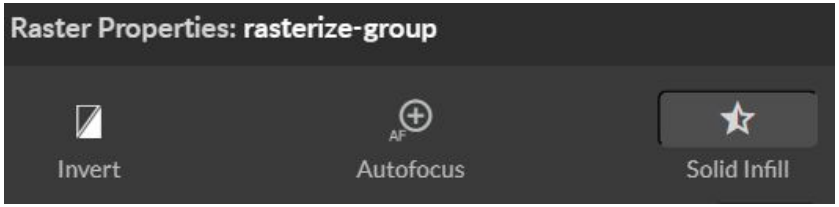
The **Power**, **Speed,** and **Current** settings are percent based, which the power being dependant on the wattage chosen. The **Current**

Wobble Amplitude if used for surfaces that are slightly uneven and **Spacing** is the space between each line. The spacing option is used a great deal in MOPA machines as certain spacing setting can be used to adjust the coloring of an engraving.

Machine Specific Settings: CO2 Machines- Rasters

Raster Objects:





There are two types of rastered objects in RE3: one is a simple rastered object while the other is a raster group. A raster group is made when one or more vector objects are rasterized.

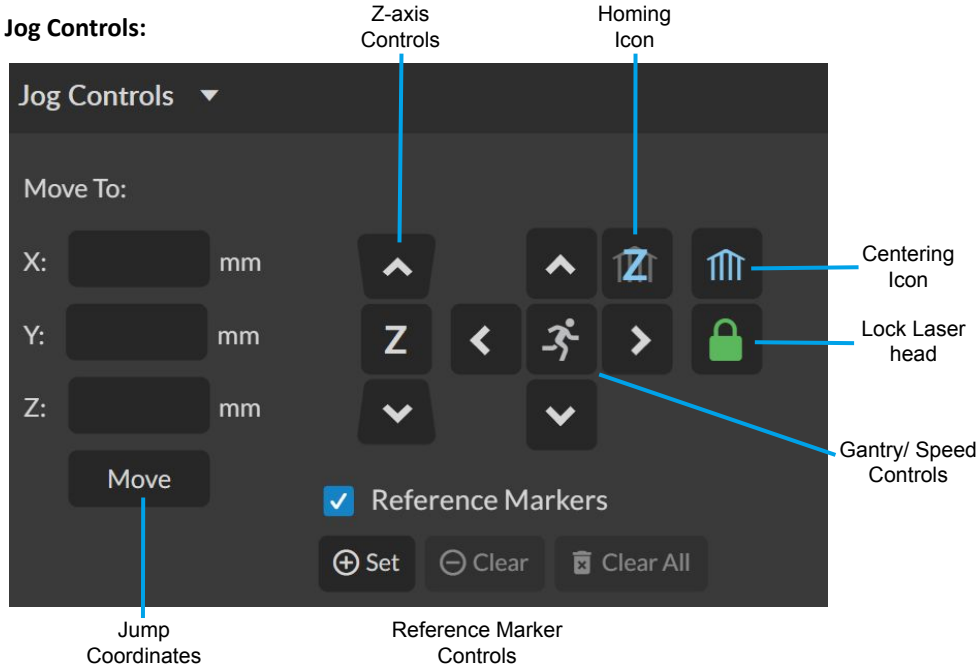
A raster object had two features, vector object do not: dithering method and inversion. **Dithering** is a technique used to simulate toned images using a limited number of dots, while **inversion** is a technique used to switch the black and white areas in an image to create a more appealing result in painted or coated materials.

A rasterize group can also be inverted, however as it was originally a vector it has a **Solid Infill** option instead of a dithering method. The Solid infill works just like an Infill does on a vector object.

The **Power**,and **Speed** are percent based,with the power being dependant on the wattage chosen. **Blur** controls the sharpness of the line. The lower the Blur number the sharper the image gets. **Edge** controls the sharpness of an object's corners. **Intensity** is similar to threshold, as it controls the amount of pixels the image will contain.

Machine Specific Settings: Fiber & UV Controls

Jog Controls:



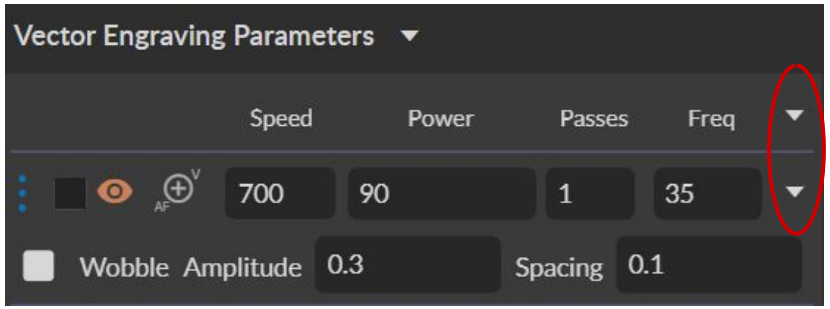
The Gantry Controls is a CO2 specific option. However, the **Speed Controls** is for both machines. By selecting the running icon the speed at with the machine moves will change.

On Fiber and UV machines the Z-axis controls the Z-stage. The **Homing** icon will return the stage to its home position, while the **Centering** icon will center the laser to the workspace. Additionally, the **Z** icon will move the stage into it's autofocus position.

The **Move To** option makes it possible to move the Z-stage to specific coordinates. This option is used when performing a project with familiar samples, moving the laser into the focused position.

The **Reference Markers** are used to set points in the workspace that can be used a number ways. Reference markers can be set along the perimeter of the project to align it with the material or it can be set along the object to make sure the Image does not run off of it.

Vector Controls:



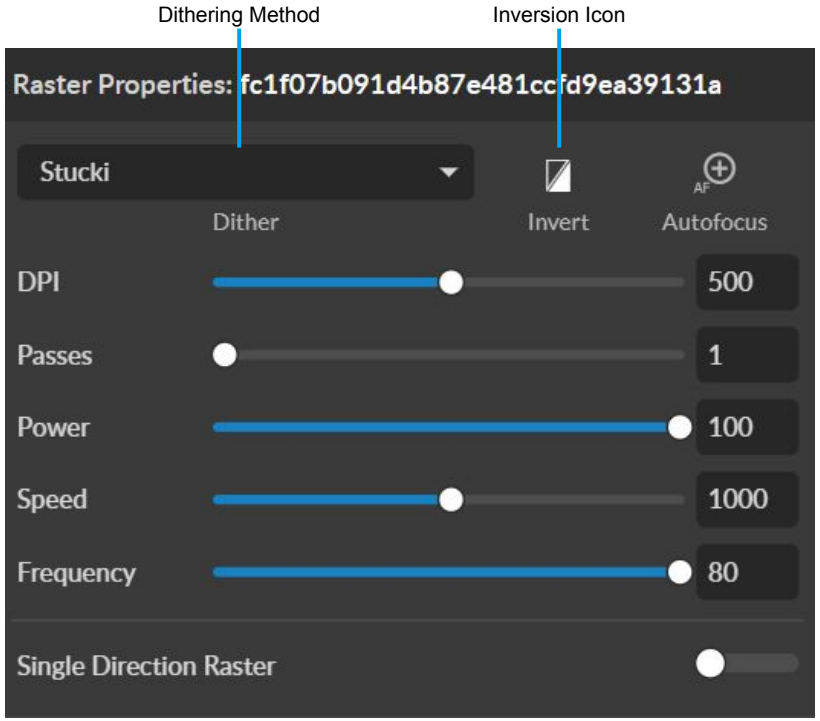
The **Vector Parameters** for Fiber and UV machines have 6 setting. The first four are visible normally while the other two must be displayed by selecting the arrow located on the right hand side.

The **Power** is percent based, it is dependant on the wattage chosen. The **Frequency** is in KiloHertz (KHz) and ranges from 20 to 80 KHz. The machine's **Speed** setting is in millimeters per second (mm/sec) and can go up to 5000.

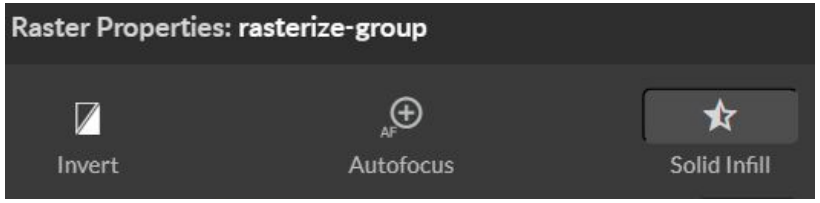
Wobble Amplitude if used for surfaces that are slightly uneven and **Spacing** is the space between each line. The spacing option is used a great deal in MOPA machines as certain spacing setting can be used to adjust the coloring of an engraving.

Machine Specific Settings: Fiber & UV Machines- Rasters

Raster Objects:



Raster Groups:



There are two types of rastered objects in RE3: one is a simple rastered object while the other is a raster group. A raster group is made when one or more vector objects are rasterized.

A raster object had two features, vector object do not: dithering method and inversion. **Dithering** is a technique used to simulate toned images using a limited number of dots, while **inversion** is a technique used to switch the black and white areas in an image to create a more appealing result in painted or coated materials.

A rasterize group can also be inverted, however as it was originally a vector it has a **Solid Infill** option instead of a dithering method. The Solid infill works just like an Infill does on a vector object.

The **DPI** (also known as Dots Per Inch) is the resolution of the image. The DPI can be adjusted up to 1000 dots per inch. The **Power** is percent based, it is dependant on the wattage chosen. The **Frequency** is in KiloHertz (KHz) and ranges from 20 to 80 KHz. The machine's **Speed** setting is in millimeters per second (mm/sec) and can go up to 5000 mm/sec.

Creating a design using vector and raster data:

Vector Engraving & Cutting	Raster Engraving
Vectors use mathematical formulas to create paths that form a shape. It is mainly used to cut materials.	Rasters are make of white and colored pixels. The colored pixels are what is engraved.
Used for creating signs & logos	Used for creating surface marking & engravings
Vectors are found in PDF, SVG,DXF, and AI files.	Rasters are found in JPEG, PNG, BMP, and TIF files.
PDF is preferred.	JPEG is preferred.

Creating a Design

You may decide that instead of just importing a picture you want to make one. When creating a design in design software, we recommend using a software you are familiar with. RE3 can work with a variety of file types but we recommend saving your files as a PDF, SVG, or JPEG. PDF and SVG files contain both raster and vector data, making them the most suitable for both engraving and cutting. Jped is the most suitable for rastering.

Beside the file types there are five things to keep in mind when designing:

1. Coloring- By this we mean the lack of coloring. When importing an image it is important to keep in mind the lasers function in two ways: on and off. The laser will fire when it reads a shaded image and stop when it doesn't. For that reason, when an image is imported it is converted into a grayscale image. This also means that any colors chosen will vanish. To compensate, you can make the image monochrome or cut out their designs one aspect at a time to get the whole object.

2. File Type- It's import to keep in mind how running your file as a vector or raster will affect the process. As mentioned on the chart rasters are pixels that are engraved typically by having the laser move left to right and up to down. Even less noticeable pixels can be detected by the machine, sometimes creating background marks in certain images. However, vectors follow path created by the user. The vector paths are engraved in one continuous motion making it ideal for lines or object that are desired in the same power setting through.

3. Materials- The material chosen must be compatible with your machine. Do not attempt to run a job on Certain materials, such as Acrylic, require additional ventilation when cut with a machine. It is up to the user to check the material to make sure it does not produce harmful fumes when burned.

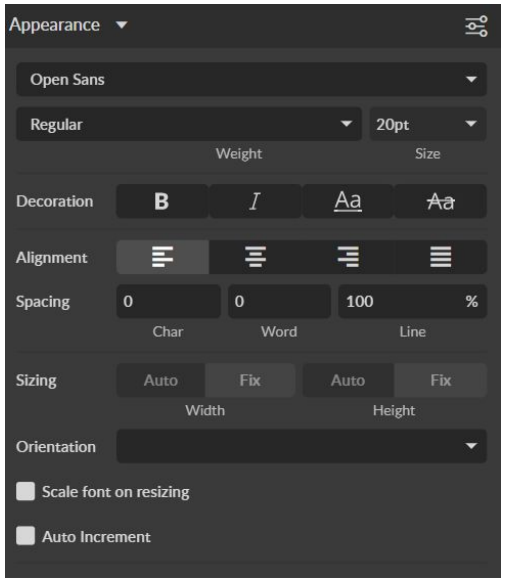
4. Cutting or Engraving- Both Vector and Raster objects can be used to engrave an object. However for cutting out something then a vector object is ideal. By adjusting the parameters, vectors are able to cut the material. This is because the perimeter of the engraving can be easily outlines and filled at 100% power.

5. Size- When designing for a laser engraver, it's important to consider both the design and material size. If you have only small pieces of material, then a simpler design may be necessary as small details can be lost due to the limited scale. Conversely, if you want to showcase intricate details in the design, using a larger piece of material can help. Additionally, it's important to note that the level of detail a machine can produce will vary based on its type. CO2 machines are typically better suited for medium to larger pieces of materials compared to Fiber and UV machines which use small to medium sizes pieces.

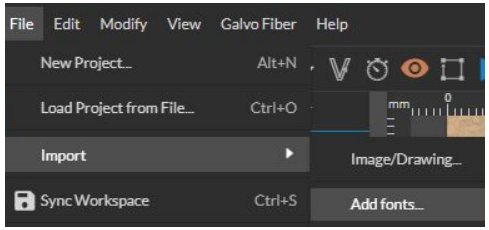
Creating and Manipulating text:

Select the Text Icon, then select the location on the workspace. A text box will appear (as shown below).

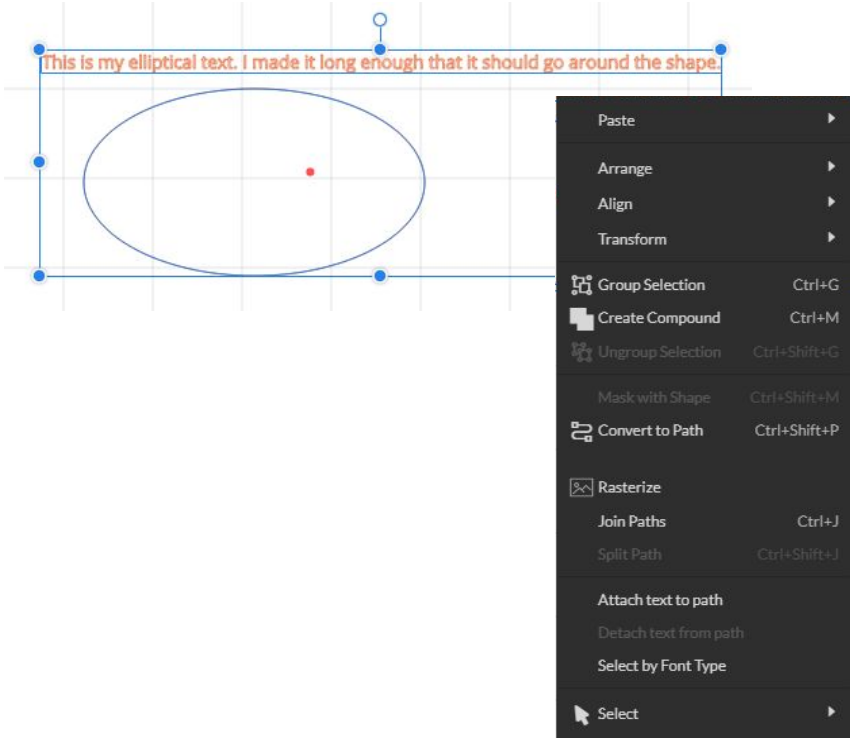
You can start typing immediately however you will not be able to change the font or any other text properties while typing. To change the text properties select the text box and then go the the appearance section.



Importing New Fonts:
New fonts can be imported to RE3 easily. Simply have the font style downloaded, then go to the file section and select Import -> Add fonts



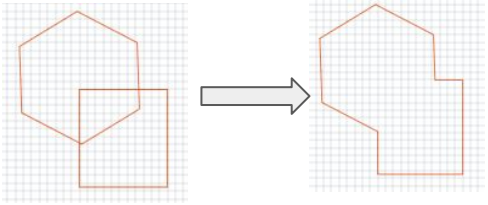
Attach Text to Path:
The user can attach and contour text to a shape or object.
For example, if the user creates an ellipse and a text element separately they can select both objects, right click and select **Attach Text to Path** option. The text will merged with the ellipse and conforms to the contour of the shape. The user can then drag the text element to the desired position, using the mouse. The text can also be detached using the **Detach text from path** option directly below.



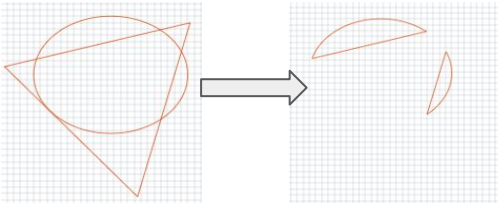
Creating and Manipulating Compound Shapes & Objects:

These function are available in the Grouping section of the toolbar (see above). Compound Shapes & Objects Operators can combine and modify shapes and objects to create unique compound shapes and objects with these functions:

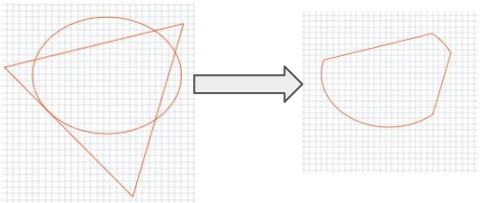
Union:



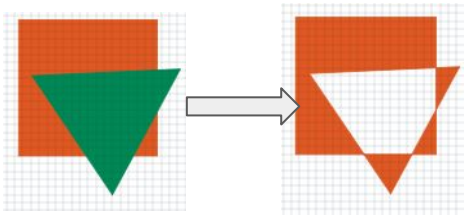
Subtract:



Intersection:



Difference:



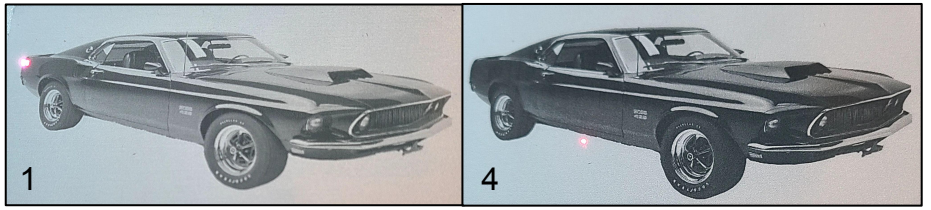
Passes:

When engraving a material sometimes you may need to perform the job again, or perform another pass. Multiple passes can be programmed into RE3.

Why would you need a second pass?

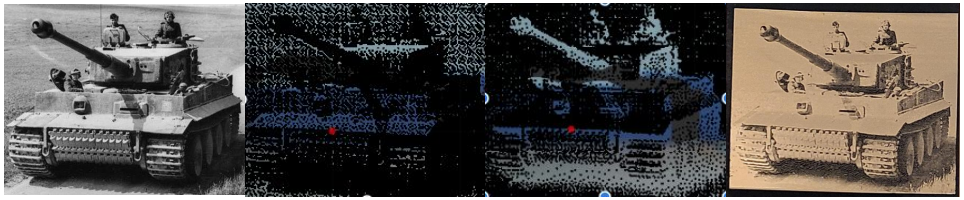
By programing multiple passes on an object, your image will obtain more depth. Another reason would be for a deeper engraving. The thicker a material is the more passes that the laser will need to fully engrave or cut the material. Increasing the power and lowering the speed can also help with the process but one should keep in mind that doing do can result in damage to the material. Therefore performing multiple passes is an easier solution.

Below is an image that was engraved with four passes. The details of the car was greatly enhanced with each pass.



Inverting:

When a raster object is inverted the black and white pixels are swapped. This methods is often used to improve the contrast of the engraving, making it easier to see in certain material.



Original | RE3 File | Inverted RE3 File | Inverted Engraving

Infills & Tracing:

Infills (Vector Data Only):

Infills as the name suggests, fills in the space within the vector lines.

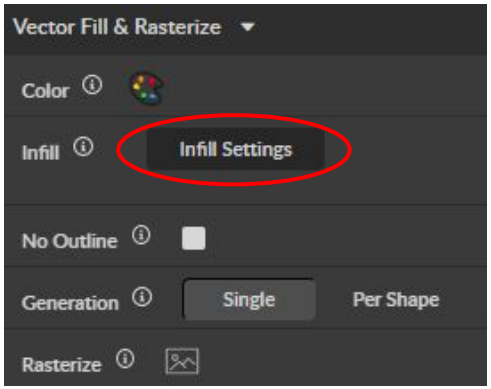
Before:

After:

Using Infills:

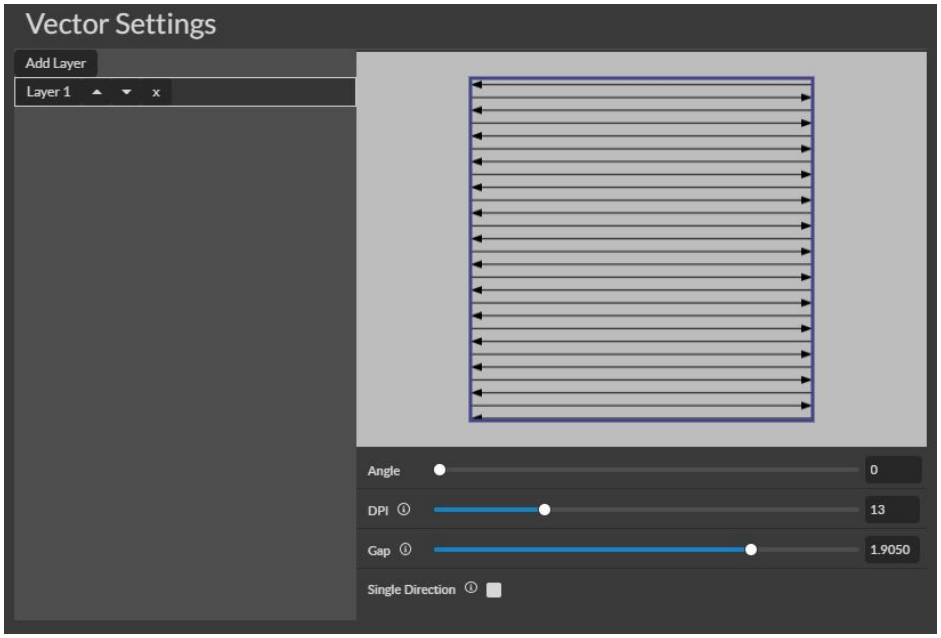
1. Go to the Vector Fill & Rasterize tab (accessible only when a vector object is selected).

2. Locate the infill section and select the "**Infill Settings**" option.



3. By selecting the icon a window should appear. Input the desired settings.

Infills Settings:



Angle - Set the angle in which your vector will be infilled.

DPI - DPI (or Dots Per Inch) is the resolution of your image.

Gap- The gap is the distance between each engraved line.

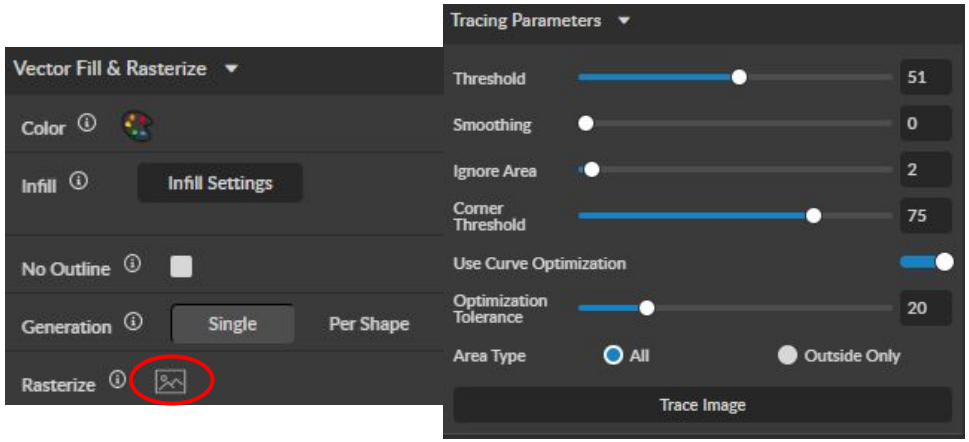
The DPI and the gap are inversely proportional to each other. As one increases the other decreases.

Single Direction- The infill can be performed in a single direction or bi-directionally (see above).

Layers- Add more infill passes. Each pass will be saved as a layer and will run in the preset order. Each layer can be adjusted to different settings.

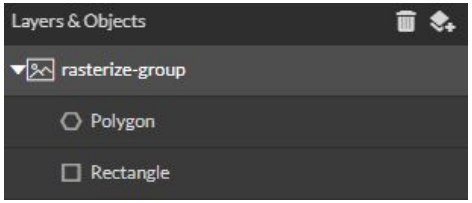
Rastering & Tracing:

A vector can be made into a raster object using the Rasterize option. Similarly, a raster object can be made into a vector using the Tracing Parameters (see below).

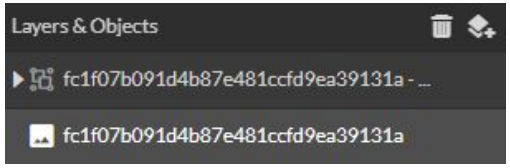


Rasterize (Vector Data Only):

A vector can be made into a raster object using the Rasterize option. SImply select the vector items you want to raster and then select the "**Rasterize"** option. A raster group will then be created containing all the vectors previously selected.



Similarly, when a raster object is converted into a vector, a vector group is formed. The vector group can be selected and edited (see the area types for more information).



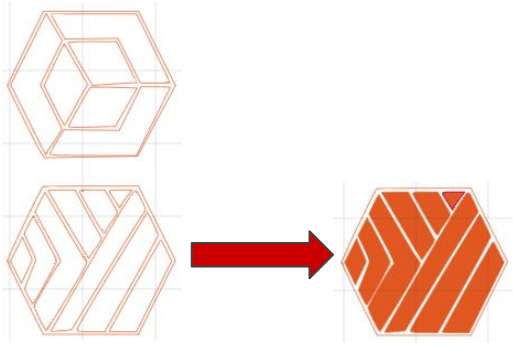
Tracing Types (Raster Data Only):

Original

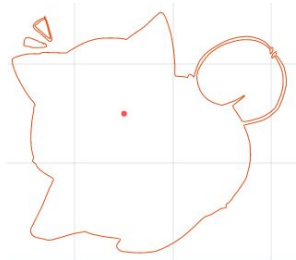
Area Type: All

All the lines in the image are traced. This is perfect for when one wants certain parts to look sharper than the others.

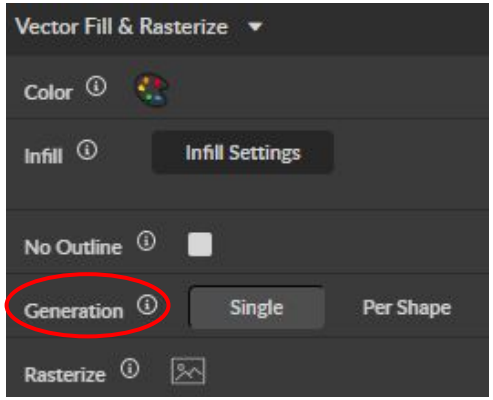
The lines are all stored into compound groups which can be customized separately from each other. For a mixture of different designs.



Area Type: Outside
This area type captures the outside of the image. This makes it useful for creating silhouettes of a picture for cutting.

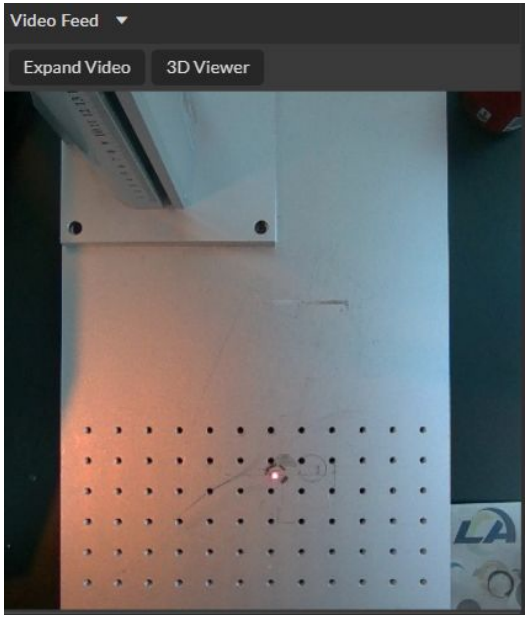


Generation:

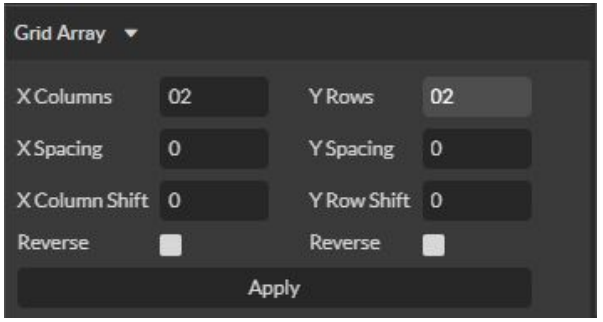


The Generation option is only for compound groups and text. It gives users the option of creating a single infill for an object or the ability to create a infill for each shape within the object.

Camera Feed:

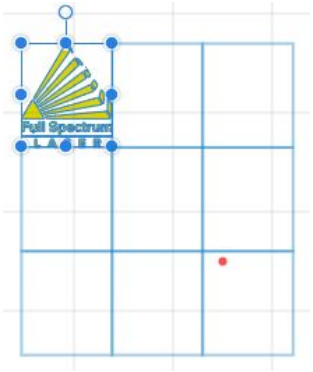


Grid Array:

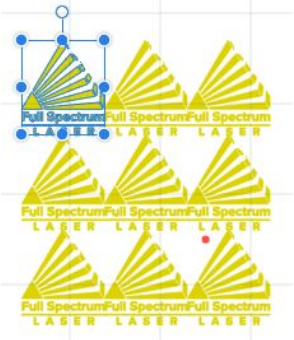


Grid Arrays are convenient for individuals that use their machines to make the same item in large quantities on a single material, such as for a business.

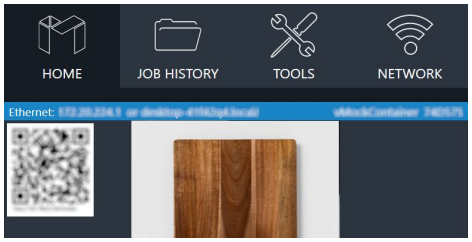
To use the grid array, locate the **Grid Array** tab and select the Rows & Columns wanted.



An outline of the array will appear as the numbers are typed in. After your selection has been made, select the **Apply** option.

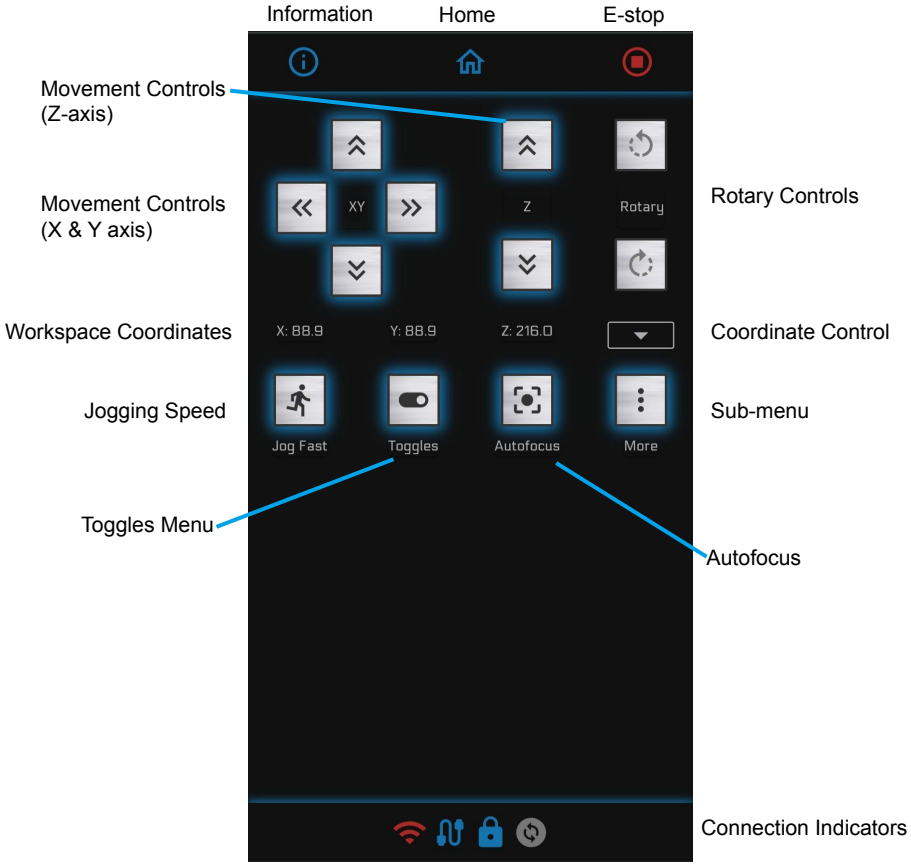


Mobile App:



The mobile application can be enter two ways. By scanning the QR code using your phone or by typing the IP address of your machine into your phone's web browser.

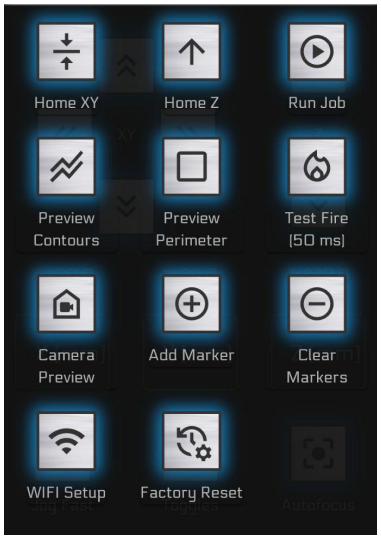
Please note that the machine and your phone must be on the same network to connect.



Information Section:

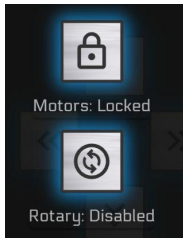
The information screen displays the Model, Firmware, as well as the IP and MAC address of the machine.

Sub-menu:



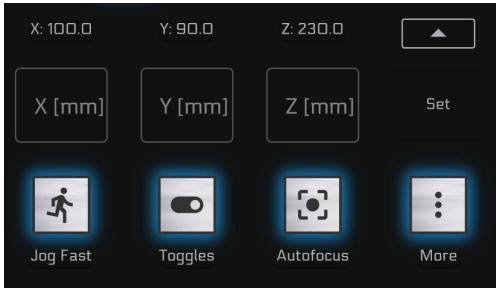
The sub menu can be used to check machine settings, home the machine, and run projects.
The **Home XY** and **Test Fire** button will only work on Titan models.

Toggles:



Rotary and Motor controls are located here.

Coordinate Controls:



The Coordinate Control bar can be used to move the Laser Head Assembly to the set coordinates.

Connection Indicators:

Indicates if the wifi and/or ethernet is connected. It also shows the motor status/