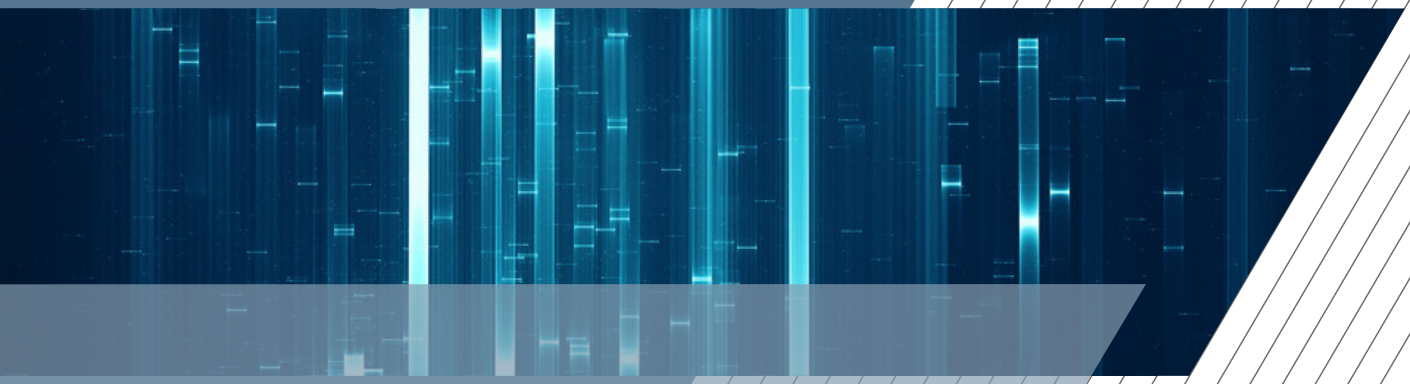
FIBERCUBE®
LASER ENGRAVING SYSTEM

# FiberCube® Marker 3801 Series

## Setup Guide, Operation & Maintenance Manual



LASERSTAR® TECHNOLOGIES

HARNESSING THE POWER OF HOT LIGHT™

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LASERSTAR
STARFX
PREMIER
DESIGN STUDIO
INDUSTRIAL EDITION
LASERSTAR

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# Declaration of Conformity

| | |
|---|---|
| Manufacturer's Name: | LaserStar Technologies Corporation® |
| Manufacturer's Address: | 2461 Orlando Central Parkway<br>Orlando, Florida 32809 |
| Phone / Fax: | PH: (407) 248-1142 FX: (866) 708-5274 |
| Designation: | FiberCube® Marker 3801 Series |
| Model Number(s): | xxx-3801 |
| Year of Manufacture: | 2021 |
| EC Directive(s): | 2014 / 35 / EU (Low Voltage Directive)<br>2014 / 30 / EU (EMC Directive) |

**Standard(s) to which Conformity is Declared:**

IEC 60825-1:2014 Ed. 3.0

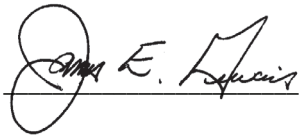
IEC 61010-1:2010 Ed. 3.0

IEC 61000-6:2 Ed. 2.0 (2005-03)

IEC 61000-6:4 Ed. 2.0 (with A1:2011)

This declaration is issued under the sole responsibility of LaserStar Technologies Corporation®. The object of this declaration is in conformity with relevant Union harmonization legislation.

I, the undersigned, hereby declare that the equipment specified above conforms to the above identified standards and fullfills the provisions of the EU directive(s).



James E. Gervais
**President and Chief Operating Officer**

Date: January 04, 2021

# Declaration of Compliance

United States and Canada

| | |
|---|---|
| Manufacturer's Name: | LaserStar Technologies Corporation® |
| Manufacturer's Address: | 2461 Orlando Central Parkway,<br>Orlando, Florida 32809 |
| Phone / Fax: | PH: (407) 248-1142 FX: (866) 708-5274 |
| Designation: | FiberCube® Marker 3801 Series |
| Model Number(s): | xxx-3801 |
| Year of Manufacture: | 2021 |

**Standard(s) to which Compliance is Declared:**

UL 61010-1:2012 Ed. 3+R:29 April 2016 "Safety Requirements for Electrical Equipment for Laboratory Use; Part 1:
General Requirements"

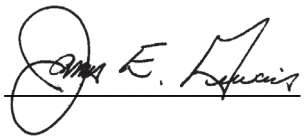
CSA C22.2 No. 61010-1-12:2012 Ed. 3+U2 "Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use; Part 1:
General Requirements"

Code of Federal Regulations (CFR), Title 21; Part 1040.10, 1040.11 for Laser Products

FCC 47CFR; Part 15, Subpart B (2017): Unintentional Radiators, Class A Verification

Listing: ETL Mark; Control Number: 4006074

I, the undersigned, hereby declare that the equipment specified above conforms to the above identified standards, as described in the test record.



*James E. Gervais*
**President and Chief Operating Officer**

Date: January 04, 2021

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# LaserStar Technologies Corporation®
# Library Publication Data

### FiberCube® 3801 Series Marker

### Setup Guide, Operation & Maintenance Manual

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# Background

A laser is a device that emits a beam of coherent light through a process of optical amplification (based on the stimulated emission of electromagnetic radiation). The word *laser* is an acronym and stands for **light amplification by stimulated emission of radiation**.

Lasers exist and are made possible because of fundamental interactions between light and matter, or more specifically, electrons — negatively charged subatomic particles that orbit around the nucleus of an atom. These electrons and their associated photon energies exist at specific energy levels (energy levels uniquely dependent on an atom's structure).

Imagine these energy levels as orbits or rings around the sun — electrons within the outer rings produce more energy than those of inner rings. With the introduction of a new energy source (a flash of light), however, electrons can be stimulated or excited to a new energy state, transitioning from a lower-energy orbit to a higher-energy orbit. When they return to their normal or "ground" state, electrons emit particles of light called photons **(figure 1)**.

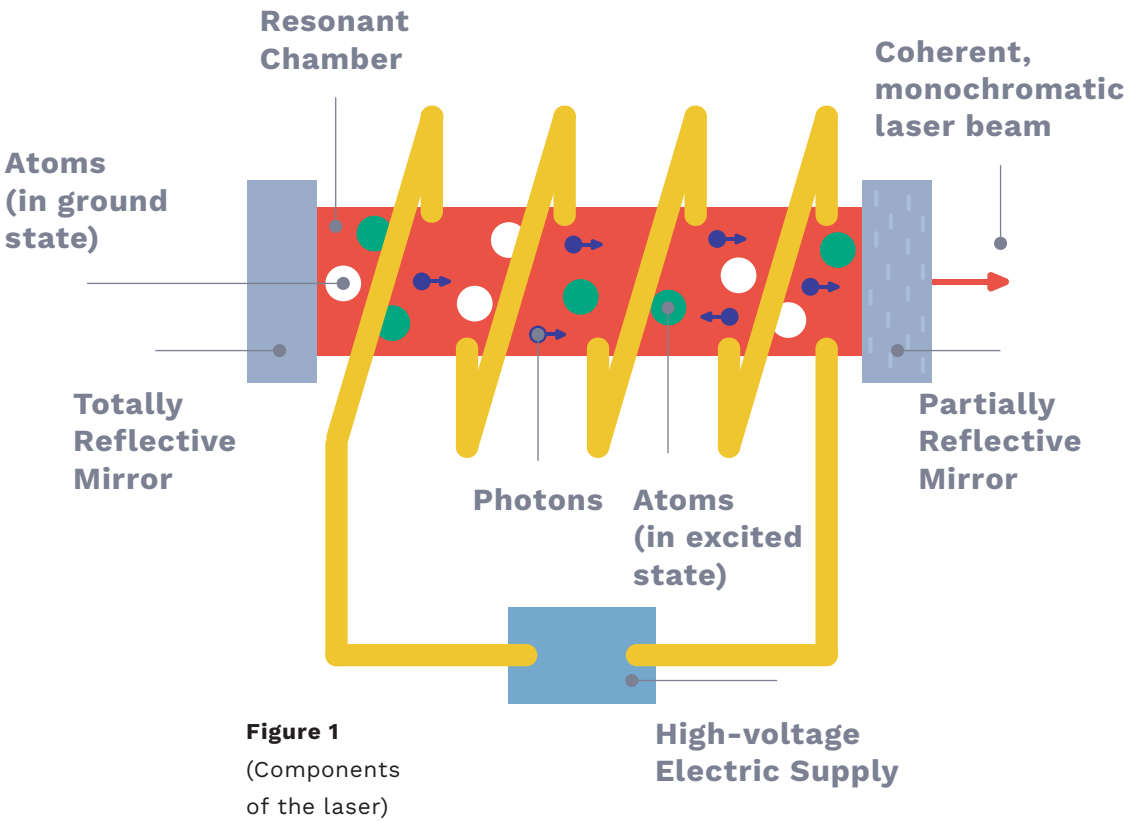



**Figure 1**
(Components of the laser)

The propagation of light through space can be described as a traveling wave motion — an electromagnetic wave. The wave consists of two fields, each fluctuating — one electric and the other magnetic. The fields remain in-phase and at right angles (orthogonal) to one another — both perpendicular to the direction of travel **(figure 2)**.

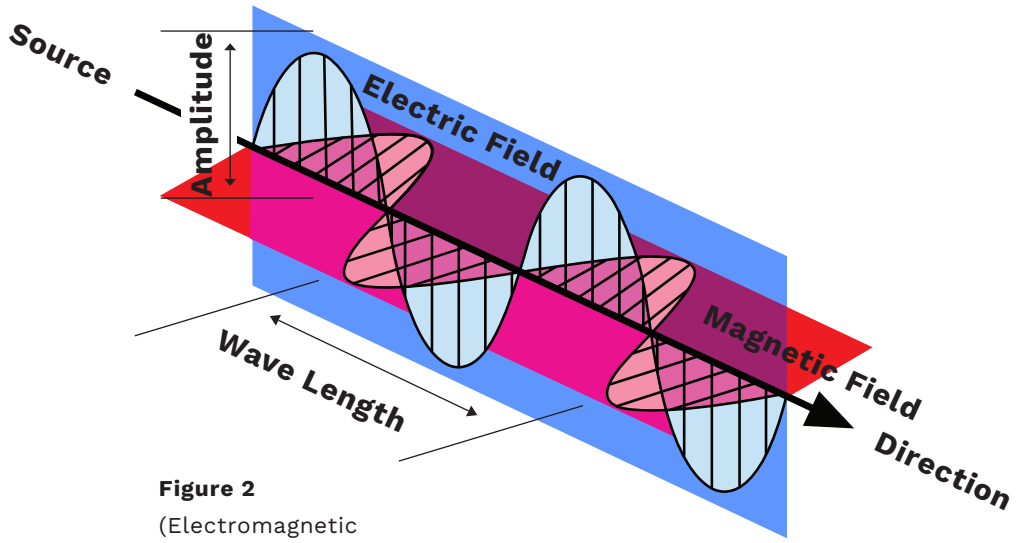



**Figure 2**
(Electromagnetic wave)

The concept of laser light is better understood by defining and examining its inherent properties. The light outputted from a laser differs from ordinary light and has three (3) defining characteristics that make it unique and help it to stand apart: coherence, monochromaticity, and direction. When all emitted photons bear a constant relationship with one another in both time and phase, the light is said to be coherent. In addition, due to the specificity and purity of the medium, laser light is also monochromatic (one color). Lastly, light emitted from the laser is highly directional, traveling as a relatively narrow beam, in a single direction, and down a specific and predetermined path **(figures 3 & 4)**.

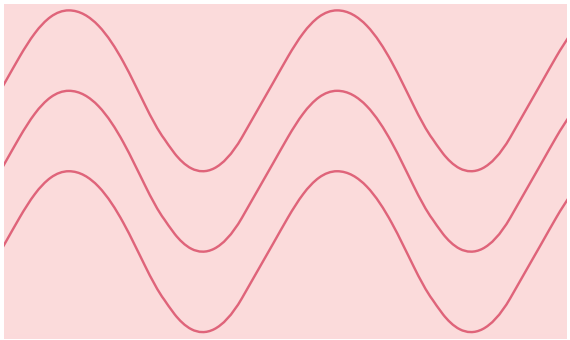


**Figure 3**
(Coherent, monochromatic, directional light)

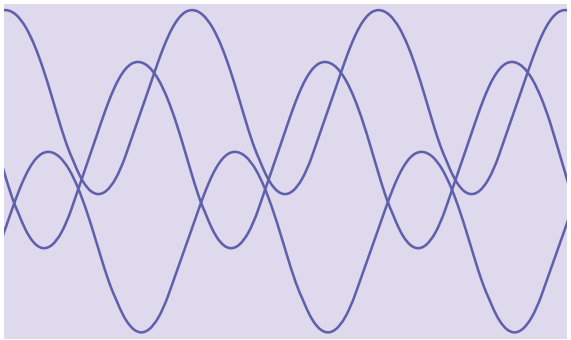


**Figure 4**
(Incoherent, monochromatic directional light)

# I. Introduction

## Fiber Medium Laser: About, Standards, and Technical Data

A fiber laser is a device in which the active gain medium is an optical fiber doped with rare-earth elements, such as erbium, ytterbium, neodymium, etc. They are related to doped fiber amplifiers, which provide light amplification without lasing. Solid-state lasers or laser amplifiers where the light is guided due to the total internal reflection in a single mode optical fiber are instead called fiber lasers. The guiding of light allows extremely long gain regions providing good cooling conditions; fibers have high surface area to volume ration which allows efficient cooling. In addition, the fiber's wave guiding properties tend to reduce thermal distortion of the beam.

The fiber laser is often designed using a double-clad fiber, which consists of a fiber core, as well as an inner and an outer cladding. The index of the three concentric layers is chosen so that the fiber core acts as a single-mode fiber for laser emissions while the outer cladding acts as an efficient multi-mode core for the pump laser. This allows the pump to propagate a large amount of power into and through the active inner core region, while still having a high numerical aperture (NA) to permit effortless launching conditions.

The fiber laser produces a very high energy density light beam, many times higher than is possible with normal light at the focal point of a lens. The energy "hot light" created at the focal point in a relatively short time (0.5 to 20 ms) heats the work piece beyond its melting point and thus enables a weld.

The affected area has a limited range — approximately 0.20 to 2 mm, depending on the material. The laser light welds two metals together and thus permits safe, durable, precise, and non-warped joining of metal materials in the form of a spot or seam. Because of the very short time of the laser pulse, the zone of heat influence is limited to the immediate vicinity of the welded spot or seam.

The characteristics of a laser pulse, and thus the effect on the material, can be influenced by the operating parameters joules (energy) and pulse length (width). The joules has influence on the amplitude; the pulse length influences the width of the laser pulse.

**In practice, the effect of both parameters while welding metals is as follows:**

- Joules first influences the weld depth
- Pulse length predominantly influences the diameter of the welding point
- Focus influences weld depth, as well as the diameter of the weld spot. When the diameter of the weld spot is increased, weld depth is simultaneously reduced

**Fiber Medium Laser: About, Standards, and Technical Data Continued on Next Page**

## Fiber Medium Laser: Advantages of Ownership

### + Flexible Fiber

The inherent properties of light ensure that it can be easily delivered to a movable focusing element, which is important for laser cutting, welding, and folding of metals and polymers.

### + Sustained Output Power

Fiber lasers can have active regions several kilometers long, and so can provide extraordinarily high optical gain. They can support kilowatt levels of continuous output power because of the fiber's high surface area to volume ratio, which allows efficient cooling.

### + Superior Optical Quality

The fiber's wave guiding properties reduce or eliminate thermal distortion of the optical path, typically producing a diffraction-limited, high-quality optical beam.

### + Conveniently Compact

Fiber lasers are compact compared to rod or gas lasers of comparable power, because the fiber can be bent and coiled to save space.

### + Unwavering Reliability

Fiber lasers exhibit high vibrational stability, extended lifetime, and maintenance-free, turnkey operation.

- High peak power and small pulses enable effective marking and engraving.
- Additional power and improved beam quality provide cleaner cut edges and faster cutting speeds.
- Lower cost of ownership.

## FiberCube® 3801 Series Marker:

## Equipment Overview

The FiberCube® 3801 Series Marker is a compact, turnkey, single-user operated laser device designed for marking, engraving, and cutting. The workstation can be operated with or without an enclosure, providing unique versatility, while still offering all of the benefits of contact-free, abrasion-resistant, permanent laser marking, transferrable to nearly any surface or material.

The FiberCube® marker is a **class 1** laser when installed in a **class 1** enclosure and while the front door is closed, the **setup key switch** remains in the "off" position, and the key (for the key switch) is removed and stored in a secure location. When the **setup key switch** is in the "off" position and the front door is open, the FiberCube® marker is a **class 3R** laser (when the **focus diodes** are in the "on" position) and the device is a **class 2** laser when the **red laser pointing diode** is "on."

**Caution: A class 4 laser requires that all persons within the Nominal Ocular Hazard Area wear appropriate laser protective eyewear.**

A wide range of standard and customizable platforms are available for the FiberCube® marker, ranging from simple enclosures to more advanced integrated x–y–z motion (with step-and-repeat laser marking or coordinated rotary motion) to seamlessly mark around a circumference; motion which is easily configured and controlled with the marking software. Selecting either a standard or customized platform offers the speed, reliability, and flexibility required to meet stringent quality control and process certification standards.

With marking, engraving, and cutting applications, in order to achieve optimal finalized results, the workpiece must be properly positioned within the focusing area of the laser beam; positioning and work piece height are determining factors that directly affect the results and outcome. The work piece height is correct when the surface of the part is in focus while under the microscope.

Laser pulse energy is another factor that can have a direct influence on the quality of marking, engraving, and cutting; this setting can be adjusted using the software.

With certain materials, the quality of the mark, engraving, or cutting can be improved by using argon (inert) gas or other similar non-reactive gases. With the use of an accompanying non-reactive gas while the laser beam is active, an endothermic reaction occurs as material is removed. The focusing rules for supporting endothermic reactions when cutting (not marking or engraving) require focusing the laser beam at (or just below) the bottom of the part surface. **(Note: This machine may be equipped with a separate, optional argon [inert] gas valve.)**

Another material removal process, called an exothermic reaction, uses gas with accelerant properties; such as oxygen under high pressure. With exothermic reactions, intense energy from the laser beam vaporizes — or literally boils — cut material as oxygen reacts vigorously with the liquid molten material.

The focusing rules for supporting exothermic reactions when cutting (not marking or engraving) require the focus position to be above the surface (for thick materials) and just into the top surface (for thinner materials).

The vapors produced while marking, engraving, and cutting can be harmful when enhaled or breathed for long periods. These fumes should be extracted from the lasing chamber and operator's work station using an external exhaust system.

# FiberCube® 3801 Series
# Workstation: External Components and Body Configuration

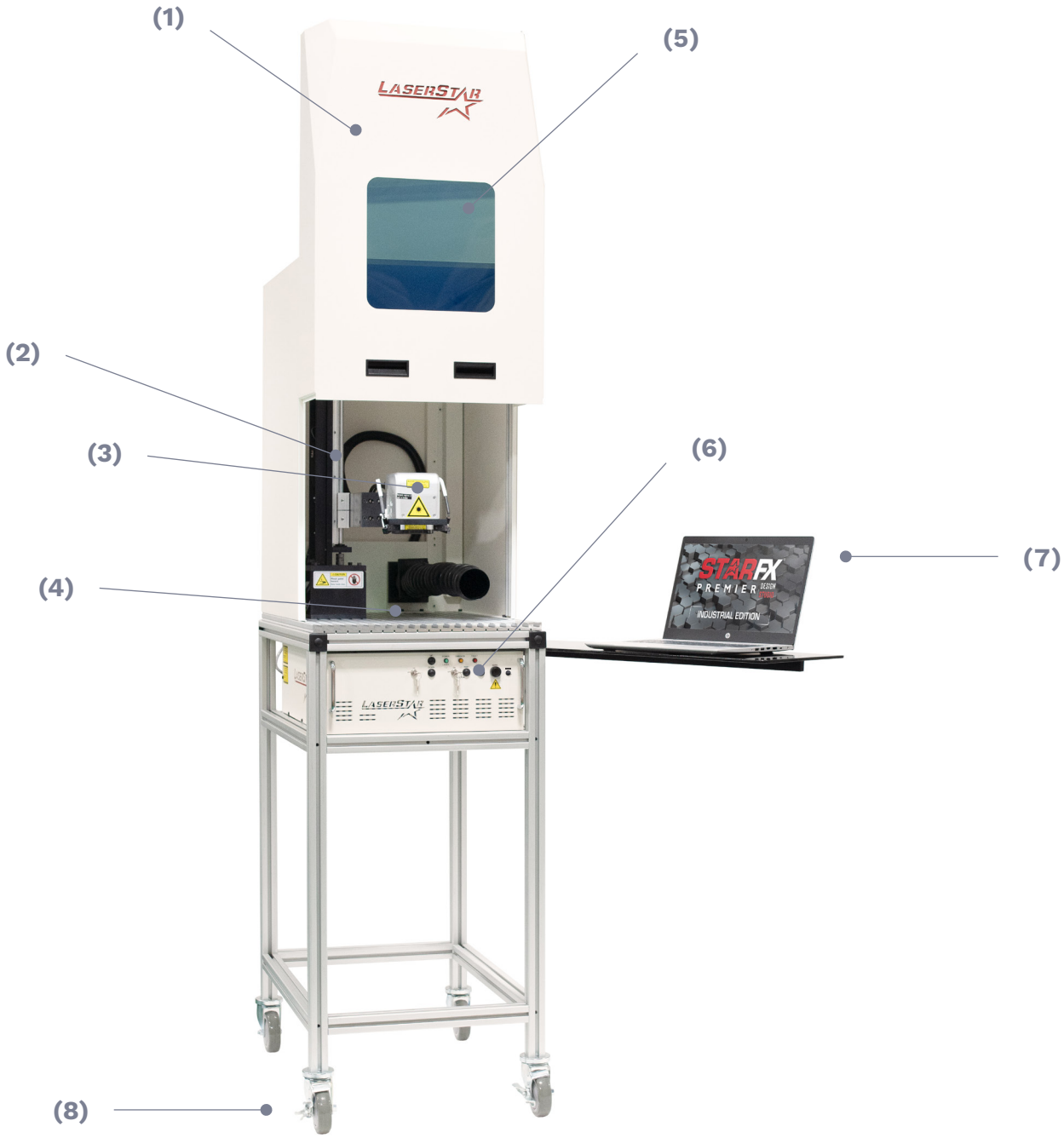



**Figure 5**
(FiberCube®
3801 Series Marker)

**External Components and Body Configuration**
**Continued on Next Page**

## External Components and Body Configuration (continued)

(for a visual reference of the individual components noted below, see the diagram on the previous page; **page 21**)

1. Chamber Enclosure (optional removable automation chamber available)
2. Optical Rail Assembly
3. Scanner Head (with focus diodes)
4. Workpiece Rest (holds or secures the workpiece while marking; not shown)
5. Splash-protective Observation Window
6. Controls Panel
7. Laptop Computer
8. Wheel Locks (×2)

Workpieces or parts within the **chamber enclosure (1)** can be observed through the **splash-protective observation window (5)**. The observation window is made from a specialized material and allows for absorption of harmful laser radiation, as well as the ultraviolet (UV) component of plasma light.

### Notes

## Technical Specifications

**The marker, a turnkey-operated device, consists of the following components, which are configuration dependent:**

- High-energy Pulse Laser (adjustable from either continuous-wave or single-pulse modes)
- Embedded Computer
- Foot Pedal Switch (for triggering laser pulses or beginning an automated marking cycle)
- Work Chamber Exhaust System (with accompanying filter)

**FiberCube® 3801 Series Marker:**
**Device Components and Build Specs**

**A typical system includes a variety of standard and optional components**

| Laser Medium | **Fiber (20W)** | **Fiber (30W)** | **Fiber (50W)** | **Fiber (60W)** |
|---|---|---|---|---|
| Pulse Energy (maximum) | 1 mJ | 0.85 mJ | 1 mJ | 2 mJ |
| Repetition Frequency | 20 – 80 kHz | 20 – 600 kHz | 20 – 600 kHz | 5 – 2000 kHz |
| Pulse Duration | 90 – 120 ns | 80 – 120 ns | 140 – 200 ns | 200 ns |
| Beam Diameter | 7.5 mm | 7.5 mm | 7.5 mm | 7.5 mm |

**Technical Specifications Continued on Next Page**

## Technical Specifications (continued)

### FiberCube® 3801 Series Marker: Device Components and Build Specs

**A typical system includes a variety of standard and optional components**

| | Fiber (20W) | Fiber (30W) | Fiber (50W) | Fiber (60W) |
|---|---|---|---|---|
| Eye Safety Filters (view window; 1030 – < 2200 nm) | OD 8+ | OD 8+ | OD 8+ | OD 8+ |
| L × W × H (door closed) | 99 × 59 × 81 cm (34 × 23 × 32 in) | 99 × 59 × 81 cm (34 × 23 × 32 in) | 99 × 59 × 81 cm (34 × 23 × 32 in) | 99 × 59 × 81 cm (34 × 23 × 32 in) |
| L × W × H (door open) | 99 × 59 × 130 cm (34 × 23 × 51 in) | 99 × 59 × 130 cm (34 × 23 × 51 in) | 99 × 59 × 130 cm (34 × 23 × 51 in) | 99 × 59 × 130 cm (34 × 23 × 51 in) |
| Weight (varies; can range based on selected components) | 82kg (180lbs) | 84kg (185lbs) | 86kg (190lbs) | 89kg (195lbs) |
| Electrical Connections (single-phase) | 10A, 120 – 240VAC, 50 / 60Hz | 10A, 120 – 240VAC, 50 / 60Hz | 10A, 120 – 240VAC, 50 / 60Hz | 10A, 120 – 240VAC, 50 / 60Hz |

### Notes

## Notes

# External Control Elements (model & option dependent)

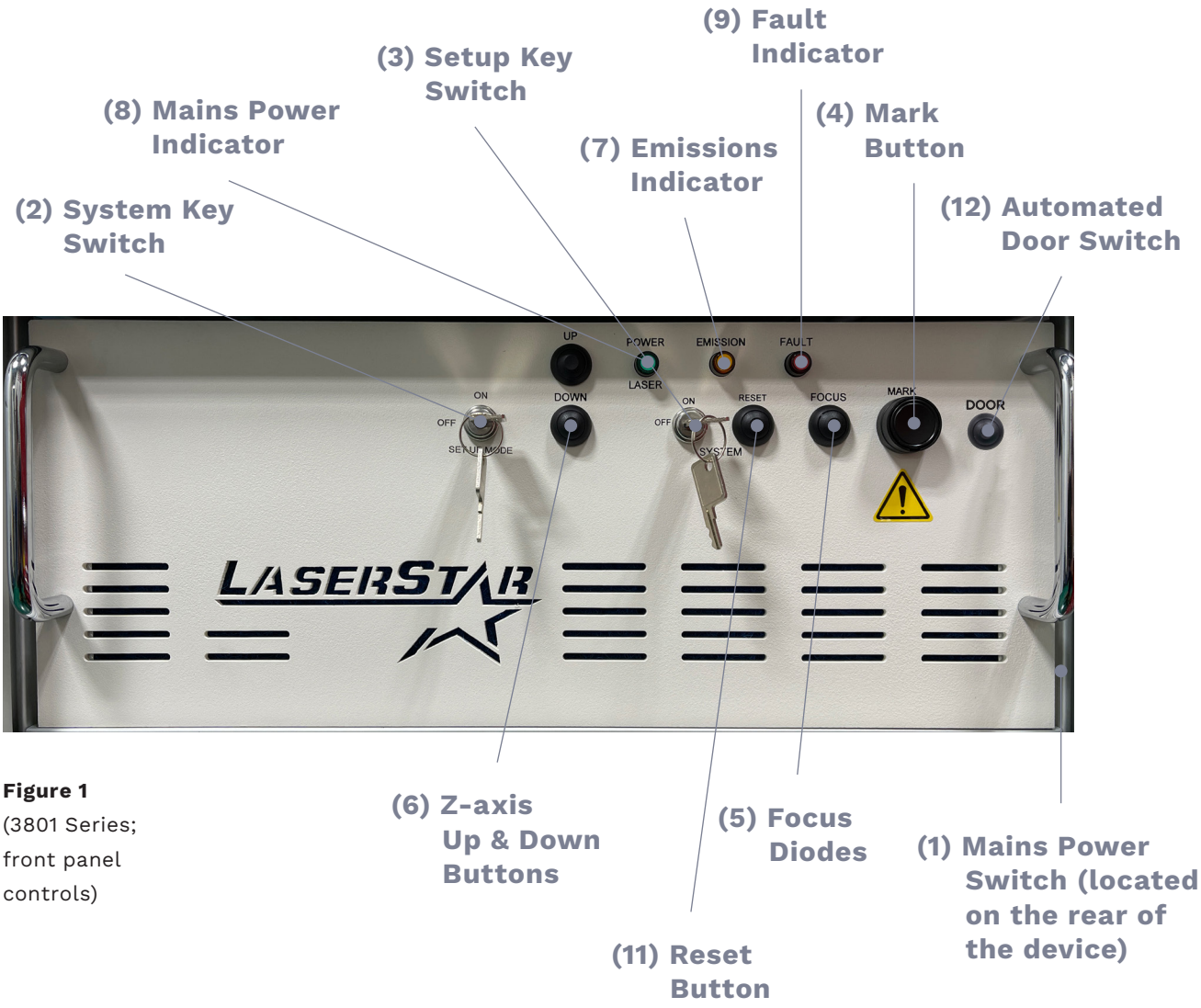



**Figure 1**
(3801 Series; front panel controls)

1. **<u>Mains Power Switch</u>:**

   The **mains power switch (1)**, which is located on the rear of the device) turns “on” or “off” the line voltage for the laser. In case of an emergency, the marker can be turned “off” (“O”) without turning “off” the device's **system key switch**. **<u>Attention</u>:** Disconnection from the AC power requires that the AC plug, located on the rear of the device, be fully disconnected.

2. **<u>System Key Switch</u>:**

   The **system key switch (2)** enables or disables the laser source and axes. Turn the **system key switch (2)** to the “on” position; the **power indicator** will turn “on” (green) when the laser source has been enabled. During normal operation, the **system key switch (2)** should remain “on.”

External Control Elements Continued on Next Page

## External Control Elements (model & option dependent)




**This device is a class 4 laser when the front door is open and the setup key switch is "on" (safety interlocks disabled) and a class 3R laser when the front door is open and the setup key switch is "off." While operating the marker, be sure to avoid exposure of the skin or eyes to direct or scattered radiation. In addition, appropriate laser safety eyewear should always be worn.**

3. **Setup Key Switch:**

   The **setup key switch (3)** is used to disable the **front door** safety interlocks when placing a workpiece inside the chamber enclosure. When the **front door** safety interlocks are disabled, the **power indicator** on the control panel will blink.

4. **Mark Button:**

   The **mark button (4)** is used to start the marking process or fire the laser. **(Note: With the automated front door model, this button will start the automated cycle: close the front door > mark > open the front door)**.

5. **Focus Diodes:**

   The **focus diodes (5)** are used to position the surface of the workpiece for maximum energy. The **focus diodes (5)** can be turned "on" by pressing the **Focus button** on the controls panel (the **setup key switch** can either be "on" or "off"). During a marking cycle, the **focus diodes (5)** will turn "off" automatically.




**The focus diodes emit class 3R laser radiation when "on" and the front door is open. The operator should avoid direct eye exposure to the beam and its specular reflection. It is recommended also that the operator wear appropriate laser protective eyewear when using this device.**

**External Control Elements Continued on Next Page**

## External Control Elements (model & option dependent)

6. **Z-axis Up & Down Buttons:**

   The **z-axis up** and **down buttons (6)** are used to adjust the height and positioning of the z-axis. When the **z-axis up** and **down buttons (6)** are held continuously, the speed for adjusting the z-axis increases. When the **z-axis up** and **down buttons (6)** are released, z-axis motion will cease. The maximum speed is <25mm (less than 1") per second; the lowest speed is approximately 1/3 the maximum. Labels noting the pinch points are located on the front of the device's scanner head and at the bottom of the z-axis rail (motorized version only). **Attention: The mains power switch can be used at any point to stop the z-axis motion.**

7. **Emissions Indicator:**

   The **emissions indicator (7)** is turned "on" (amber) after the **system key switch** is turned "on" and the **Reset button** is pressed. While the **emissions indicator (7)** remains "on," the laser is enabled and ready to fire.

8. **Mains Power Indicator:**

   The **mains power indicator (8)** turns "on" (green) when the **mains power switch** is "on." **Attention:** This indicator blinks "on" and "off" when the **setup key switch** is "on."

9. **Fault Indicator:**

   The **fault indicator (9)** turns "on" (red) when a system fault is detected. When this occurs, the device should be powered down and restarted. If the fault cannot be cleared, be sure to contact LaserStar Technologies Corporation® Service Department for support. **Attention:** If you notice the indicator blinks "on" and "off;" this is an indication that the remote interlock is not plugged in.

10. **Power Door Up & Down Buttons (optional; not shown):**

    The **power door up** and **down buttons (10)** are used to open or close the **front door** of the enclosure.

**External Control Elements Continued on Next Page**

## External Control Elements (model & option dependent)

**11. <u>Reset Button</u>:**

The **reset button (11)** is used to turn “on” the computer, enable the laser source to fire, and power-up the drive axes. The **emissions indicator** will turn “on” (amber) when the laser source is enabled.

**12. <u>Automated Door Switch</u>:**

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## Foot Pedal Switch Connector

The **foot pedal switch connector** (located on the rear panel) is used for marking, to fire the laser or begin an automatic cycle.

## Remote Mark (optional)

The **remote mark input** is available through the optional interface connector on markers that are equipped with an automated **front door**. While the **setup key switch** is in the “on” position, the **remote mark** will not allow the laser to fire (marking cycle to begin).

## Remote Interlock Connector

In addition to the foot pedal switch connector, there is a **remote interlock connector** (located on the rear of the marker) which is available to readily connect this device to a **remote interlock circuit** (such as an entry door) into a specific laser room. The **remote interlock** can be bypassed by using the **remote interlock shorting connector**. For instructions on connecting or bypassing this feature, be sure to reference the section on installation; **Installation > Remote Interlock Connector**; **chapter III** within this manual.

## Foot Pedal Switch Connector

The workstation is equipped with a foot pedal switch for triggering laser pulses or to begin an automatic cycle. The foot pedal is connected to the marker via several flexible cables; these can be moved and re-positioned by the operator, as needed.

**The foot pedal switch has two (2) operating positions with the following functions:**

stage 1:

- Depress the foot pedal partially (you'll feel initial resistance); this will trigger the inert (argon) gas supply to switch “on.”

stage 2:

- Depress the foot pedal fully (until it reaches the floor); this will trigger a laser pulse. If the inert gas supply is connected to the welder, it will remain “on” until the foot pedal switch has been fully released.

**When releasing laser pulses consecutively, the following options are available:**

- The foot pedal switch can be partially released after each laser pulse, and then pressed down again, right away.

- If the pulse frequency is set for continuous pulse mode (Hz), while depressing and holding down the foot pedal, a series of laser pulses will fire consecutively.

- If **Burst Mode (B)** is set (and while depressing and continuing to hold the foot pedal), a number of pulses (chosen by the operator) are released in quick succession.

## Remote Interlock Connector

In addition to the foot pedal switch connector, there is a remote interlock connector available to readily connect the device to a secondary interlock circuit (such as an entry door) into a specific laser room. The remote interlock can be bypassed by using the remote interlock shorting cap (p/n 101-36-0036). For information on connecting or bypassing this feature, be sure to reference the installation instructions (see **Remote Interlock** on **page 60**). For the location of the remote interlock connector, refer to **Service > External Fuses & Rear Connections**.

## Locking Brake

The front wheels of the workstation are equipped with a locking brake to help secure the machine and prevent unintentional movement. Pressing the brake lever down will activate the brake.

## Notes

# II. Safety

## Overview and Fundamentals

Radiation produced by laser light is capable of melting, burning, or vaporizing almost any material. The composition of the workpiece also dictates the vapor or gases that are generated; therefore, appropriate safety precautions are essential and critically important.

The FiberCube® 3801 Series Marker is designed exclusively for marking, engraving, and cutting applications, including both metals and metal alloys, as well as other non-metallic materials. This device incorporates a **class 3R laser** (used for pointing, as well as focusing on workpieces; some models use a **class 2 laser**). In addition, a **class 4 laser** can be supplied in a **class 1** enclosure (these models operate with the **front door** closed) or a **class 4** openframe series.

To use the marker for any purpose beyond what has been outlined in this operation manual is to use it improperly. **LaserStar Technologies Corporation® will not accept liability for damages resulting from improper use or negligence.**

### Proper use of the marker includes:

- Following all instructions and procedures and heeding all precautions, warnings, and important safety guidelines provided throughout this manual.
- Ensuring inspections and routine maintenance is scheduled and completed on-time to maintain the marker and preserve the equipment in its optimal condition.

In addition to general information and specified mandatory regulations that help to ensure safe operation of this device, this section also outlines information on potential risks and associated dangers when using the marker, which cannot be eliminated (either because of design or structural means). These advisories are marked with varying safety symbols (examples follow) and are a mandatory requirement set forth by OSHA and CDRH.




**Indicates a potential threat or danger to health or life. Failure to heed this advisory can result in serious damage, critical injury, and death.**




**Indicates a potentially dangerous situation. Failure to heed this advisory can result in minor injury or property damage.**



**Indicates helpful tips or other important guidelines for correct use of the welding workstation. Failure to heed this advisory can result in malfunctions or problems with the device and additionally, can result in damage to areas or property in close proximity to the machine.**



**Indicates safe operating guidelines, tips and recommendations, and particularly useful details that will help you to better utilize all of the functions of your laser marker.**

## General Information

The FiberCube® 3801 Series Marker incorporates a **class 4 laser** (solid-state) with a high-powered optical output. **This device emits both visible and invisible radiation; the invisible radiation produces a wavelength of 1050 – 1090nm (near infrared range) and is not detectable by the human eye**. In addition, the visible secondary radiation that is emitted from this device can cause dazzle effects when viewed for any length of time.




**When working with direct access to the laser beam (for general use, maintenance or repair) appropriate laser protective eyewear must always be worn. Intense radiation is capable of destroying the delicate tissues of the eye. When infrared light is transmitted from the cornea to the lens of the eye, it's multiplied (concentrated by up to 100,000 times). The light is then narrowly focused on the retina, causing burning and lesions. Because the tissue of the retina cannot be repaired, damage is permanent, resulting in a reduction or loss of eyesight (these effects may not be apparent for many years).**

Always follow OSHA regulations, ANSI Z136.1-2014, Safe Use of Lasers or the equivalent national or international regulations (e.g. IEC / EN Standard 60825-1:2014) to ensure accident prevention and reduce your risk of exposure to radiation when working with laser equipment.



**If modifications are made to this device that affect performance, software or intended function (as described in ANSI Z136.1-2014, Safe Use of Lasers and outlined in official documentation for laser standards classification), the individual or organization responsible assumes the status of manufacturer and must obtain a new classification and appropriate labeling for the device.**

When operating laser equipment, appropriate protective eyewear — which protects against direct, reflected, and scattered radiation, is required; however, even while wearing protective eyewear, you should remain cautious, never looking directly into the laser beam, as intense laser light is capable of destroying the delicate tissues of the eye. (Note: With **class 4** operation, protective eyewear will normally shield against the hazards of collateral radiation (which includes ultraviolet, visible, and infrared radiation), however, if a concern exists that the accessible collateral radiation might be hazardous, the end-user is responsible for review and consideration of the MPE values required for the various materials being processed.)




**While operating the equipment without the workspace protective housing or front door in place, all persons in the Nominal Ocular Hazard Area (NOHA) are required to wear appropriate laser protective eyewear (OD >6.5). This protective eyewear must meet applicable safety requirements (based on the laser's output power). The maximum radiant exposure (10cm from the laser's focus) is 8mJ/cm^2. The maximum permissible exposure (MPE) @10s is 185nJ/cm^2. The Nominal Ocular Hazard Distance (NOHA) is 24m from the laser's focus (163mm focus lens @10s exposure).**




**Although the skin can withstand considerably higher radiation intensity than the tissue of the eye, burning destroys tissue. The severity and extent of damage depends on the period of exposure and the intensity of the irradiation. Appropriate protective clothing should be worn to protect the skin whenever necessary.**

**If a laser injury (or a suspected laser injury) occurs while using the laser marker, be sure to complete the following steps right away:**

- Turn “off” the device’s **mains power switch**
- Notify your Safety Officer or safety specialist
- Consult a doctor or go to the hospital

## Fire Hazard

The intense power output from this laser marker can pose a fire hazard; a wide range of materials are susceptible to catching fire and precautions must be taken to prevent fires while the laser beam is active. Paper items (including diagrams, leaflets or even posters on the wall), curtains lacking fire retardant, wooden panels or other similar materials can be easily set on fire by direct or reflected laser radiation.

Containers holding flammable or explosive chemical agents (e.g. used for cleaning and maintenance tasks) should be kept away from the areas that are exposed to the laser beam. When using solvents or cleaning agents, be sure to heed relevant warnings. Significant explosions, fires, and other dangers can result if such containers are inadvertently exposed to or destroyed by the intense invisible laser beam.

## Fundamental Safety Information

**The guidelines below ensure safe operation of the laser marker:**

- Read this manual; it contains guidelines and important information for ensuring the safety of the operator and outlines procedures for proper use of the marker.
- Anyone who works with or operates the laser marker must be informed of pertinent safety information and applicable safety regulations; this is a prerequisite for safe, trouble-free operation of this machine.
- Anyone who works with or operates the laser marker is expected to follow (and be knowledgeable in) the outlined operational procedures; especially the guidelines for safety.
- Mandatory regulations and requirements for ensuring safety and accident prevention (that are relevant for the current place of installation) must be complied with. In addition, all regulations set forth by OHSA, ANSI Z136.1-2014, Safe Use of Lasers or equivalent national or international regulations (e.g. IEC / EN Standard 60825-1:2014) are especially critical and must be strictly adhered to. Lastly, be sure to stay informed on all required state, municipalities, and local regulations and requirements.

## Organizational Measures

**Specific guidelines and policies must be upheld to ensure the safety and wellbeing of personel who work with and operate the marker. Organizational responsibilities and expectations are as follows:**

- The employer must provide necessary personal safety equipment (in this case, laser protective eyewear is required only for maintenance purposes) whenever there is direct access to the laser beam.
- Regulations and requirements outlined in accordance with OSHA regulations, ANSI Z136.1-2014, Safe Use of Lasers or equivalent national or international regulations (e.g. IEC / EN Standard 60825-1:2014) must also be fulfilled.
- The laser marker must be serviced at regular intervals and maintained as instructed within this manual.

## Employer Requirements

**Only authorized personnel who have received adequate training are permitted to work with and operate the marker. Employers are responsible for ensuring that all operating personel:**

- Have familiarity with important regulations regarding workplace safety and accident prevention; employees must also have received instruction on the use of the laser system;
- Have read and understood the chapter in this manual concerning safety and be familiar with relevant warnings; employees should sign in acknowledgment;
- Receive training and instruction on the dangerous effects of laser radiation in accordance with OSHA regulations, ANSI Z136.1-2014, Safe Use of Lasers or equivalent national or international regulations (e.g. IEC/EN Standard 60825-1:2014) to ensure accident prevention when working with laser equipment;
- Receive ongoing training at regular intervals on relevant topics, such as operation, safety, and best practices for using the laser marker.

## Personnel Requirements

**Employees who are trained and authorized to work with the marker are expected to:**

- Comply with important regulations concerning workplace safety and accident prevention for laser radiation, OHSA regulations, ANSI Z136.1-2014, Safe Use of Lasers or the equivalent national or international regulations (e.g. IEC/EN Standard 60825-1:2014).
- Have read and understood the chapter within this manual regarding safety and be familiar with the warnings detailed throughout this manual; employees should sign in acknowledgment.

## Potential Equipment Dangers

The FiberCube® 3801 Series Marker is a state-of-the-art device, **meticulously designed and engineered to meet and exceed standards for safety and approved operation and safety regulations**. Nevertheless, use of this equipment can still endanger life and limb (both the operator and third parties) or damage products and other material assets.




**The laser workstation must only be used for its intended purpose as outlined in this manual (see details on proper usage).In addition, the machine must also remain functionally sound (and in optimal condition) from the standpoint of safety. If a malfunction occurs that creates an unsafe condition or negative consequence, it must be corrected right away.**

## Protective Devices

- Before each use, the safety mechanisms for the laser marker must all be checked to ensure that they are functional and appropriately affixed to the device.

- Safety mechanisms may only be removed when the laser marker has been switched “off” and appropriate measures have been taken to prevent the machine from being restarted. **(Note: The interlock switches can be bypassed by our service technicians and authorized specialists, if needed, but only while making adjustments and carrying out service-related tasks.)**

## Informal Safety Measures

The operating instructions for the workstation must remain at the installation site. In addition, all applicable regulations for ensuring safety while working with or operating laser equipment (including local regulations for accident prevention and environmental protection) must be complied with. Regulations set forth by OSHA, ANSI Z136.1–2014, Safe Use of Lasers or the equivalent national or international regulations (e.g. IEC/EN Standard 60825–1:2014) must also be strictly adhered to. **All safety and warning labels attached to this device must remain intact, legible, and accessible; see the section on labeling.**

## Personnel Training

Only qualified personnel who receive adequate training and instruction on accident prevention and associated dangers when working with laser radiation (as required by OSHA, ANSI Z136.1–2014, Safe Use of Lasers or the equivalent national or international regulations [e.g. IEC/EN Standard 60825–1:2014]) are permitted to operate the laser marker. In addition, trainees are only permitted to use the machine while under the supervision of an experienced operator.

## Safety Measures for Normal Use

- Before using the machine, you must verify that all of the safety mechanisms (remote interlock, chamber enclosure, front door safety interlock, laser protective eyewear, etc.) are in proper order and functional.

- Be sure to check the machine at least once a week for external damage and to ensure soundness of all safety mechanisms and other components (splash-protective observation window, laser protective win dow, interlock circuits, chamber enclosure, chamber access door). **The marker must only be used after routine safety checks are performed and the machine is deemed to be in safe and operable condition**.

## Electric Shock Danger

- **Only authorized personnel are permitted to carry out maintenance on the power supply.**




- **The housing for the internal components must remain closed at all times. Only authorized personnel who are specially trained (and possess the appropriate tools) are permitted to open the housing and perform maintenance on the internal components.**

- **If work is to be carried out on voltage-carrying parts, a second person must be present who can switch the device “off” using the power switch, if necessary (see section entitled “Notes on Maintenance”).**

## Particularly Dangerous Points

- **Particularly dangerous points must be labeled as such; various warning labels and their location on the machine are described in the section entitled, “Labeling.”**




- **The marker integrates a class 4 laser; therefore, appropriate safety eyewear is required and must be worn at all times.**

- **Above all, never operate the laser while your hands, fingers, or other body parts are positioned directly inside or beneath the cross-hair or path of the laser beam.**

## Emission of Noxious Gases and Vapors

- **Avoid inhalation of vapors produced during the welding applications process with correct use of the argon (inert) gas.**




- **Radiation produced by laser light is capable of melting, burning, or vaporizing almost any material. The composition of the workpiece also dictates the vapor or gases that are generated; therefore, appropriate safety precautions are essential and critically important. The operator should filter the air exhausted as required by OSHA regulations (for further details, reference the section on installation).**

- **Never use this device on non-metallic materials, especially plastics, without the use of an approved external fume and heavy particle exhaust filtration system.**

## Equipment Modifications: Structural, Software, and System

+ **Never attempt to make additions or modifications to this equipment (structural or otherwise); any alteration requires mandatory written approval from LaserStar Technologies Corporation®.**

+ **It's important that this device be maintained as intended and kept in safe and operable condition. Be sure to immediately replace all parts that are not in optimal working condition. Never purchase or install components from other manufacturers; use only LaserStar Technologies Corporation® replacement and consumable parts.**

## Important Advisory

Parts ordered from LaserStar Technologies Corporation® meet stipulated requirements for safety and performance; **there is no guarantee for parts purchased from companies other than LaserStar Technologies Corporation®.**

## Safety Officer

**When class 4 laser equipment is installed, the employer must appoint a competent Laser Safety Officer**; this action must be recorded in writing. In the case of **class 1** laser devices, the Laser Safety Officer need only be present while the service technician is carrying out service or maintenance on the equipment (and only when there's direct access to the laser beam). This assumes that the service technician bypasses the interlock switches or removes the protective covers from the machine.

With ongoing training and experience in the field of laser radiation, the Laser Safety Officer should be fully competent in operating the workstation. In addition, this person should **be knowledgable and informed on all important safety protocols for the machine, as the Laser Safety Officer bears full responsibility for the safe operation of the laser equipment and correct implementation of mandatory safety measures**.

When completing training for proper use of the marker, the Laser Safety Officer may elect to receive instruction from an approved body (e.g. an institution providing insurance against occupational accidents) or alternatively, can purchase and enroll in training provided by LaserStar Technologies Corporation®.




**Authorized personnel with responsibilities for the operation, maintenance, or repair of this device must read and understand both the safety protocols and operating instructions for the equipment. Be sure to use this device only for its intended purpose; never aim the laser's beam in the direction of or directly at humans or animals.**

## What To Do If You Receive A Burn

If a laser pulse has burned your fingers or hand, you must be sure to have the wound treated. Depending on the severity of the burn, medical treatment may be necessary. Although a small burn is not particularly critical, it must still be monitored to be sure there is no resulting infection.

### Scattered Radiation!




**Scattered radiation can also cause minor burns on the skin of your hand. Depending on the material, its reflective properties, and the selected pulse energy, scattered radiation can also be dangerous. Only under very unfavorable circumstances will the scattered radiation reach intensities that can cause slight burns; this is because individual laser pulses are very short.**

Normal exposure of the skin to low levels of scattered radiation (at a wavelength of 1070nm) is regarded as physiologically safe; in this instance, infrared light is comparable with radiation from the sun.

### Notes

# Important Safety &
# Informational Labels (figures 1 – 7; continued)

**(7b)**
**[48-40006]**




**Figure 1**
(3801 Series;
front view)

**(10)**
**[810-8001-10]**
**Operator Must Read the Manual Prior to Use.**

**Important Safety & Informational Labels**
**Continued on Next Page**

# Important Safety &
# Informational Labels (figures 1 – 7; continued)

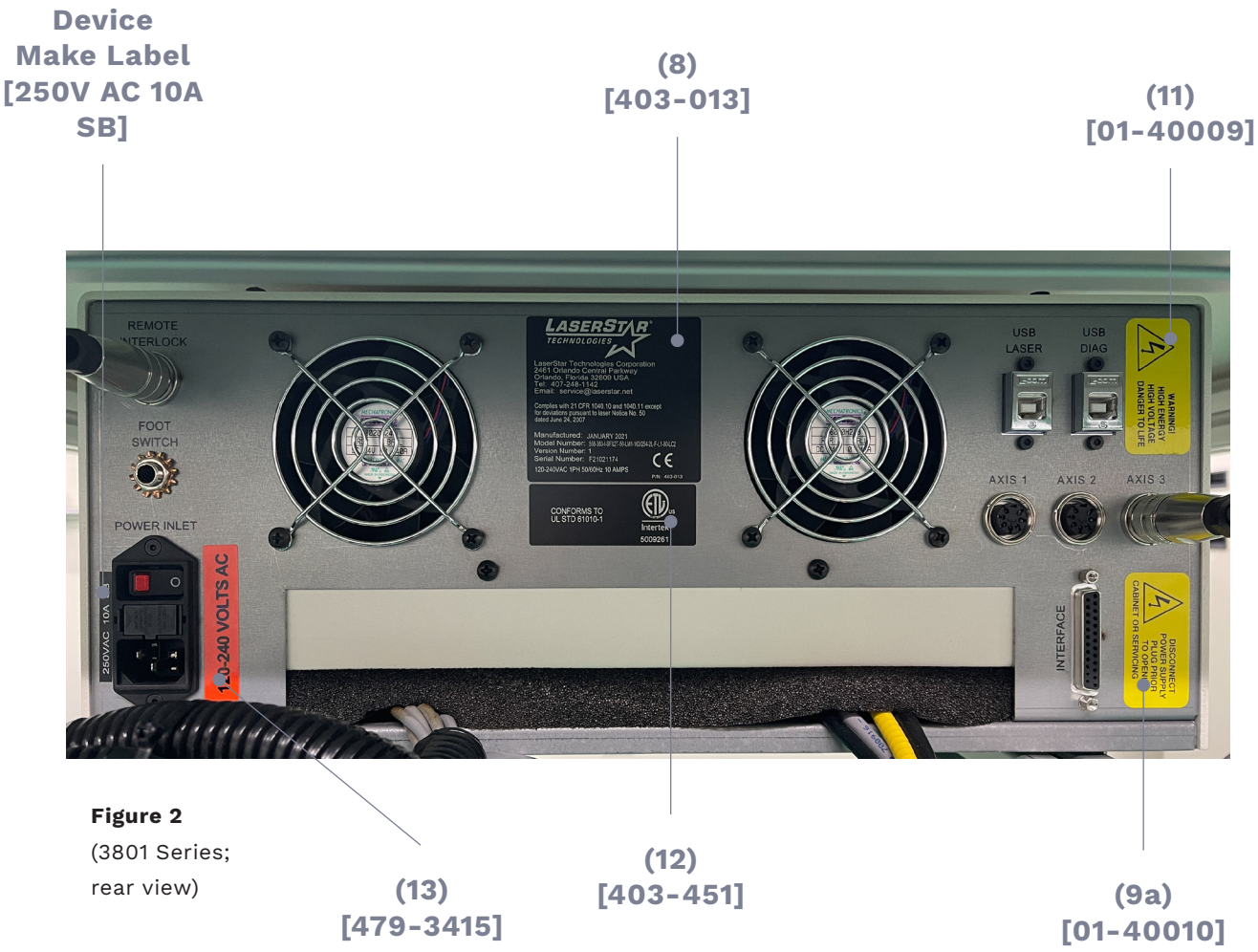



**Figure 2**
(3801 Series;
rear view)

**Important Safety & Informational Labels**
**Continued on Next Page**

# Important Safety &
# Informational Labels (figures 1 – 7)

**(3)**
**[48-40002]**




**Figure 3**
(3801 Series;
right-side view)

**(4b)**
**[48-40007]**




**Figure 4**
(3801 Series;
left-side view)

**(4a)**
**[48-40004]**

**Important Safety & Informational Labels**
**Continued on Next Page**

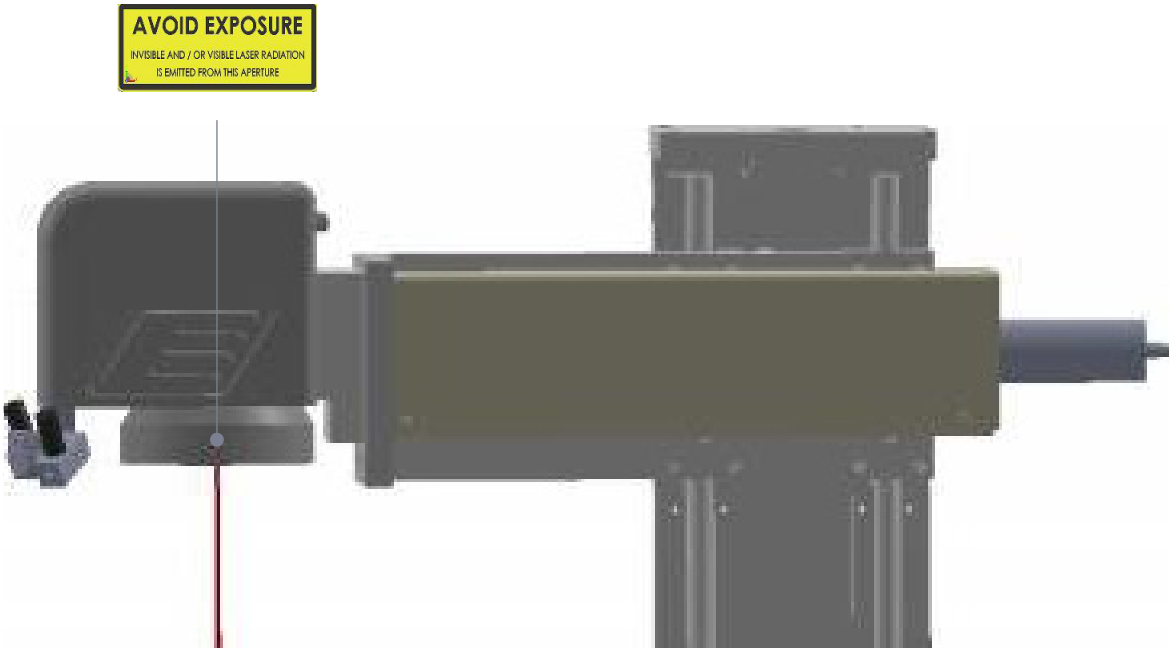



**Figure 5**
(Collimator
and collimator
housing)

Important Safety & Informational Labels
Continued on Next Page

# Important Safety & Informational Labels (figures 1 – 7; continued)

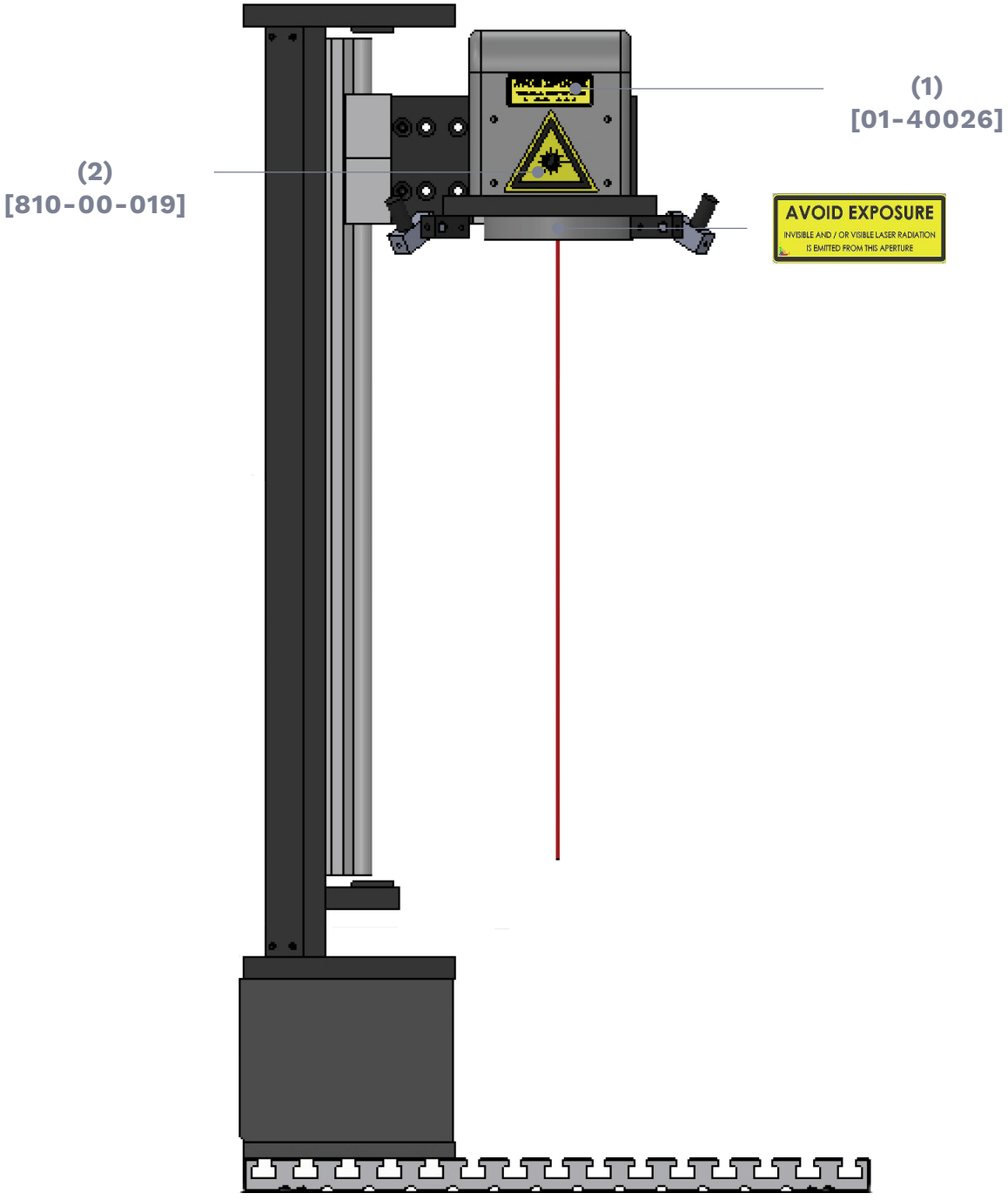



**Figure 6**
(Optical rail assembly and scanner head)

# Important Safety & Informational Labels (figures 1 – 7; continued)

(1)
[01-40026]

(2)
[810-00-019]

(14)
[810-8001-21]
Applicable
for Motorized
Z-axis Only




**Figure 7**
(Collimator
and collimator
housing)

Important Safety & Informational Labels
Continued on Next Page

## Notes

# Label Reproductions

Complies with **21 CFR 1040.10** and **1040.11**, except for deviations pursuant to **Laser Notice No. 50**; dated July 26th, 2001.

## Aperture (1a or 1b; model dependent)




**(1a)**
**[71-40026]**




**(1b)**
**[01-40026]**

## General Warning



**(2)**
**[810-00-019]**

## Visible and / or Invisible Radiation (3a or 3b; model dependent)




**(3a)**
**[71-40025]**

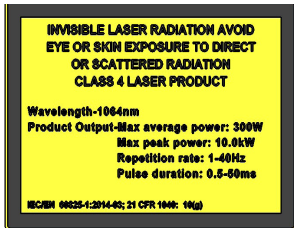



**(3b)**
**[01-40025]**

**Label Reproductions Continued on Next Page**

# Label Reproductions (continued)

## Invisible Radiation Output & Standards (model dependent)




(4)
[13-40011]

## Visible Radiation Output & Standards (5a or 5b; model dependent)




(5a)
[48-40004]




(5b)
[48-40007]

## Non-interlocked Protective Housing (6a or 6b; model dependent)




(6a)
[71-40028]




(6b)
[01-40028]

Label Reproductions Continued on Next Page

## Label Reproductions (continued)

### Device Certificate or Identification (model dependent)




(7)
[403-003]

### Danger: High Voltage (be sure to disable power source <u>before</u> servicing)




(8a)
[01-40010]



(8b)
[810-00-016]

### Operator Must Read Manual <u>Prior</u> to Use



(9)
[810-8001-10]

Label Reproductions Continued on Next Page

## Label Reproductions (continued)

### High Energy, High Voltage, Danger to Life




**(10)**
**[01-40009]**

### ETL Certification (model dependent)




**(11)**
**[403-450]**

### Wait 5 Minutes <u>Before</u> Discharging




**(12)**
**[01-40012]**

### 208 – 240 Volts AC (model dependent)




**(13)**
**[479-3414]**

**Label Reproductions Continued on Next Page**

## Label Reproductions (continued)

### Device Certificate or Identification (model dependent)




(14)
[48-40001]

### Caution: Pinch Point Hazard; Keep Hands Clear (15a or 15b; model dependent)







(15a)
[810-8001-21]

(15b)
[810-8001-22]

## Notes

## Notes

# III. Installation

## Overview and Requirements

This section describes the requirements that must be fulfilled to ensure faultless operation of the laser marker. Details for installation, setup, and transport are also provided in this chapter.

## Safety Guidelines

When choosing an installation site, be sure to take into account for maintenance, the ability to limit laser area is required (see regulations set forth by OSHA regarding accident prevention for laser radiation, ANSI Z136. 1–2014, Safe Use of Lasers or equivalent national or international regultions (e.g. IEC/EN Standard 60825–1:2014).

**To ensure faultless operation of this device, specific measures must be implemented to promote safety and encourage sound operational practices. In an effort to safeguard against accidents, an installation site must meet and abide by the following rules and requirements:**

- The marker should be installed and remain in a location that is as dust-free as possible.
- Never expose this machine to direct sunlight.
- To ensure proper ventilation, the **minimum clearance between this device and any wall surface must be at least 12” (300mm) from the back and sides**.
- Never position the marker in a way that makes it difficult to access or operate the machine's disconnecting device.
- **This device is required to be connected to an approved external filtration and fume exhaust system** (either purchased separately or sold through LaserStar Technologies Corporation®). For additional details about this requirement, be sure to reach out to your sales representative.

## Ambient Conditions

Operating Temperature: (reference **Introduction > Technical Specifications; section I)**

Storage Temperature: (reference **Introduction > Technical Specifications; section I)**

## Environmental Conditions

Elevation: (reference **Introduction > Technical Specifications; section I**)

Relative Humidity: (reference **Introduction > Technical Specifications; section I**)

## Unpacking

**Before shipping, the marker underwent a thorough inspections process and rigorous software testing. This device was was delivered to the shipping carrier in faultless condition. If you suspect mishandling, before opening the shipping container, check the outside for indications of damage that may have occured in transit.**

- If possible, make use of the supplied skid to transport the device to its final destination (the intended installation site).
- When unpacking the marker and removing components from the shipping container, packaging, and skid base, be sure to use exceptional care.
- For helpful tips and step-by-step instructions on setup, be sure to reference the included quick setup guide: FiberCube 3801 Series Laser Marker – Quick Setup Guide (located in the back of this manual).

## Standard Shipping Container Contents

- FiberCube® 3801 Series Marker (stand-alone; with or without enclosure)
- Laptop Computer (stand-alone; optional)
- Basic Device Components and Hardware
- Motion Devices (optional)
- Operation Manual (digitized version; included on flash drive)

**(Note: Orders can include additional accessories [add-ons that were purchased separately] Following delivery, be sure to reference the included packing slip and compare with parts received.)**

## Lifting and Carrying the Equipment

- A minimum of two (2) people capable of lifting and carrying the equipment is required.
- The door handle and other parts and components of the unit must not be used for lifting.
- Follow OSHA guidelines for lifting methods; based on the weight and size of the unit and the user's facility requirements.

### Notes

## Removing the Shipping Stabilizer Bolts (counterweight securing bolts)

**<u>Two (2) persons are recommended for the steps that follow</u>:**

1. Remove the rear panel, which is secured by Phillips #2 M4 screws (see **figure 3**; **page 58**). **<u>Attention</u>:** Before removing the panel, it may first be necessary to loosen the cable-retaining nut to allow the cable to slide out, before proceeding.



**Figure 1**
(3801 Series; rear panel)

**Counterweight Securing Bolts (requires 4mm hex key wrench; x2 total)**

**Removing the Shipping Stabilizer Bolts (counterweight securing bolts) Continued on Next Page**

## Removing the Shipping Stabilizer Bolts (counterweight securing bolts; continued)

2. Using a 4mm hex key wrench, remove the two (2) shipping stabilizer bolts (counterweight securing bolts) positioned along each side at the rear of the laser system (reference **figure 1**; **previous page & figure 2**; **below**).

3. Reinstall the rear panel and tighten the cable-retaining nut.




**Figure 2**
(Removing the counterweight securing bolts)

## Rear Panel Removal (location of M4 screws)

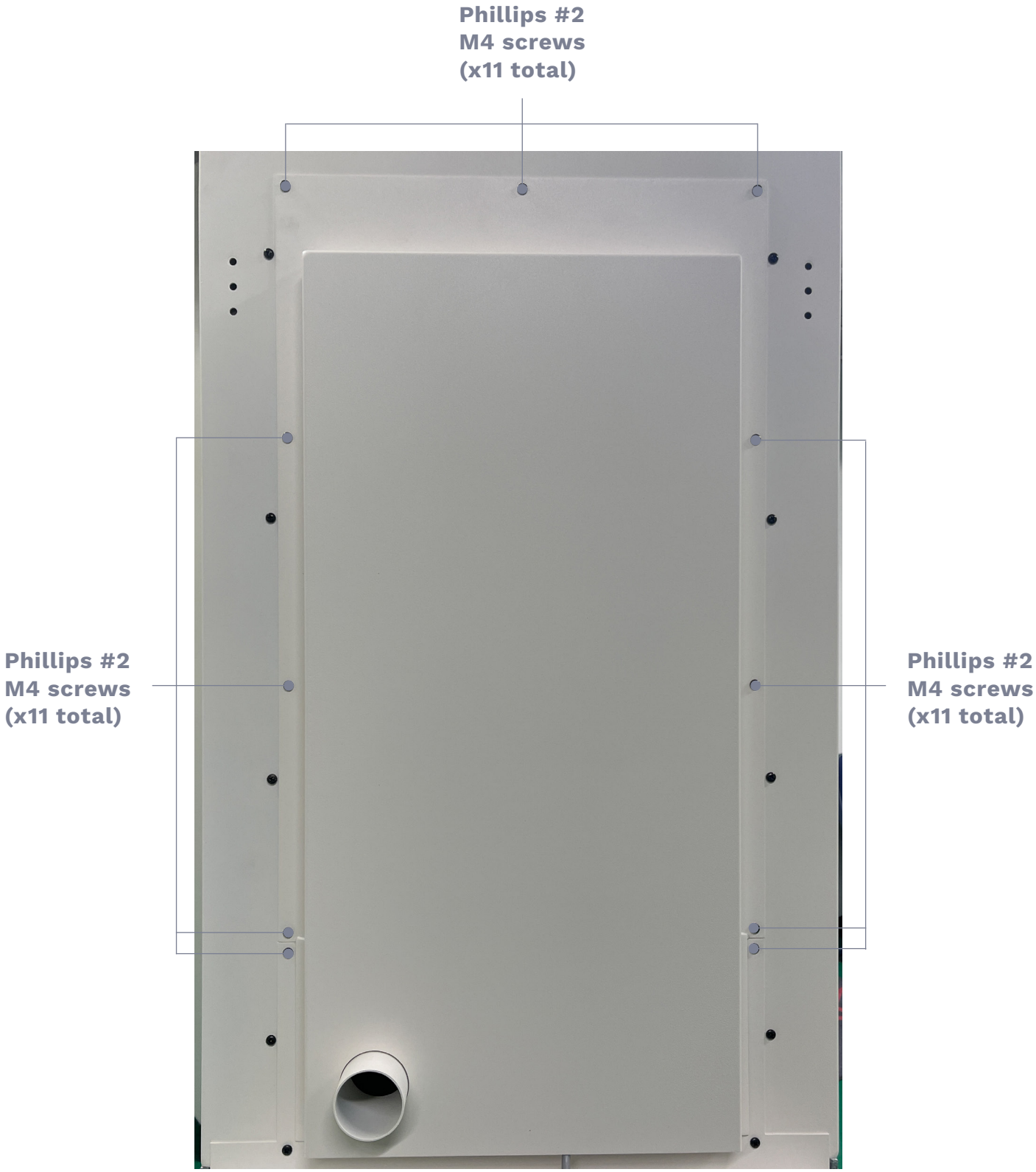



**Figure 3**
(Rear panel removal)

## Initial Power Connections

The activities described in this section should only be performed by trained service technicians who are affiliated with LaserStar Technologies Corporation® or other authorized personnel who are trained and qualified. Warranty claims for damage to persons or property that are the result of an improperly connected device will not be honored.



**Check the VAC label and device's certificate or ID label (located on the rear of the machine) and compare with the power requirements at the installation site.**

## AC Voltage Input (AC disconnect)

The AC voltage input is used to supply AC power to the workstation; removing this plug will disconnect the AC power from the equipment. Before applying AC voltage, each of the device's switches (**mains power switch**, **system key switch**, and **setup key switch**) should be “off.”

The machine’s model is the determining factor for AC requirements; check that the AC supply agrees with the specifications on the device's certificate or ID label (located on the rear of the marker). This label includes important information for your machine, including the device's model number, serial number, and AC requirements. **Attention: Make sure the workstation is grounded; the ground wire must be connected for safe and reliable operation. When power requirements exceed 1kV on the AC line, surge suppression is required.**

When replacing the detachable mains supply cord, it’s important that the new cord be appropriately rated and suitable for the required or anticipated electrical load. Be sure to check the rating for the replacement cord before purchase; **never use or purchase cords that lack an appropriate rating**.

### Notes

## Remote Interlock Connector

The laser marker is equipped with a remote interlock connector for connecting to a secondary interlock system or remote interlock circuit (such as an entry door into a specific laser room). **The marker will not generate a laser pulse unless the remote interlock connector is closed**. For the location of the remote interlock connector, reference the section for **External Fuse Replacement, Rear System Overview & External Connections; within Maintenance**.

### When connecting the remote interlock to a secondary interlock circuit, the following requirements must be met:

+ Before wiring, the shorting jumper (under the plastic cover of the connector) must be removed.

+ The wiring should be routed away from all power cords and should not exceed thirty (30) feet or nine (9) meters) in length.

+ The interlock must be a voltage-free, form-a contact (normally open) that is held closed to enable operation of the laser.

+ The shorting connection in the connector must be removed and wired to the secondary interlock circuit.

+ A licensed professional in compliance with and knowledgeable of applicable electrical codes must perform the wiring procedure.

### If you are not connecting the remote interlock to a secondary interlock system; the shorting connector must be installed on the device to enable operation of the laser.

The shorting connector and keys for the **system key switch** and **setup key switch** are included inside the bag within the work chamber.

1. To enable operation of the laser, insert the shorting connector into the remote interlock connector (located on the controls panel; rear of the machine).

2. Manually tighten the connector locking ring, turning clockwise, until finger tight.

## External Exhaust System

All **class 1** devices are equipped with an exhaust connection (2” or 50.8mm) at the rear of the enclosure. We recommend the use of an external exhaust system with the appropriate air filtration (dependent on the type of material being marked, engraved, or cut) and a fume extractor or vacuum (when determining the required “CFM” [200 to 400CFM is the typical range; application dependent], the device's power output and enclosure size should be taken into account).




**Processing vapors with particulates can be an explosive or fire hazard (depending on the particulate material and concentration). Consult your organization’s internal safety department for details on regulations and concentration levels of fumes with particulates (for your specific material processing) and for requirements set by your local authority for permissibility and safety limits to ensure the lasing equipment is adequate for your application.**

## Electromagnetic Compatibility

This device meets EMC standards listed in the **Declaration of Conformity** and **Declaration of Compliance**.

### Notes

## Disassembly and Transport

To prepare the equipment for transport over short distances, you will only need to unplug the power supply and inert gas supply and loosen the locking brake(s) on the front wheels.

## Preparing for Storage

The equipment must be stored in a clean environment that meets specified storage temperature and humidity requirements. These details can be found in **Introduction > Technical Specifications; section I**.

### Notes

## Notes

# IV. Operation

## Overview & Fundamentals

This section describes systems operations. The ( > ) symbol notes actions that must be carried out by the operator. In most cases, these actions (in any form) will result in responses or reactions from the device; these responses are noted with a ( ⊗ ) symbol.




**Whenever adjustments are made to this device that alter performance or use of the controls (adjustments which affect safety or interfere with standard operating protocols), this can result in hazardous radiation exposure. If this device is operated in a manner that has not been approved by the manufacturer, the equipment protections could fail, compromising the safety of the operator and others who are nearby. Before operating this device, all users must be sure to read the section within this manual on safety.**



**Before turning "on" the laser marker, be sure to read the section detailing steps for Power Up–Restart-Power Down. Failure to follow this procedure can result in unreliable operation. (Note: A copy of this quick reference guide can be found in the Appendix; section X within this manual.)**



**Be sure to verify that the Fault Indicator (located on the front of the FiberCube Control Panel is "OFF" before enabling the system to fire.**



**When adjusting the laser's focus for highly reflective materials (silver, copper, gold, brass, etc.), the operator must follow the steps for focusing and defocusing (for further details, see the Appendix; page 122). Failure to follow the laser focusing and defocusing guidelines increases potential risk for damaging the device. This damage is considered a process and applications induced failure and is not covered under warranty.**




**When firing the laser with the front door open and setup key switch "on," the marker will emit class 4 laser radiation. Be sure to avoid eye or skin exposure to direct or scattered radiation. All persons in the Nominal Ocular Hazard Area (NOHA) must also be sure to wear appropriate laser protective eyewear.**




**When operating the marker with the front door open, setup key switch "off", and focus diodes and/or red laser pointing diode "on," the laser is operating as a class 3R laser. Notice the caution label on the front door, which reads: "CLASS 3R LASER RADIATION WHEN OPEN; AVOID DIRECT EYE EXPOSURE." The user should avoid directly looking at the laser beam or its specular reflection. It is recommended also that all persons in the Nominal Ocular Hazard Area (NOHA) wear appropriate laser protective eyewear for class 3R radiation. (Note: The focus diodes should remain "off" when the device is not in use.)**

**Overview & Fundamentals Continued on Next Page**



**When enabling power to the device (and before launching the LaserStar StarFX® Premier Design Studio software), check that both ends of the USB cable are plugged in, and that the mains power switch is in the "on" position. An incorrect start-up sequence can corrupt the configuration file (markcfg7), resulting in device malfunction. Reference Troubleshooting Basics > System Marks Parts Incorrectly for instructions on installing a duplicate configuration file, if needed.**



**If a system fault is displayed on the laptop computer, be sure to turn "off" the system key switch, shut-down the LaserStar StarFX® Premier Design Studio software; and turn "off" the mains power switch. Restart the marker following the standard start-up procedure. (Note: A list of fault messages and additional system recovery procedures can be found in Troubleshooting Basics; section VI: within this manual.)**




**The operator should not have any part of their body in the chamber or marking area during z-axis motion. The z-axis is moved up or down using buttons on the controls panel. The z-axis has three (3) rates of speed (model dependent). This maximum speed is <25mm per second (<1" per second). The lowest speed is approximately 1/3 the maximum speed. Pinch Point labels are located on the front of the scanner head and at the bottom of the motorized z-axis rail. The mains power switch can be used at any time to stop z-axis motion.**

## Notes

## Visible Warning with Class 4 Operation (setup key switch “on”)

The laser marker utilizes the control panel and laptop computer screen, which operate independently, to communicate warnings and provide updates or alerts pertaining to the machines’ status.

## Manual Operation

### Control Panel:

1. The **power indicator** will blink.

### Laptop Computer and LaserStar StarFX® Premier Design Studio Software:

2. **The LaserStar StarFX® Premier software (screen 6)** indicates that the laser is running when “marking” is displayed on the laptop computer screen.

3. To stop the marking process at any time, press the **stop button**; this button displays on the icon ribbon for the **LaserStar StarFX® Premier software**.

## Automated Operation (optional)

### Control Panel:

1. The **power indicator** will blink.

### Laptop Computer and LaserStar StarFX® Premier Design Studio Software:

2. **The LaserStar StarFX® Premier software (screen 6)** indicates that the laser is running when “marking” is displayed on the laptop computer screen.

3. To stop the marking process at any time, press the **stop button**; this button displays on the icon ribbon for the **LaserStar StarFX® Premier software**.

## Initial Operation (manual front door)

After having properly connected the equipment, the laser marker is ready for use. For detailed instructions on enabling power to this device, restarting, or shutting down, reference the instructions for **Power Up-Restart-Power Down** in the **Appendix**; **page 118**.

When making adjustments to the **final focus lens** for a different work distance or field of view, you must **recalibrate the lens using the LaserStar StarFX® Premier Design Studio software**. The software will also display a prompt requesting that the operator verify their lens selection. When this message appears, simply select the lens that's currently installed on the device.




**Figure 1**
(Switching "on")

### Notes

## Switching “On” the Workstation

| Operator Action > | System Response ⊗ |
|---|---|
| | |
| Make sure the **mains power switch** is in the “off” or “O” position (see **figure 1** on the previous page). | Verify. |
| Check that the **system key switch** and **setup key switch** are in the “off” or “O” position. | Verify. |
| Check to be sure the USB cable is plugged in and correctly seated. | This cable connects the laptop computer to the marker; it must be properly seated and plugged in for the device to operate.<br><br>**Caution: Launching the StarFX® Premier Design Studio software before having plugged in the USB cable at both ends may corrupt the device’s software configu-ra-tion file: markcfg7.** |
| Turn the **mains power switch** “on” or to the “I” position (see **figure 1** on the previous page). | The **power indicator** will be green. |
| Turn the **system key switch** to the “on” or “I” position.<br><br>**(Note: The setup key switch should be in the “off” or “O” position.)** | The marker is ready for use; the computer can be powered “on.” |
| Turn “on” the laptop computer. | On the desktop, you will notice icons for the **LaserStar StarFX® Premier Design Studio software** and the accompanying software user manual. |

**Switching “On” the Workstation Continued on Next Page**

## Switching “On” the Workstation

| Operator Action | System Response ⊗ |
|---|---|
| | |
| Double-click on the icon for the **LaserStar StarFX® Premier Design Studio software**.<br><br>**(Note: Refer to the Premier software user manual for helpful tips and instructions on programming, setup, and usage.)** | LaserStar Technologies Corporation® logo displays briefly, followed by the main interface screen for the **StarFX® Premier software**. |
| The **emissions indicator** on the controls panel should still be “off.” | The **emissions indicator** will switch to amber when the laser source has been enabled.<br><br>**<u>Attention</u>: The system key switch and mains power switch can be used to disable the laser source and power down or turn “off” the device at any time.** |
| Press the **reset button**. | The **emissions indicator** will turn “on” and change to amber; the device is ready for use. |
| Proceed to **Programs, Parts & Setup**. | Follow these instructions to proceed with using the workstation. |

### Notes

## Switching “Off” the Marking System:

1. Close the Premier software; exit to the computer desktop.
2. The laptop computer can be turned “off” or remain “on;” either option is suitable.
3. Close the front door of the work chamber.
4. Turn the **setup key switch** “off” or to the “O” position.
5. Turn the **system key switch** “off” or to the “O” position.
6. Turn “off” the **mains power switch**.

**Remove both the system and setup keys. Store the keys in a secure location; only authorized personnel should have access.**

**Attention:**

Reference **External Control Elements**; **page 26** within this manual for additional front panel switch functionality and operations.

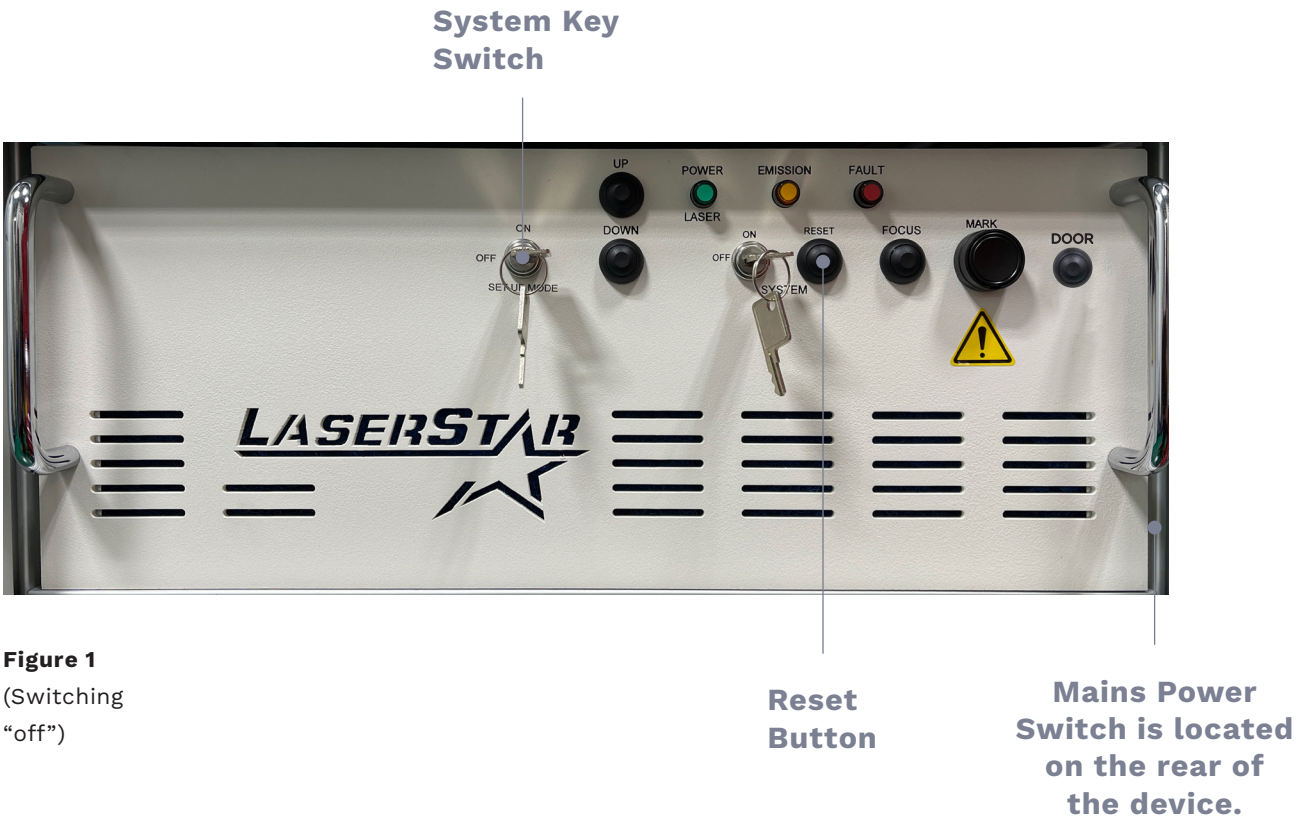



**Figure 1**
(Switching “off”)

## Notes

## Programs, Parts & Setup

The tasks listed below are typically performed by an individual who is trained and qualified; process for determining optimal position and targeting for marking, engraving or cutting.

| Operator Action > | System Response ⊗ |
|---|---|
| | |
| Open the **front door** of the enclosure and place the workpiece or part on or in the fixture. **(Note: The surface to be marked, cut, or engraved should be within the laser's focal plane.)** | If the **setup key switch** is "on," the **power indicator** will blink when the door is open or closed. |
| Press the **focus button** on the controls panel to turn "on" or "off" the **focus diodes**. The **focus diodes** are used to accurately position and distance (z-axis) the laser's **final focus lens** in relation to the workpiece (some models are equipped with optional automatic focusing). **Caution**: When the **focus diodes** are "on," the marker is a **class 3R** laser. Never look directly into the **focus diodes** or their specular reflection. It is recommended also that the operator wear appropriate laser protective eyewear. | The point at which the two (2) **focus diodes** converge is the starting position for the z-axis. Place the part surface to be marked perpendicular to the beam axis; should also be parallel with the plane formed by the face (or end) of the **final focus lens**.<br><br>**(Note: Reference the Focusing and Defocusing Guidelines in the Appendix section of this manual. If adjusting the focus diodes, refer to Appendix C and the StarFX® Premier software manual.)** |
| Choose the appropriate part program by clicking "file" and selecting "open." Next, locate the directory for the required part program; click on the program. | The laptop monitor will display an image of the feature to be marked, engraved, or cut. |
| Turn the **setup key switch** (applicable for enclosed systems only) to the "on" or "I" position. | The laser can now fire with the **front door** of the enclosure open. The **power indicator** will blink continuously to indicate that the safety interlocks have been disabled.<br><br>Avoid exposure of the skin or eyes to direct or scattered radiation. All persons within the Nominal Ocular Hazard Area (NOHA) are required to wear the appropriate laser protective eyewear. |

**Programs, Parts & Setup Continued on Next Page**

| Operator Action > | System Response ⊗ |
|---|---|
| | |
| Select the appropriate trace option from the **trace icon** in the drop-down menu. Next, press the **mark icon** or **mark button** on the controls panel **(screen 3)**. | The (red) profile box will be displayed on the workpiece. If required, adjust the part position in relation to the profile box and make sure the **focus diodes** are in focus. **(Note: When adjusting the focus diodes, be sure to refer to Appendix C, as well as the Premier software manual.)** |
| Select the **stop icon** on the **StarFX® Premier software** icon ribbon **(screen 4)**. | The red laser pointing diode will turn “off." |
| The individual in-charge of setup can initiate the marking process using any of the following methods:<br><br>Select the **mark icon** on the **StarFX® Premier software** or;<br><br>Press the **mark button** located on the controls panel or;<br><br>Depress the **foot pedal** (optional accessory; plugs into the rear of the device). | The **mark icon** (located on the right-hand side of PC monitor) will change from red to green. The part program will begin marking, engraving, or cutting (during this process, the user will notice “marking” displays on the screen). During the cycle, if you need to stop marking, click the **stop button**.<br><br>**(Note: For single cycle operation, make sure that continue is not selected.)** |
| The technician in charge of device setup can optimize the position of the part in Z (laser beam focus) for optimal marking, engraving, and cutting. | Optimization complete.<br><br>**(Note: Reference Focusing and Defocusing Guidelines in the Appendix of this manual.)** |
| Turn the **setup key switch** to the “off” or “O” position. | The **power indicator** will stop blinking and switch to green.<br><br>**(Note: Once setup is completed, be sure to remove the setup key and place it in a secure location (should remain accessible only to personel who are authorized to perform device setup).** |

**Programs, Parts & Setup Continued on Next Page**

| Operator Action > | System Response ⊗ |
|---|---|
| | |
| Close the front door of the enclosure. | The device is ready for use. |

## Notes

## Parts Marking, Cutting & Engraving

Steps below are done with or without having completed the procedure for programs, parts & setup.)

| Operator Action > | System Response ⊗ |
|---|---|
| | |
| On the computer desktop, double-click on the **LaserStar StarFX® Premier Design Studio software icon**. **(Note: A manual for the StarFX® Premier software [in PDF format] is already saved on the computer.)** | The LaserStar® logo displays briefly, followed by the main interface screen for the **StarFX® Premier software.**<br><br>**(Note: Refer to the StarFX® Premier Design Studio software manual for instructions on programming and usage.)** |
| Choose the appropriate part program by clicking “file” and selecting “open.” Next, locate the directory for the required part program; click on the program. | The laptosp monitor will display an image of the workpiece to be marked, engraved, or cut. |
| Open the **front door** of the enclosure and place the workpiece or part on or in the fixture.<br><br>**(Note: The surface to be marked, engraved, or cut should be within the laser’s focal plane.)** | The part is loaded on the fixture. |
| Select the appropriate trace option from the trace menu. Then, select the **mark icon** or press the **mark button** on the controls panel. | The (red) profile box will display on the part or workpiece. If necessary, adjust the position of the part relative to the profile box, ensuring that the **focus diodes** are precisely focused.<br><br>**(Note: If making adjustments to the focus diodes, be sure to refer to Appendix C and the StarFX® Premier software manual.)** |
| Close the **front door** of the work chamber or enclosure (enclosed systems only). | The **emissions indicator** on the controls panel must be “on” to mark. |

**Parts Marking, Cutting & Engraving Continued on Next Page**

## Parts Marking, Cutting & Engraving (continued)

| Operator Action > | System Response ⊗ |
|---|---|
| | |
| The operator may start the marking process using any of the following methods:<br><br>Select the **mark icon** on the Premier software screen-(Screen 5) or;<br><br>Press the **mark button** located on the control panel or;<br><br>Depress the **foot pedal** (optional component); plugs into the rear of the system. | The **mark icon** on the right-hand side of the display will change from red to green.<br><br>The part program will start marking, engraving, or cutting. The word “mark” will be greyed out on the **LaserStar StarFX® Premier Design Studio software**. To stop marking at any time during the cycle, click on the **stop button** (displayed on the **Premier software** icon ribbon). |
| Opening the front door (enclosed systems only) during the part program cycle | The laser will stop lasing, but the part program will continue. |
| To restart the part program after an abort, close the **front door** and select **mark**. | The part program will start marking from the beginning. |
| With the power door option, if the **mark button** on the controls panel is used to start the program, the **front door** will automatically open at the end of a cycle. | The front door will open at the end of the program. |
| The part program is complete. | The system will stop. |

### Notes

## Initial Operation (automated front door)

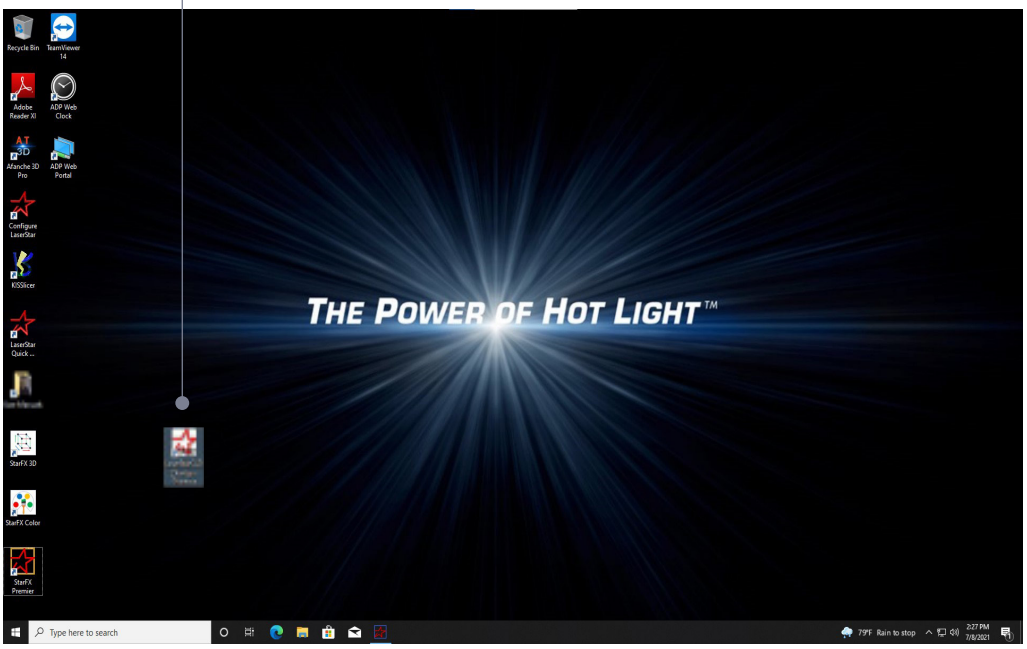
After having properly connected the equipment, the laser marker is ready for use. For detailed instructions on enabling power to this device, restarting, or shutting down, reference the instructions for **Power Up-Restart-Power Down** in the **Appendix**; **page 118**.

When making adjustments to the **final focus lens** for a different work distance or field of view, you must **recalibrate the lens using the LaserStar® Premier software**. The software will also display a prompt requesting that the operator verify their lens selection. When this message appears, simply select the lens that's currently installed on the device.

### Notes

# LaserStar StarFX® Premier Design Studio Icons and Software Screens

**StarFX® Premier Design Studio Software Program**



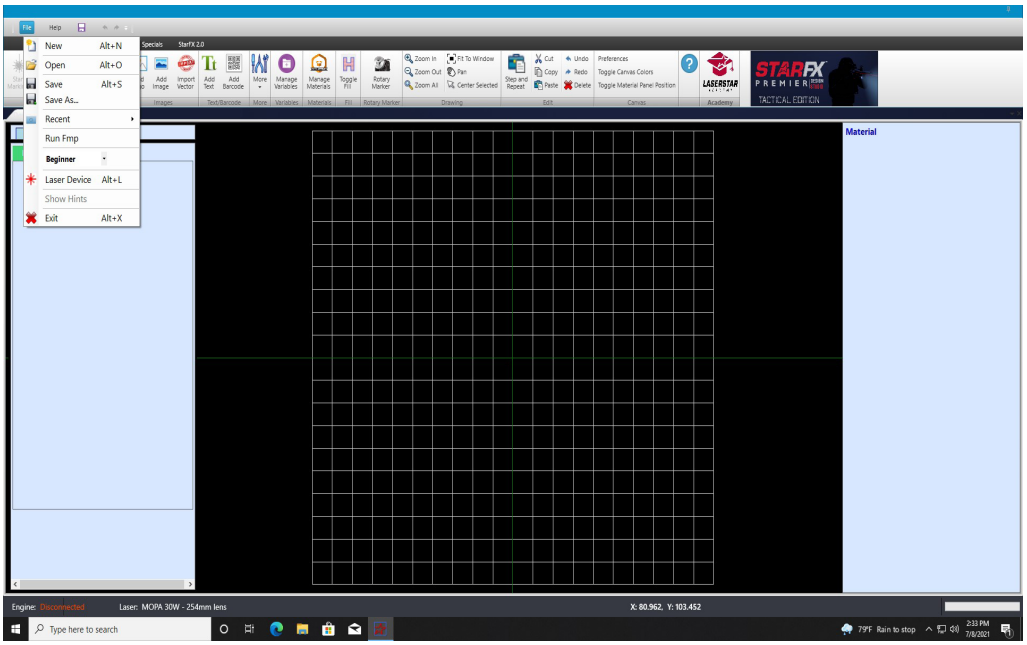

**LaserStar StarFX® Premier Design Studio Software Manual**

**Screen 1**
(LaserStar StarFX® Premier Design Studio software; laptop computer [desktop])

**LaserStar StarFX® Premier Design Studio Icons and Software Screens Continued on Next Page**

# LaserStar StarFX® Premier Design Studio Icons and Software Screens (continued)

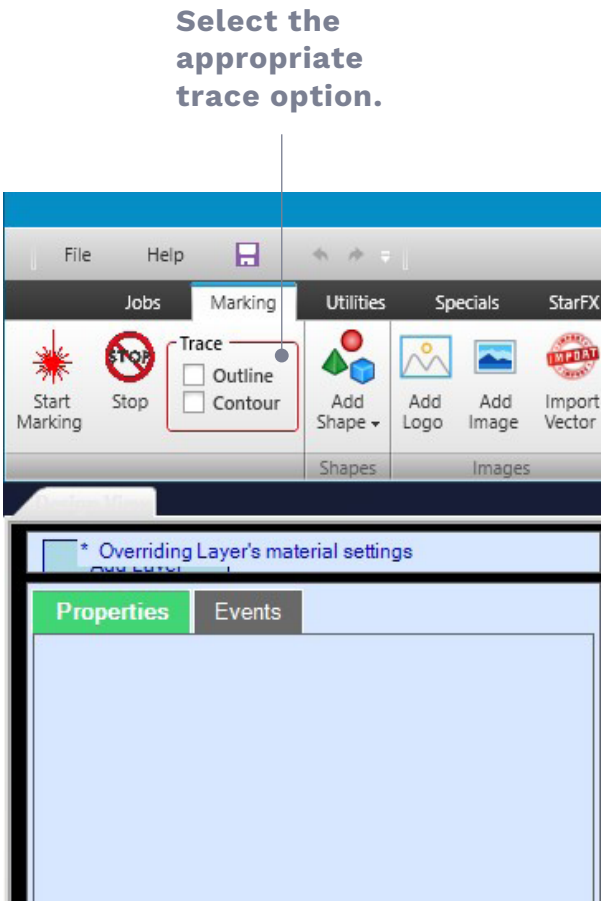
**Select “file” to open an existing part program or generate a new one using the Premier Design Studio drawing tools.**




**Screen 2**
(Open existing part program or generate a new one)

**LaserStar StarFX® Premier Design Studio Icons and Software Screens Continued on Next Page**

# LaserStar StarFX® Premier Design Studio Icons and Software Screens



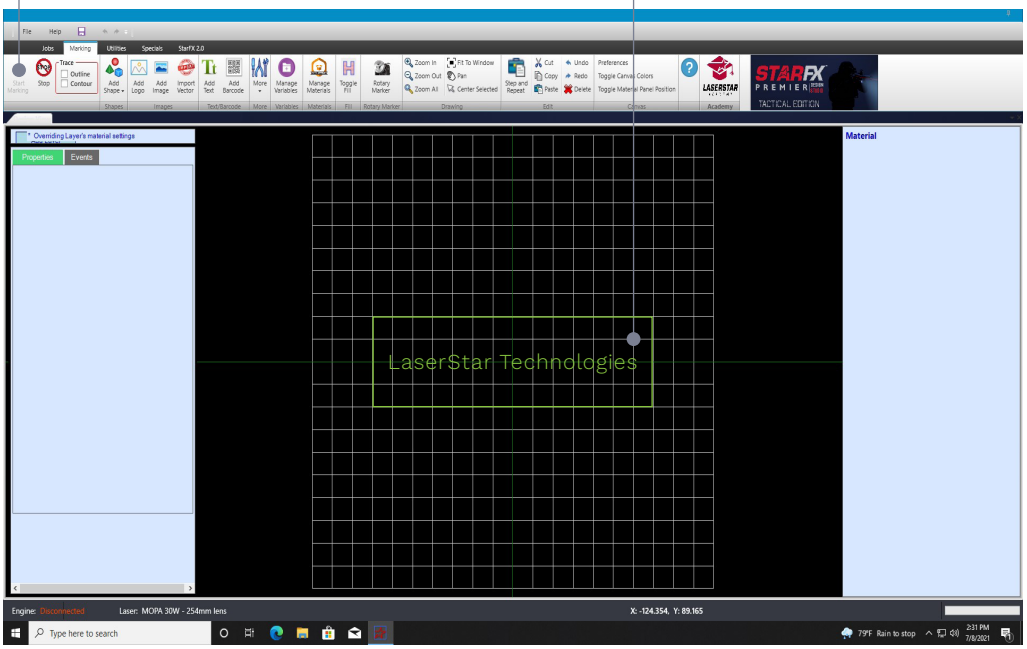

**Screen 3**
(Trace options)

**LaserStar StarFX® Premier Design Studio Icons and Software Screens Continued on Next Page**

# LaserStar StarFX® Premier Design Studio Icons and Software Screens (continued)

**To mark or trace, select the mark icon.**

**File opened for marking a rectangle, as shown.**

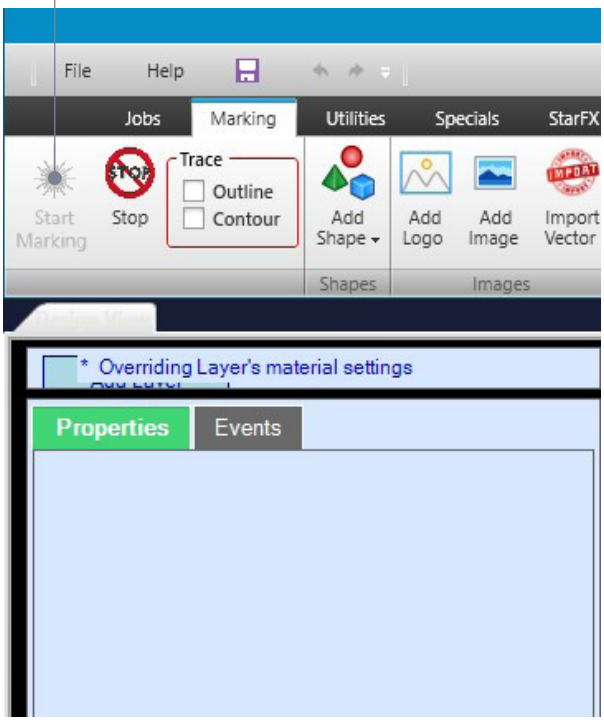



**Screen 4**
(Select the mark icon to mark or trace)

**LaserStar StarFX® Premier Design Studio Icons and Software Screens Continued on Next Page**

# LaserStar StarFX® Premier Design Studio Icons and Software Screens

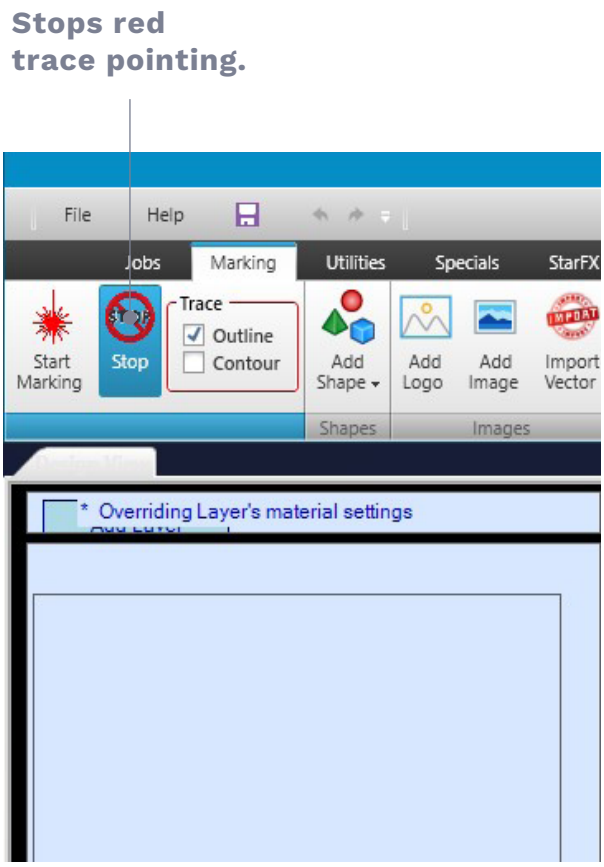
**Grayed out icon indicates that the laser is currently marking.**




**Screen 5**
(Stop button appears while the marking process completes)

**LaserStar StarFX® Premier Design Studio Icons and Software Screens Continued on Next Page**

# LaserStar StarFX® Premier Design Studio Icons and Software Screens (continued)

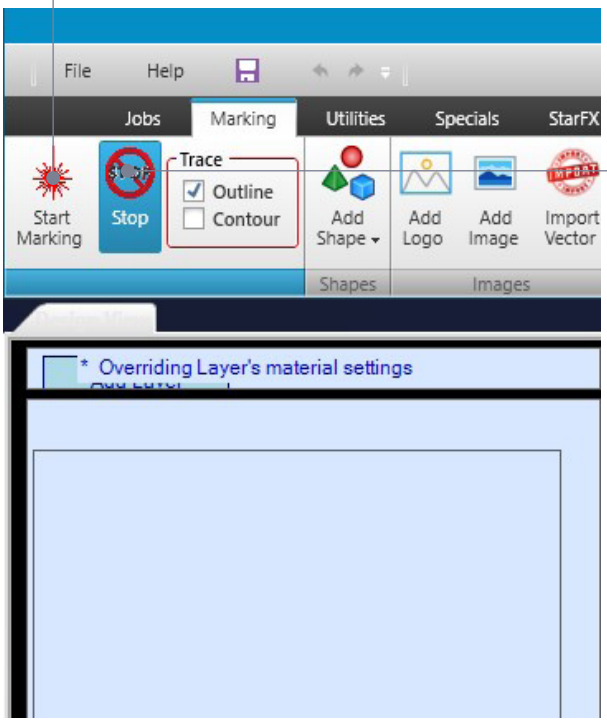



**Screen 6**
(Laser pointing diode active; select "stop" when setup is complete)

**LaserStar StarFX® Premier Design Studio Icons and Software Screens Continued on Next Page**

# LaserStar StarFX® Premier Design Studio Icons and Software Screens

**Indicates the part program is enabled and marking.**



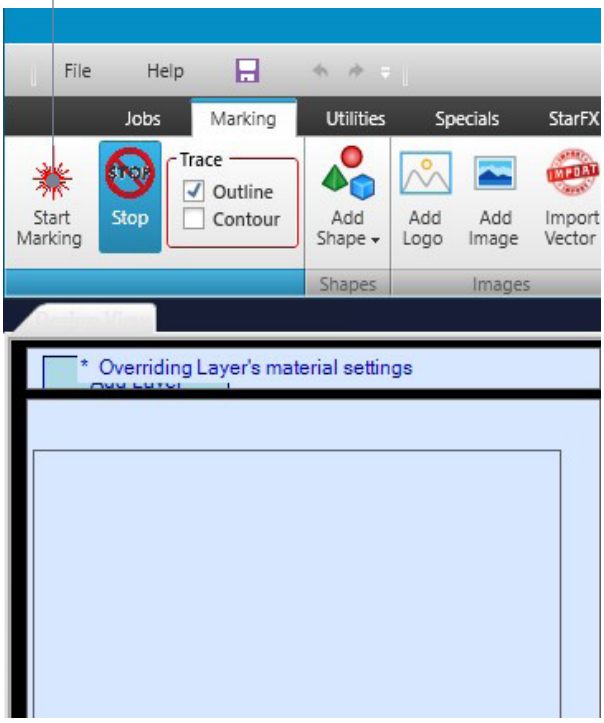

**Select "stop" to halt the part program.**

**Screen 7**
(Part program has been stopped or aborted)

**LaserStar StarFX® Premier Design Studio Icons and Software Screens Continued on Next Page**

# LaserStar StarFX® Premier Design Studio Icons and Software Screens (continued)

**Click “mark” to re-start the part program from the beginning.**




**Screen 8**
(Restart the part program from the beginning)

**LaserStar StarFX® Premier Design Studio Icons and Software Screens Continued on Next Page**

## Notes

## Notes

# V. Maintenance

## Overview & Requirements

Routine maintenance is a requirement for ensuring the safe and optimal operation of the marker. Regular maintenance intervals must be scheduled in accordance with the manufacturer's recommendations and requirements. **(Note: When working with an opened device, be sure always to wear appropriate laser protective eyewear.)**

### Before maintenance can be carried out, the following safety measures must be observed and followed:

- Disable all systems, subsystems, and auxiliary equipment by turning "off" and disconnecting from power sources or live components.
- Verify that all disconnected equipment has been secured against being switched "on" again (whether automatically or inadvertently). Secure the **mains power switch** with a padlock (you may use the mechanical locking device provided) or alternatively, remove the fuses. Check all warning indicators to be sure they're functional and remain alert while maintenance is being carried out.
- Using a voltage meter or voltage tester, check whether the equipment is "live." Measure the conductors against one another and also against the protective ground conductor.
- When reconnecting the equipment, **remember, you should always ground first**. With low-voltage devices, short-circuit the capacitors, and for high-voltage devices, short circuit both the capacitors and high-voltage lines. When service has been concluded, be sure to remove the grounding and shorting jumpers.




**While working with an opened device, regulations set forth by OSHA regarding laser safety (or equivalent national or international regulations [e.g. EC Directive 608 or IEC Publication 825]) must be adhered to.**

- If there's a risk of touching "live" components while at the worksite, and it's not possible to disconnect these components from their volt age source, they must be covered with a reliable and sufficiently strong insulating material. If the components cannot be covered, another method must be used to prevent direct contact. Once precautions are in place, be sure also to cover the workspace with plastic sheeting, paneling, or a rubber mat.
- After maintenance has been concluded, the service personnel must verify that the equipment is safe to operate.
- When replacing components, use only Laser-Star Technologies Corporation® approved parts and accessories.




**While performing maintenance tasks, be sure never to work alone. A second person familiar with the risks posed by high-voltage electricity and laser radiation should be present. In the event of an emergency, this person will provide support, disabling power sources, and administering first aid, if necessary.**




**This device complies with all generally recognized technical standards and regulations, including those set forth by OSHA, EC, EN, DIN, and VDE. The laser is ignited and operated using dangerous high voltage (>1 kV) and special care must be taken when working inside the control box. When recording measurements for electrical or electronic components (and while the machine is "on,") it is critical to maintain required clearances (for details, see Installation; section III). When working with electrical equipment of this kind, you must comply with relevant safety regulations (OSHA, or the equivalent national or international standards).**

## Maintenance Intervals



**The maintenance schedule is dependent on both the environment and general usage. The operator should determine the appropriate maintenance intervals.**

### Weekly: (a)

1. The outside surface of the enclosure, the work chamber, and safety material (surrounds the outside of the splash-protective observation window) should be cleaned using a cloth that's been dampened with water or other non-abrasive cleaner. **If you choose to use 70% isopropyl alcohol, a flammable liquid, be sure there's no contact with the stand-alone laptop computer; this will damage the display. Additionally, you should never use strong cleaning agents, such as powders or solvents to clean the equipment.**

2. The **protective disk**, which is located inside the work chamber, should be unscrewed from the **focus lens** and cleaned with a lens cleaning solution. We recommend LaserStar Technologies Corporation® cleaning solution (part number: 810-2353), which can be conveniently purchased from our e-store. If you prefer to use cleaning wipes (part number: 810-2356 [quantity: 1]) or 810-2354 [quantity:90]), these are also available to purchase from our e-store. **(Note: If opting for 70% isopropyl alcohol, be sure to use with a lint-free cleaning cloth. After cleaning, polish with a clean, lint-free wipe to remove any hazy residue.)**

Over time, and with continued use, you will notice metal splashes will adhering to the surface of the **protective disk**; there is a danger of local heating at these splash points that can result in cracking or possible destruction of the **focus lens**. Eventually, the **protective disk** will need to be replaced. **Caution: When replacing the protective disk, always replace with a new component; never reinstall the protective disk with the side that has metal splashes facing upward.**

### Quarterly: (b)

1. Use a vacuum to clean the vents for the air filter (located on the front of the device's control panel).

2. The splash-protective observation window should be visually checked for cracks, voids, or other damage. **If you discover damage, be sure to replace the splash-protective observation window before using the device.**

**Maintenance Intervals Continued on Next Page**

## Protective Disk

The **protective disk**, which is constructed from glass, prevents the lens from being damaged by mechanical influences, such as metal splashes or dust. An anti-reflective coating is present on both sides of the **protective disk** and helps to minimize the chance of loss as a result of absorption.

## Protective Disk Replacement

1. Turn the **mains power switch** “off” or to the “O” position. Wait **five (5) minutes** for the chamber lights to cool.

2. Unscrew the knurled ring from the underside of the lens; turning counterclockwise, remove the component from the welding chamber — ensuring that it remains horizontal, if possible.

3. Replace the previous protective disk with a new one.

4. Turning clockwise, secure the knurled ring together with the new **protective disk**; reaffix to the underside of the lens.

### Notes

## Cleaning the Air Filter

1. Turn “off” the **mains power switch** and **system key switch**.

2. Using a shop vacuum with the flexible hose and brush tool attached, clean the air filter and remove excess dust from the device by running the vacuum across the vents (located on the front of the device’s control panel).




**Figure 1**
(Air filter location)

**Air filter is located behind the controls panel cover.**

### Notes

# VI. Troubleshooting

Before troubleshooting is carried out on the machine, be sure to reference the important safety protocols outlined in **Maintenance**; **section V** within this manual.




**While working with an opened device, regulations set forth by OSHA regarding laser safety (or equivalent national or international regulations [e.g. EC Directive 608 or IEC Publication 825]) must be adhered to.**

## Equipment Malfunction

If you experience a malfunction with your machine that cannot be eliminated through one of the actions outlined in the previous sections for maintenance or troubleshooting, be sure to document your results and immediately contact LaserStar Technologies Corporation® Service Department for support, by calling 1-888-578-7782.




**Service and maintenance tasks should only be performed by technicians who are affiliated with LaserStar Technologies Corporation® and who are appropriately trained; other properly trained personnel; personnel who are supervised by trained personnel (in-person or by phone); or by those who have read and understand the service-related protocols within the sections for maintenance and operation within this manual.**

| LaserStar Technologies: Important Contacts | | |
|---|---|---|
| **Sales & Training** | **Service & Support** | **Corporate Office** |
| (407) 248-1142<br>sales@laserstar.net | 1-888-578-7782 | 2461 Orlando Central Pkwy.<br>Orlando, Florida 32809 |

## Diagnosing & Troubleshooting Basics

| Error or Issue | Possible Cause | Corrective Action |
|---|---|---|
| The laser system does not turn “on.” | AC is not plugged in. | Plug-in the AC. |
| The laser system does not turn “on.” | The wall switch is not turned “on.” | Turn “on” the wall switch. |
| The laser system does not turn “on.” | Fuse(s) is blown. | Reference instructions for **Fuse Replacement**; see **page 125**. |
| The laser turns “on,” but will not mark or fire. | The **front door** of the **work chamber** is open. | Close the chamber door. |
| The laser turns “on,” but will not mark or fire. | The **remote Interlock** plug has either become loosened, unplugged, or is missing. | Install the **remote Interlock** plug.<br><br>Turn the **system key switch** “on” or to the “I” position.<br><br>Turn “on” the laser by pressing the **reset button** (the **emissions indicator** will turn “on” and change to an amber color). |
| The laser turns “on,” but will not mark or fire. | The **system key switch** was not enabled or turned “on” or it was disabled or turned “off” during the marking cycle, or the **reset button** was not pressed following activation of the **system key switch**. | Turn the **system key switch** to the "on" or "I" position.<br><br>Press the **reset button** (the**emissions indicator** will turn “on” and change to an amber color).<br><br>Press the **mark button**. |

**Diagnosing & Troubleshooting Basics**
**Continued on Next Page**

## Diagnosing & Troubleshooting Basics

| Error or Issue | Possible Cause | Corrective Action |
|---|---|---|
| The laser turns "on," but will not mark or fire. | The interlock opened and closed while the part program was active and/or running. | Check to be sure the **front door** of the **work chamber** is closed.<br><br>Press the **mark button**. |
| The **final focus lens** is not powering "on." | The **protective disk** has either become contaminated or is defective. | Examine the **protective disk**, checking for visible damage or smudging; clean or replace, if necessary. |
| The power outputted from the **final focus lens** is low. | Review the settings for the power, frequency, speed, and velocity; make sure they're all appropriate. | Make adjustments to the settings, as required. |
| The power outputted from the **final focus lens** is low. | Check that the workpiece is inside the focal plan for the lens. | The surface of the workpiece should remain parallel with the face of the final focus lens. |
| The power outputted from the **final focus lens** is low. | Check to be sure the **focus diodes** have not been inadvertently moved or adjusted. | Refer to instructions for **Focus Diodes Alignment, Adjustment & Replacement; page 110**. |
| **Message:** "Cannot find dongle! Software will not work in demo state." | USB cable is not plugged in or it became unplugged while the device was operating. | Turn "off" the laptop computer, **system key switch**, and **mains power switch**.<br><br>Reconnect the USB cable.<br><br>If it appears that the USB cable is still connected, check the connections by unplugging and reinserting the cable once again.<br><br>Restart the device. |

**Diagnosing & Troubleshooting Basics**
**Continued on Next Page**

## Diagnosing & Troubleshooting Basics

| Error or Issue | Possible Cause | Corrective Action |
|---|---|---|
| **Message:** "Invalid Device Handle" | USB cable is not plugged in or it became unplugged while the device was operating. | Turn "off" the laptop computer, **system key switch**, and **mains power switch**.<br><br>Reconnect the USB cable.<br><br>If it appears that the USB cable is still connected, check the connections by unplugging and reinserting the cable once again.<br><br>Restart the device. |
| **Message:** "No data available. Check whether the file was loaded." | USB cable is not plugged in or it became unplugged while the device was operating. | Turn "off" the laptop computer, **system key switch**, and **mains power switch**.<br><br>Reconnect the USB cable.<br><br>If it appears that the USB cable is still connected, check the connections by unplugging and reinserting the cable once again.<br><br>Restart the device. |
| The device marks the part incorrectly. | USB cable became unplugged while the device was in operation and/or the configuration file has become corrupted. | Turn "off" the laptop computer, **system key switch**, and **mains power switch**.<br><br>Contact LaserStar Technologies® Service Department for additional support and troubleshooting; either by calling 1-888-578-7782 or emailing service@laserstar.net. |

**Diagnosing & Troubleshooting Basics**
**Continued on Next Page**

## Notes

## Notes

# Fault Diagnostics Software

For support with troubleshooting and to obtain the fault diagnostics software, please contact LaserStar Technologies® Service Department.

## **Important Advisory**:

The fault diagnostics software must only be used under guidance from support technicians affiliated with LaserStar Technologies Corporation®. If you are in need of support and require the use of the diagnostics software, please be sure to reach out to our service department for assistance.

| LaserStar Technologies: Important Contacts | | |
|---|---|---|
| **Sales & Training** | **Service & Support** | **Corporate Office** |
| (407) 248-1142<br>service@laserstar.net | 1-888-578-7782 | 2461 Orlando Central Pkwy.<br>Orlando, Florida 32809 |

## Notes

## VII. Parts & Accessories

| LaserStar Technologies Corporation® Approved Components | |
|---|---|
| **Description** | **Catalog Number** |
| Operation and Maintenance Manual (hardcopy) | 58-99990-3801 |
| Operation and Maintenance Manual (digital; USB flash drive) | 58-99991-3801 |
| Fuse (10A, 250V AC, SB 5 × 20mm) | 405-4320-100 |
| Fiber Wipe (quantity ×1) | 810-2356 |
| Fiber Wipes (quantity ×90) | 810-2354 |
| Power Cord (without connector [flying leads] on input ends)<br><br>CSA LL110850 & UL E84516 3×18 AWG (3×0.824mm) 60°C 300V | 405-6199-254 |
| Power Cord (with connector on both ends)<br><br>Power Cord (without connector [flying leads] on input ends)<br><br>CSA LL112007 & UL E159216 3×18 AWG (3×0.824mm) 60°C 300V | PWC-001 |
| Power Cord (AC power cord; ROJ [remove outer jacket] to IEC60320 C13 connector [8 feet] 10A, 250V H05VV-F3G1.0, VDE-UL-CSA-CE) | 405-6199-255 |

**Parts & Accessories Continued on Next Page**

## VII. Parts & Accessories (continued)

| LaserStar Technologies Corporation® Approved Components | |
|---|---|
| **Description** | **Catalog Number** |
| USB Cable<br>(6’ with ferrites on each end) | 405-6199-911 |
| Protective Disk<br>(used with 408-2473-100, 408-2473-160, or 408-2473-254) | 408-2470-300 |
| Fan Filter | 61-64001 |
| Remote Interlock<br>Shorting Connector | 148-36-0114 |
| Premier Programming Manual | .pdf file has been preloaded<br>on supplied laptop computer. |

### Notes

**Parts & Accessories Continued on Next Page**

## Notes

## Notes

# VIII. Original Equipment Warranty

LaserStar Technologies Corporation® ("LaserStar") warrants for a period of one (1) year, two (2) years, or three (3) years (depending on your purchase) from the date of invoice that this equipment will be free from defects in materials and workmanship as determined at the date of shipment. For details on your warranty period, please reference your purchase invoice.

**(a). Limited Warranty:**

After reaching out and notifying LaserStar Technologies Corporation® Service Department about a problem with your machine, we will, at our option, elect to:

1. Immediately send a replacement part; or

2. Request defective part(s) or alternatively, the entire machine be returned to LaserStar Technologies Corporation® Service Department for inspection and repair or replacement; or

3. Schedule a service technician to travel to the buyer's facility to inspect, troubleshoot, repair, or replace defective components.

**(b). Warranty Exclusions:**

1. This warranty does not provide coverage or protection against damage, misuse or abuse of the optical components (lenses, mirrors, glass, crystal, etc.) associated with the device;

2. This warranty does not provide coverage or protection against damage, misuse or abuse of the computer hardware;

3. This warranty does not provide coverage or protection for consumable parts (flashlamp [or flashlamp connectors], protective disk, air filter, water filter, deionized water, cuffs, fuses, halogen lights, LED lamps, final focus [f–theta] lens, etc.).

This warranty is applicable for all equipment, when operated under normal conditions, and in an industrial environment. Any unauthorized use, misuse, neglect, or modification, including use of accessories that have not been previously approved or authorized by LaserStar Technologies Corporation® will void this warranty. Under no circumstance will LaserStar Technologies Corporation® accept liability for loss of use or for any indirect or consequential damage that is the result of customer negligence.

Satisfaction of this warranty, consistent with other provisions herein, is limited to replacement or repair, modification, or issuance of a credit for applicable equipment, at the sole discretion of LaserStar Technologies Corporation®, and with LaserStar Technologies Corporation® to determine the availability of service personnel, and any absorption of associated service-related expenses.

**The warranty terms previously outlined are valid and will remain in effect only if and when the following obligations are met:**

**(a).** Prompt written notification is provided to LaserStar Technologies Corporation® upon discovery of an alleged defect;

**(b).** LaserStar Technologies Corporation® examines the equipment, and to its satisfaction, finds that any defect is not the result of misuse, neglect, improper installation, improper operation or improper maintenance, unauthorized repair, alteration or unusual deterioration or degradation of the equipment or parts thereof, due to the physical environment or an electrical or electromagnetic noise environment.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, and therefore, excludes certifications or the like for equipment performance, use or design with respect to any standard, regulation or the like (unless, and to the extent, this has been approved independently, and in writing by LaserStar Technologies Corporation®) and EXTENDS ONLY TO THE BUYER OR CUSTOMER PURCHASING DIRECTLY FROM LASERSTAR TECHNOLOGIES CORPORATION® OR FROM ANOTHER AUTHORIZED RESELLER.

**Return Authorization:**

Whether your equipment is under warranty and in need of repair or otherwise, you must first **contact LaserStar Technologies Corporation® to communicate your issue**, **schedule service**, **and obtain prior authorization**; such authorization shall be granted for each reasonable request. Unless such authority has been granted, the shipment will be refused. Any and all transportation-related expenses associated with evaluation or repair of your equipment, including any refusal of delivery, are the sole expense of the buyer. When sending equipment to our facility, an RMA or CRA number will be assigned to accompany your machine; this number should remain clearly marked and visible on the exterior of the shipping container.

**Governing Law:**

The sale and purchase of this equipment, including all terms and conditions thereof, shall be governed in accordance with the Uniform Commercial Code and the laws of the State of Rhode Island.

**Limited Liability:**

LASERSTAR TECHNOLOGIES CORPORATION® DOES NOT ASSUME RESPONSIBILITY FOR, NOR WILL IT BE HELD LIABLE FOR (A) FINES OR PENALTIES RELATING TO PENALTY CLAUSES OF ANY VARIETY, OR (B) CERTIFICATIONS NOT OTHERWISE SPECIFICALLY PROVIDED HEREIN, (C) INDEMNIFICATION FROM THE BUYER OR OTHERS (RELATED OR NOT) FOR LIABILITY, CLAIMS, ACTION, DAMAGES, LOSS, FINES, COSTS OR EXPENSES, INCLUDING, WITHOUT LIMITATION, REASONABLE ATTORNEY'S FEES, OF EVERY KIND OR NATURE ASSERTED BY ANY PARTY, AND ARISING DIRECTLY OR INDIRECTLY FROM OR IN CONNECTION WITH EQUIPMENT OR REPAIRS RELATING TO THIS PURCHASE ORDER, OR (D) FOR INDIRECT OR CONSEQUENTIAL DAMAGE UNDER ANY CIRCUMSTANCE.

This warranty does provide coverage or protection against damage or defects resulting from accidents that occur while in transit, unauthorized repairs, alteration, misuse, neglect or failure to follow proper safety and operating instructions, fire, flood, freezing temperatures or acts of God.

## Authorized Equipment Repairs

| Corporate Office | Rhode Island Office | California Office |
|---|---|---|
| **Sales, Training, Repairs & Manufacturing**<br>2461 Orlando Central Pkwy.<br>Orlando, Florida 32809<br>(407) 248-1142 | **Sales, Training & Repairs**<br>One Industrial Court<br>Riverside, Rhode Island 02915<br>(401) 438-1500 | **Sales, Training, Repairs & Manufacturing**<br>20 East Foothill Blvd. Ste. 128<br>Arcadia, California 91006<br>(213) 612-0622 |

## Notes

## Notes

# IX. Service

Before service is carried out on the machine, be sure to reference the important safety protocols outlined in **Maintenance**; **section V** within this manual.




**Service and maintenance tasks should only be performed by technicians who are affiliated with LaserStar Technologies Corporation® and who are appropriately trained; other properly trained personnel; personnel who are supervised by trained personnel (in-person or by phone); or by those who have read and understood the service-related protocols within the sections for Operation and Maintenance within this manual.**




**While carrying out service-related activities with an open device, you must comply with regulations set forth by OSHA for accident prevention with regard to laser radiation or the equivalent national or international regulations (e.g. EC Directive 608 or IEC Publication 825). Be sure also to safeguard your eyes and wear appropriate laser protective eyewear.**

## Equipment Malfunction

If you experience a malfunction with your machine that cannot be eliminated through one of the actions outlined in the previous sections for maintenance or troubleshooting, please document your results and immediately contact LaserStar Technologies® Service Department for support; either by calling 1-888-578-7782 or emailing service@laserstar.net. When reaching out, be sure to include your machine's model number and serial number with all correspondence. After emailing, plan to follow-up with a phone call to our service department; this will ensure that we have received all of the details necessary to assist you.

| LaserStar Technologies: Important Contacts | | |
|---|---|---|
| **Sales & Training** | **Service & Support** | **Corporate Office** |
| (407) 248-1142<br>sales@laserstar.net | 1-888-578-7782 | 2461 Orlando Central Pkwy.<br>Orlando, Florida 32809 |

# IX. Service, Section A: Rear System Overview, Internal & External Connections

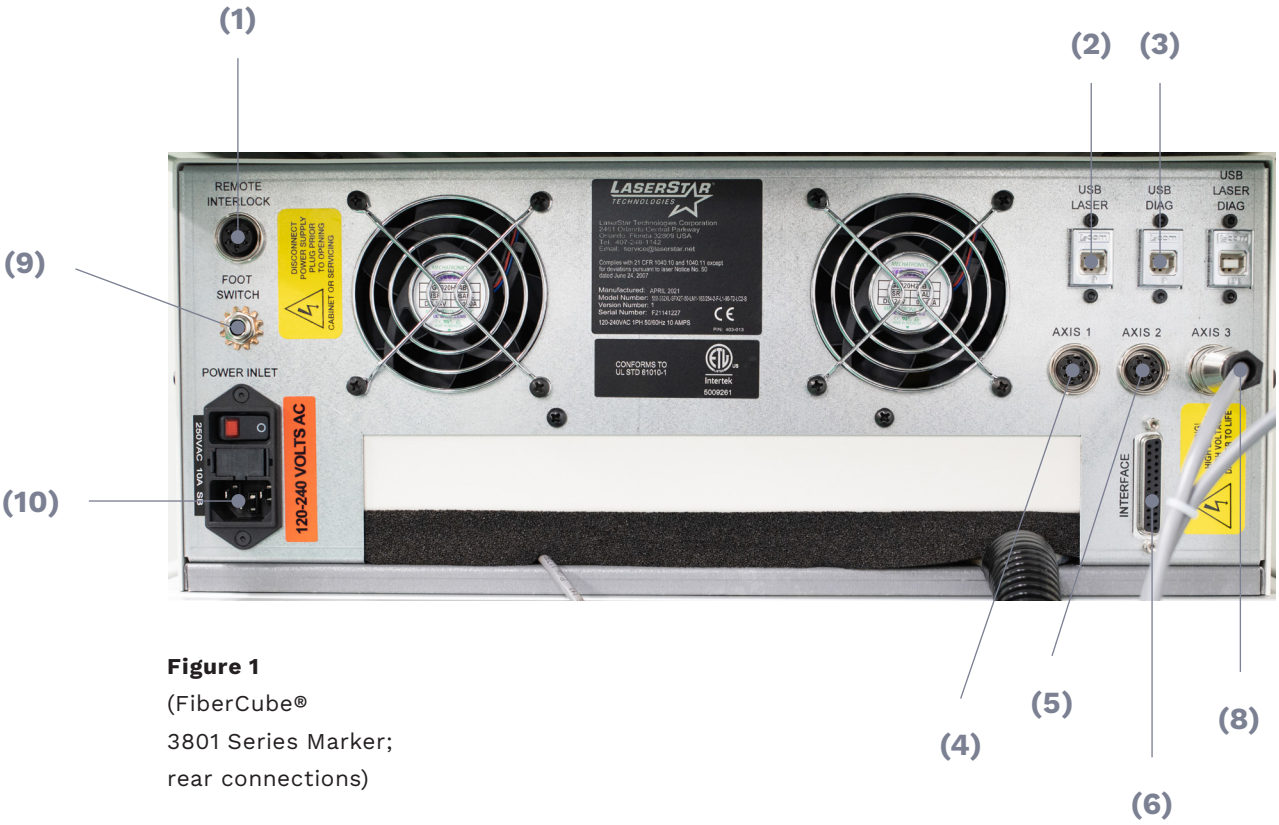



**Figure 1**
(FiberCube®
3801 Series Marker;
rear connections)

1. **<u>Remote Interlock</u>:**

   Reference **remote interlock connector** in **sections I & III**.

2. **<u>USB 1: Laser</u>:**

   The **USB 1: laser (2)** facilitates communication between the laptop computer, the marker, and the device's laser control electronics.

3. **<u>USB 2: USB Diag</u>:**

   The **USB 2: diag (3)** is used for system fault diagnostics and device troubleshooting.

4. **<u>Axis 1</u>:**

   **Axis 1 (4)** is used to supply power to a linear or rotary axis.

**Rear System Overview, Internal & External Connections Continued on Next Page**

## Rear System Overview, Internal & External Connections (continued)

5. **Axis 2:**

   **Axis 2 (5)** is used to supply power to a linear or rotary axis.

6. **IO Rack Interface:**

   The **IO rack interface (6)** is used for specific specialized internal and external functions.

7. **Chamber Exhaust:**

   The **chamber exhaust (not shown)** is used to connect an external chamber exhaust system.

8. **Axis 3:**

   **Axis 3 (8)** is used to supply power to a linear or rotary axis.

9. **Foot Pedal Switch:**

   The **foot pedal switch (9)** is an external switch that can be used as a trigger source to fire the laser or begin a marking cycle.

10. **Power Input (main “on” “off”):**

    The **power input (10)** is the main port and source of power for the device.

### Notes

# IX. Service, Section B: Major Internal System Components

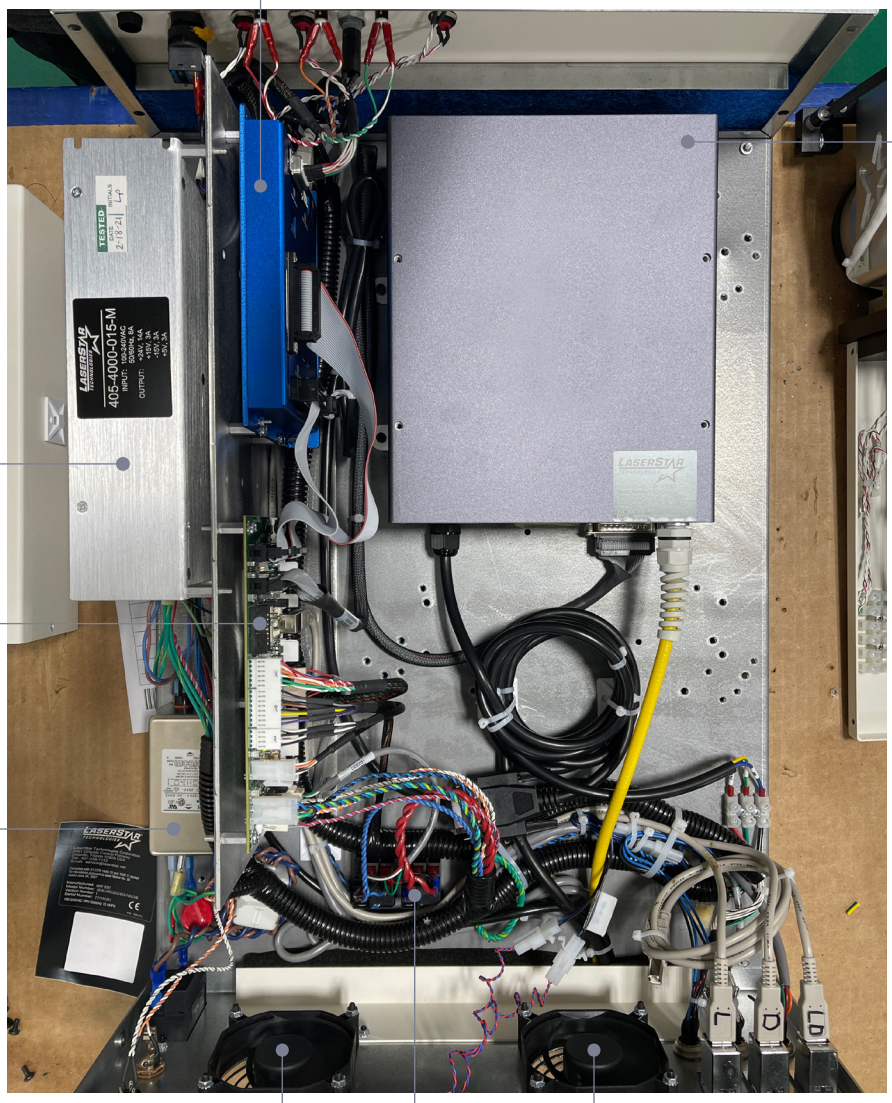



**Figure 2**
(Internal Electronic Components)

Major Internal System Components Continued on Next Page

# IX. Service, Section C: Focus Diodes Alignment, Adjustment & Replacement




**This device is a class 4 and class 3R laser. Avoid eye or skin exposure to direct or scattered radiation. All persons in the Nominal Ocular Hazard Area must wear appropriate laser protective eyewear.**

## Focus Diodes Alignment

This procedure assumes that the operator has completed the steps for adjusting the **focus diodes** to a minimum "dot" size within the laser's marking plane. If this is not the case, please proceed to **Service C: Adjusting the Focus Diodes**; **section II**; follow all steps until completed.

### Tools Needed (supplied or required):

+ Slotted Screwdriver (3/16" – 1/4")
+ Hex Key Wrench (2mm)

1. Select the **LaserStar StarFX® Premier Design Studio icon** on the computer desktop; this will launch the software for the workstation.

2. Draw a 0.5mm circle on the page and center this shape to the 0.0 location by clicking the **Put to Origin button**.




**Focus Diodes Alignment, Adjustment & Replacement Procedures Continued on Next Page**

## Focus Diodes Alignment, Adjustment & Replacement (continued)

3. Configure the settings for power and speed to achieve the results shown in **figure 2** (see next page).

4. Using the default material, set the loop count to 100.

5. Place a flat piece of scrap material on a lab stand, positioning the workpiece underneath the lasers' scan head.

6. Select the **mark icon** (located on the LaserStar **StarFX® Premier Design Studio software** menu ribbon).

7. Move the lab stand up and down to find an ideal position; this is the location where the laser marks most accurately (reference **figures 1 & 2**; see next page).

8. When the surface of the workpiece is in focus, select the **stop button**; be sure not to make any additional movements or adjustments.

9. Turn "on" the **focus diodes** by pressing the **focus button**.

10. Using the 2mm hex key wrench, loosen the hex set screws to adjust the positioning of the pivot and angle of the **focus diodes** (reference **figure 3**; **page 111**) until they reach the center of the 0.5mm circle. When this step is finalized, the **focus diodes** will be overlapping one another to form a single "dot" within the center of the circle. The marker is now ready for use.

### Notes

**Focus Diodes Alignment, Adjustment & Replacement Procedures Continued on Next Page**

# IX. Service, Section C: Focus Diodes Alignment, Adjustment & Replacement (continued)



**Figure 1**
(Laser;
out of focus)



**Figure 2**
(Laser;
in focus)

**Focus Diodes Alignment, Adjustment & Replacement Continued on Next Page**

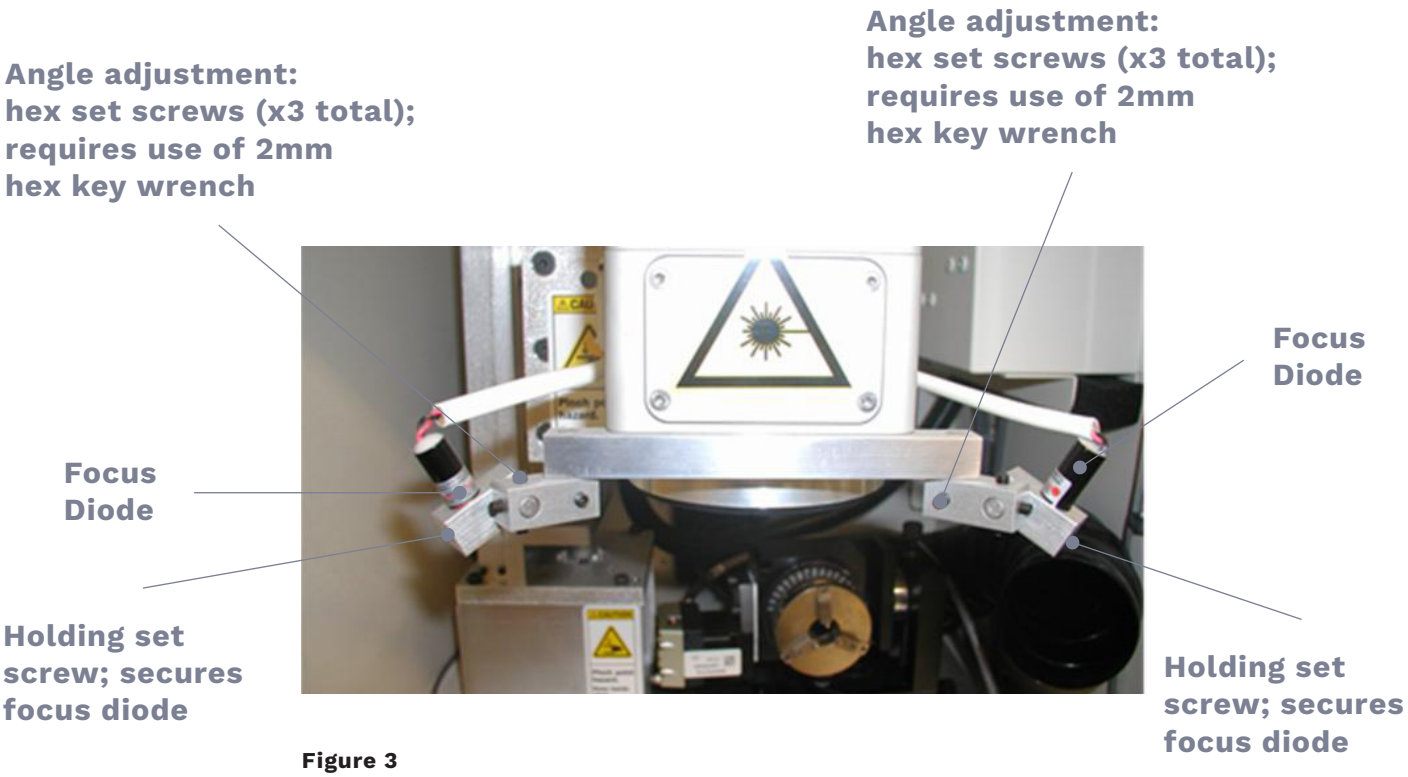



**Figure 3**
(Angle and pivot adjustment)

**Focus Diodes Alignment, Adjustment & Replacement Procedures Continued on Next Page**

## Replacing the Focus Diodes

1. Turn “off” the **system key switch** and **mains power switch**.

2. Unplug or disconnect the wires for each of the **focus diodes** (be sure to take note of the wire color and locations for each of the connection sites.)

3. Loosen the holding set screws that secure the **focus diodes**.

4. Install the new **focus diodes** into their chambers, ensuring that the output ends for each are positioned downward toward the bottom of the cavity; tighten the holding set screws **(be sure not to overtighten these screws)**.

5. Reconnect the **focus diodes**, ensuring that all wires are correctly connected. **Caution**: If the wires are not properly connected, there is a risk of damaging the **focus diodes**.

6. Turn “on” the **system key switch** and **mains power switch**.

7. Check to make sure the laser beam is in focus (see note on **page 98**).

8. Turn “on” the **focus diodes**. **Caution**: When using this device, and while the laser beam is active, you should never stare into the beam that's emitted.

### Notes

**Replacing the Focus Diodes Continued on Next Page**

## Replacing the Focus Diodes (continued)

**Safety glasses are recommended for the steps that follow:**

9. Turn “on” the **red laser pointing diode**.

10. The **focus diodes** are focused by inserting a slotted screwdriver (3/16” to 1/4” blade width) into the output ends of the component. (Note: The tip of the screwdriver must be wide enough to ensure that it does not contact the face of the diode, which will cause damage to the lens; reference **figure 4**; below.)

11. To determine the minimum spot size for each of the focus diodes, rotate the diodes slotted screw clockwise or counterclockwise. If needed, be sure to revisit **Service, section C: Focus Diodes Alignment** for additional notes.




**Figure 4**
(Focus diode;
adjustment slot)

# Fault Diagnostics Software

For support with troubleshooting and to obtain the fault diagnostics software, please contact LaserStar Technologies® Service Department.

## **Important Advisory**:

The fault diagnostics software must only be used under guidance from support technicians affiliated with LaserStar Technologies Corporation®. If you are in need of support and require the use of the diagnostics software, please be sure to reach out to our service department for assistance.

| LaserStar Technologies: Important Contacts | | |
|---|---|---|
| **Sales & Training** | **Service & Support** | **Corporate Office** |
| (407) 248-1142<br>service@laserstar.net | 1-888-578-7782 | 2461 Orlando Central Pkwy.<br>Orlando, Florida 32809 |

## Notes

# X. Appendix

Failure to follow the steps for the Power Up-Restart-Power Down procedure may corrupt the configuration file, resulting in faulty or unreliable device operation. For help with troubleshooting, be sure to refer to the **troubleshooting guidelines** on **page 92**.)

## Power Up–Restart–Power Down

### Power Up:

1. Check to be sure that the **mains power switch**, **system key switch**, and **setup key switch** are in the “off” position.

2. Make sure the laptop computer is “off.”

3. Verify that the USB cable (connecting the computer and marker) is plugged in and correctly seated.

4. Verify that the **remote interlock connector** is installed.

5. Plug-in and connect the AC power to both the marker and laptop computer.

6. Turn the **mains power switch** and **system key switch** “on.”

7. Verify that the **setup key switch** is “off” and press the **reset button**.

8. Turn “on” the laptop computer.

### LaserStar StarFX® Premier Design Studio Software:

9. Select the **StarFX® Premier Design Studio software icon** on the computer desktop; this will launch the device’s software.

10. Select the appropriate file or part program (located on the **Premier Design Studio software** main interface screen).

**Power Up–Restart–Power Down Continued on Next Page**

## Power Up–Restart–Power Down (continued)

### LaserStar StarFX® Premier Design Studio Software:

11. Select "**trace contour**" from the **trace menu** (dropdown selection).

12. Verify that the part to be marked is positioned properly within the (red) profile box.

13. Turn "off" the profile diode by selecting the **stop button** (located on the **Premier Design Studio software** menu ribbon).

14. Press the **focus button** on the control panel to turn "on" the **focus diodes**.

**Caution:** The **focus diodes** are **class 3R lasers**. Never look directly into the **focus diodes** or their emitted specular reflection. When using the device, it is recommended that the operator wear appropriate laser protective eyewear suitable for **class 3R lasers**. For additional details on these precautions, be sure to review the section on safety, which begins on **page 32**.

### Notes

**Power Up–Restart–Power Down Continued on Next Page**

## Power Up–Restart–Power Down (continued)

### LaserStar StarFX® Premier Design Studio Software:

**14.** Close the **front door** of the enclosure.

**15.** To begin the marking cycle, select "**mark**" or press the **mark button** (located on the **LaserStar StarFX® Premier software** main interface screen).

**16.** The marking process can be stopped at any time by pressing the **stop button** (located on the Premier main interface screen) or by turning "off" the **system key switch** or **mains power switch**.

**Caution:** This is a **class 4 laser** when the **front door** is open, and the **setup key switch** is "on". When using the device, be sure to avoid eye or skin exposure to direct or scattered radiation. In addition, all persons in the Nominal Ocular Hazard Area (NOHA) must wear the appropriate laser protective eye wear for the **class 4 laser** emissions and collateral radiation. For additional details on these precautions, see the section on safety, which begins on **page 32**.

### Restart:

**1.** If the **remote interlock switch** circuit is opened or the **system key switch** is turned "off" during marking, the marking cycle will stop.

**2.** Close the **remote interlock switch** circuit.

**3.** Turn "on" the **system key switch**.

**4.** Press the **reset button**; the **emissions indicator** will turn "on".

**5.** Verify that the **front door** of the work chamber is closed.

**6.** Select "**mark**" or press the **mark button** to begin the marking cycle.

**Power Up–Restart–Power Down Continued on Next Page**

## Power Up–Restart–Power Down (continued)

### Power Down:

1. Close the **StarFX® Premier Design Studio software**; exit to the computer desktop.

2. The laptop computer can be turned “off” or left “on;” either option is suitable.

3. Close the **front door** of the enclosure.

4. Check to be sure that the **setup key switch** is “off.”

5. Turn the **system key switch** “off.”

6. Turn the **mains power switch** “off.”

### Notes

# Focusing and Defocusing Guidelines

## Overview & Requirements

When operating G4 pulsed fiber lasers on highly-reflective materials, there is a risk of potential damage to the ILLK beam delivery optic. This section highlights the associated dangers and offers suggestions for minimizing said risk while working with these materials. **Damage to the ILLK beam delivery optic is considered a process and application-induced failure and is not covered under warranty**.

- ILLK beam delivery provides extremely robust protection for the laser, ensuring that back-reflected light is isolated and removed before it can enter and adversely affect the lasers' cavity; however, great care must be excercised when processing highly-reflective materials that are heavily defocused (silver, copper, gold, brass, etc.).

- In extreme cases, when processing highly-reflective materials (while in a defocused state), back-reflected light can be focused onto optical surfaces within the ILLK, resulting in energy densities that exceed the rated Laser Induced Damage Threshold (LIDT) for the optical surface. This circumstance can result in an initial etching of the optics in the ILLK (see **figure 1**; next page). With continued operation (and due to enhanced absorption) a catastrophic failure can result. The potential for absorption is low, however, due to the scattered nature of back-reflected light and its sensitivity to angular deviation from normal incidence, nevertheless, the operator should never use this device when the circumstances present a high risk.

- The highest risk optical setup happens when long focal length Beam Expanding Collimators (BECs) are used in conjunction with a short focal length **f-theta lenses**. When processing highly-reflective materials, an F100 [BEC] and FL-100 [f-theta] combination is not recommended.

With general applications usage, pulsed fiber lasers are typically operated while in a focused state, however, it's often in attempting to find or set the focus point on a particular material that the highest risk of optic damage can occur.

**Using the methods below for focus-finding, ensure the safety of the operator and avoid damaging the ILLK beam delivery optic:**

- When completing the steps for initial setup and focus-finding, use less reflective materials like stainless steel (never use metals like silver, gold, copper, or brass).

- With initial setup and focus-finding, the marker should be operated at reduced power. Then later, during processing, power can be increasd.

- When beginning the process for focus-finding, locate the end of the workpiece that is postioned toward the **f-theta lens** (this can be determined using the "flange focal length" dimension provided by the f-theta manufacturer (see **figure 1**; next page); this is the safe zone.

- Taking small steps (<0.5mm), move the workpiece toward the focus spot until focus is achieved. The highest risk of optical damage is beyond focus at a distance that is dependent on both the BEC's and **f-theta lens** combination. Once focus is found, be sure not to move beyond the values listed in the data table (see next page); this is the "danger zone."

- Once focus has been found, fine-tuning can be done using the operators' preferred power and materials. If the focus needs addtional adjustments in the future, be sure to use the same process as before — move the workpiece toward the **f-theta lens** and away from focus, in small steps; (< 0.5mm).

**Focusing and Defocusing Guidelines Continued on Next Page**



**Figure 1**
(ILLK optic; Etch damage from back-reflected light)

**BEC Focal Length (units in millimeters)**

**Data Table: F-Theta Lens Focal Length (units in millimeters)**

| | **100** | **163** | **254** | **300** | **410** |
|---|---|---|---|---|---|
| **F30** | 15 | 40 | 97 | 135 | 252 |
| **F50** | 5 | 14 | 35 | 49 | 91 |
| **F75** | 2 | 6 | 16 | 22 | 40 |
| **F100** | | 4 | 9 | 12 | 22 |

Positive defocusing limits [millimeters represent the extent of the safe zone below optimal focus]. The reflected out-of-focus state that can damage the optic is shown in the data table above [in grey], while the other fields show normal back-reflection resulting from in-focus processing.

**Focusing and Defocusing Guidelines Continued on Next Page**

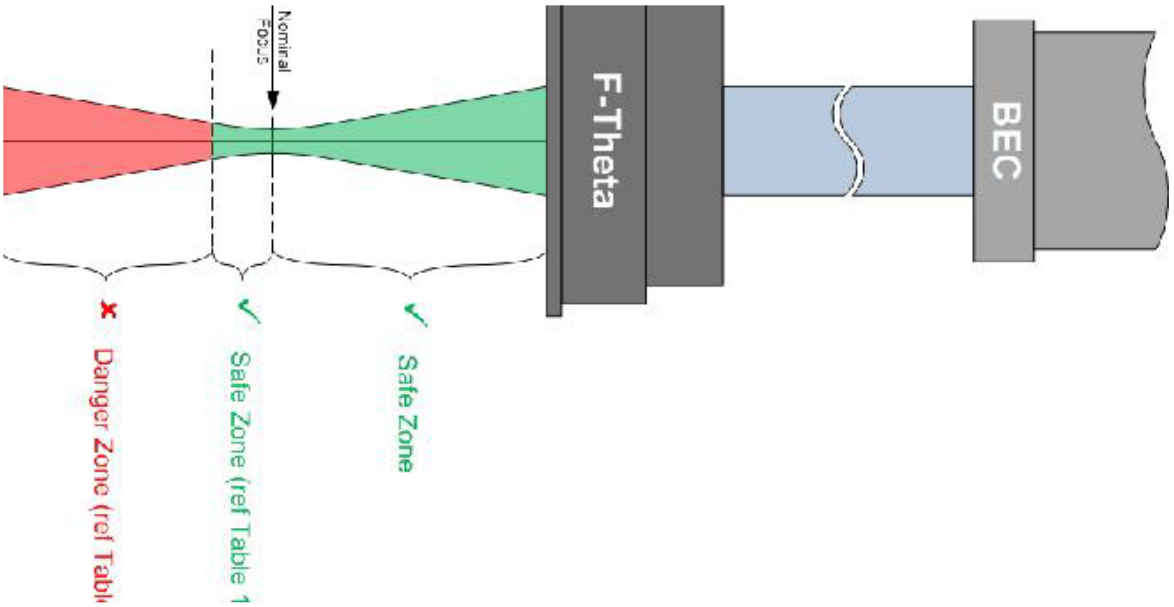



**Figure 2**
(Processing reflective materials; danger zone)

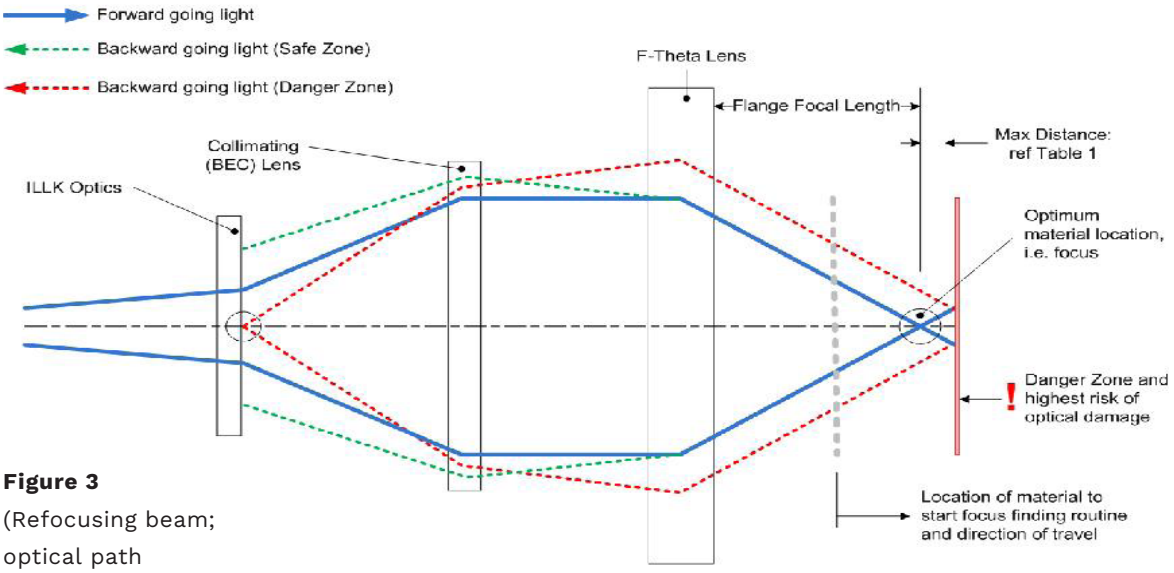



**Figure 3**
(Refocusing beam; optical path

## Notes

# Appendix C: FiberCube Software Installation & Upgrades

For support with FiberCube® software installation or upgrades for a customer-supplied computer, please contact LaserStar Technologies Corporation® Service Department.

| LaserStar Technologies: Important Contacts | | |
|---|---|---|
| **Sales & Training** | **Service & Support** | **Corporate Office** |
| (407) 248-1142<br>service@laserstar.net | 1-888-578-7782 | 2461 Orlando Central Pkwy.<br>Orlando, Florida 32809 |

## Notes

LASERSTAR TECHNOLOGIES

# STARFX PREMIER DESIGN STUDIO

# SOFTWARE USER GUIDE EDITION 1.0

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STARFX®

PREMIER | DESIGN STUDIO

# SOFTWARE
# USER GUIDE
# Edition 1.0

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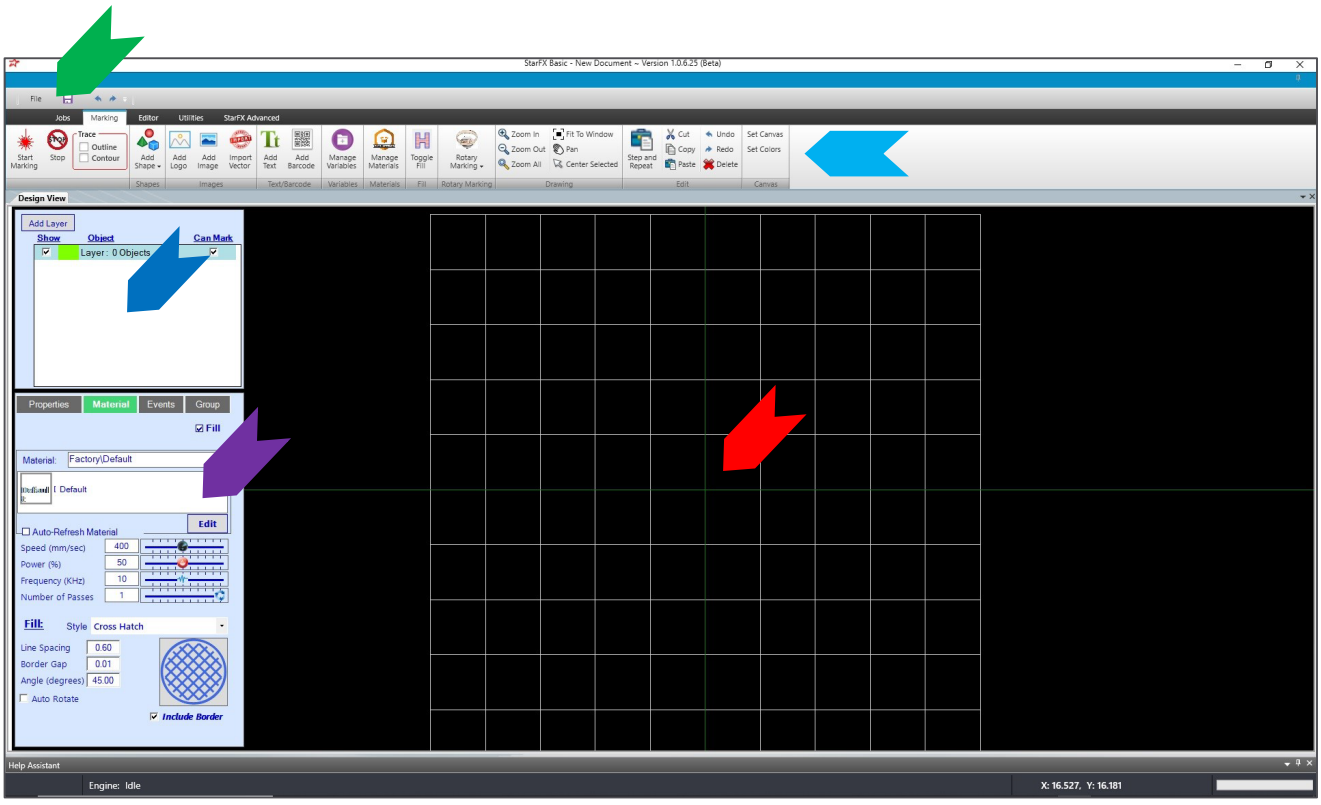


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# INTRODUCTION

**The Marking module** provides a user interface that is simple and uncluttered with features that go beyond basic marking of text and logos but still provides all of the tools needed for artistic efforts.
It goes through a logical flow from defining the part to aligning the final mark on the part. We will go through each of these steps in detail in the following pages.

The first thing we will go over are the basics of the Visual Programming Screen from a “big picture” perspective.



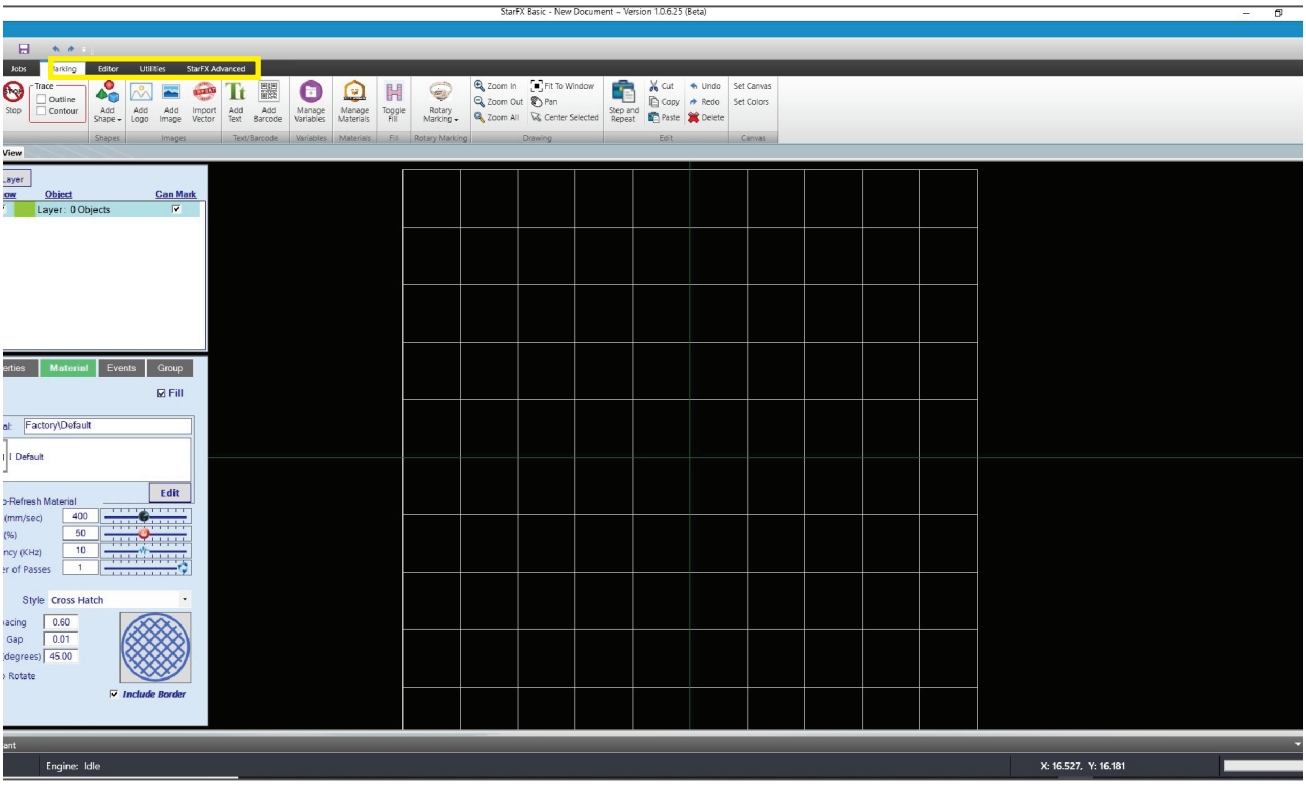

There are four areas we will look at:

1. The “Menu” section
2. The ”Ribbon” area
3. The “Program Tree”
4. The “Object Property Tabs”
5. The “The Drawing Screen”



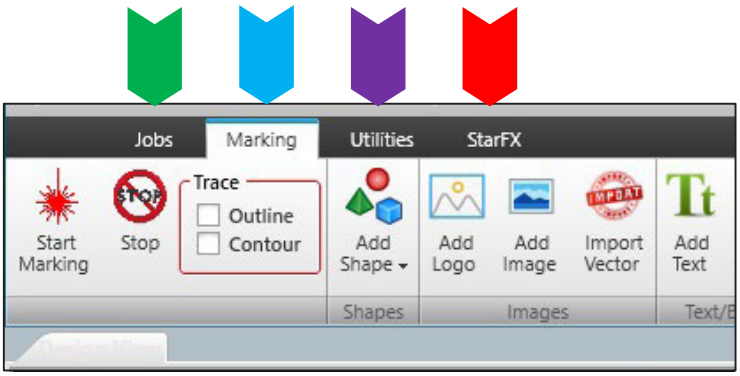
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# MENU



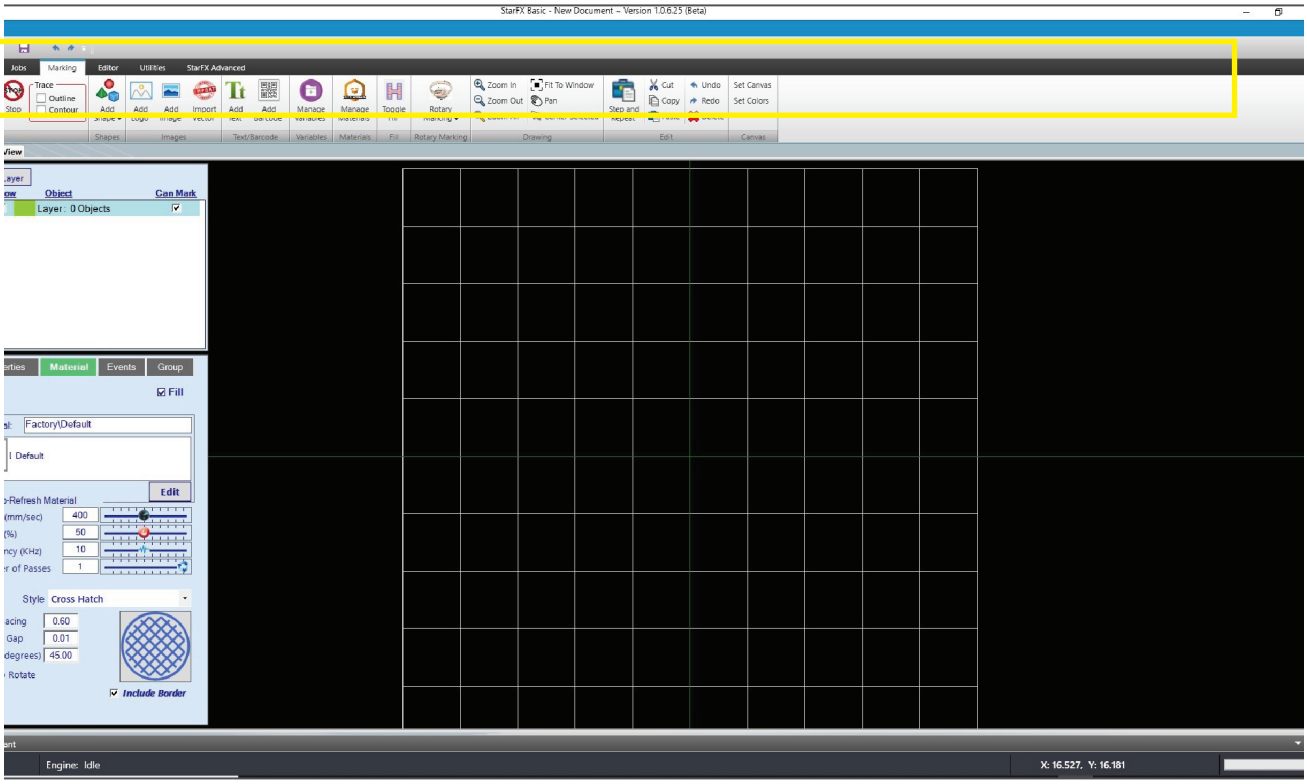

The Menu consists of five selections.

1. Jobs
2. Marking
3. System Utilities
4. StarFX



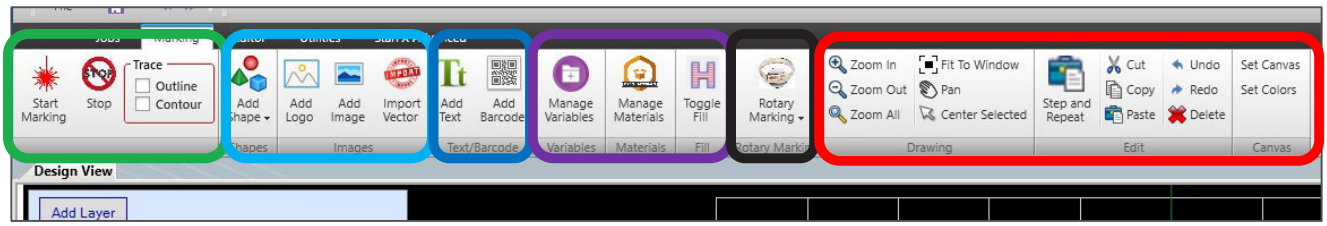

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# RIBBON



The Ribbon controls six functions.

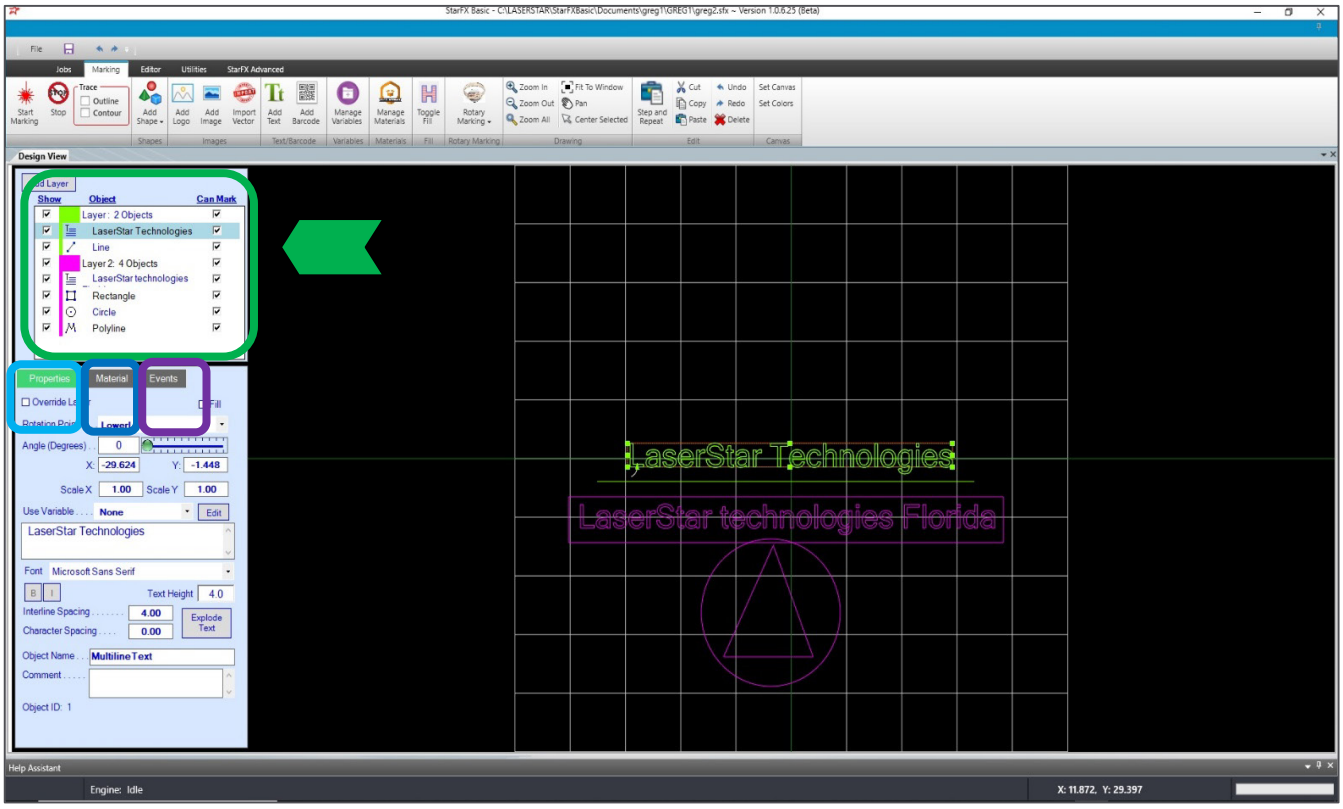
1. **Marking Actions**
2. **Drawing Shapes and Logos**
3. **Drawing Text and Barcodes**
4. **Lasing Parameters**
5. **Other Modes**
6. **Visual Effects**






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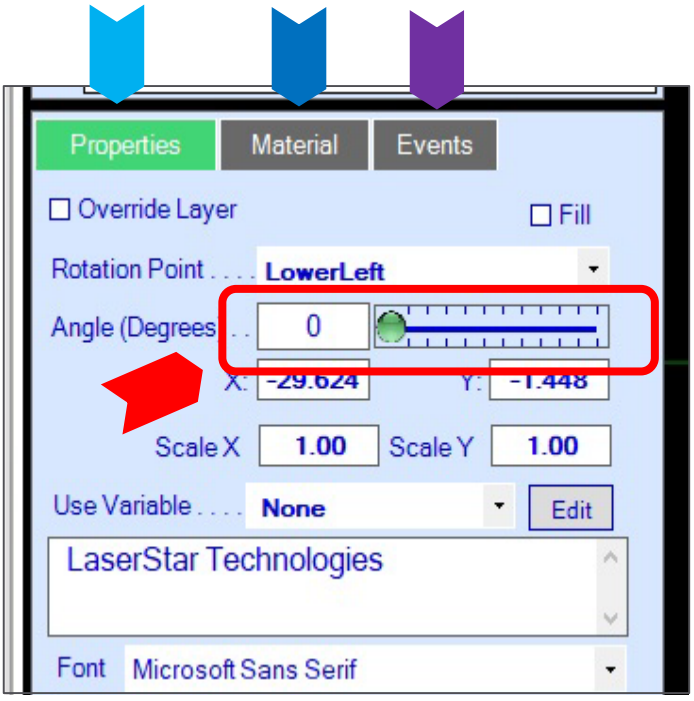
# PROGRAM CONTROL




The Program Control area provides features that allow you to change many properties of your lasing program.

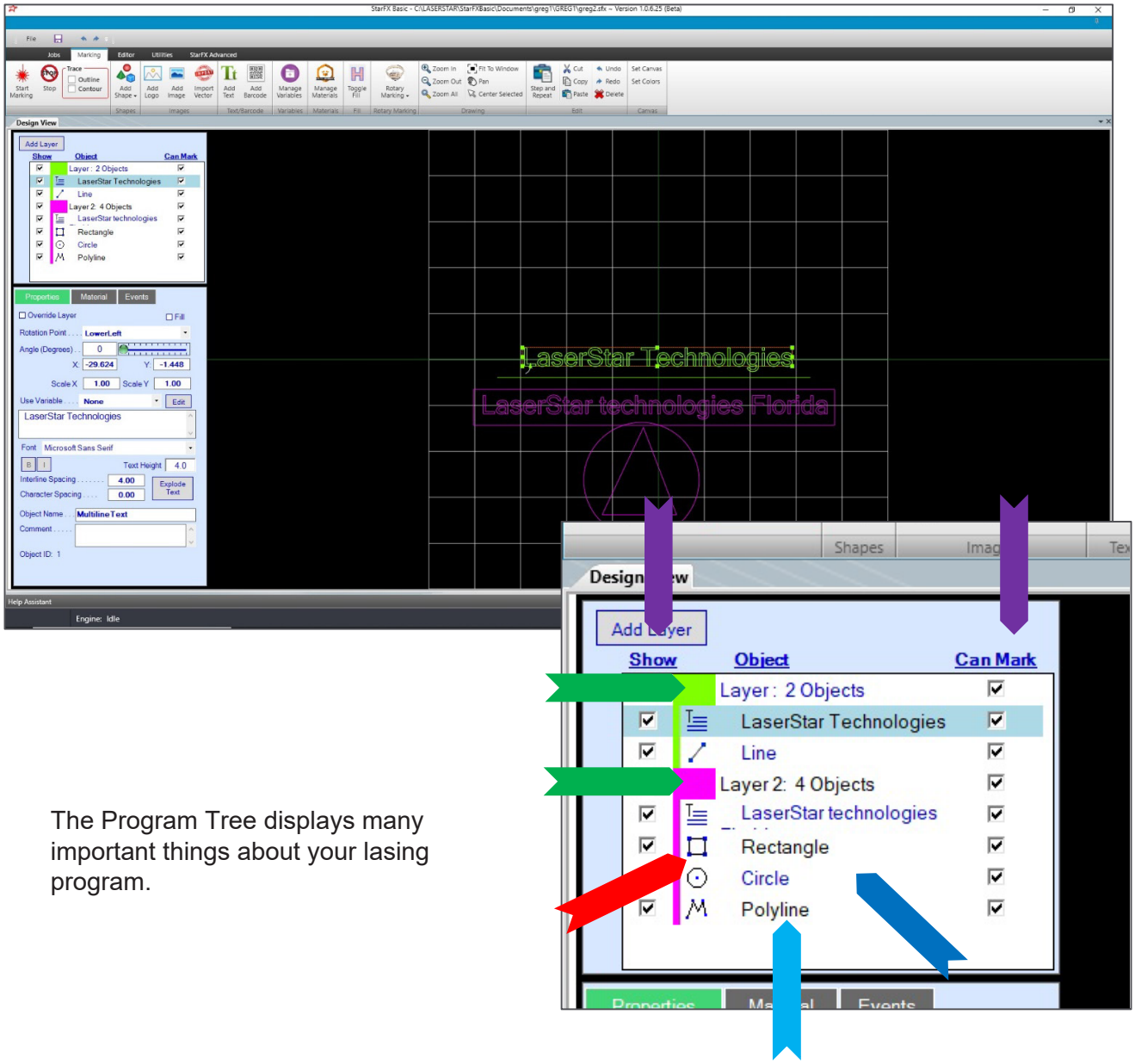
1. **The Program Tree**
2. **The Properties Tab**
3. **The Materials Tab**
4. **The Events Tab**
5. **The Overrides**

We will go over each in detail.




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# PROGRAM CONTROL



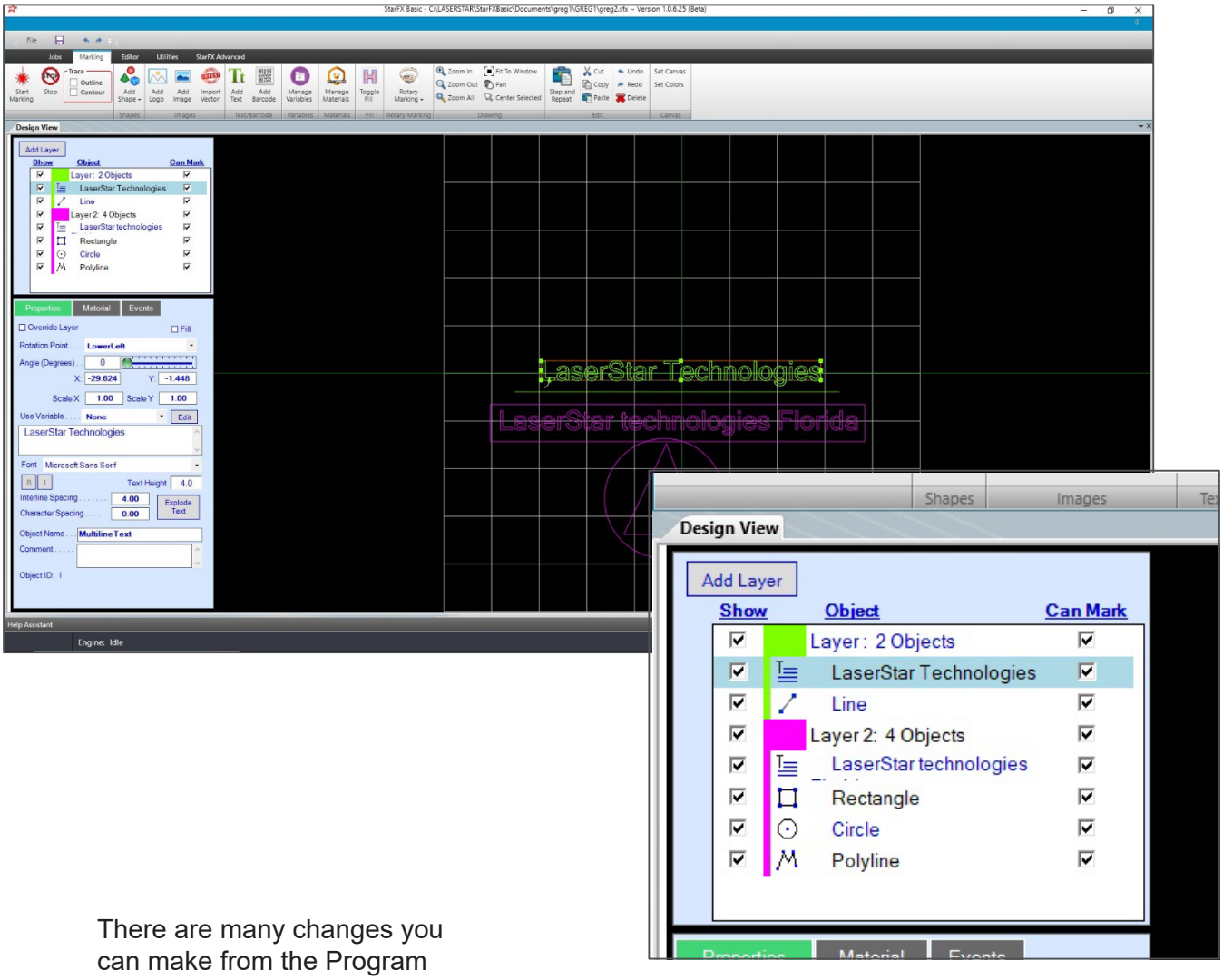

The Program Tree displays many important things about your lasing program.

1. **What layers you have.**
2. **What objects you have and what layer they are on.**
3. **The order that objects and layers will be lased.**
4. **Whether an object is to be lased or if it even wants to be shown on the screen.**
5. **What type each object is.**



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# PROGRAM TREE

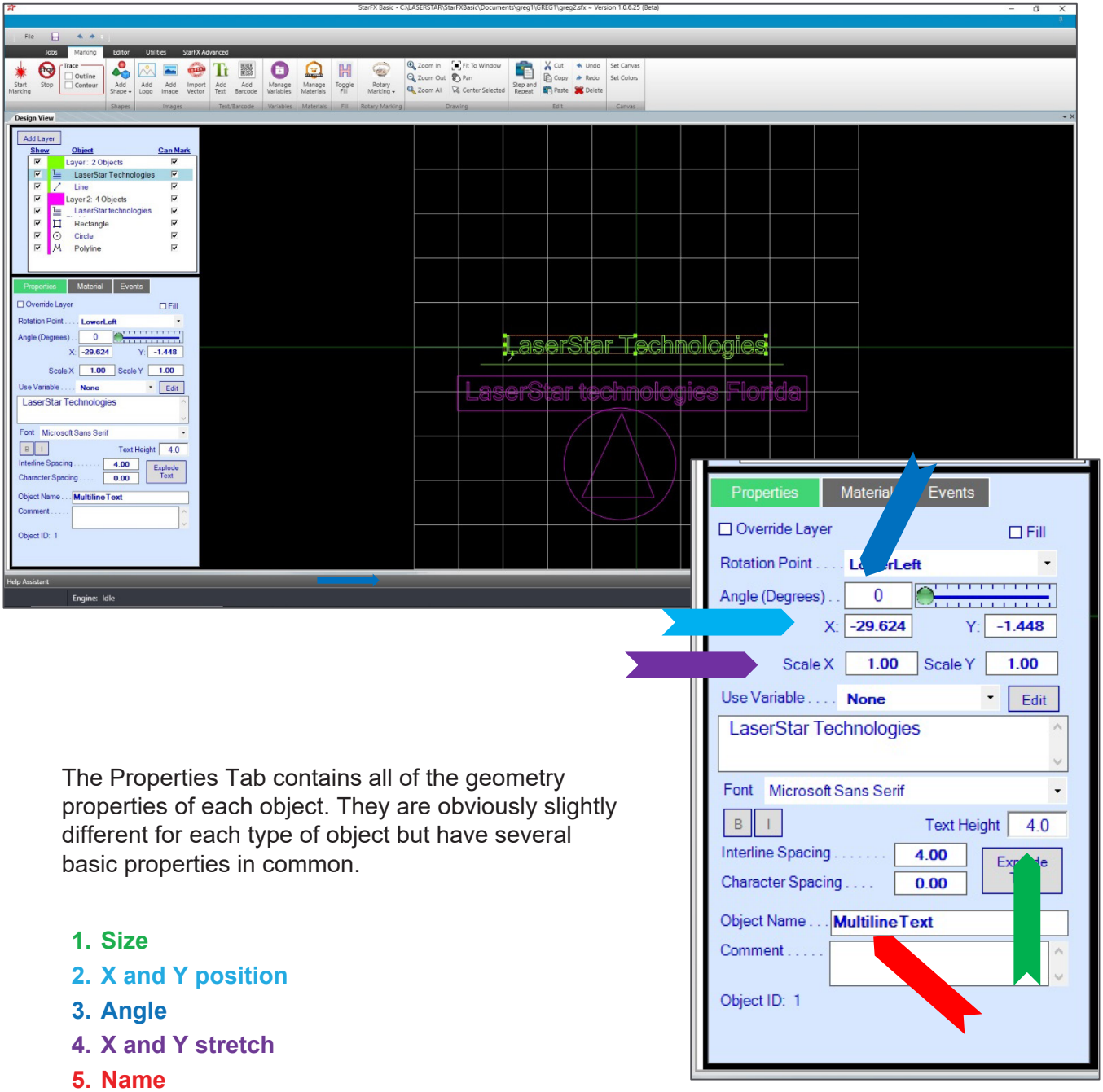



There are many changes you can make from the Program Tree, you can:

1. **Move the order items are lased by dragging and dropping them.**
2. **By selecting an object on the Tree it becomes selected on the Drawing Screen.**
3. **Decide whether to lase an item or not.**
4. **Unclutter a complicated program to lase only a specific set of objects by unchecking the “Show” boxes.**
5. **See an orderly view of your entire program.**

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# PROPERTIES TAB




The Properties Tab contains all of the geometry properties of each object. They are obviously slightly different for each type of object but have several basic properties in common.

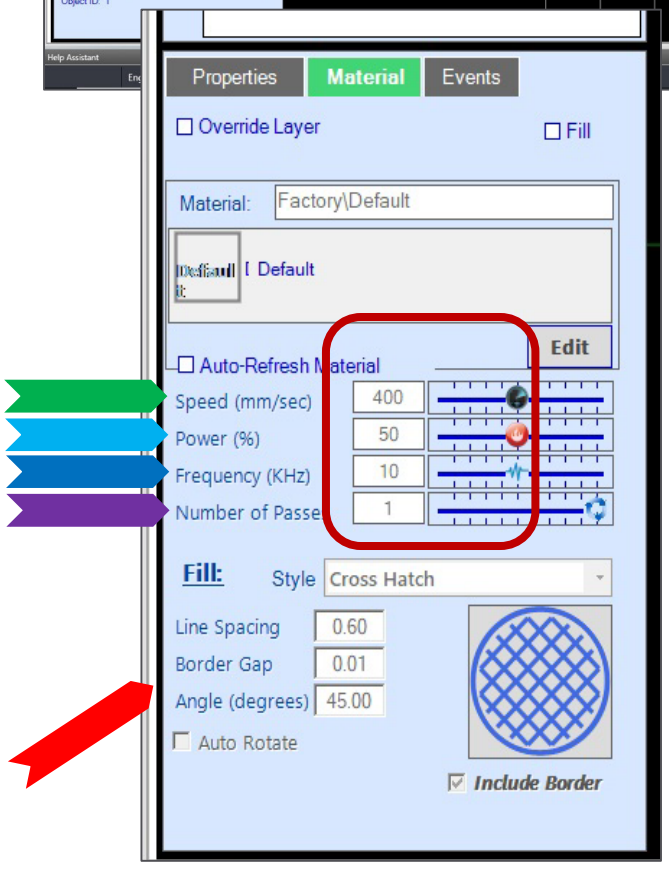
1. **Size**
2. **X and Y position**
3. **Angle**
4. **X and Y stretch**
5. **Name**

There are many other important properties that you can change to go from a “drag and drop” insertion of an object to a “blueprint” style where each property is typed in with a specific value.



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# MATERIALS TAB



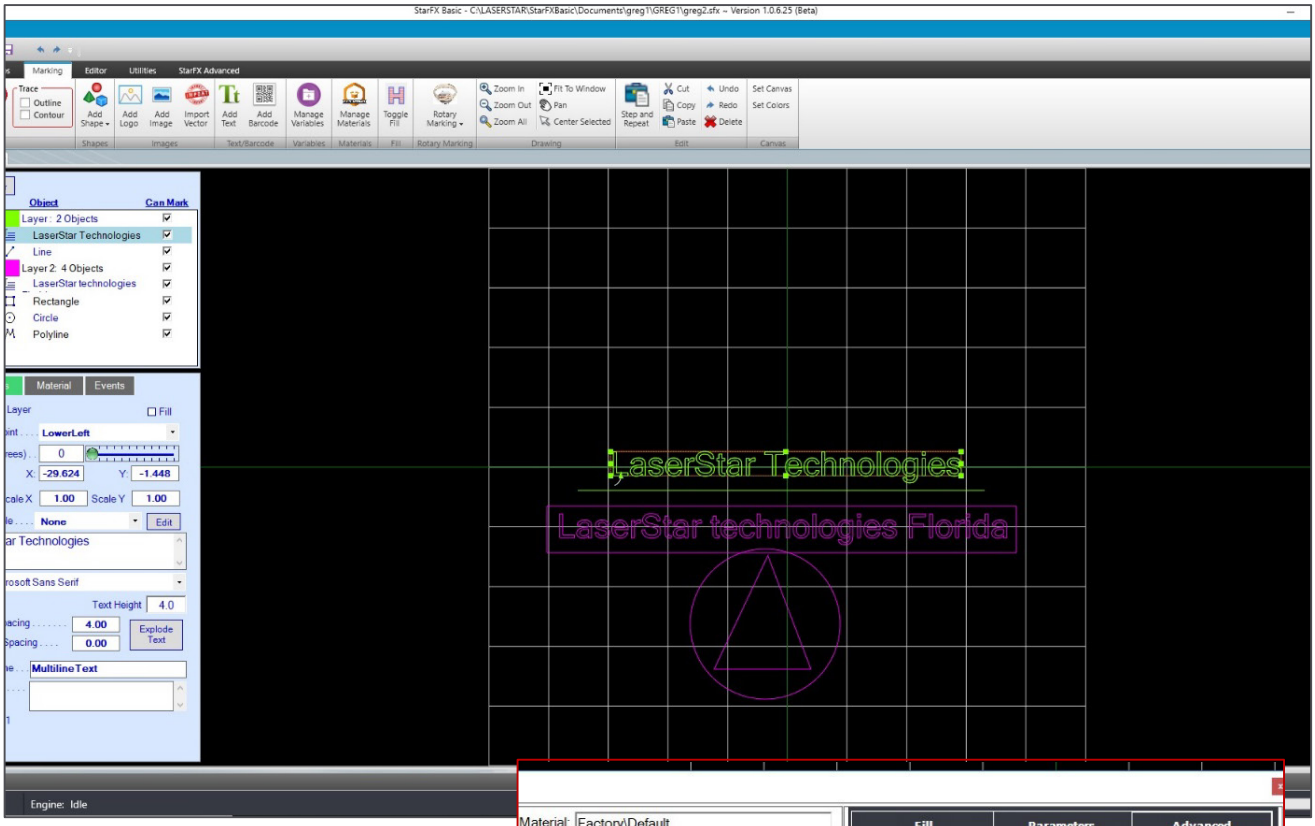

The Materials Tab contains all of the lasing parameters.

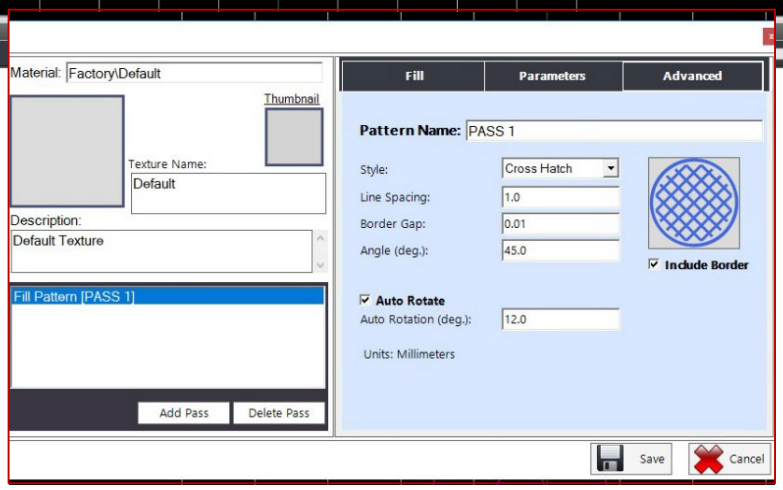
1. **Speed**
2. **Power**
3. **Frequency**
4. **Number of passes**
5. **Fill style**

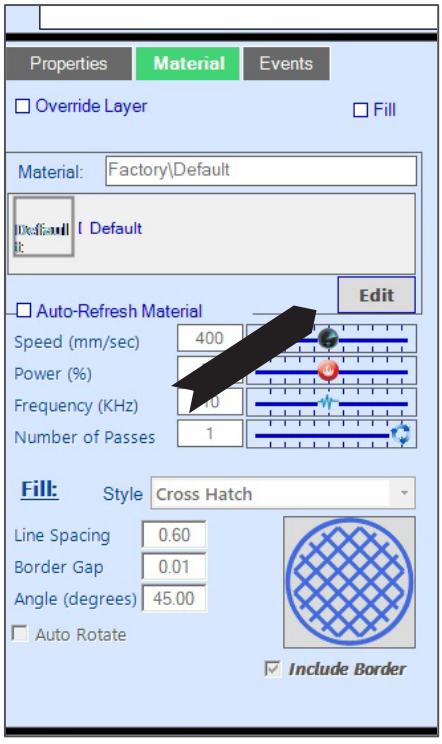
One of the MOST important features here are the Overrides.
These allow the operator the discretion of adjusting the basic laser parameters with out changing the actual Material properties.
The overrides only allow changes within a certain pre-defined window percentage.

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# MATERIALS TAB (CONT.)



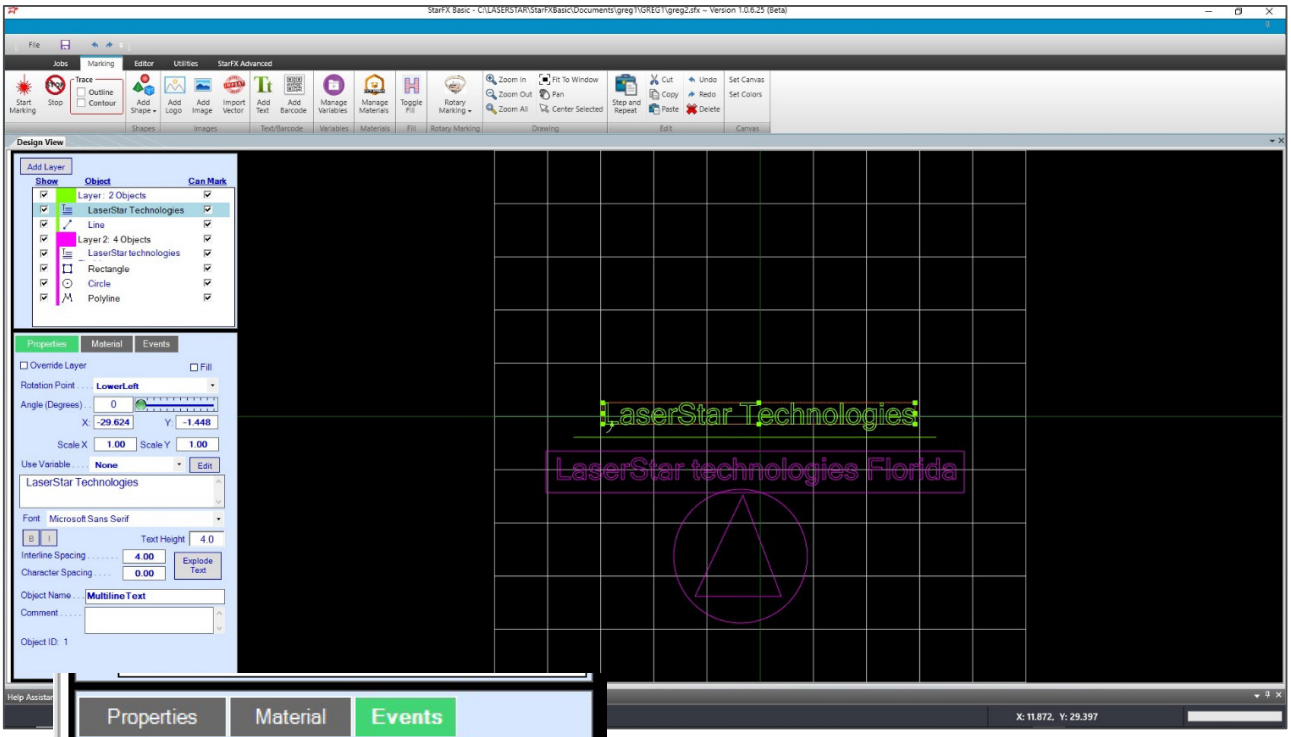



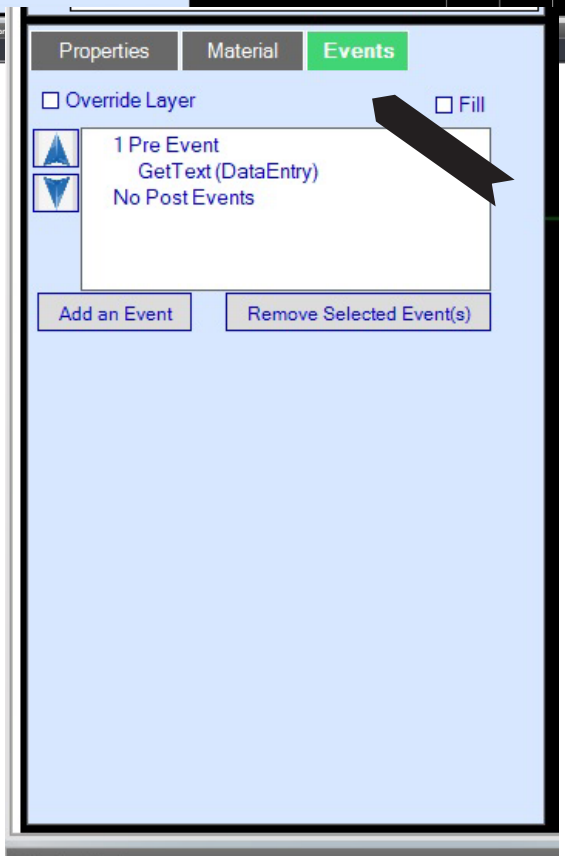

Selecting the “Edit” button will bring up the full Materials Editor for that material library if you are in anything but “Basic” mode.



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# EVENTS TAB




The Events Tab displays any Events that have been added to an object.

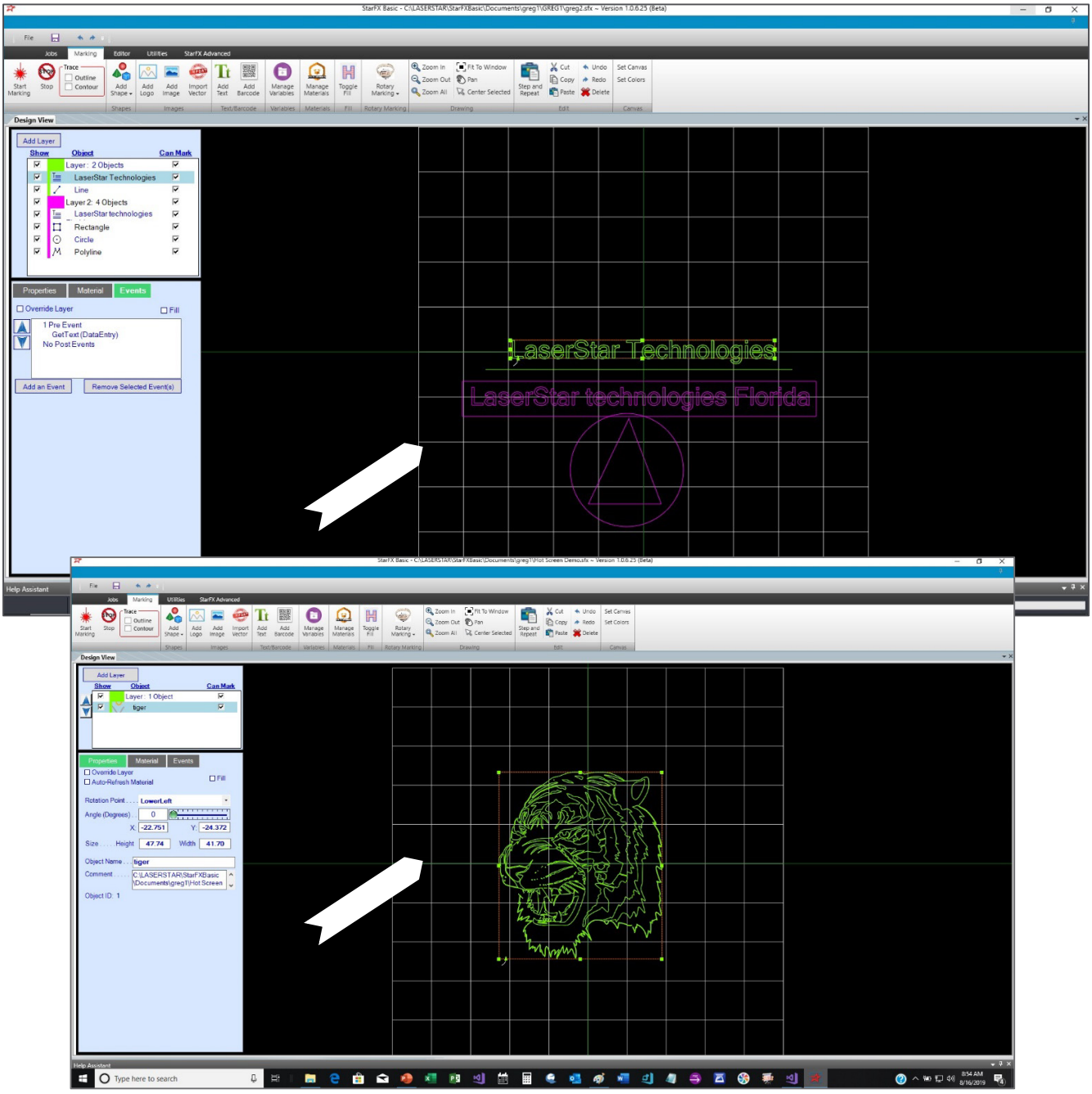
Events will be covered in a later discussion but are somewhat self explanatory.

An Event is some action not related to actual lasing that you want to happen before an object is lased or after an object is lased.

A typical example would be to ask the operator to enter the text to lase (maybe from a list they have been given) or to write the current serial number lased to a text file for later use.

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# The Canvas (Drawing Screen)




The Canvas is where you create the actual objects to lase.



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# MENU

CLICKABLE CONTENT

## UTILITIES

Roles

Users

Axis Control

Star Screen Setup

Repeat Job

## MAIN SCREEN

### DRAWING SCREEN

Marking

Drawing Tools

Management

Rotary

Canvas Tools

Shapes

Images

Logos

Graphic Images

Vector Images

Text Tool

### CREATING A PROGRAM

Layers and Objects

Program Tree

Properties

Events

### THE MORE TOOLS

Combine Tool

Weld

Explode

Merge

Convert To Polyline

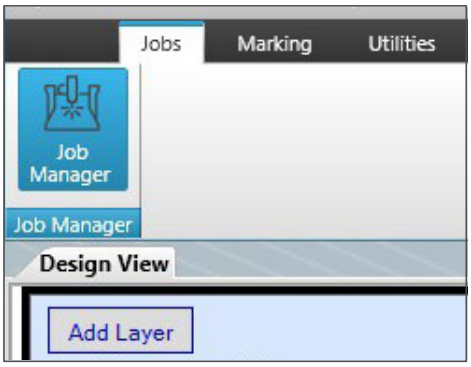
Offset

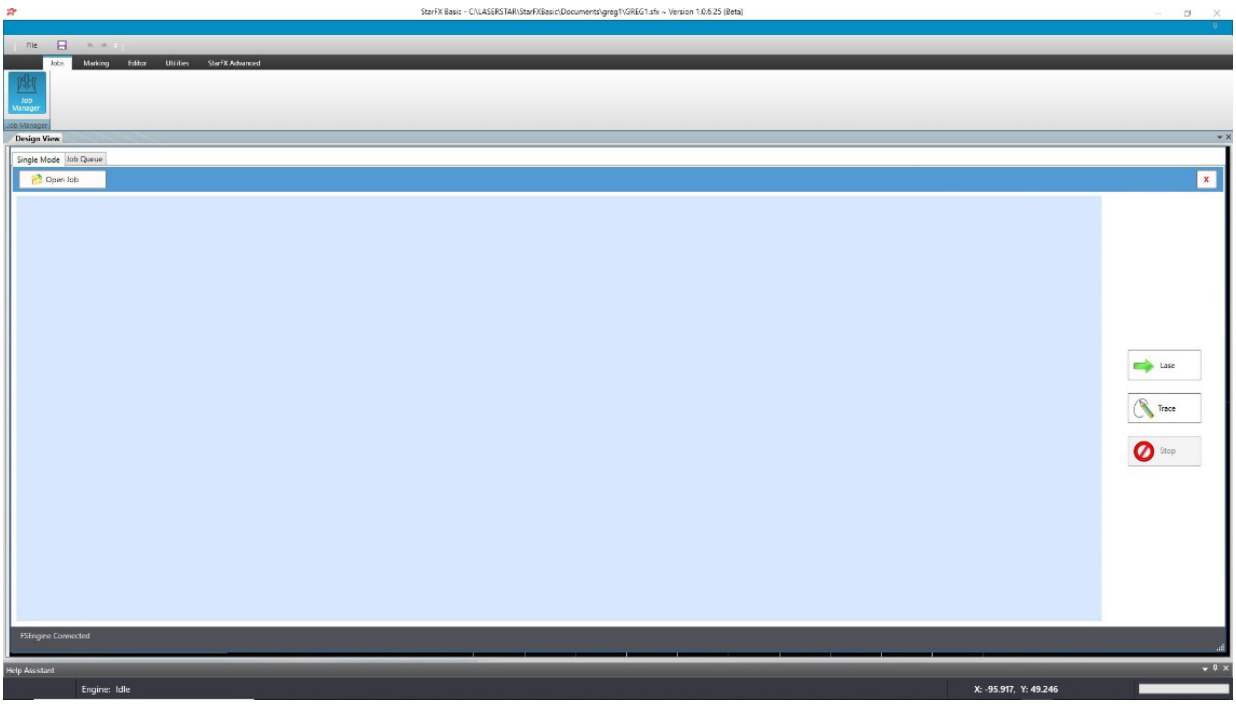
Text To Curve



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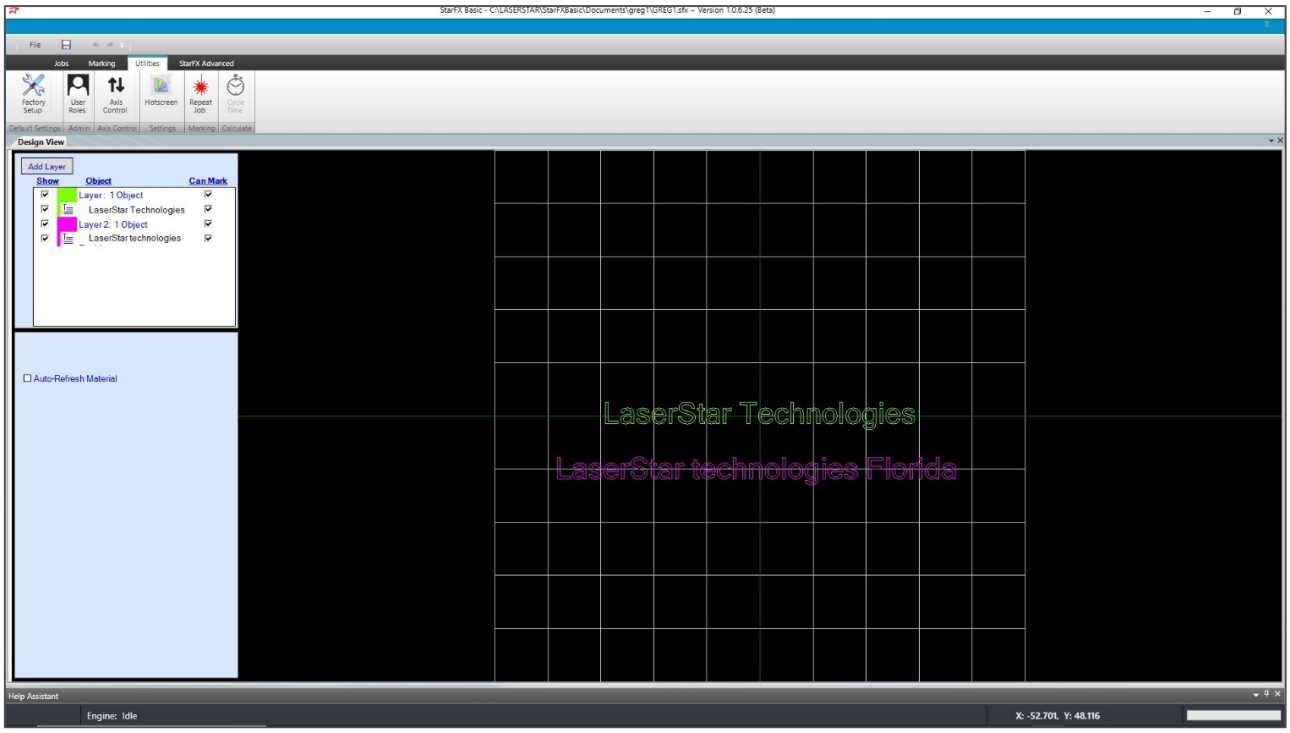
The Jobs Tab is the first tab in the Menu. The manual for this tab is included in the JOB QUE MODULE chapter. Go to page 255 or CLICK HERE.

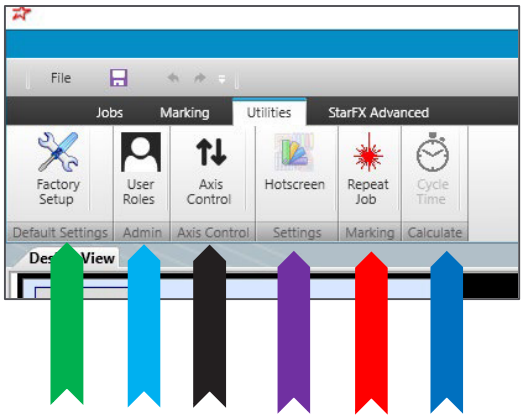


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# UTILITIES



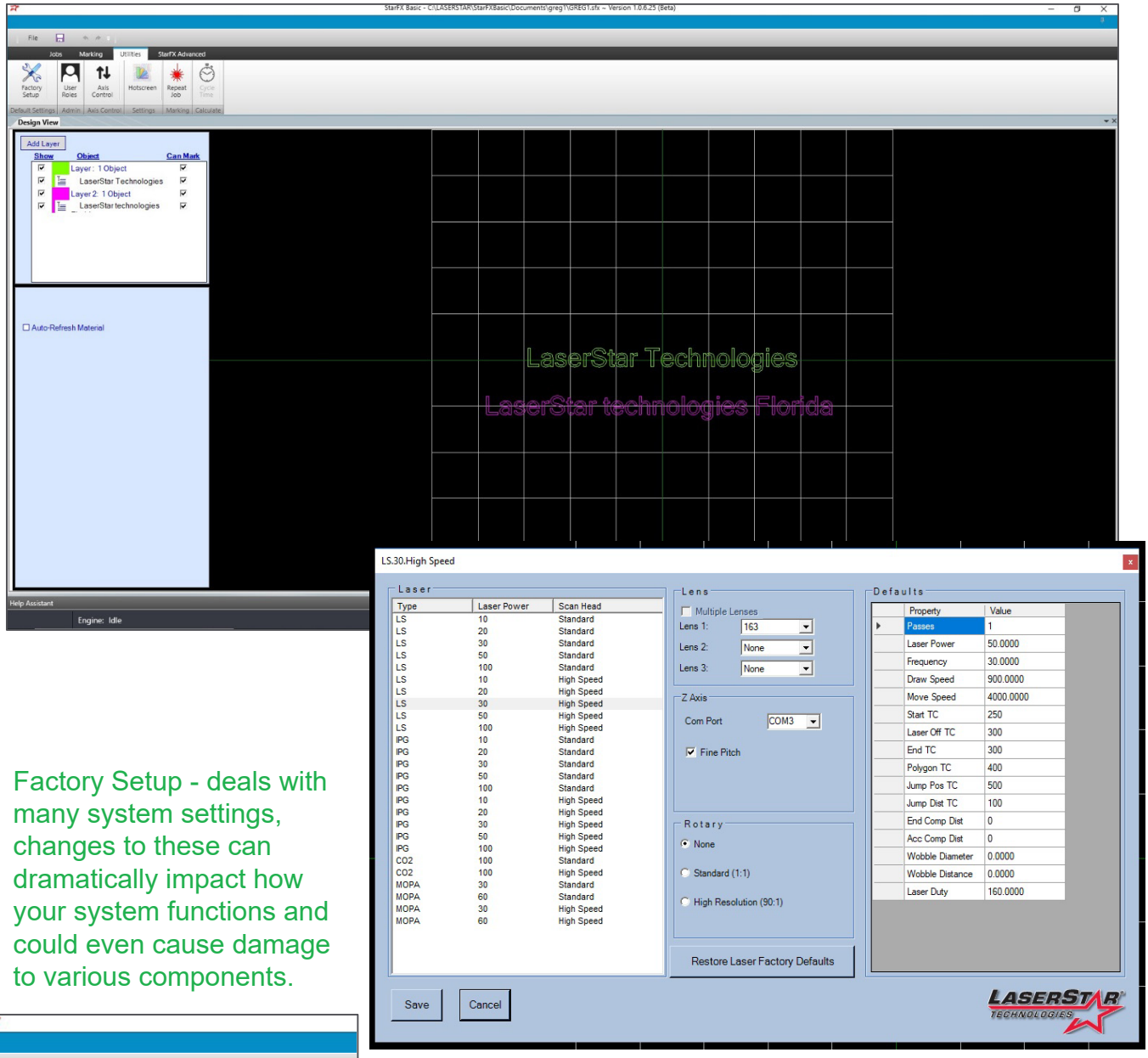

Next is “Utilities” this covers several setup options for the marking system. These are typically done at the factory and should not be adjusted without sufficient training.

1. **Factory Setup - system settings.**
2. **User Roles - permissions associated with each role.(Basic, Intermediate, Advanced)**
3. **Axis Control - basic features to Jog, Home and Index any available Axis.**
4. **Hot Screen – Setup fonts and colors for the Operator Interface Screen.**
5. **Repeat Job – Runs the continuous steps of**
   a. **Trace**
   b. **Mark**
   c. **Trace...**
6. **Cycle Time Calculator - calculates the cycle time for a selected object.**

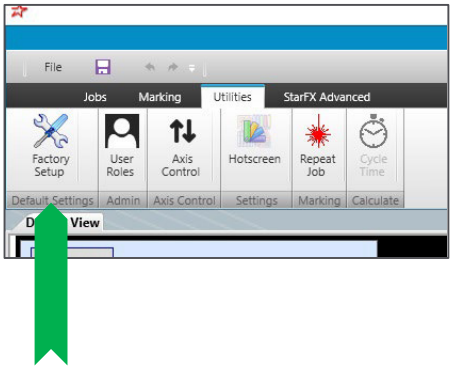


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# UTILITIES



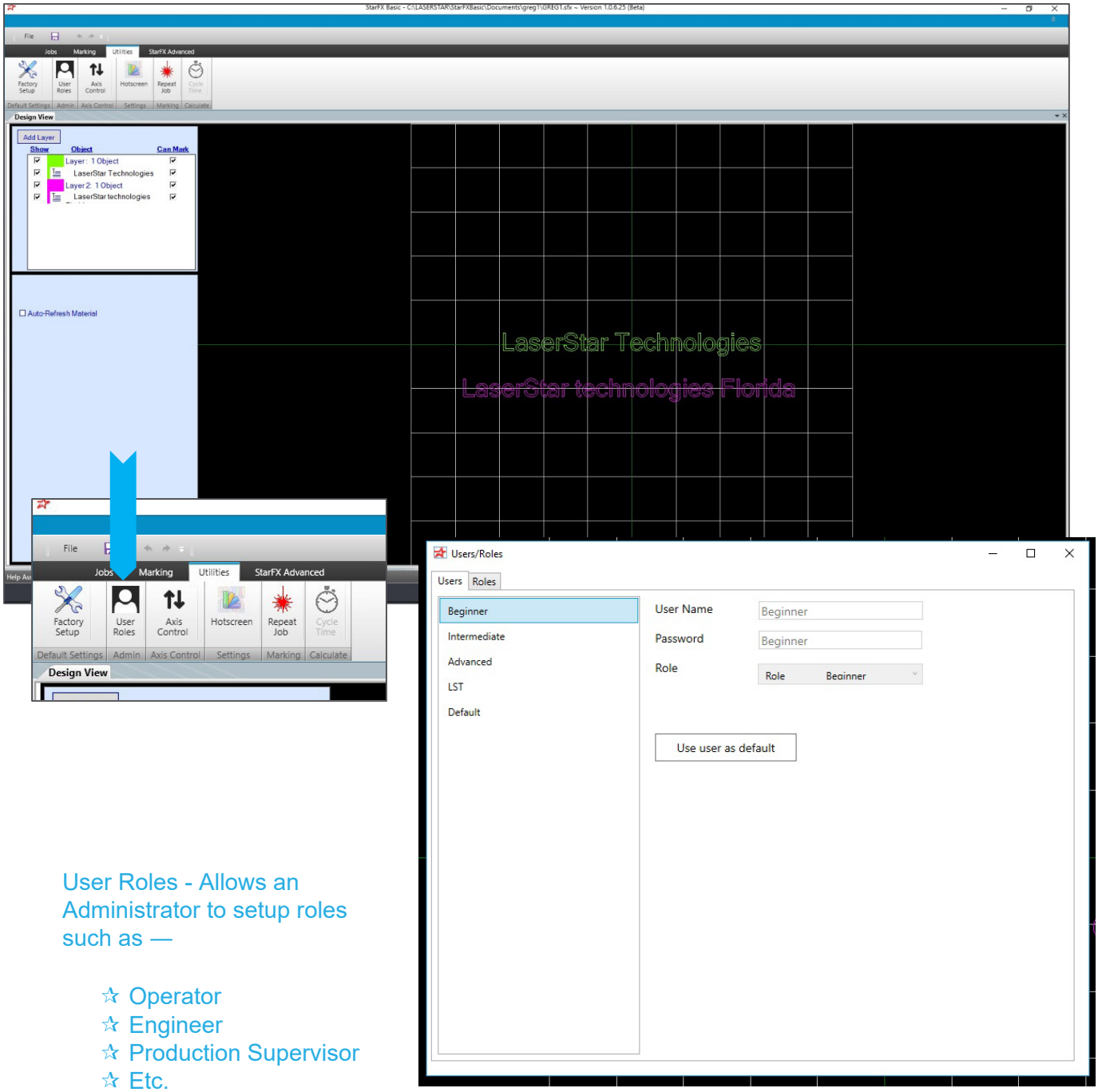

Factory Setup - deals with many system settings, changes to these can dramatically impact how your system functions and could even cause damage to various components.




Do not change any of these values without LaserStar guidance.

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# ROLES




User Roles - Allows an Administrator to setup roles such as —

- ☆ Operator
- ☆ Engineer
- ☆ Production Supervisor
- ☆ Etc.

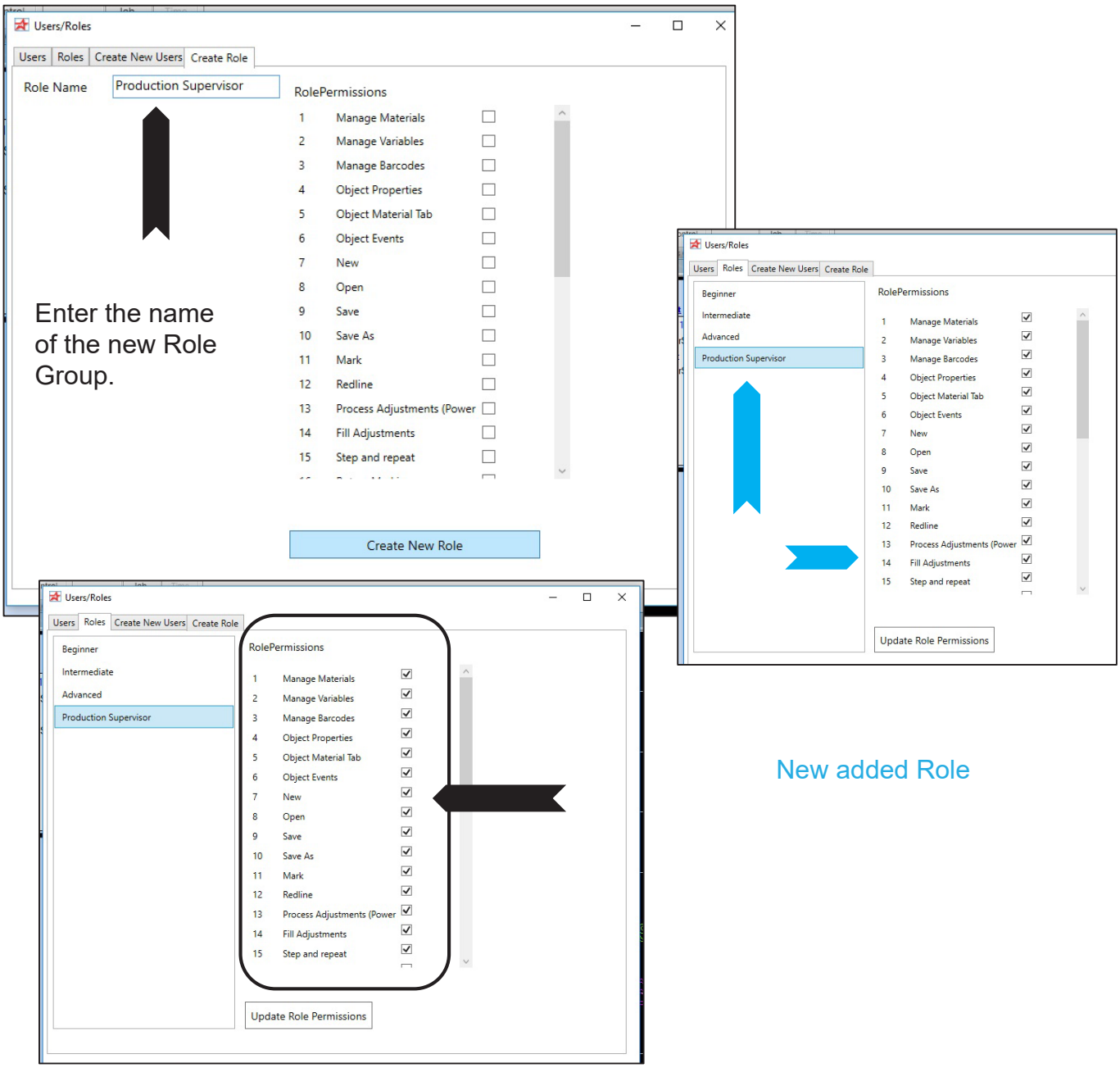
Then what access each role has to the various features of the software can be assigned.

This keeps certain users from accessing areas that could be damaging to the production environment such as program editing or Material Libraries.



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# ROLES

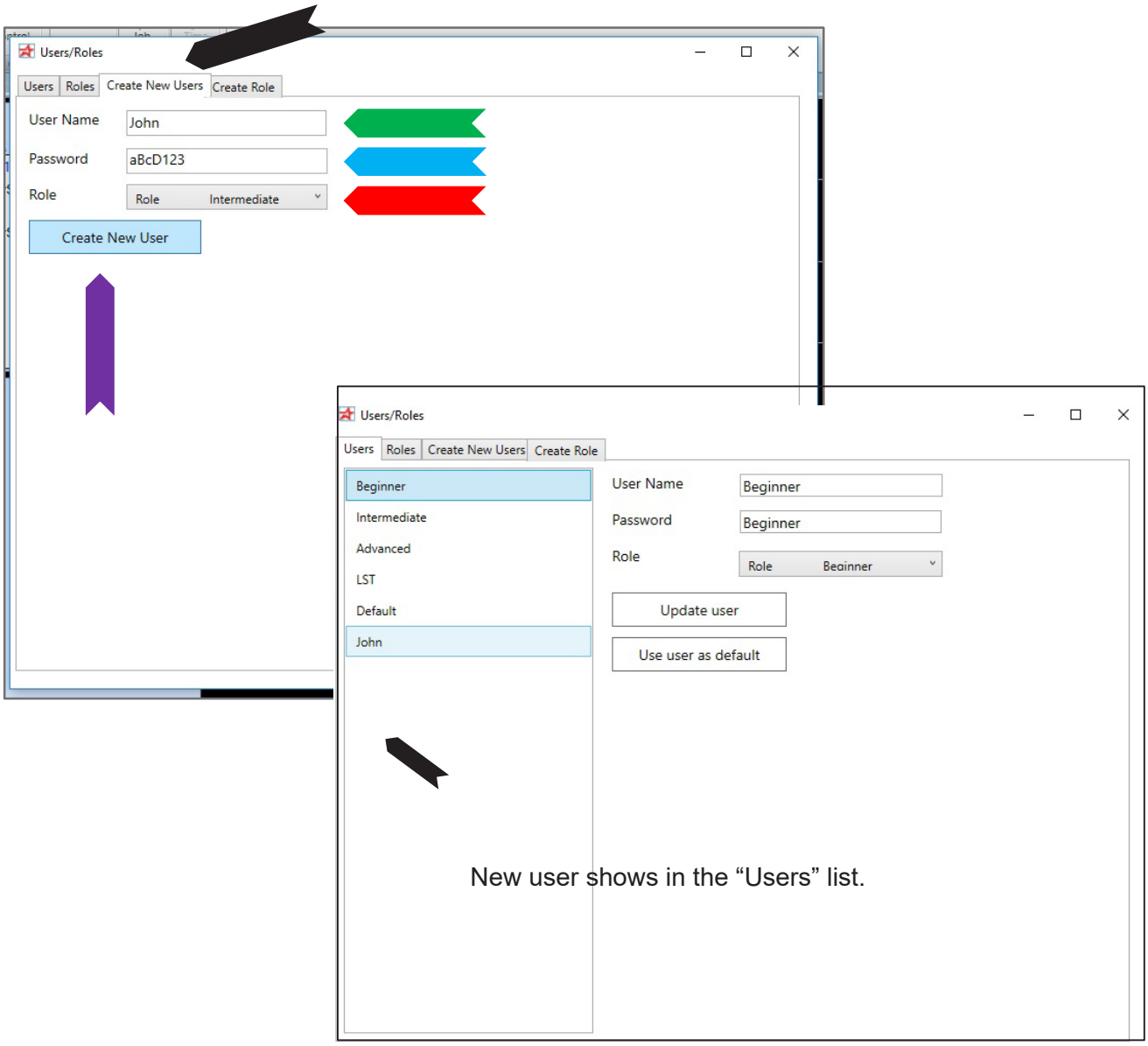



New added Role

The “Create Roles Tab” allows you to Create a new Role Group or edit an existing one, you simply select which of the 29 features you want accessible to each role by checking the box next to the feature you want this role to have access to.

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# USERS



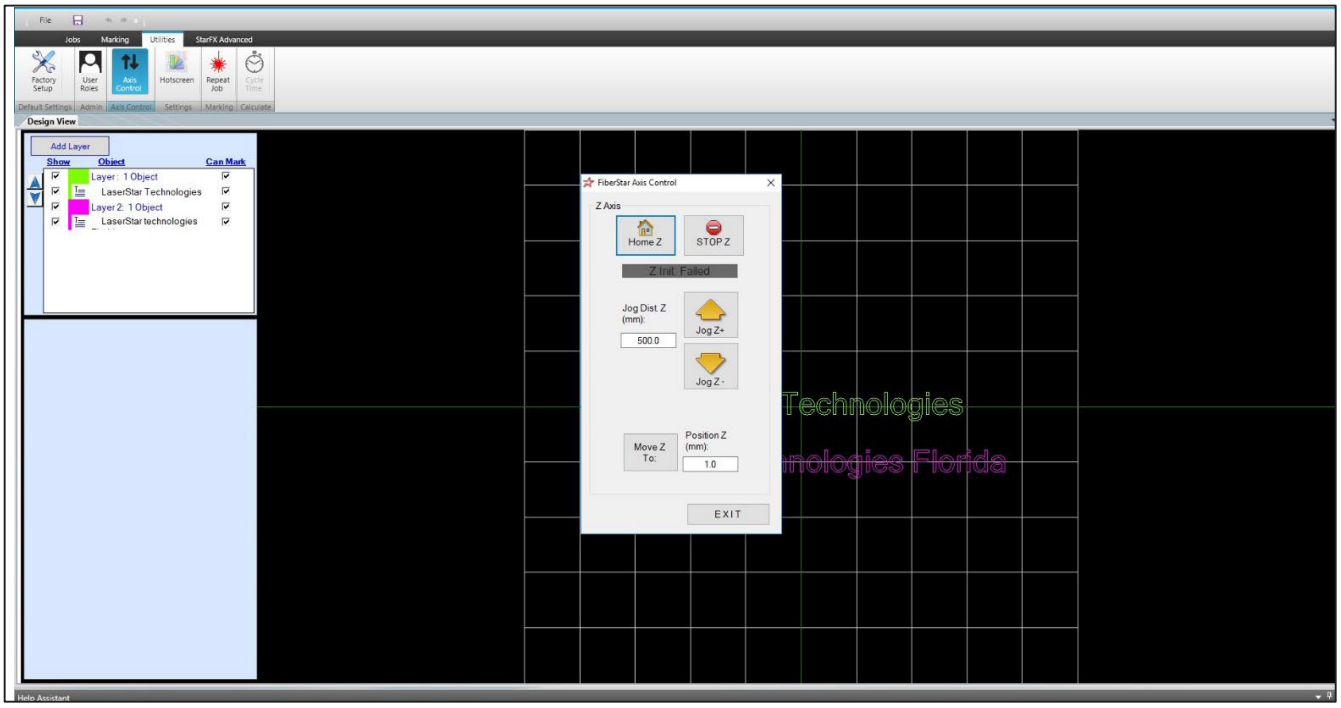

Adding a new User is just as easy.

- ☆ Select the “Create New User” Tab.
- ☆ Enter their name.
- ☆ Enter the Password.
- ☆ Select the desired Role
- ☆ Press the “Create New User” button.



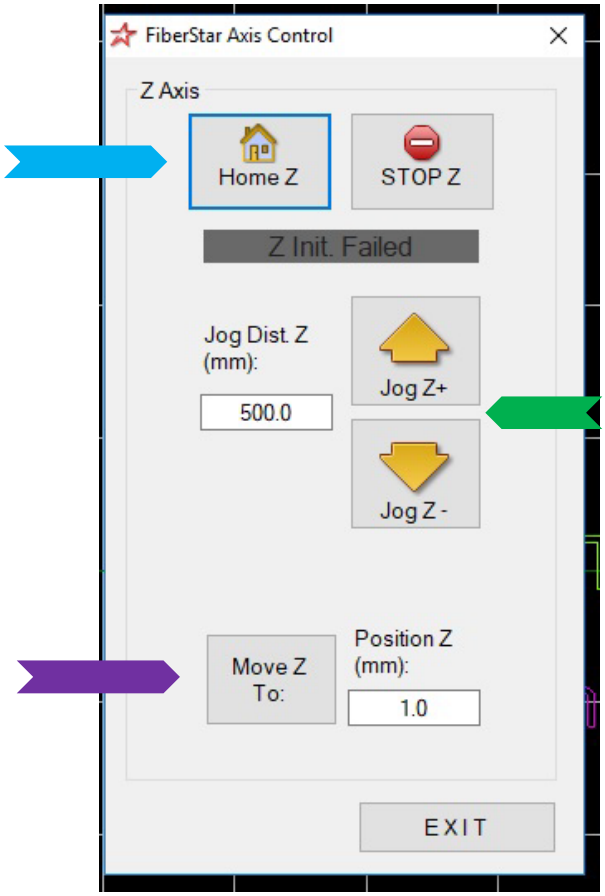
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# AXIS CONTROL



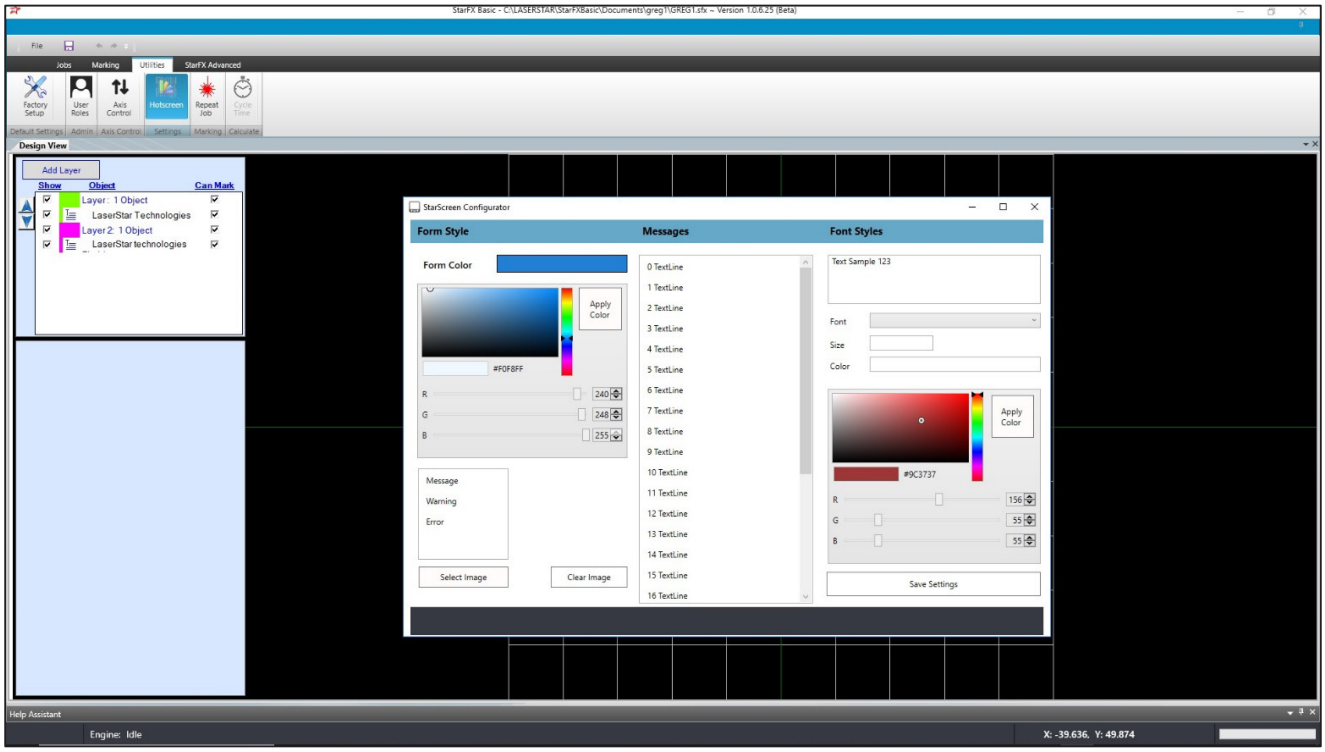

The Axis Control selection brings up a screen that allows you to perform basic functions of any of the Axis that were purchased.
This is typically X, Z and R (rotary). You can:

Home
Jog
or Move to a specific positions




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# STAR SCREEN SETUP




The Star Screen Setup button displays the setup screen for the way the Star Screen will show messages.

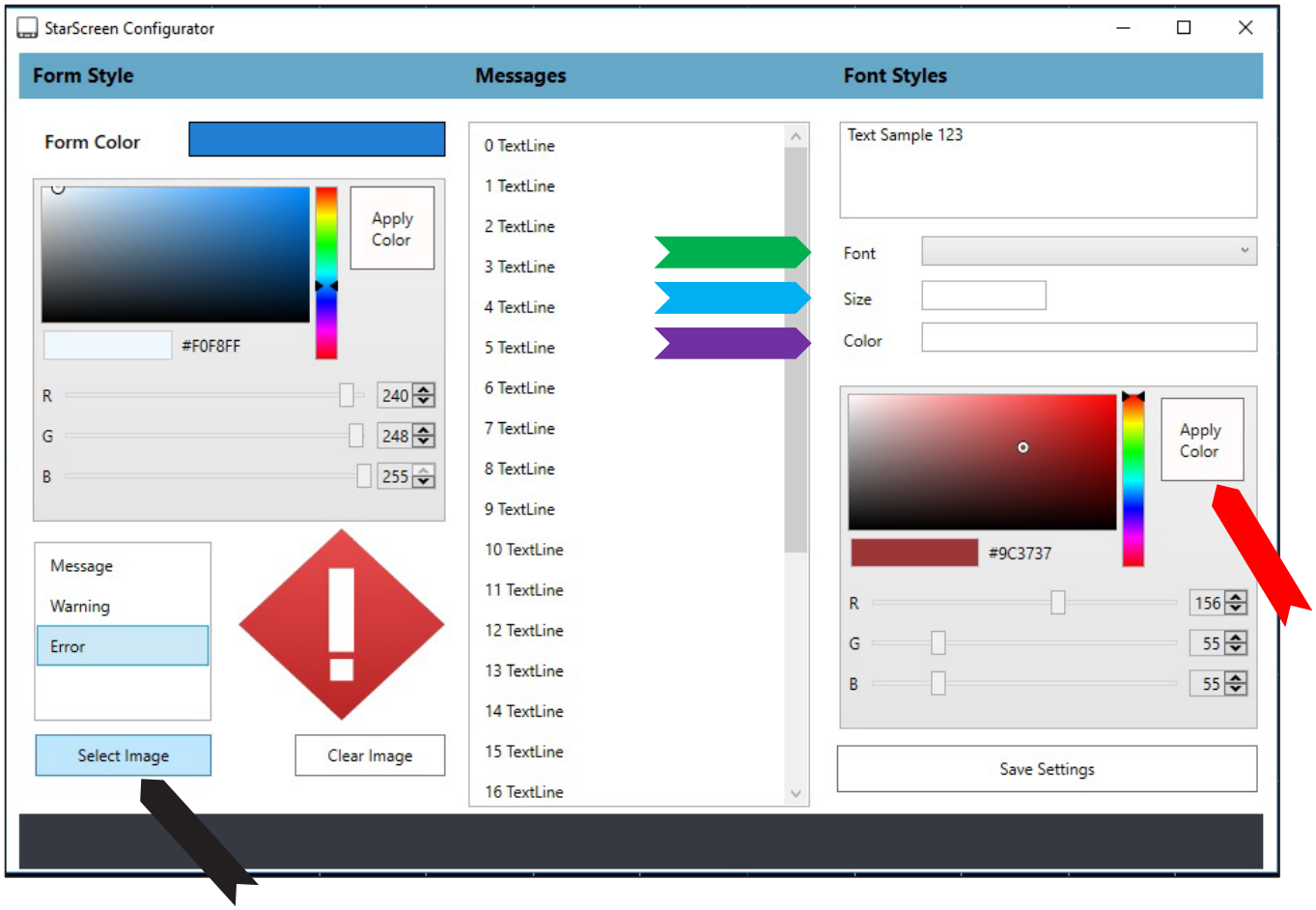
The Star Screen will be covered in detail later. In a short explanation it is the screen that can interface with the Operator as the program is running to –

- ☆ **Give instructions.**
- ☆ **Ask for input.**
- ☆ **Show Warnings or Faults.**
- ☆ **Show the progress of a multi-step program.**



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# STAR SCREEN SETUP (CONT.)

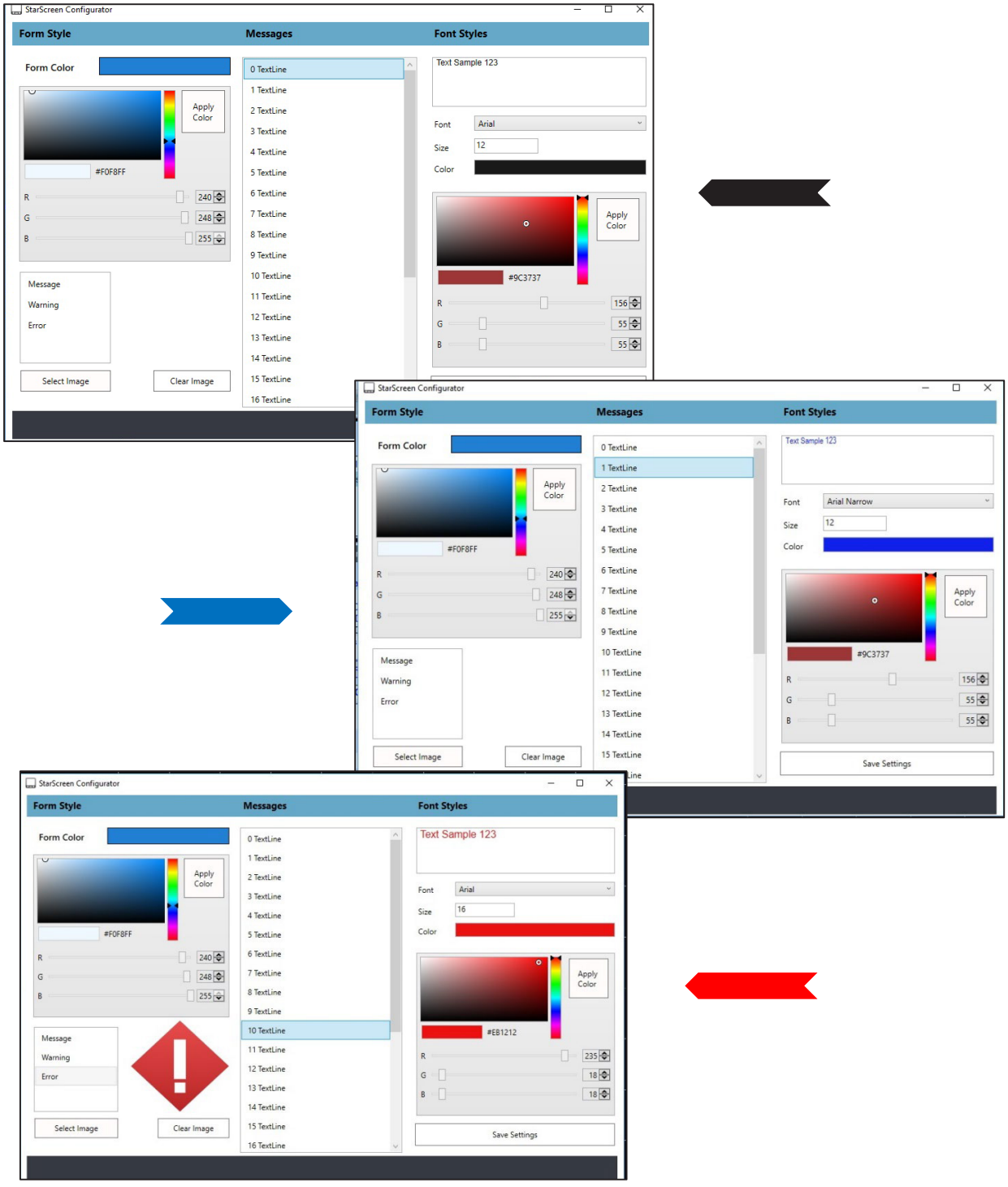



The Setup Screen allows you to do several things for each message type and each line of the Display Screen -

- ☆ Select an Icon for the different types of displays.
- ☆ Pick a font.
- ☆ Choose a size.
- ☆ Create a color for the text.
- ☆ Create a color for the whole screen.

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# STAR SCREEN SETUP (CONT.)

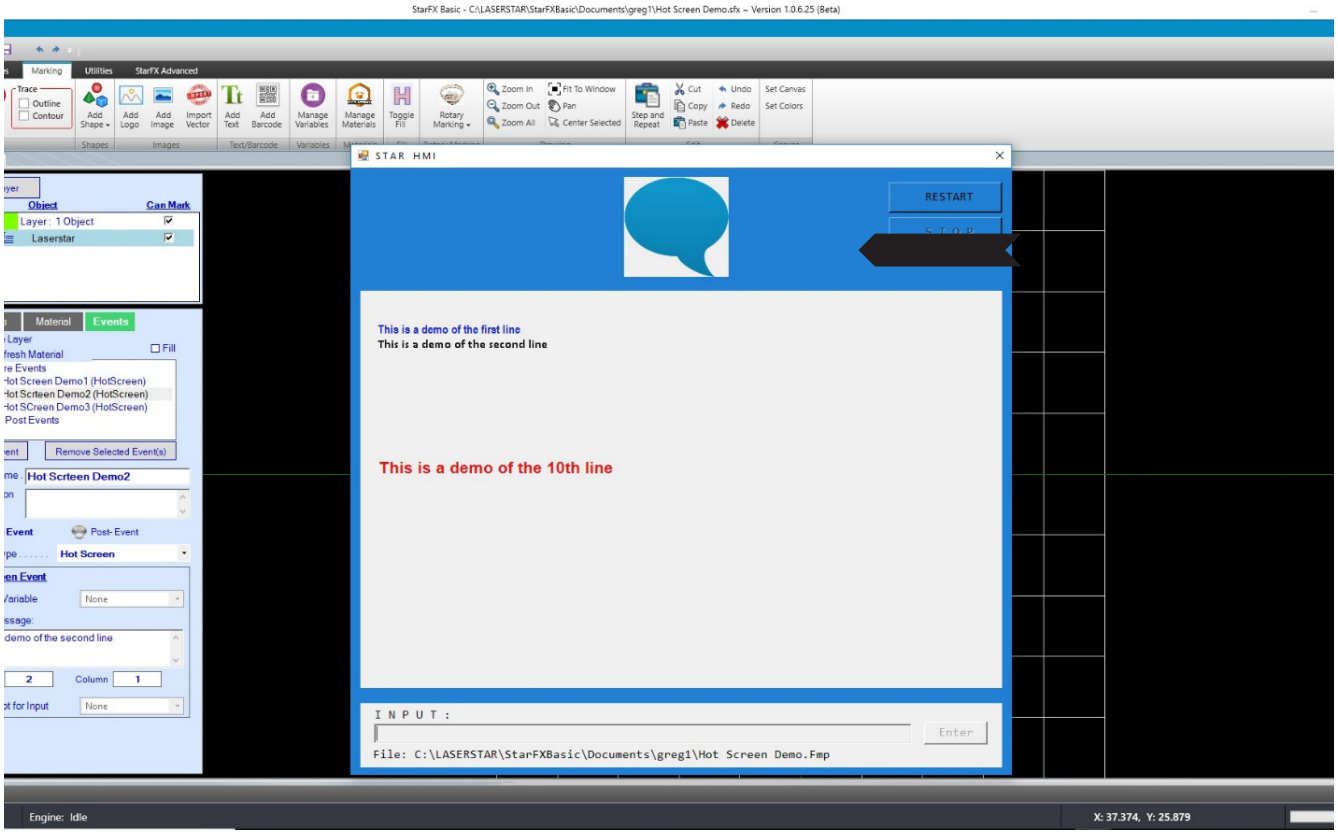



Here we have setup the first line to be “Arial”, “12 Pt size” and the “Color Black”. The second line to be “Arial”, “12 Pt size” and the “Color Blue”. And the tenth line to be “Arial”, “16 Pt size” and the “Color Red”.

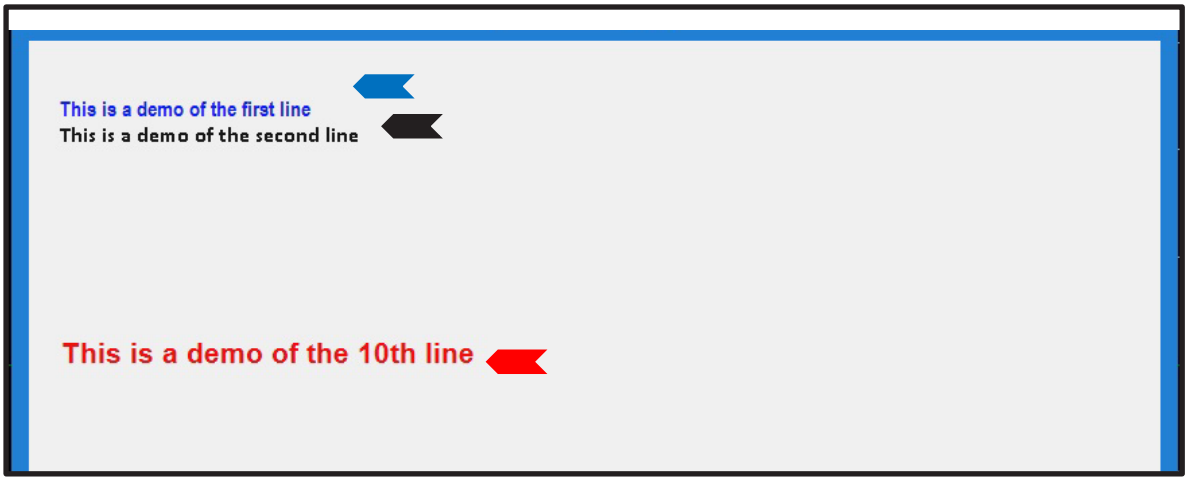


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# STAR SCREEN SETUP (CONT.)

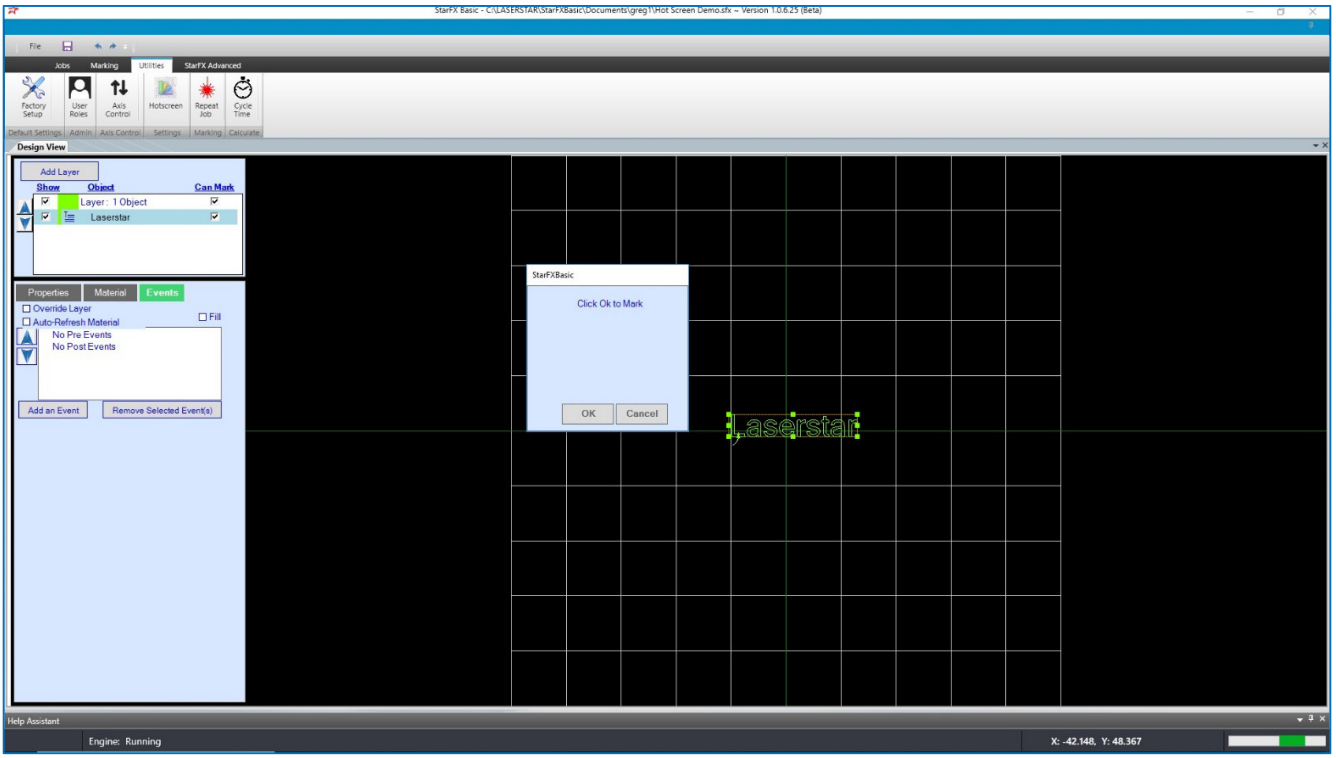


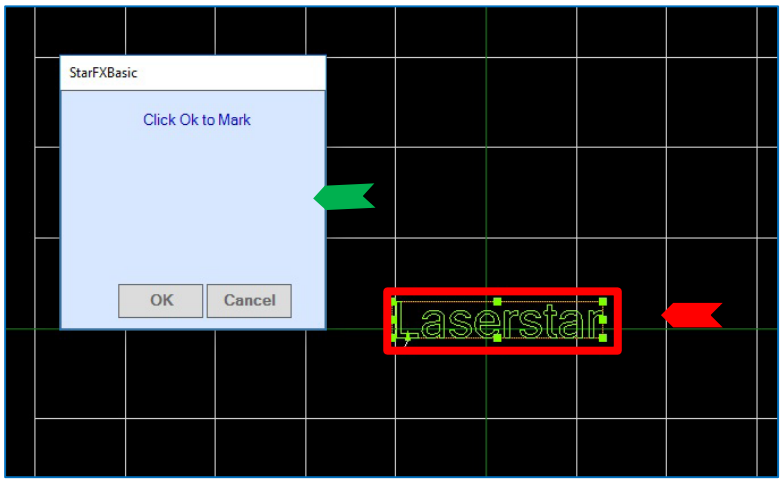

Here is the actual Star Screen running from the program as an Event.

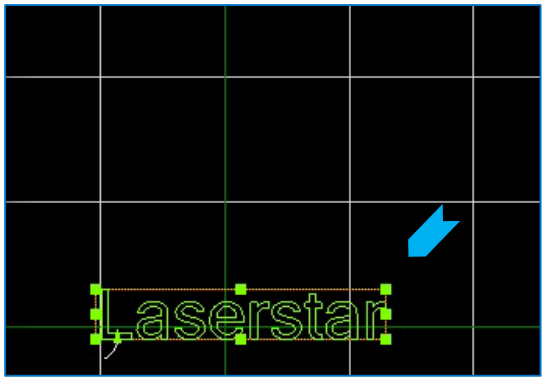



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# REPEAT JOB



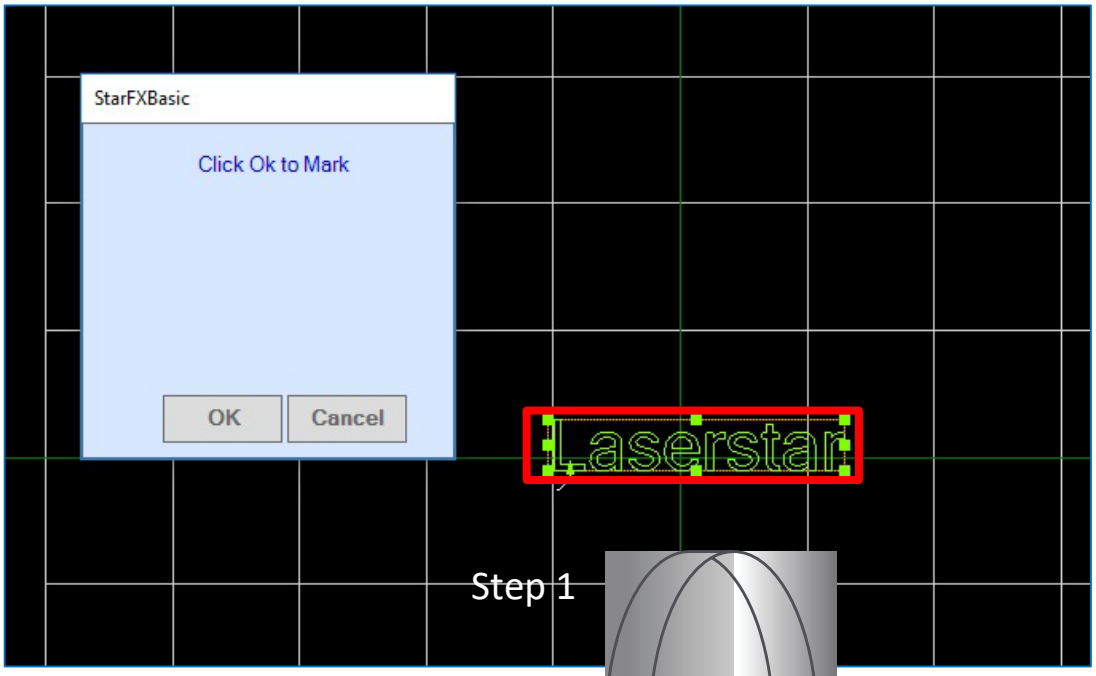

Repeat Job is a production feature that does a continuous run in two steps.

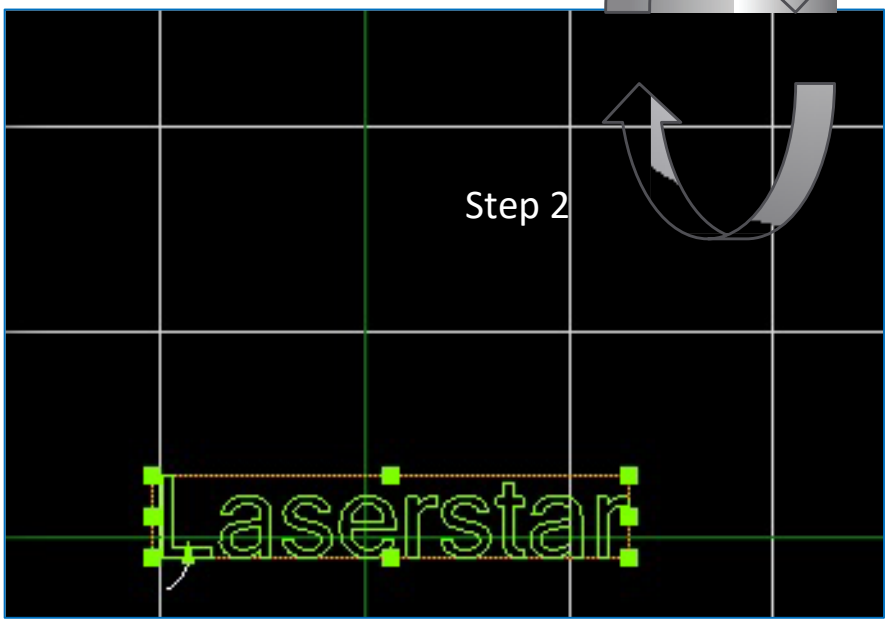
- ☆ First it runs the “Red Trace“ box to allow the operator to align the part to lase to the actual lasing.
- ☆ A message box appears to provide a way for the operator to signal that the alignment is complete.
- ☆ When the operator clicks the “OK” button the part is lased.

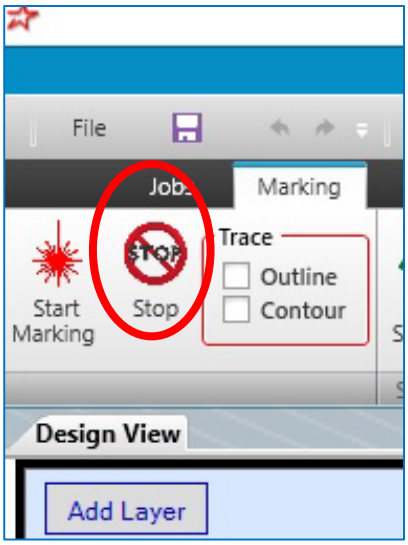


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# REPEAT JOB (CONT.)



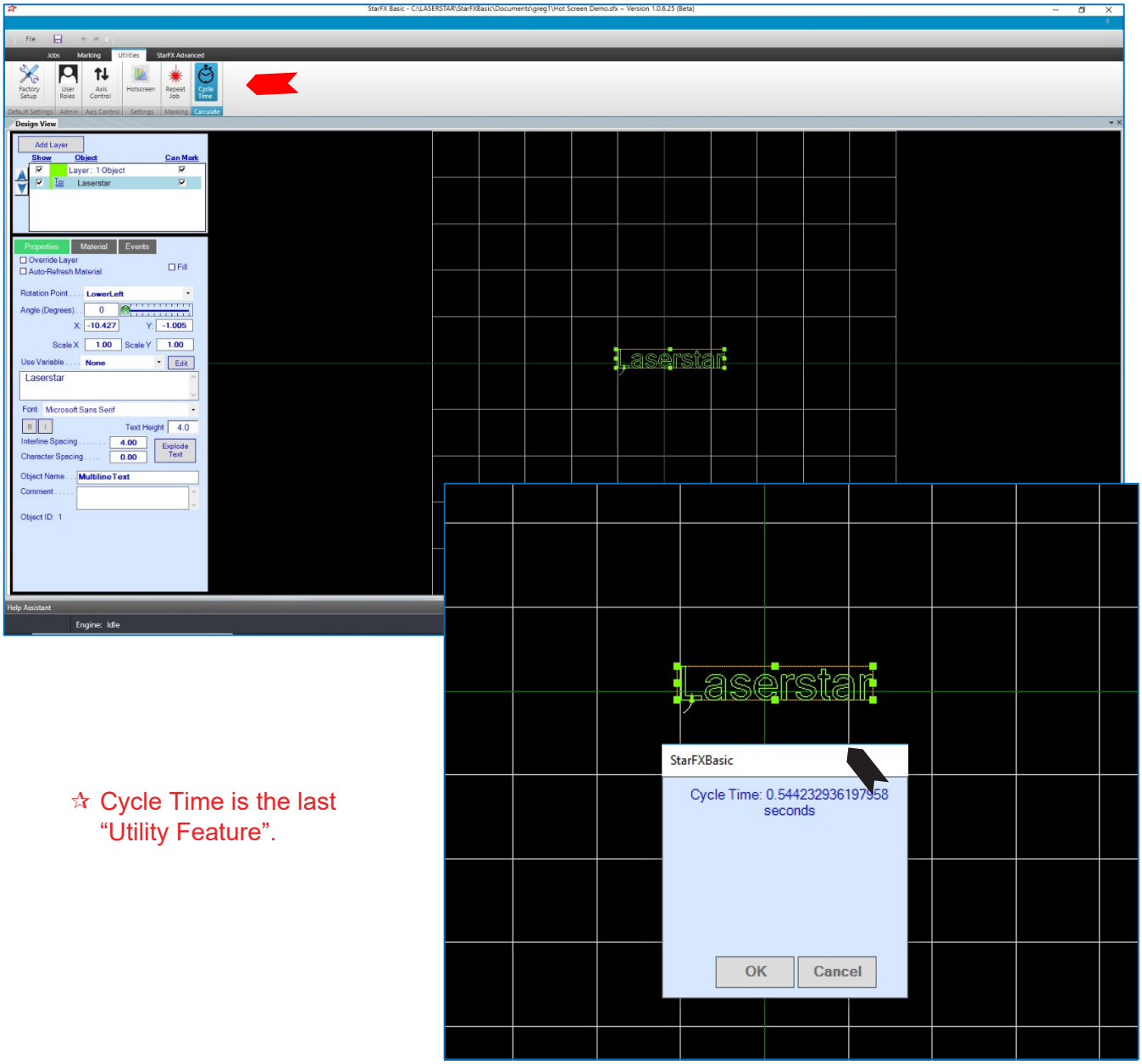




This pattern will repeat itself automatically until the **Stop Lase** button is pressed.

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# CYCLE TYPE



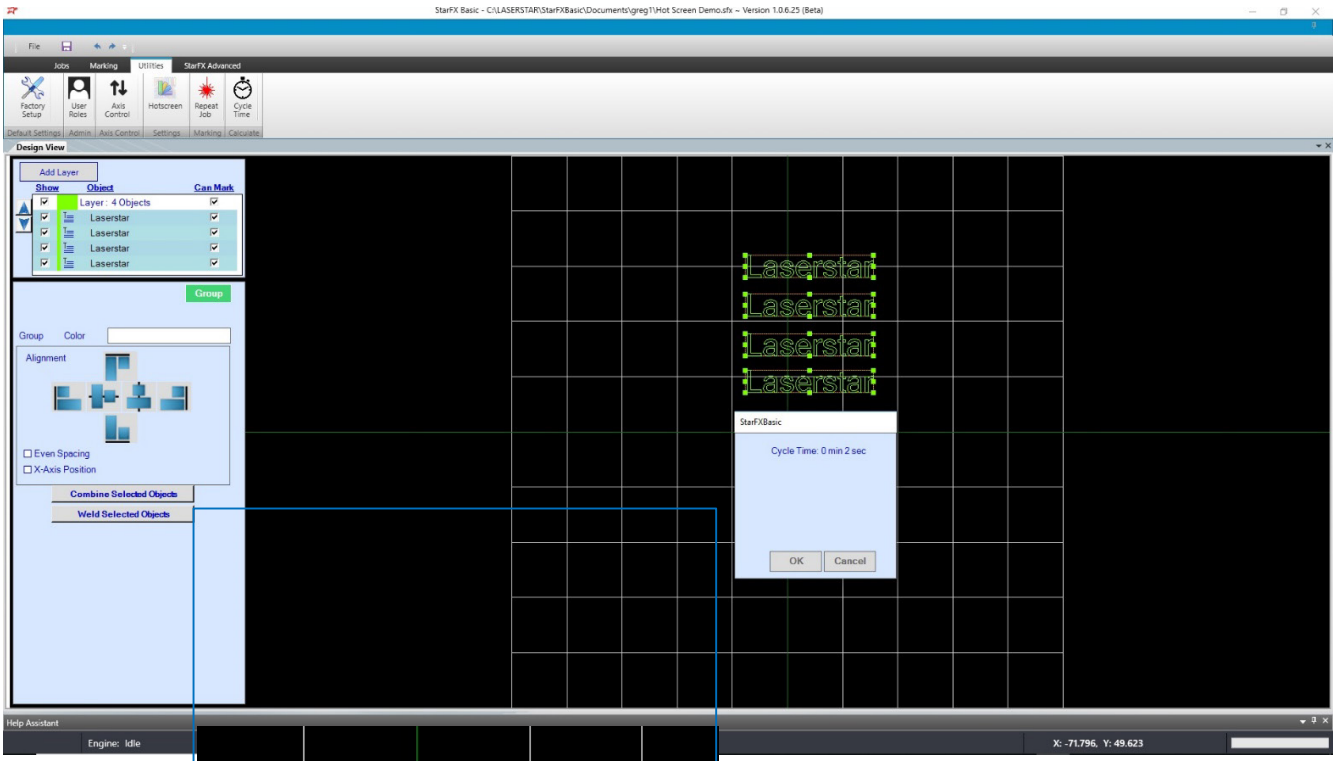

☆ Cycle Time is the last "Utility Feature".

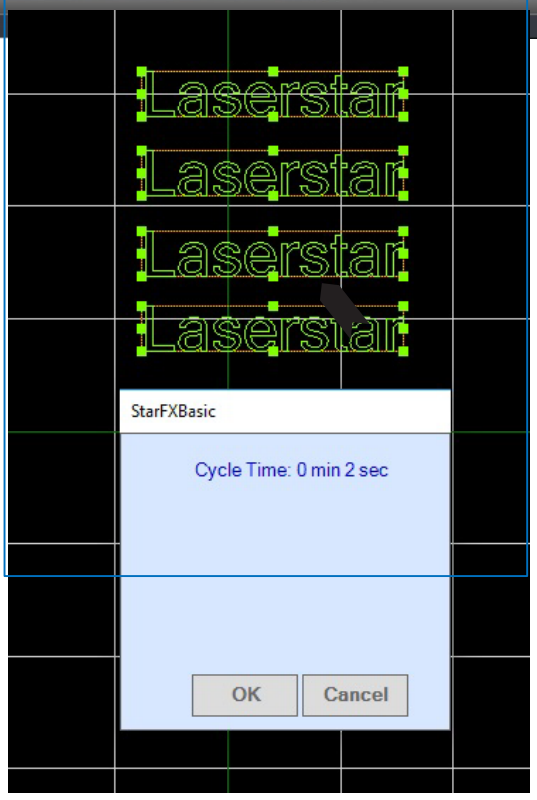
It simply calculates the estimated cycle time of the selected Object. This time is fairly accurate and takes into account all of the Material settings including Fill and TC values.



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# CYCLE TYPE (CONT.)




Here it calculates the cycle time of the selected Group of Objects.

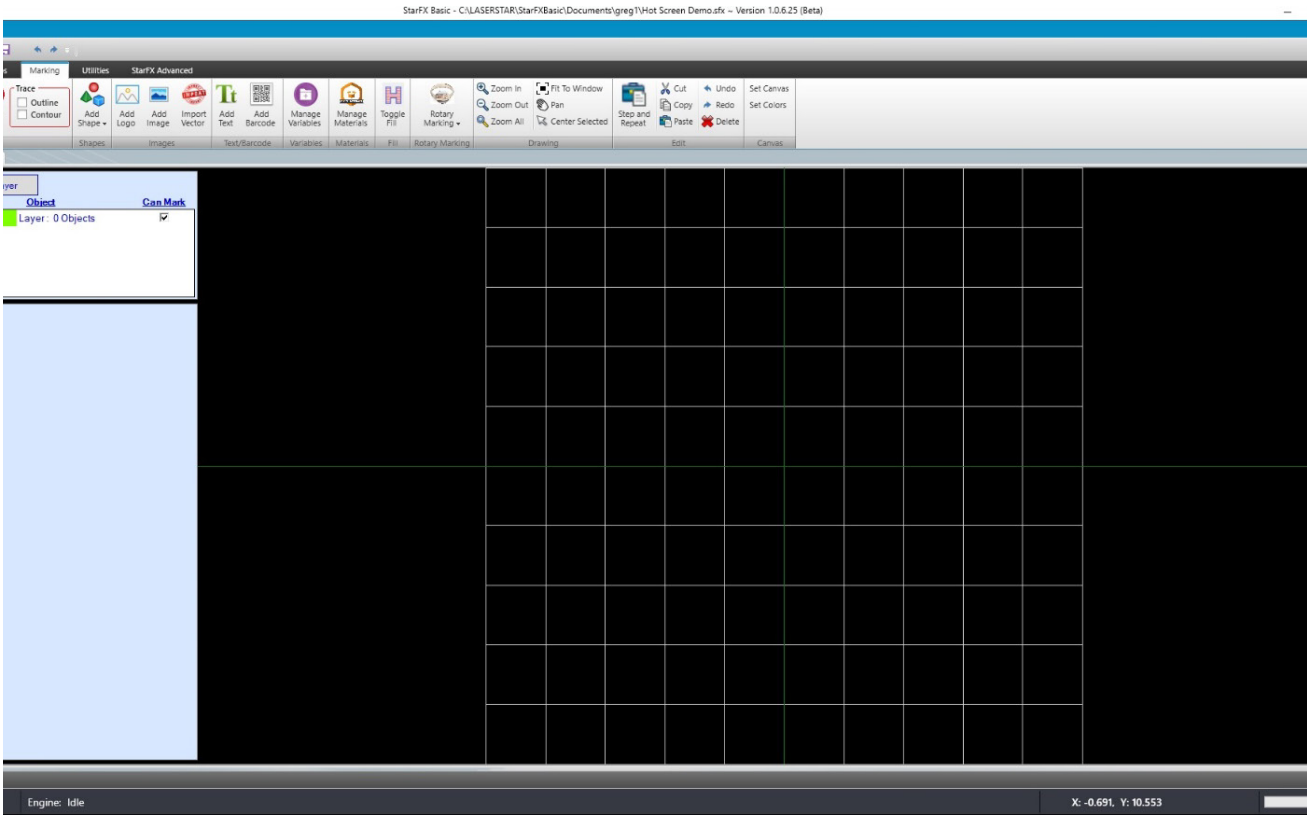
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# MAIN SCREEN

## DRAWING SCREEN

Next we will cover the “Main Screen” or the Drawing Screen

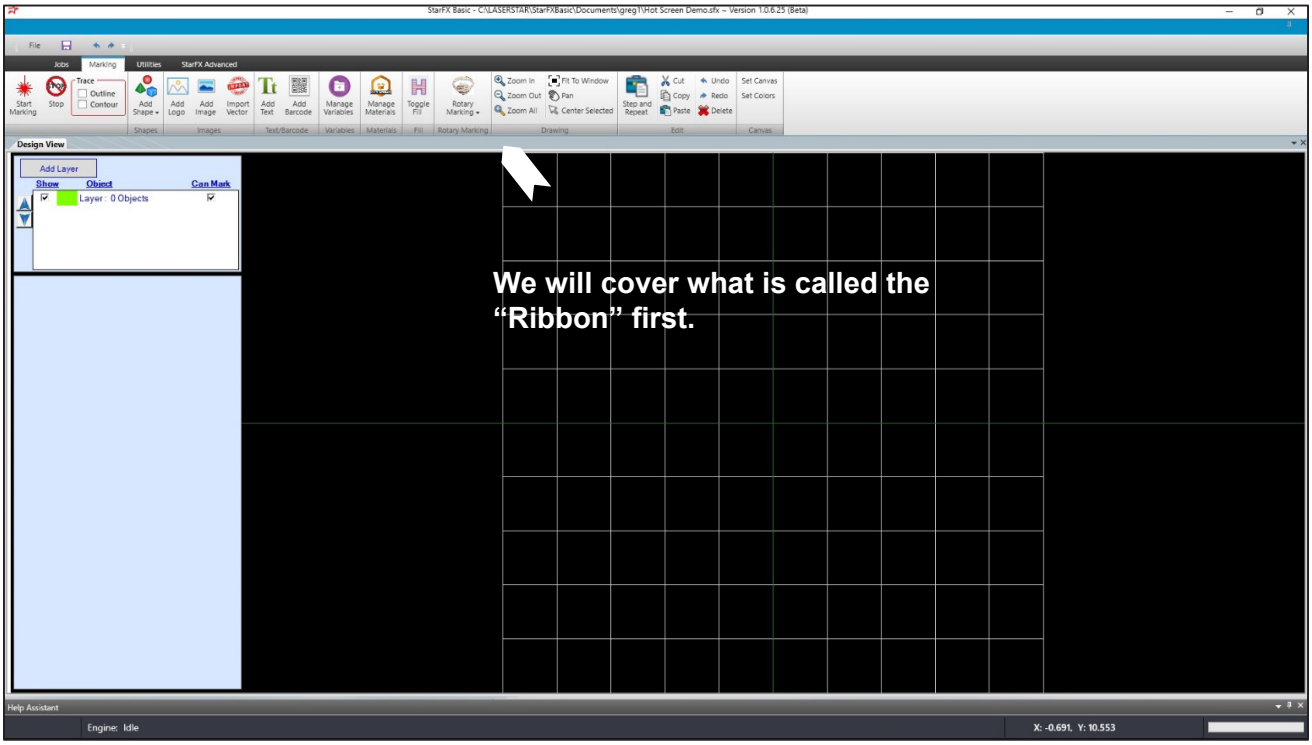
(sometimes called the Canvas).

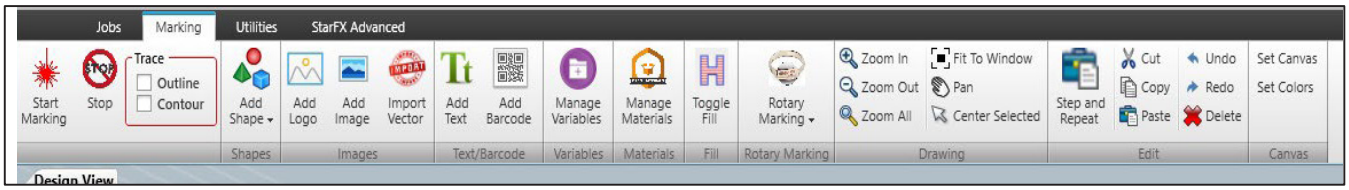





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# MAIN SCREEN



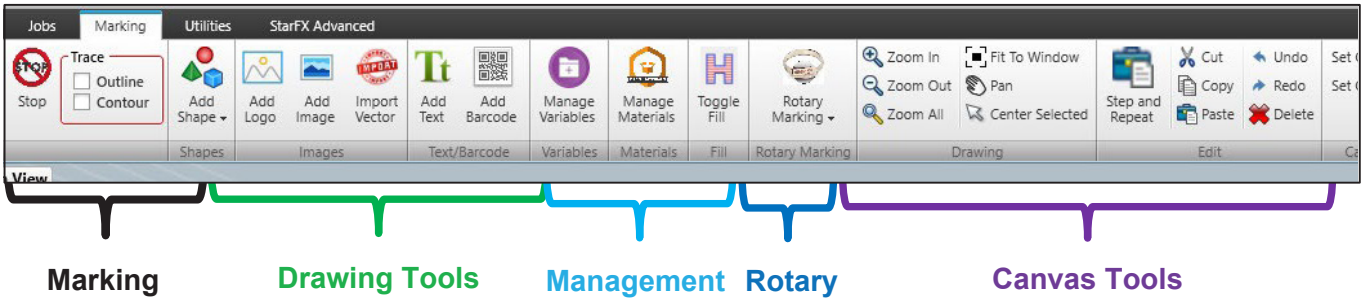




The “Ribbon” contains all of the Tools used to “draw” objects on the screen and to create a specific flow to the lasing program.

It also provides some high level capabilities such as Events and the Materials Library.

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# MAIN SCREEN




The “Ribbon” is divided up into sections to make it easier to find the action you want to happen.

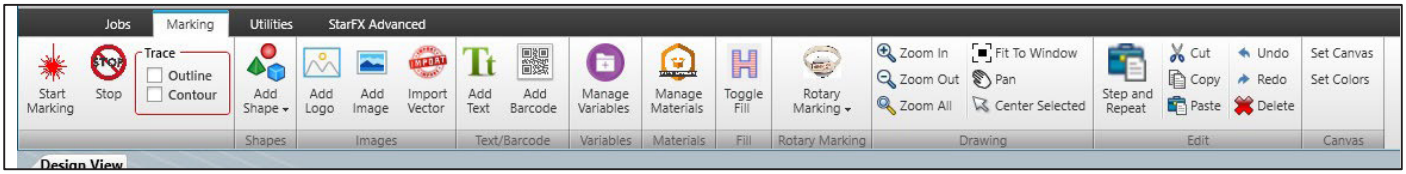
- ☆ Marking the lasing program once it is completed.
- ☆ Drawing Tools to perform the various types of objects displayed on the Drawing Screen.
- ☆ Management Tools to control Materials, Variables and Fill.
- ☆ Rotary Tools presents a separate HMI that is specifically for Round Part marking.
- ☆ Canvas Tools provides all of the standard Zoom, Copy and other screen manipulation properties.



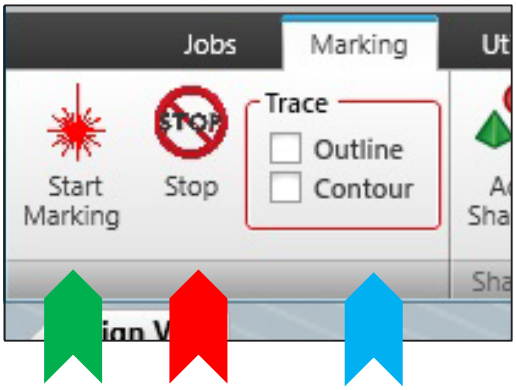
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# MAIN SCREEN

## Marking




Marking




Marking includes three selections.

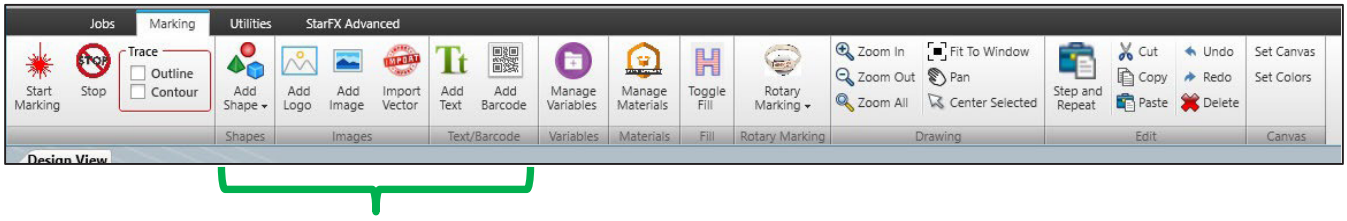
- ☆ Start the Lasing Program.
- ☆ Stop a running Program.
- ☆ Run in Trace Mode (Align Mode).
- ☆ Do a Box Outline.
- ☆ Trace the actual marking.

*Marking is covered in greater detail later in the chapter – page 37.*

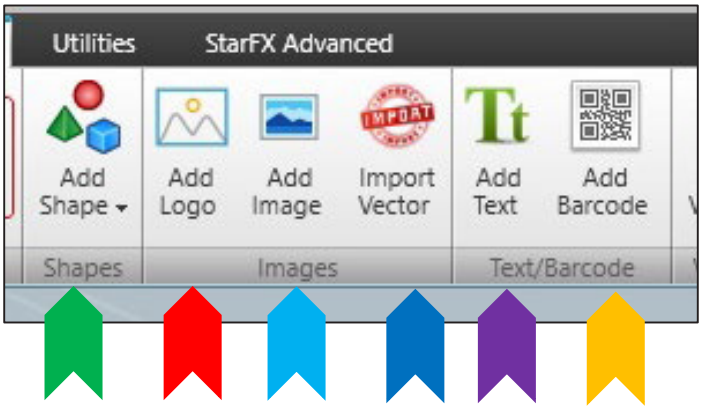
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# MAIN SCREEN

## Drawing Tools




**Drawing Tools**




The Drawing Tools include six types of

tools.

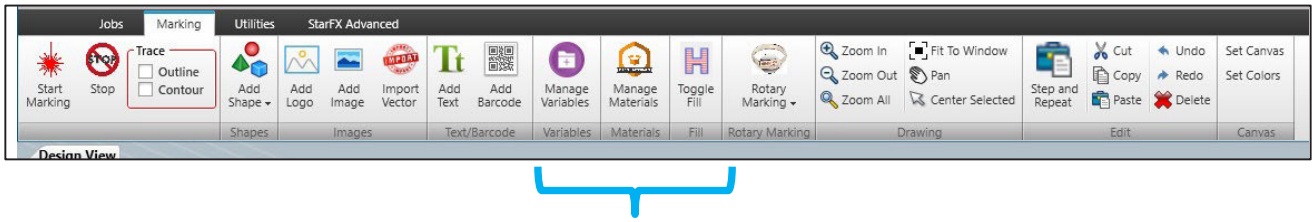
- ☆ Draw a Shape such as a Line or Circle.
- ☆ Display a previously created “LaserStar” vector image.
- ☆ Show a graphic image (picture)such as a BMP or PNG file.
- ☆ Import a vector image such as a DXF or SVG file created by another software program.
- ☆ Text from any Windows TTF font.
- ☆ Display a barcode through the Barcode Creator.



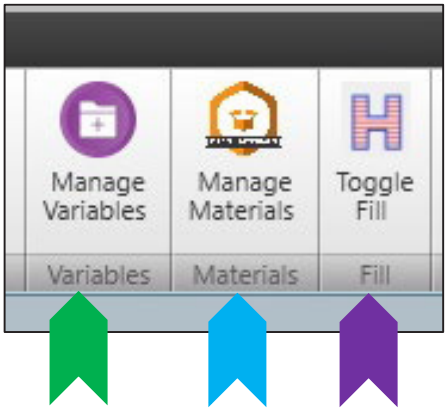
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# MAIN SCREEN

## Management




**Management**



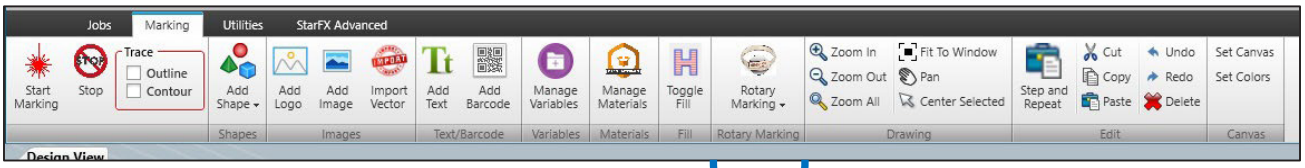

The Management Tools allow you to focus on a screen that looks at the “Big Picture” of a specific feature but provides the ability change individual aspects of that feature.

- ☆ Manage the variables that are used in incrementing text or barcodes.
- ☆ Edit the characteristics of the Materials Library.
- ☆ Turn Fill on and off.

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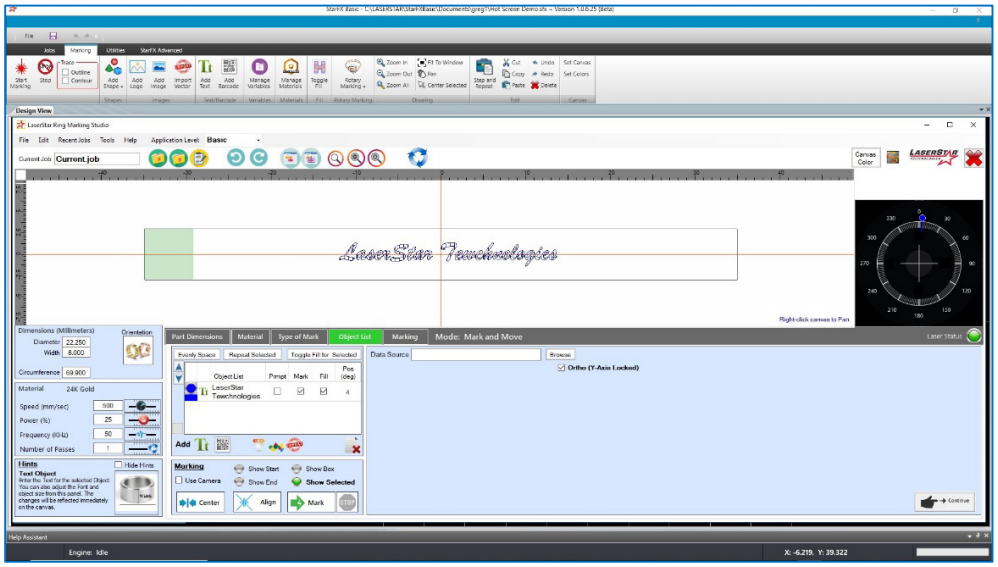
# MAIN SCREEN

## Rotary




**Rotary**




The Rotary Marking selection takes you to a whole new Program Creation Environment that is simple to use and geared to cylindrical parts or jewelry.

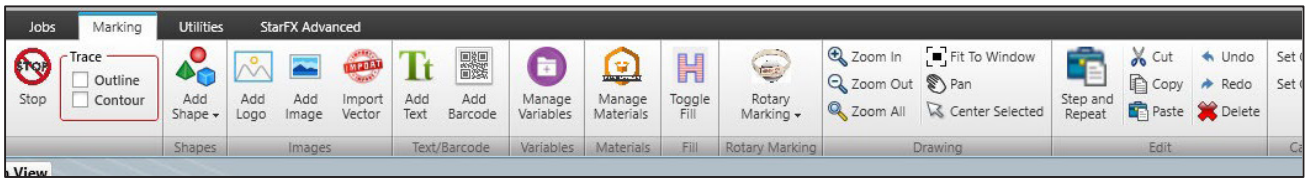
*This is covered in the Round Part Marking chapter. Go to page 123 or click here.*



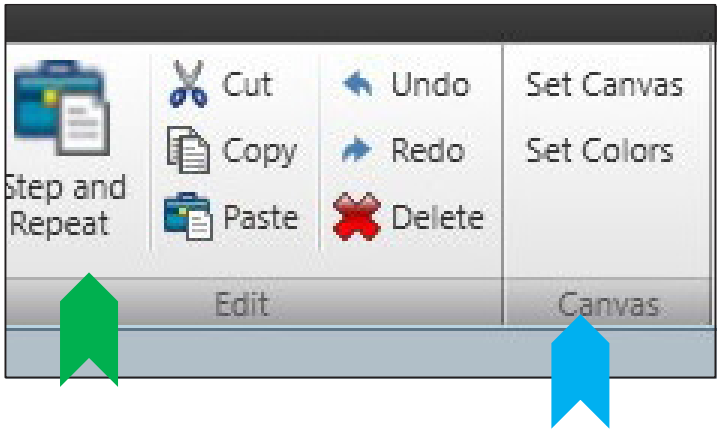
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# MAIN SCREEN

## Canvas Tools




**Canvas Tools**




The last section of the “Ribbon” has all of the familiar tools for Zooming, Cut and Paste, etc.

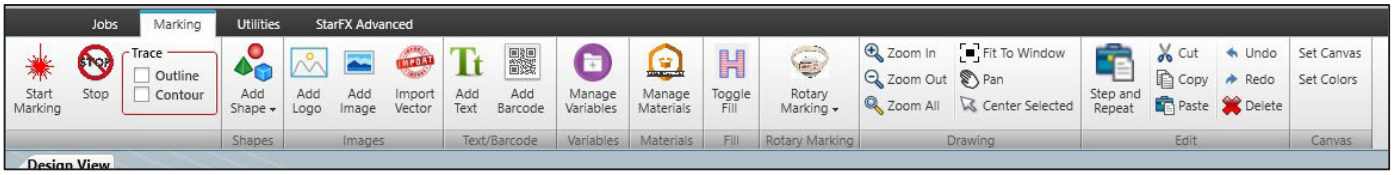
Included there are two special sections – Step and Repeat and Canvas.

These are still to manipulate objects on the Drawing Screen (Canvas) but have a special job that we will cover later.

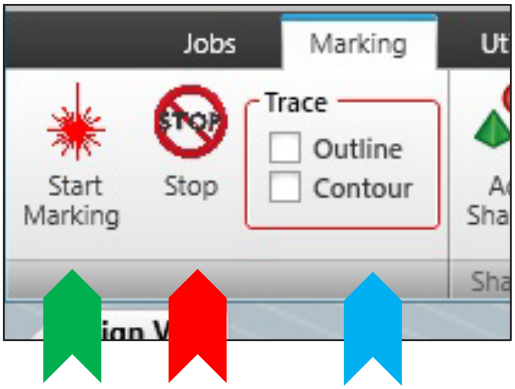
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# MAIN SCREEN

## Marking 2




Marking

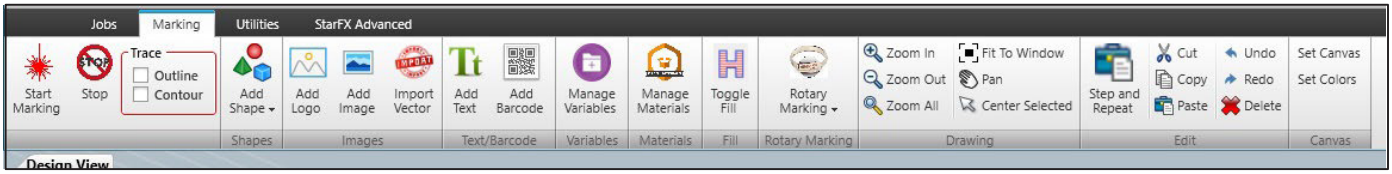



Marking includes three selections. Ok now for the details, as previously stated there are three things you can do in the Marking section Start a Marking Program, Stop a Marking Program or Run the Program in Trace mode.

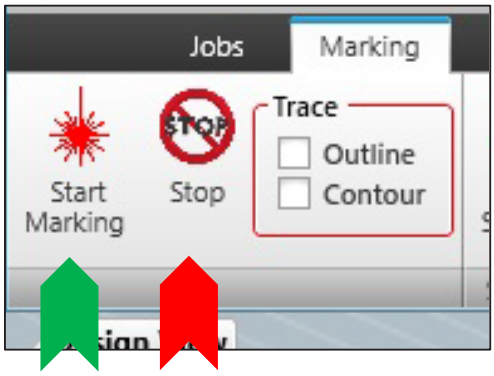


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# MAIN SCREEN




Marking

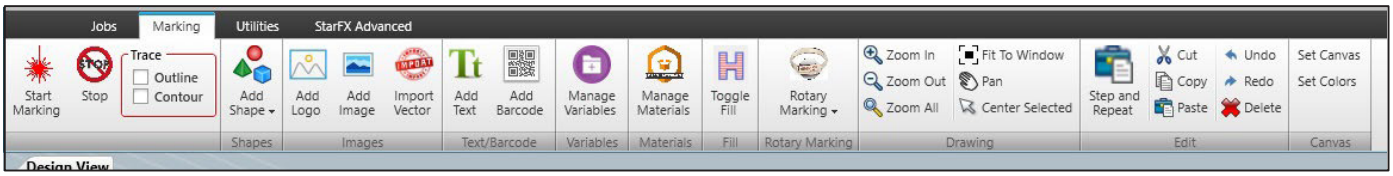



Once you have created a Marking Program the Start Marking button will lase that program (or you can use your physical Mark Button on the system if provided).

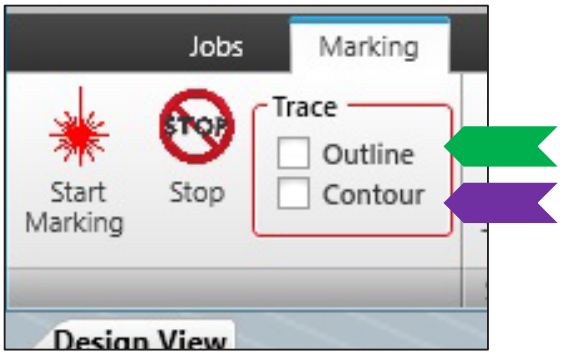
The Stop Button will halt or abort a running program (Note: this selection stops all action of a currently running program but if it is re-started it starts from the beginning not where it was halted).

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# MAIN SCREEN




Marking




Under the Trace button you have two choices Outline or Contour each will use the Red Trace laser to draw your program where it is eye safe so you can use this with the door open (if your system has a door) or with eyewear removed, to align your part to the lasing area.

Outline – draws a box around the entire lasing area

Contour traces the actual lasing pattern

*LaserStar Technologies*

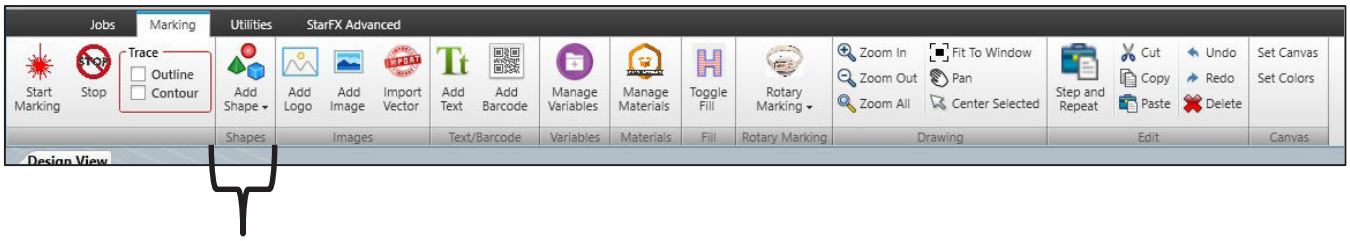
*LaserStar Technologies*



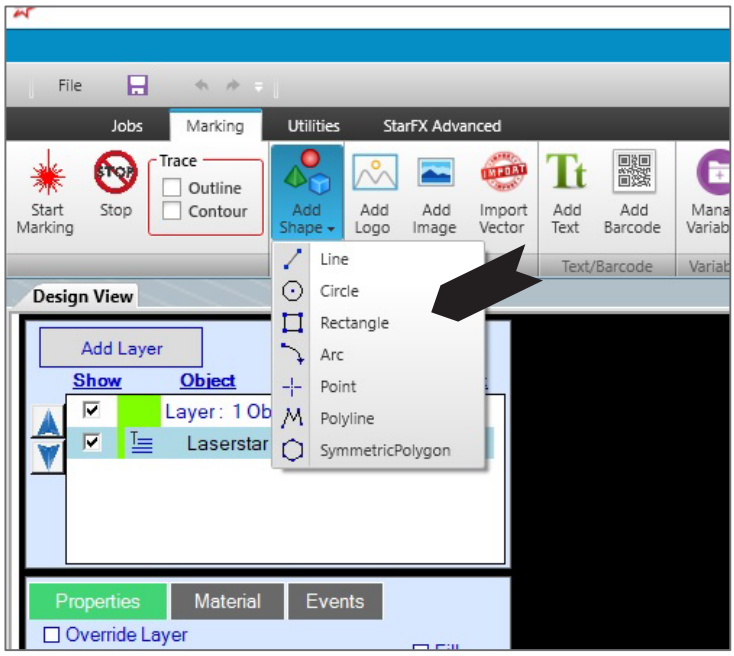
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# MAIN SCREEN

## Shapes



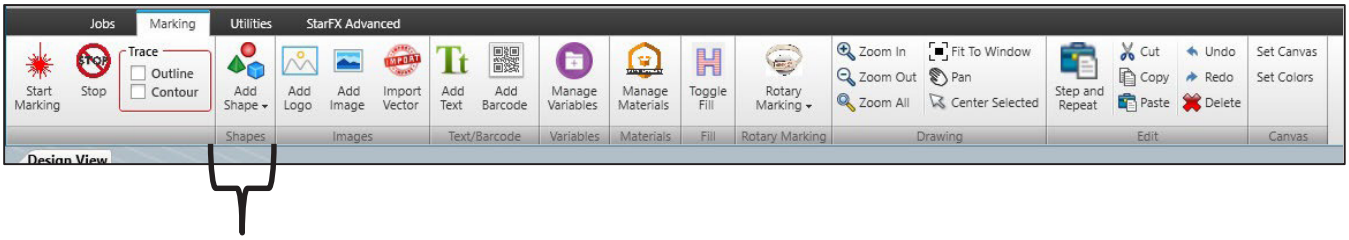

**Shapes**



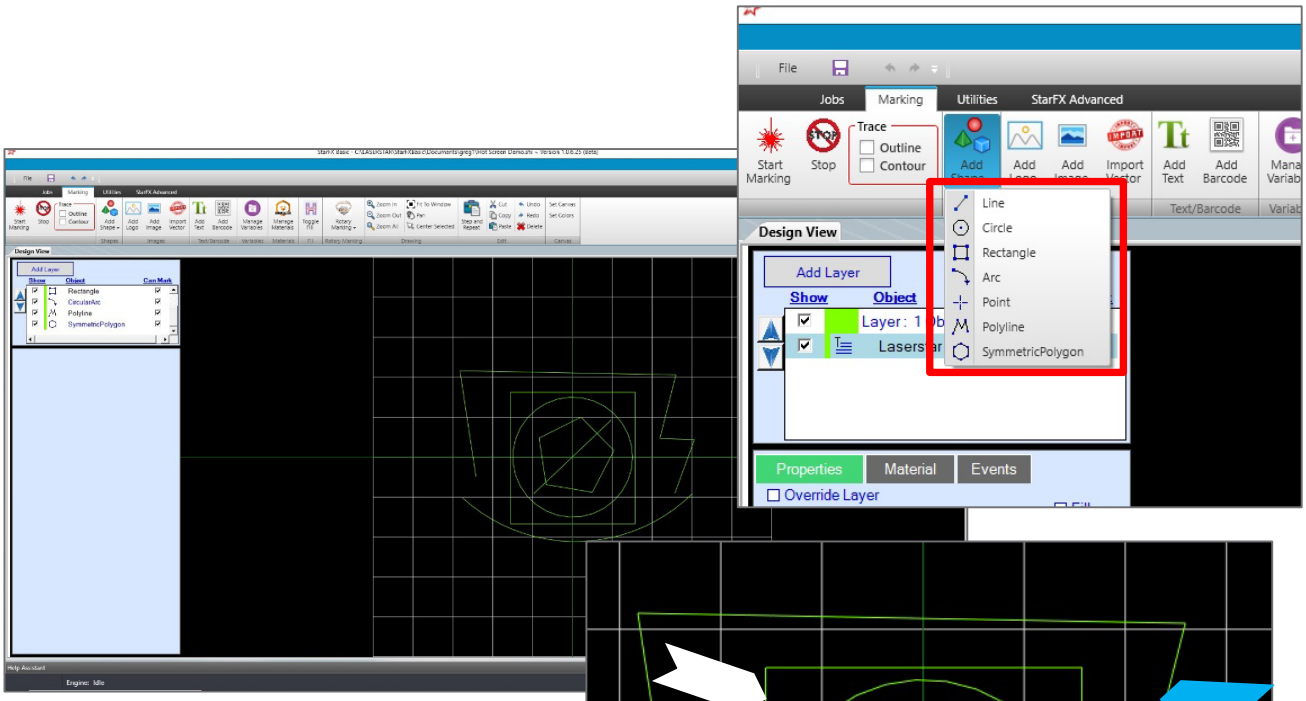

Shapes give you the ability to draw basic “shapes” such as lines, circles and others manually on the Drawing Screen.

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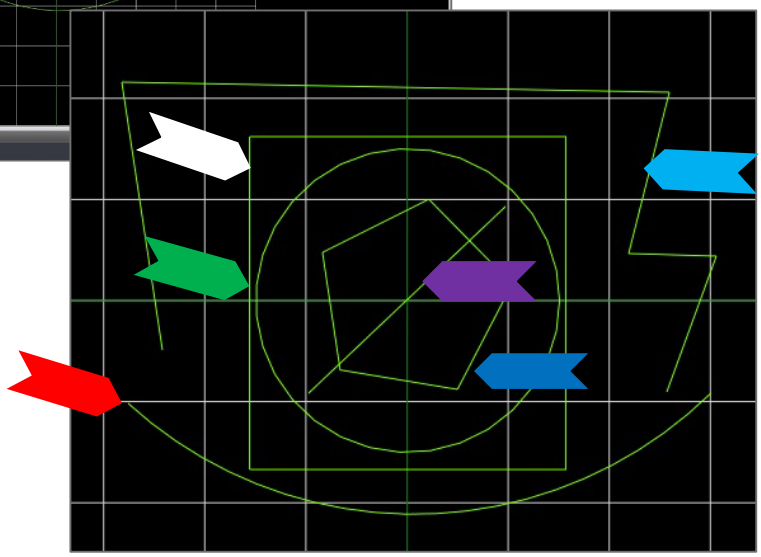
# MAIN SCREEN




**Shapes**




Lines.
Circles.
Rectangles.
Arcs.
Points.
Polyline.
Polygons.



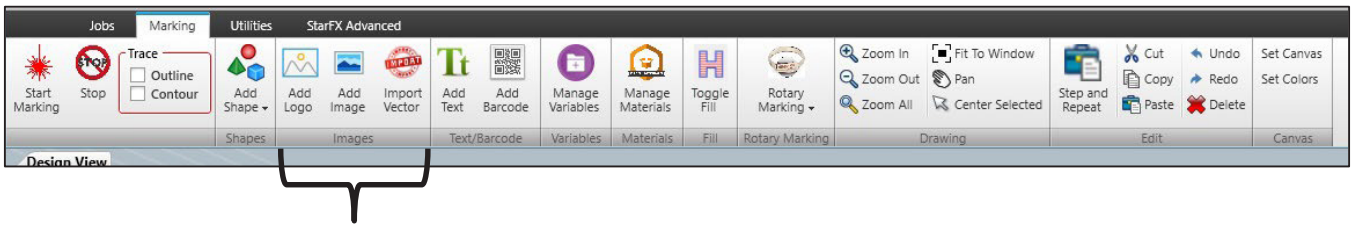
***Shapes*** give you the ability to draw basic “shapes” such as lines, circles and others manually on the Drawing Screen.



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# MAIN SCREEN

## Images




**Images**

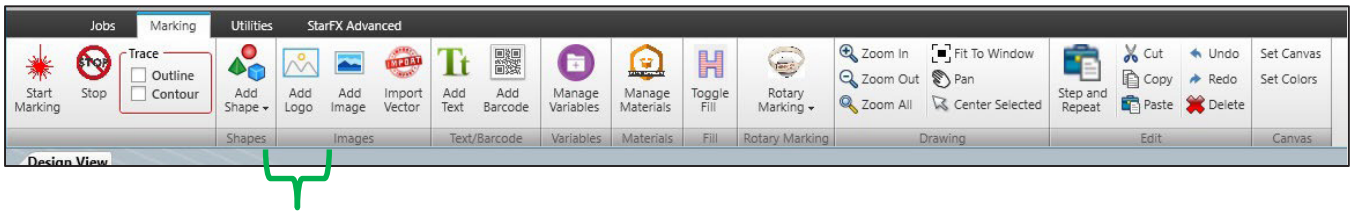
***Graphic Images*** are files that have the extension of BMP, PNG, TIF, JPG and many others. These are pixel images like you would see in a photograph.

- ☆ Previously created Logos.
- ☆ Graphics files such as BMP, JPG or PNG.
- ☆ Vector files like DXF from a CAD program or SVG from a Graphics program.

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# MAIN SCREEN

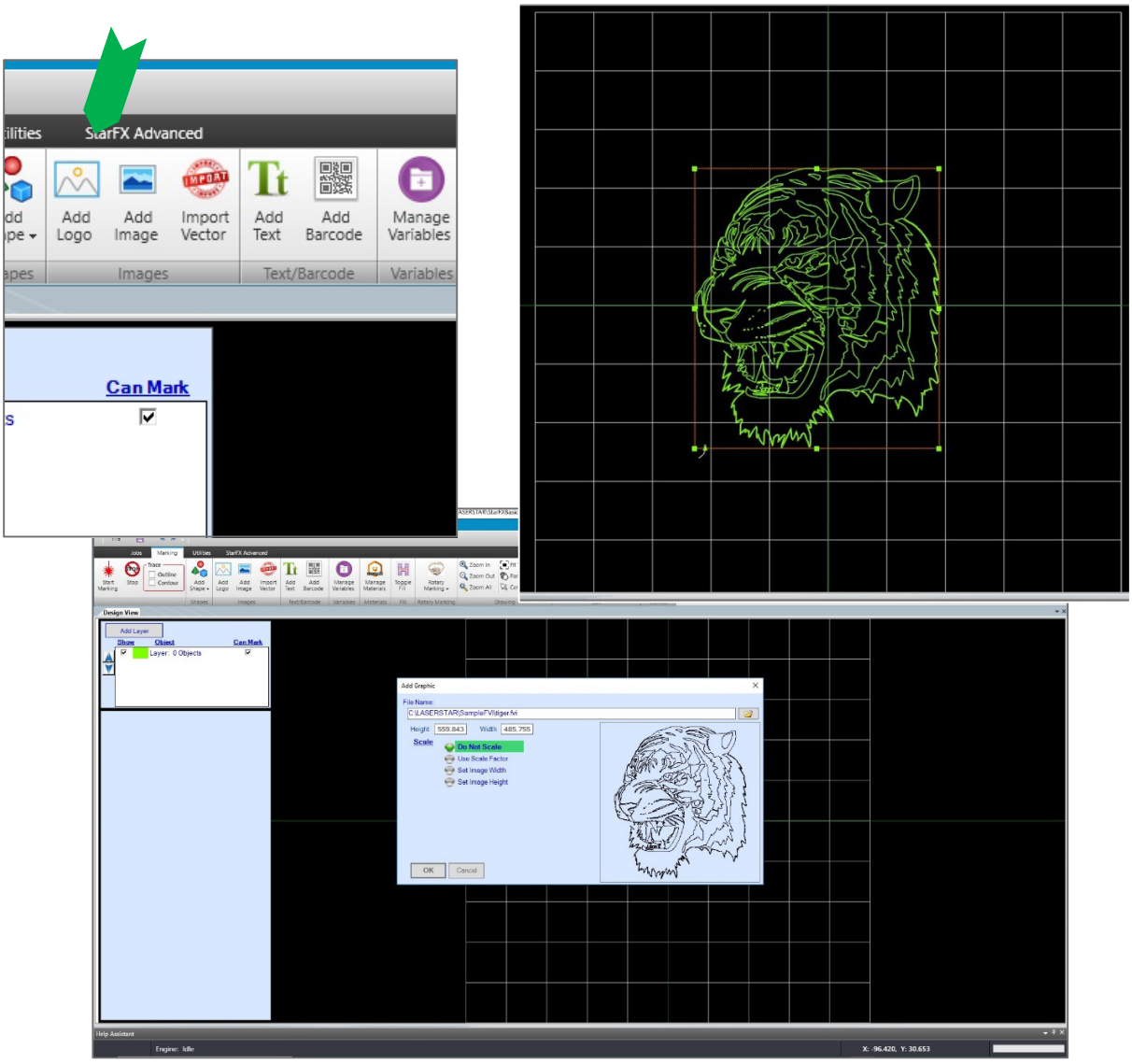
## Logos




### Logos

Previously created Logos from , this is the “native” STARFX PREMIER DESIGN STUDIO drawing format.

These are created from some of the other Drawing Tools to be covered later or even from another LaserStar product they have the .FVI file type.

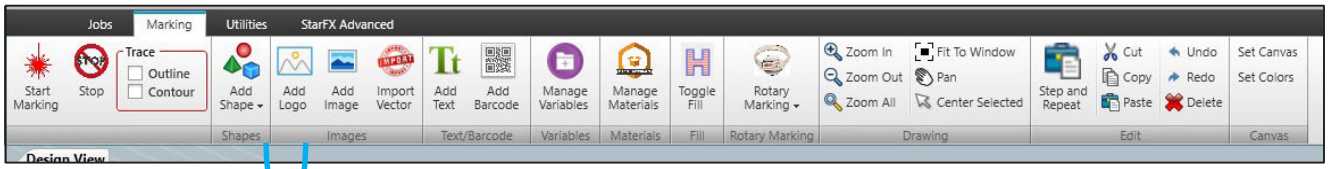




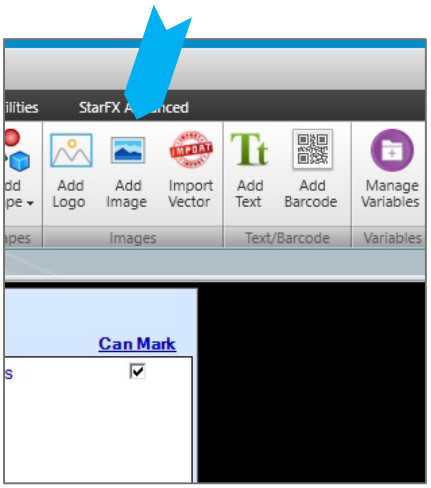

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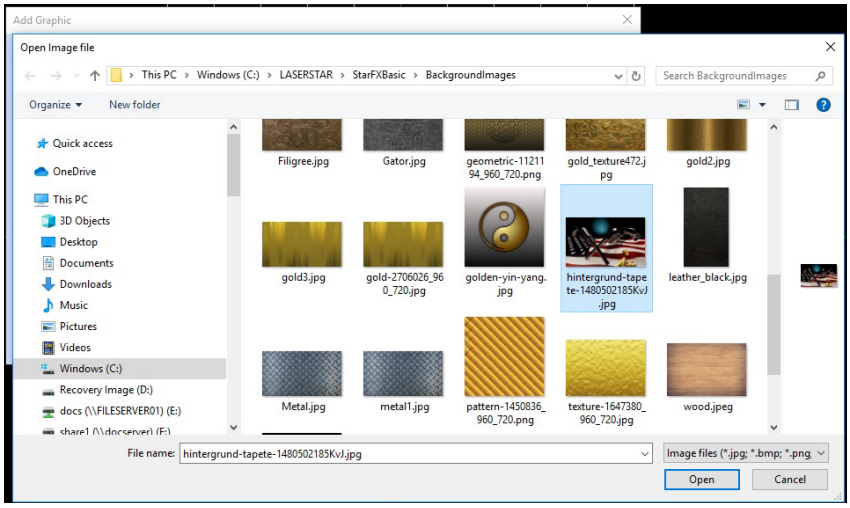
# MAIN SCREEN

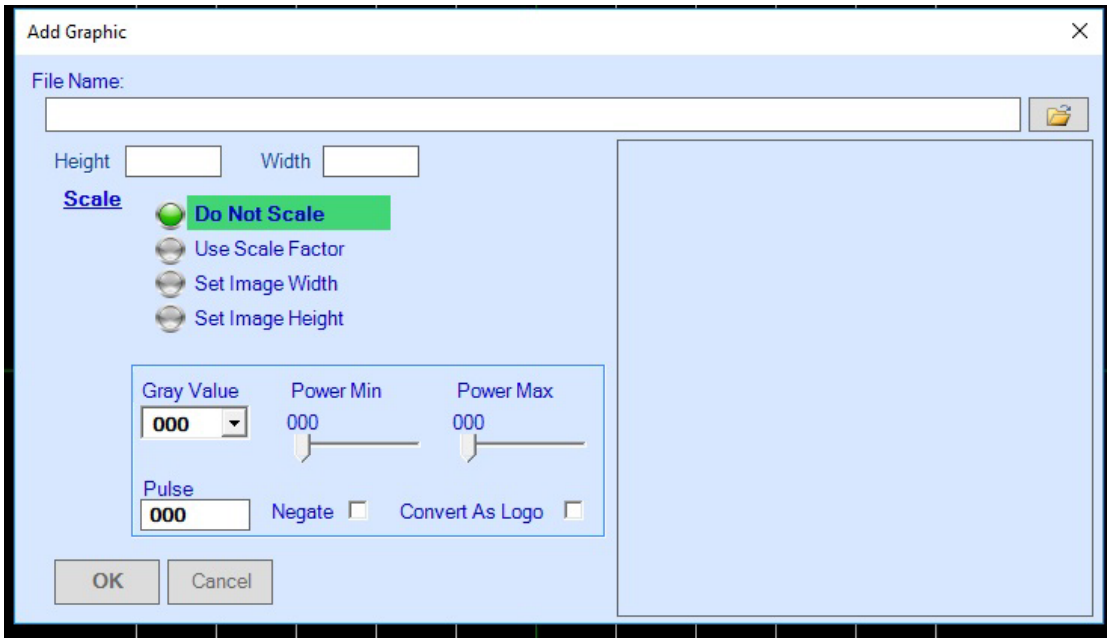
## Graphic Images




### Graphic Images

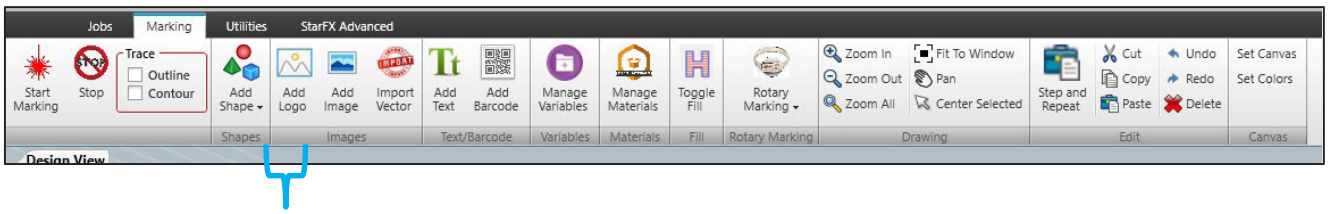


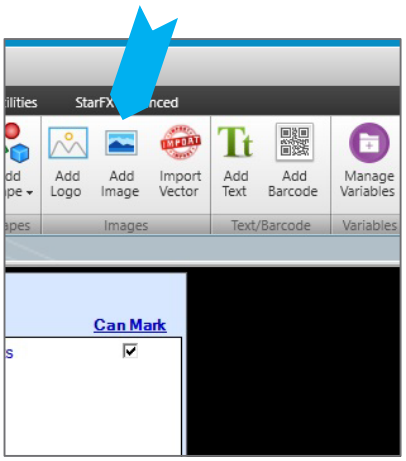



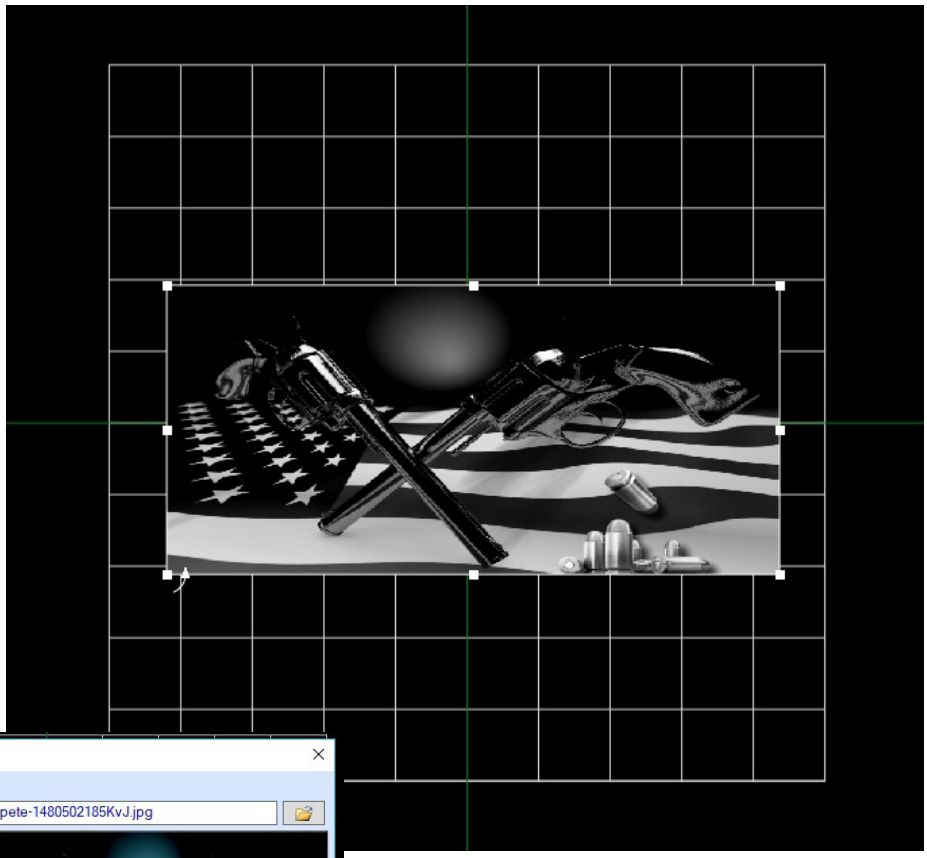

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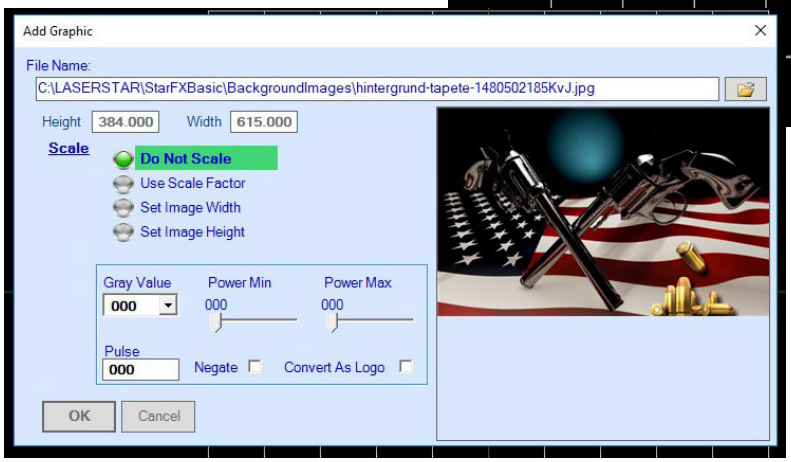
# MAIN SCREEN




## Graphic Images





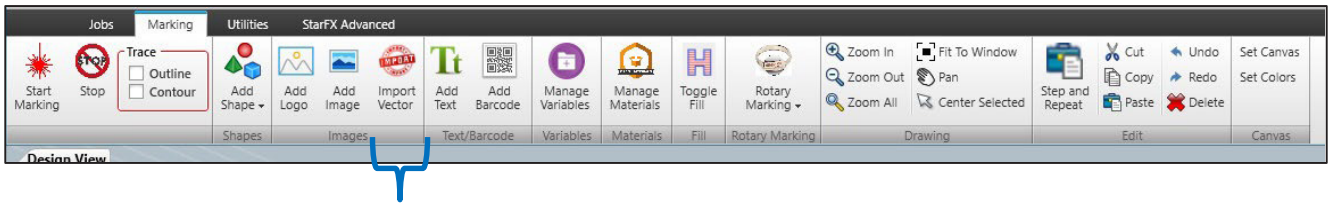

***Graphic Images*** are files that have the extension of BMP, PNG, TIF, JPG and many others. These are pixel images like you would see in a photograph.



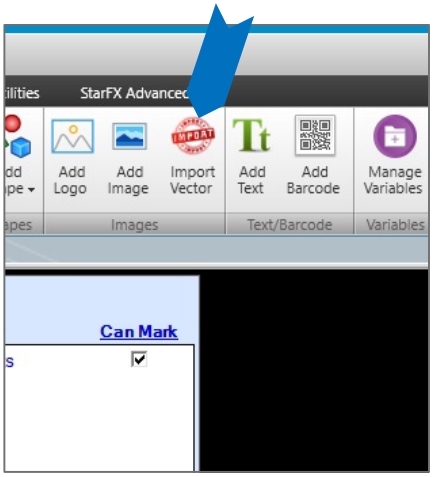
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# MAIN SCREEN

## Vector Images




### Vector Images



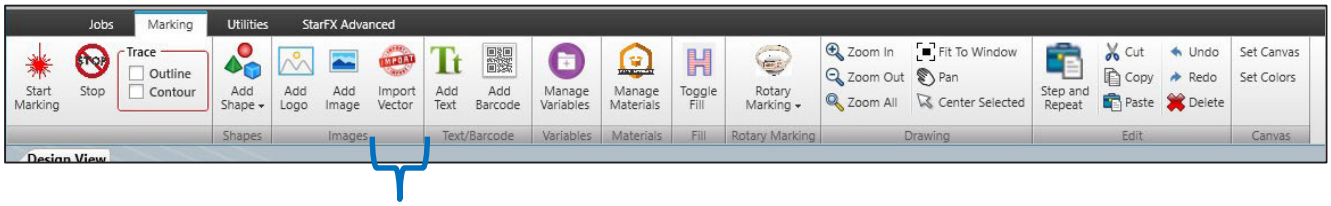

Vector Images are typically CAD files such as DXF or DWG or Graphic Vectors such as SVG files.

Vectors are different from a true graphics file, which are made up of pixels, they consist of lines and arcs and are scalable with no loss of resolution.

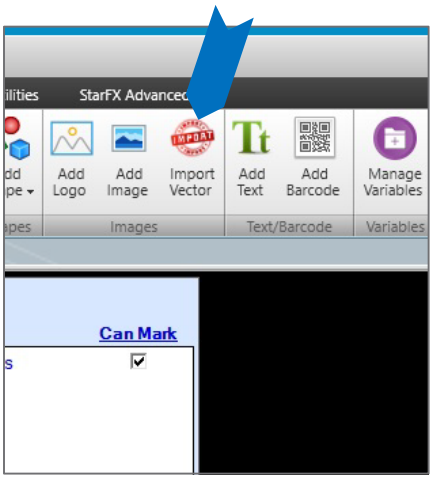
In other words they look just as good as the original image whether they are made smaller or larger.

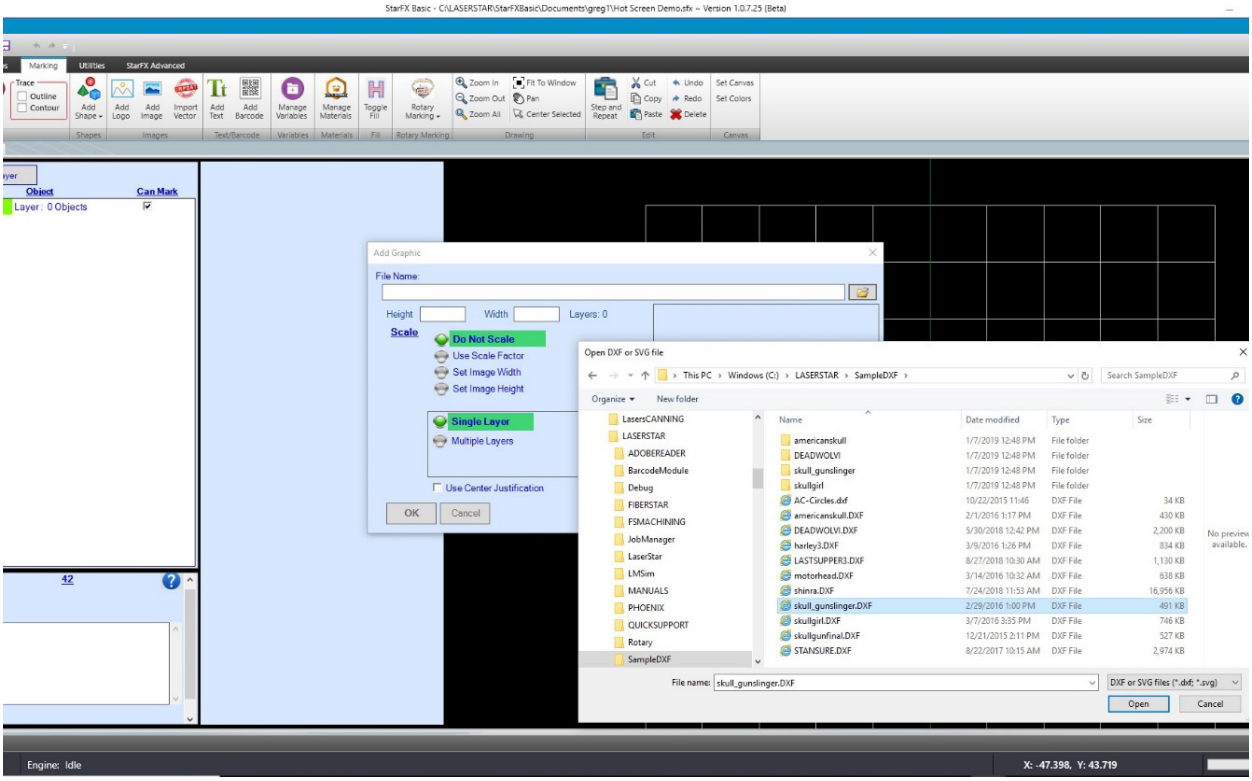
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# MAIN SCREEN




## Vector Images

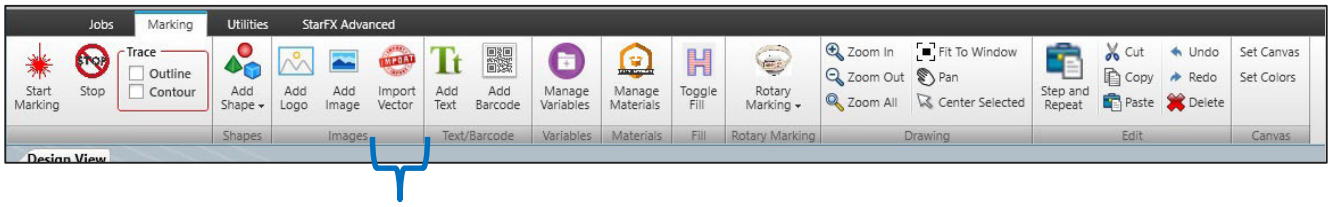


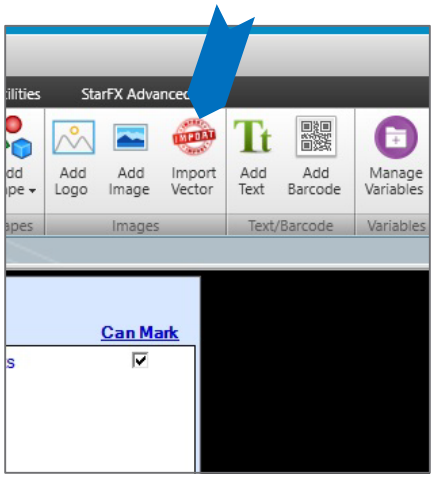


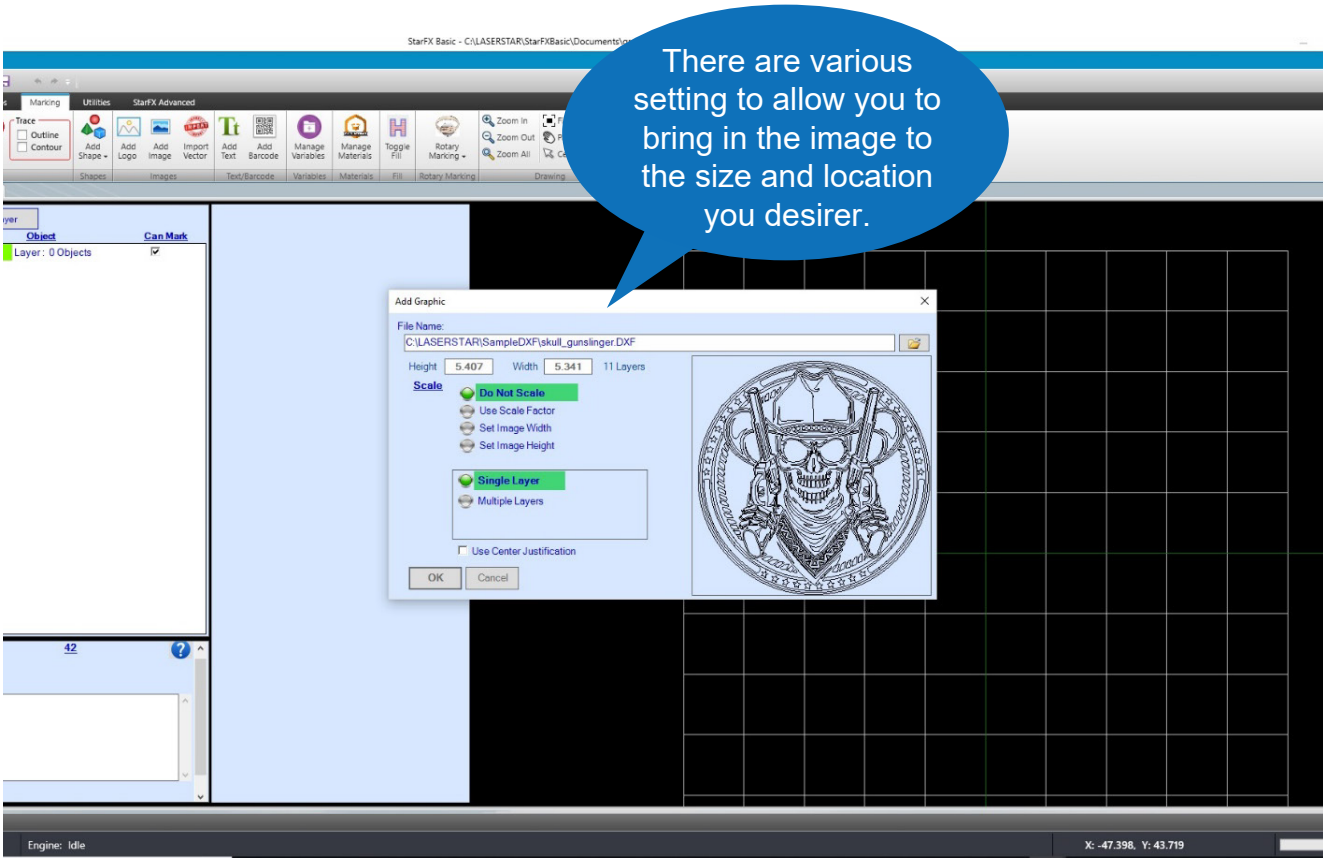

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# MAIN SCREEN



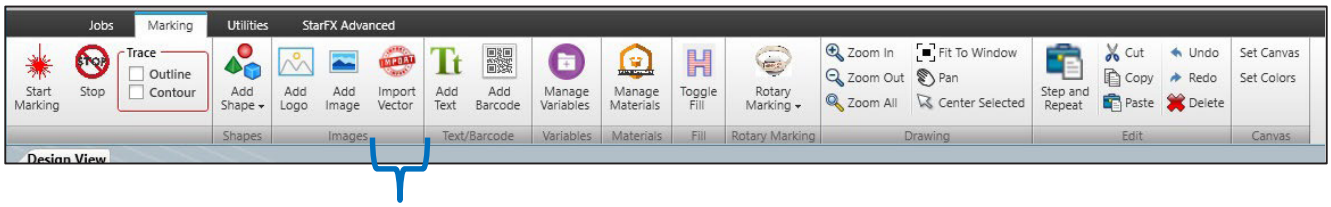

## Vector Images



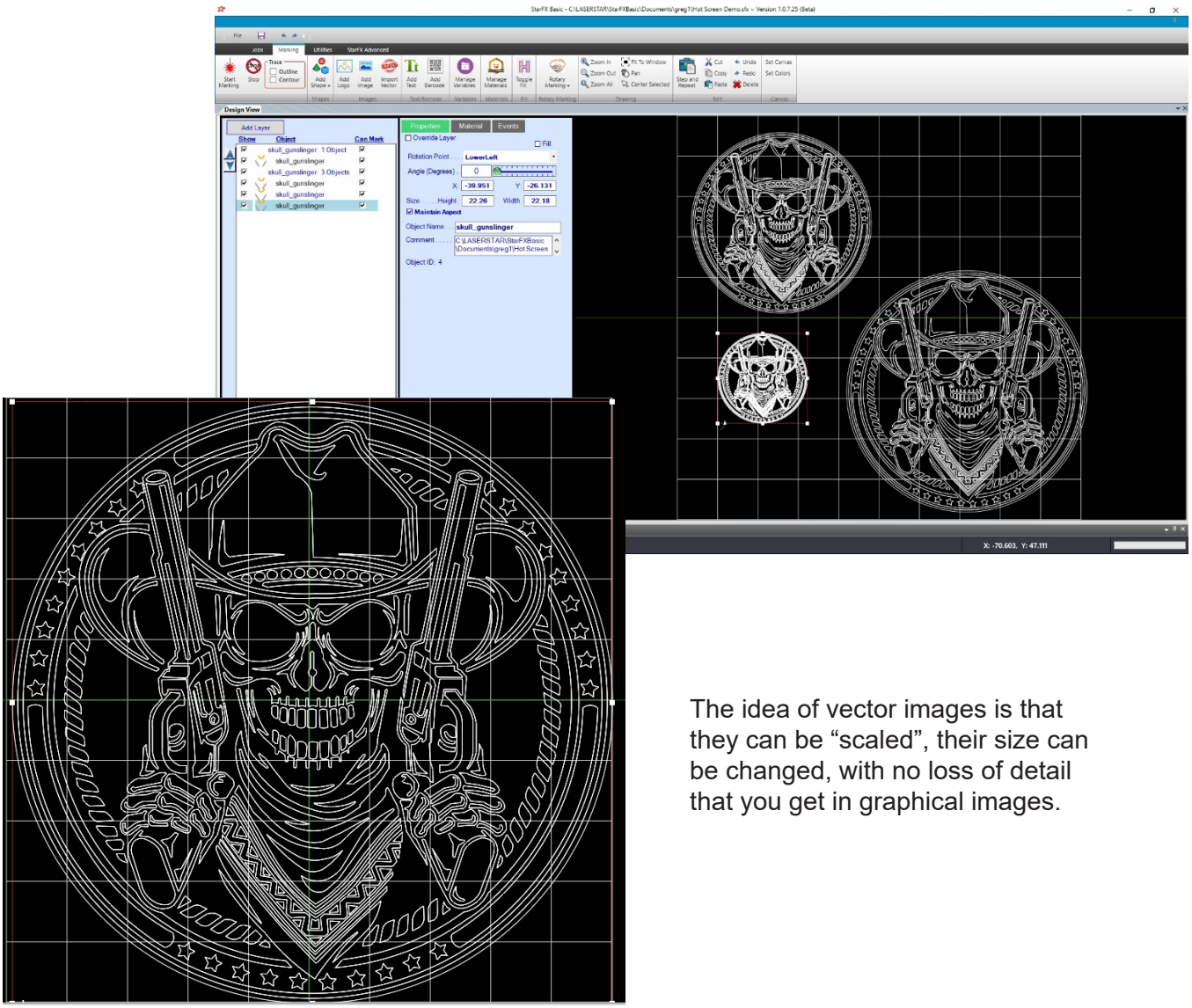




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# MAIN SCREEN




## Vector Images



The idea of vector images is that they can be “scaled”, their size can be changed, with no loss of detail that you get in graphical images.

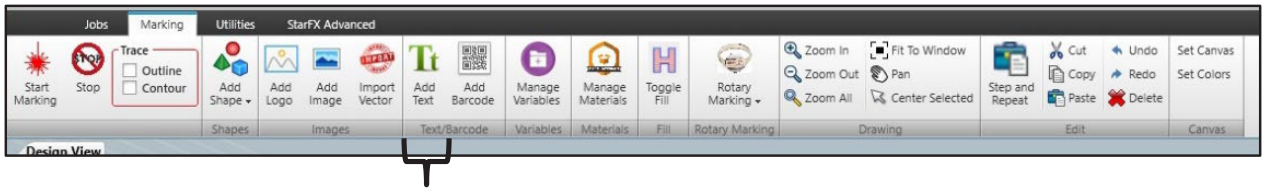
Zoomed view of a scaled down vector image which still has full detail.



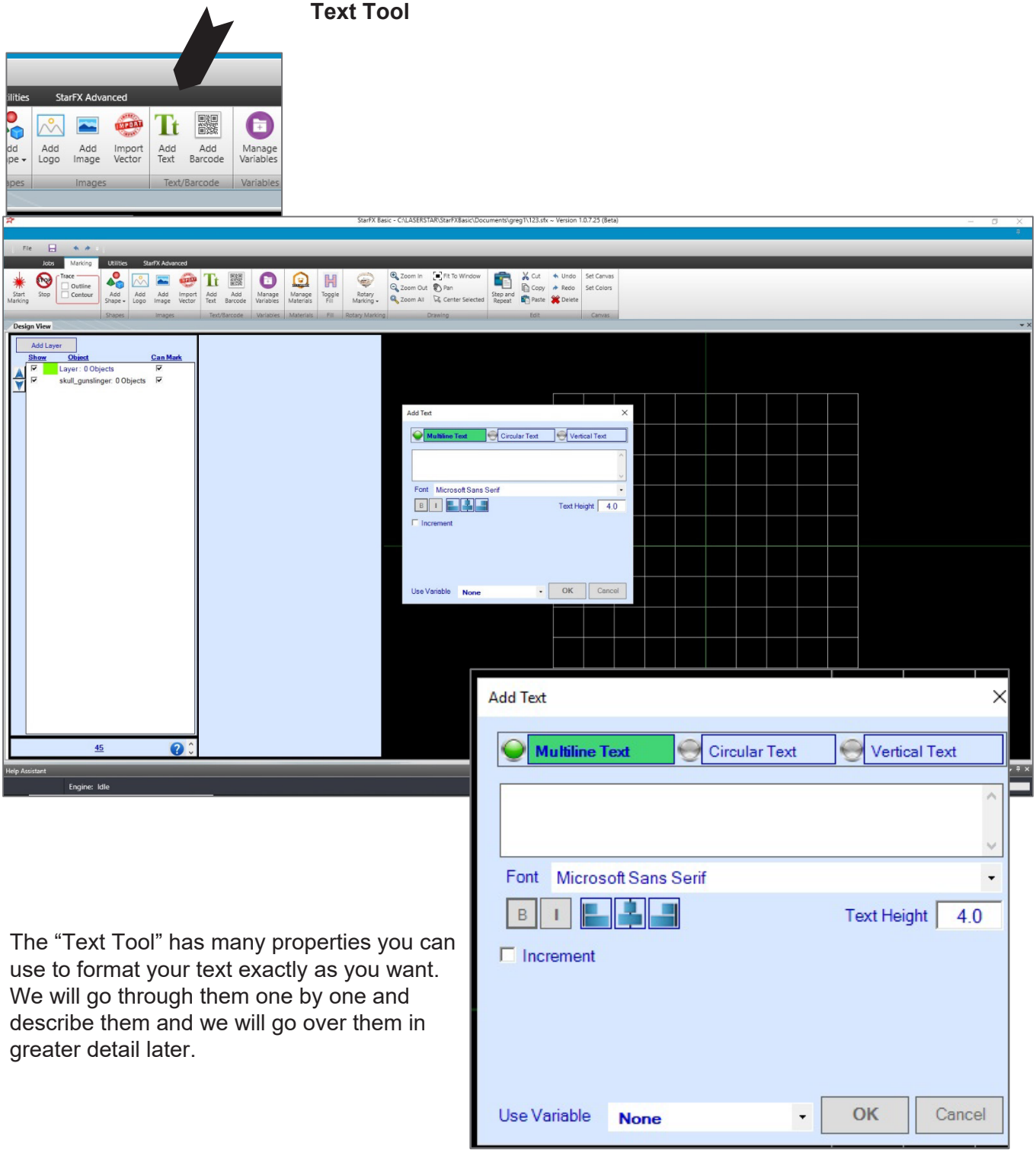
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# MAIN SCREEN

## Text Tool



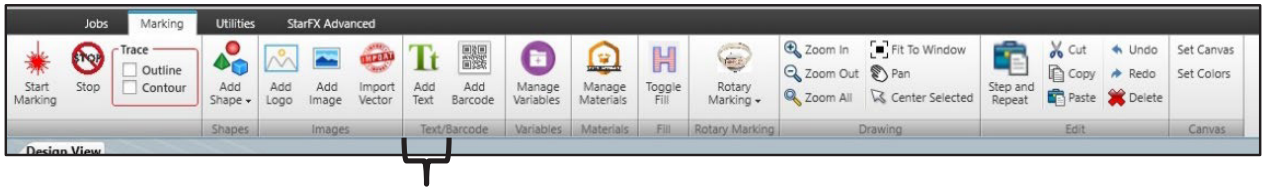

**Text Tool**




The “Text Tool” has many properties you can use to format your text exactly as you want. We will go through them one by one and describe them and we will go over them in greater detail later.

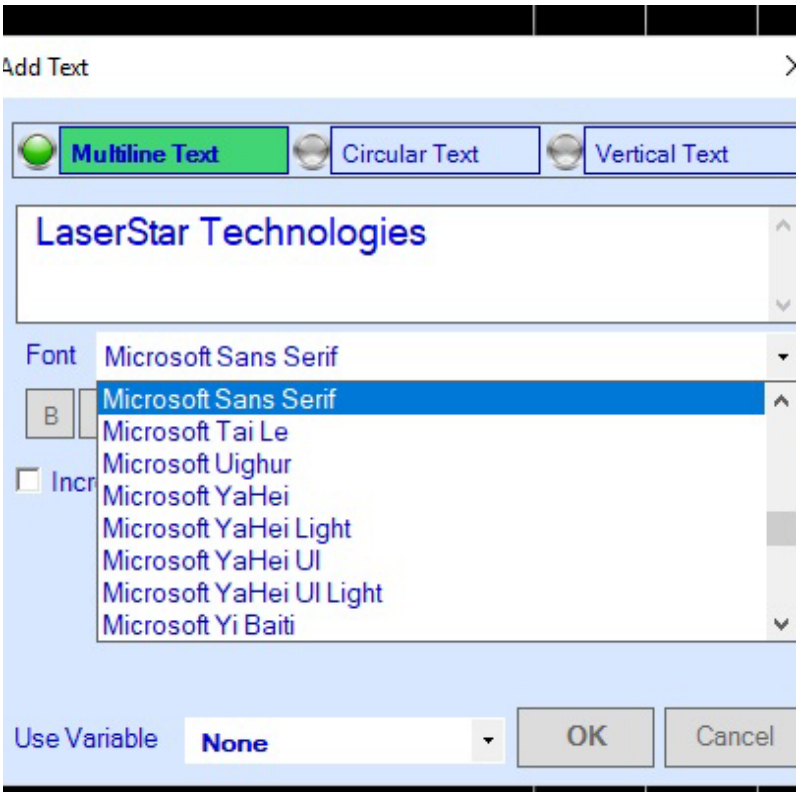
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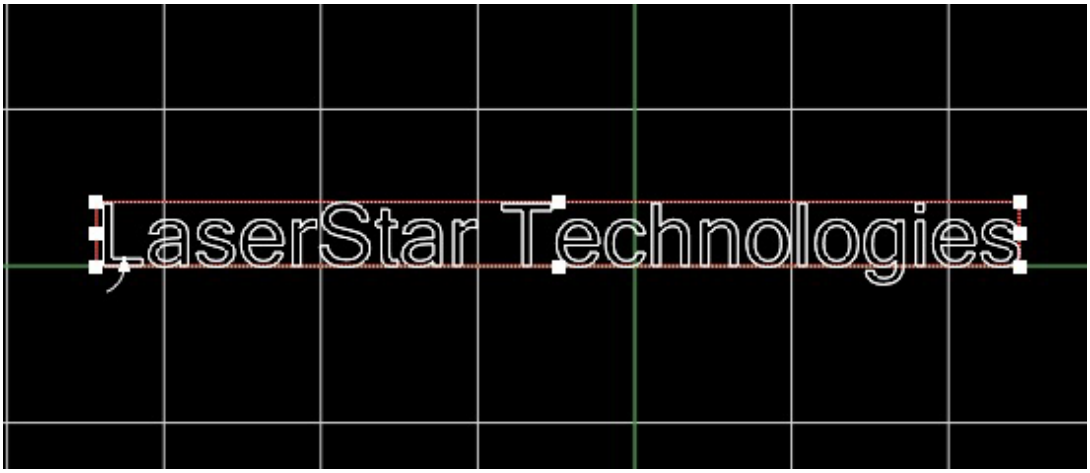
# MAIN SCREEN




**Text Tool**

You can select any registered Windows True Type Font (.ttf).

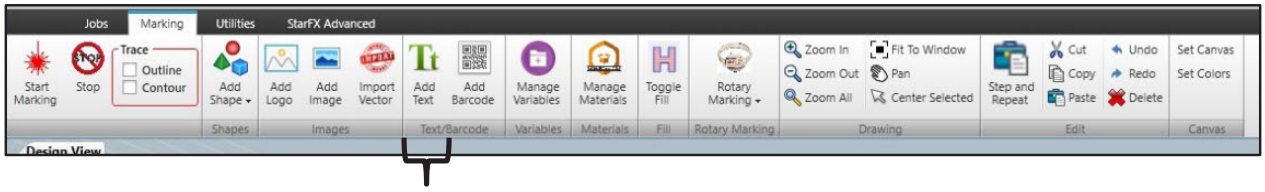


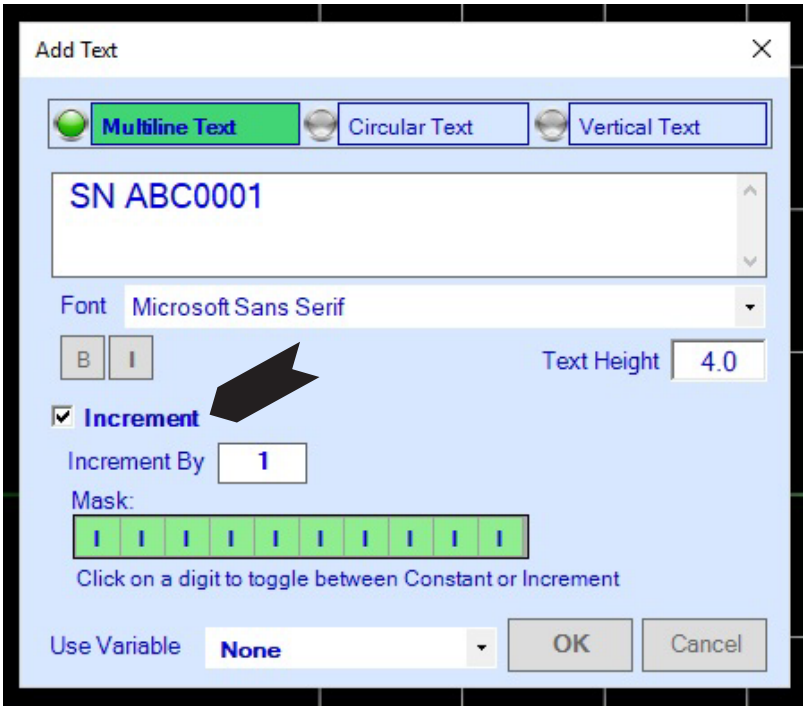



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# MAIN SCREEN



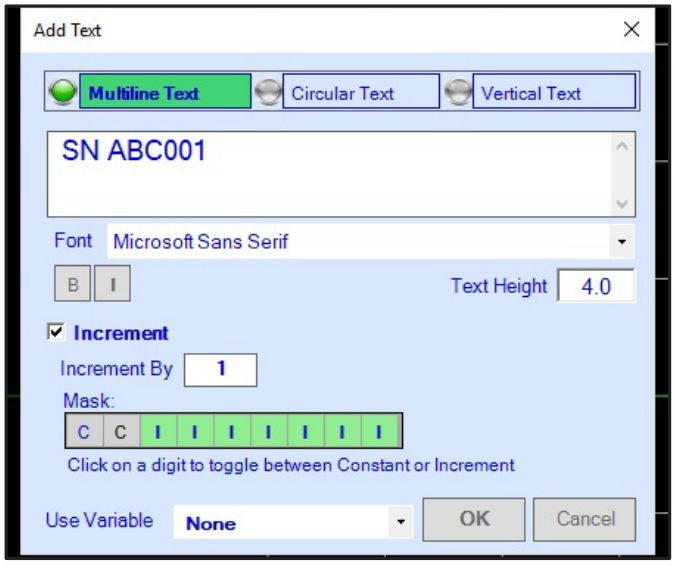

**Text Tool**




By checking the “Increment Box” you can have an incrementing serial number.

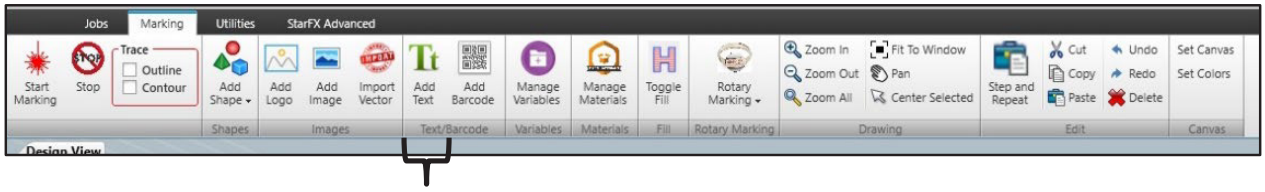
You can also use a “mask” to only increment the characters you want.

A “C” designates a character that will not increment while an “I” is a character that will increment.

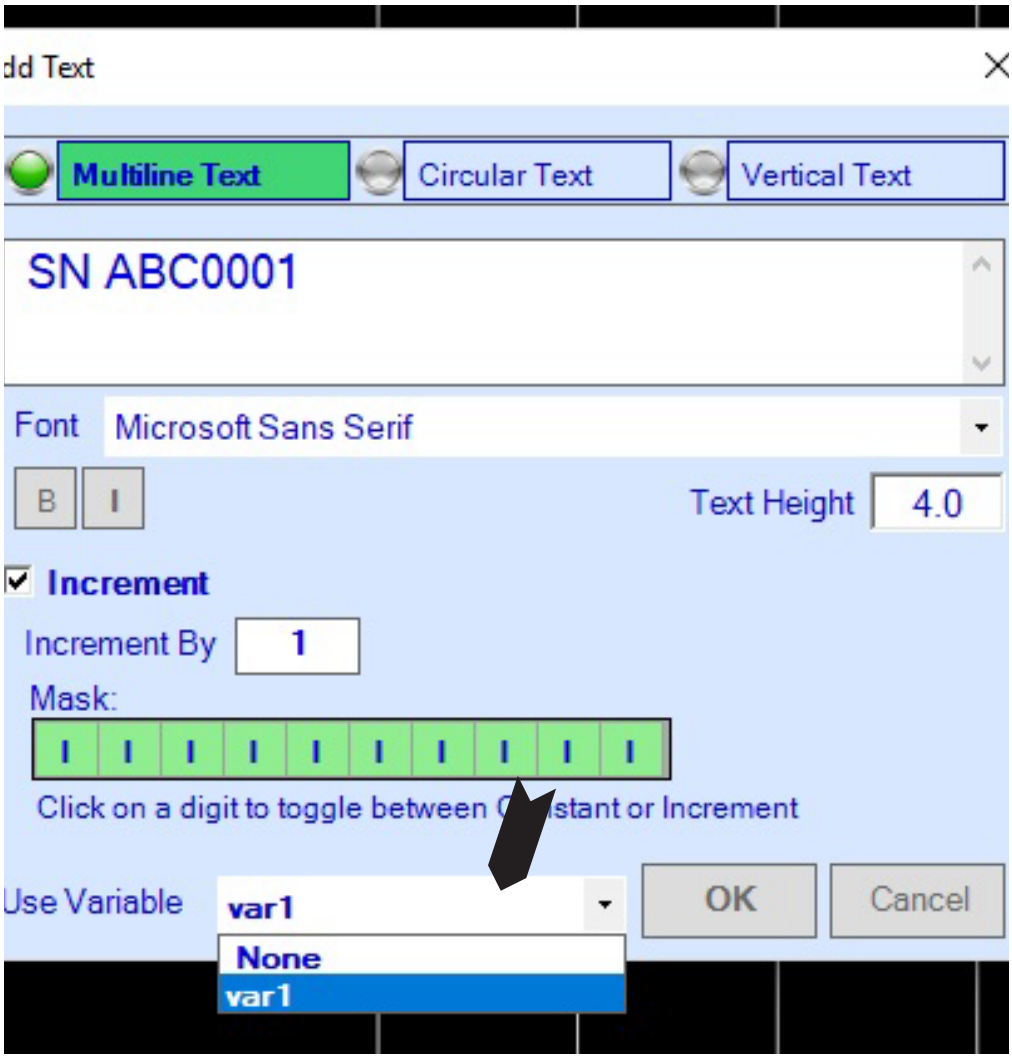



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# MAIN SCREEN




**Text Tool**




By selecting this text to be a “Variable” you can use this same text value in another text object such a s a Barcode because variables can be shared by different text objects.

This allows you to have a Barcode and a Human Readable text on your part that will both have the same data



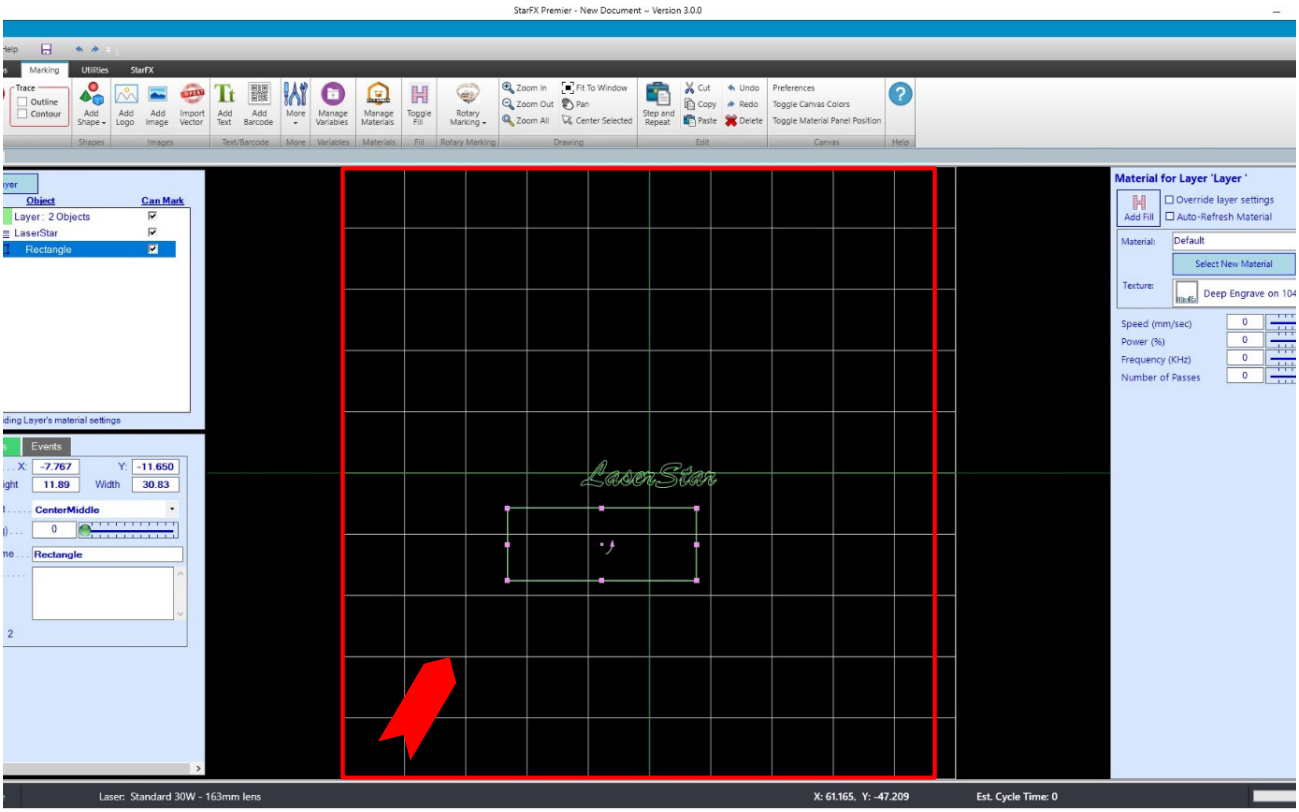
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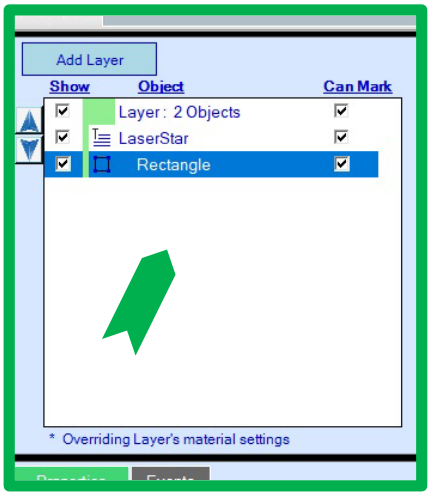
# MAIN SCREEN

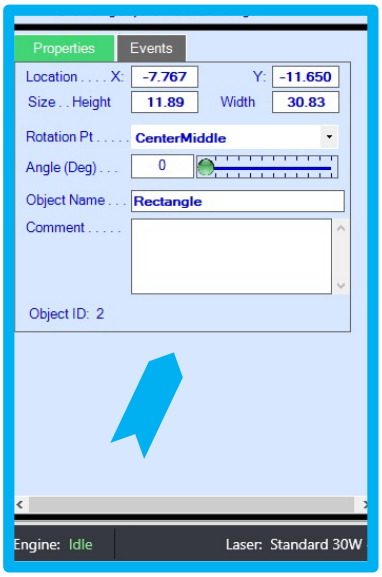
## CREATING A PROGRAM

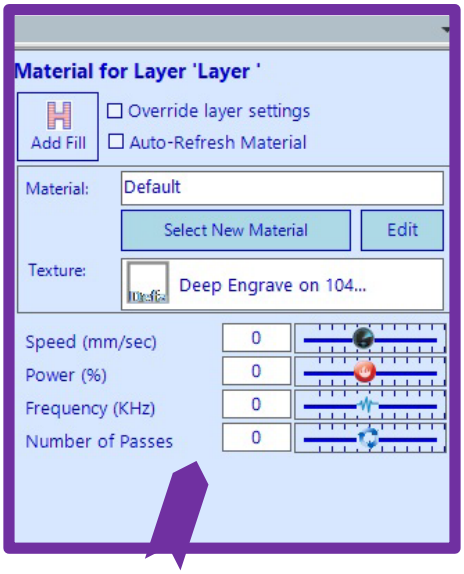
There are three main sections of interest when creating a program.

- ☆ The Program Tree.
- ☆ The Properties.
- ☆ The Materials Selection and Adjustment.
- ☆ The actual “Canvas”.



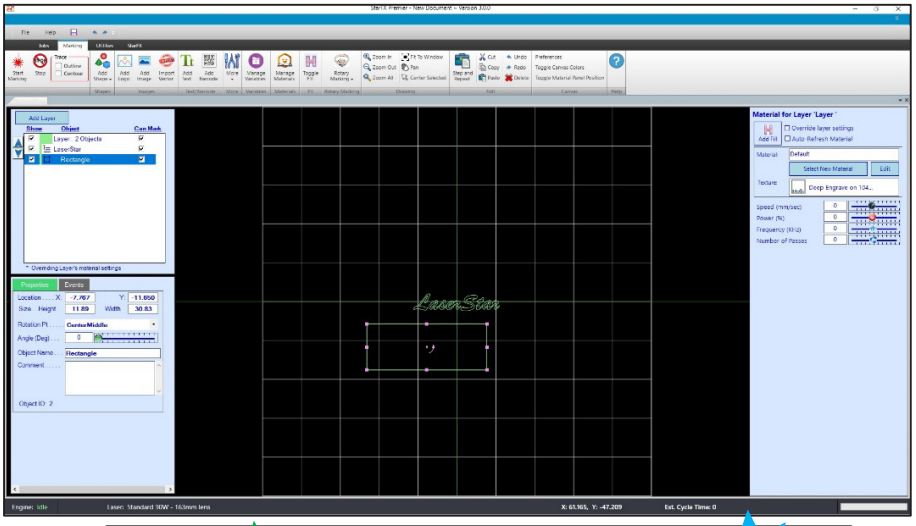

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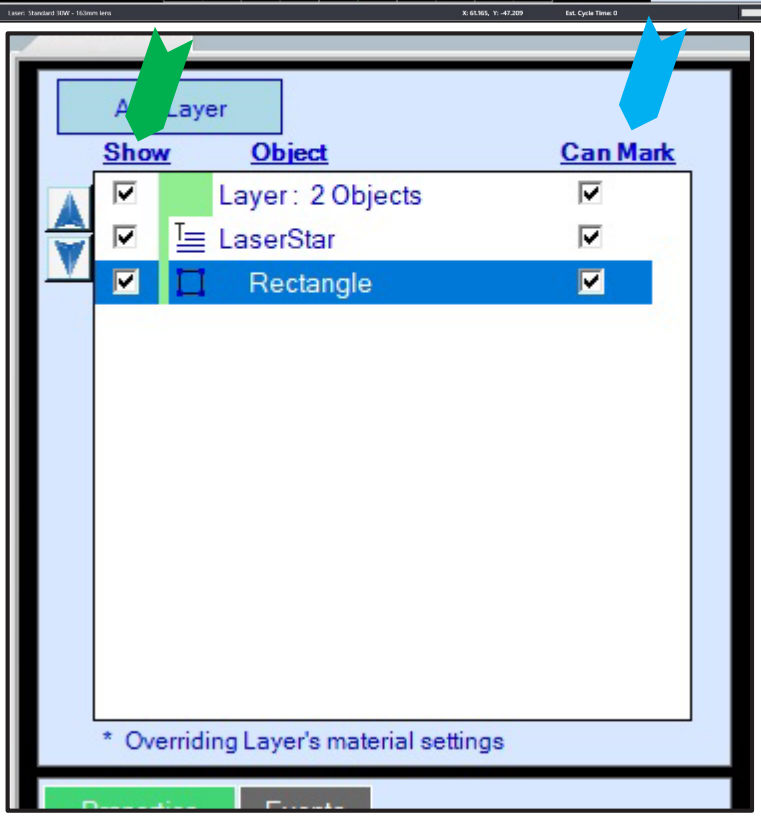
# CREATING A PROGRAM

The Program Tree shows you all of the “objects” that are on your Canvas and the order that they will be lased.

You can elect to not show an object by unchecking the “Show” box.

Or to not lase an object by unchecking the “Can Mark” box.



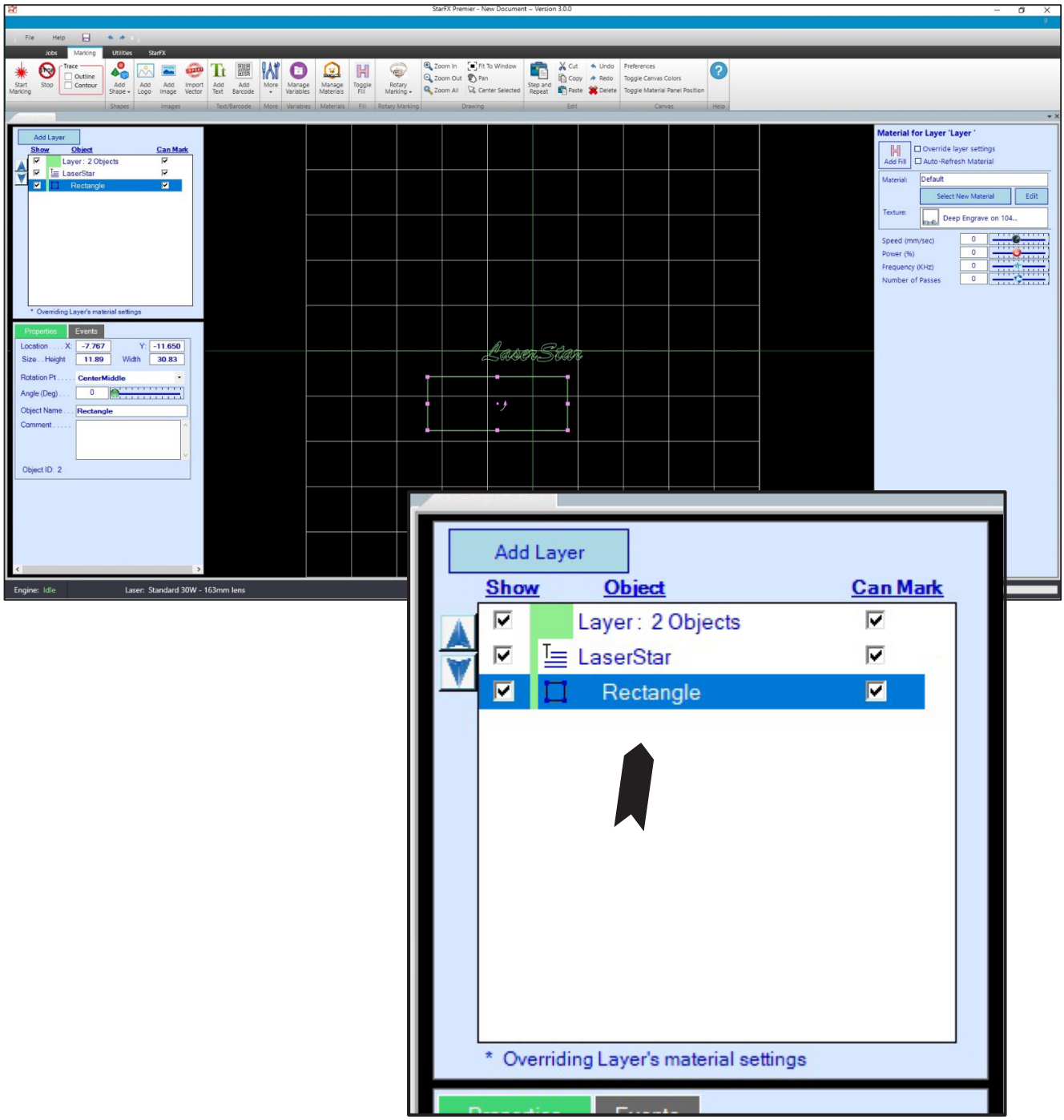





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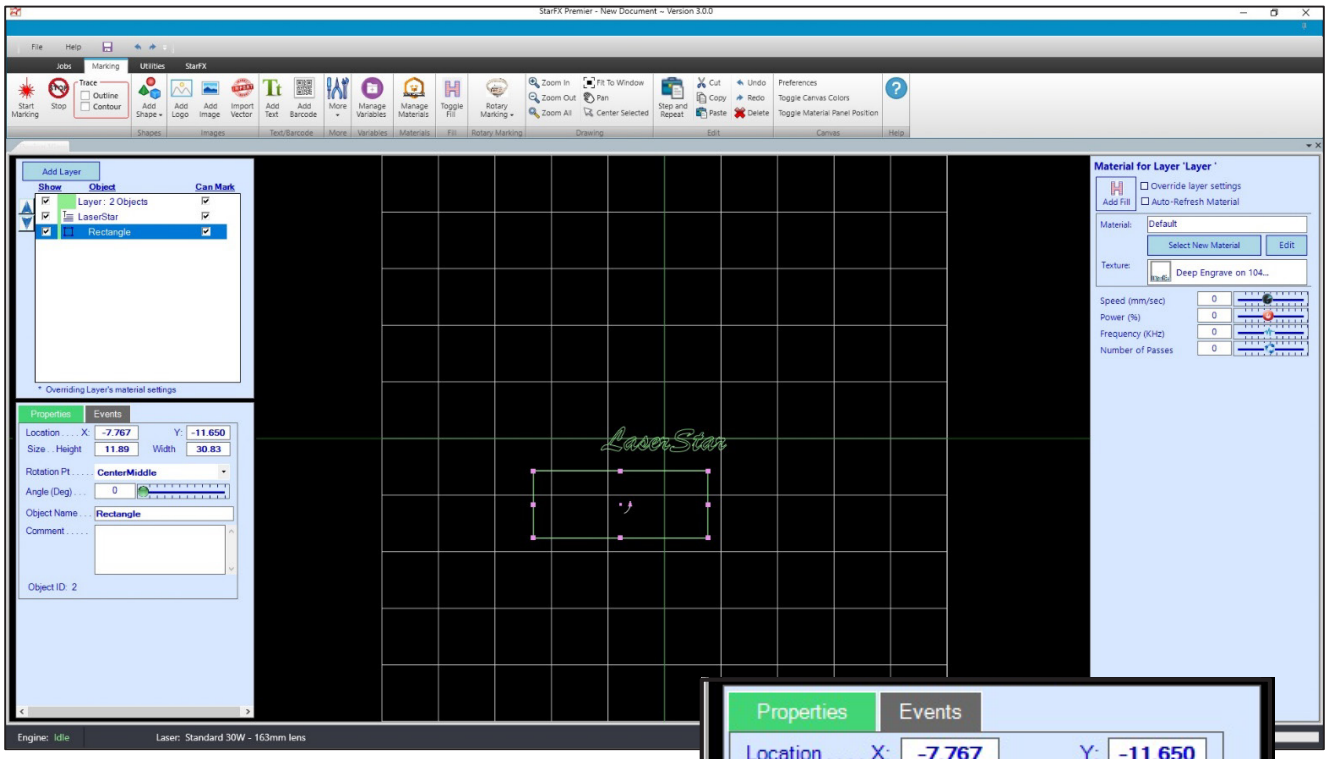
# CREATING A PROGRAM

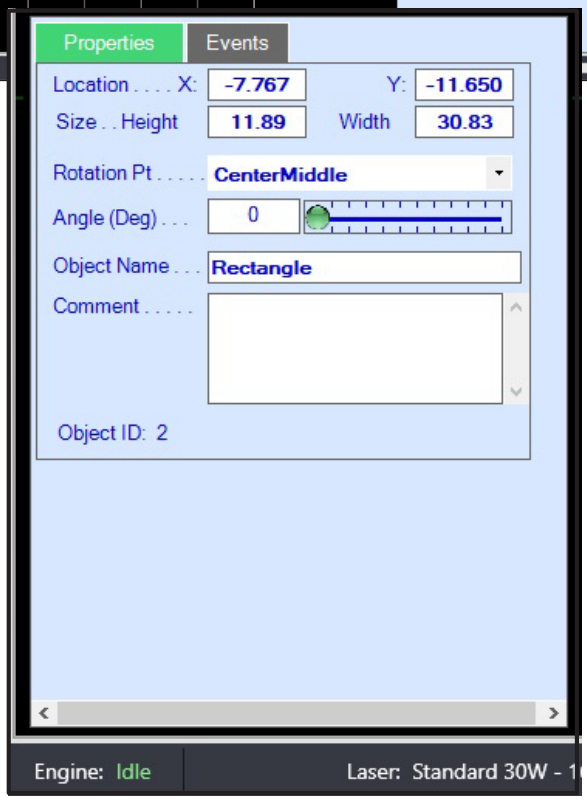
By highlighting an object in the tree that will also be the selected object on the Canvas.




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# CREATING A PROGRAM



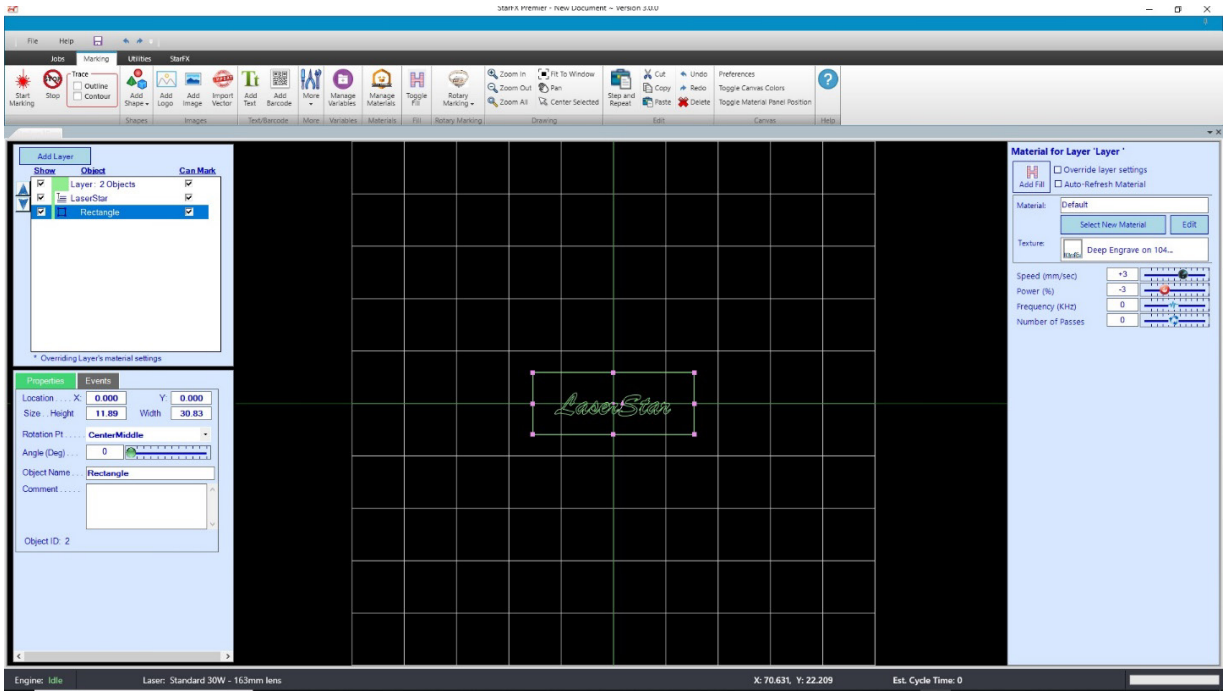

The Property tabs show the “Blue Print” information about the selected object on the Canvas.

So if “Drag and “Drop” is not accurate enough you can enter the exact information for an object in this area.



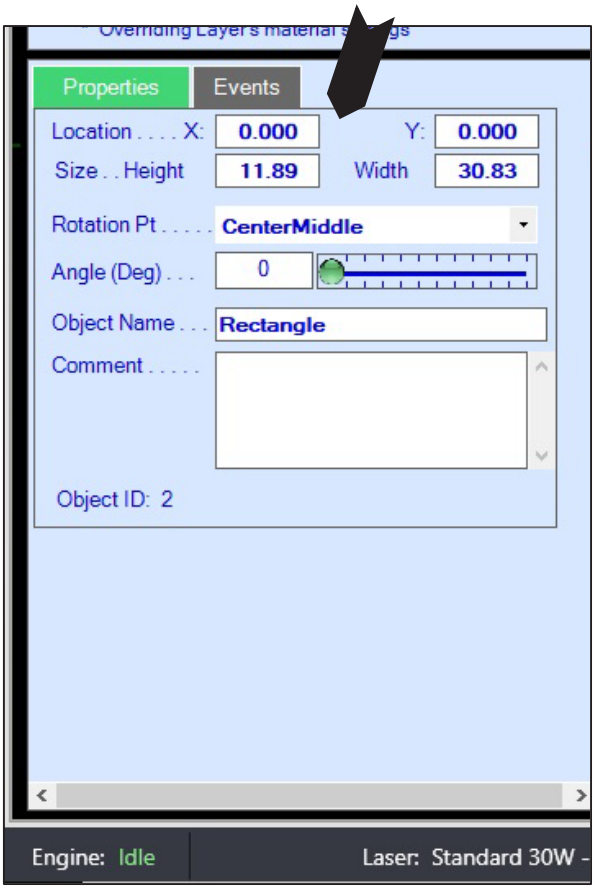
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# CREATING A PROGRAM



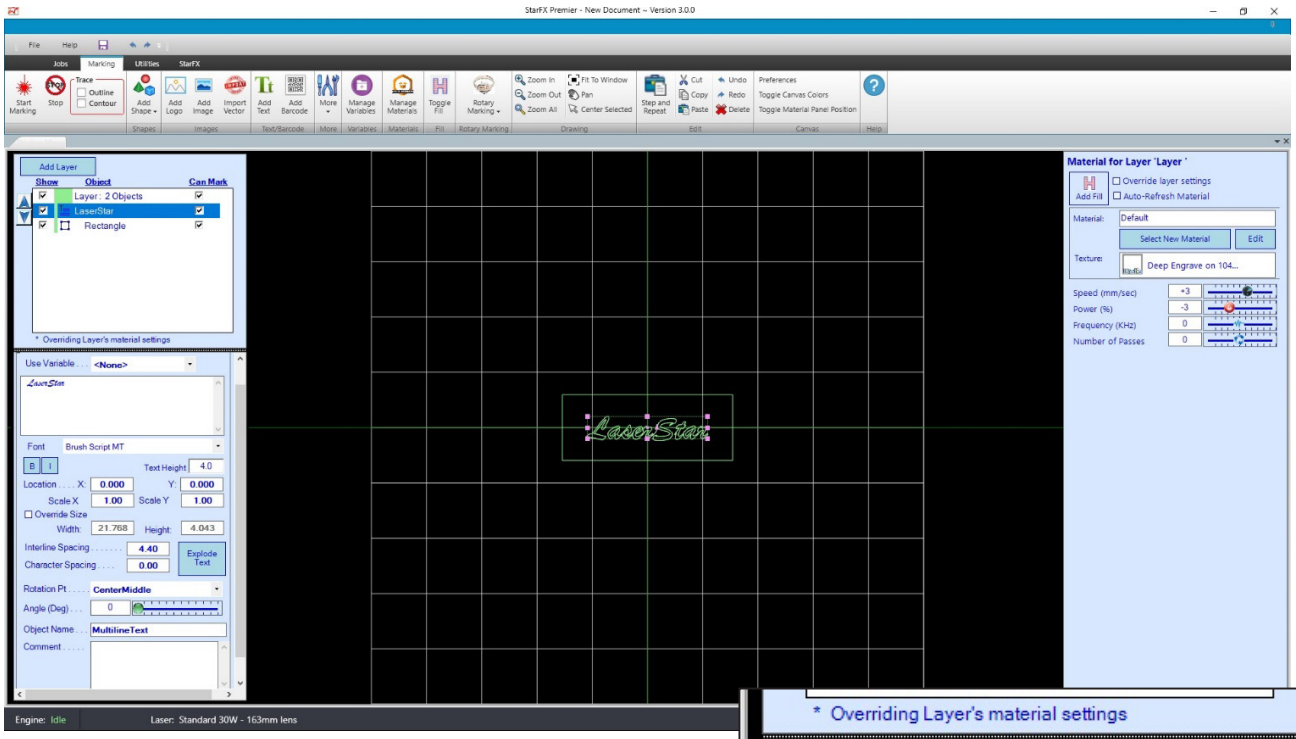
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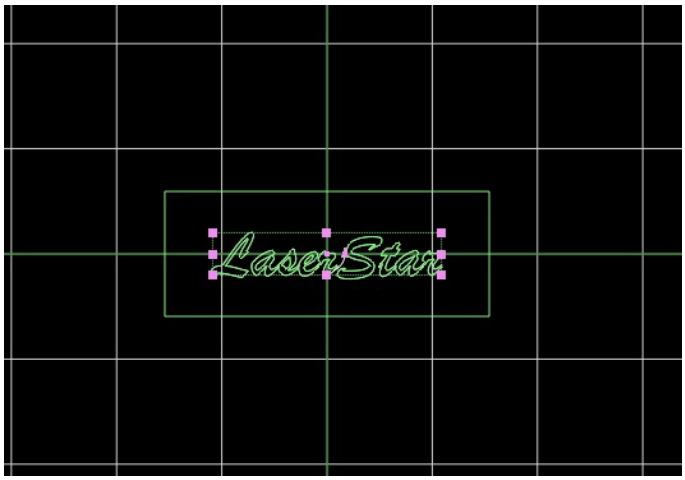


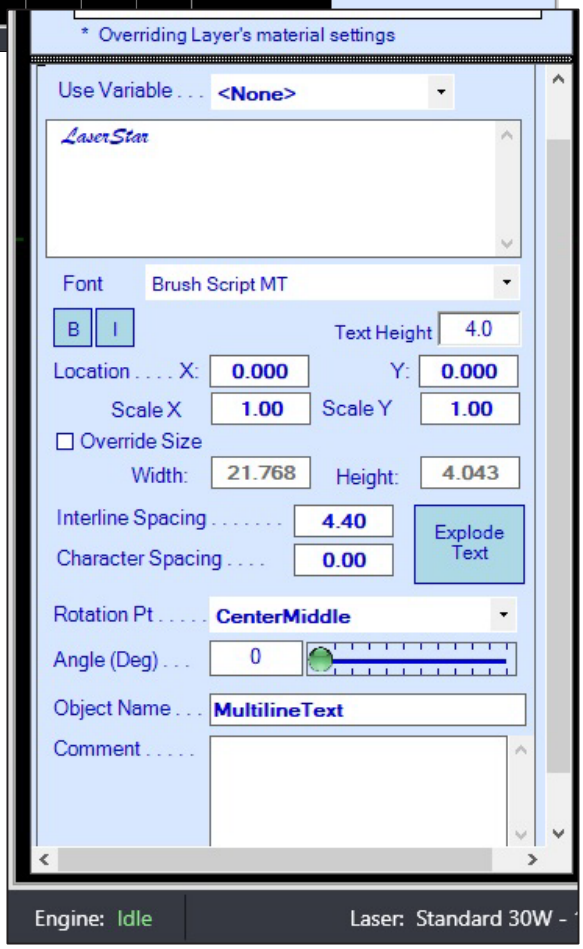

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# CREATING A PROGRAM




Obviously the Property information is different for each type of object.

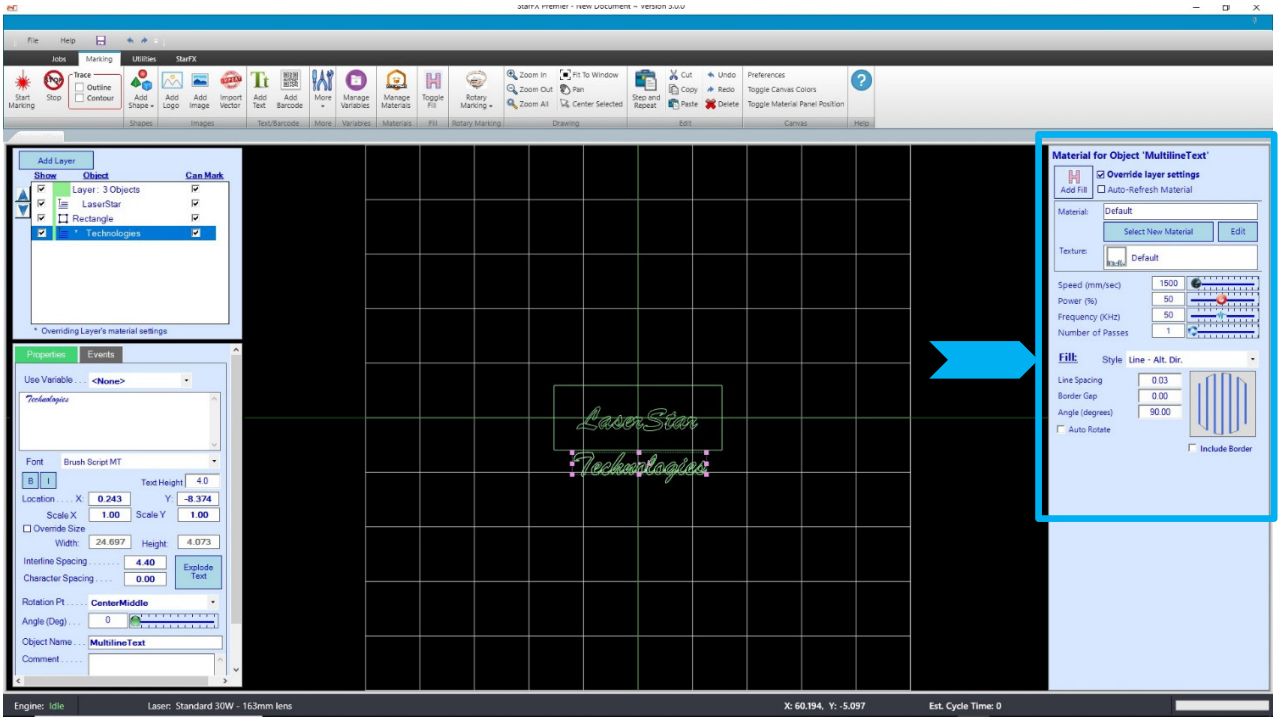


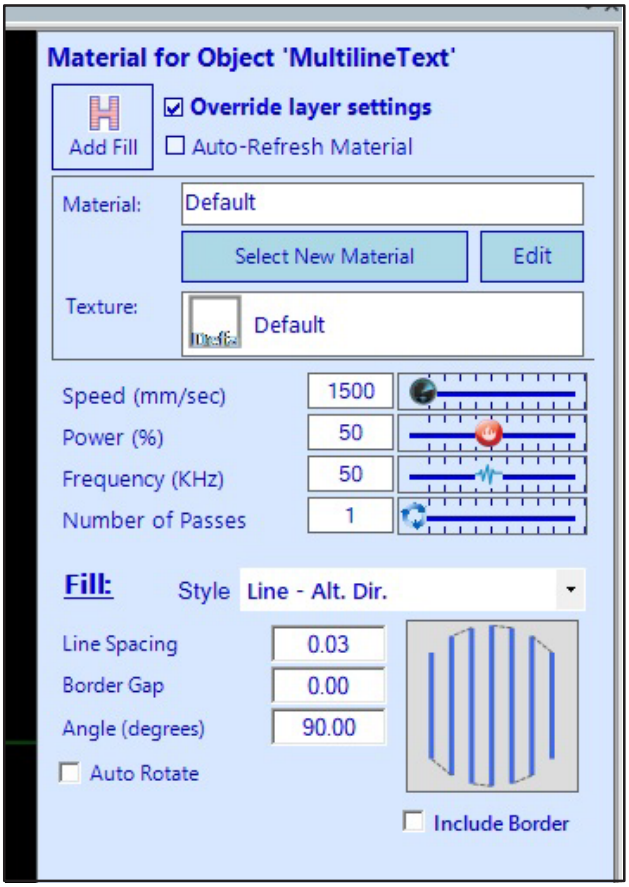



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# CREATING A PROGRAM

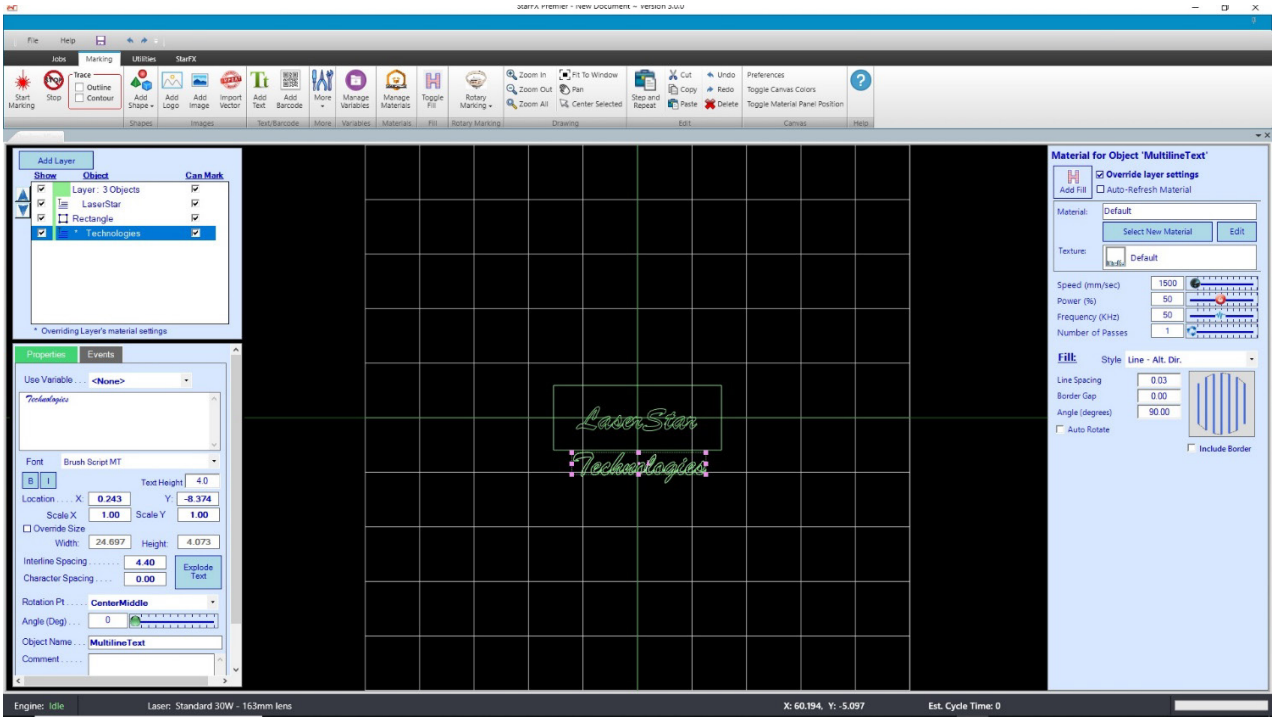


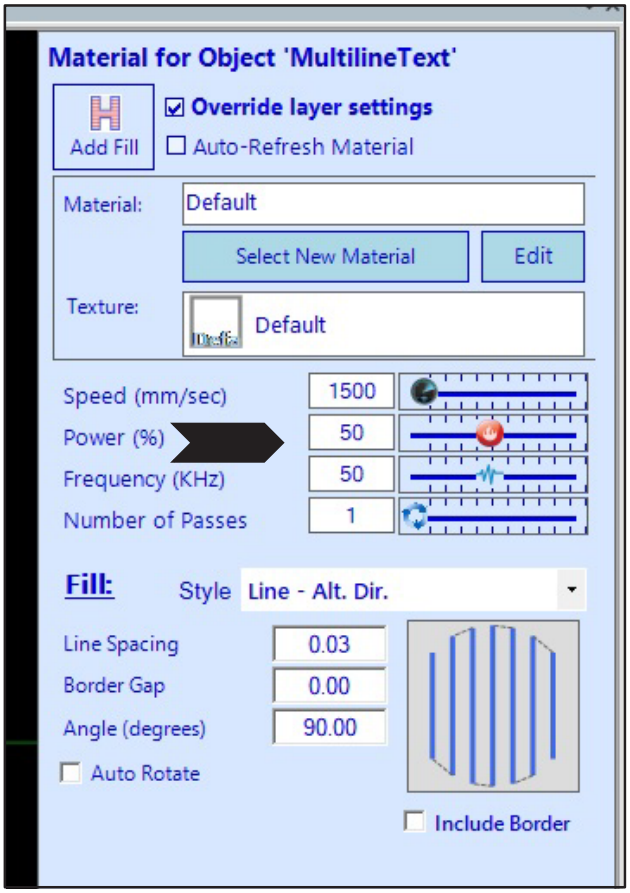

On the right side of the Canvas is the "Material Selection" area.




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# CREATING A PROGRAM






If no material is selected or a new object is added to the Canvas the Material is assigned as “Default”.

The “Default” Material has special characteristics in the Override section in that the Override properties are actual values instead of a percentage as is the case when an existing Material is selected.

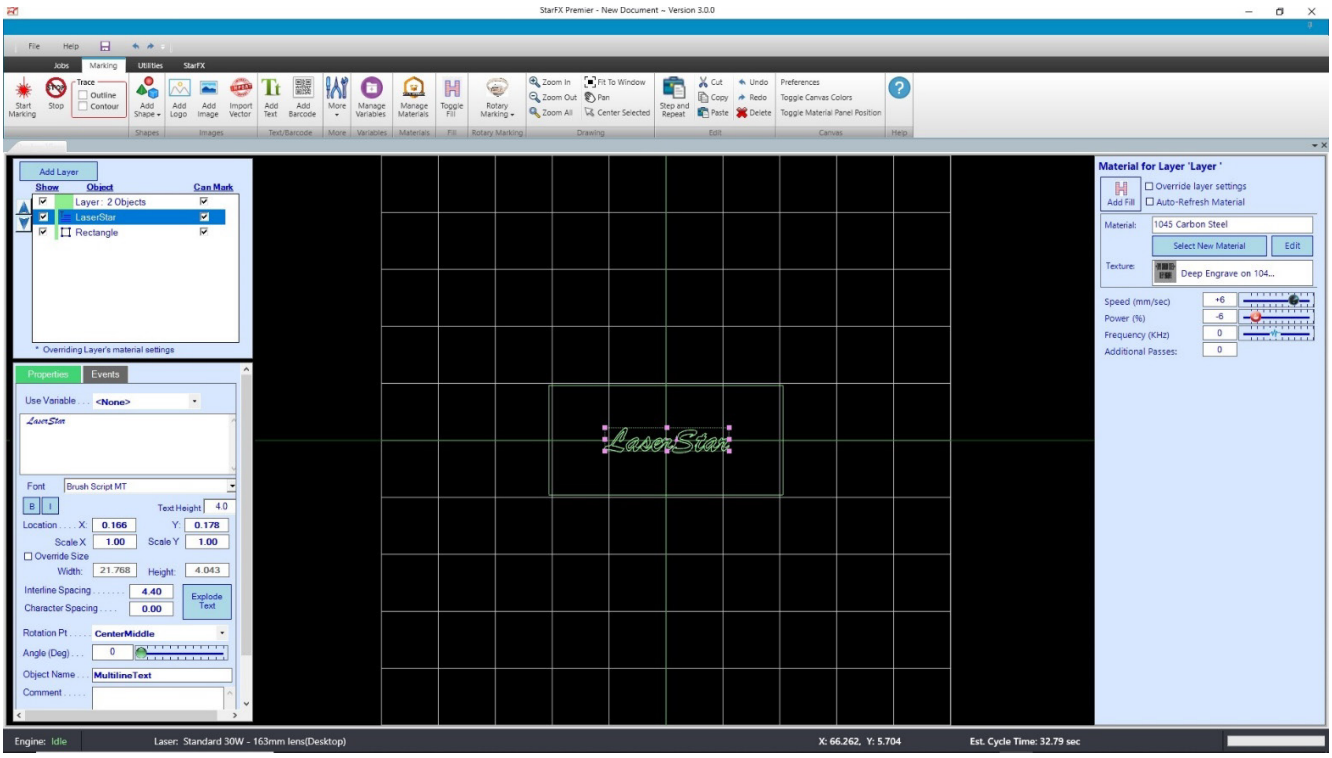
*Override Sliders allow the operator to make minor adjustment to the key laser parameters without actually changing the Material settings.*

*This can be used to account for variations in the material that is to be marked.*



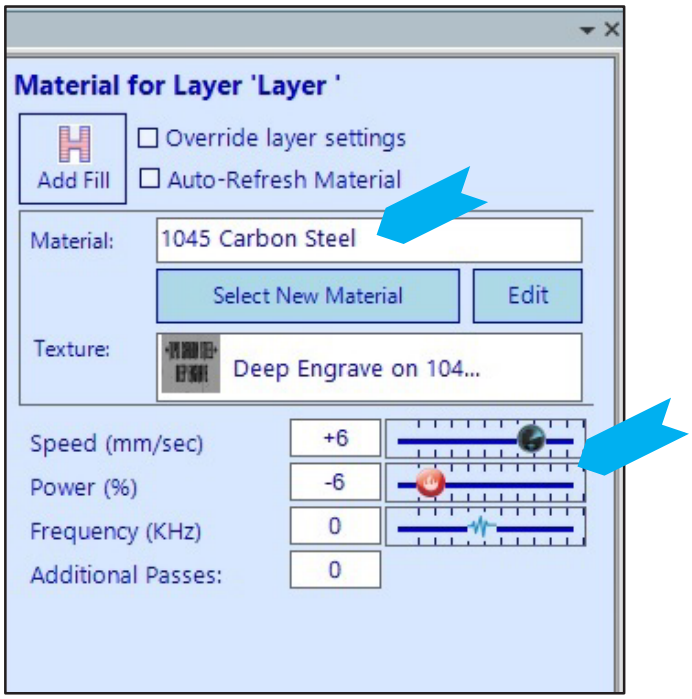
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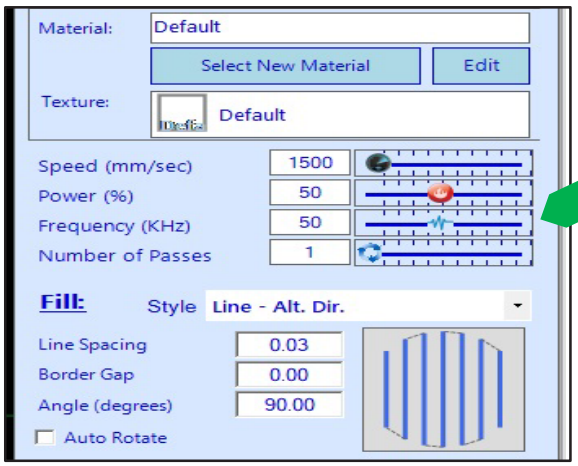
# CREATING A PROGRAM




As shown here if an actual Material is selected the Override values are a percentage up or down of the value that has been set in the Materials Manager.

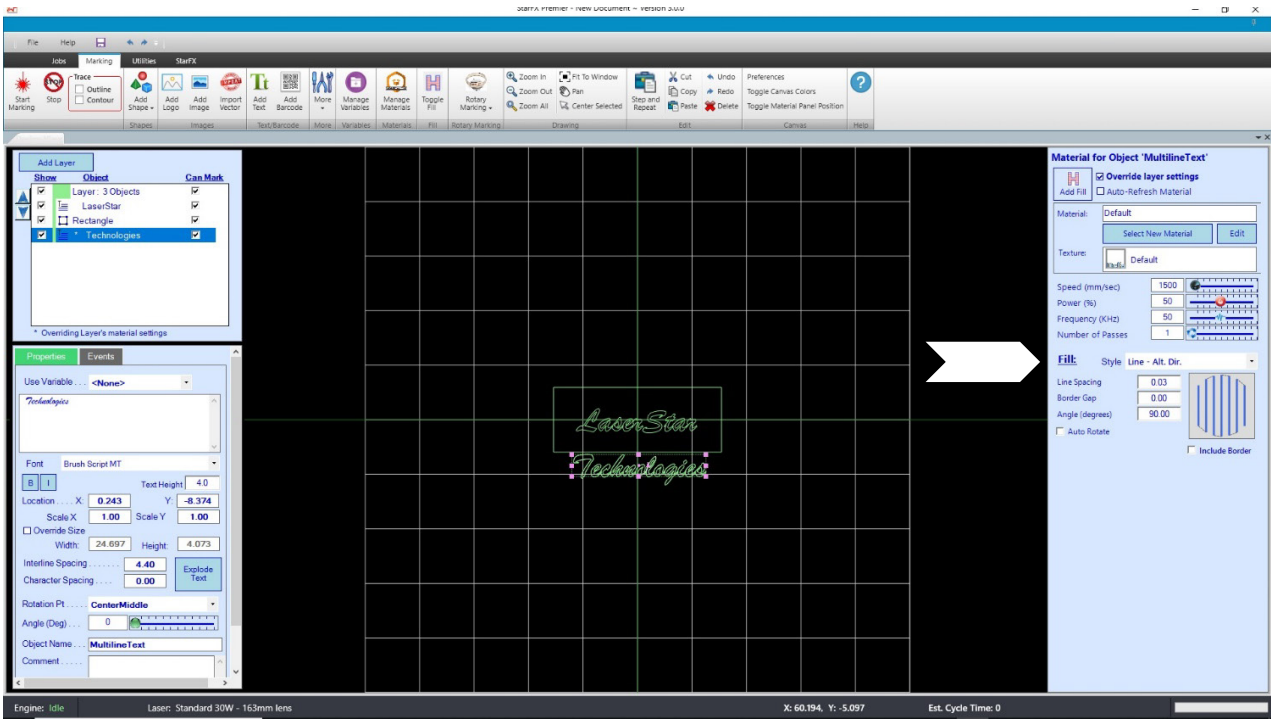
Were in the previous page the “Default” Material adjusts the actual value.




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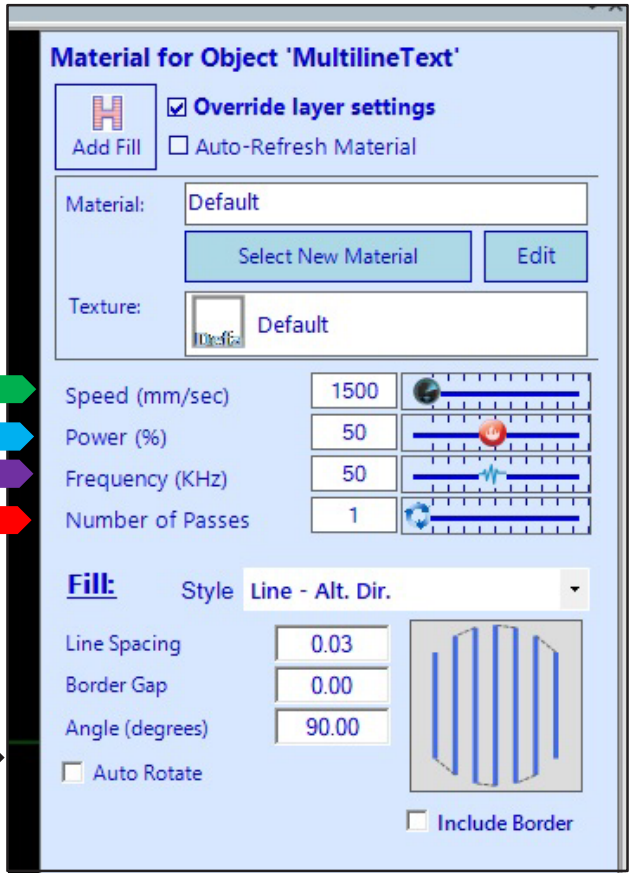
# CREATING A PROGRAM



There are three main  sections of interest when creating as program.

- ☆ Speed
- ☆ Power
- ☆ Frequency
- ☆ Number of Passes

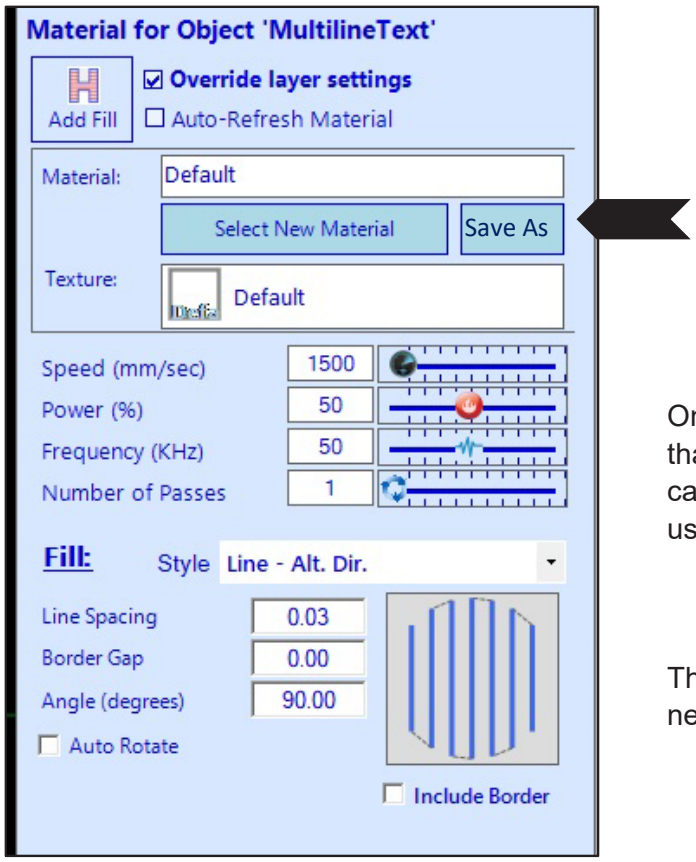
You can move the slider or type in the value.
You can also set some basic parameters for Filling an object.





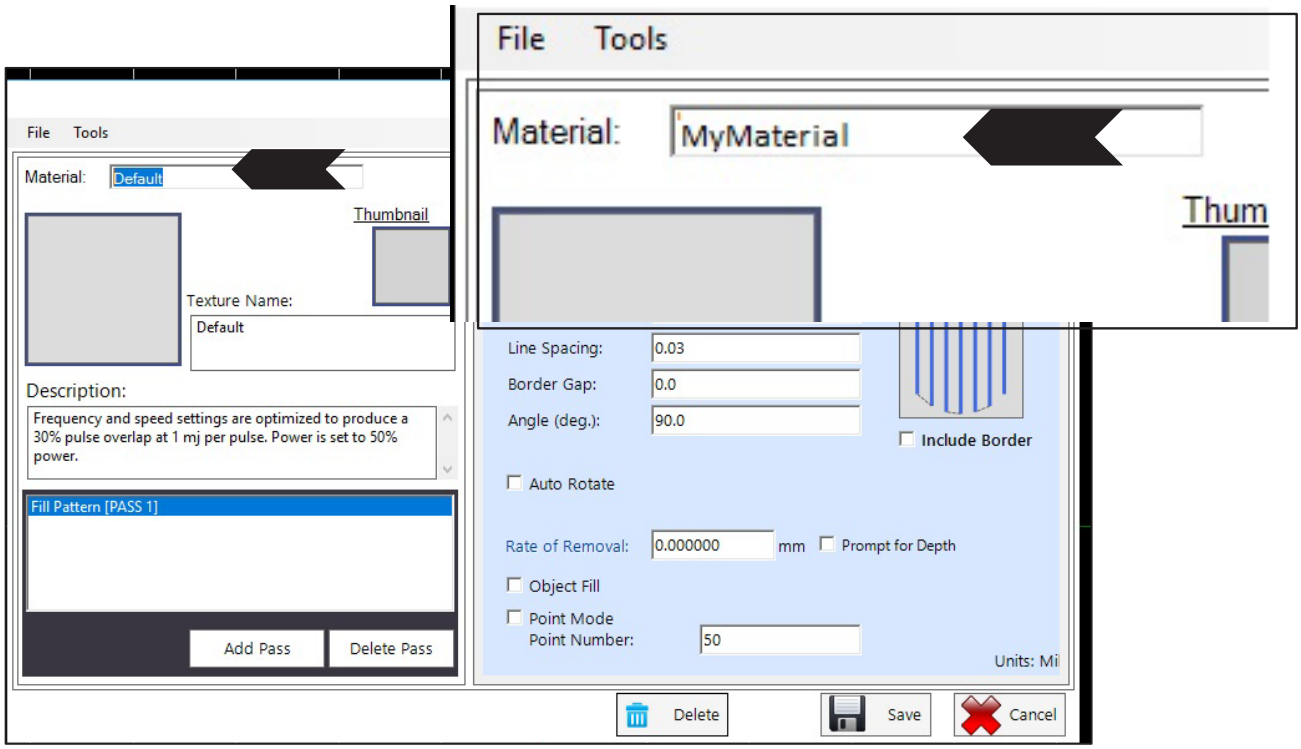

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# CREATING A PROGRAM



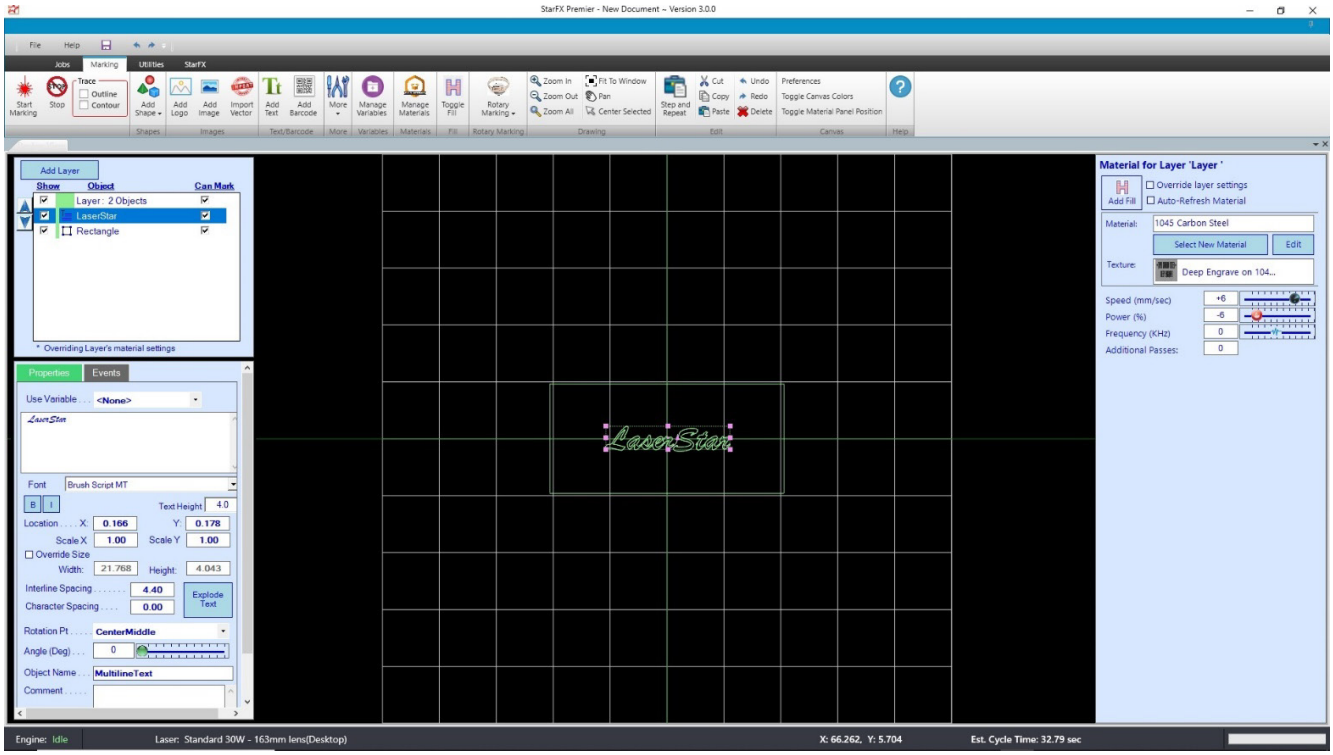

Once you have achieved the settings that give you the desired results you can save these as a new material by using the **"Save As"** button.

Then simply change the name to your new material.



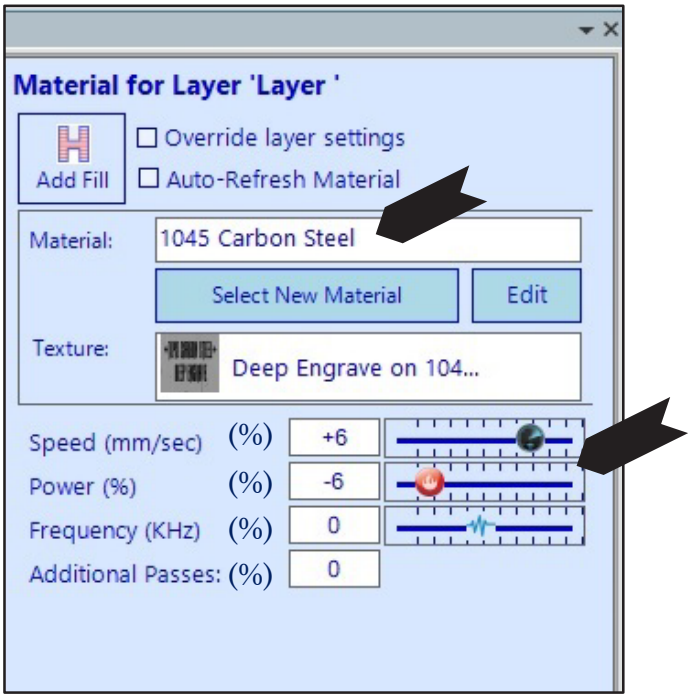

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# CREATING A PROGRAM




The purpose of the Override sliders when a pre-existing Material is selected is to give the operator some flexibility in making minor “tweaks” to the material settings to allow for variations in material or production requirements without giving them access to editing the material values themselves.

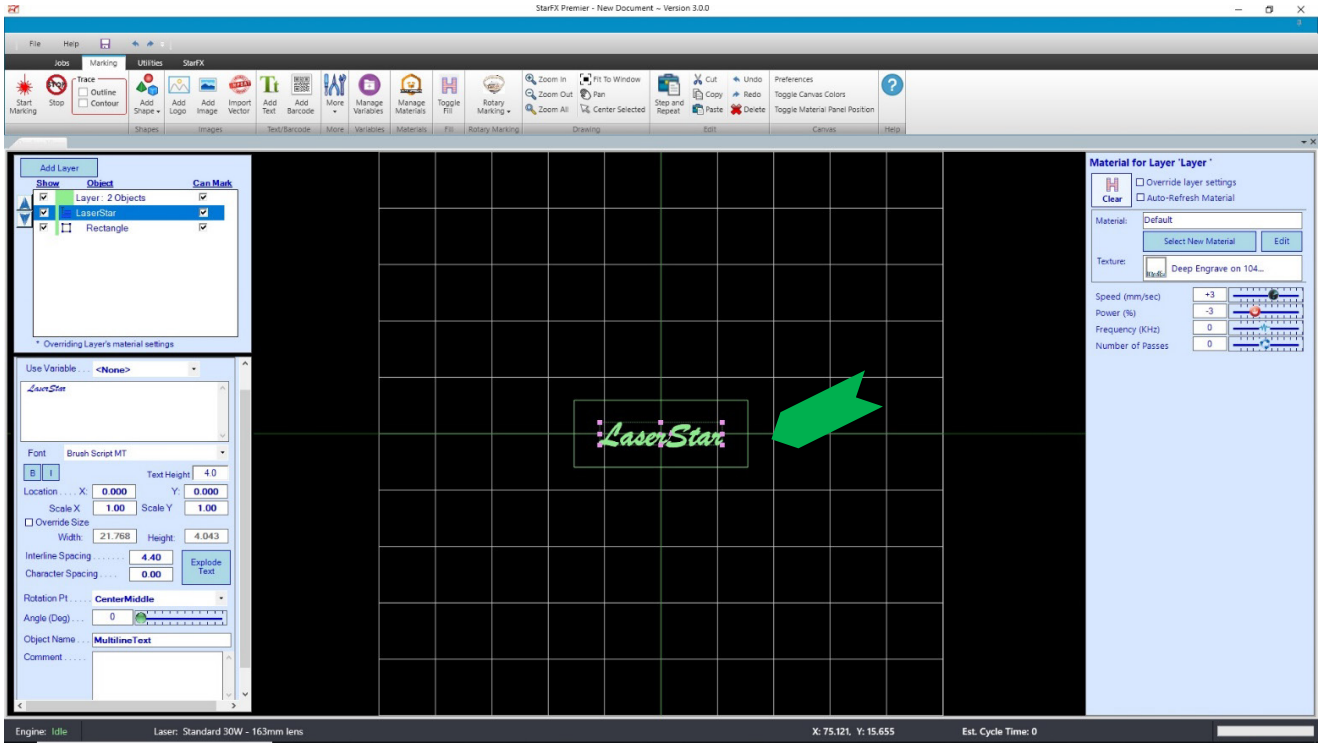
That is why they are adjusting a percentage of the actual value instead of the value itself.






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# CREATING A PROGRAM




Two select a Material for any object takes a few steps, that is because initially the “Layer” material is passed on to all objects that are on that layer.

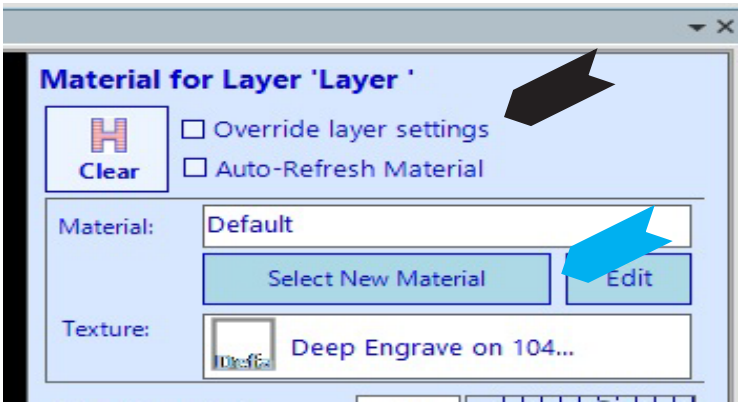
This allows you to group objects that take the same parameters on one layer and those that take another set of parameters on another layer. This could be all the objects with “Fill” and those that do not use “Fill”.

To “Override” the Material for an object you

Select an object.

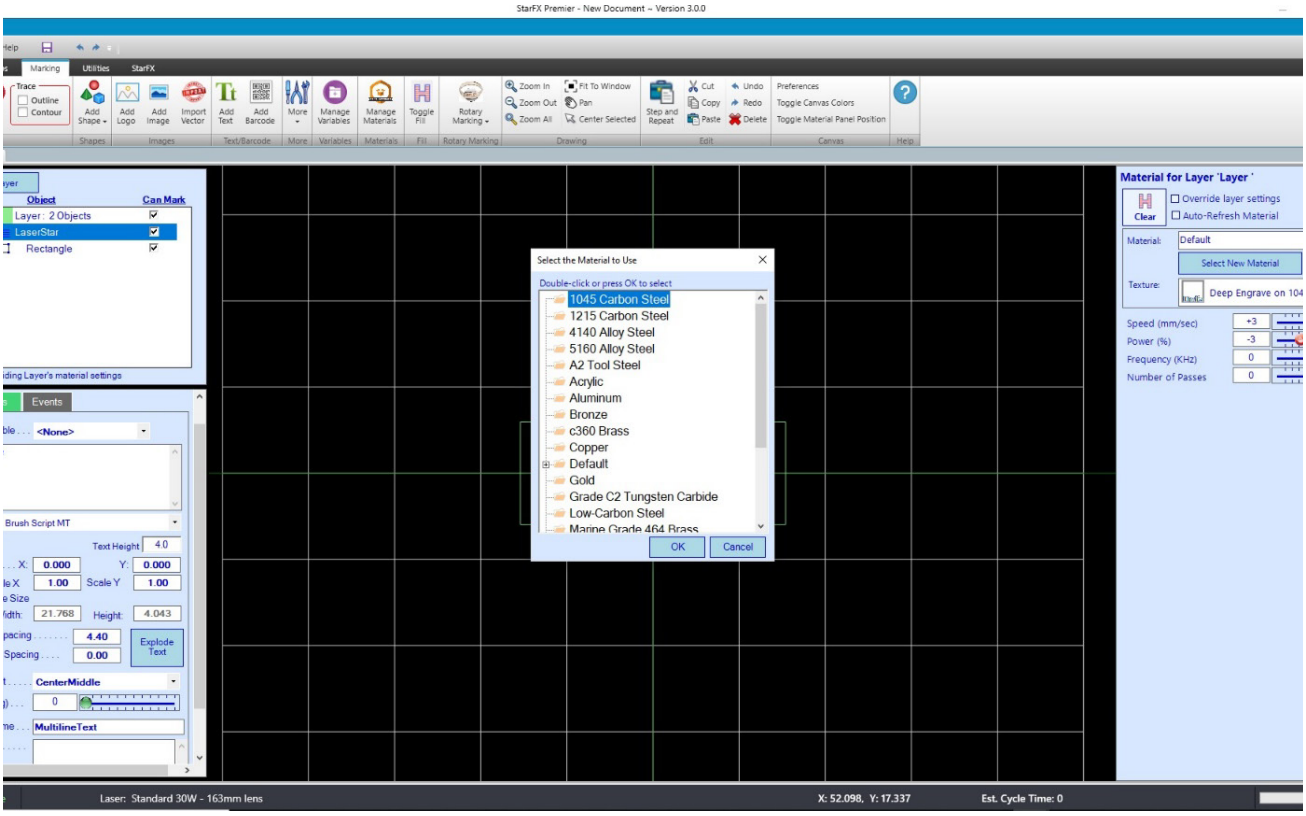
Check the “Override” box.

Push the “Select New Material” button.

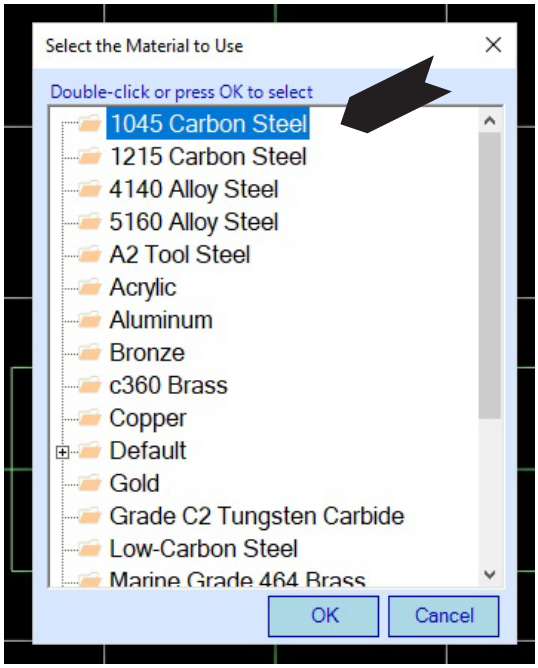


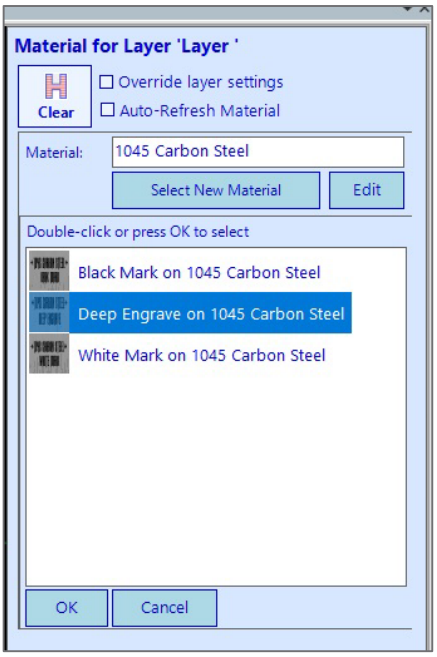

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# CREATING A PROGRAM




You start with a choice of the Main Material and this brings up several choices of different types of marking to chose from.

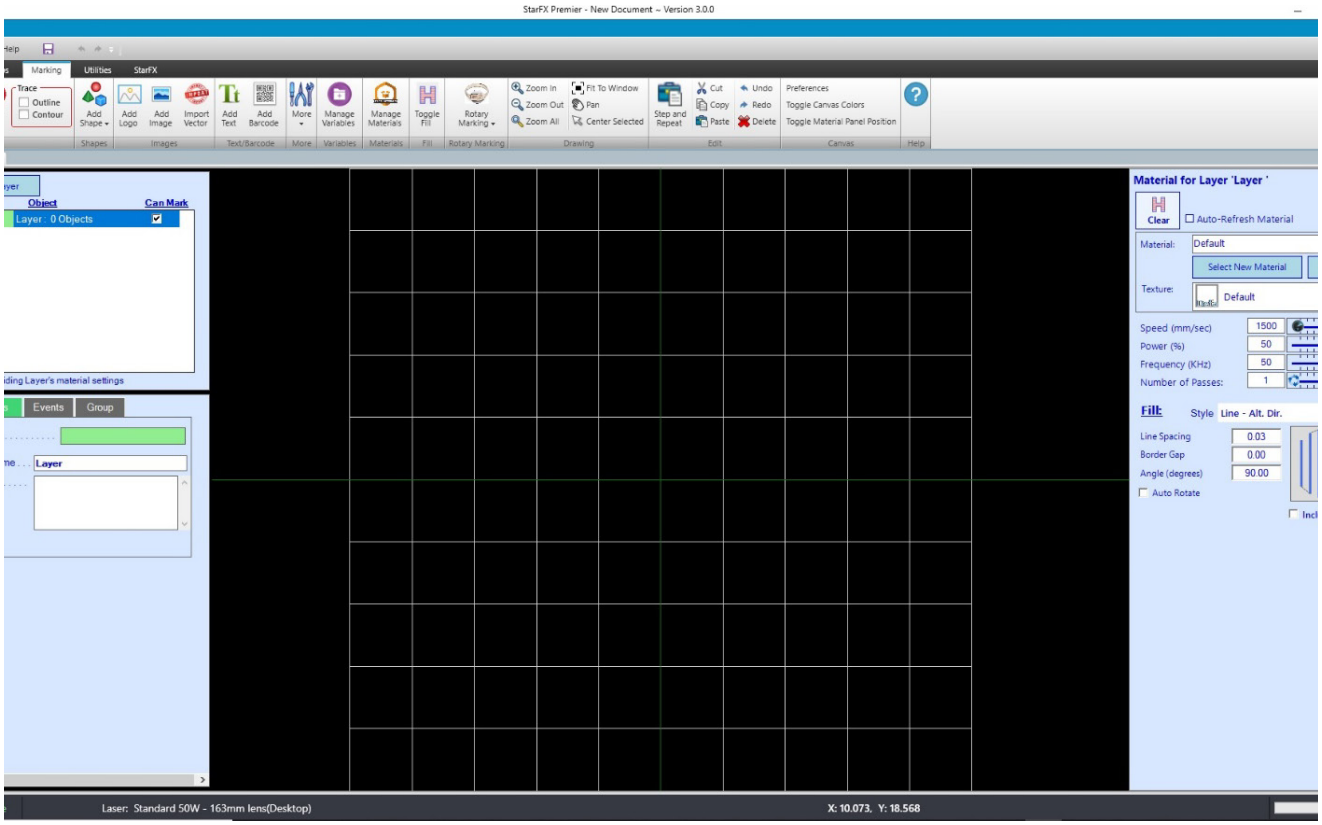





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# CREATING A PROGRAM



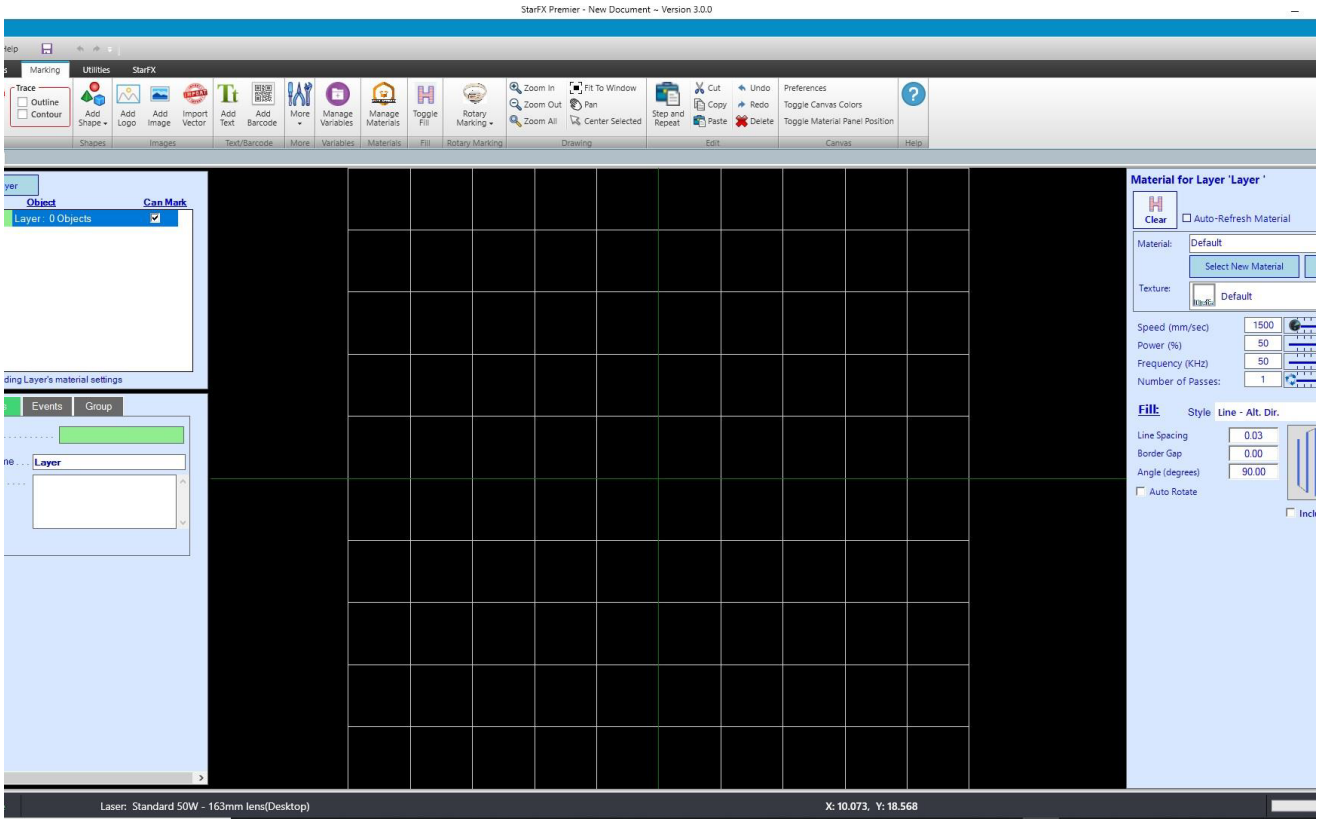

You start with a choice of the Main Material and this brings up several choices of different types of marking to chose from.

1. Layers and Objects.
2. Layers and Materials.
3. Layers and Viewing and Marking.
4. Layers and Order of Operation.

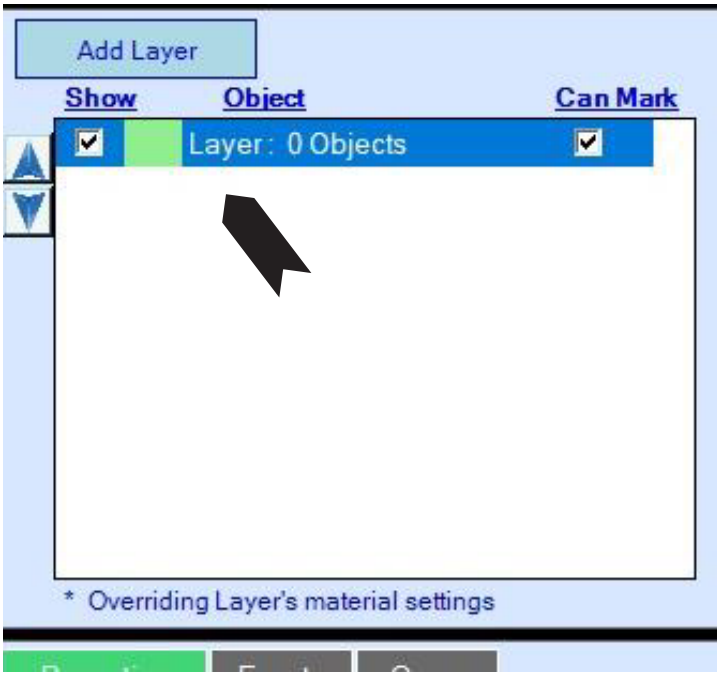
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# CREATING A PROGRAM

## Layers and Objects




Any new program starts with a default “Layer”.

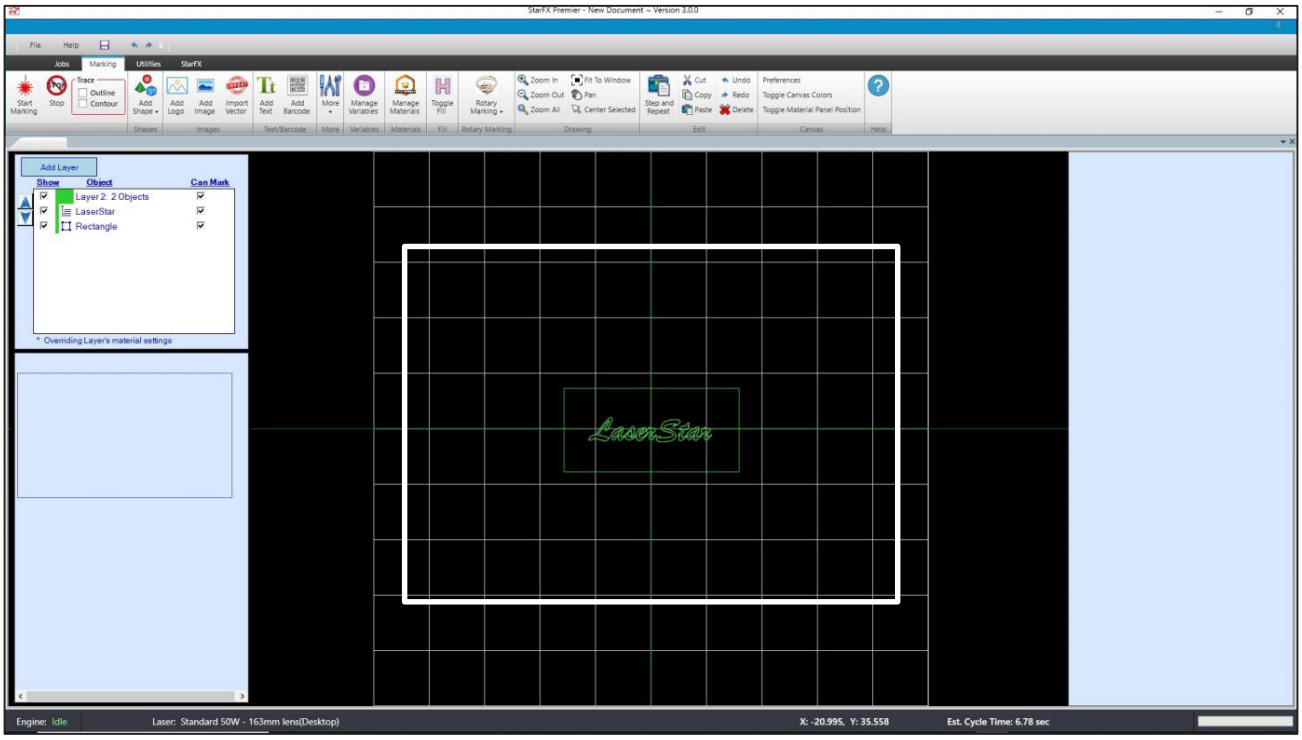





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# CREATING A PROGRAM

## Layers and Objects



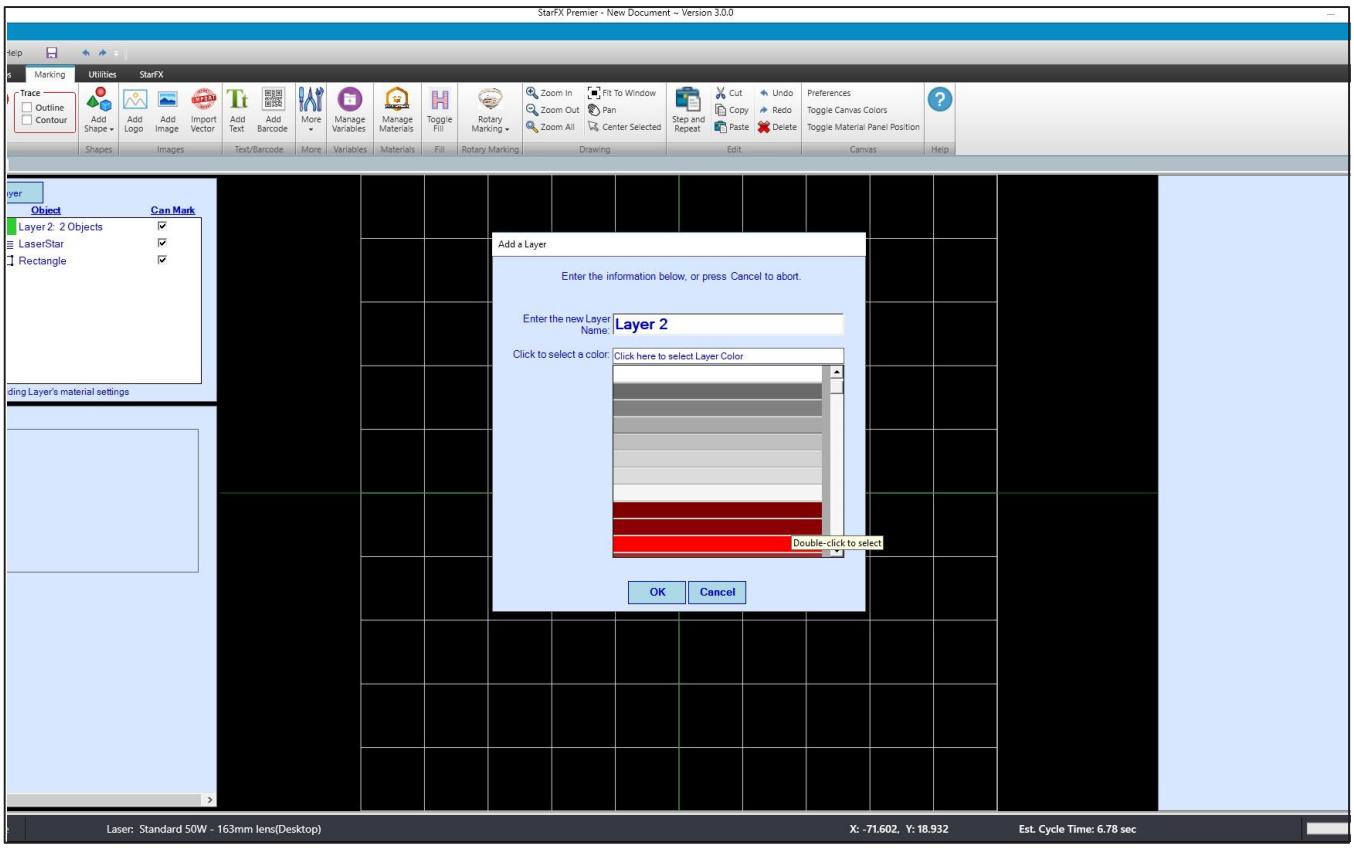

Since our objective is to lase on parts we start by adding objects to lase to our layer.

As previously stated any objects added to a Layer automatically pick up the properties of that Layer such as Material.

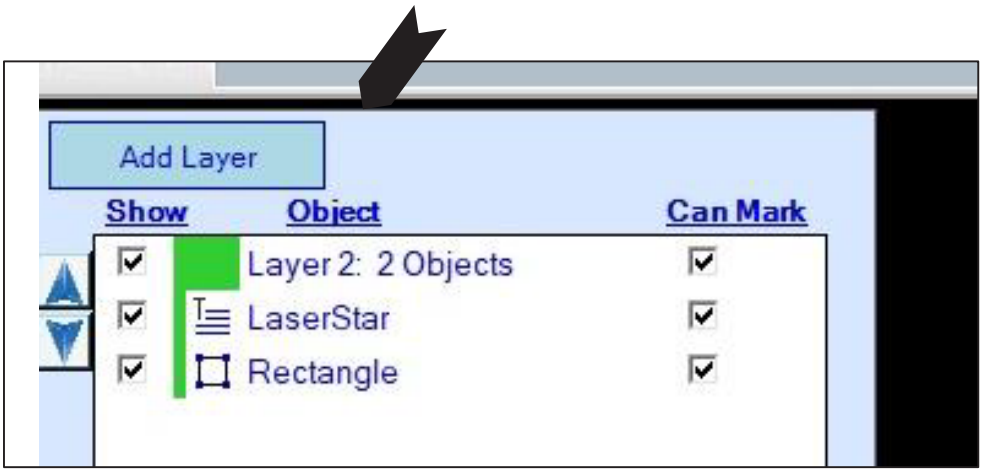
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# CREATING A PROGRAM

## Layers and Objects




Adding a Layer is as simple as selecting the “Add Layer” button.

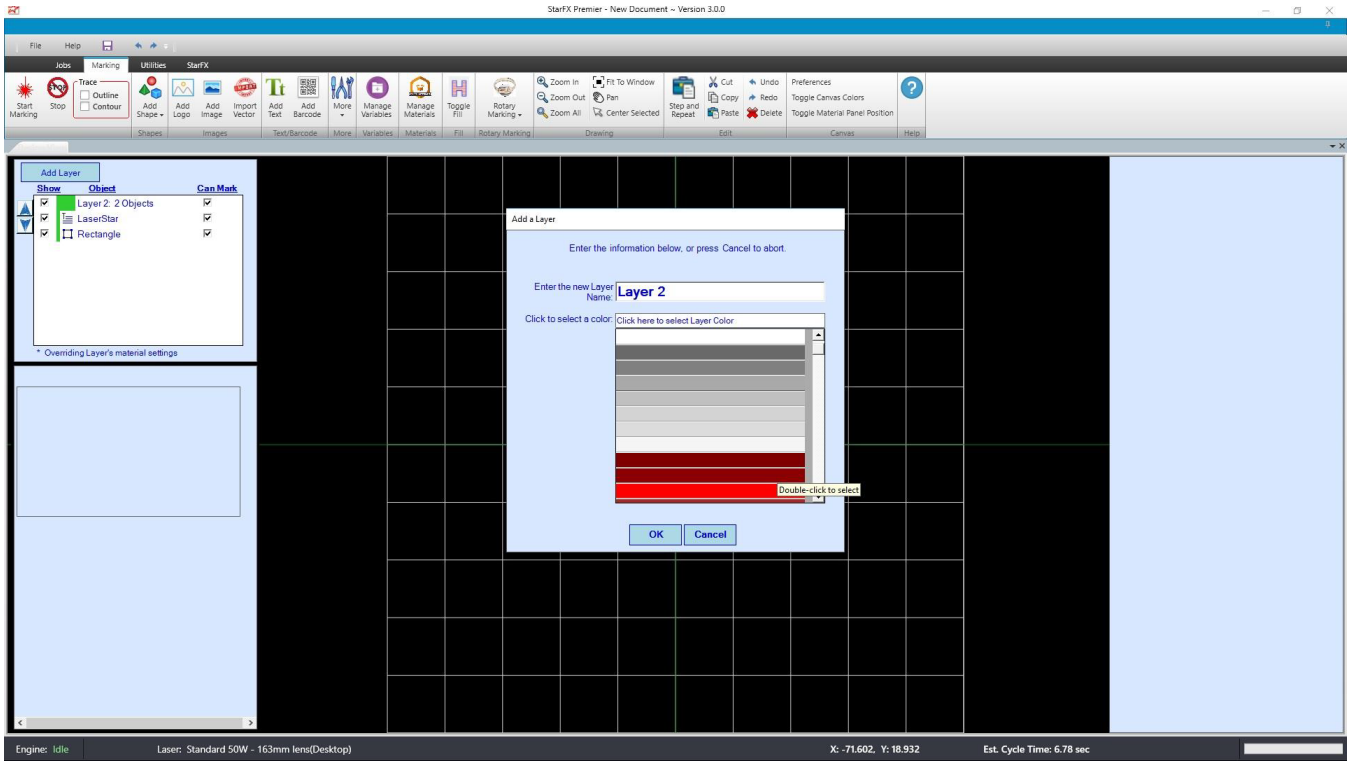




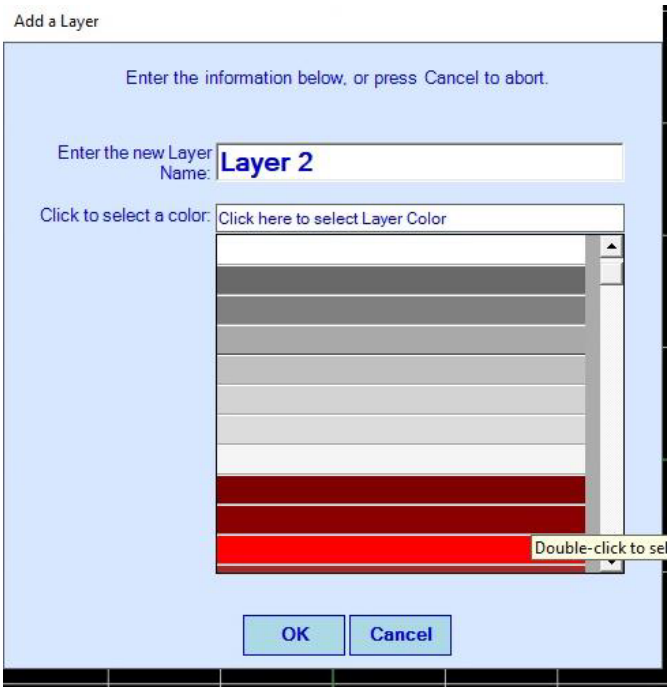

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# CREATING A PROGRAM

## Layers and Objects



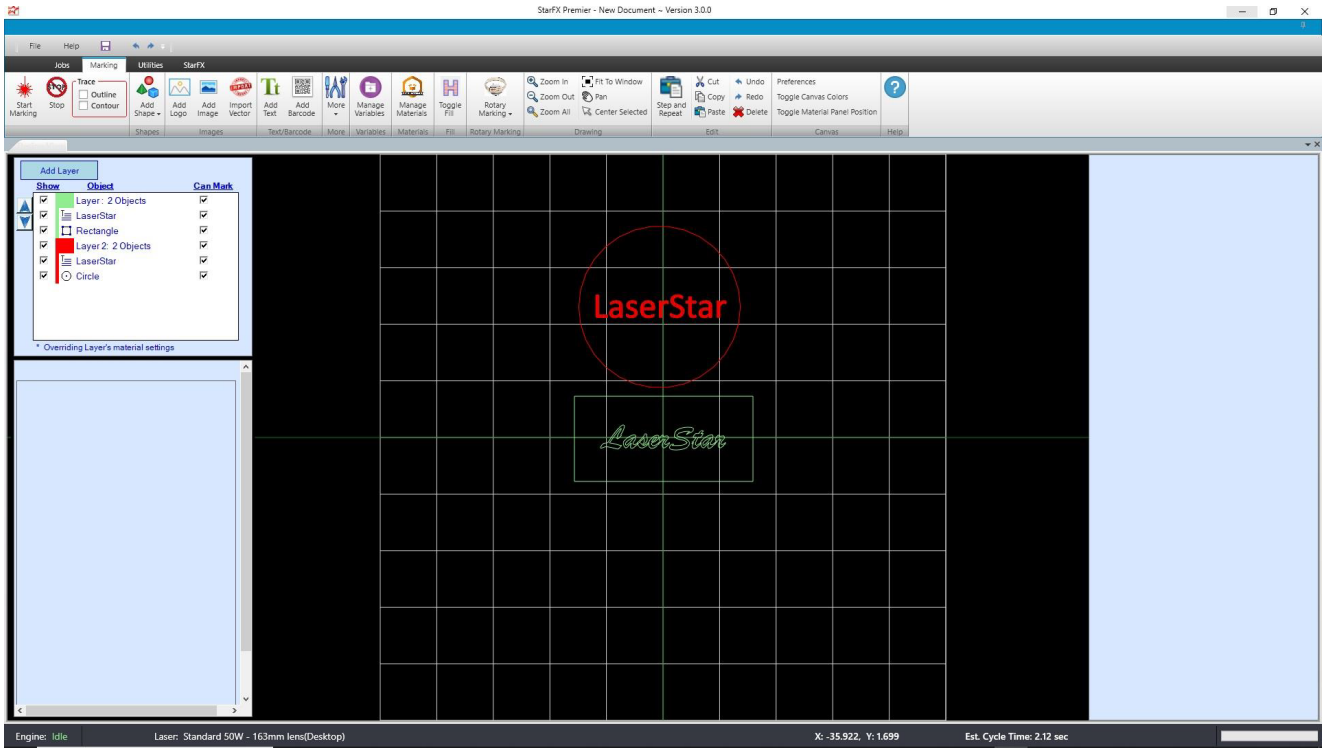

You enter a name for your New Layer
and select a color (this helps to distinguish Objects on different Layers from each other) and push OK.



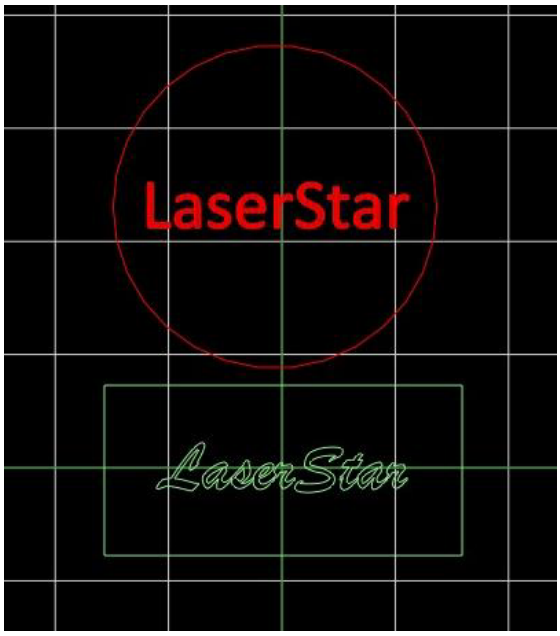

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# CREATING A PROGRAM

## Layers and Objects




You can now see that Objects added to the first Layer are a different color than those added to the second layer making it easy to see what objects are associated with each Layer.

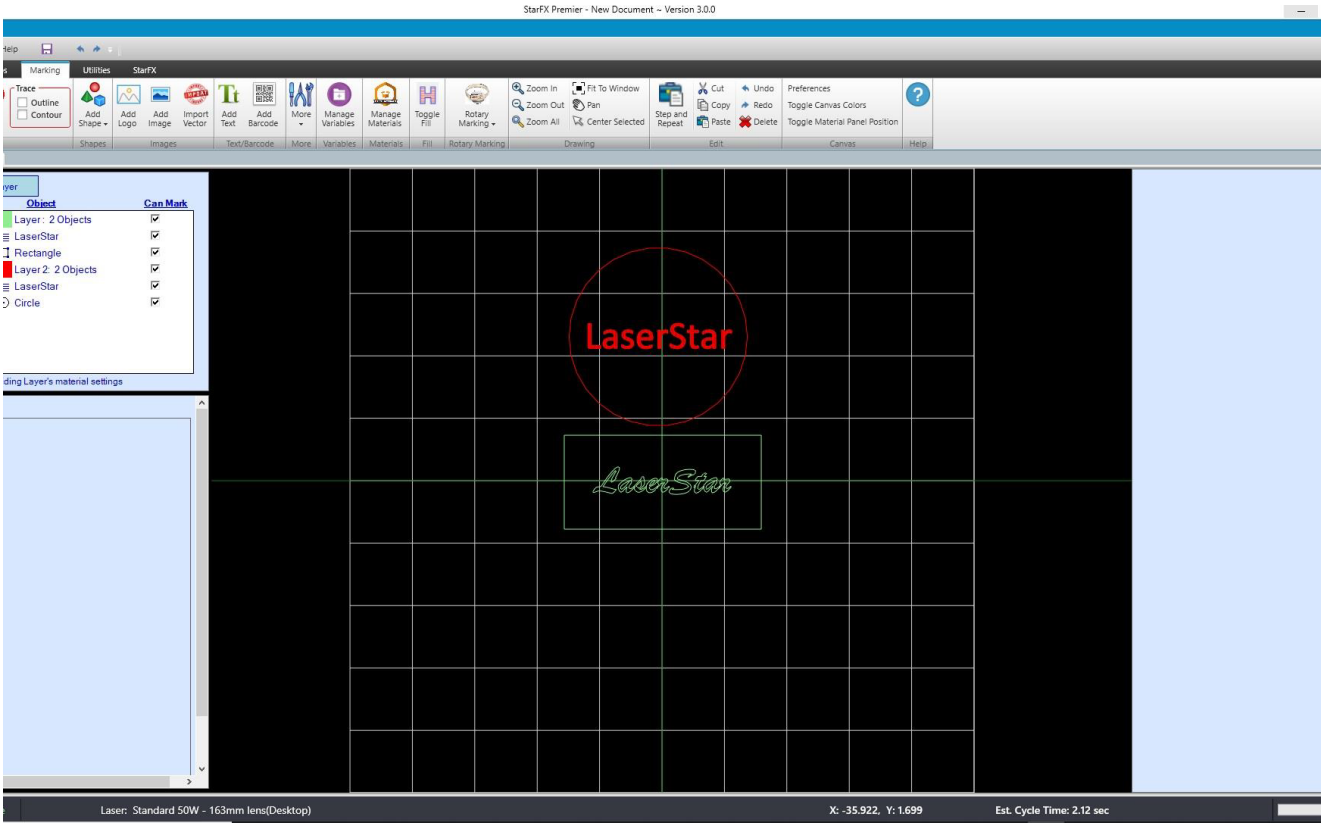





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# CREATING A PROGRAM

## Layers and Objects




What are Layers used for, why would I want more than one Layer? There are many reasons but a couple of typical uses are -

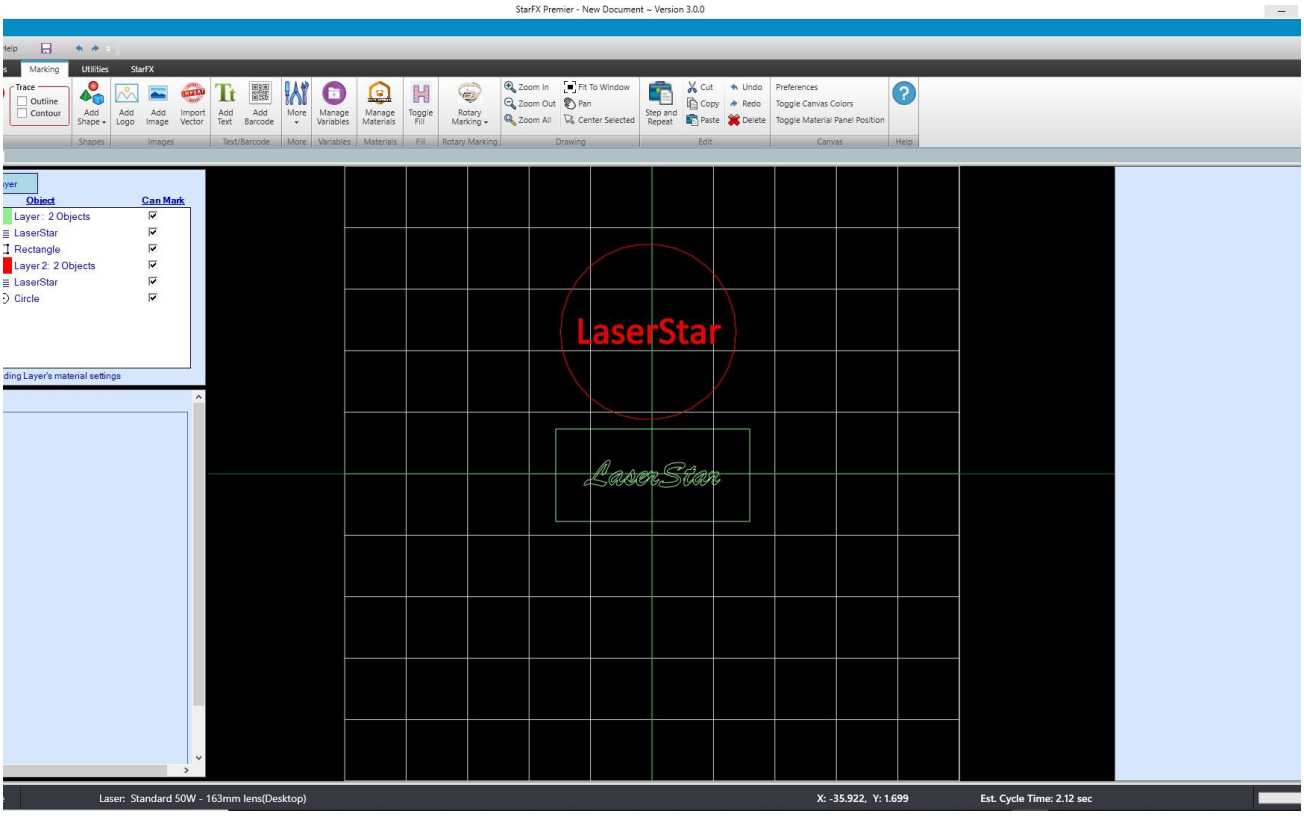
1. You have two or more Material requirements on your part.
   - ☆ On Stainless Steel you need several “Black Marks”.
   - ☆ You also need several “White Marks” or maybe a “Deep Engraved” Mark
2. You want certain objects that you want to be lased in one order and others in a different order.
3. You have a part that sometimes has the Objects on Layer 1 and Layer 2 lased and at other times it uses Layer 1 and Layer 3.

The ability to “Turn Off” a Layer or an Object makes this simple to achieve.

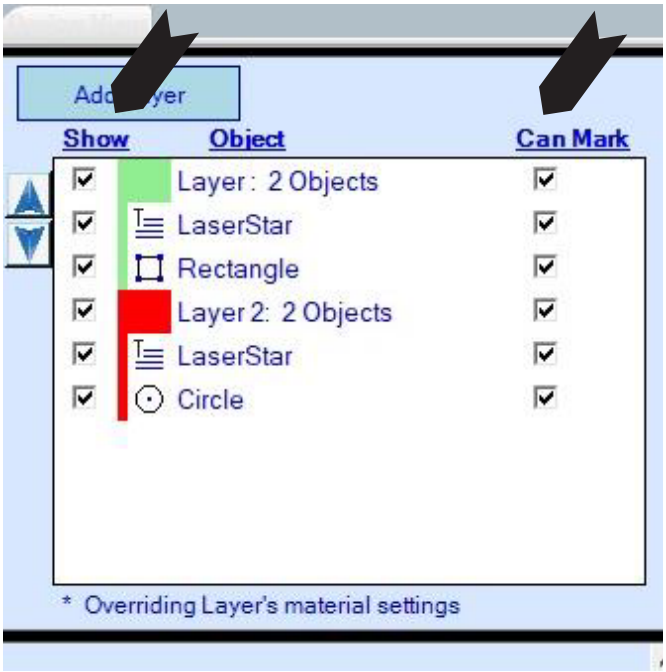
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# CREATING A PROGRAM

## The Program Tree




Some interesting features of the Program Tree are the ability to either turn off an Object visually or to turn it off from being lased.

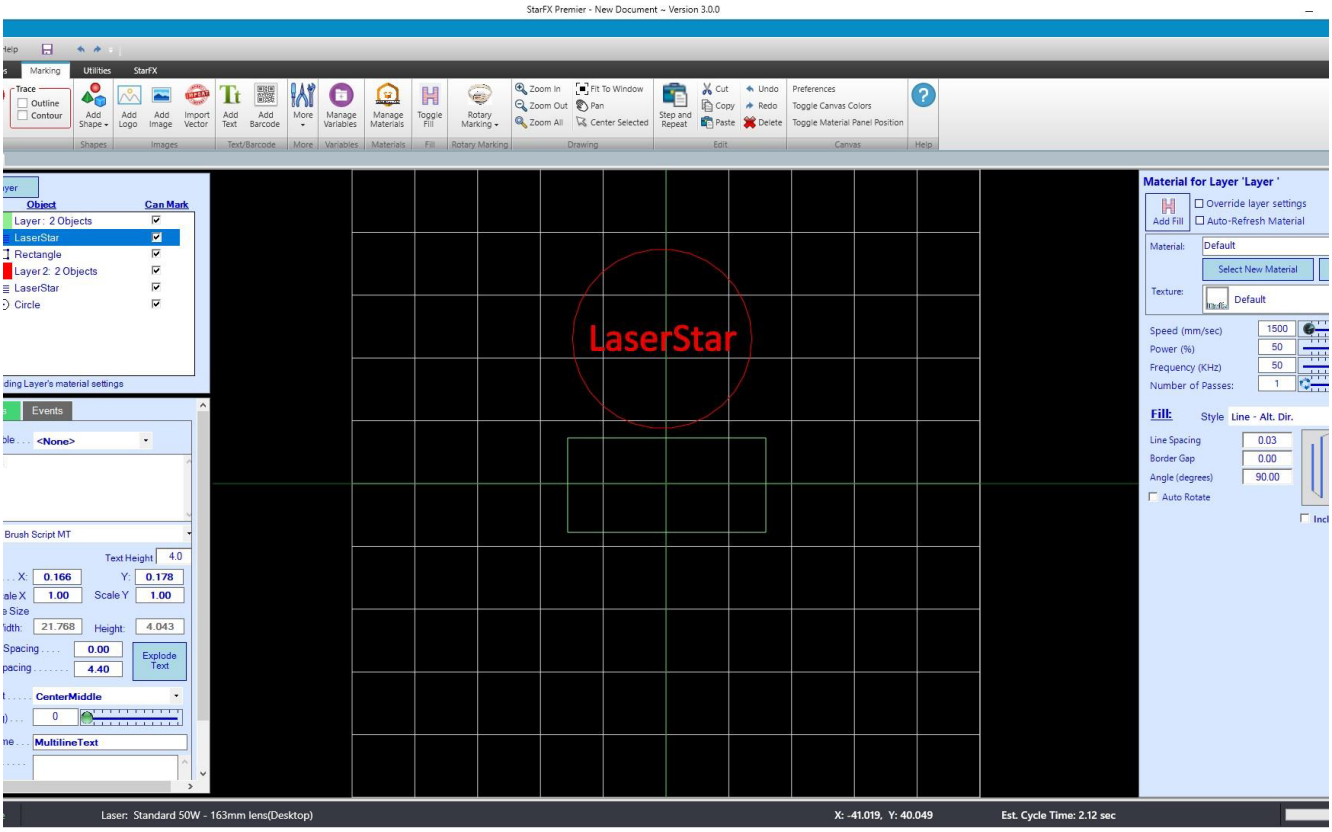




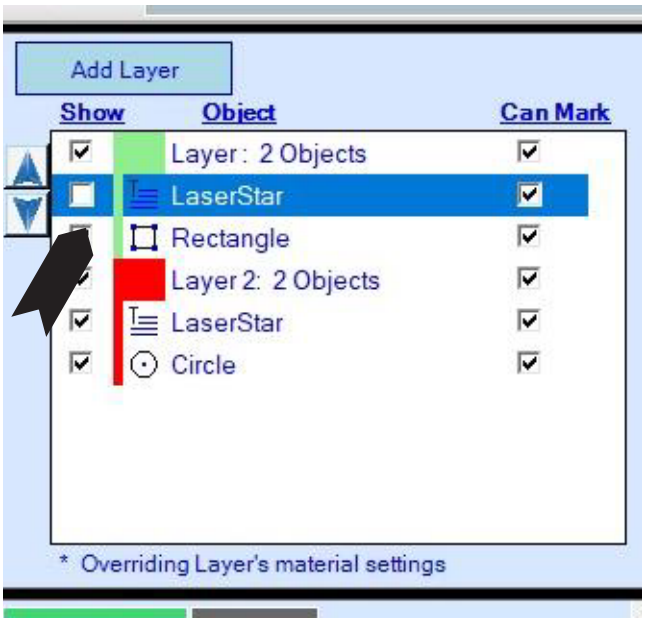

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# CREATING A PROGRAM

## The Program Tree



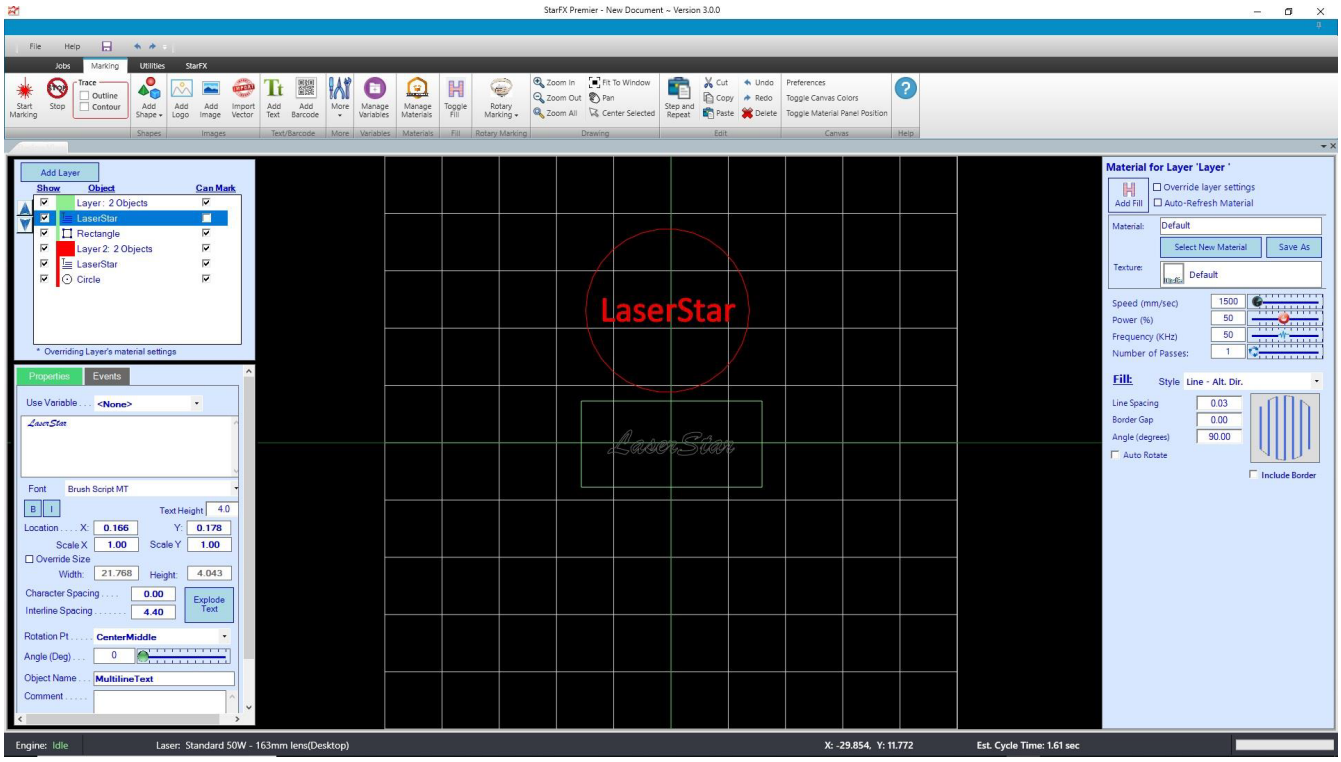

Simply checking or unchecking the boxes on the same line as the object achieves this.



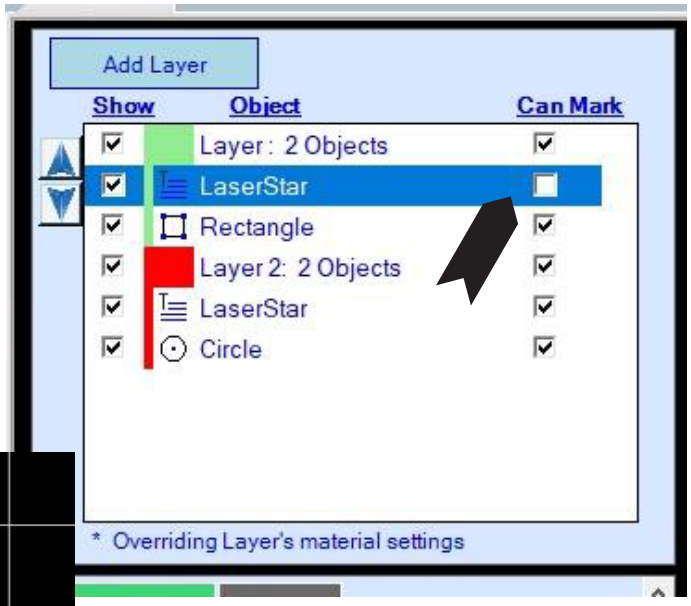

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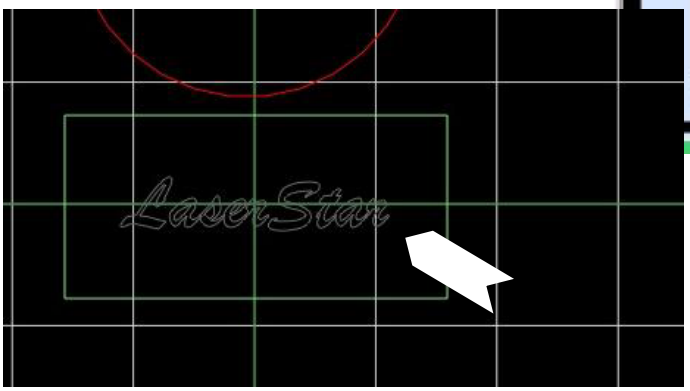
# CREATING A PROGRAM

## The Program Tree




Simply checking or unchecking the boxes on the same line as the object achieves this.



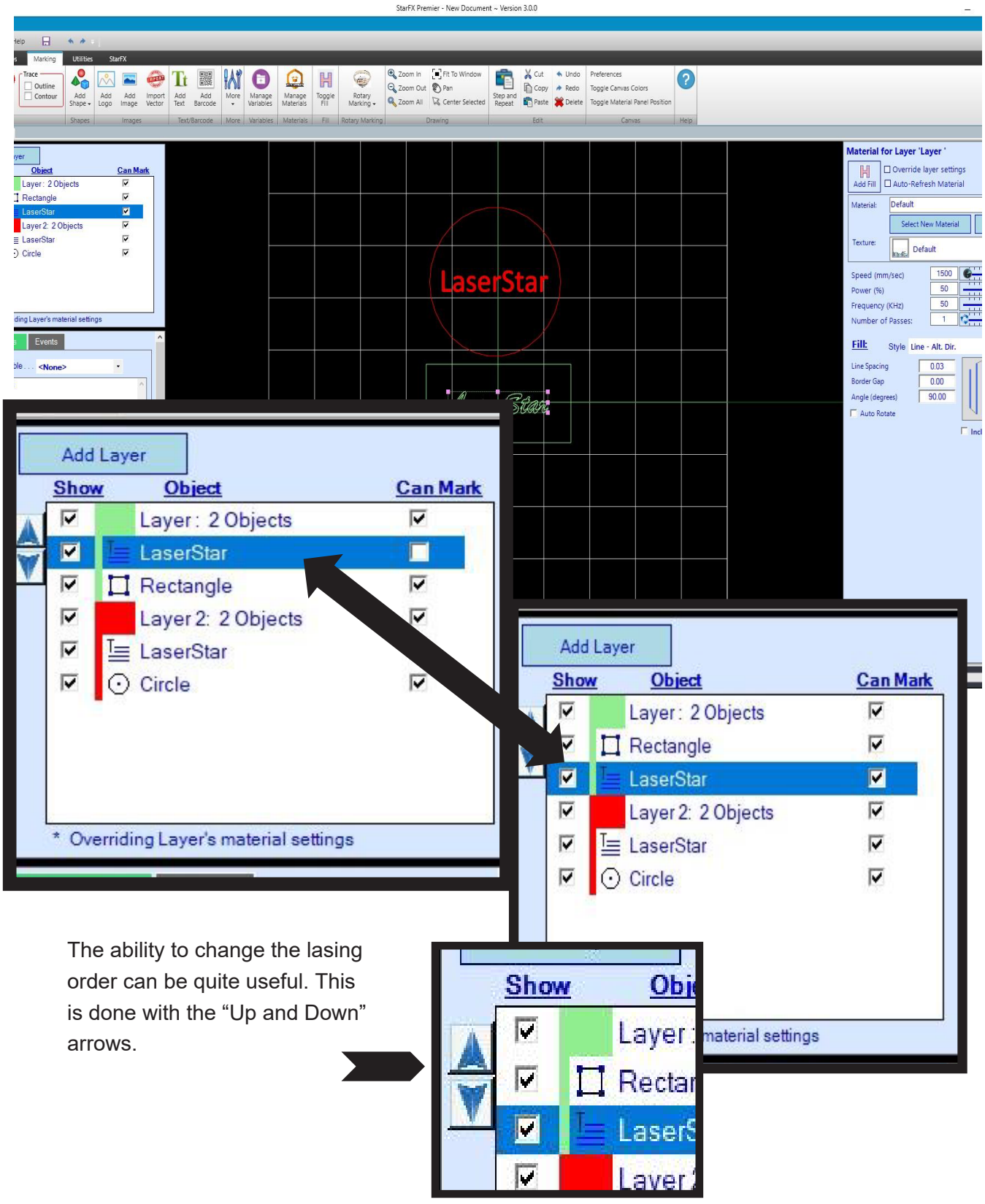

The Object shows up as Gray when it will not be lased.



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# CREATING A PROGRAM

## The Program Tree

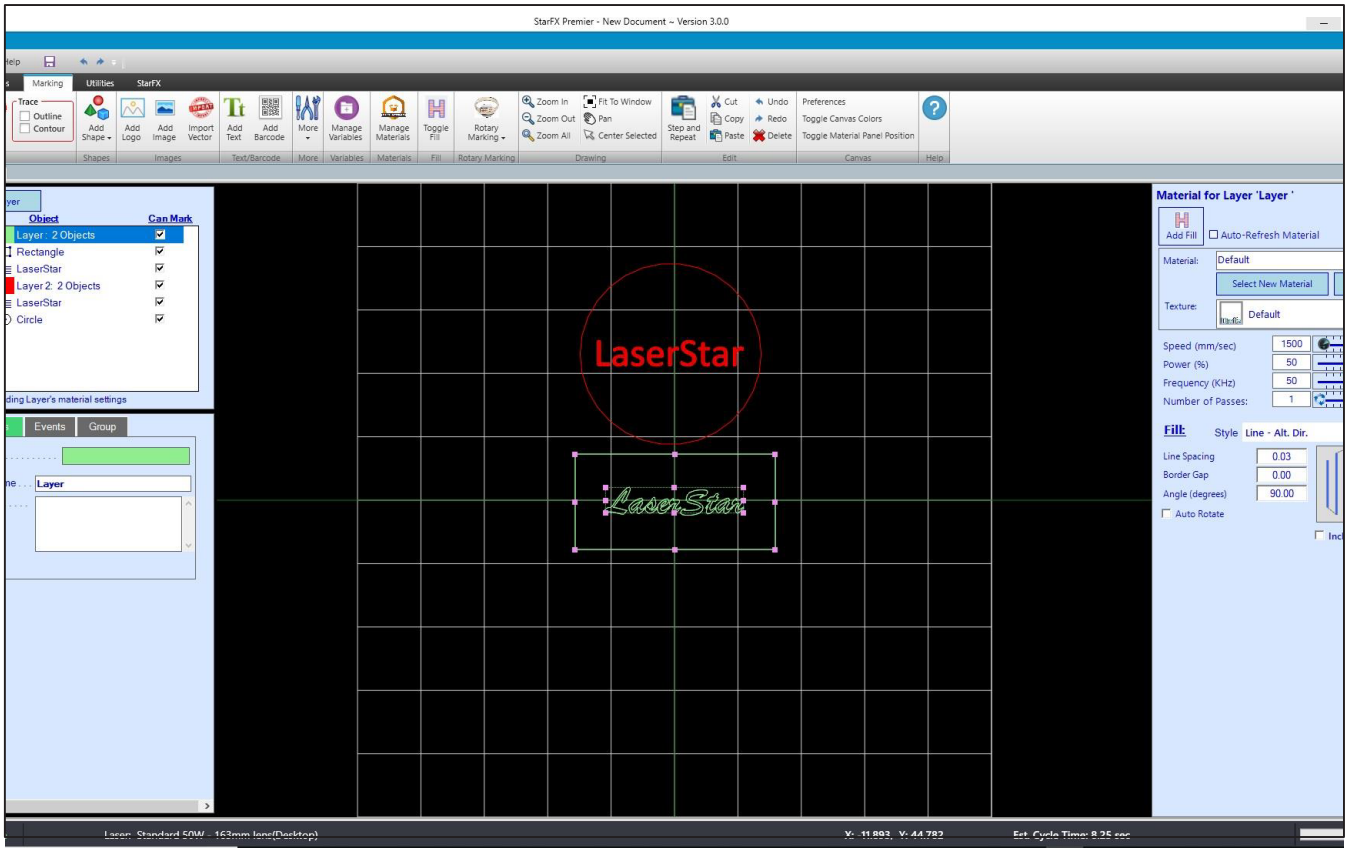


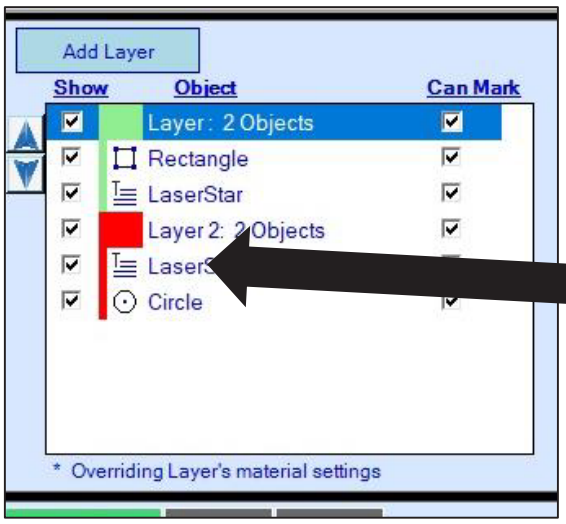

The ability to change the lasing order can be quite useful. This is done with the “Up and Down” arrows.

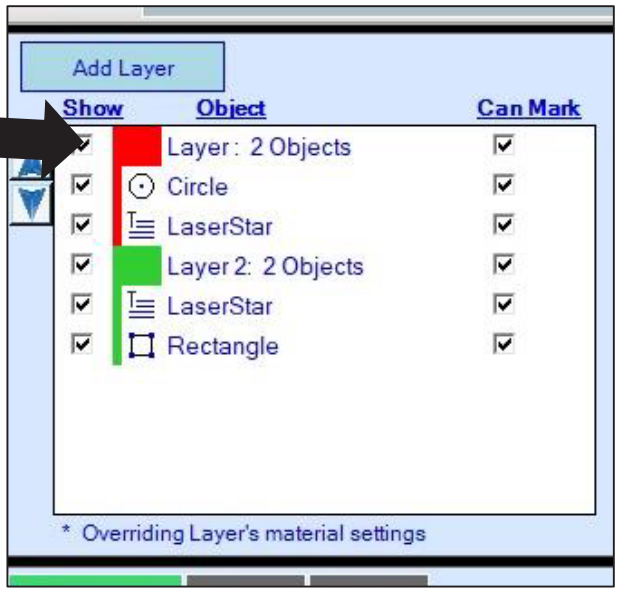
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# CREATING A PROGRAM

## The Program Tree



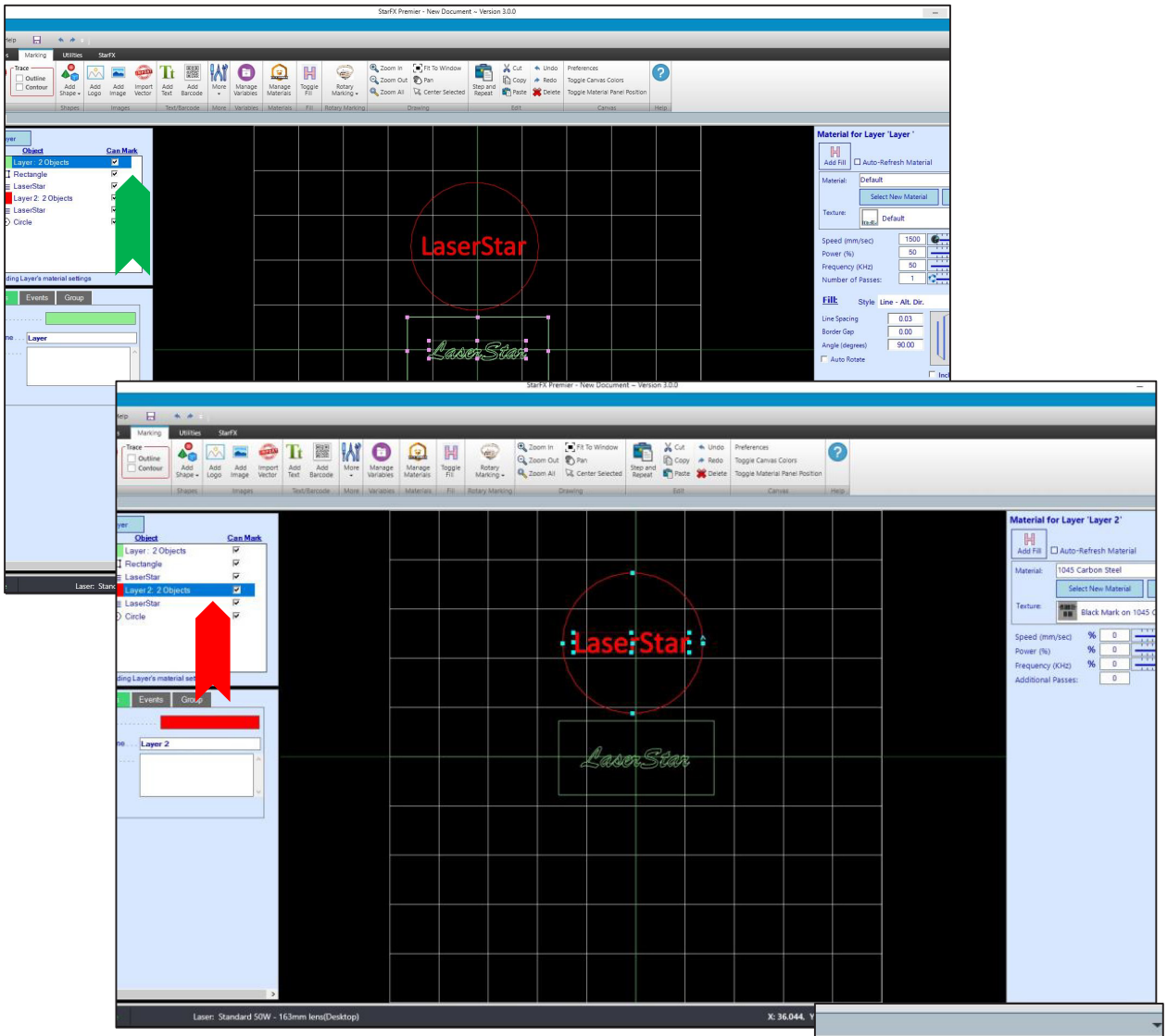

You can even do this for an entire Layer.



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# CREATING A PROGRAM

## The Program Tree

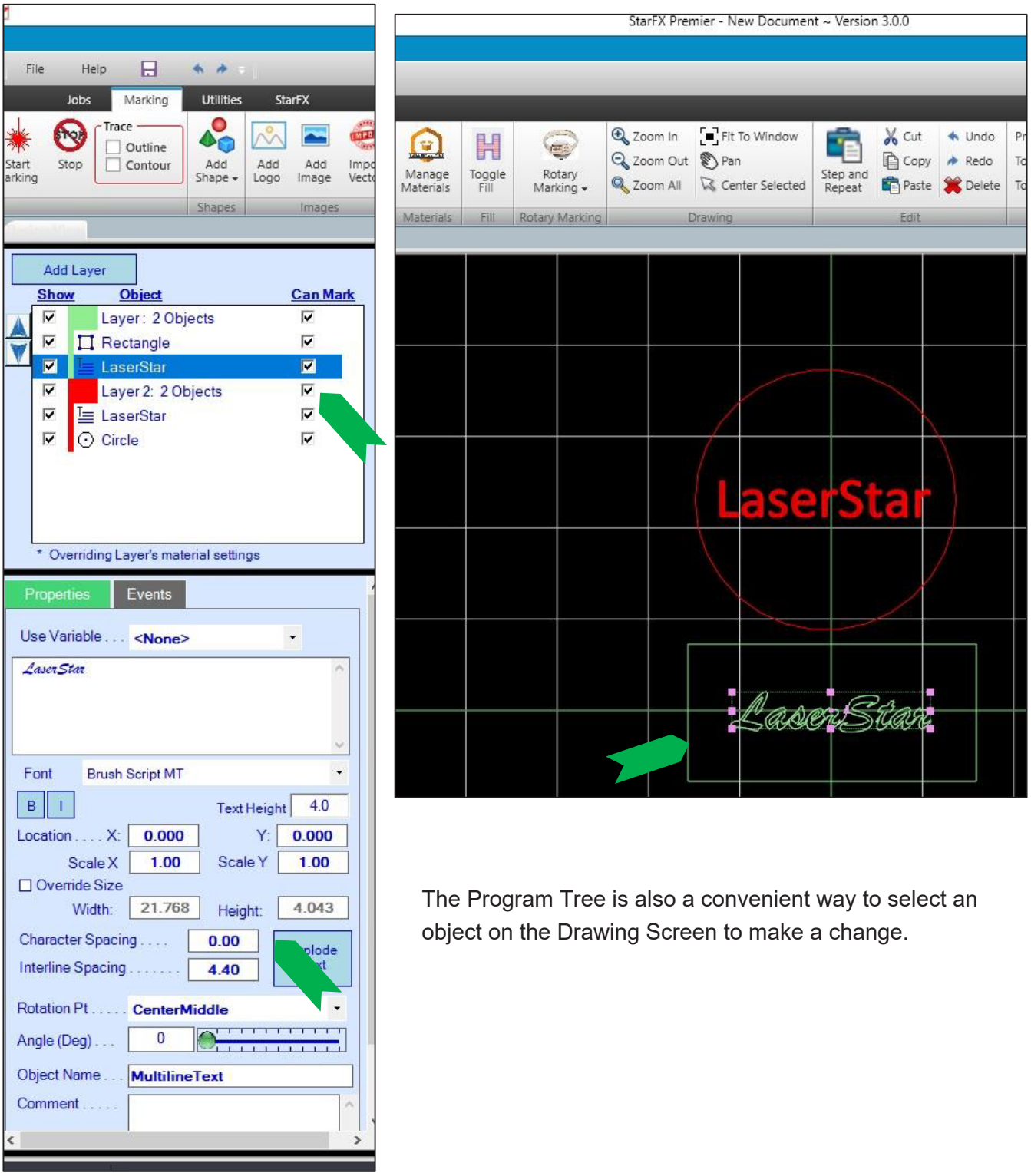



And as previously mentioned each Layer can have a different Material selection and all of the objects on that layer receive those settings.

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# CREATING A PROGRAM

## The Program Tree



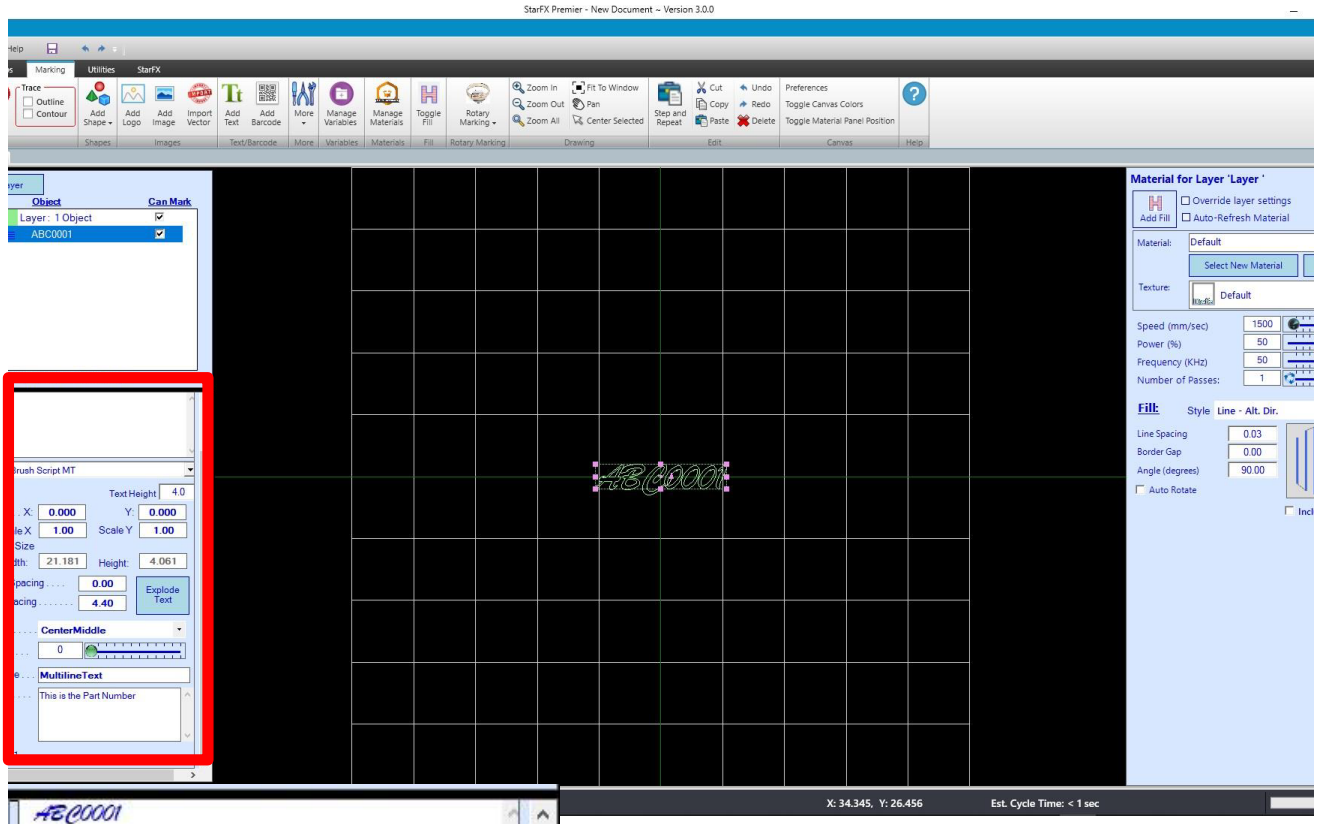

The Program Tree is also a convenient way to select an object on the Drawing Screen to make a change.

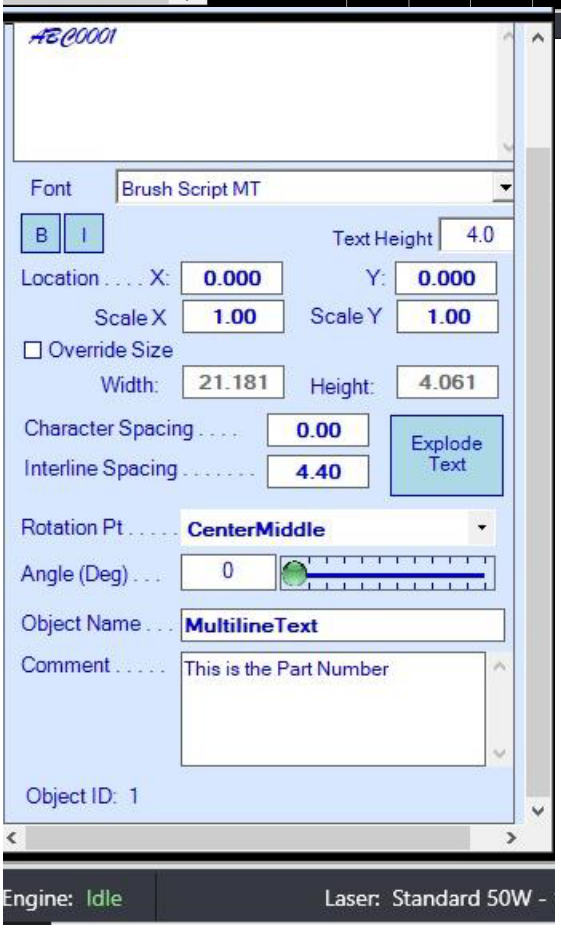


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# CREATING A PROGRAM

## Properties




The Properties Section is where you can type in "actual" values such as location, height and many other properties.

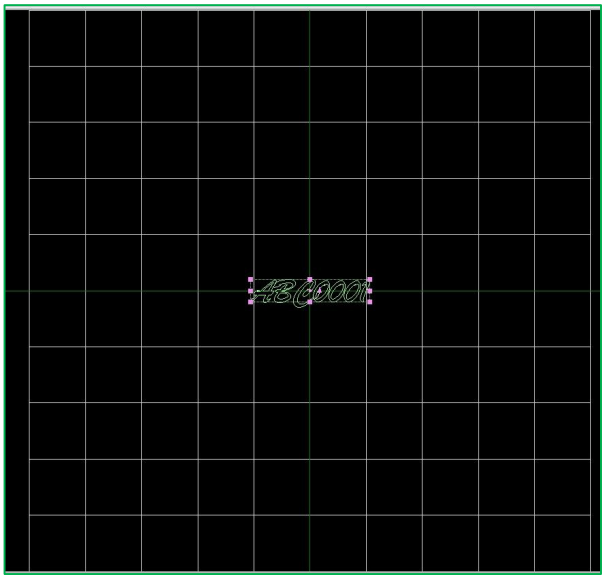
Many marking programs can not be done with "Drag and Drop" but have to have specified locations and sizes.

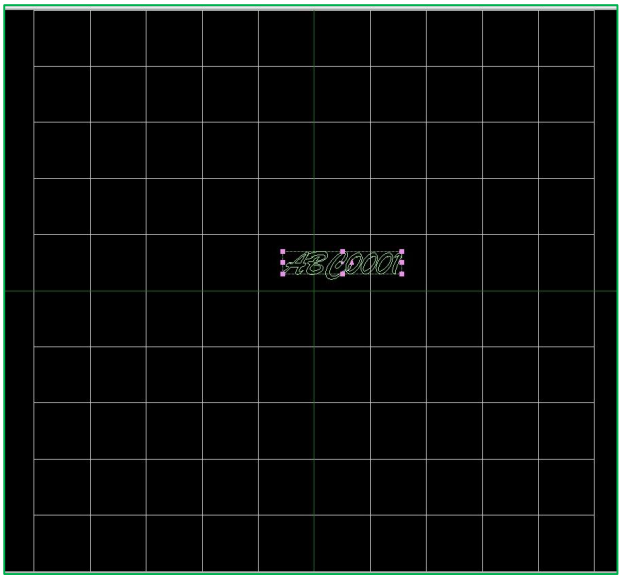
In addition, other cosmetic changes can be made here.

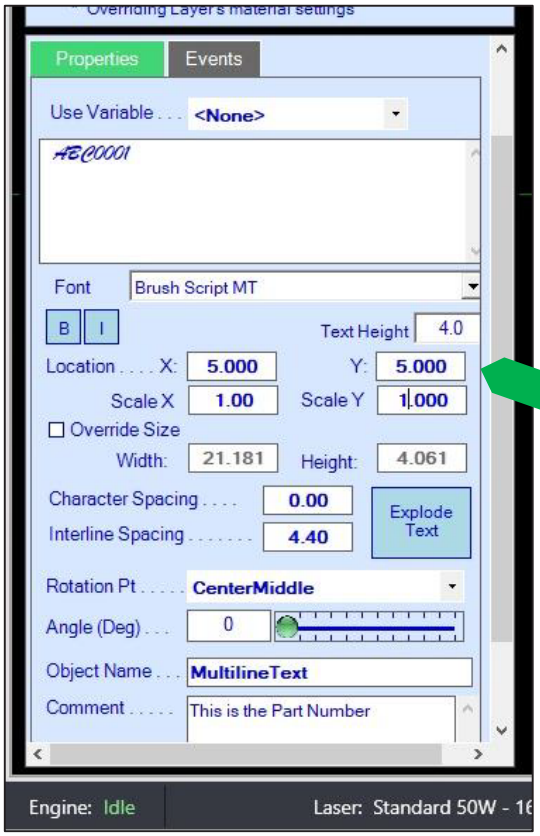
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# CREATING A PROGRAM

## Properties







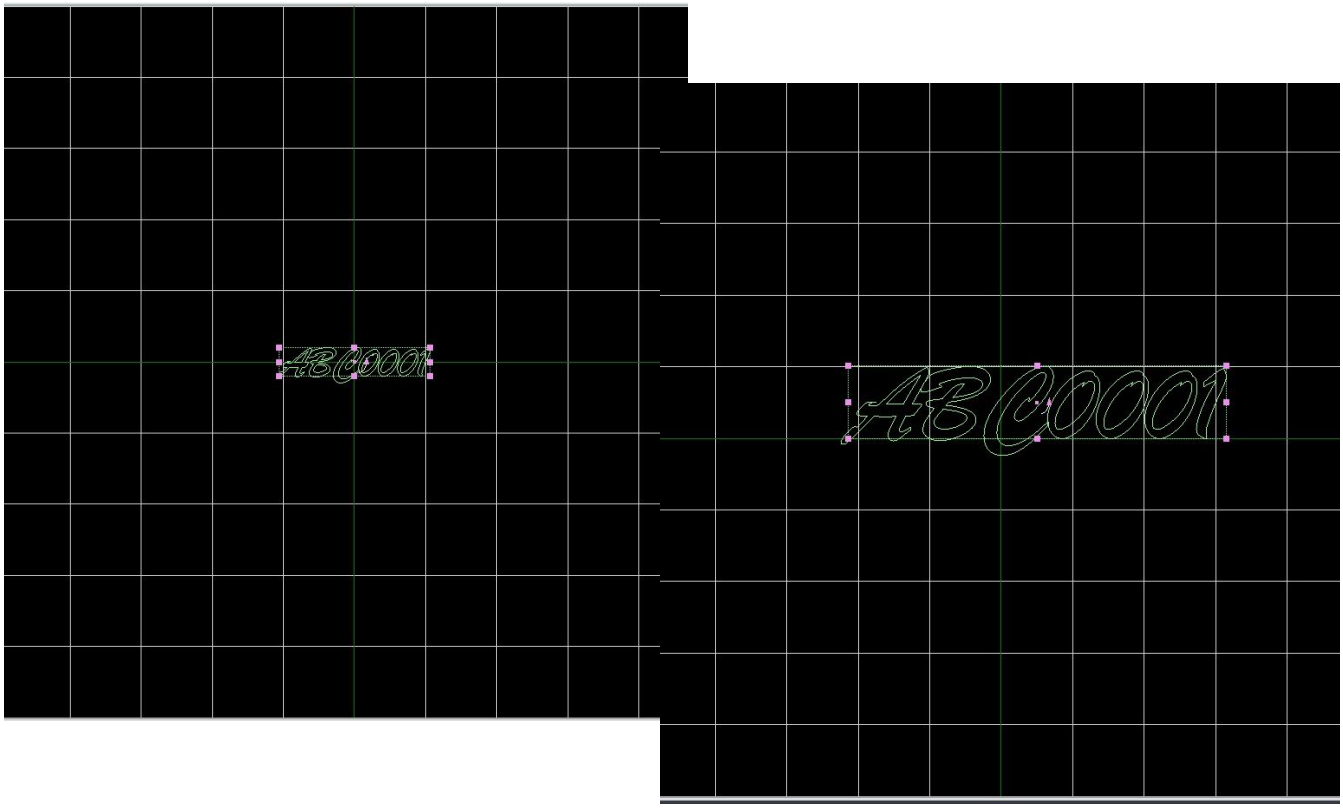

**LOCATION**

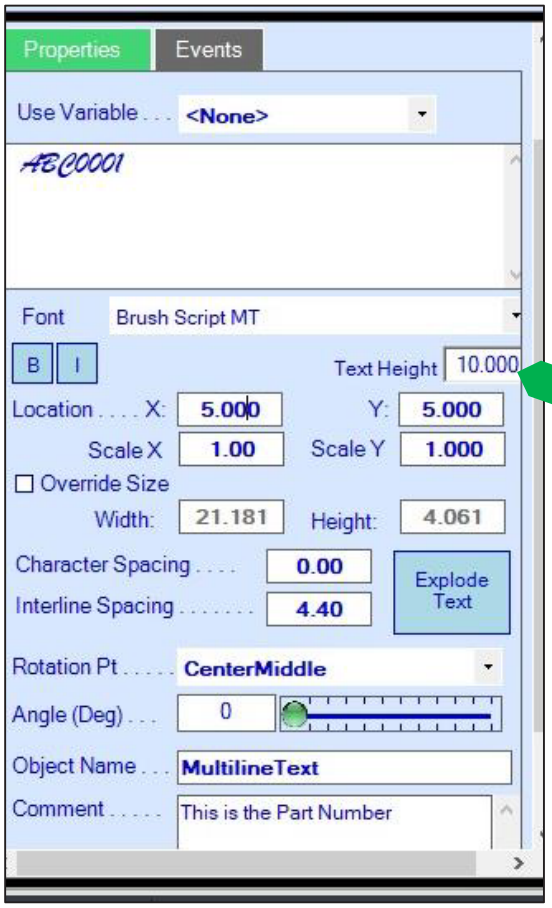


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# CREATING A PROGRAM

## Properties



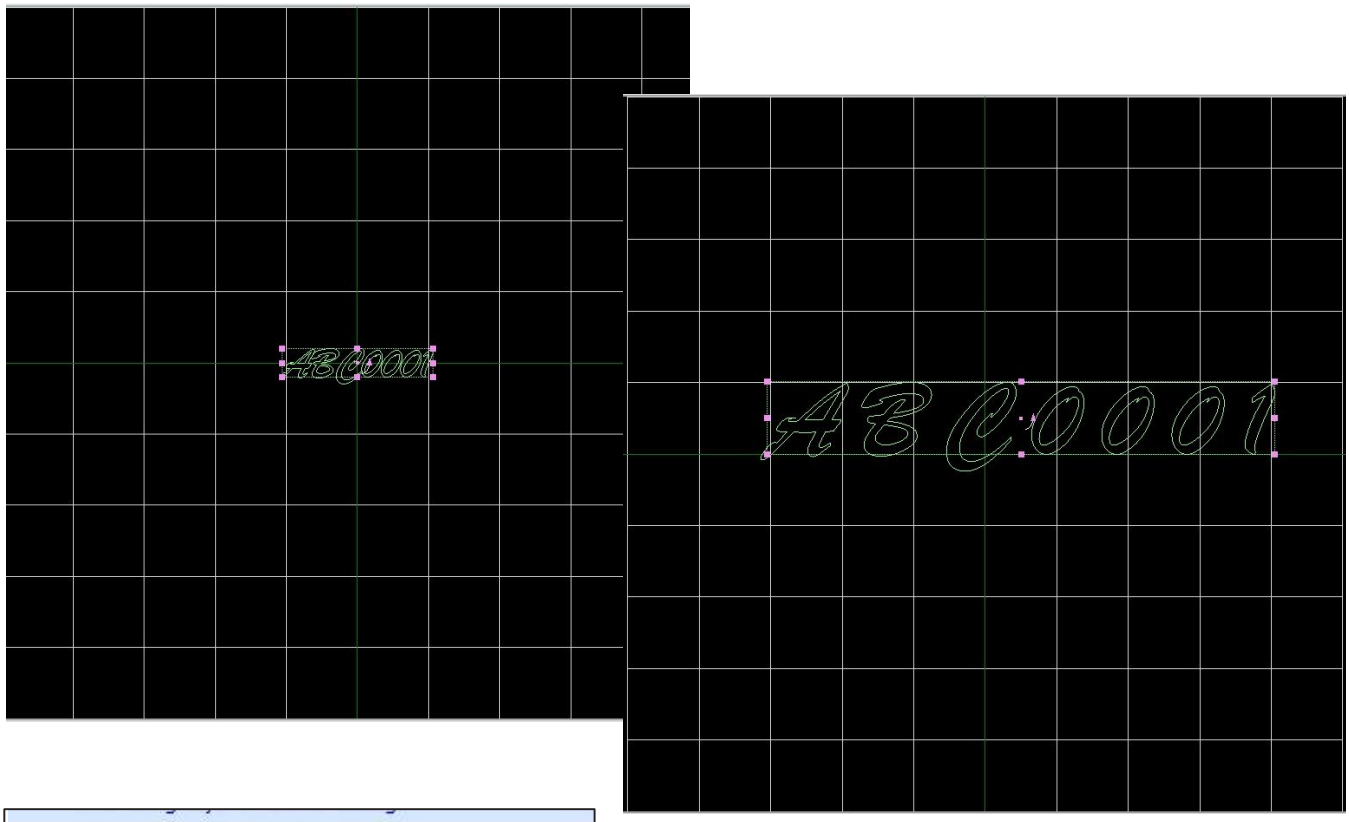



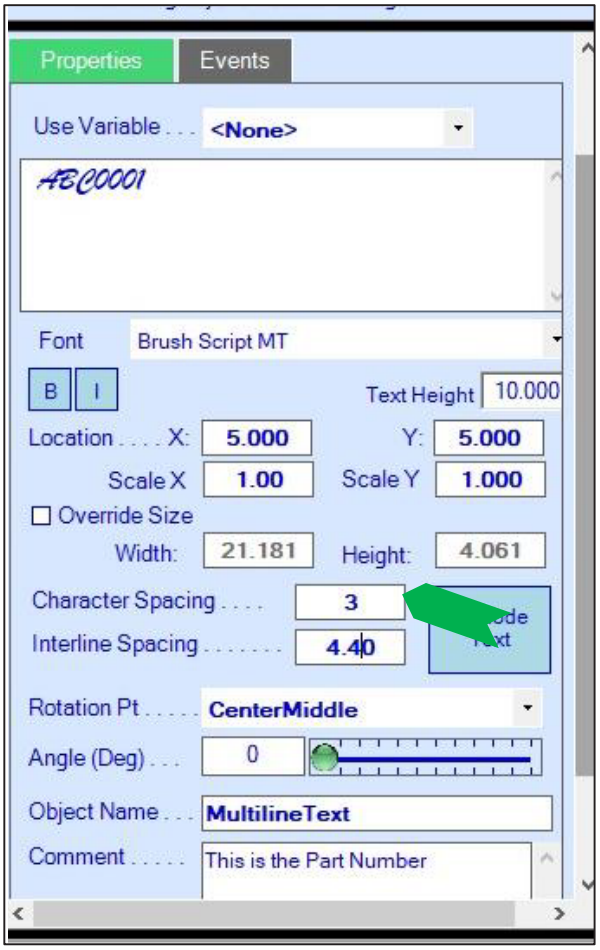

**SIZE**

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# CREATING A PROGRAM

## Properties



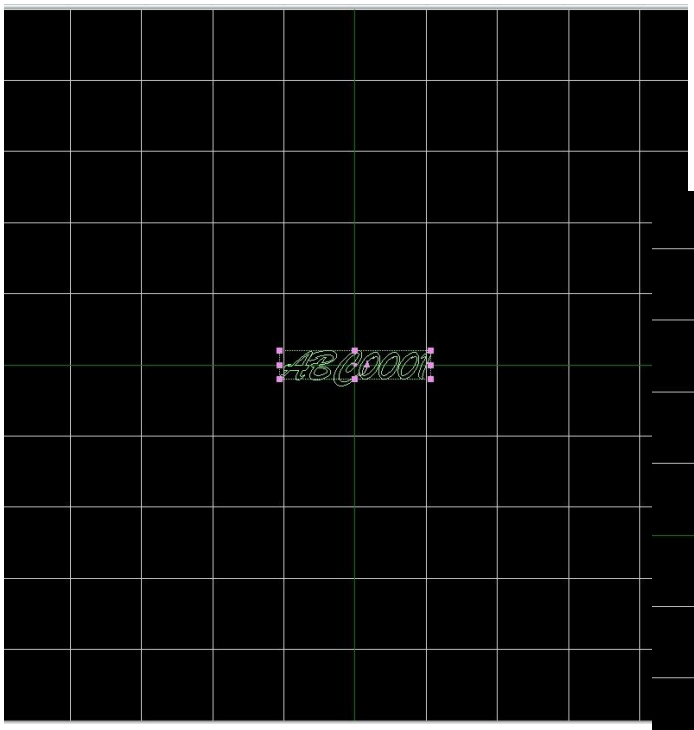

**CHARACTER SPACING**

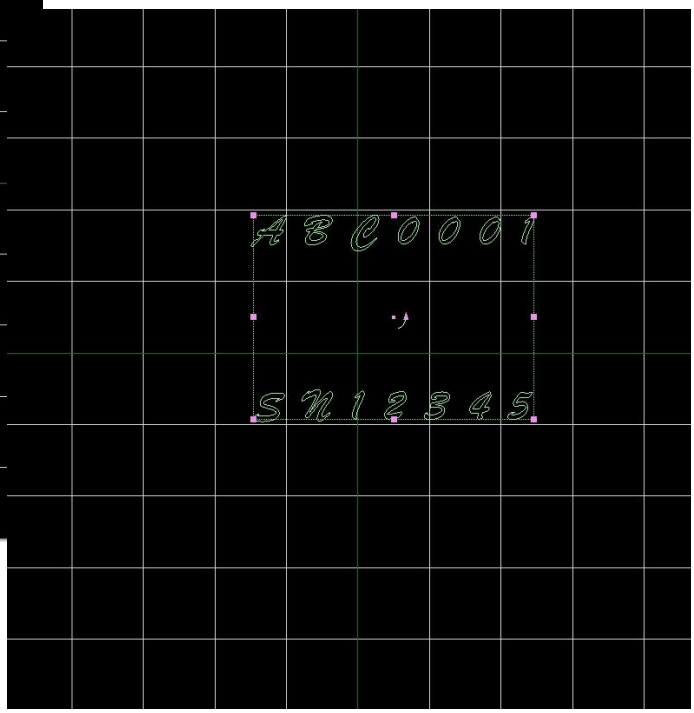


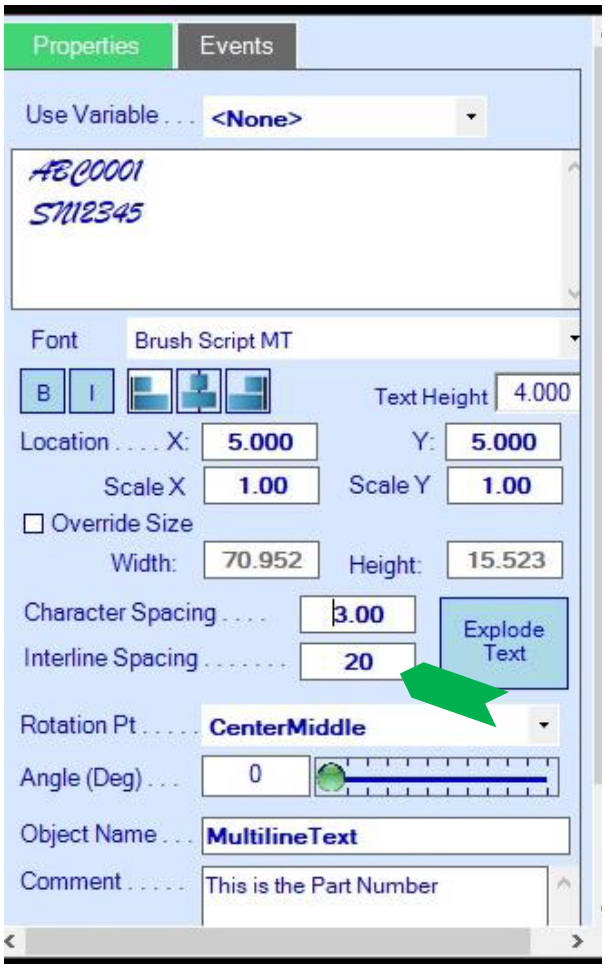
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# CREATING A PROGRAM

## Properties



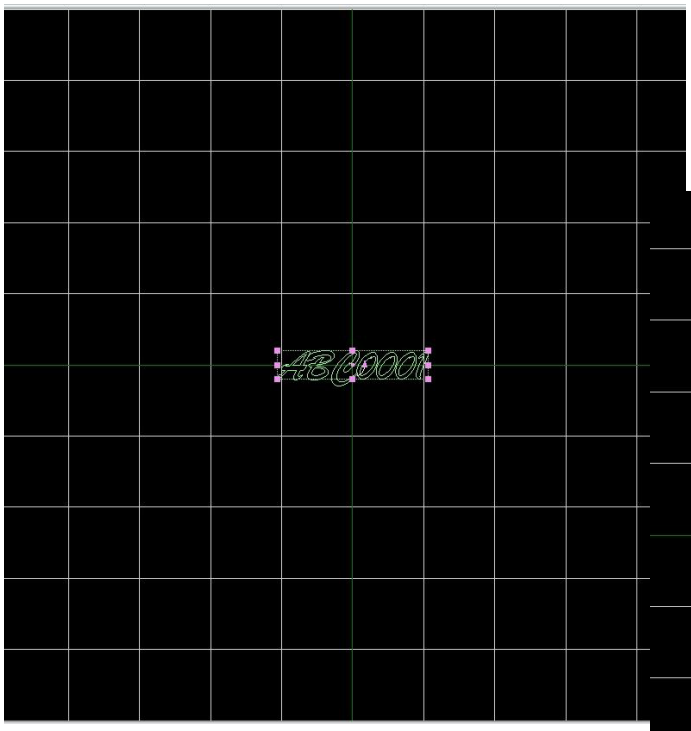



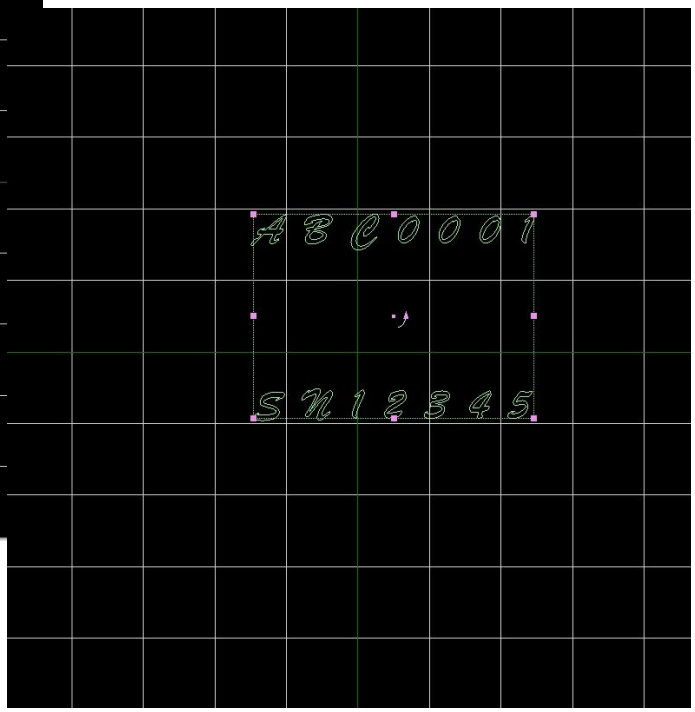

**LINE SPACING**

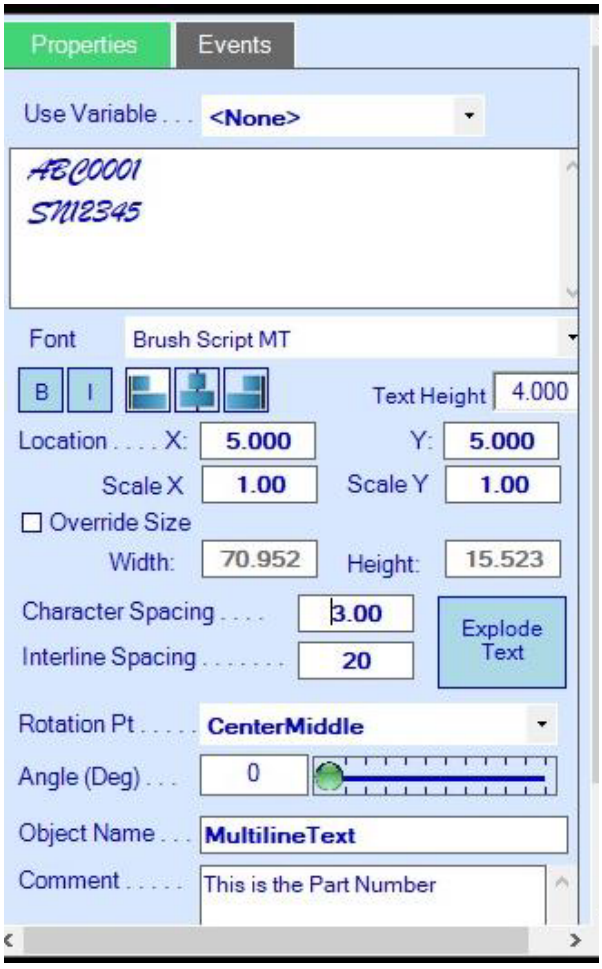
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# CREATING A PROGRAM

## Properties




As you can see this is a very important section to become familiar with.

Here you can make your object look and act exactly as you want to.

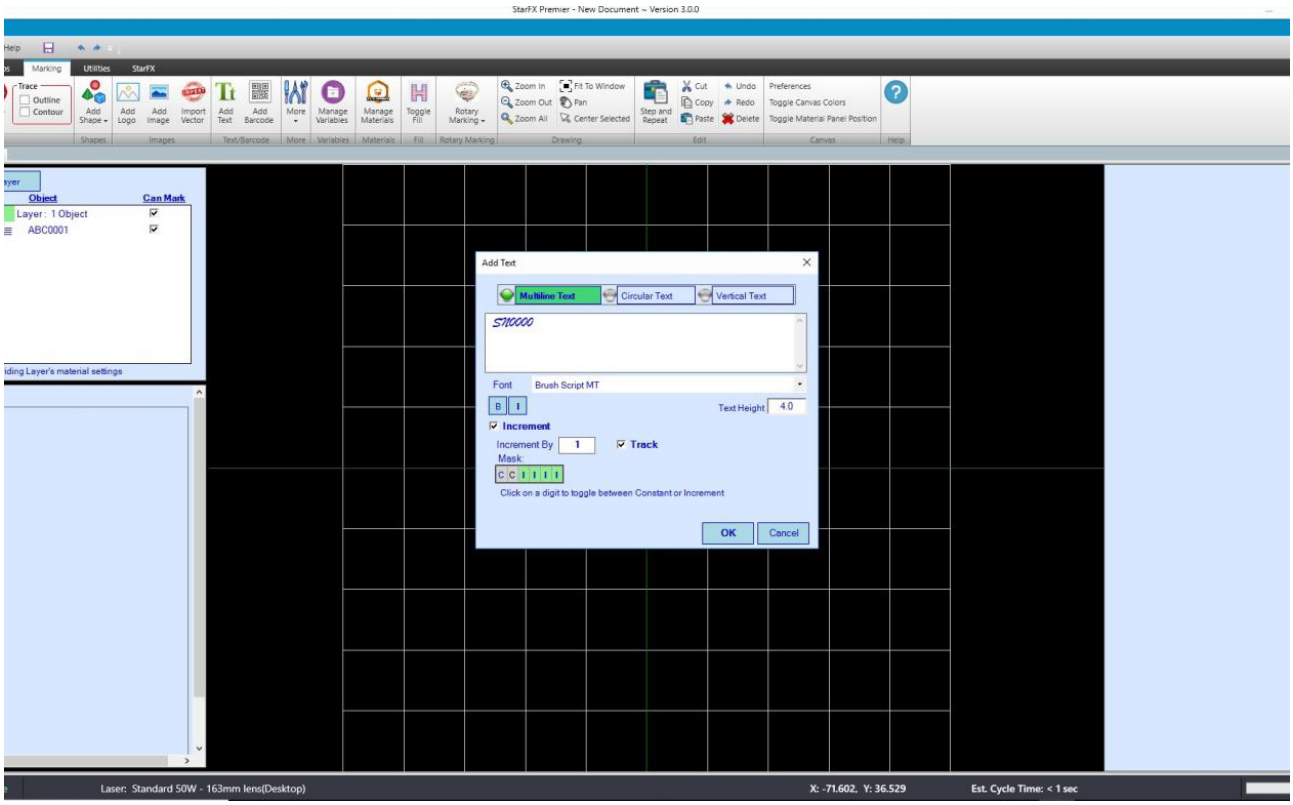
And obviously each type of object has its own set of properties.

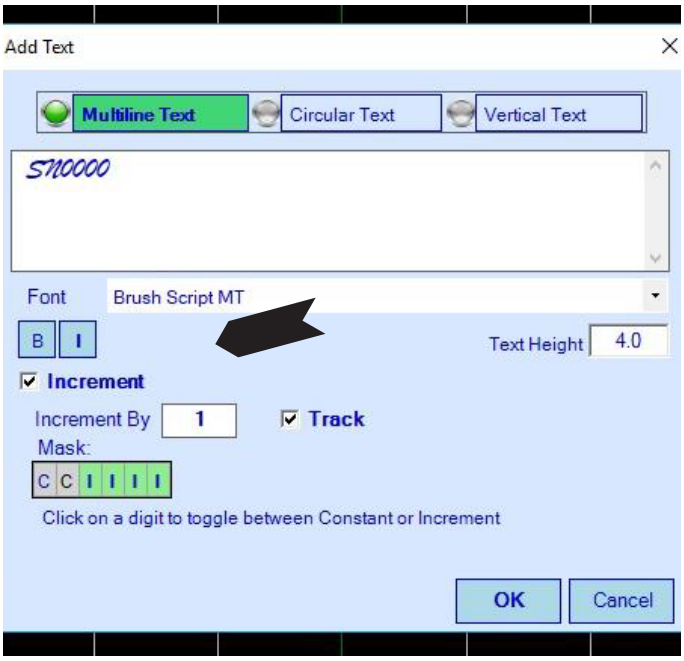


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# CREATING A PROGRAM

## Events



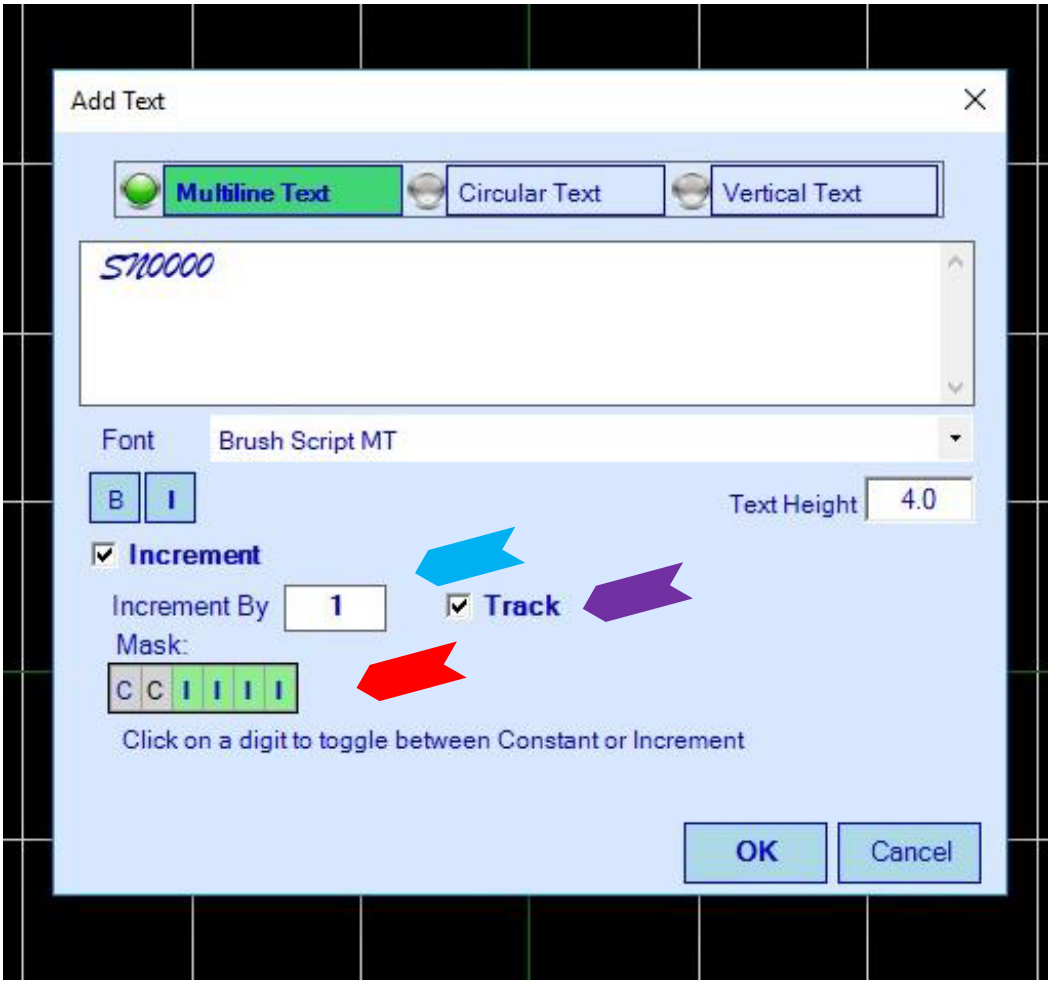

Before we get into “Events” we will look at an automatic Event found in the Text Object.

When you select a Text Object to put on the screen there is a “Check Box” called “Increment”.

When this is checked the text becomes auto-incrementing.

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## Events




There are several things to point out that appear only when you select this type of text:

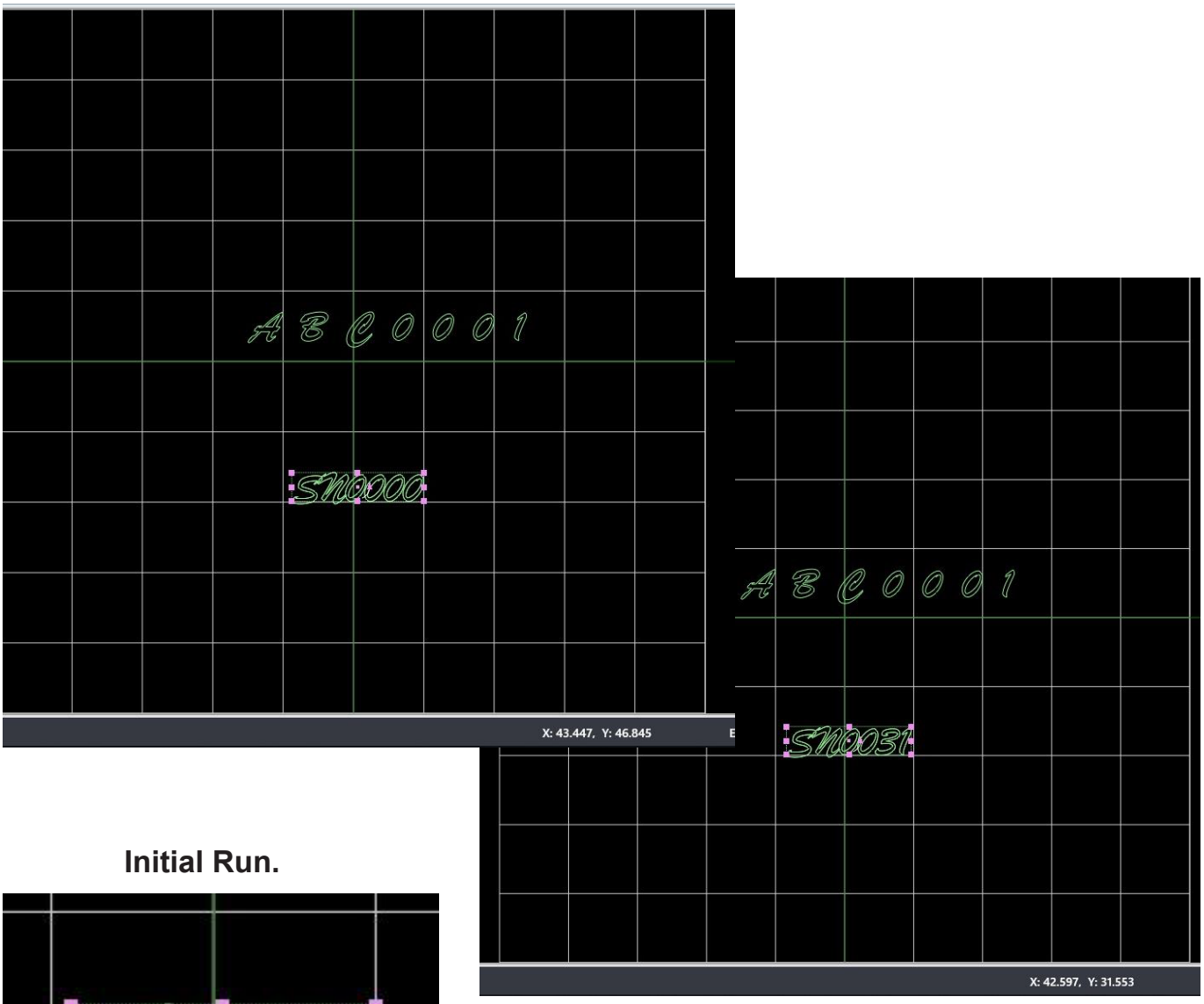
1. **"Increment By" is how much you want the text to increment each time it is lased, this is usually 1 but it can be any value you want.**
2. **"Track" signifies that you want the software to keep track of the number so if you close the program and run it again several days later it will start with the number you left off with.**
3. **"Mask" lets you decide which characters in the number you want to increment. "C" indicates a constant and will not increment where "I" will cause that character to increment by the indicated increment vale.**



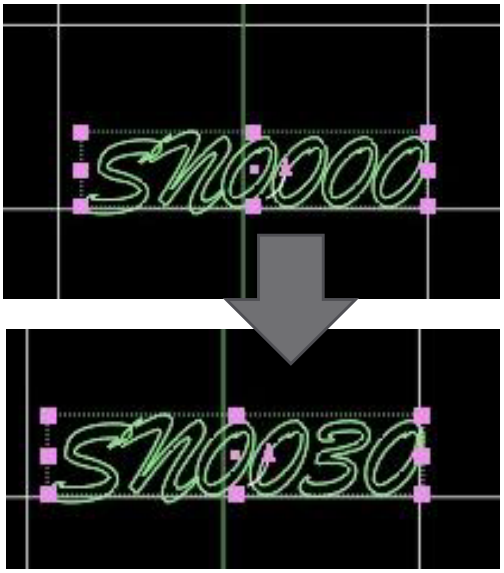
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# CREATING A PROGRAM

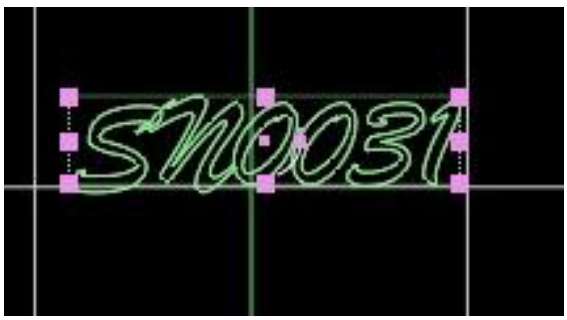
## Events




**Initial Run.**




**One Week Later.**

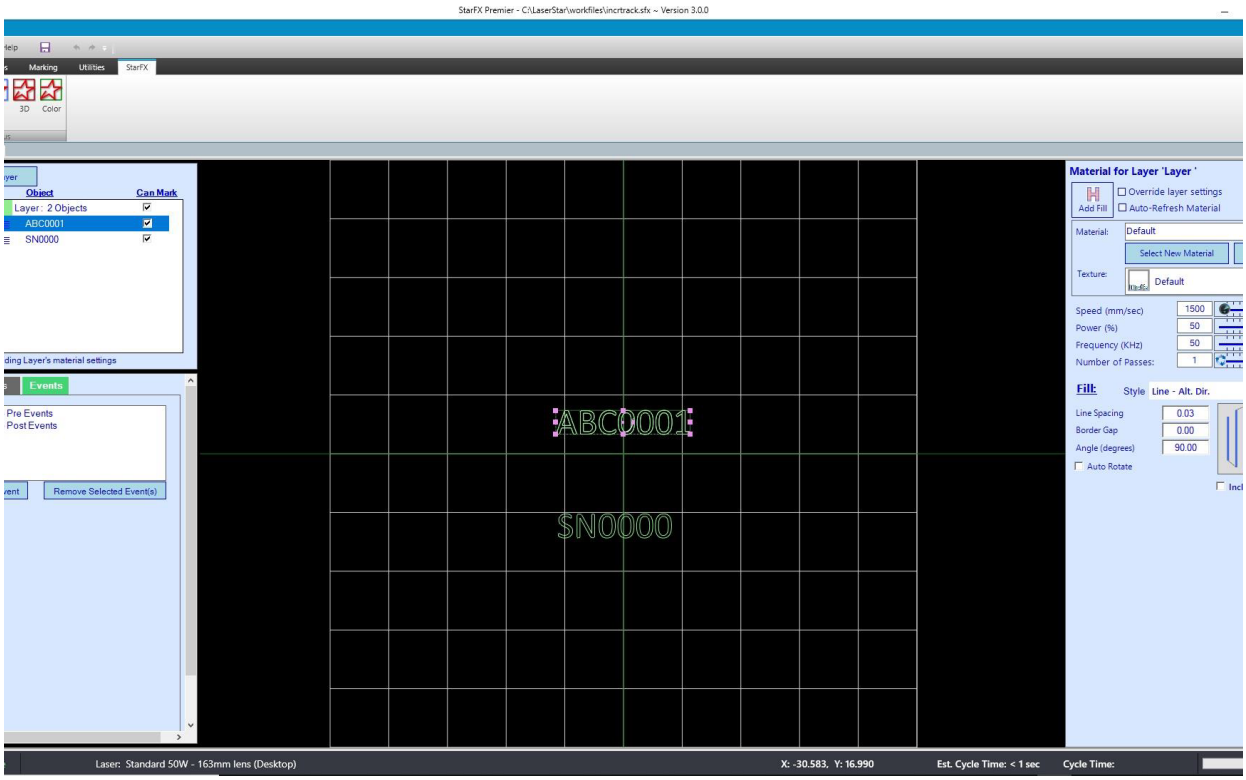


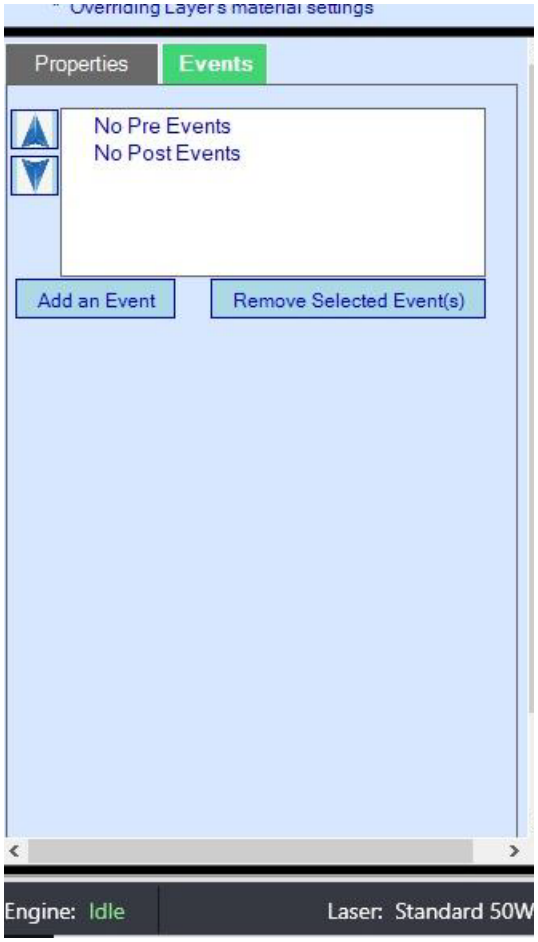

Here the program was run until the last number lased was SN0030 then a week later it was open and run again and it started with SN0031.

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# CREATING A PROGRAM

## Events




Events are one of the most powerful tools in the Premier Tool Kit.

These let the user insert actions before and after each object allowing the program to do much more than just lasing.

Events can

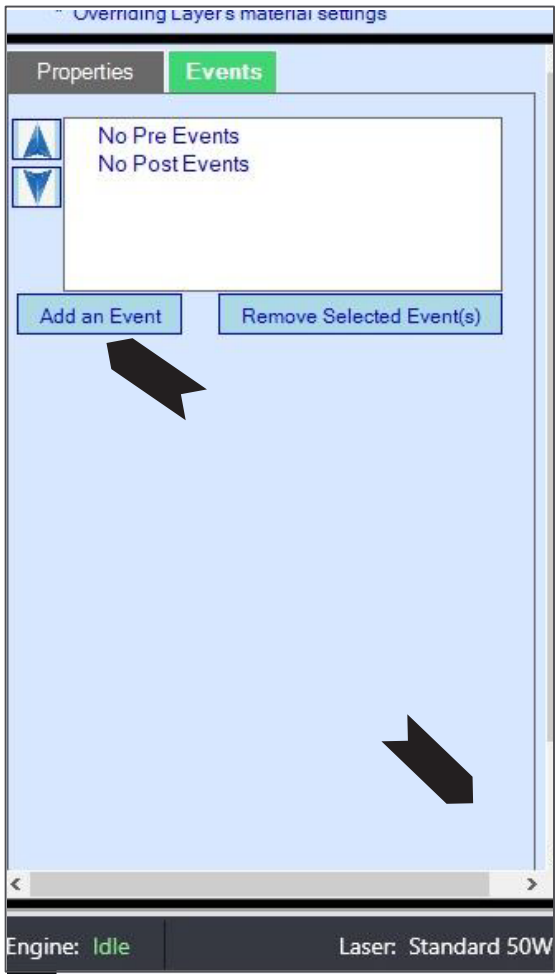
- ☆ Move an Axis.
- ☆ Display Messages to the operator.
- ☆ Ask for input from the operator.
- ☆ Talk to a Barcode reader.
- ☆ Access a Database.
- ☆ And much more.



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# CREATING A PROGRAM

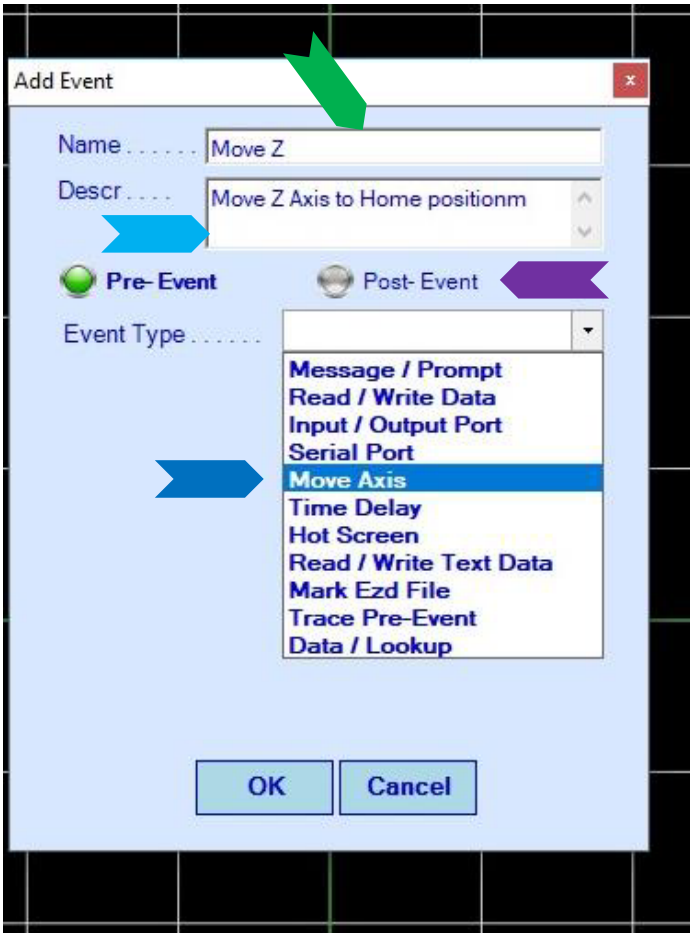
## Events




We start with “Adding an Event”.

This brings up the “Event” selection window.

*Note: an Event is always associated with an object or a Layer.*

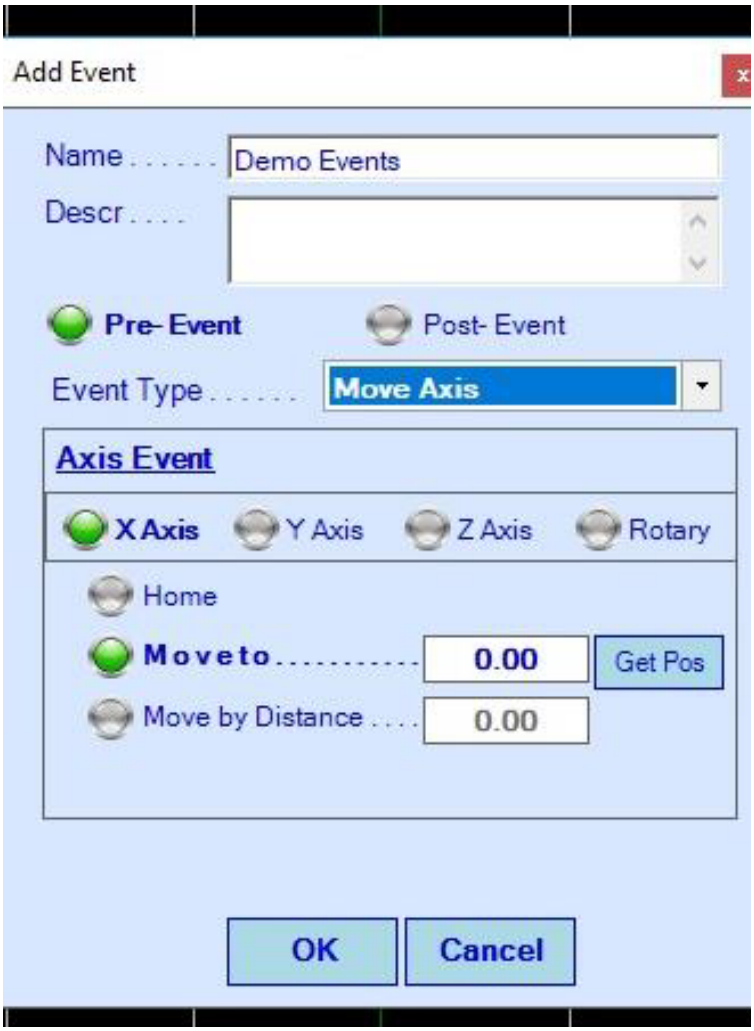



1. **You then give the event a name.**
2. **Add a more detailed description if desired.**
3. **Decide if you want the action to happen before (Pre-Event) or after (Post-Event) the object is lased.**
4. **Pick the Event type or Action.**

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# CREATING A PROGRAM

## Events




Each Event has its own Window that asks for the appropriate information for that type of event.

**Here we see the Input Box for a Move Event which asks for:**

- ☆ The Axis to Move.
- ☆ The type of Move:
  - ☆ Home.
  - ☆ Move to a position.
  - ☆ Move by a certain distance.

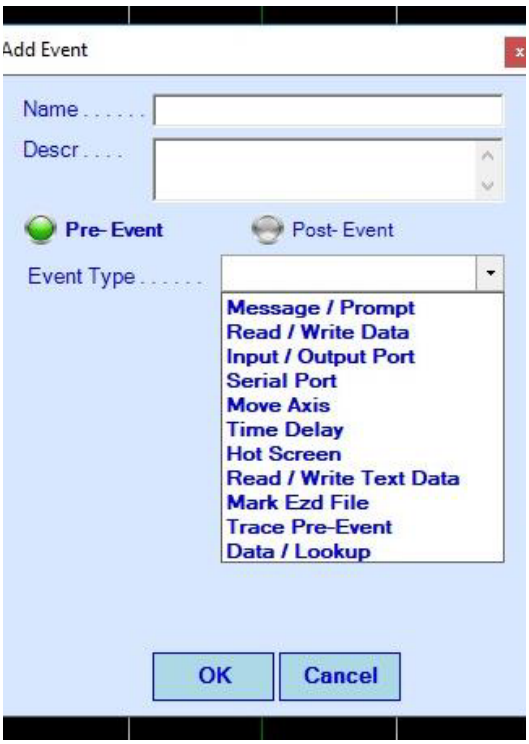


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# CREATING A PROGRAM

## Events

Shown here are a list of all of the current Event selections.
We will briefly go through each one.




Prompt the Operator for Data.




Display an informative Message.

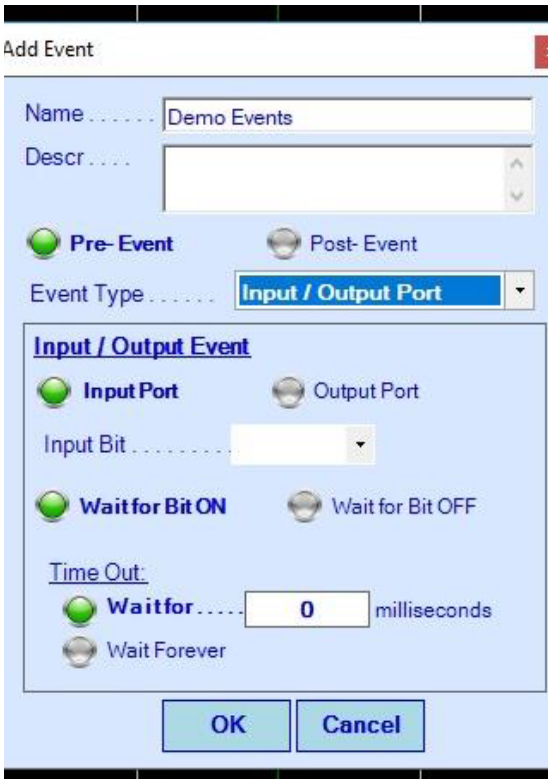



Read and Write Data to a file.

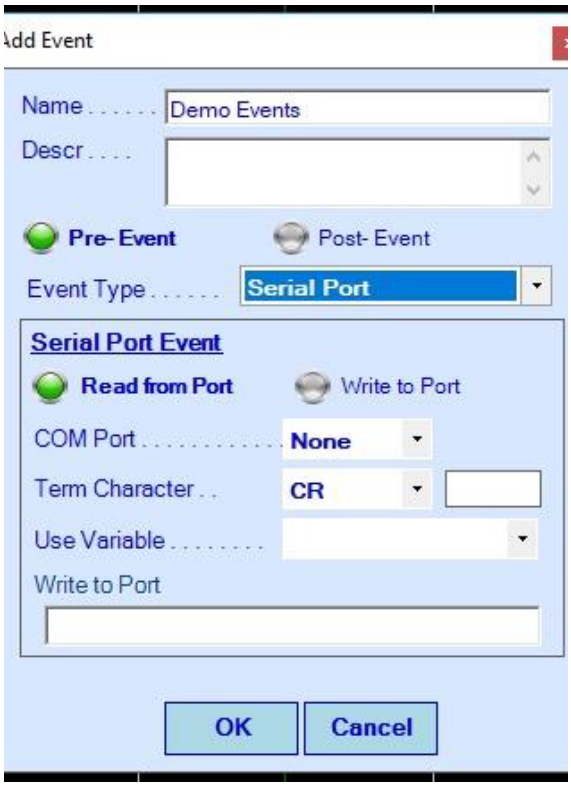
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# CREATING A PROGRAM

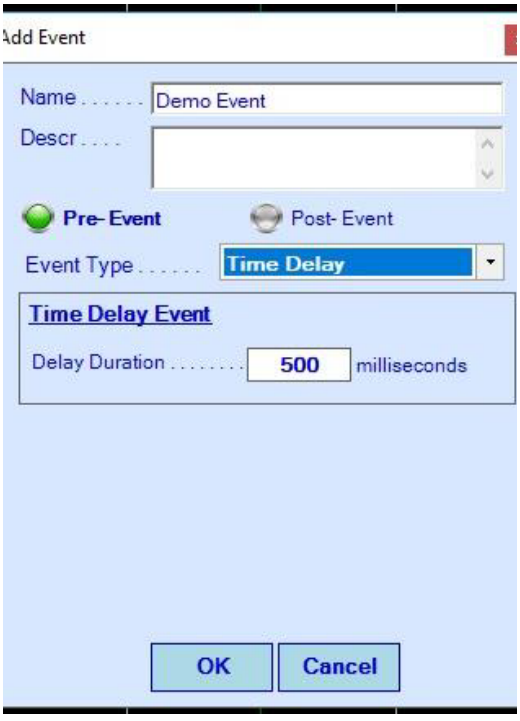
## Events




Reading an Input Bit and Turning On/Off an Output Bit.




Reading and Writing to the Serial Port.



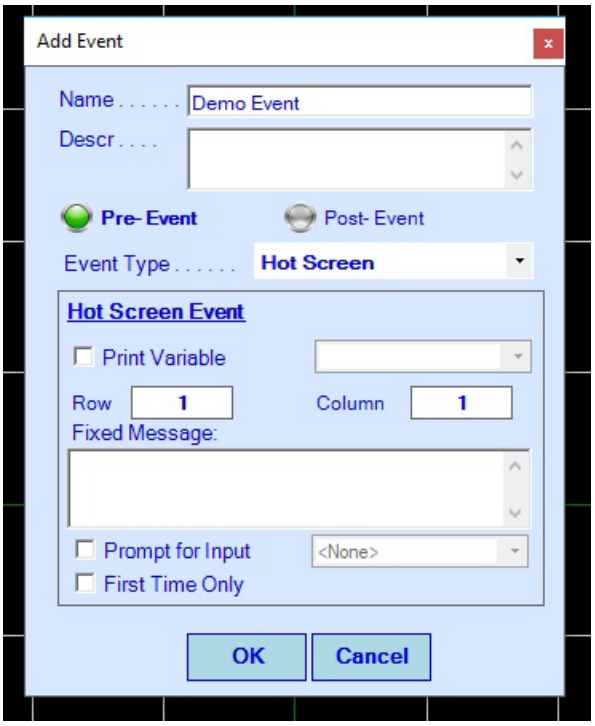

Setting a Time Delay before the next action occurs.



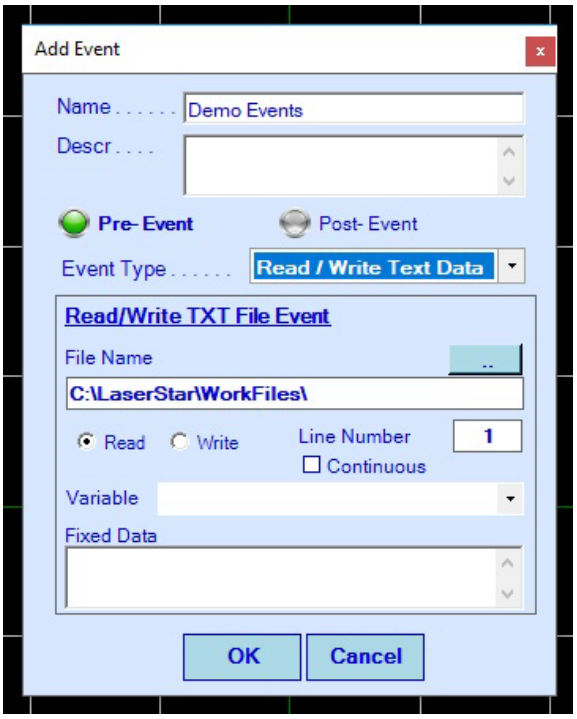
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# CREATING A PROGRAM

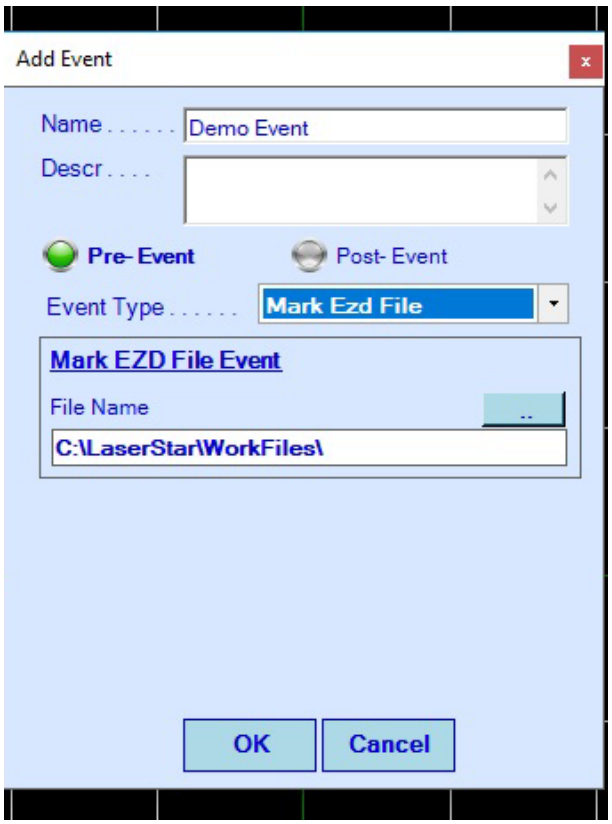
## Events




Creating sophisticated Operator dialog screens with StarScreen.




Reading and Writing to a Text File.

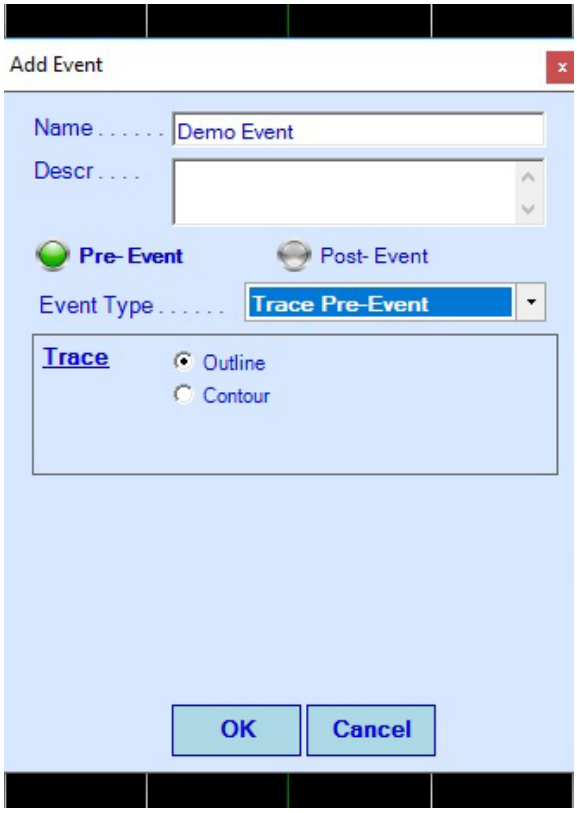



Lasing a legacy CAD2 program.

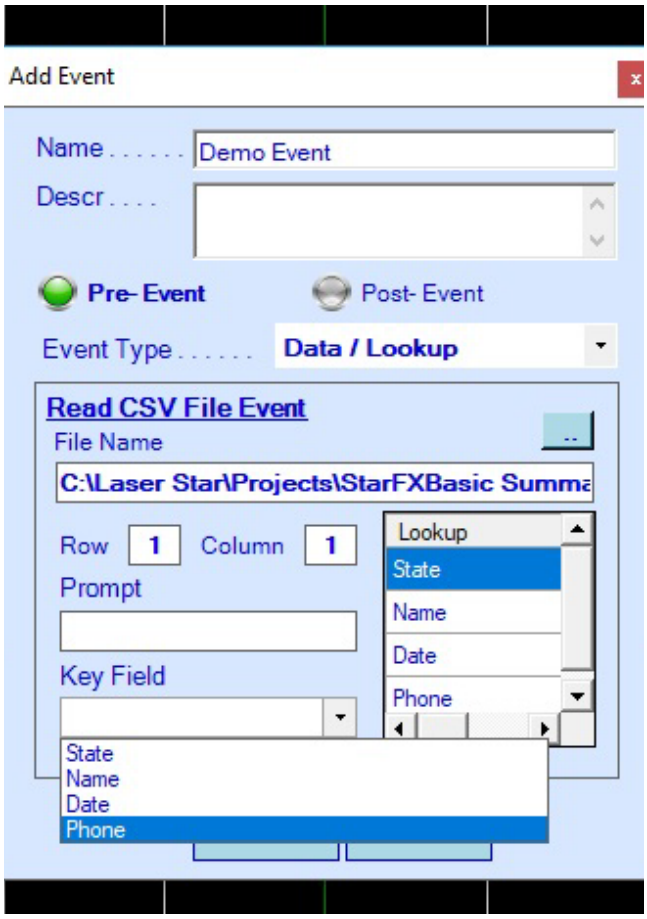
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# CREATING A PROGRAM

## Events




Run the Red Trace feature on a selected object.



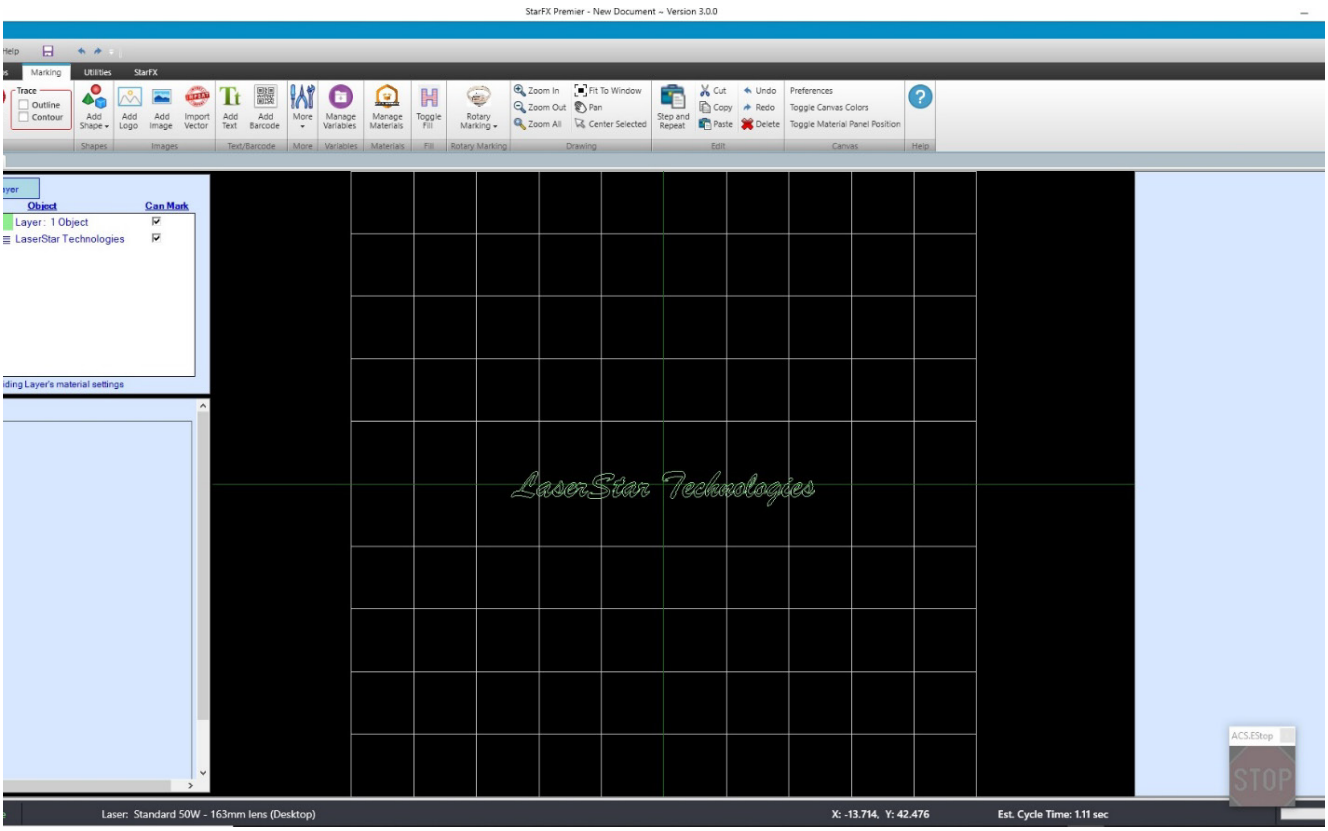

Read a CSV file from Excel or some other Database and assign different fields to a corresponding Variable in the lasing program.

As you can see there many powerful Events to easily add sophistication and functionality to your lasing program.



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# THE MORE TOOLS



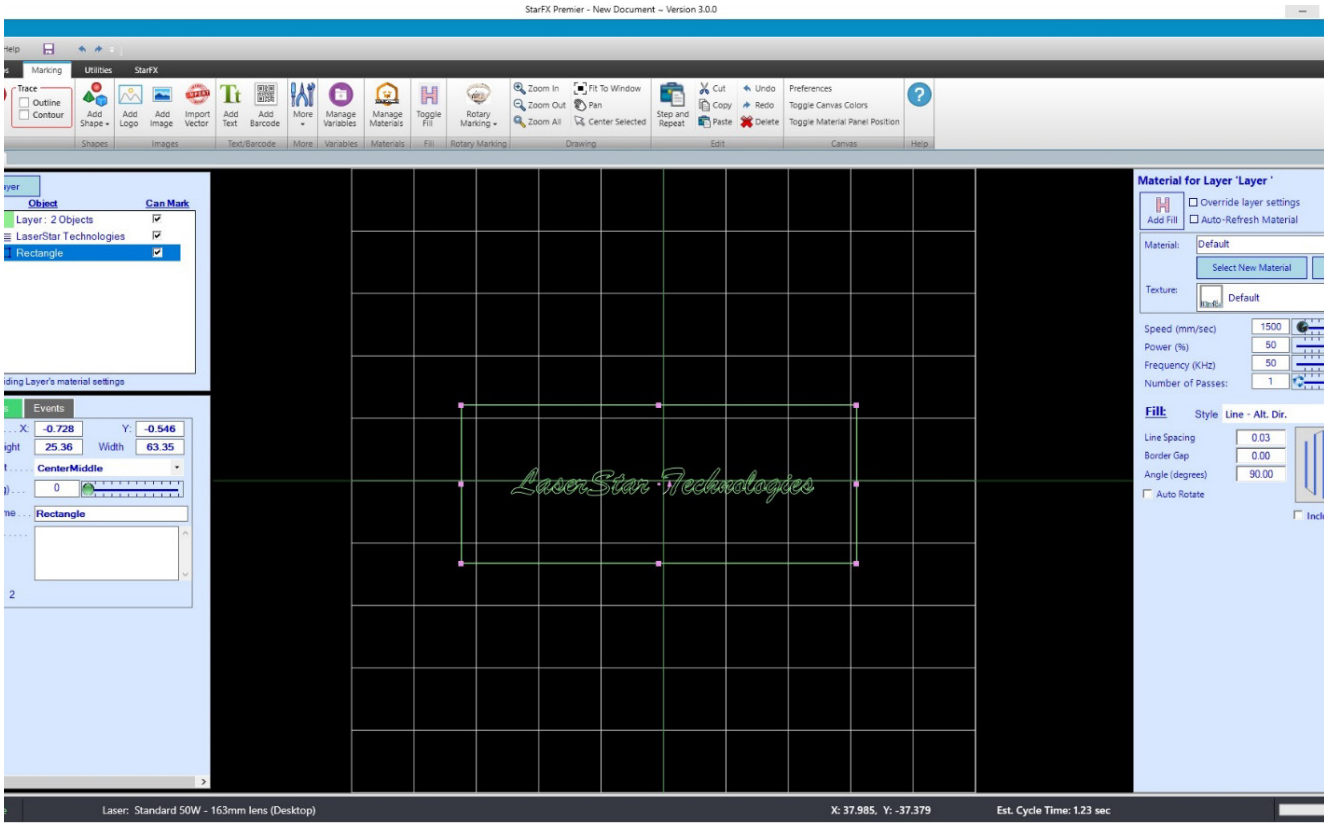


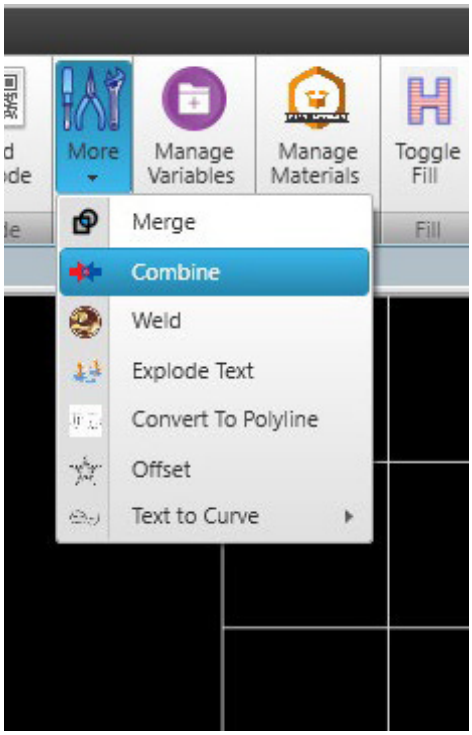


The next thing we will go over are the "More Tools". These tools let you create a more sophisticated and artistic set of objects than you can do with the standard tools that are provided.

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# COMBINE TOOL



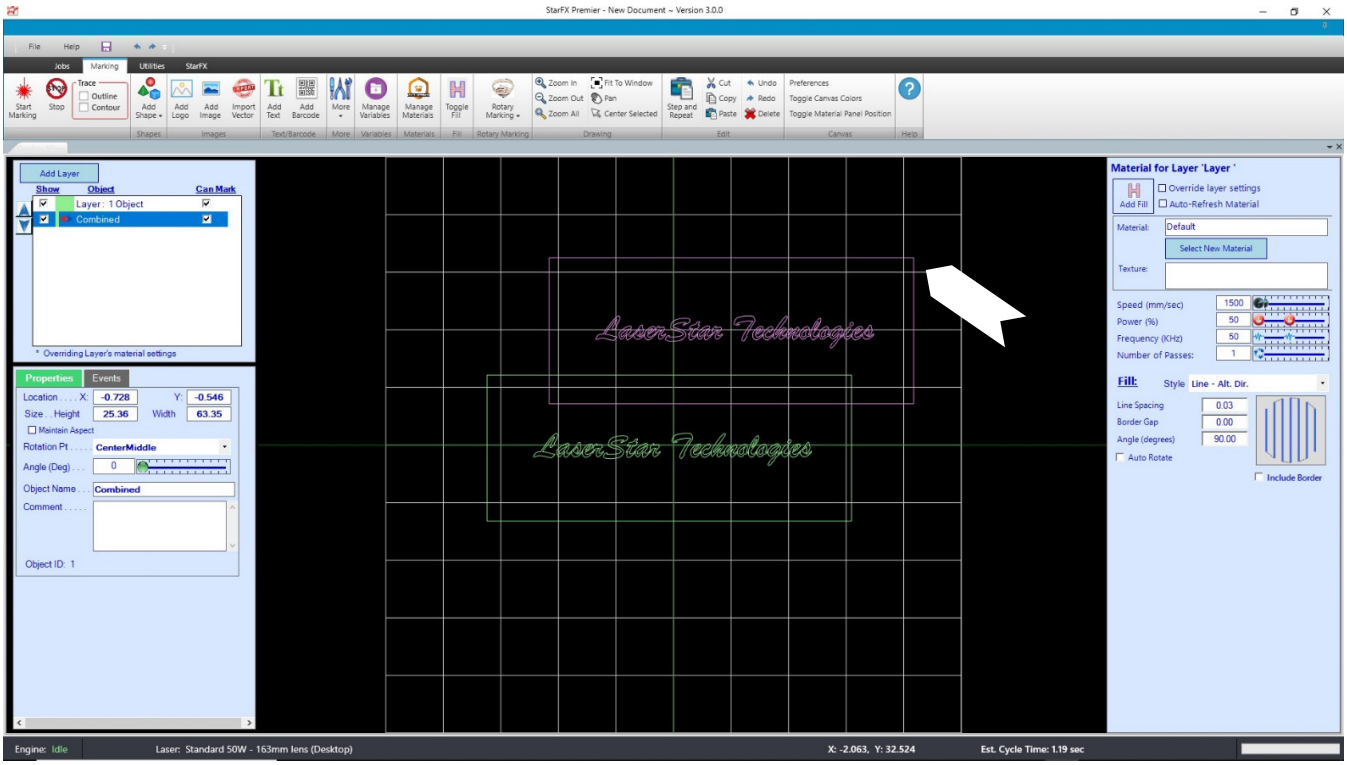



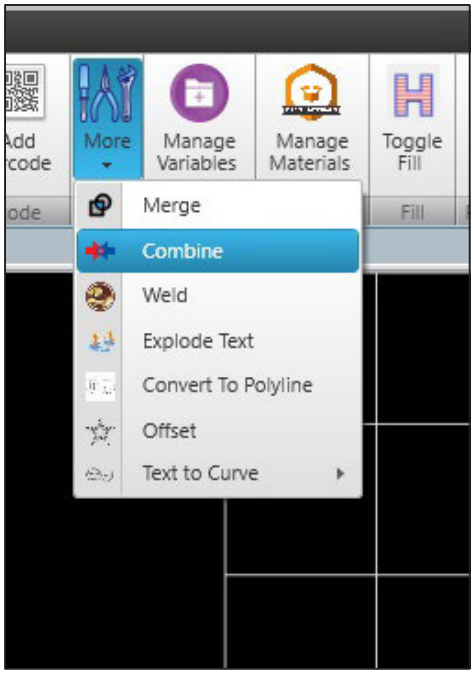

We will start with the **"Combine Tool"** which allows you to combine two or more objects into one object and thus be able to fill the outside object around the inside object.



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# COMBINE TOOL

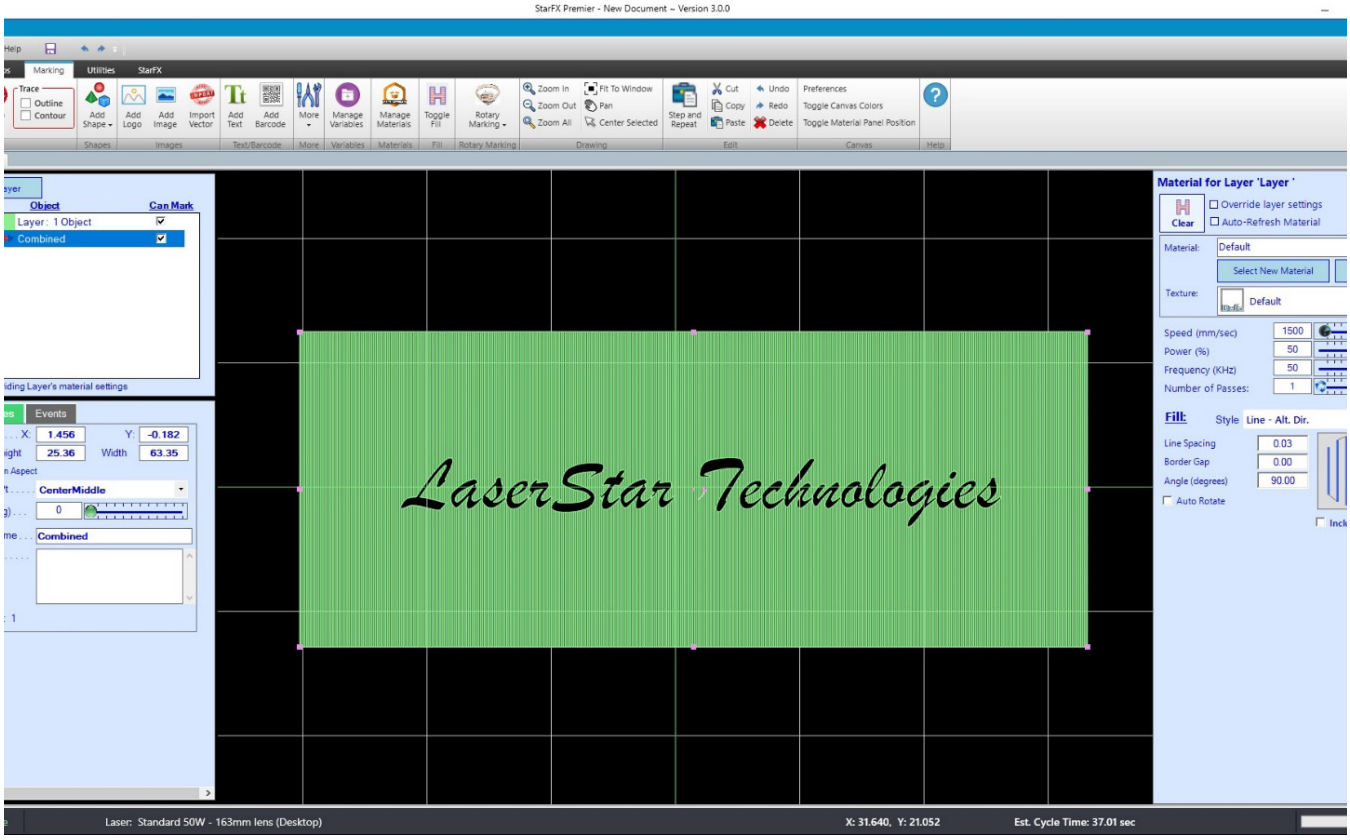


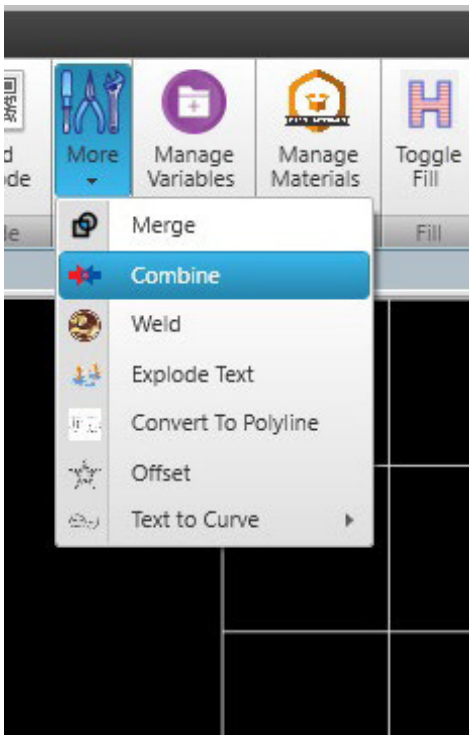




You can see that after Combining the Rectangle and the Text move as one object.

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# COMBINE TOOL



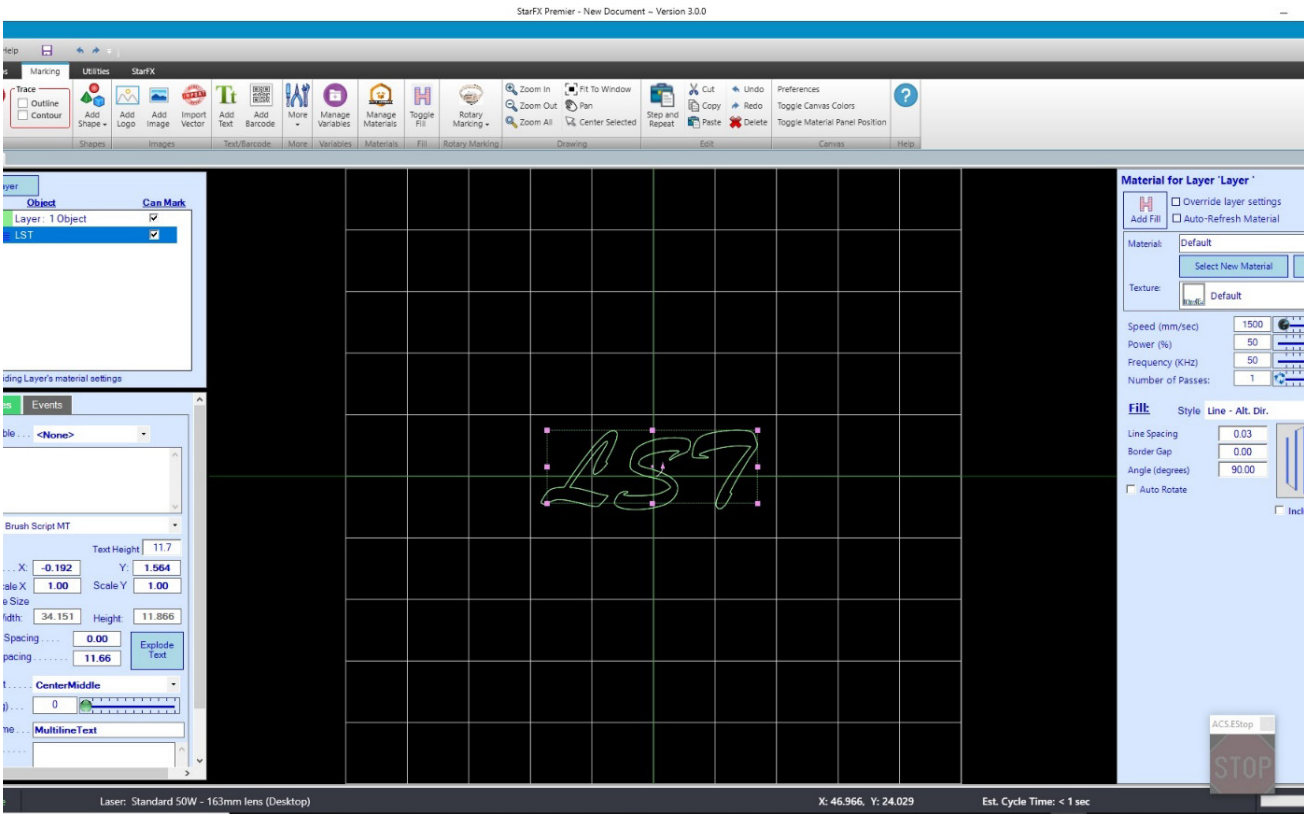




And if we fill the rectangle it fills around the text.



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# WELD TOOL

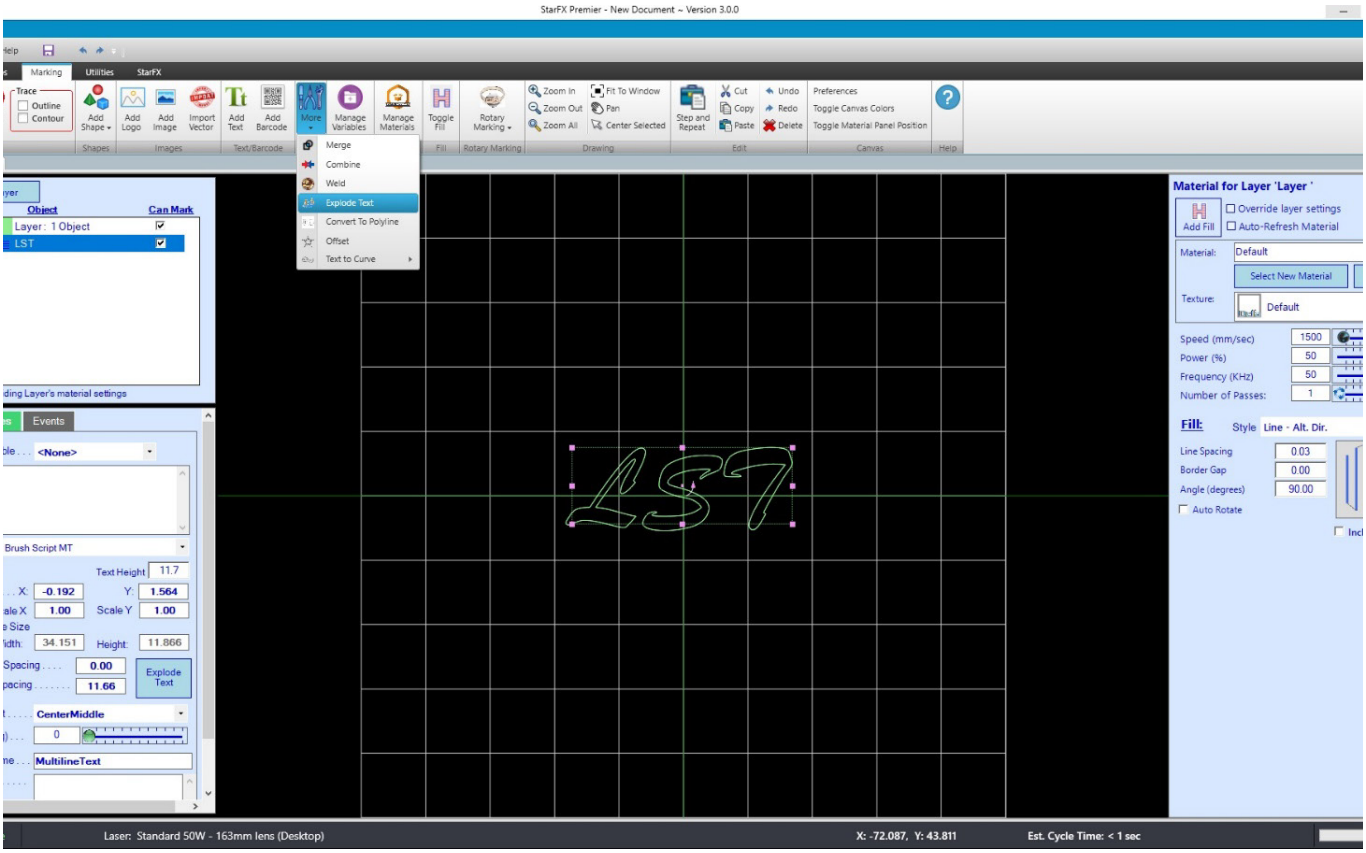


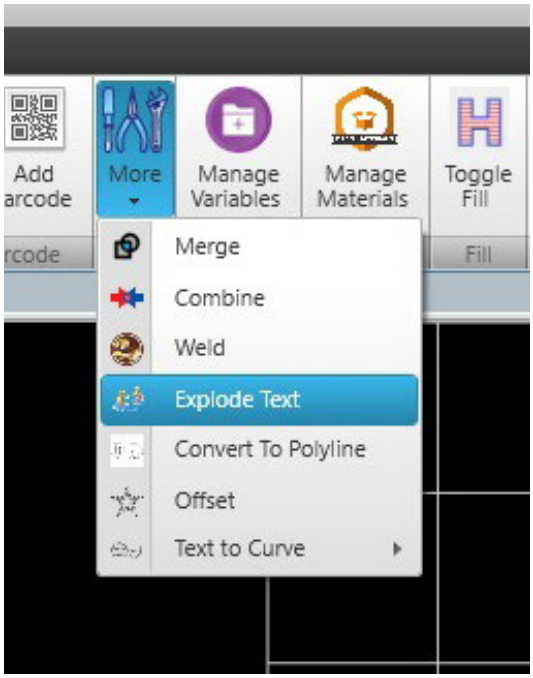

Next we will look at the **"Weld Tool"** which is typically used to create Monograms.

We start with the desired font and create a three letter text object.

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# EXPLODE TOOL



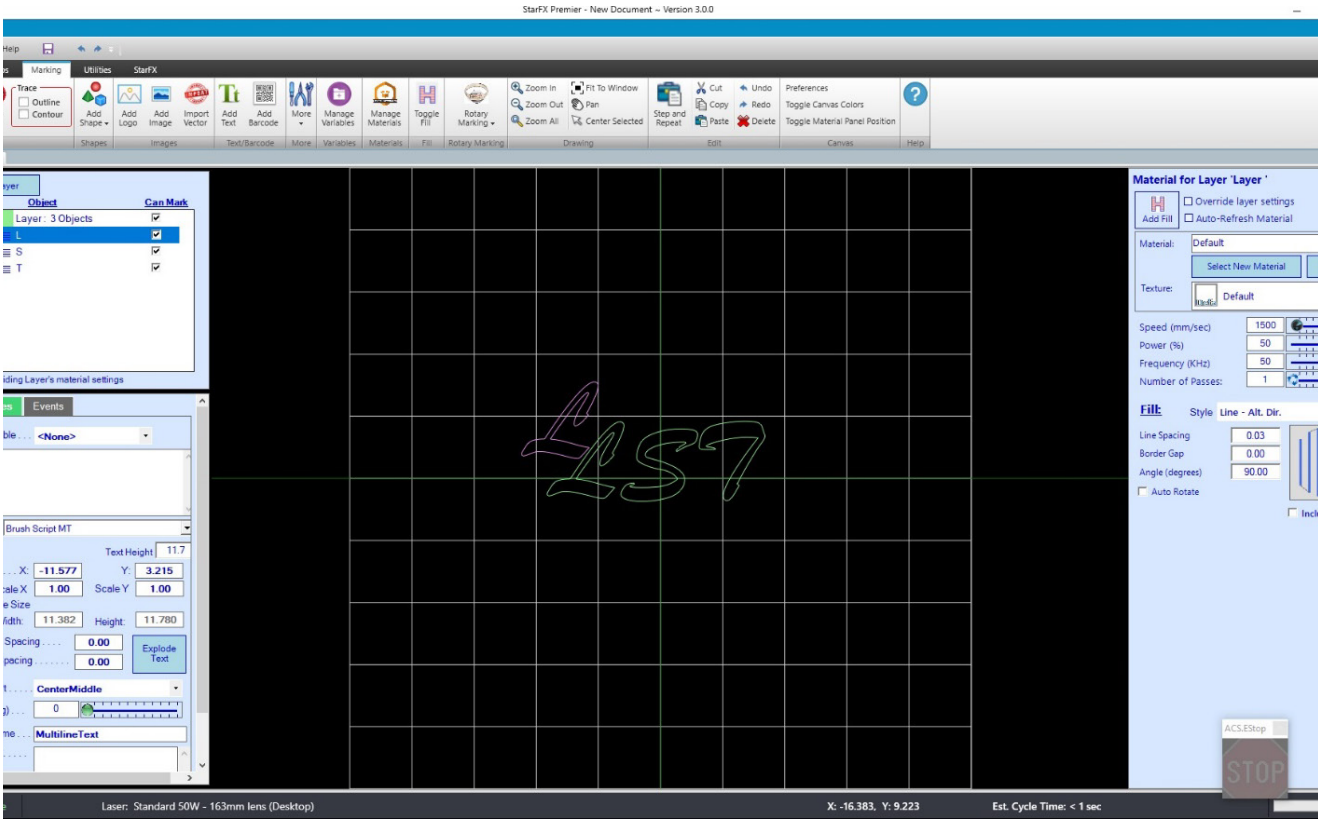




The second step is to **"Explode"** the text so that each letter is an independent object and can be moved by itself.



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# WELD TOOL

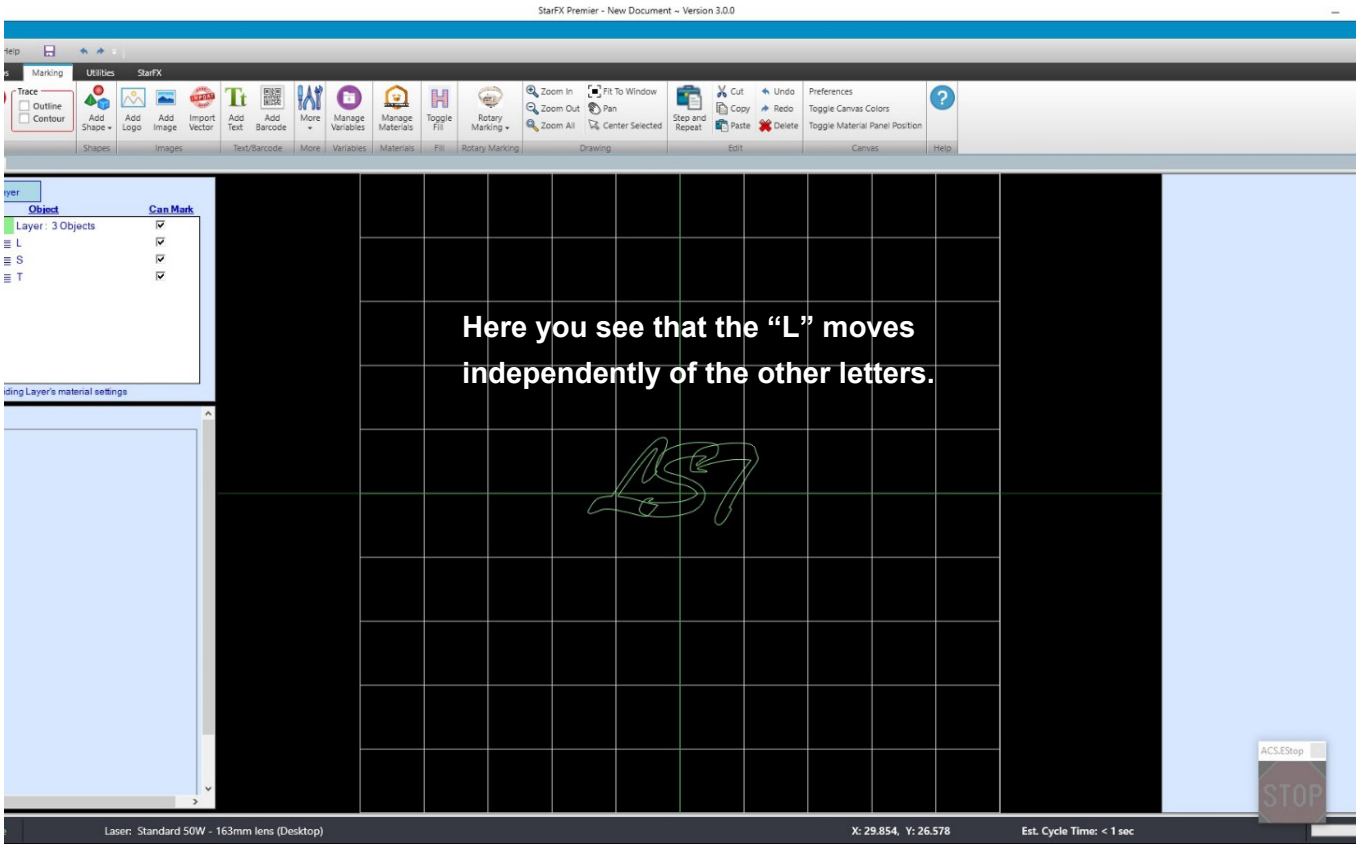


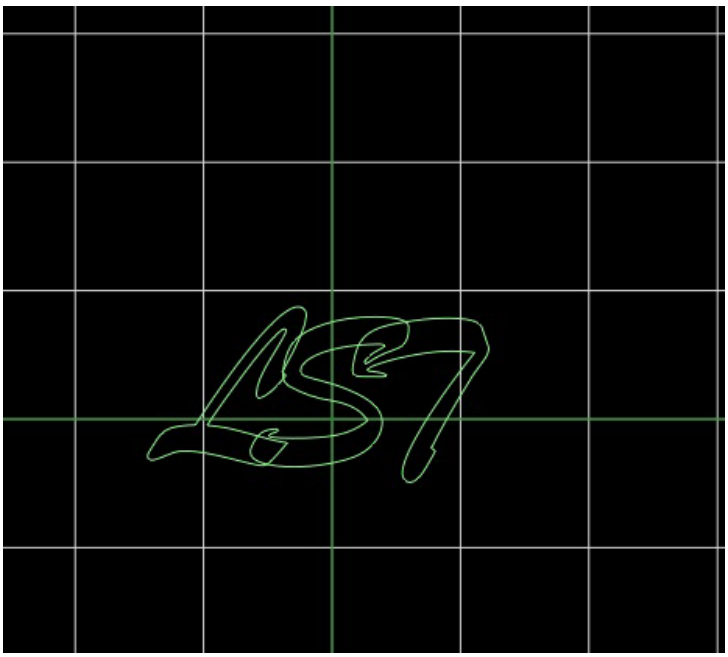



Here you see that the **"L"** moves independently of the other letters.

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# WELD TOOL



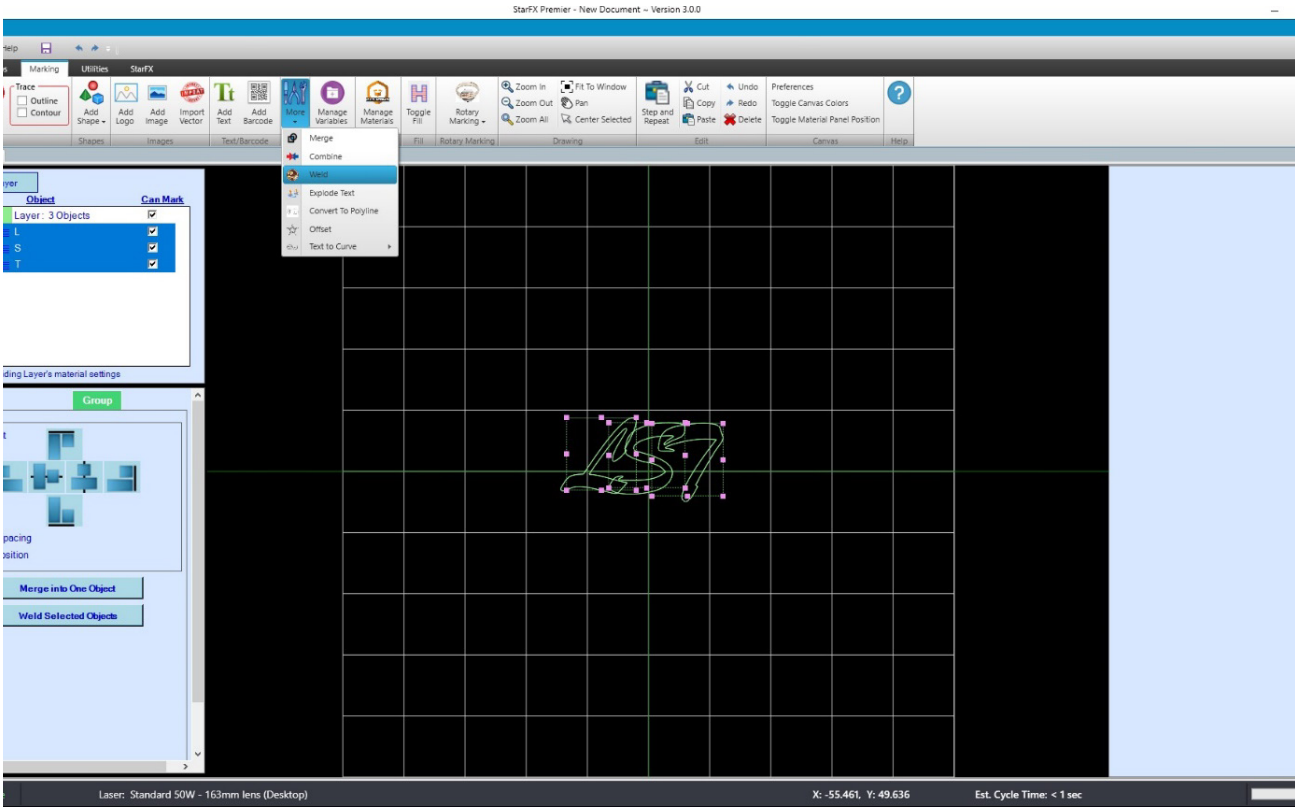



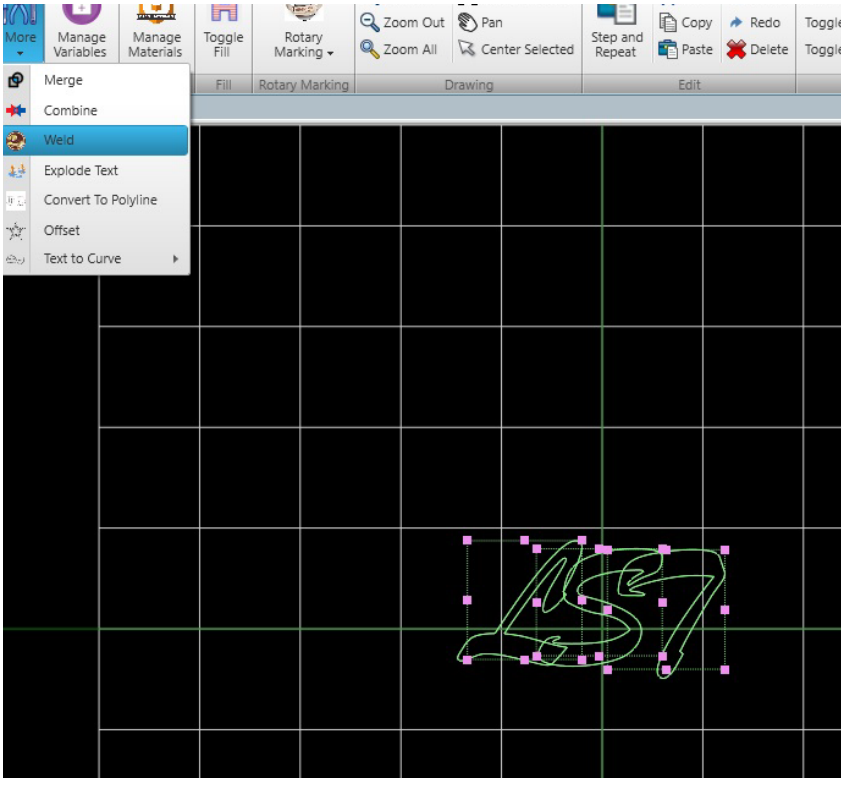
Then you overlap the letters for the desired affect.



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# WELD TOOL

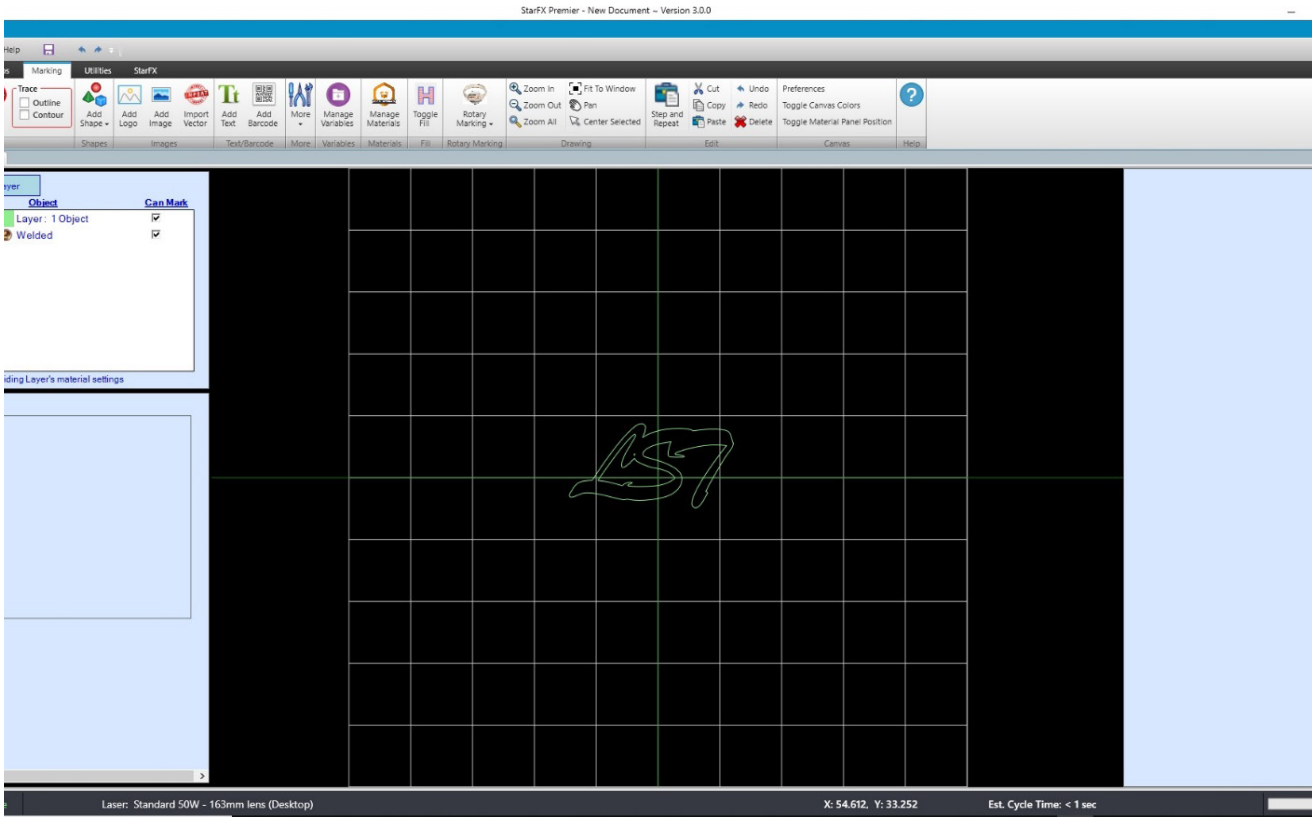


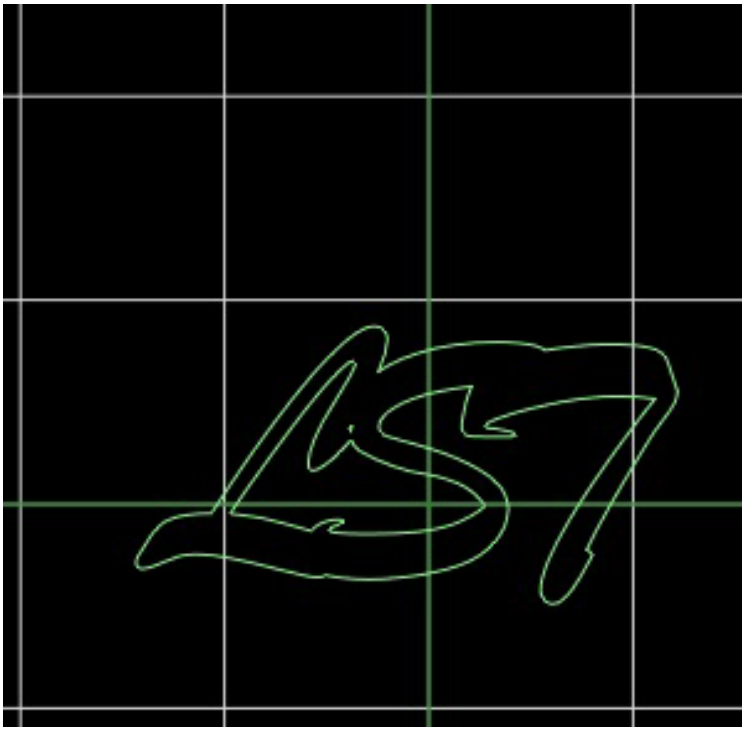




Highlight all of the characters and select the “Weld Tool”.

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# WELD TOOL



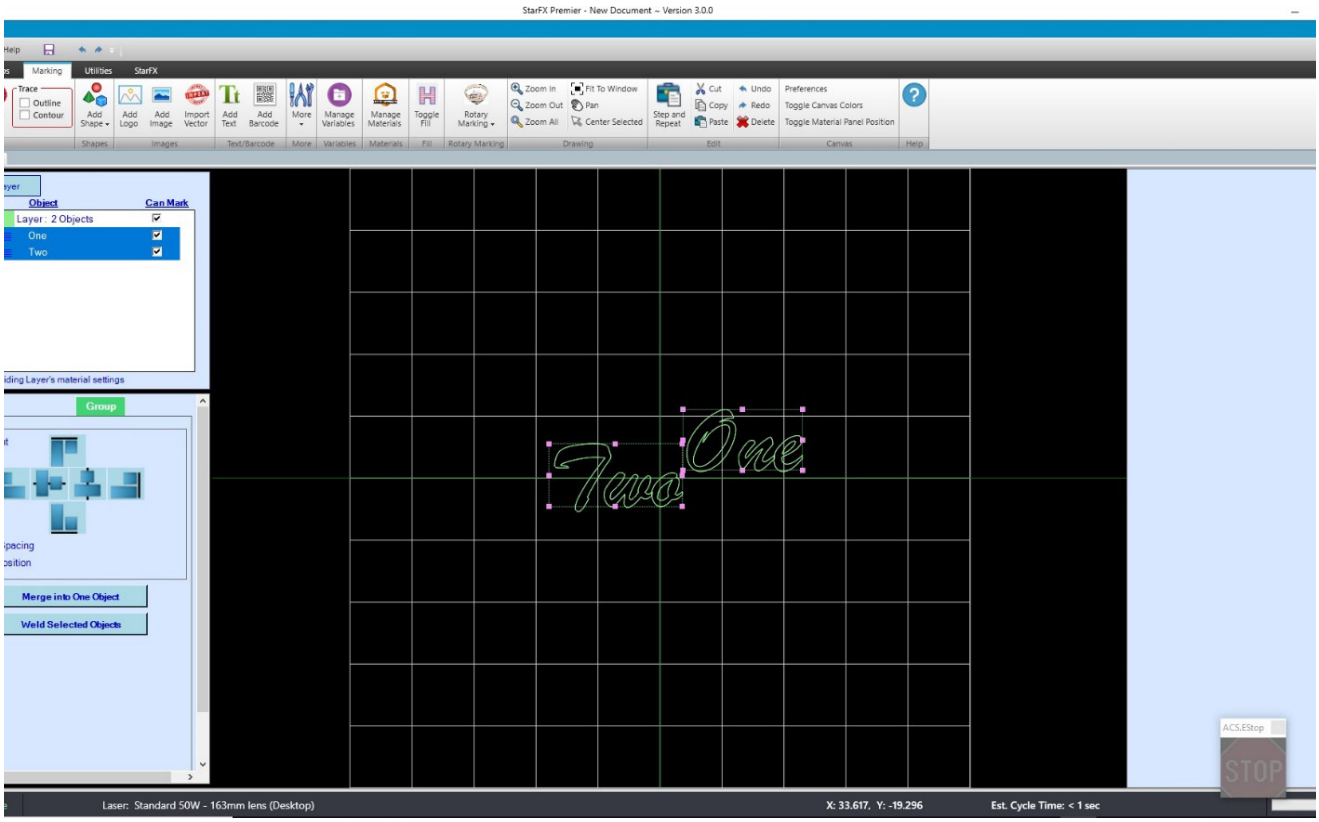



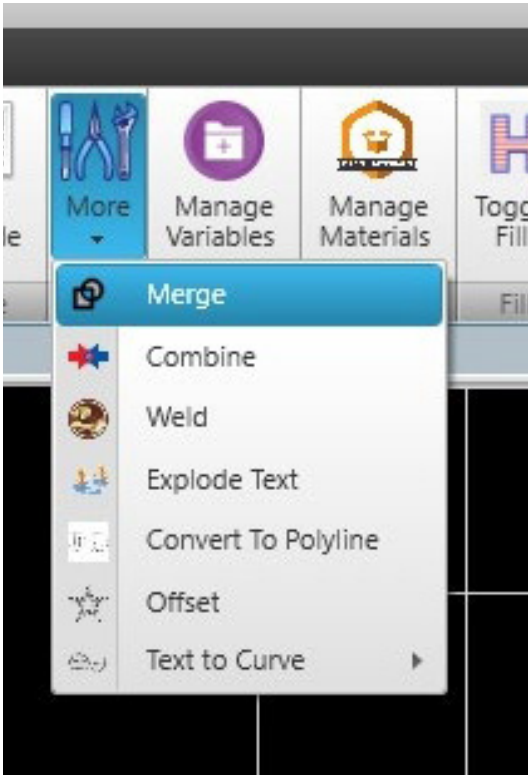
The characters are now “welded” together as one object and any overlapping areas are eliminated.



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# MERGE TOOL



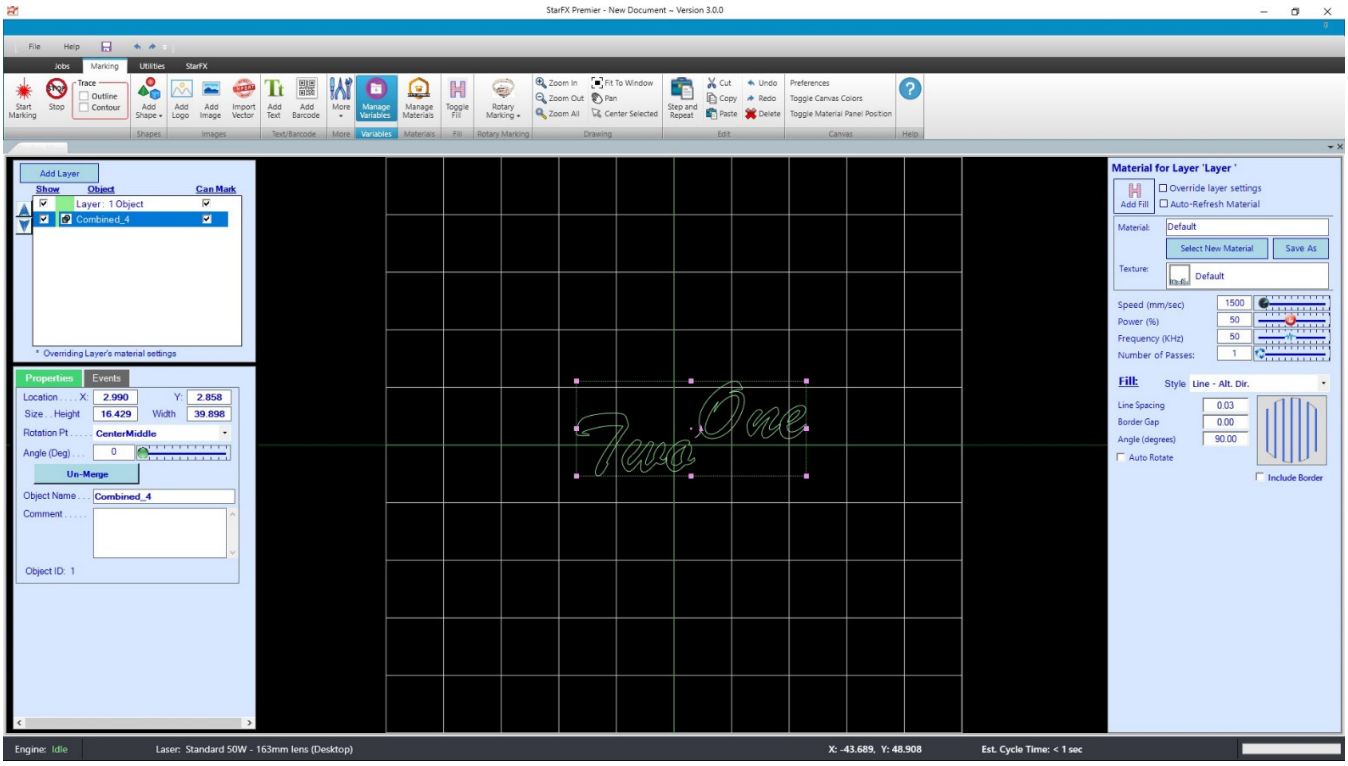



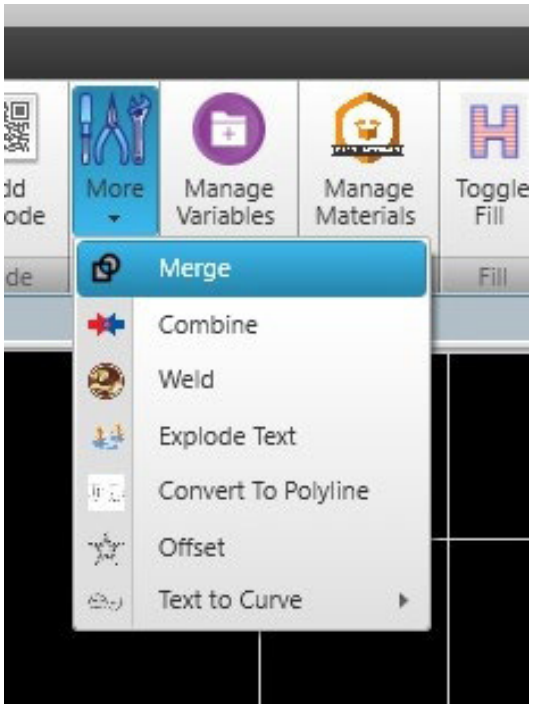

The **"Merge Tool"** does just what it suggests it makes two or more objects become one object.

This is different than "Grouping" several objects where each object retains its original type. Merging literally turns the selected objects into a single new object and it reacts to other commands as one object.

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# MERGE TOOL



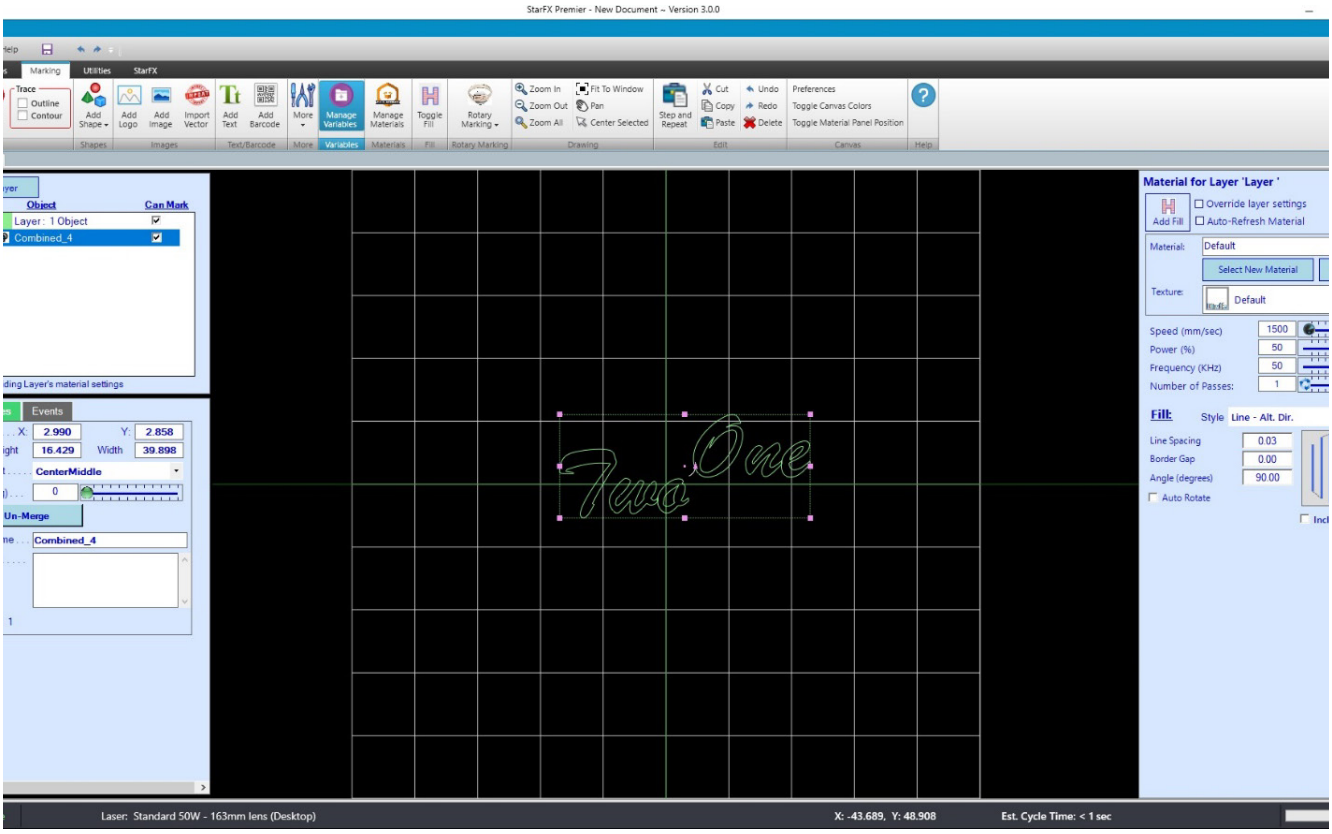



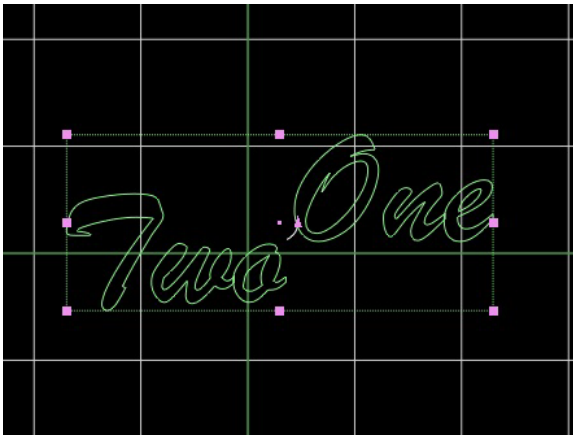

You select the objects to merge and then pick the **"Merge Tool"**.

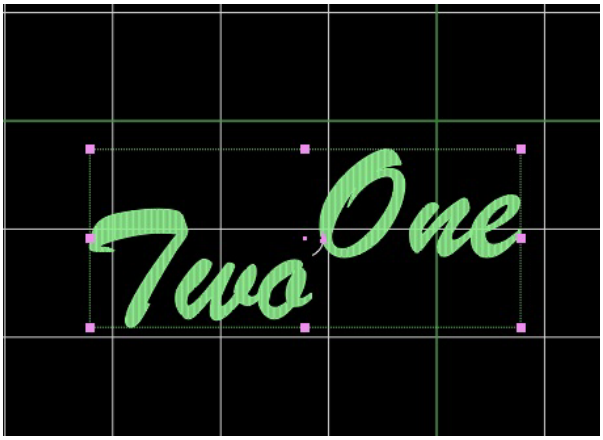


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# MERGE TOOL



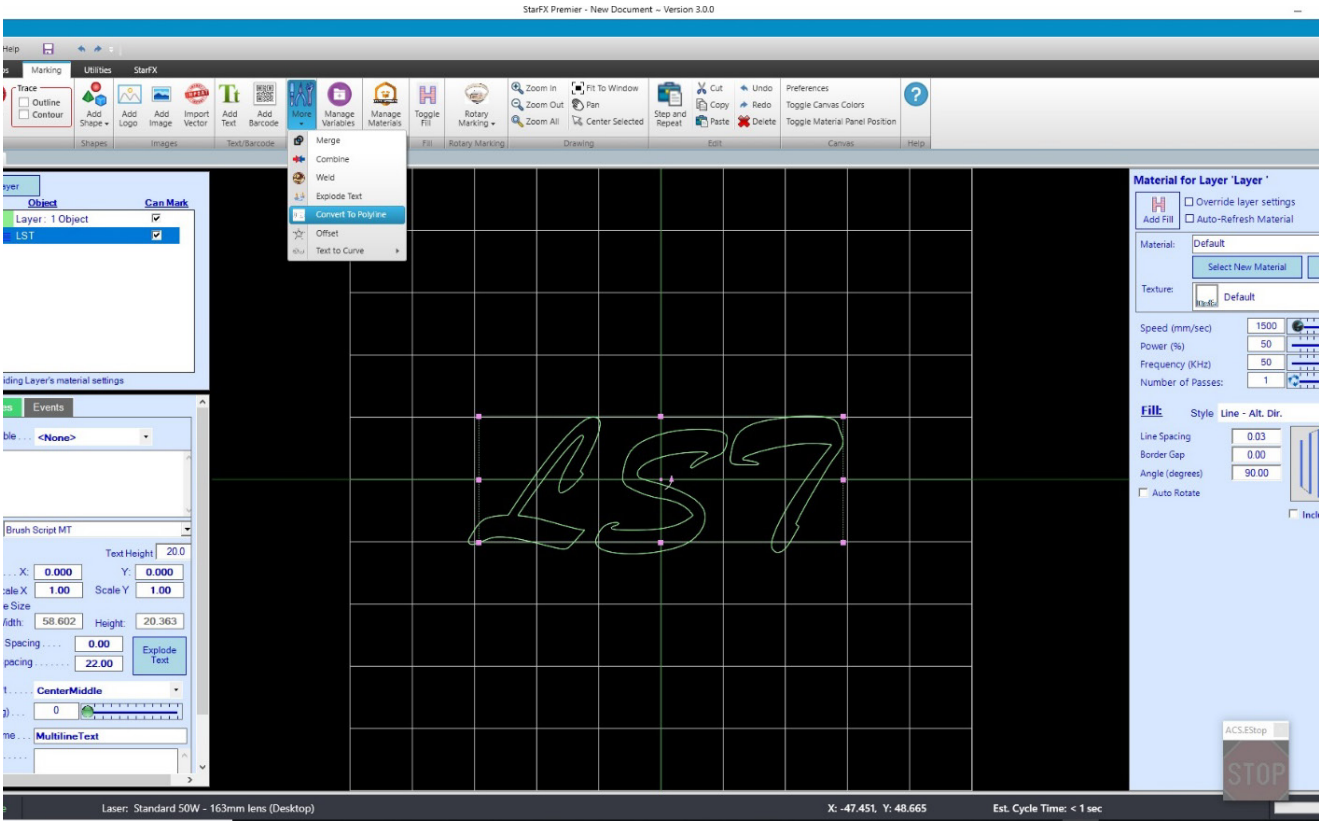



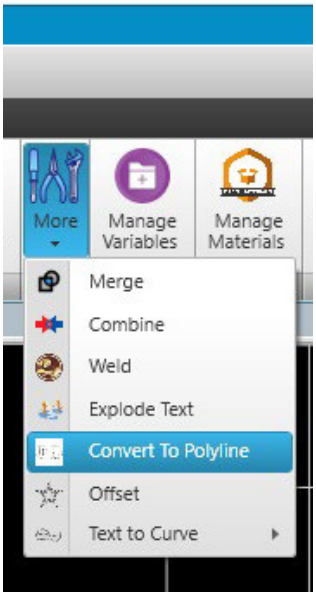




They now act as one object if you fill or move or size them they will both receive that action.

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# MERGE TOOL




The **"Convert to Polyline"** Tool is provided to specifically allow the user to alter the way a standard Windows font looks.

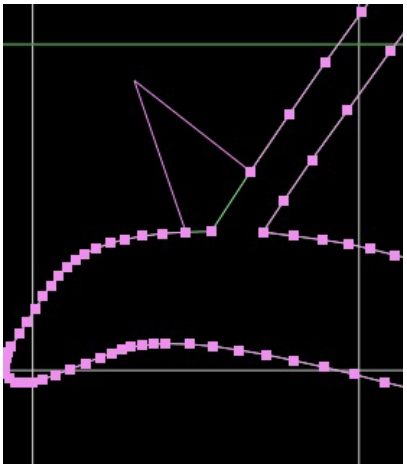
This is typically because the font creates a problem in the lasing process such as a hot spot in an intersection or point on sensitive materials.

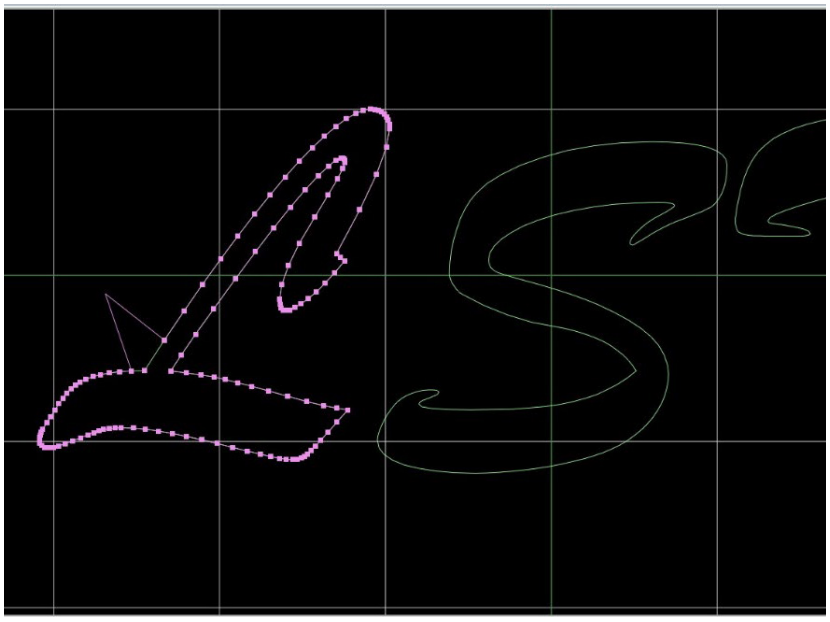


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# MERGE TOOL





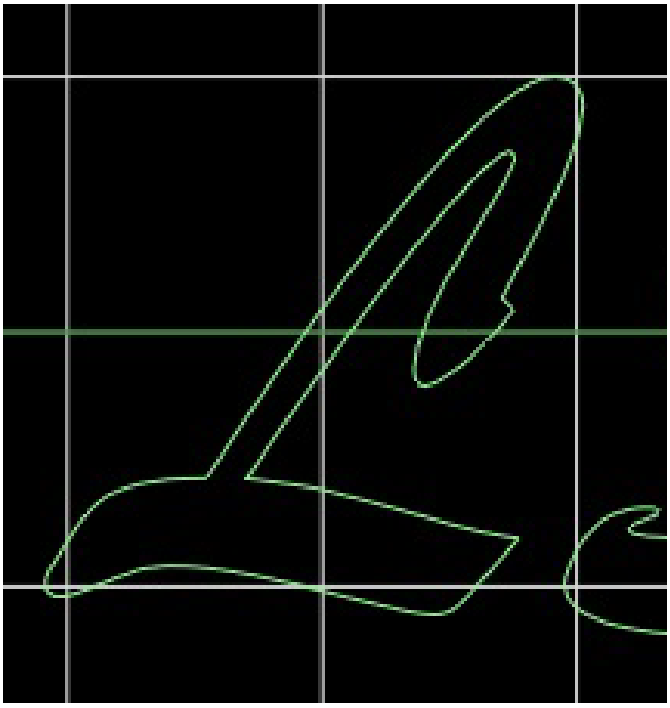


After Converting the text selected becomes like an Imported CADD file and all of the lines of the character are editable.

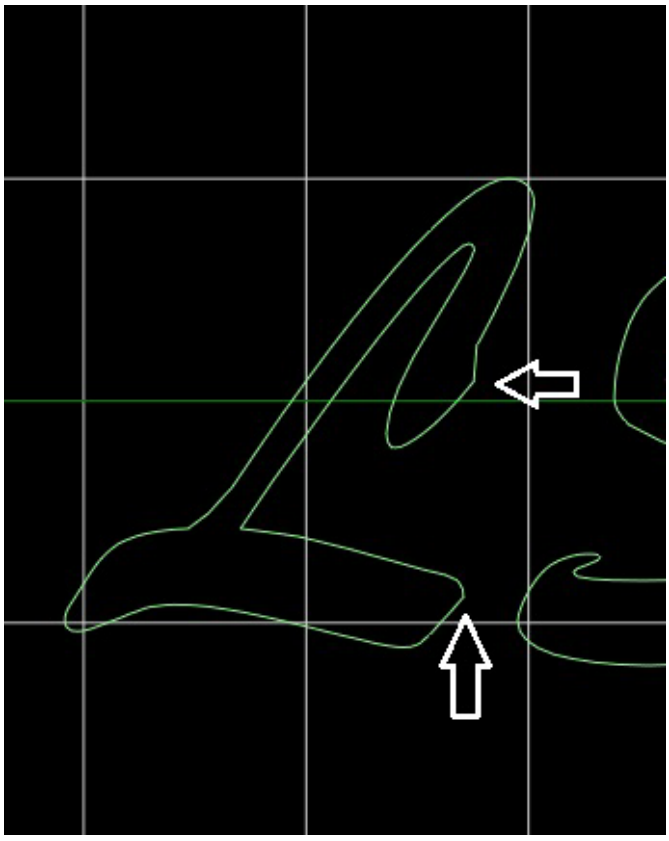
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# CONVERT TO POLYLINE TOOL

## ORIGINAL



## AFTER EDITING



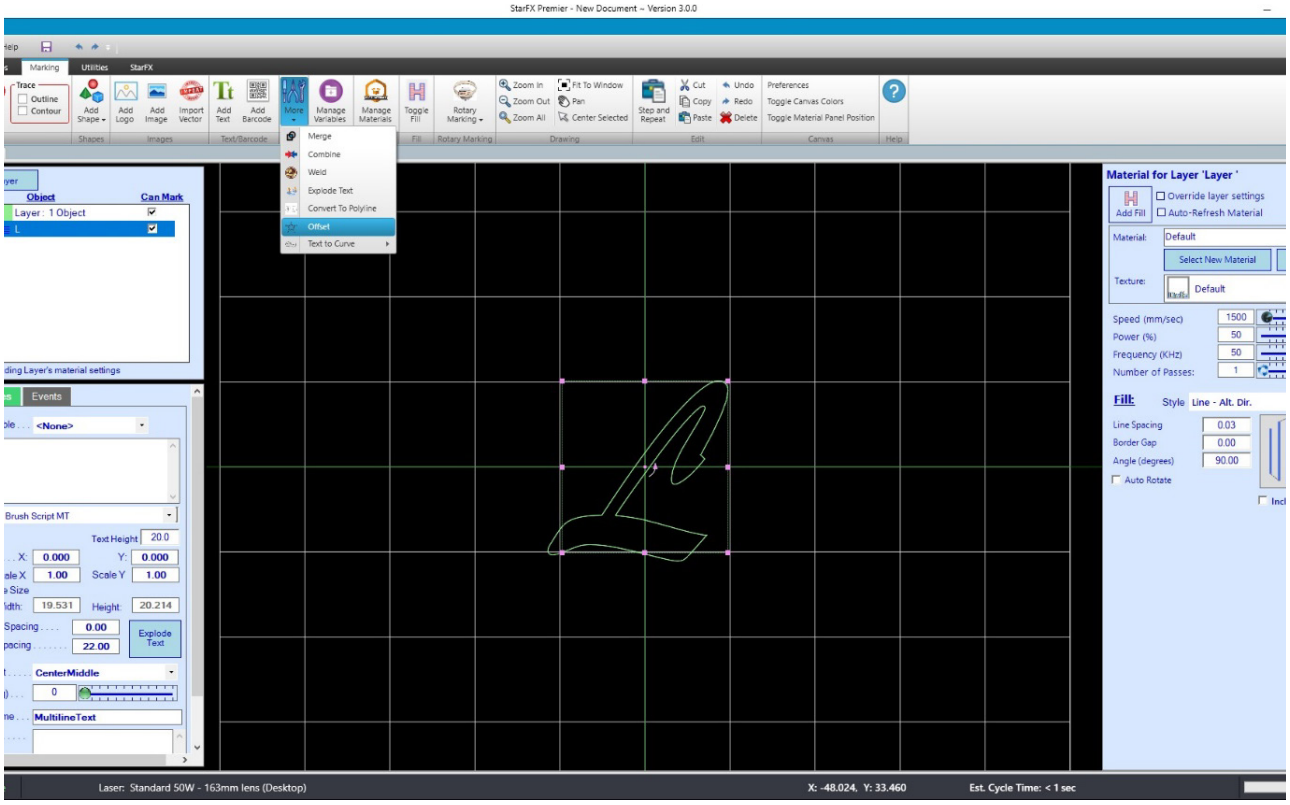
Small changes can be made to better fit a specific material or process.

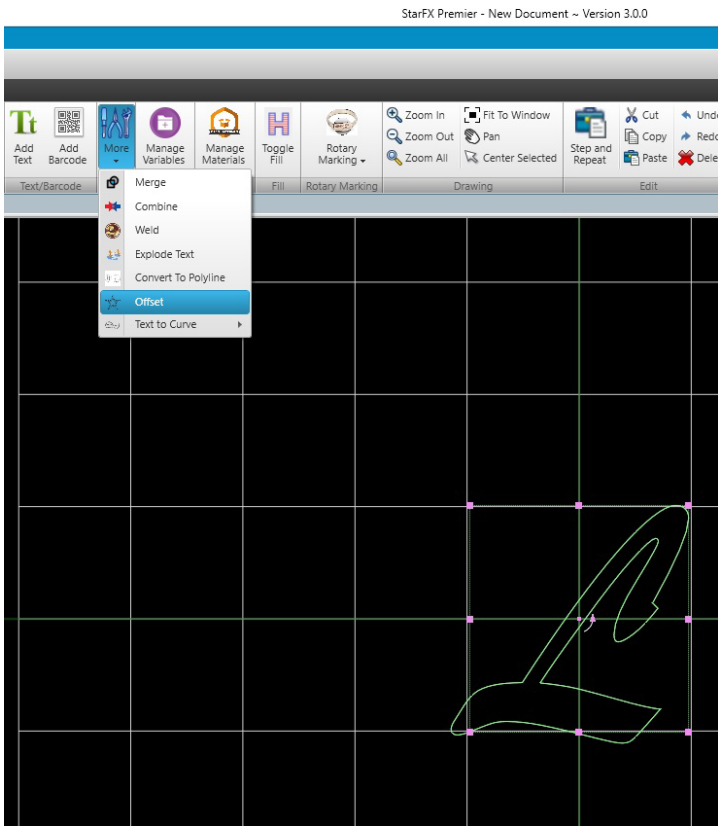
While this tool can be used to cosmetically alter some text that can be a tedious task and the text itself can not be changed.



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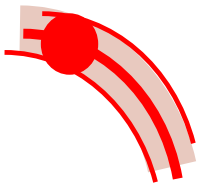
# OFFSET TOOL



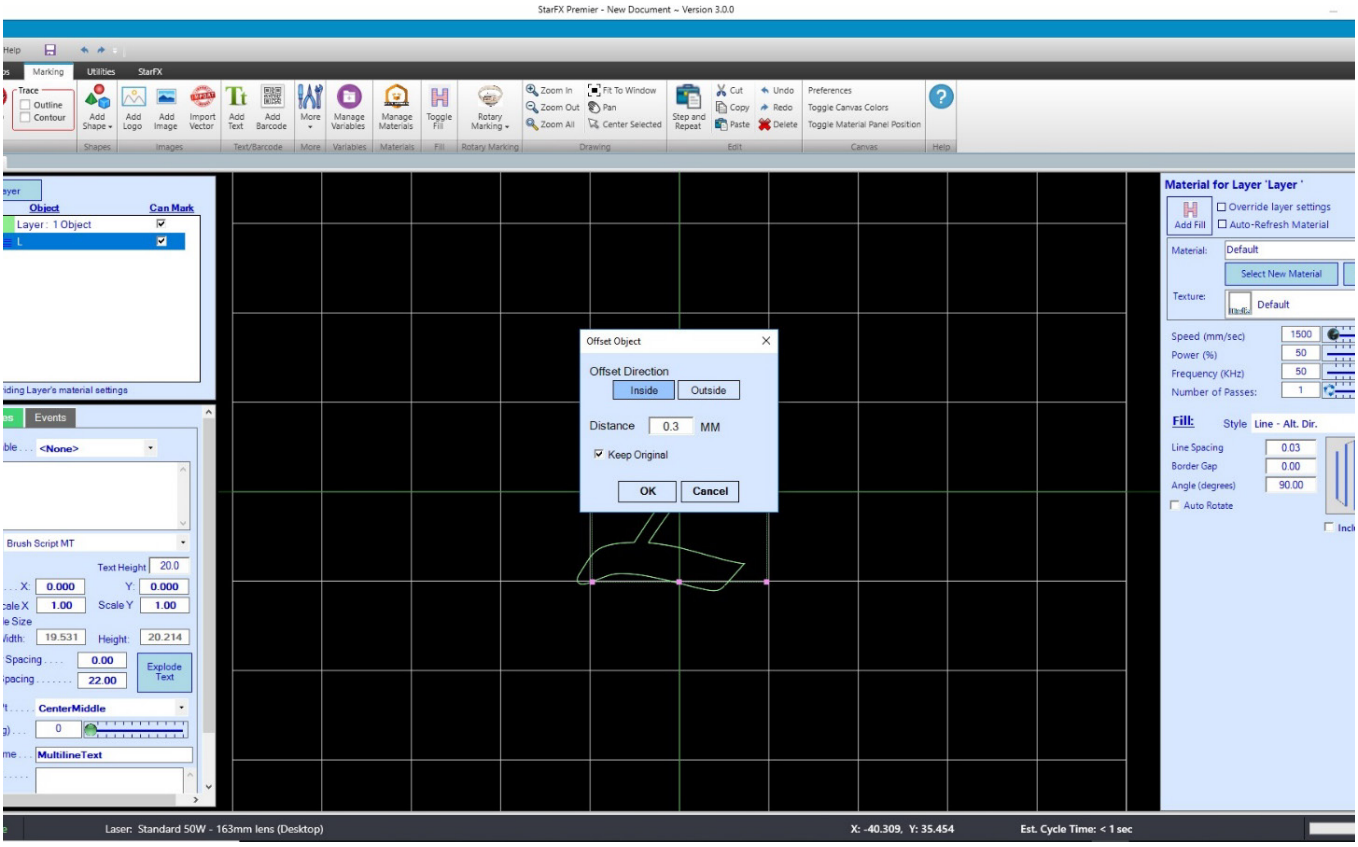

The “Offset Tool” is mostly for cosmetic effects and is typically used to “thin” an object that appears to “thick” when lased.

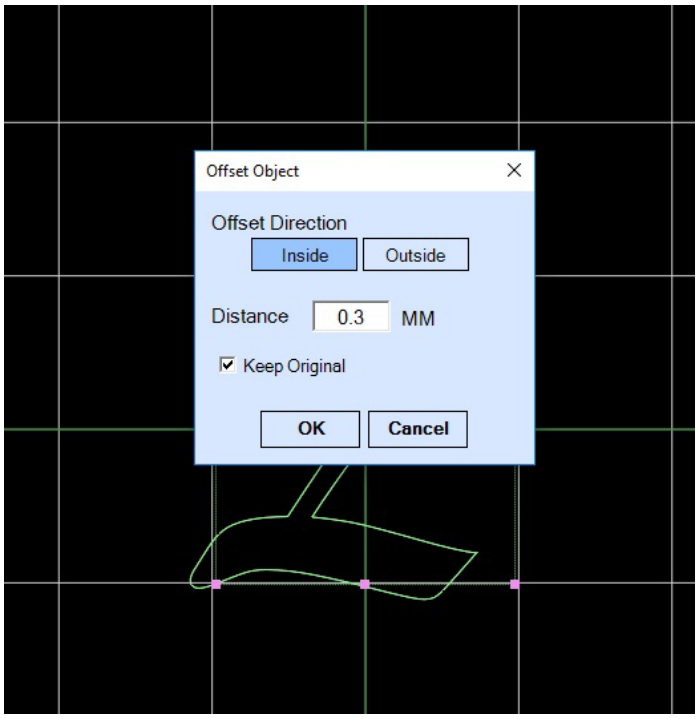
This is because the laser mark has a size and just like signing your name with a paint brush instead of a pencil the size of the mark can affect the final appearance.



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# OFFSET TOOL



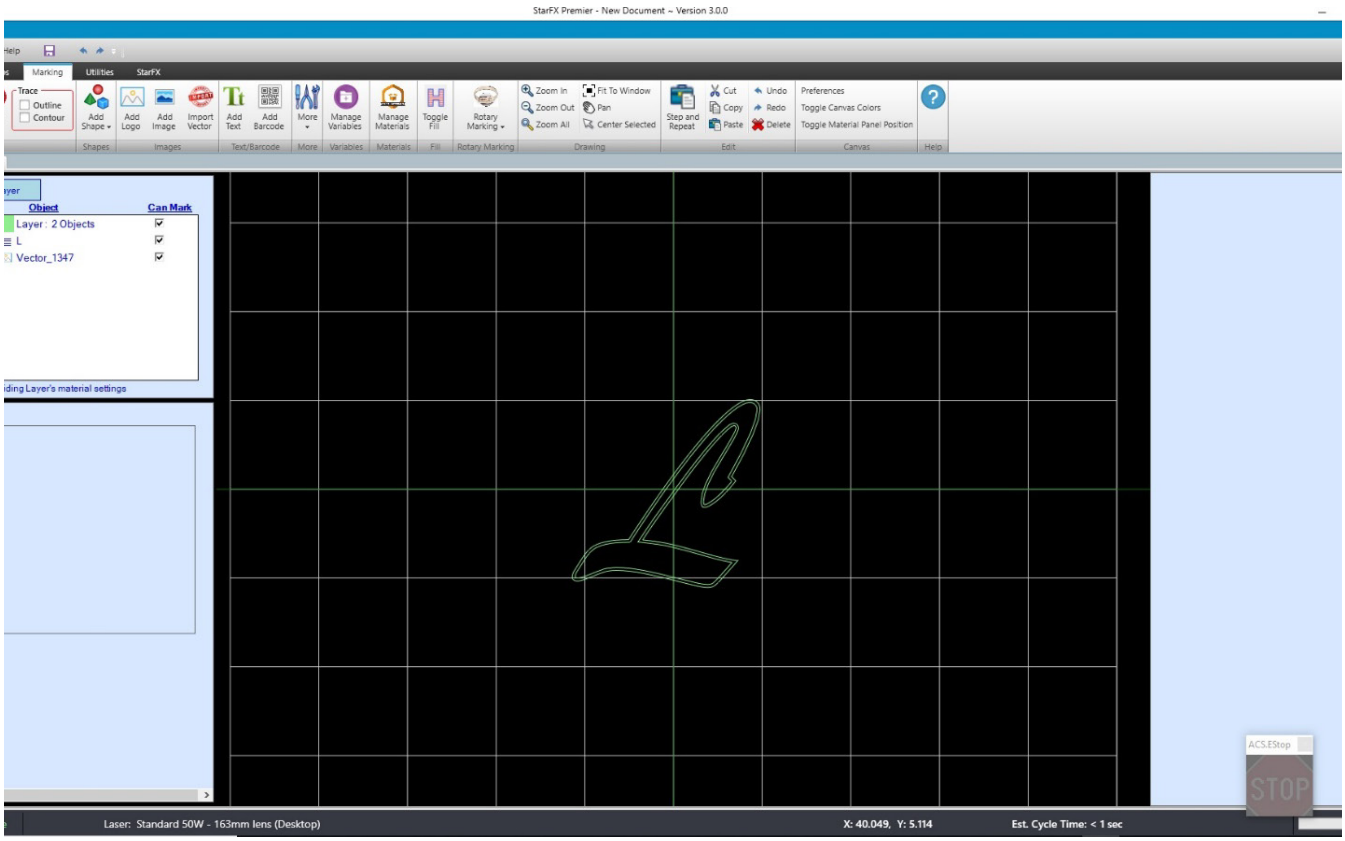

Once the **Tool** is selected it will ask if you:

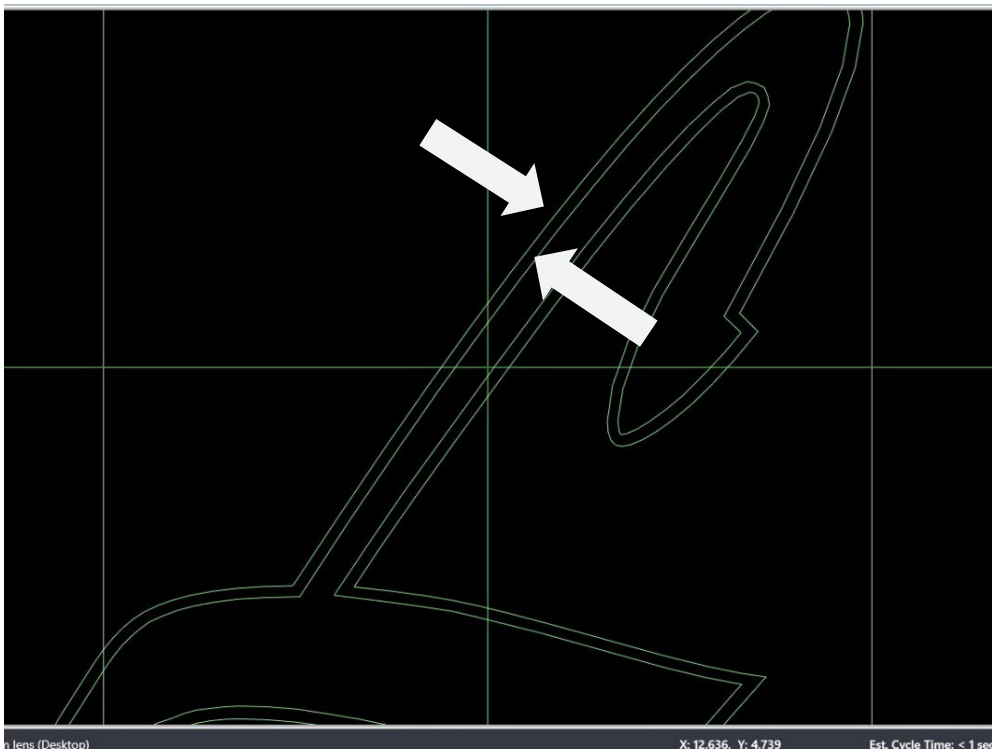
- ☆ Want to offset the original shape to the *Inside* or to the *Outside*.
- ☆ What size you want the offset to be.
- ☆ Whether you want to keep the original shape or not.



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# OFFSET TOOL

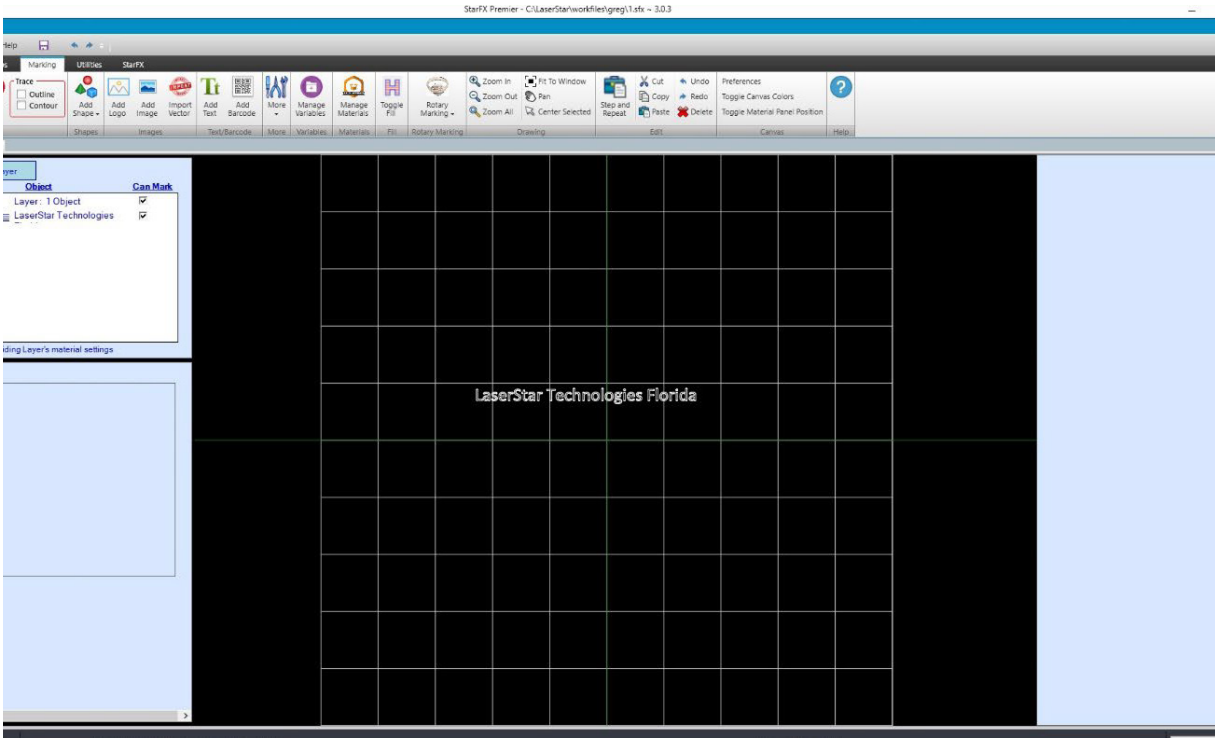


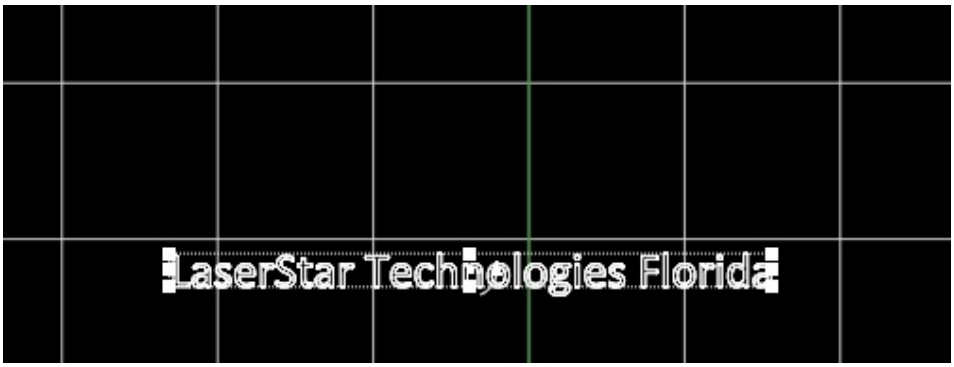




The offset is performed.

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# TEXT TO CURVE TOOL



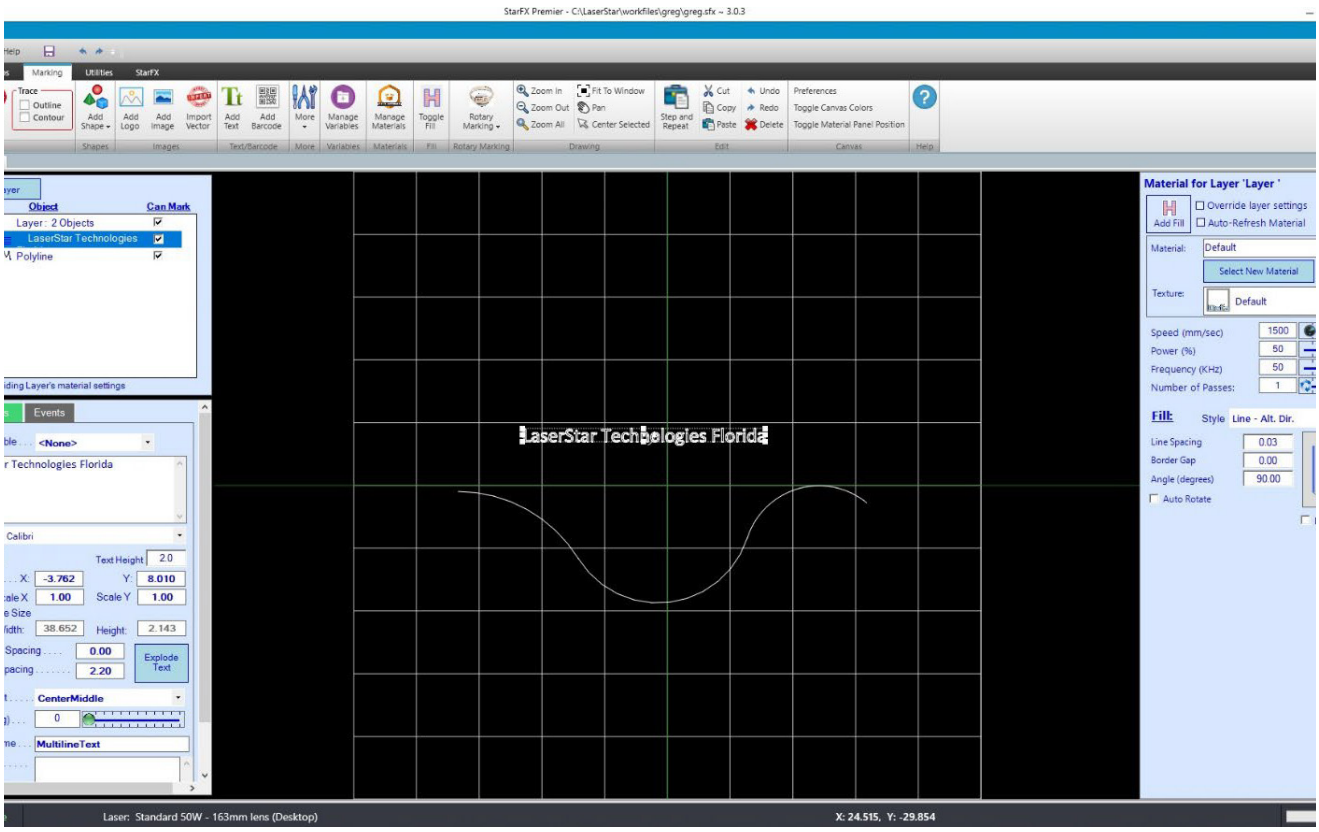



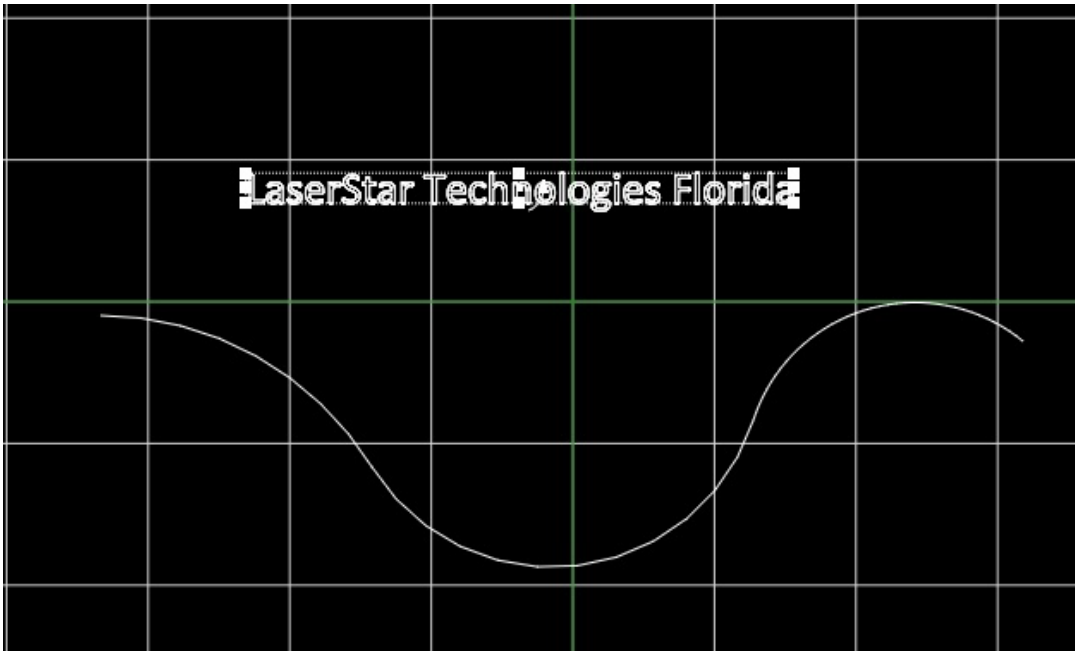

The **“Text to Curve”** Tool starts out with creating the desired text and font you want to lase.



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# TEXT TO CURVE TOOL

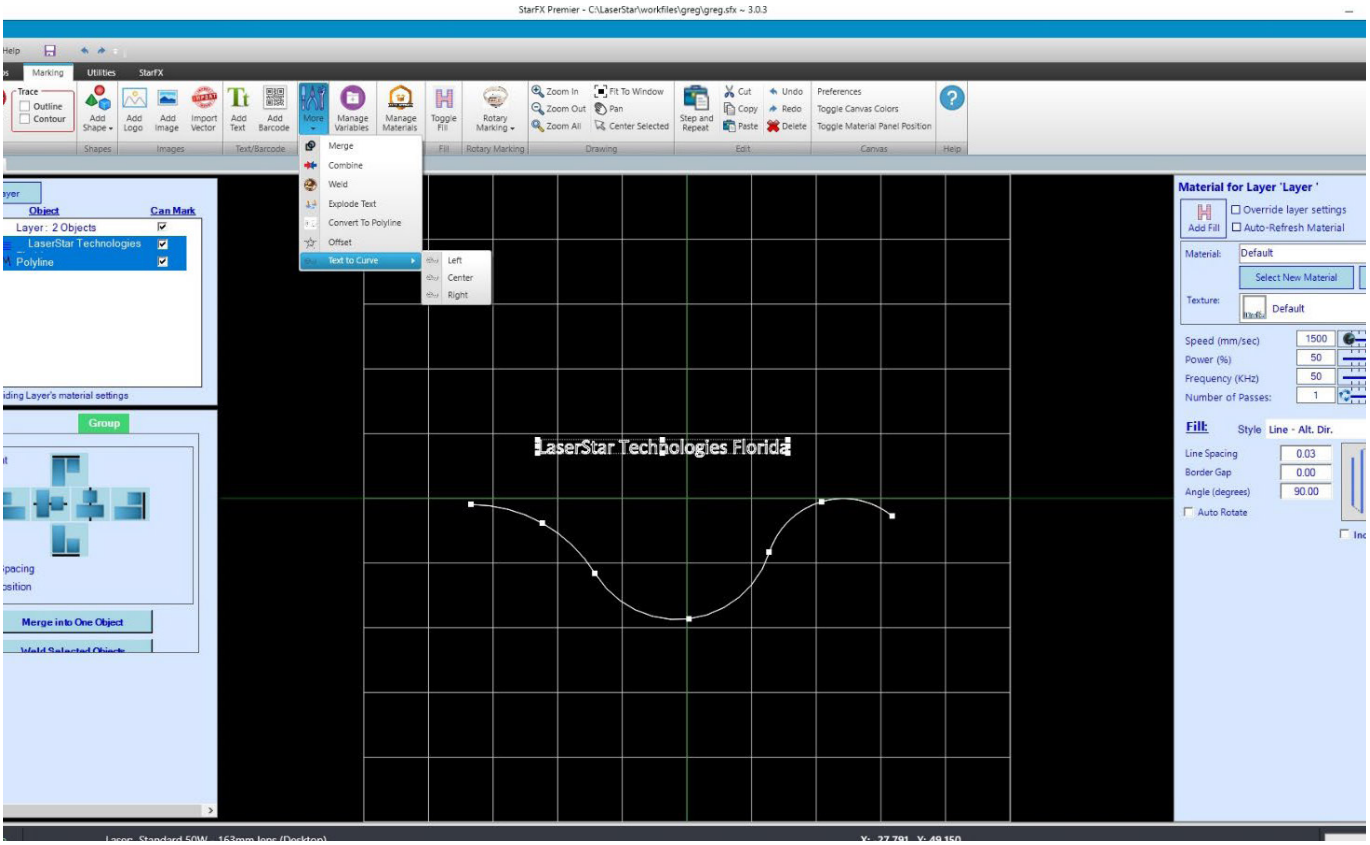


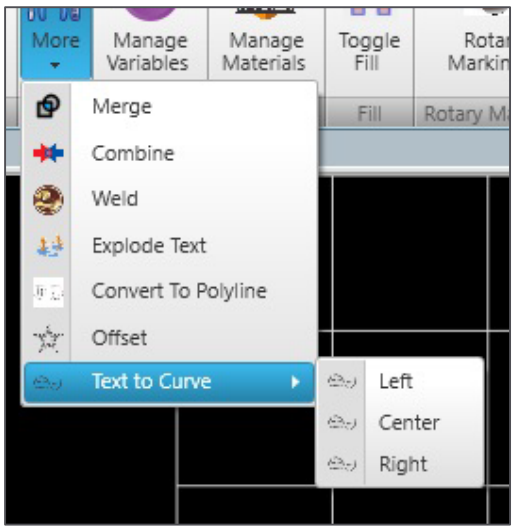




Next you draw a curve with the **"Shapes"** Polyline Tool or import a shape from CADD.

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# TEXT TO CURVE TOOL




With both objects selected you pick the **"Text to Curve"** Tool.

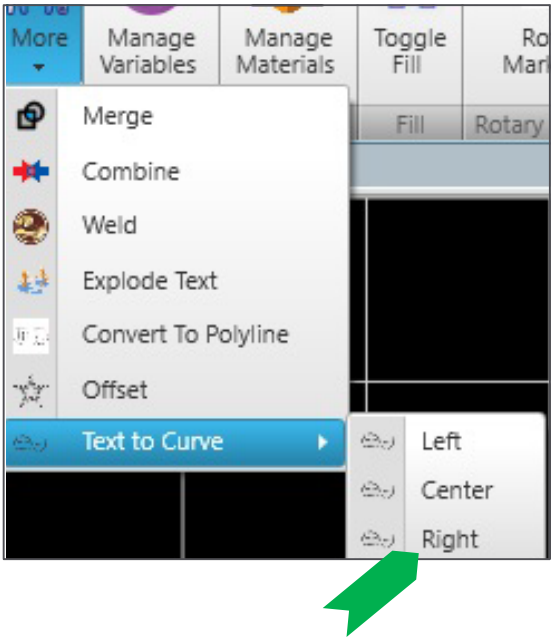
Then choose where you want it to start.

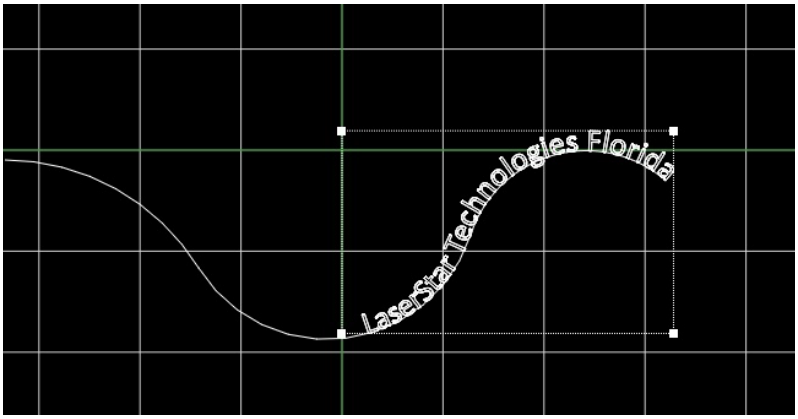


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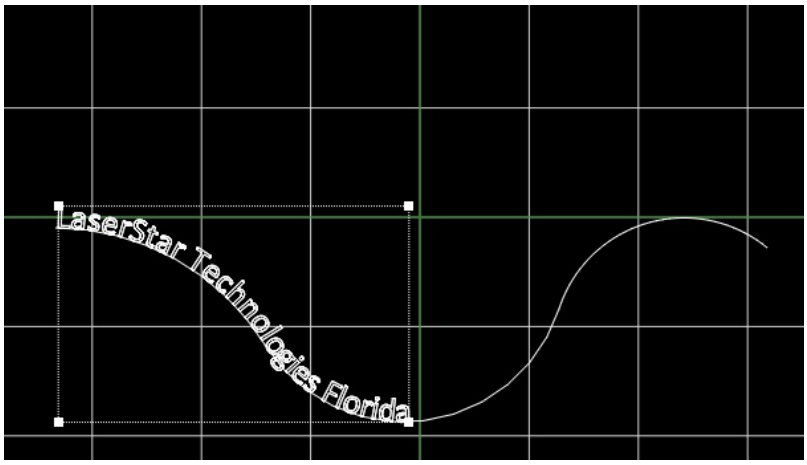
# TEXT TO CURVE TOOL

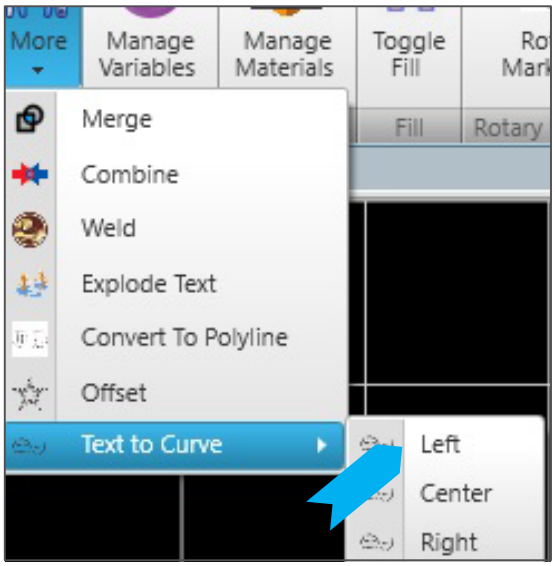
Start at the **right** edge.



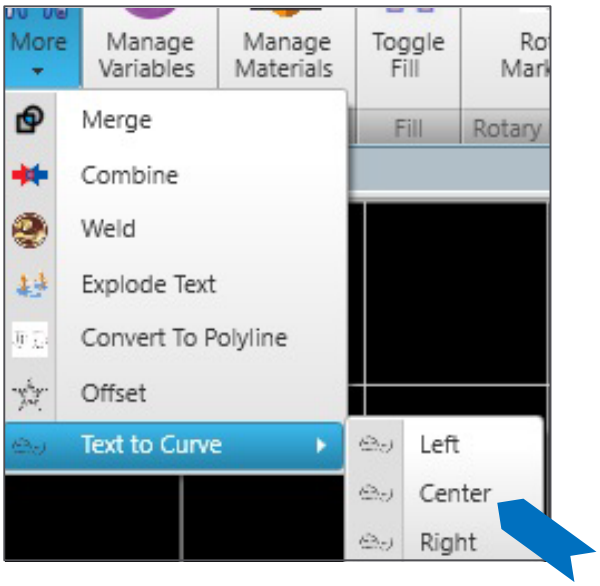

Start at the **left** edge.



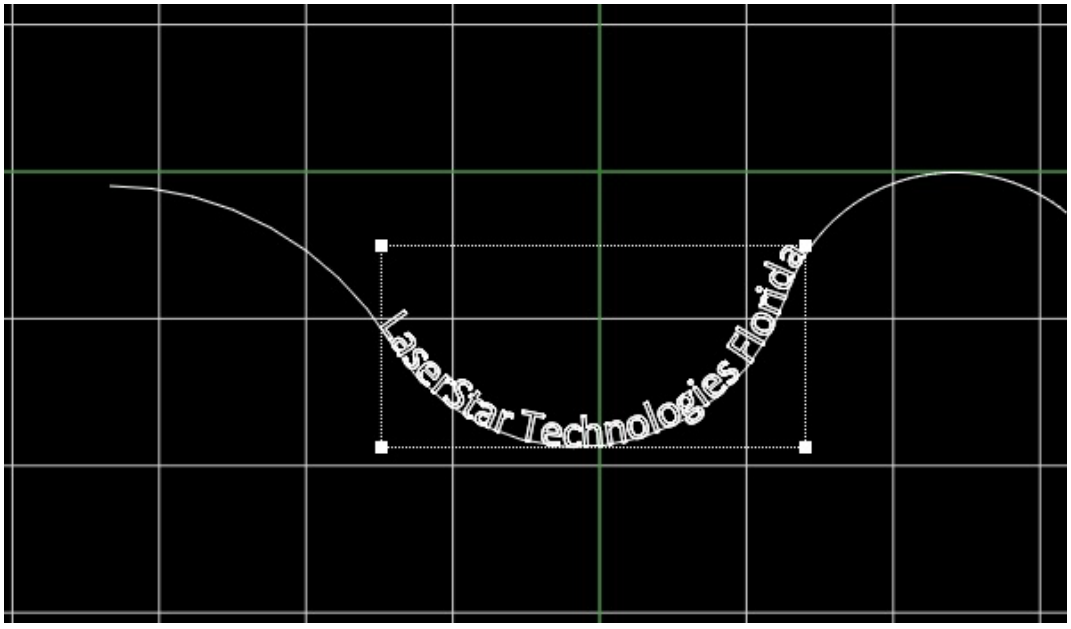




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# TEXT TO CURVE TOOL




Or start in the Center.






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# ROTARY MARKING MODULE EXPRESS SCREEN

CLICKABLE CONTENT


## INTRODUCTION

## MENU ICONS

## DRAWING SCREEN

## CREATE A NEW PROGRAM

## PART DIMENSIONS

## SELECTING A MATERIAL

## TYPE OF ROTARY MARK

- Mark & Move
- Text Marking
- Section Marking

## SELECT A DRAWING OBJECT

- Text Object
- Shapes
- Logos
- Import Vectors

## ADVANCED FEATURES

- Weld Tool
- Combine Tool
- Offset Tool
- Text To Curve Tool
- Convert To Polyline Tool

## MARKING A PART

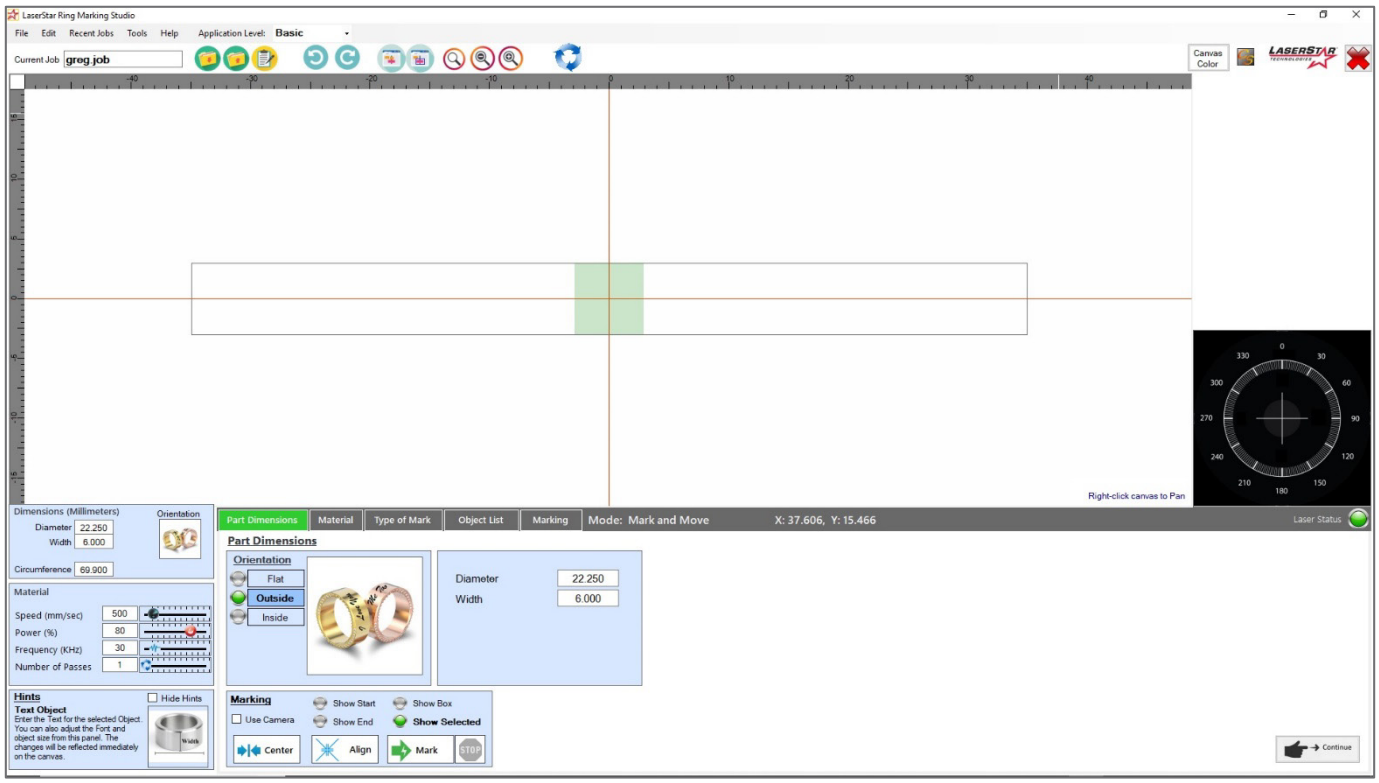

LASERSTAR ACADEMY

Please be sure to see the video tutorials for the further details on the device that you have purchased.



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# INTRODUCTION



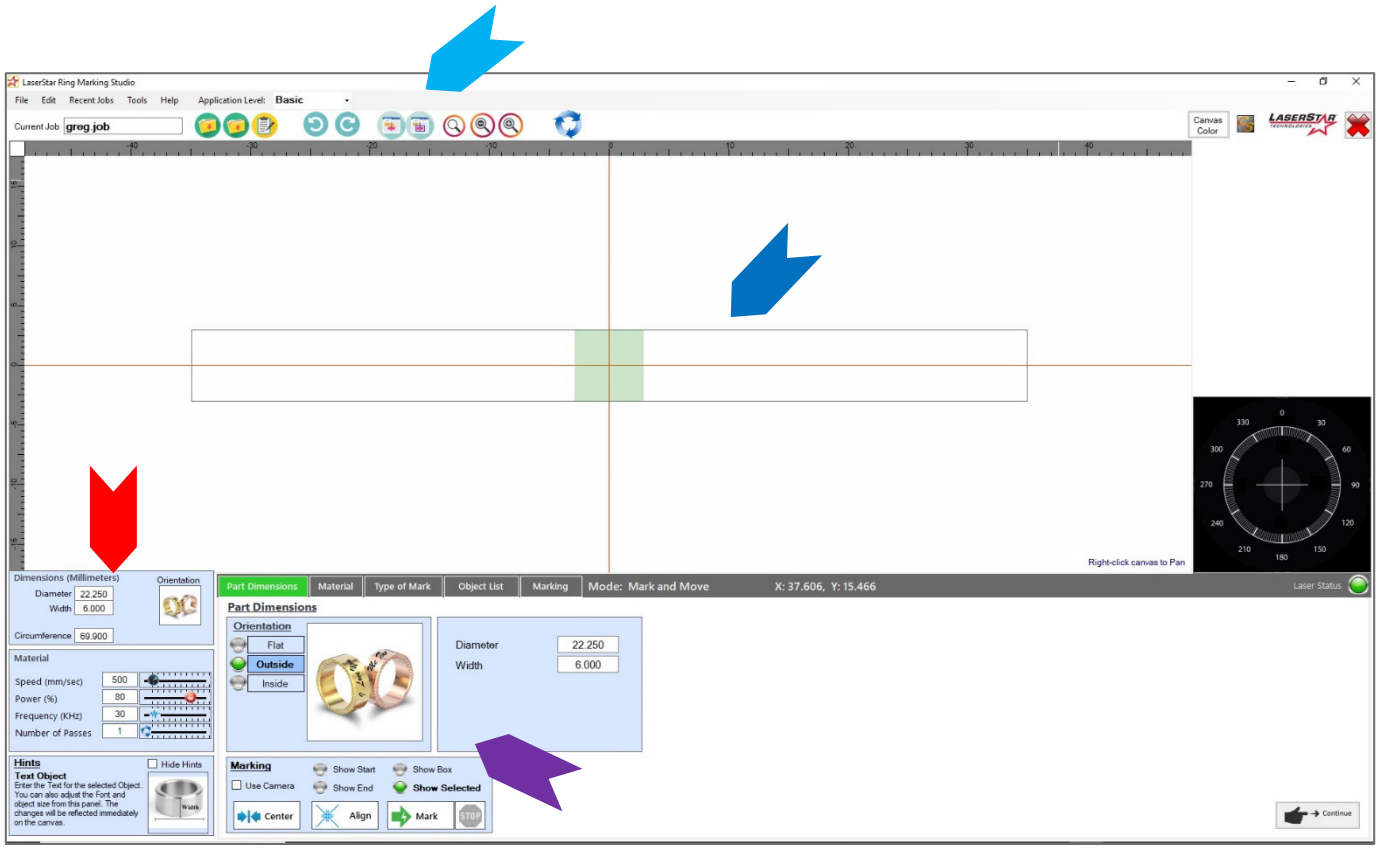

The Jewelry Marking module provides a user interface that is simple and uncluttered with features that go beyond basic marking of text and logos but still provides all of the tools needed for artistic efforts.

It goes through a logical flow from defining the part to aligning the final mark on the part.

We will go through each of these steps in detail in the following pages.

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# INTRODUCTION



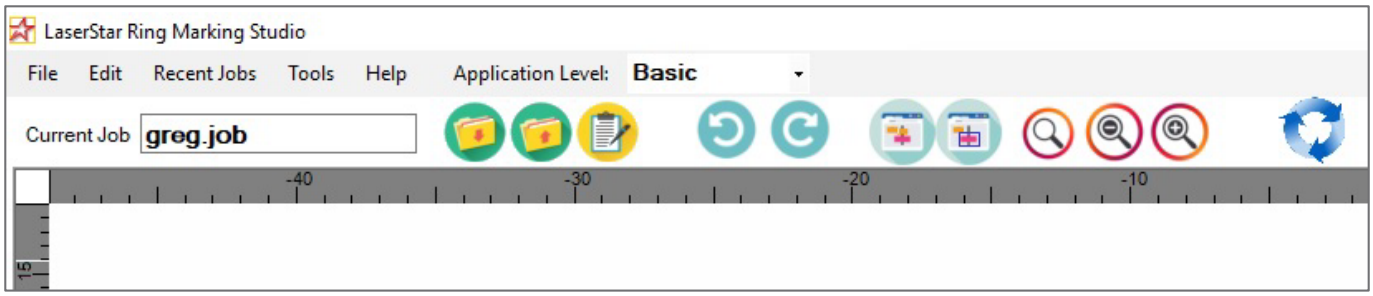

We start by describing the main areas of the software and their basic functions and then go into a more detailed description and examples.

1. The ”Menu Choices”.
2. The “Drawing Screen”.
3. The “Programing or Data Entry” area.
4. The “Information and Adjustment” section.



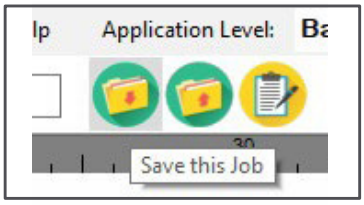
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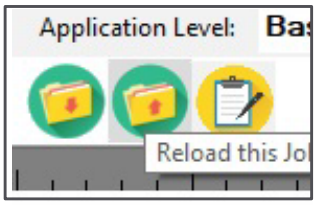
# MENU ICONS

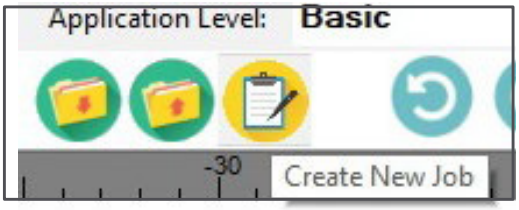



Most of the features on the Menu will be familiar to most users but we will go over them briefly. We will start with the Icons, these are typical and need no explanation.

They are the ”Save a Job”, “Reload a Job” or “Create a New Job”.

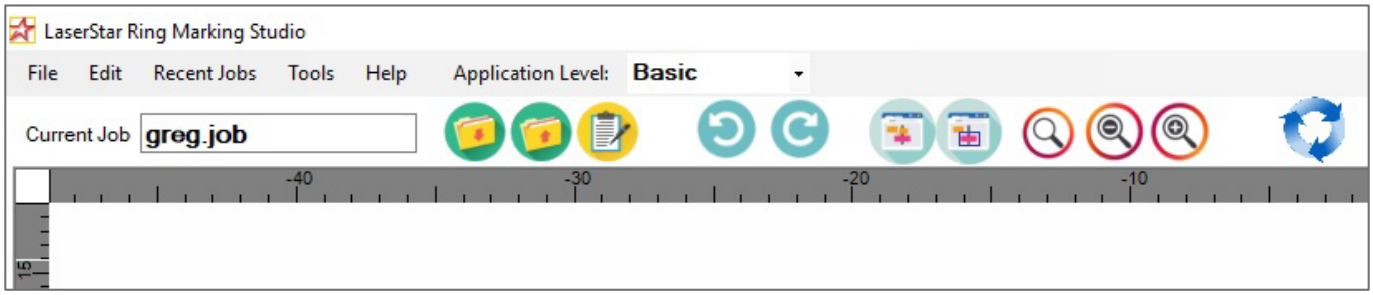


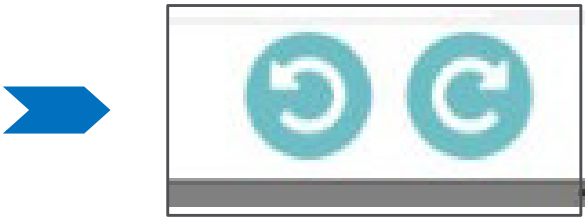

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# MENU ICONS




IIIIIIIIIMost of the features on the Menu will be familiar to most users but we will go over them briefly.

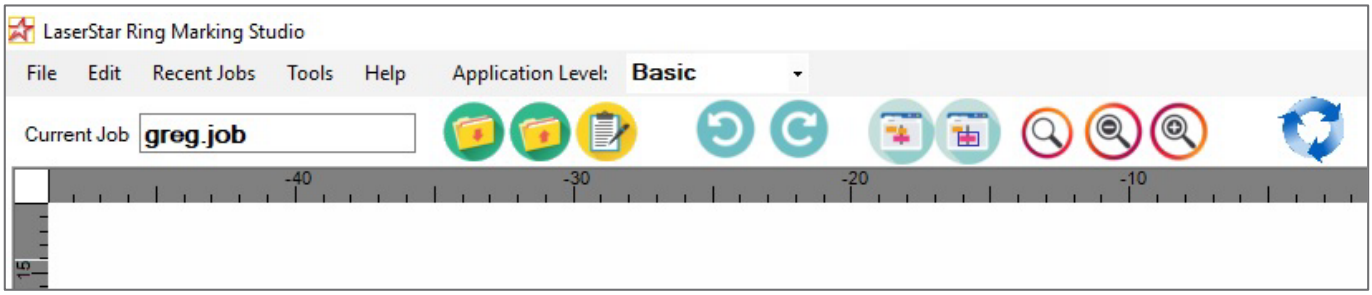
Next are the "Undo and Redo" buttons.





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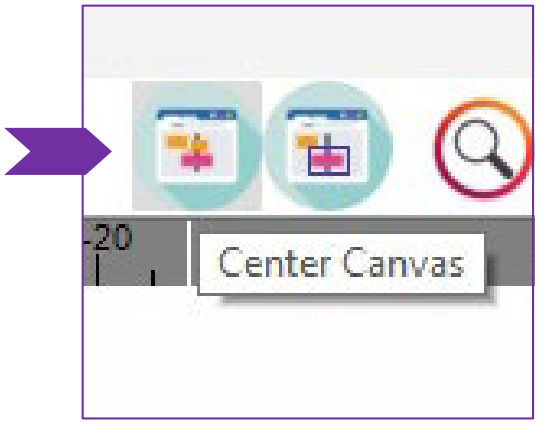
# MENU ICONS

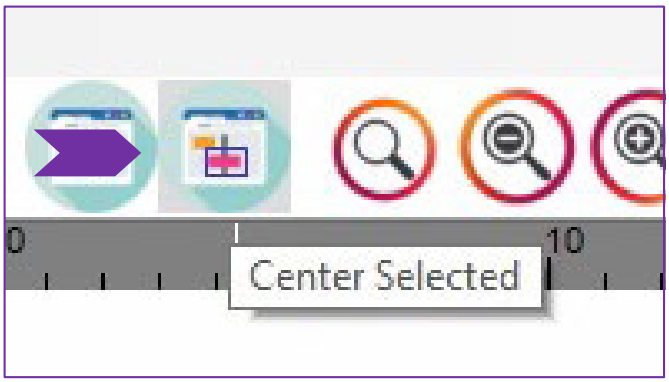



Most of the features on the Menu will be familiar to most users but we will go over them briefly.

The next five Icon have to do with manipulating the Drawing Screen (Canvas).

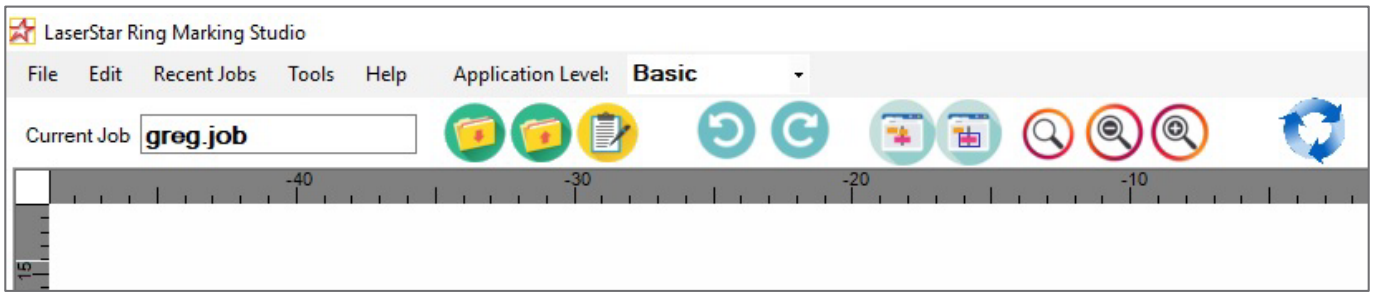
1. Center the Canvas (Drawing Screen)
2. Center the selected object.




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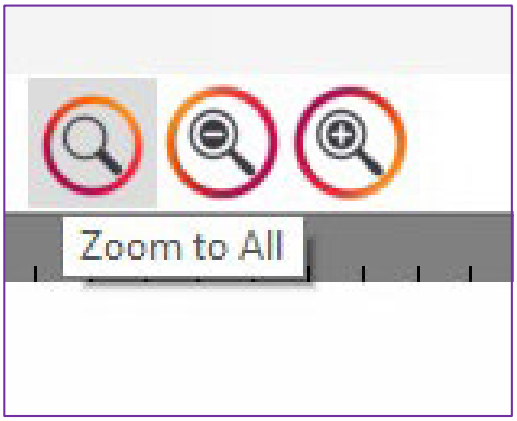
# MENU ICONS

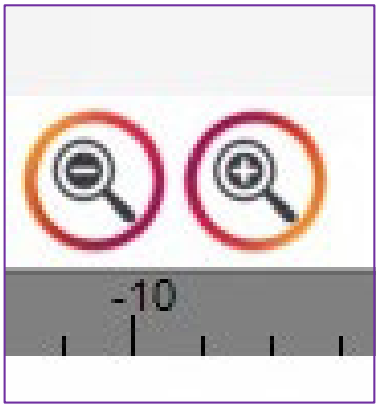



Most of the features on the Menu will be familiar to most users but we will go over them briefly.

The “Zoom” buttons are familiar to everyone.

1. Zoom All.
2. Zoom Plus and Minus.

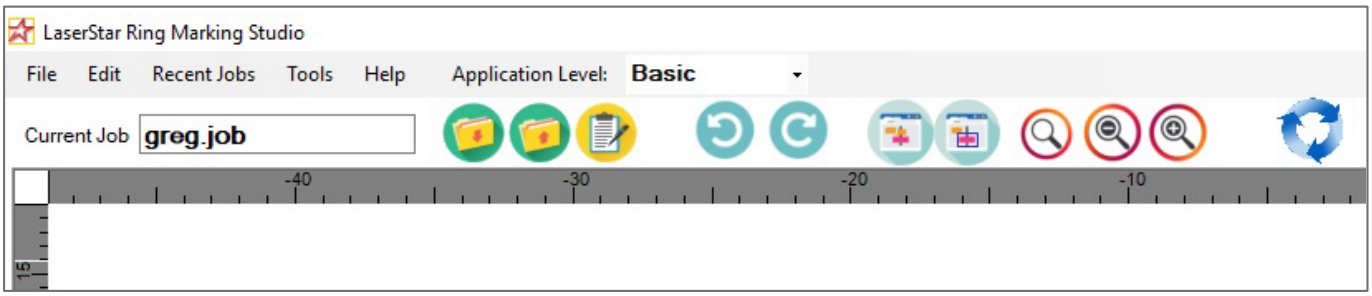





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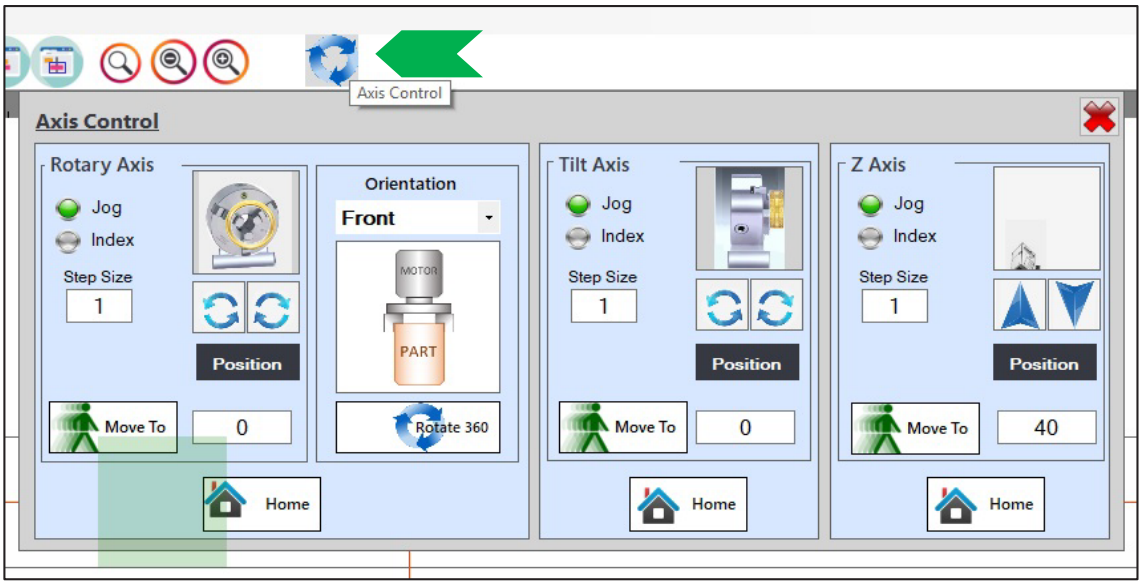
# MENU ICONS




Most of the features on the Menu will be familiar to most users but we will go over them briefly.

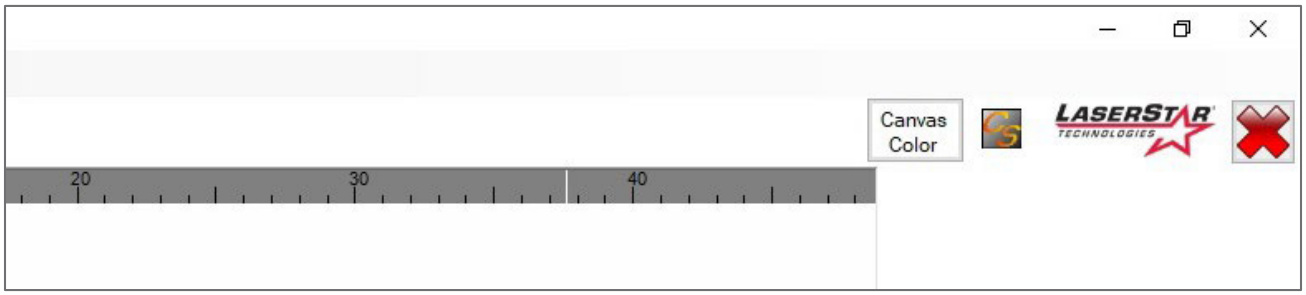
The next Icon may not be recognized by all users but this is the Axis Control Icon which allows you to do some basic functions on your purchased options.

The Axis Control icon brings up its own window which we will go over later.



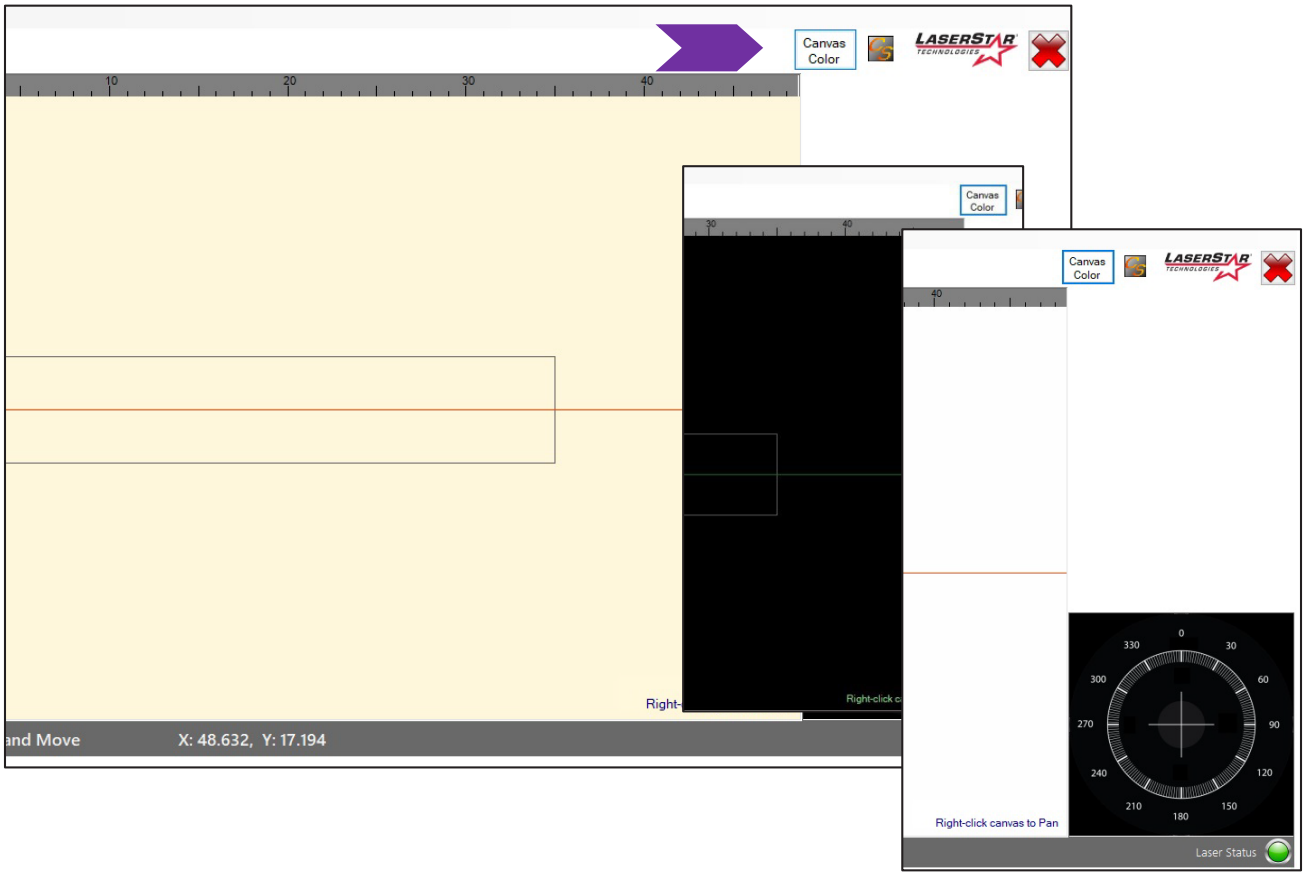

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# MENU ICONS




Most of the features on the Menu will be familiar to most users but we will go over them briefly.

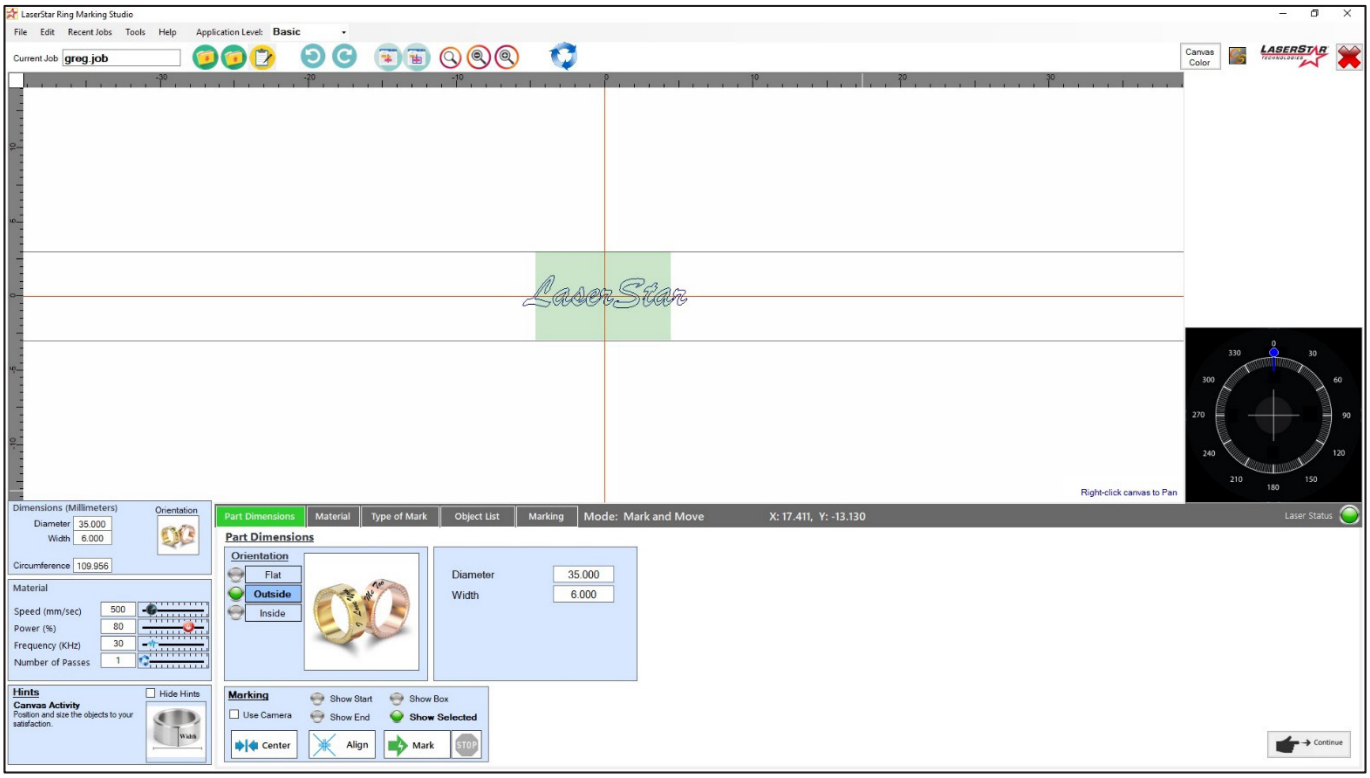
The ”Canvas Colors” icon changes the color of the Canvas to three different choices.





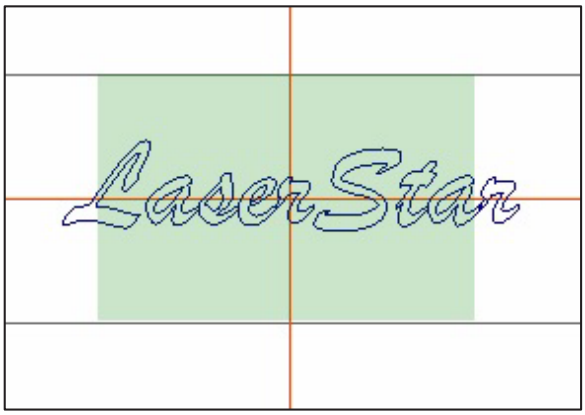

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# DRAWING SCREEN



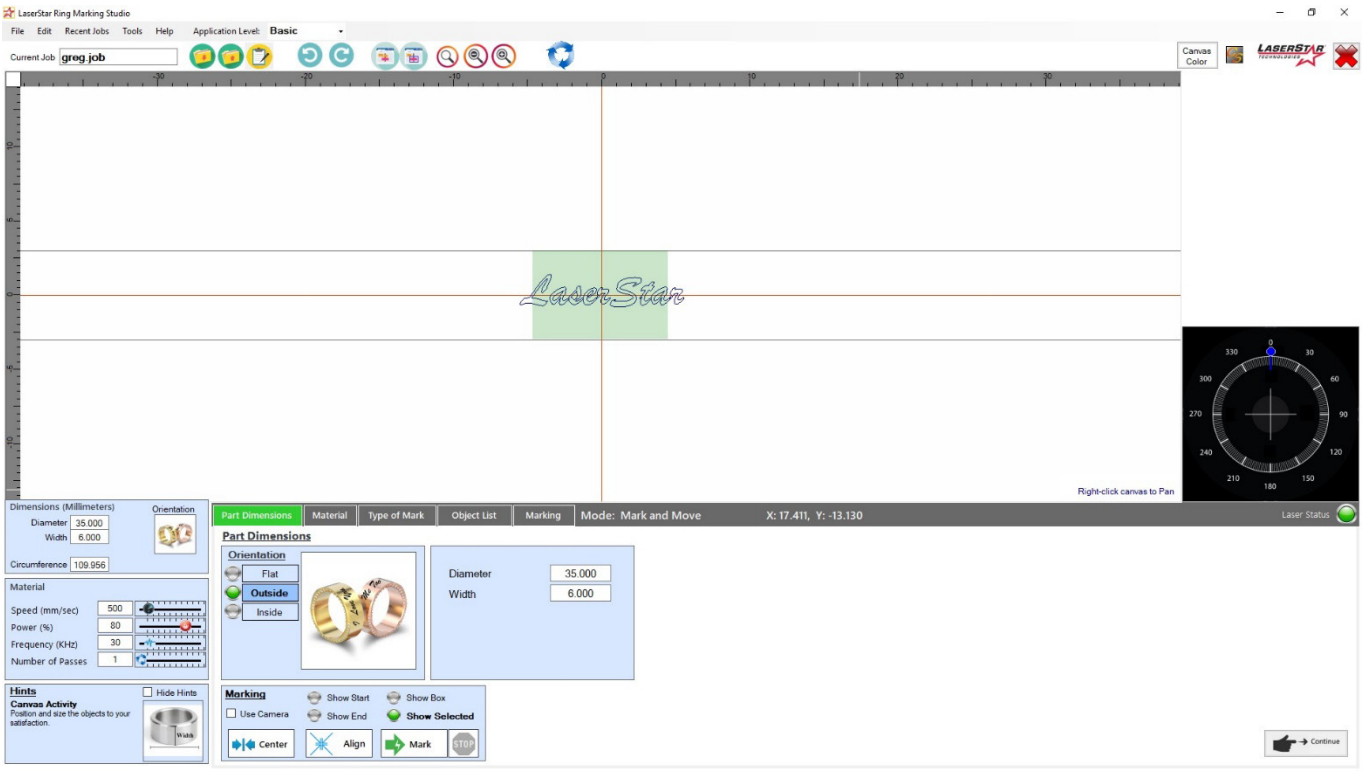

The Drawing Screen is where you create the look of your mark. It has many features we will describe to assist you in producing the mark you require.

The first item to mention is the light green box in the center of the screen. This shows the area you can mark before you would have to rotate your part or use one of the automatic rotation features (discussed later).



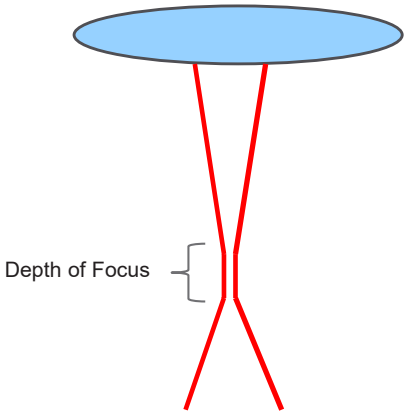

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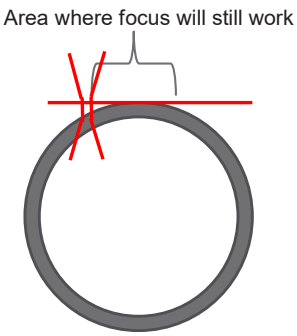
# DRAWING SCREEN

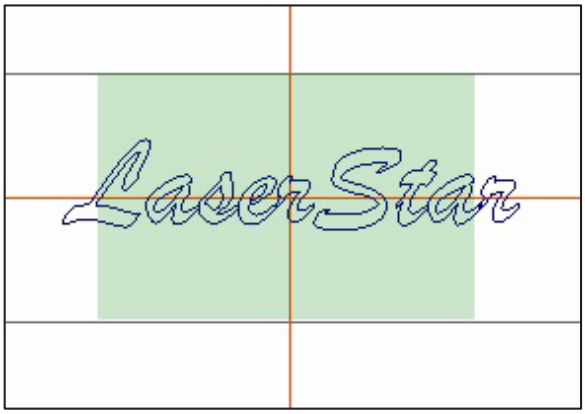



As you can see here the text is outside the light green box .

This means that the beginning and end of the text could be faded on the actual part because they have gone out of focus.



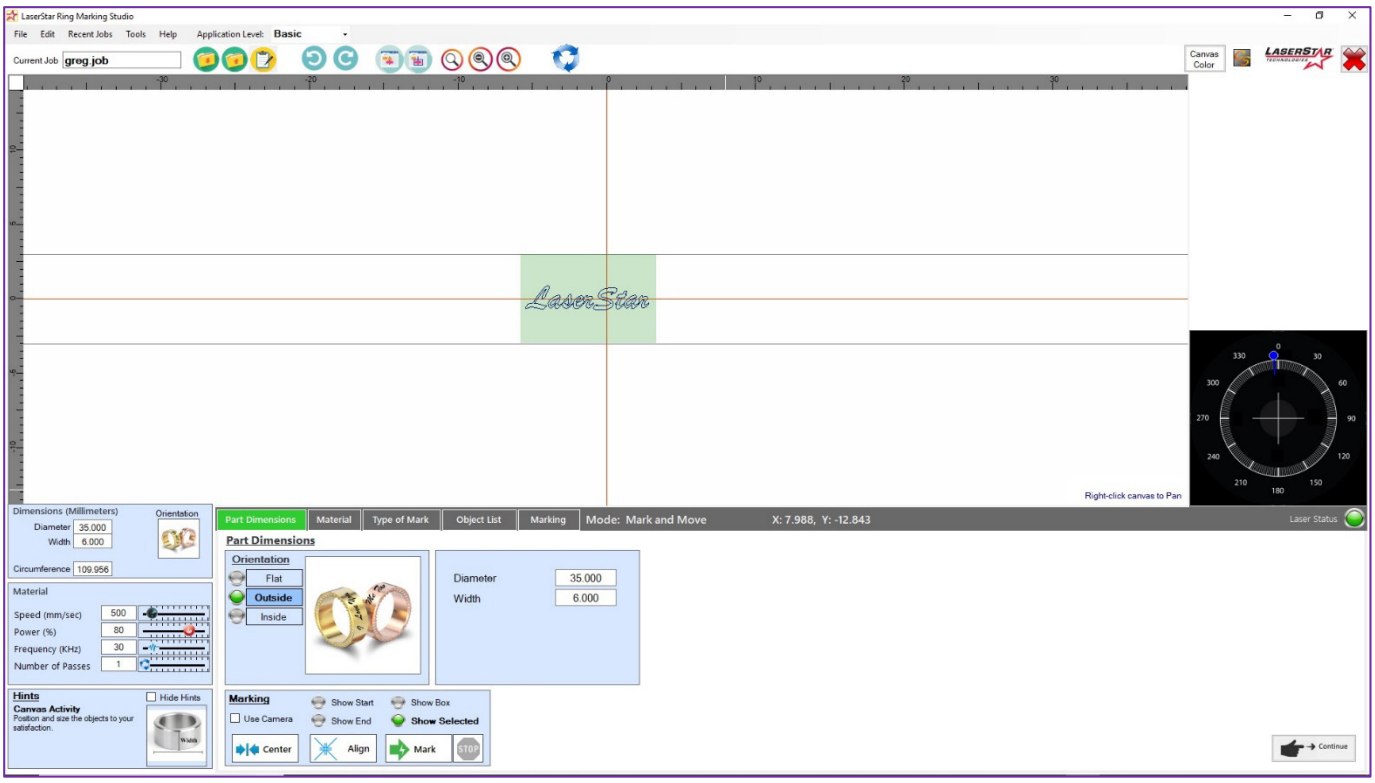





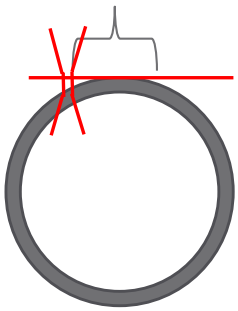

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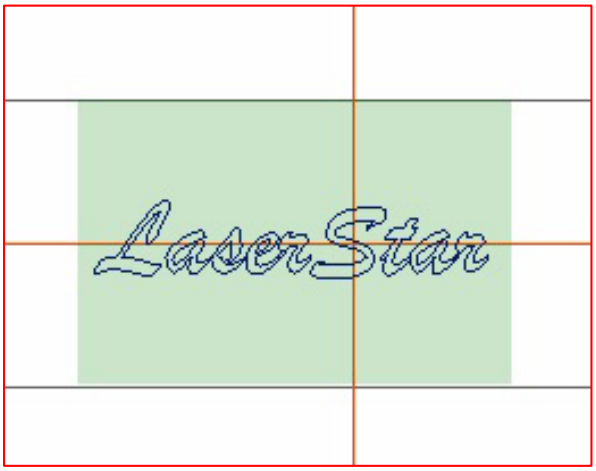
# DRAWING SCREEN




So if the marking object stays within the light green box all will be well.

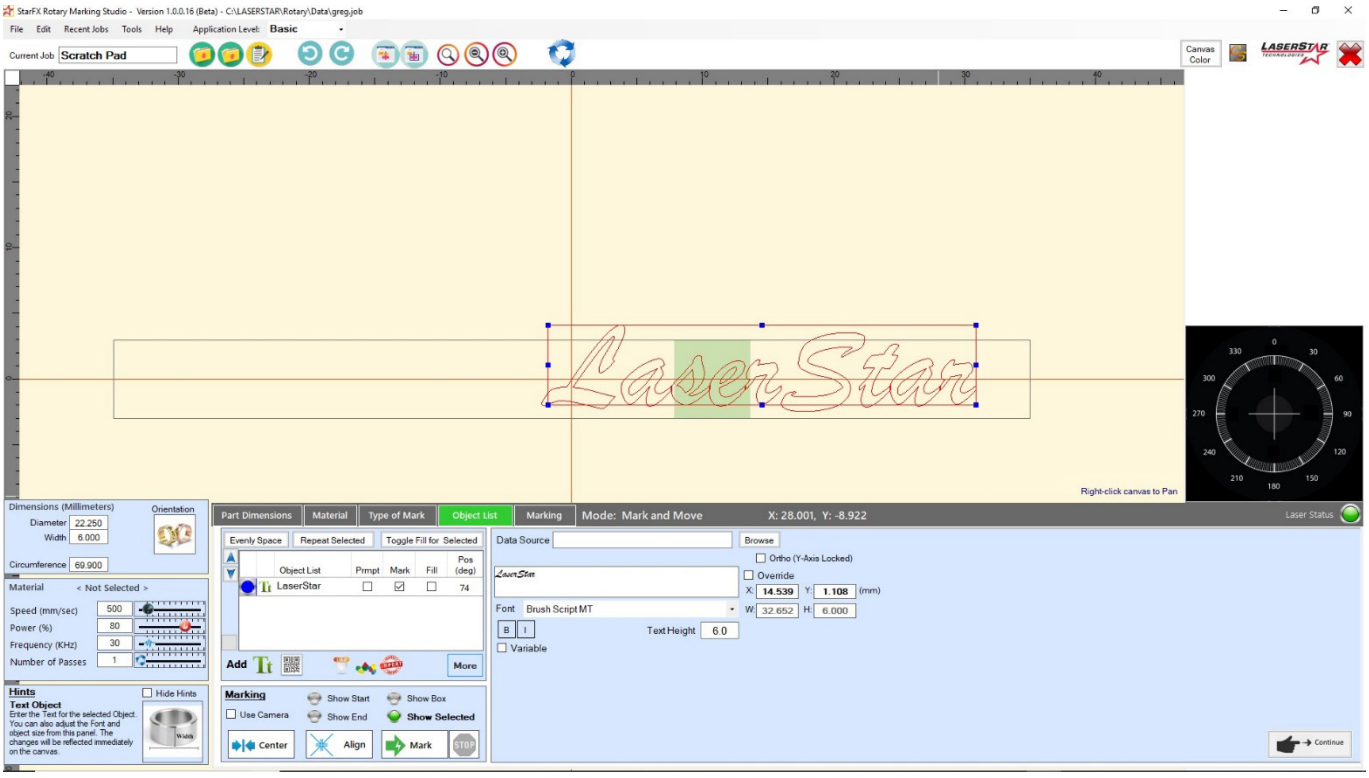
Area where focus will still work





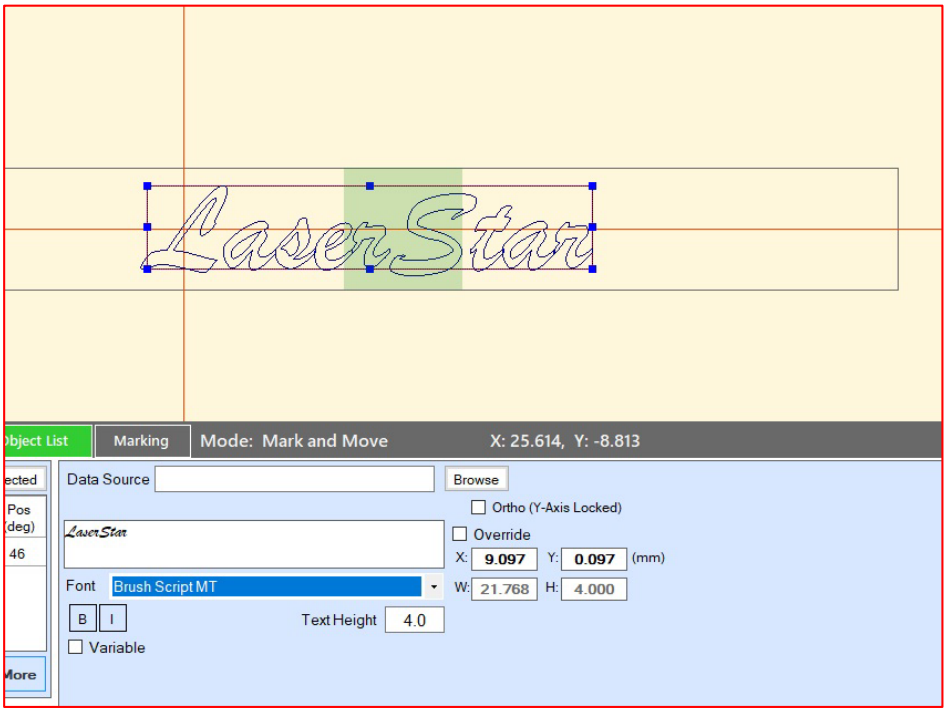

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# DRAWING SCREEN




Another protection feature of the Drawing Screen is that if you make your mark too tall to fit on the height of your part (as defined in the Part Dimension tab) the object will be turned red.

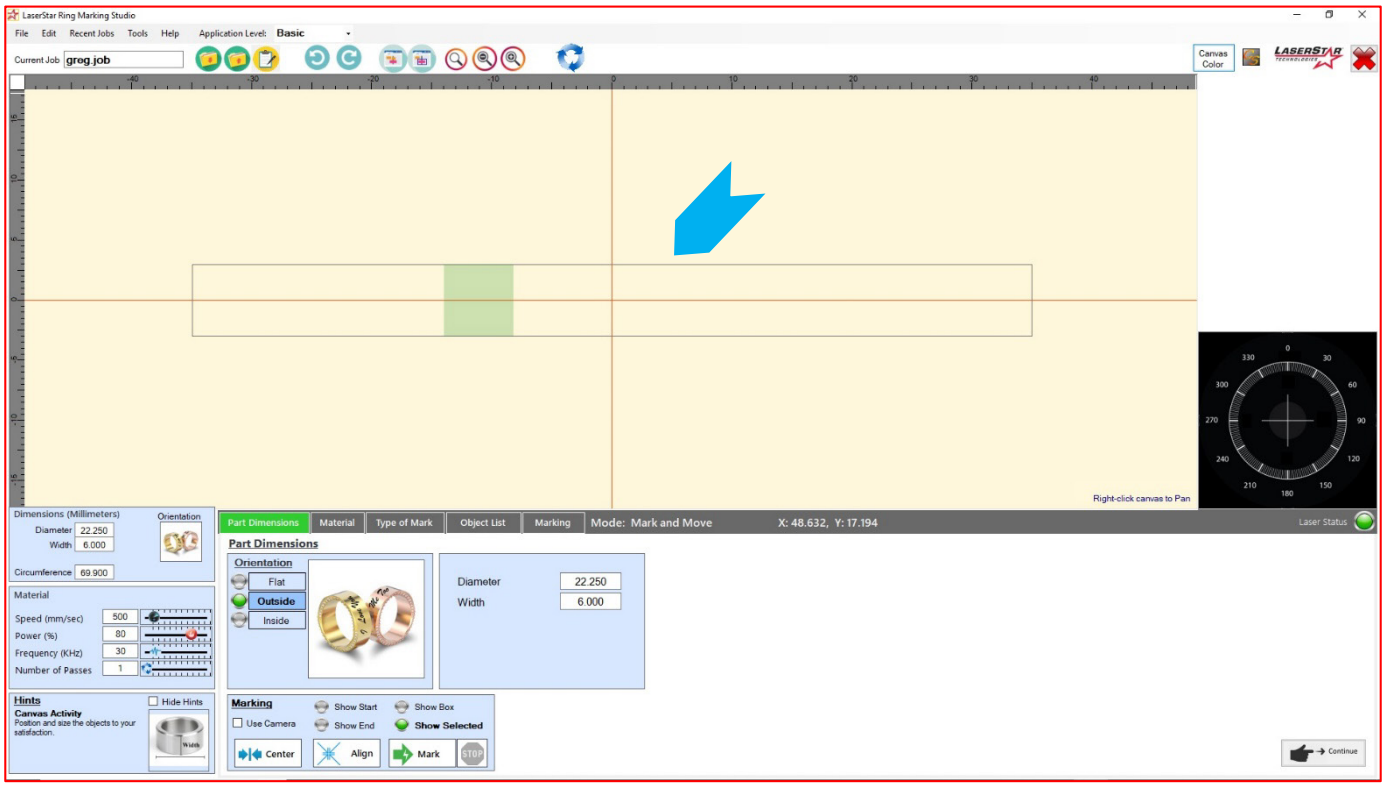
Adjusting the height will put it back in the safe zone.





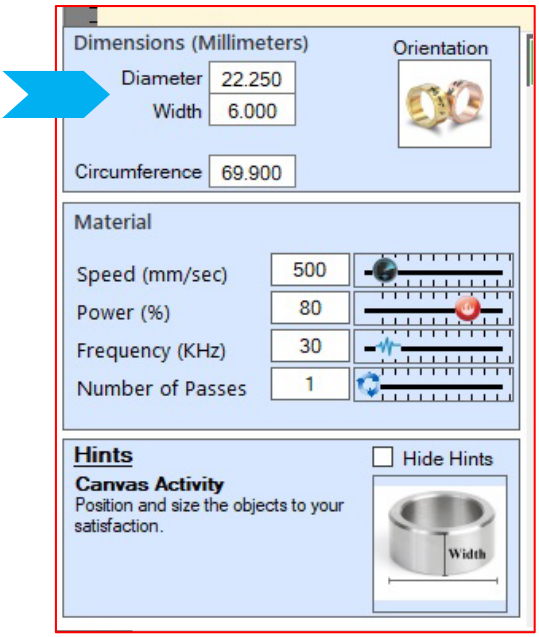

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# DRAWING SCREEN



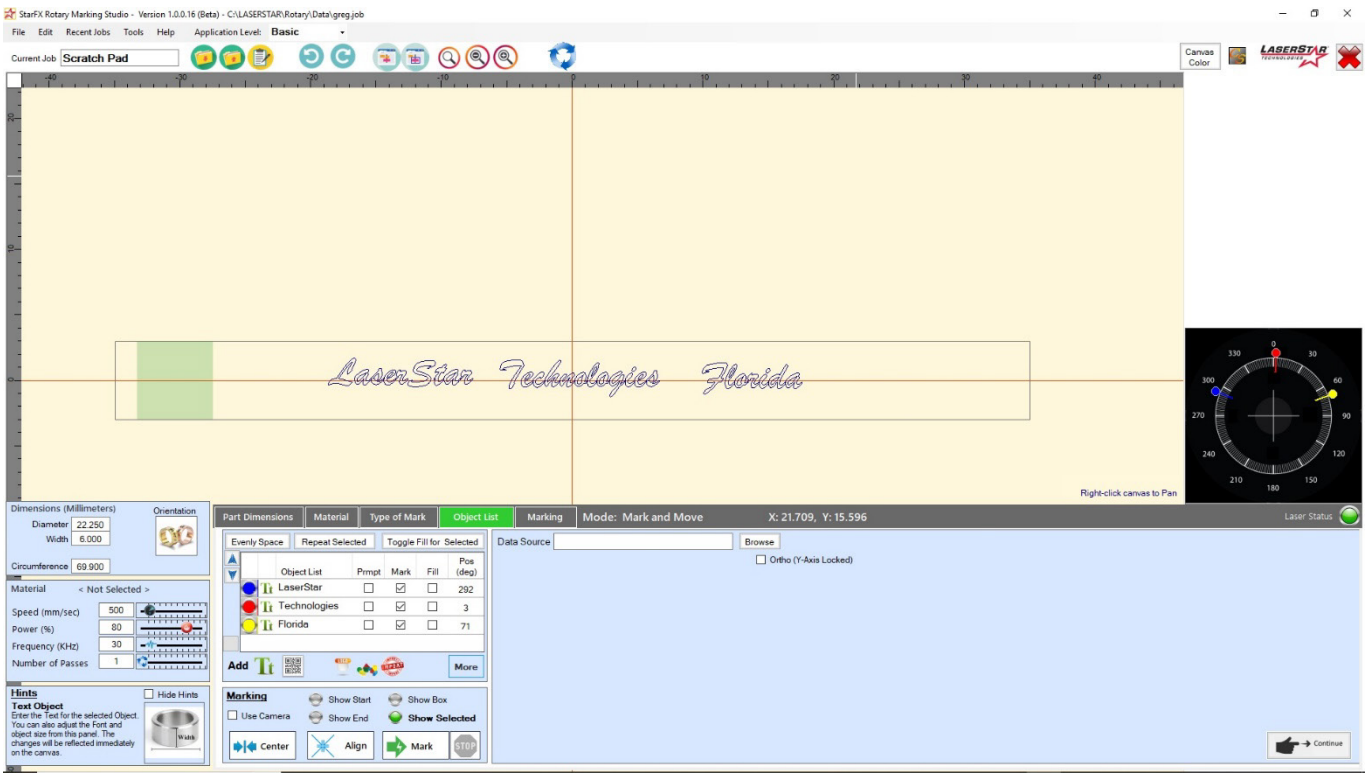

Two additional features to mention before we move on.

1. There is a Blue Box that represents the total marking area of the part, for instance what a ring would be if it was stretched out flat.



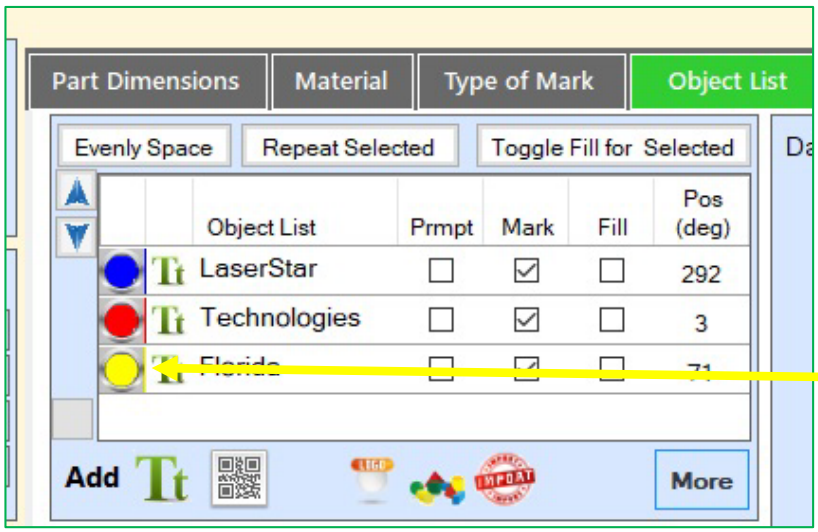

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# DRAWING SCREEN

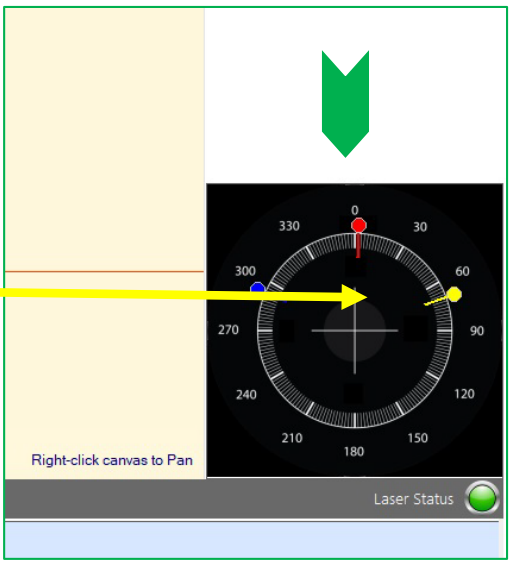



Two additional features to mention before we move on.

2. A box that shows where all of the marking objects will be from an angular perspective.



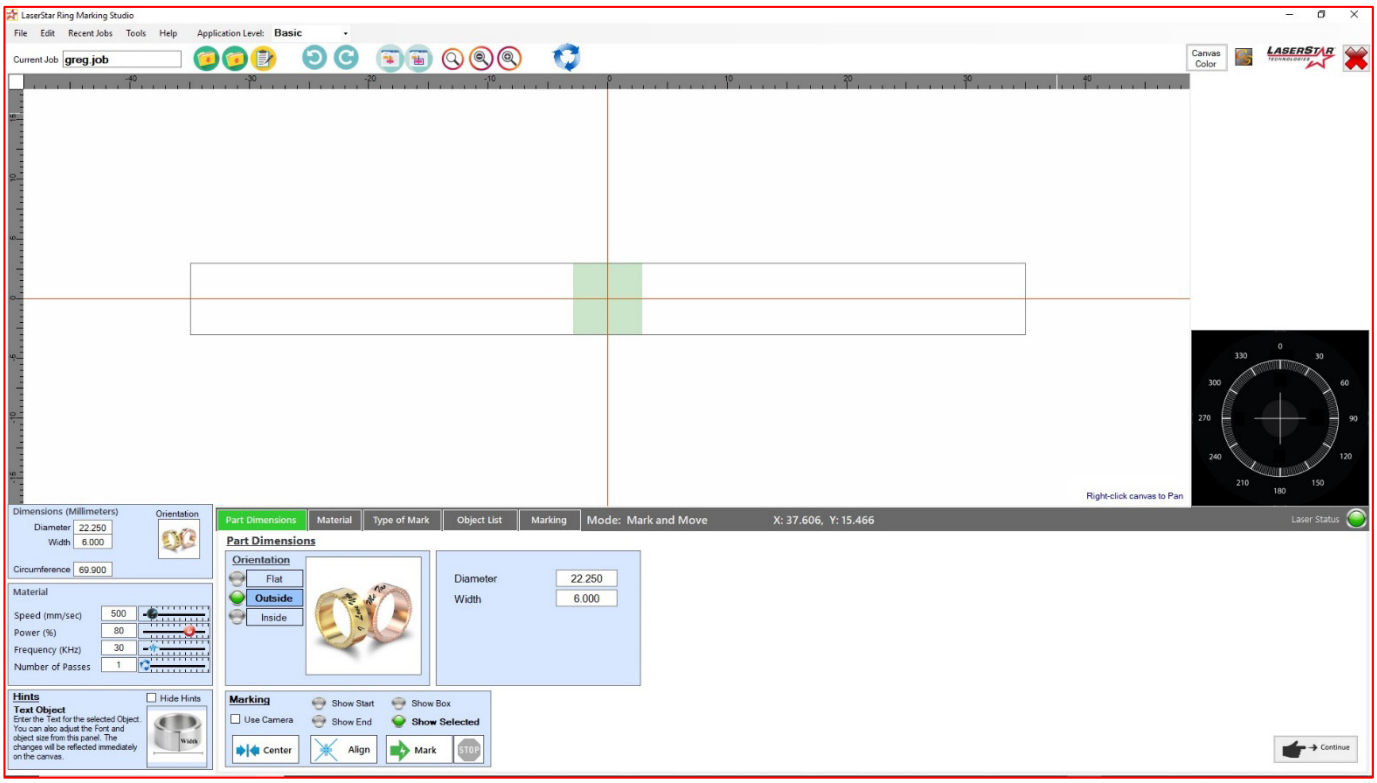

The color of the angle matches the color of the object.





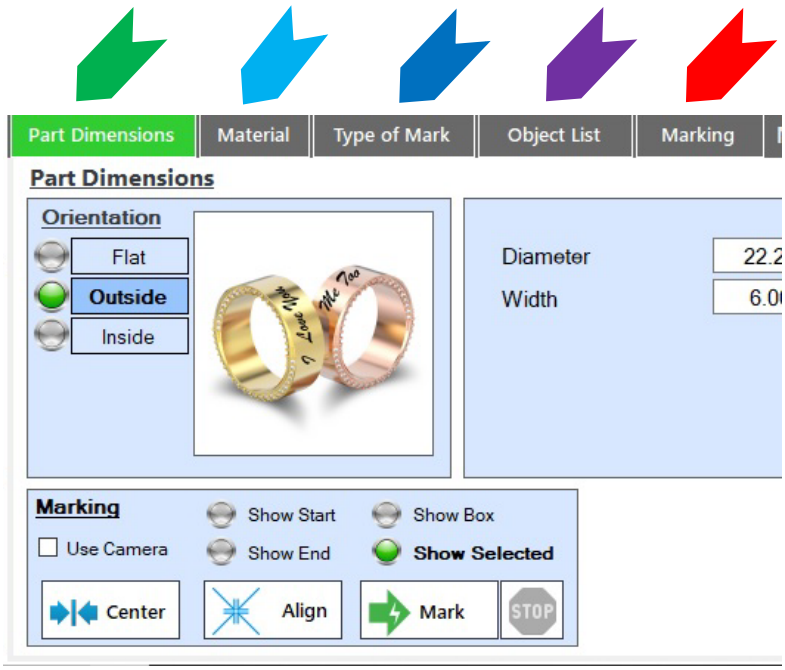

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# CREATE A NEW PROGRAM




Now we will go through the program creation tabs and the steps it takes to make a new lasing program. The tabs are:

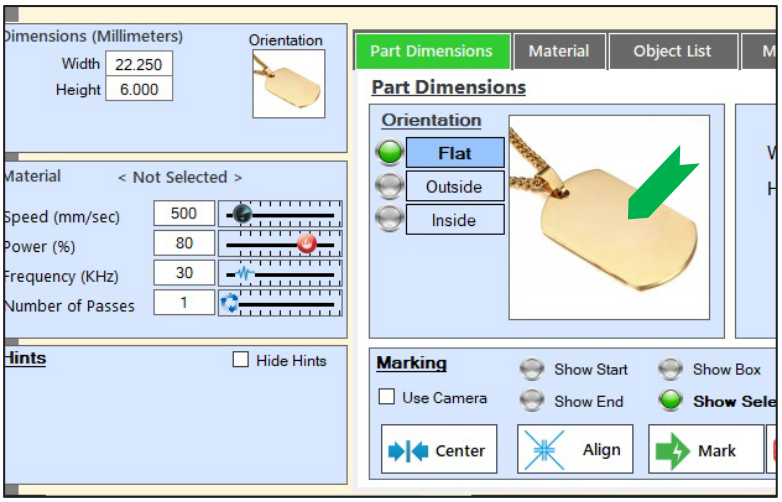
1. Part Dimensions.
2. Material.
3. Type of Mark .
4. Object List.
5. Marking



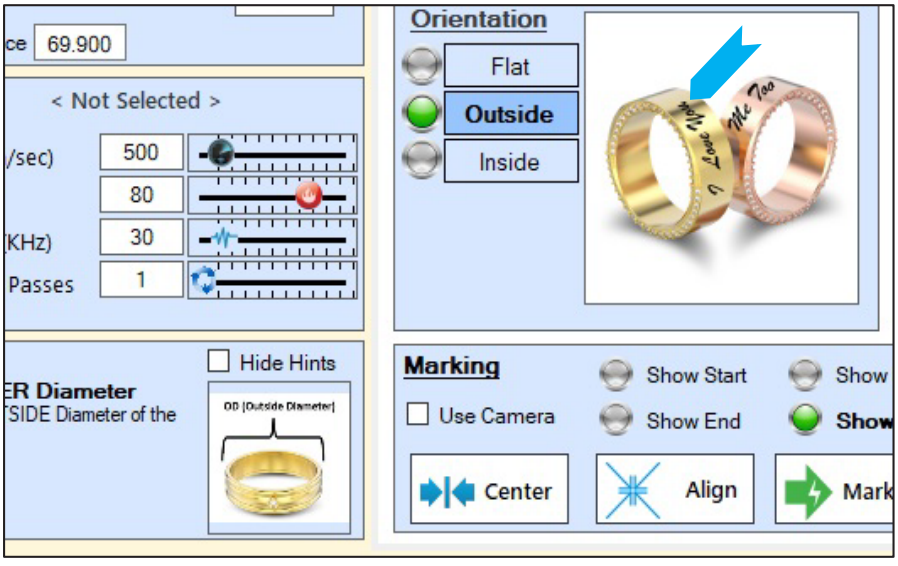

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# STEP 1: PART DIMENSIONS

Part Dimensions allow you to choose flat, inside or outside rotary mark.




Flat marking such as a pendent or to cut out an Emblem.

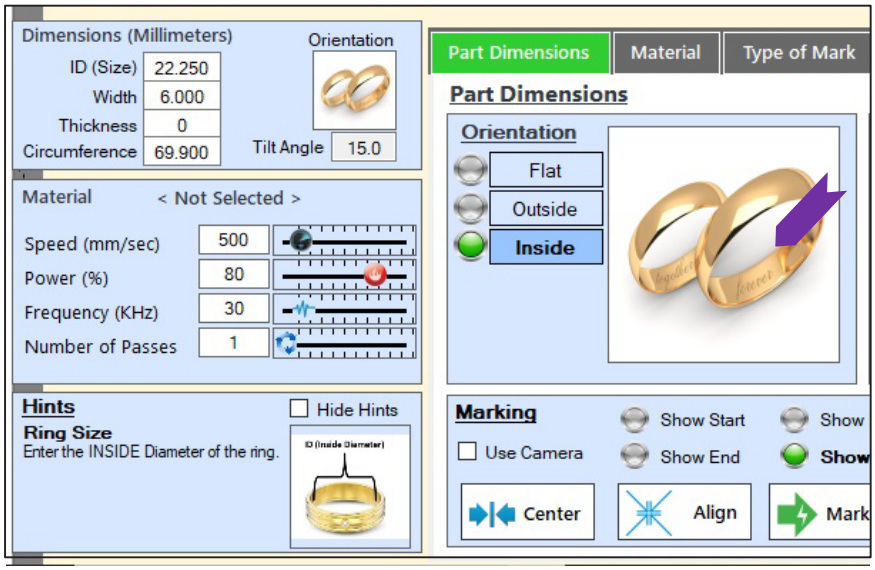



Marking on the OD of a ring or bracelet.



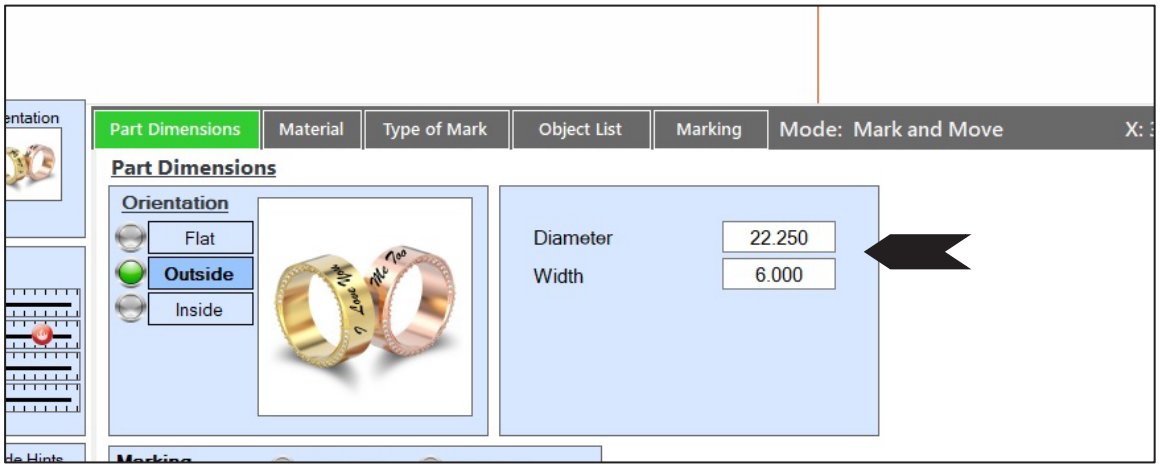
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# STEP 1: PART DIMENSIONS




Marking on the ID of a ring or bracelet.

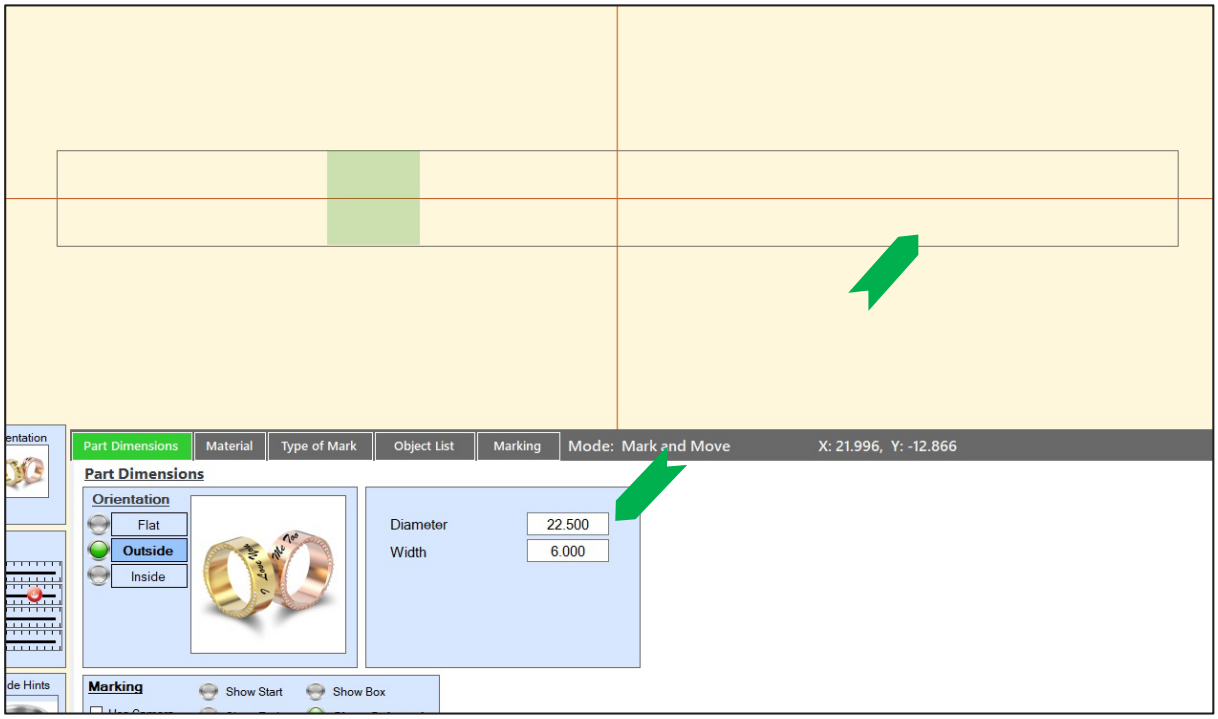
Next, input the dimensions of your part.



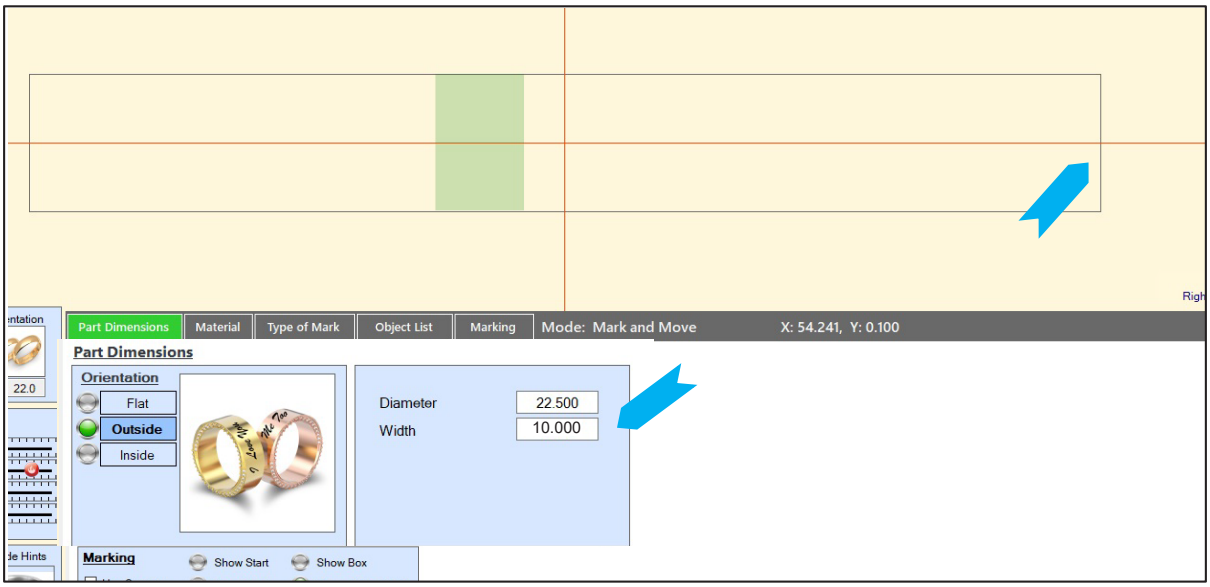

(Continue)

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# STEP 1: PART DIMENSIONS




Changing the part dimensions changes the box on the Drawing Screen so you know exactly where you can mark, the circumference is automatically calculated to draw the width of the box, the Diameter is used to draw the width of the guide box.

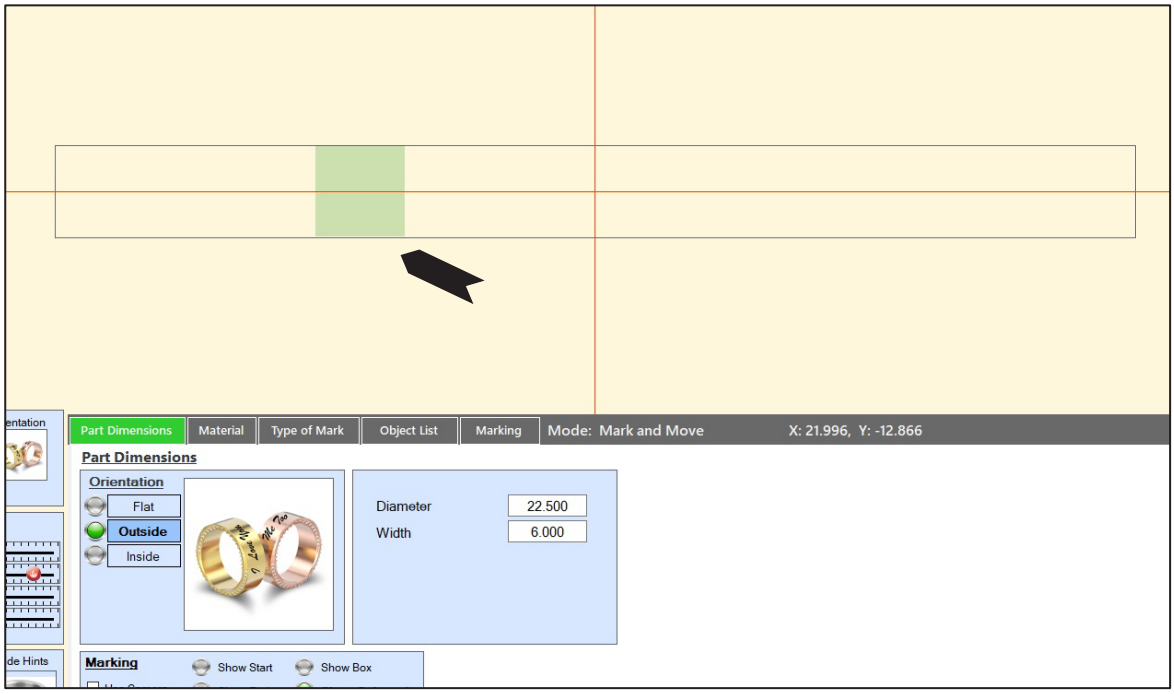


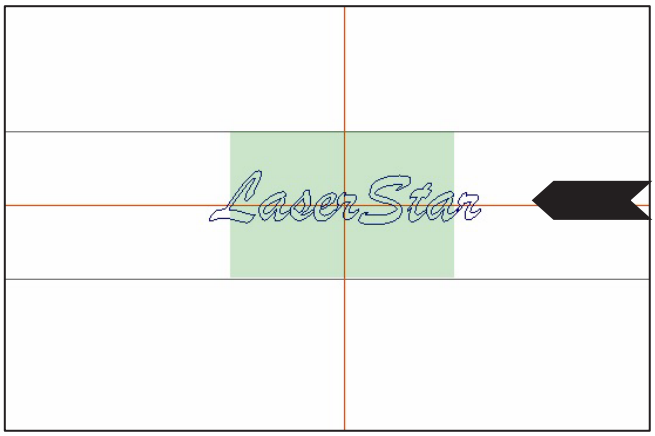

And the Width is used to show the height of the guide box.

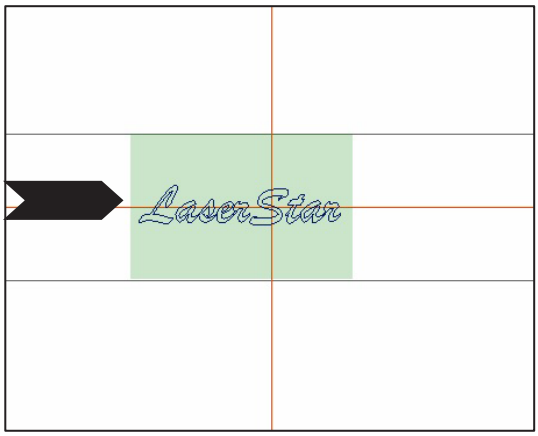


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# STEP 1: PART DIMENSIONS



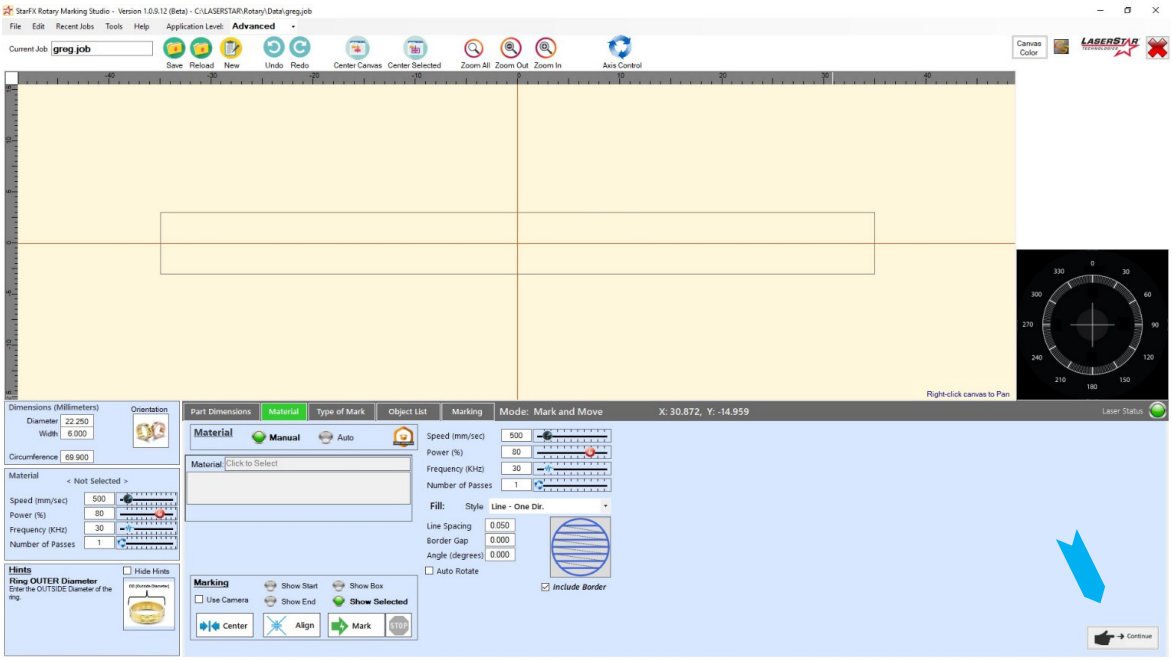




The Green Box shows you the area you can mark in before you would have to rotate the part. You can re-size your mark to insure it will fit.

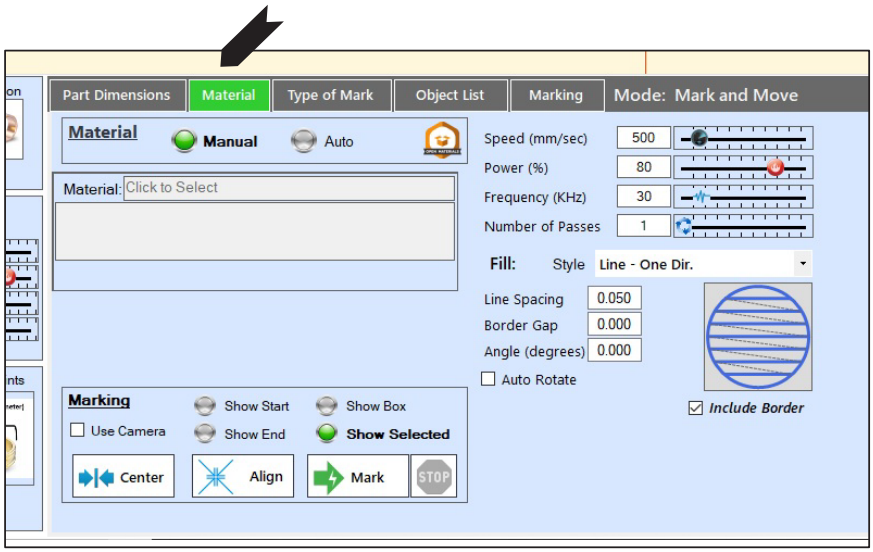
This is typically important in the “Mark and Move” Type of Mark tab covered later.

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# STEP 2: MATERIAL SELECTION





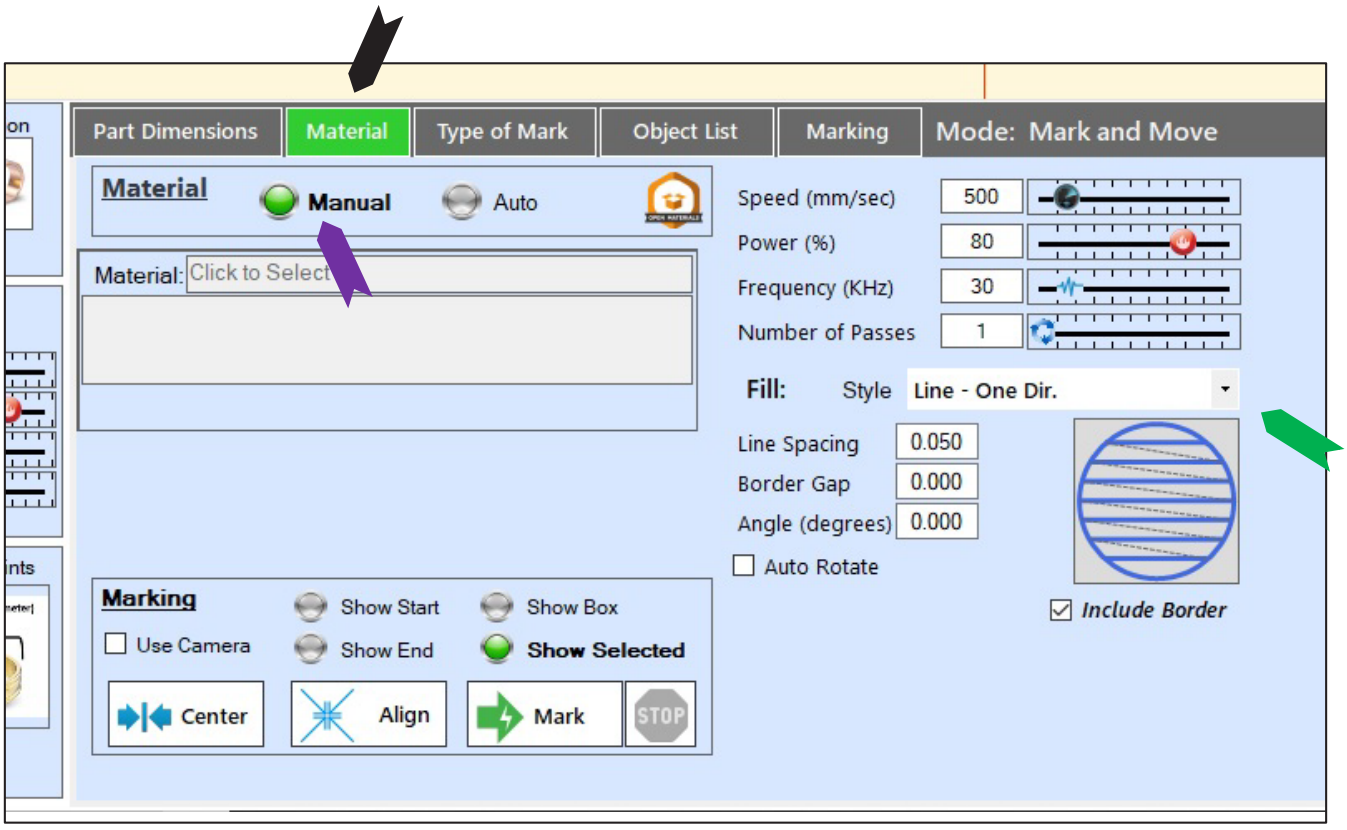




**Note:** *Selecting the "Continue" button will walk you through the steps.*



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# STEP 2: MATERIAL SELECTION

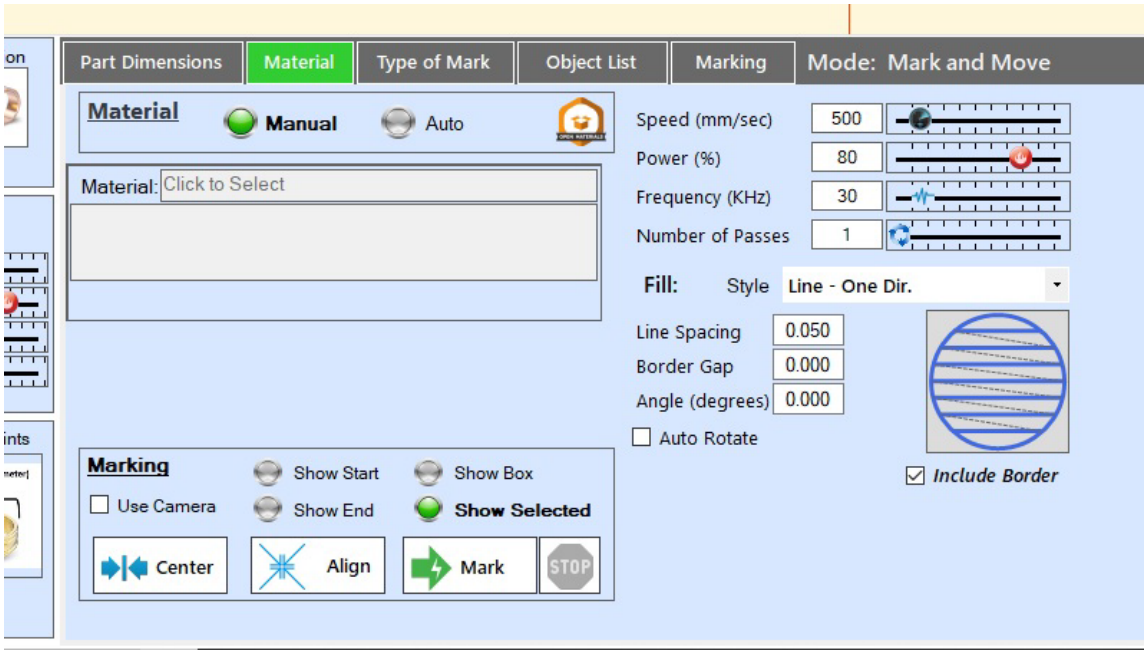


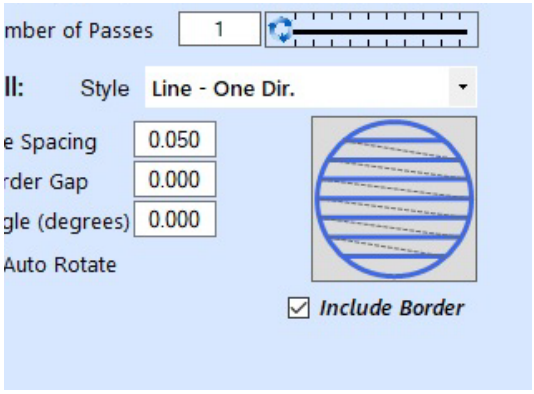

If “Manual” is selected then the basic laser parameters are available and can be adjusted at will.

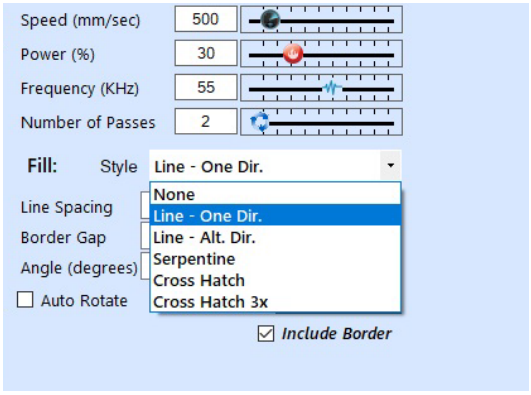
They have convenient sliders or you can type in the actual values.

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# STEP 2: MATERIAL SELECTION



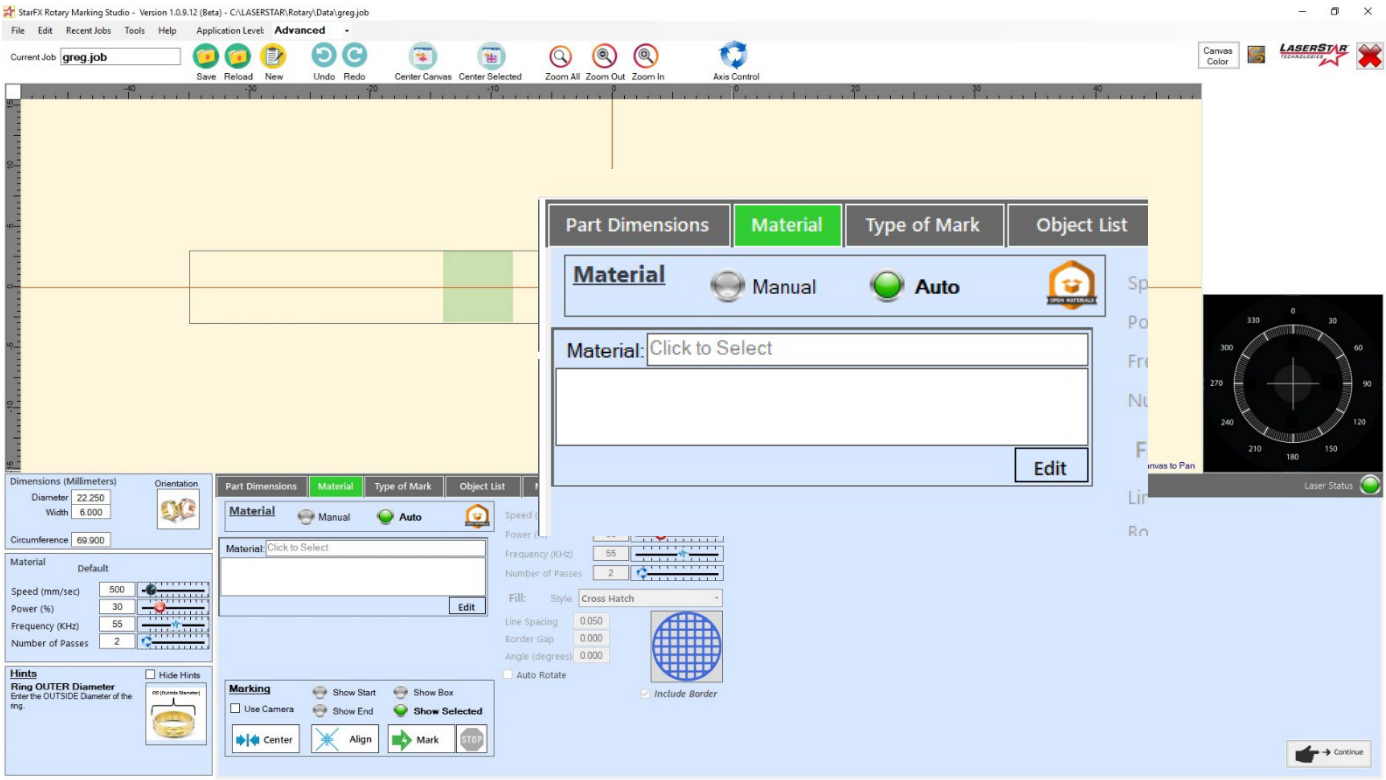




Different fill patterns and fill spacings can even be selected in **"Manual"**.



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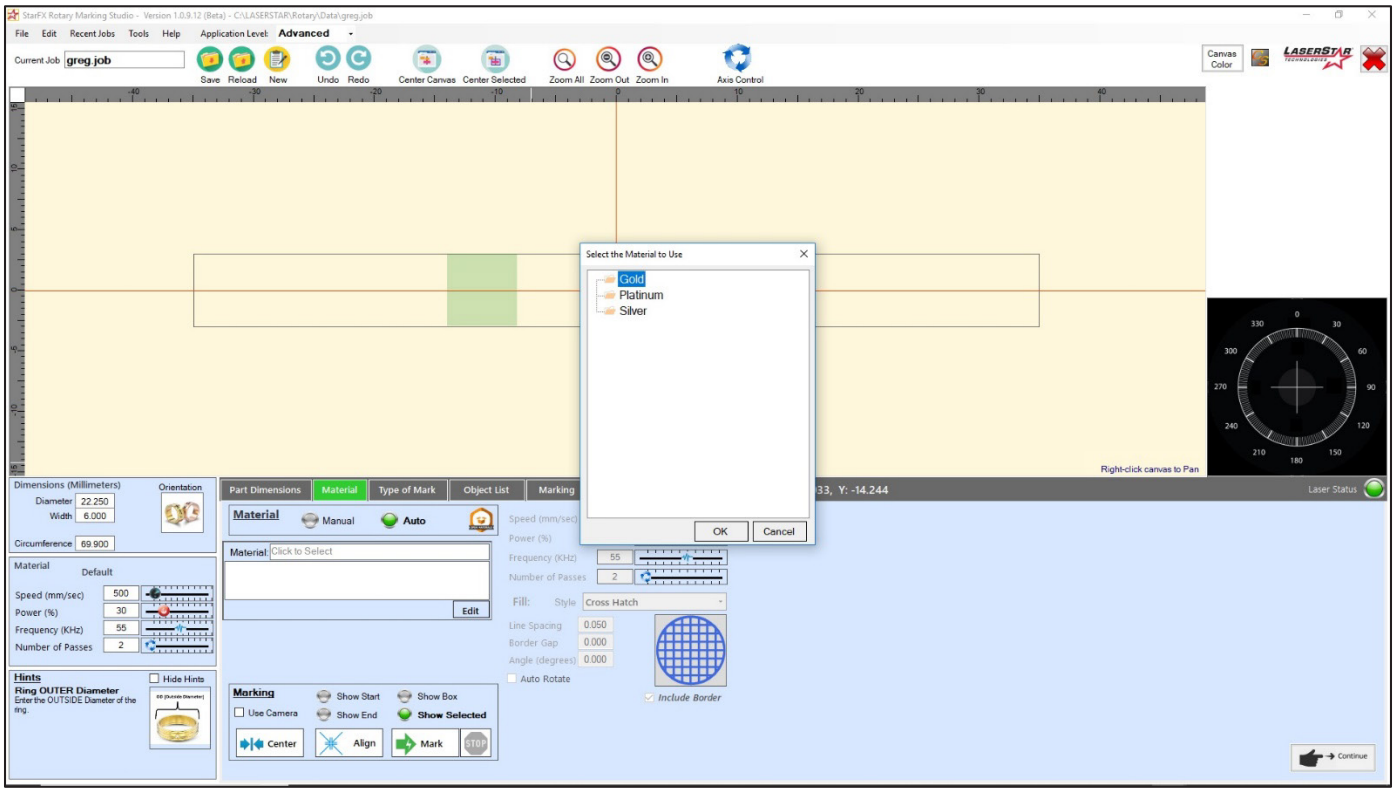
# STEP 2: MATERIAL SELECTION



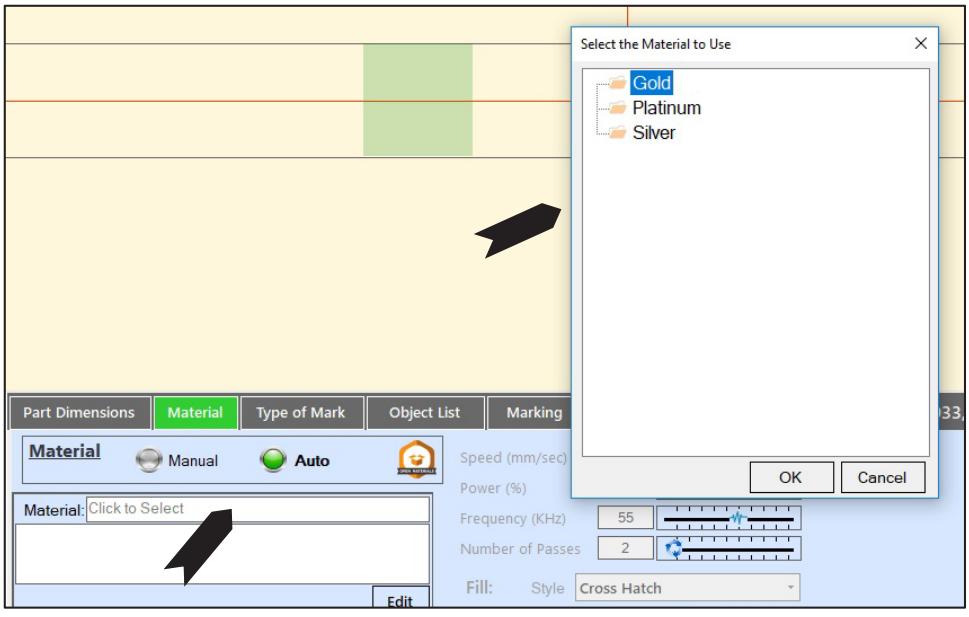

If you want to select something from the already established Materials Library select the **"Auto"** button.

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# STEP 2: MATERIAL SELECTION



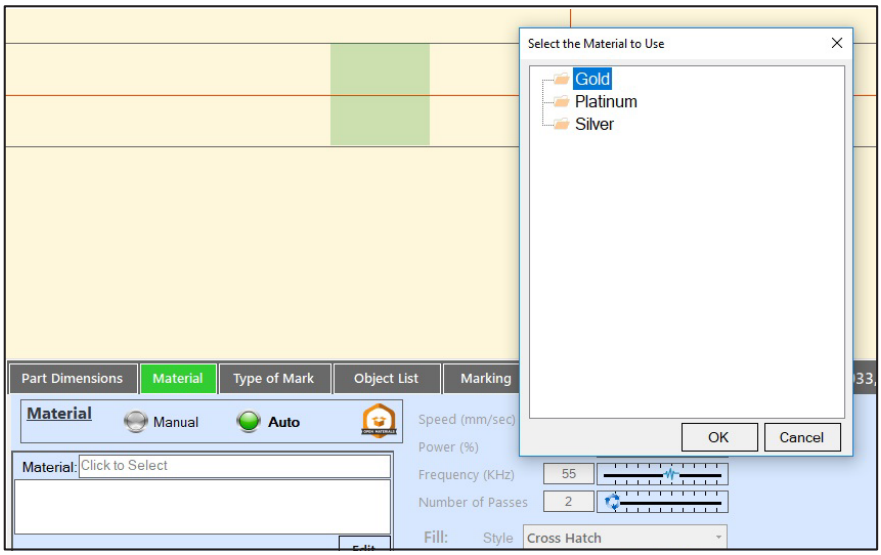

Mouse clicking on the Material selection area brings up the main material categories.



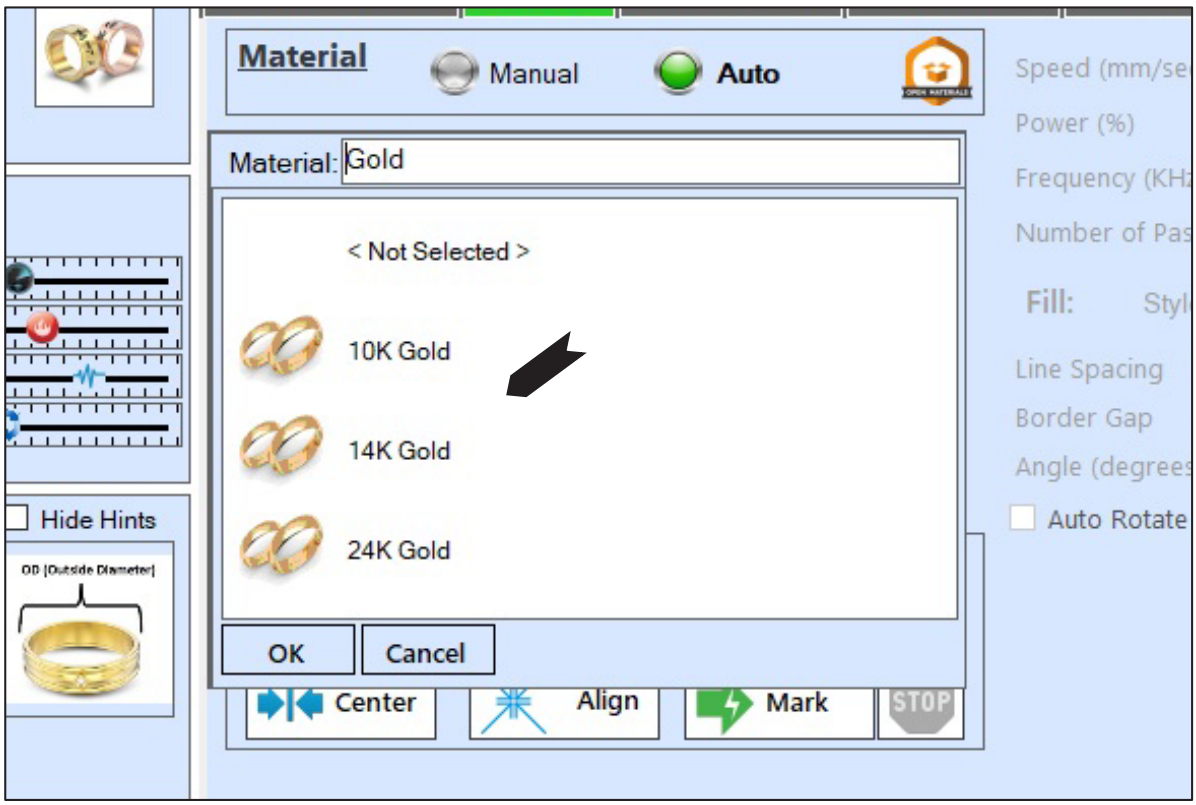



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# STEP 2: MATERIAL SELECTION

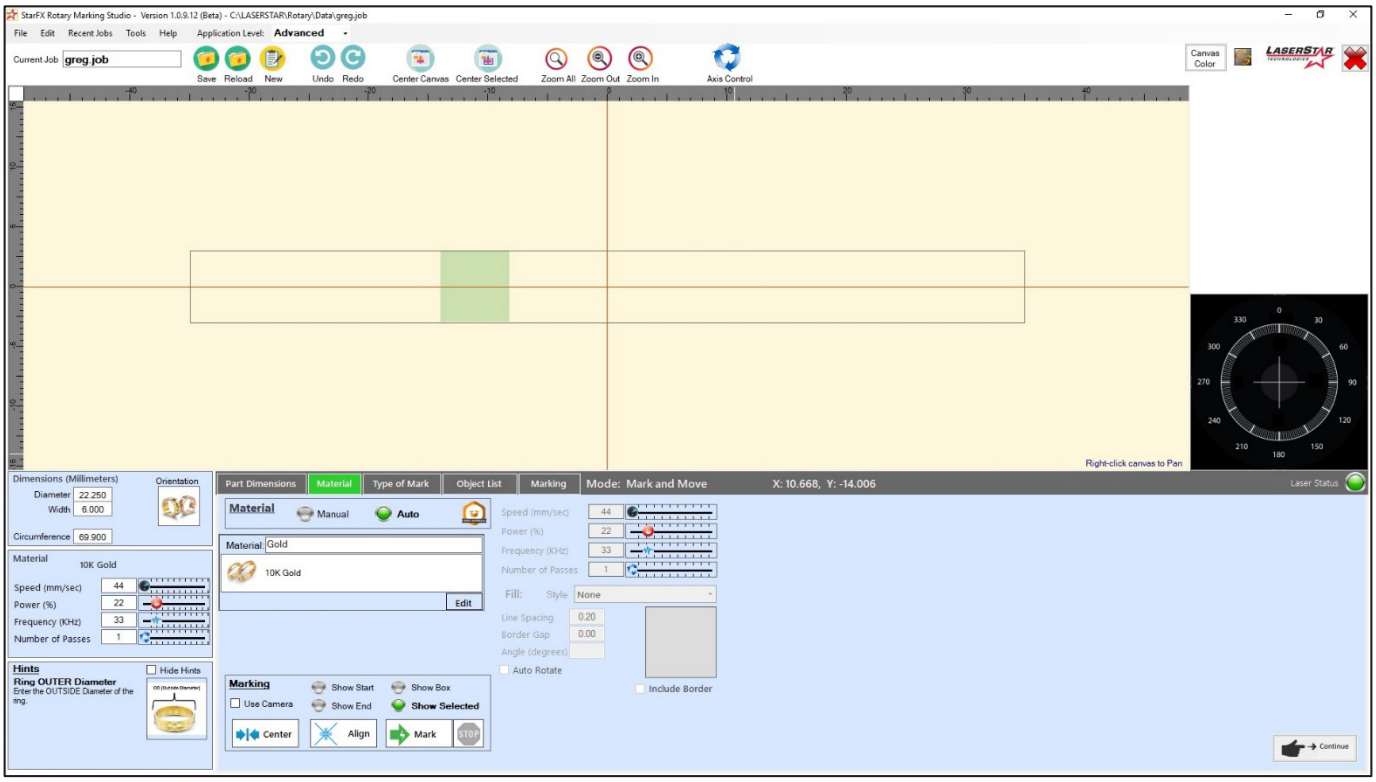



Next choose one of these sub-categories from the list.



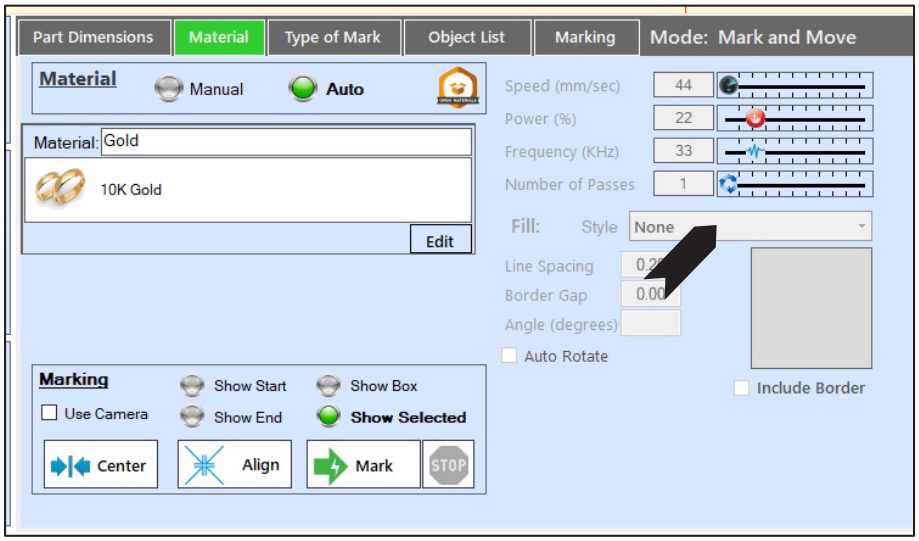

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# STEP 2: MATERIAL SELECTION




All of the laser parameters will come in automatically.

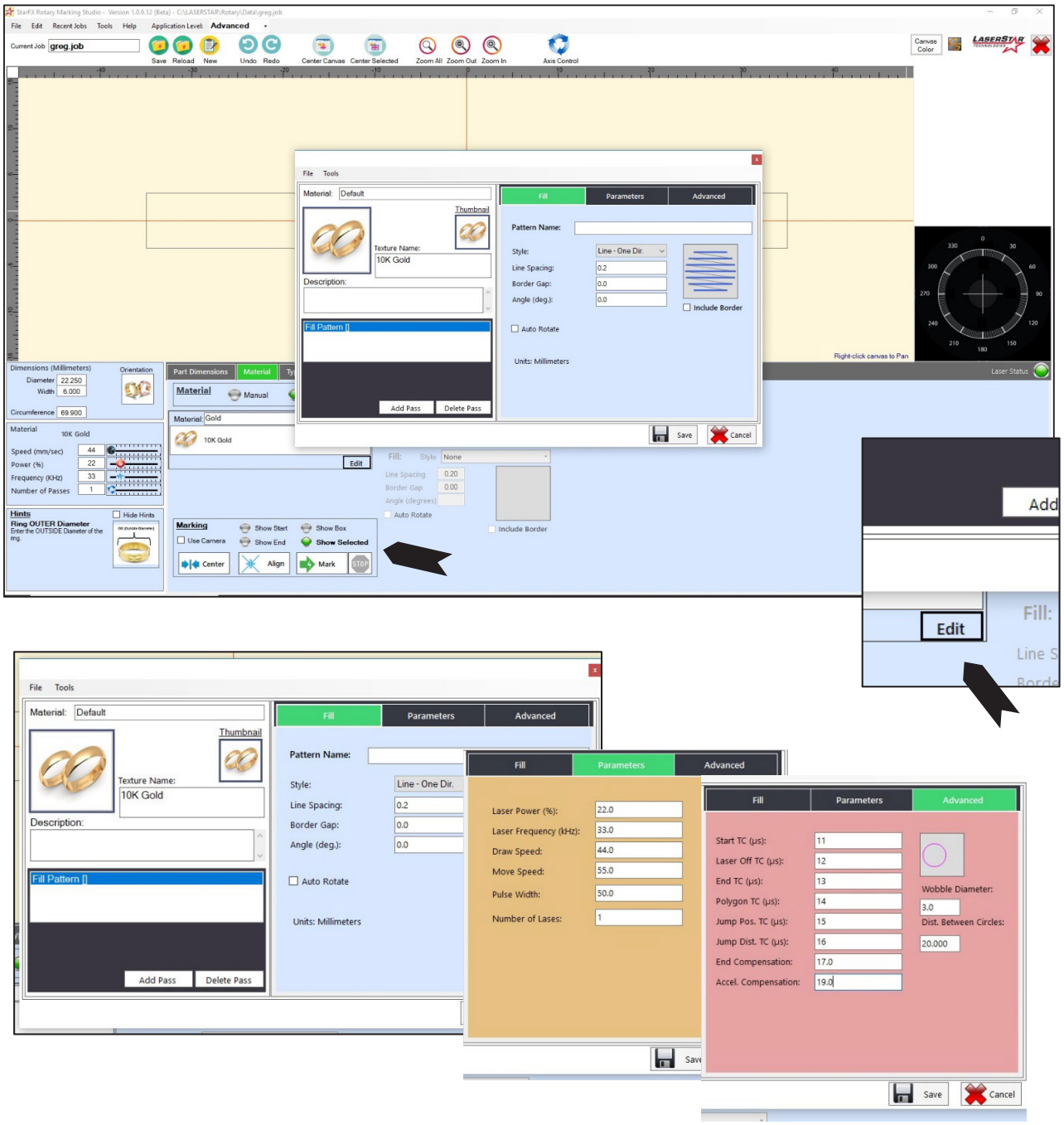
The Overrides can be used to make minor adjustments to the more common parameters to allow for slight differences in materials.






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# STEP 2: MATERIAL SELECTION



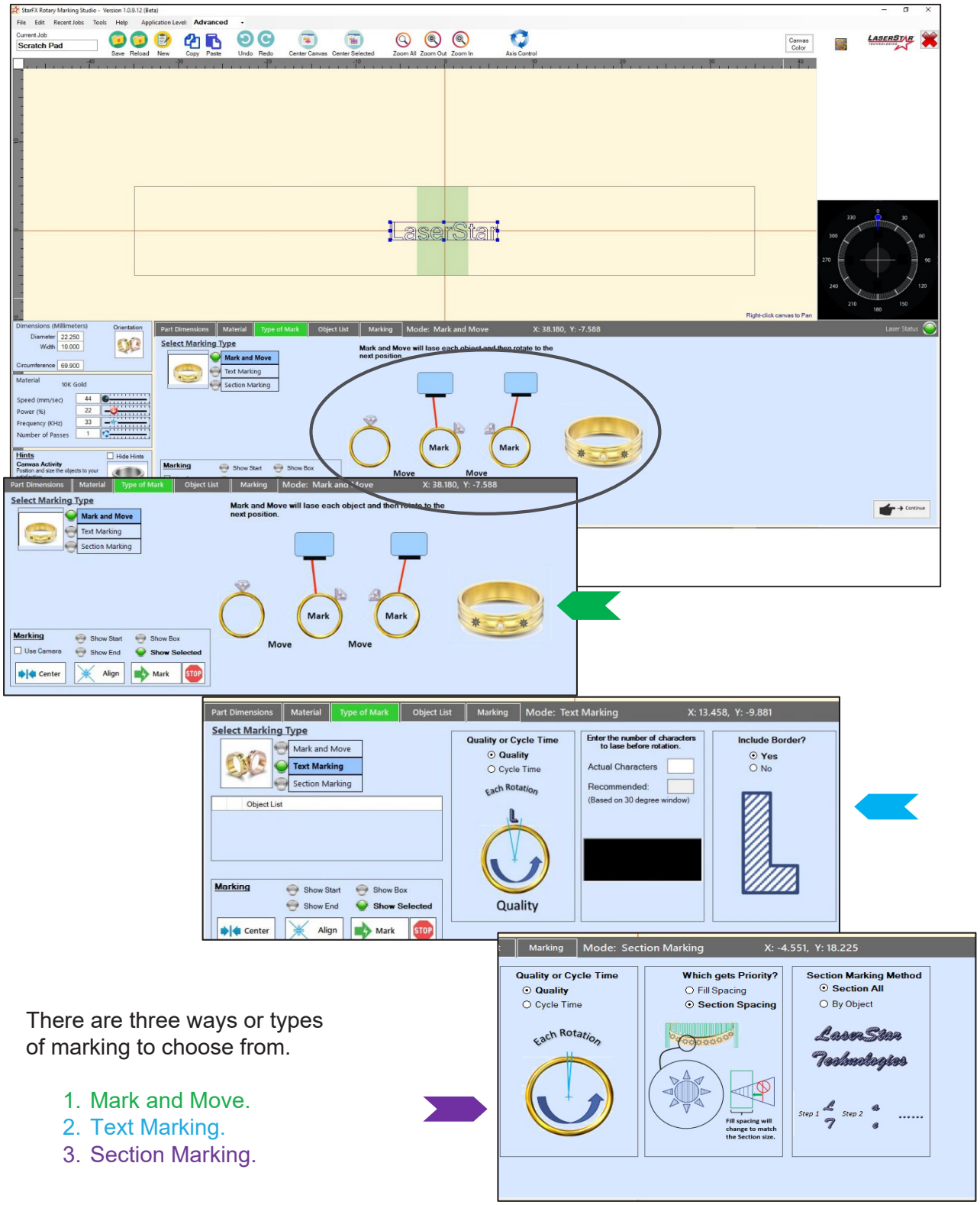

Selecting the “Edit Button” will bring up the Materials Manager screen where permanent changes can be made (this should only be done by someone who has been trained in this area).

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# STEP 3: TYPE OF MARK

## Select Type Of Mark

Each type displays pictures explaining how that type works.




There are three ways or types of marking to choose from.

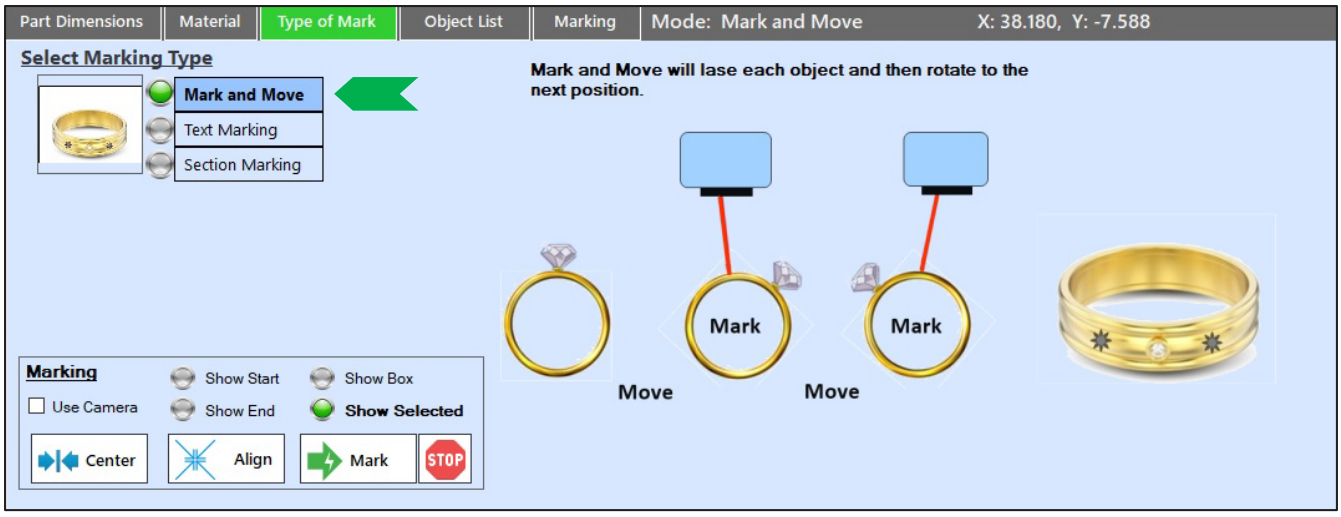
1. Mark and Move.
2. Text Marking.
3. Section Marking.



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# STEP 3: TYPE OF MARK

## Mark and Move




The Mark and Move type of rotary marking is just what is says, you mark whatever will fit on the part with no rotation. When that marking is complete it rotates to another location and marks the second text and logos, this would continue for as many locations as required.

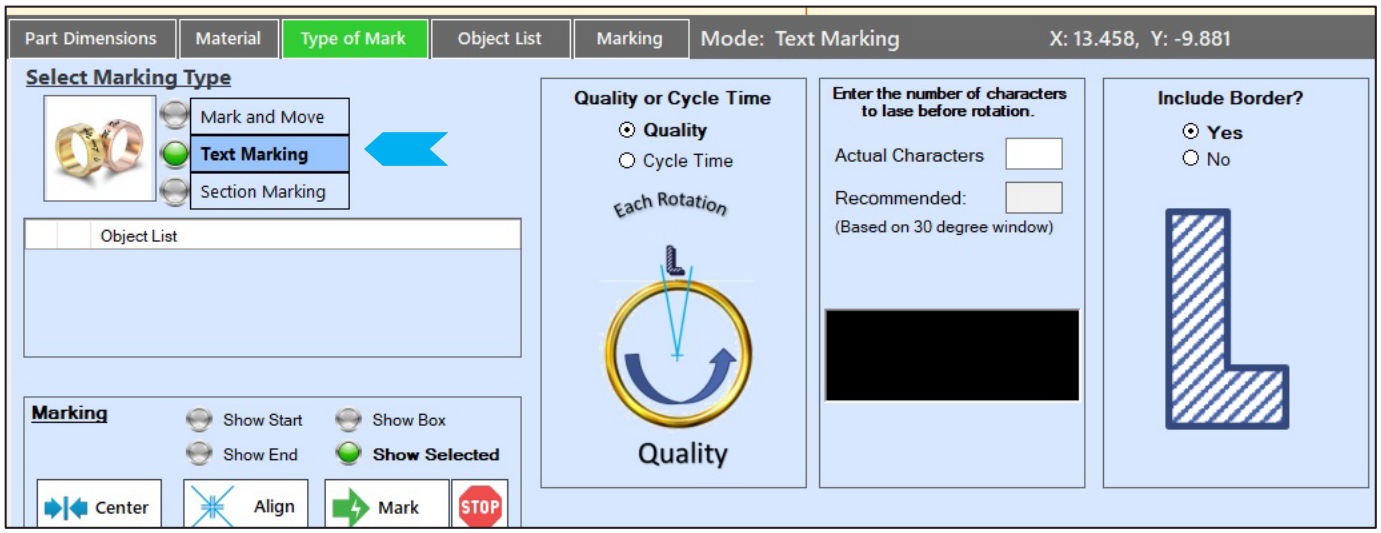
This is typically used for small logos or text that will fit in the previously mentioned light green box.



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# STEP 3: TYPE OF MARK

## Text Marking




Text Marking provides a unique method of marking longer text around the OD or inside the ID of a ring or bracelet.

The software automatically calculates how many characters it can lase before it needs to rotate the part. It lases the first characters and also calculates how far to rotate to make the next part of the text line up exactly where it should.

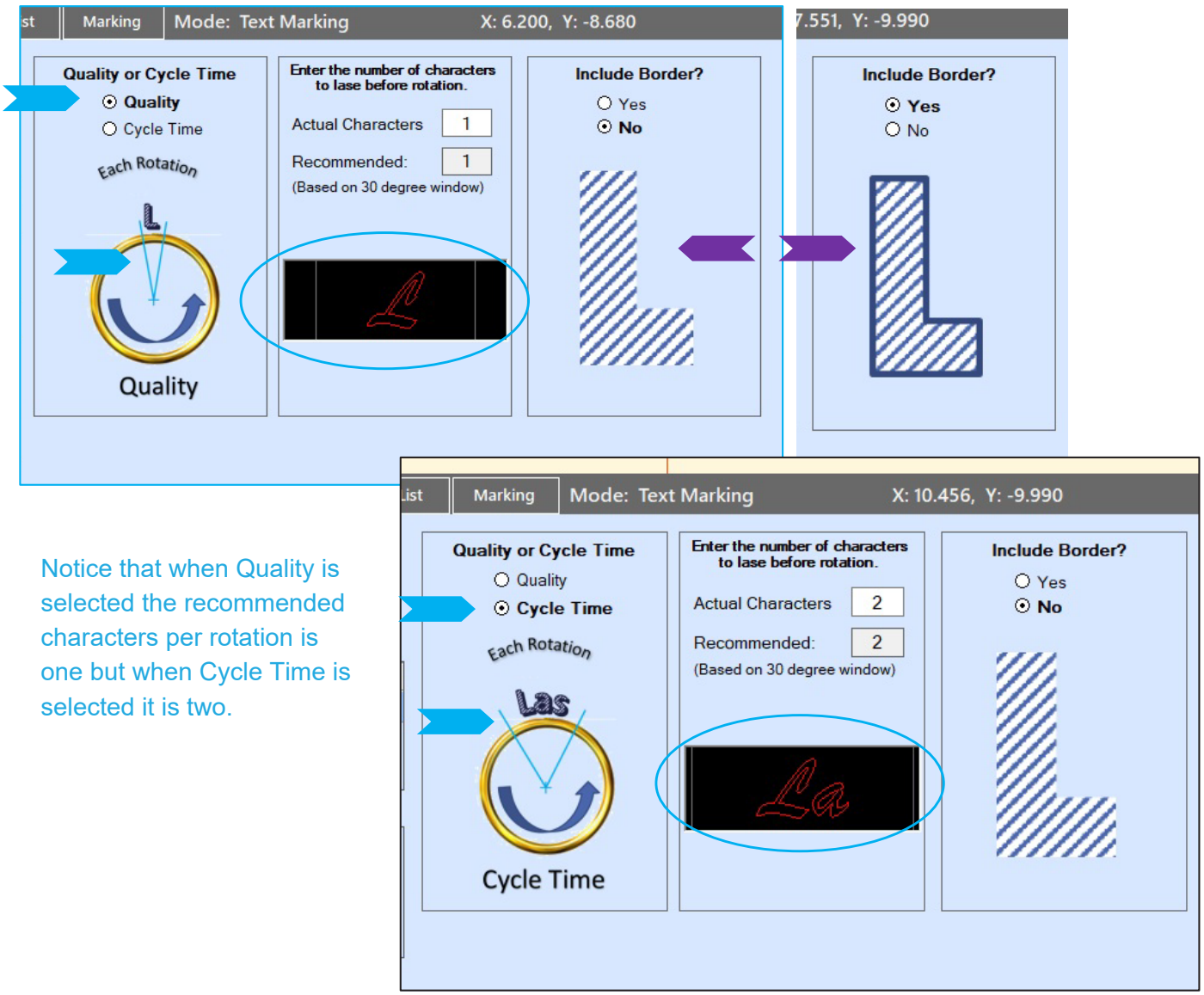




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# STEP 3: TYPE OF MARK

## Section Marking




Notice that when Quality is selected the recommended characters per rotation is one but when Cycle Time is selected it is two.

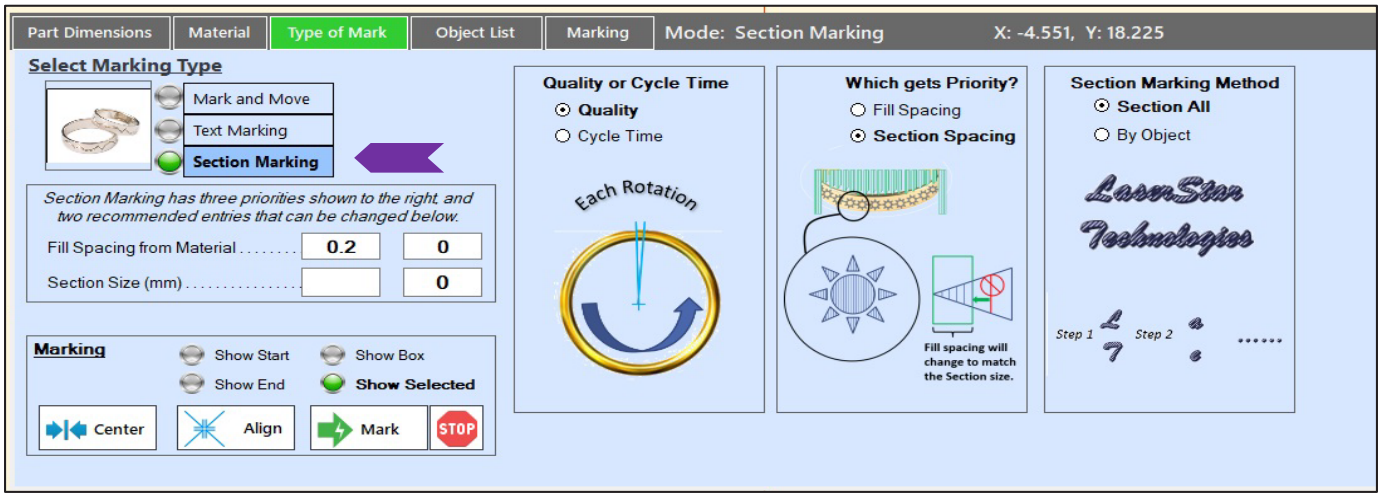
There are a few different choices you have in this type of mark.

1. Quality vs Cycle time.
2. Border or No Border.

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# STEP 3: TYPE OF MARK

## Section Marking




Section Marking is another unique rotary marking feature that allows the user to mark just about anything around the entire ring inside or out.

However, it is a little more complicated to use, we will cover the basics but regular use of this feature may require advanced training.





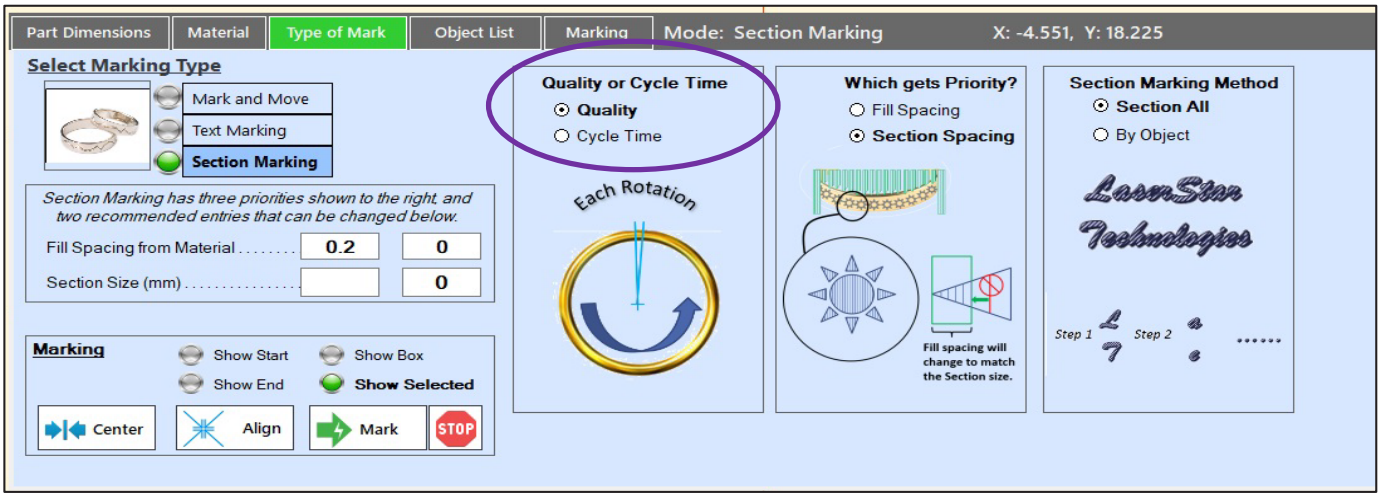


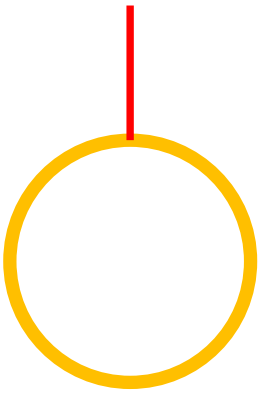


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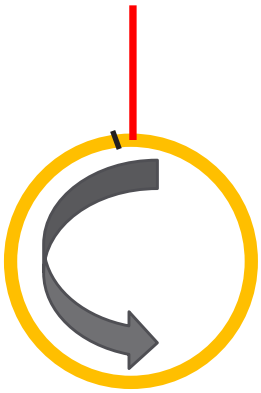
# STEP 3: TYPE OF MARK

## Section Marking

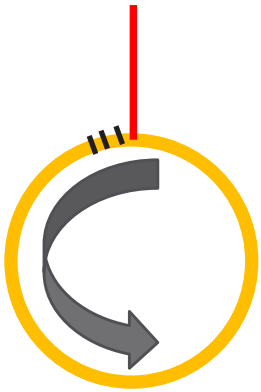


*Selecting between the two choices is like increasing the DPI.*



*Quality will lase only one line of fill and then rotate.*



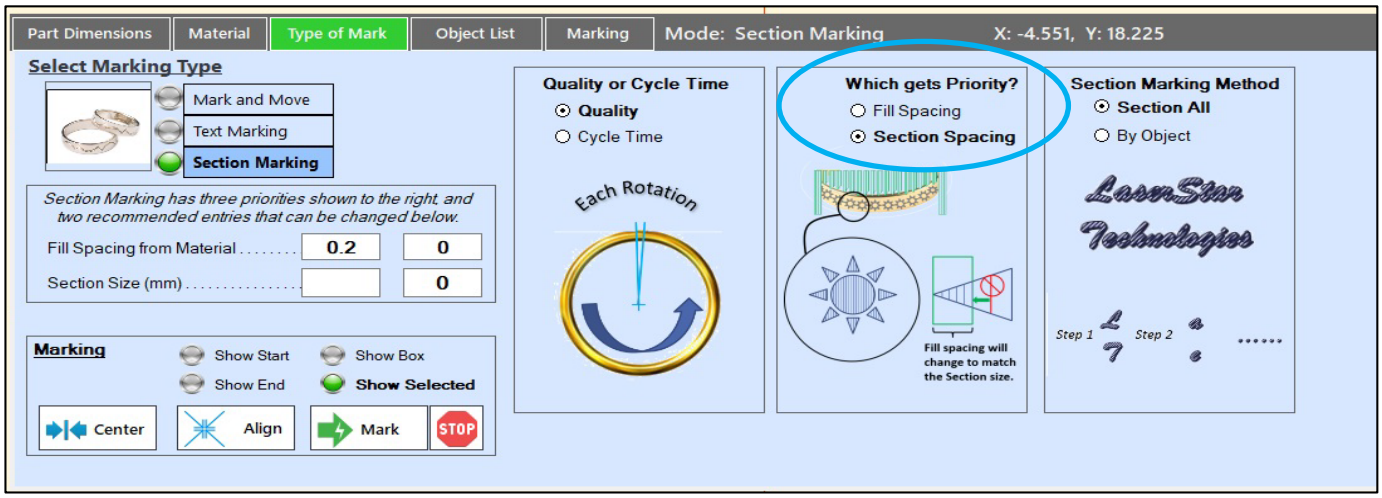
*Cycle Time will lase several lines of fill before it rotates.*

As in the previous types you can choose the priority between “Quality” and “Cycle Time”.

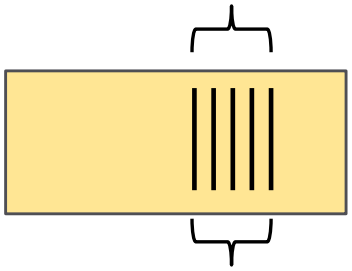
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# SECTION STEP 3: TYPE OF MARK

## Section Marking

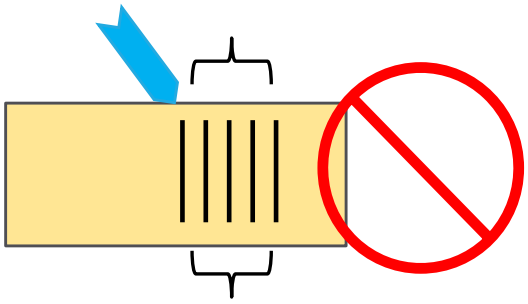



*The total fill spacing must match the split size.*



*How much the ring will rotate called the split size.*

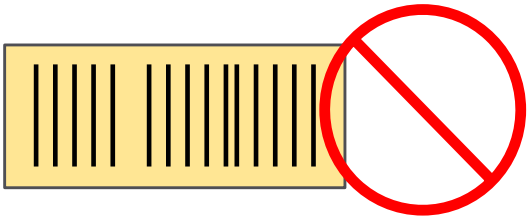
*The total fill spacing must match the split size.*



*How much the ring will rotate called the split size.*

The trick to this type of marking is to keep the split size (the amount of rotation of the circumference) evenly divisible by the fill spacing, other wise you will get round off errors that could cause gaps or overlays.

*Gaps or an overlap.*

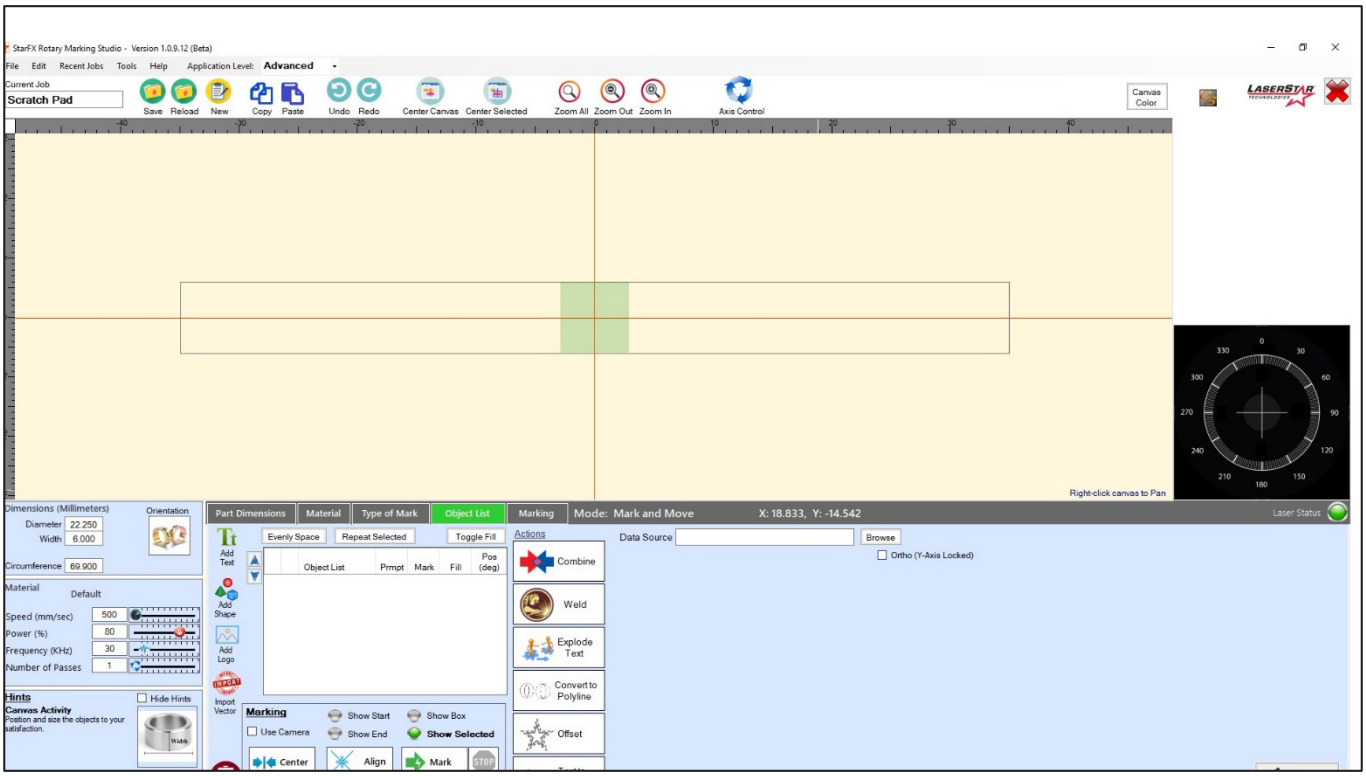


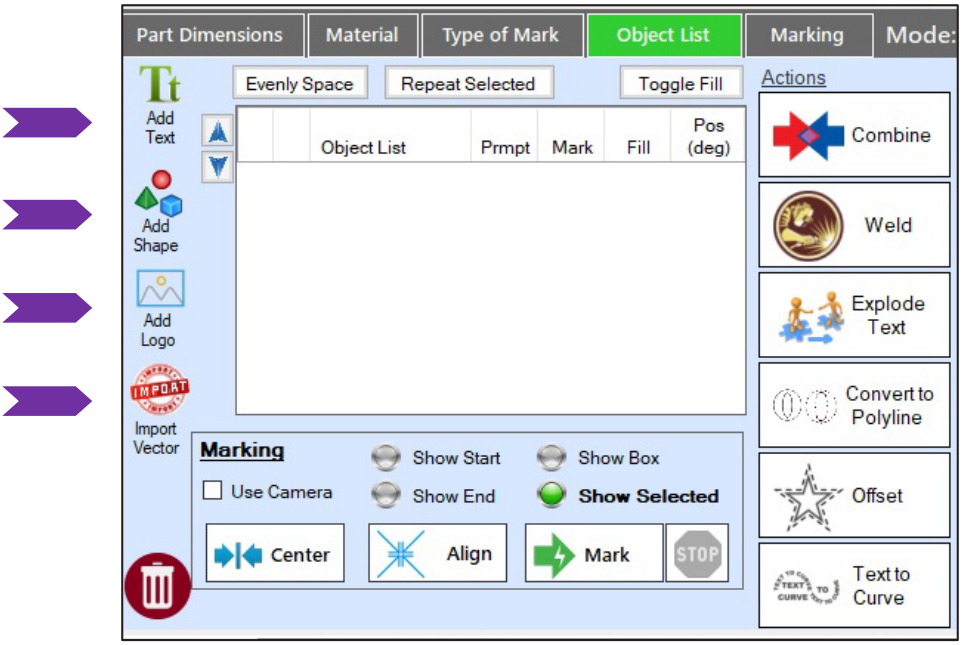


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# STEP 4: SELECTING OBJECTS TO LASE

## Creating Mark



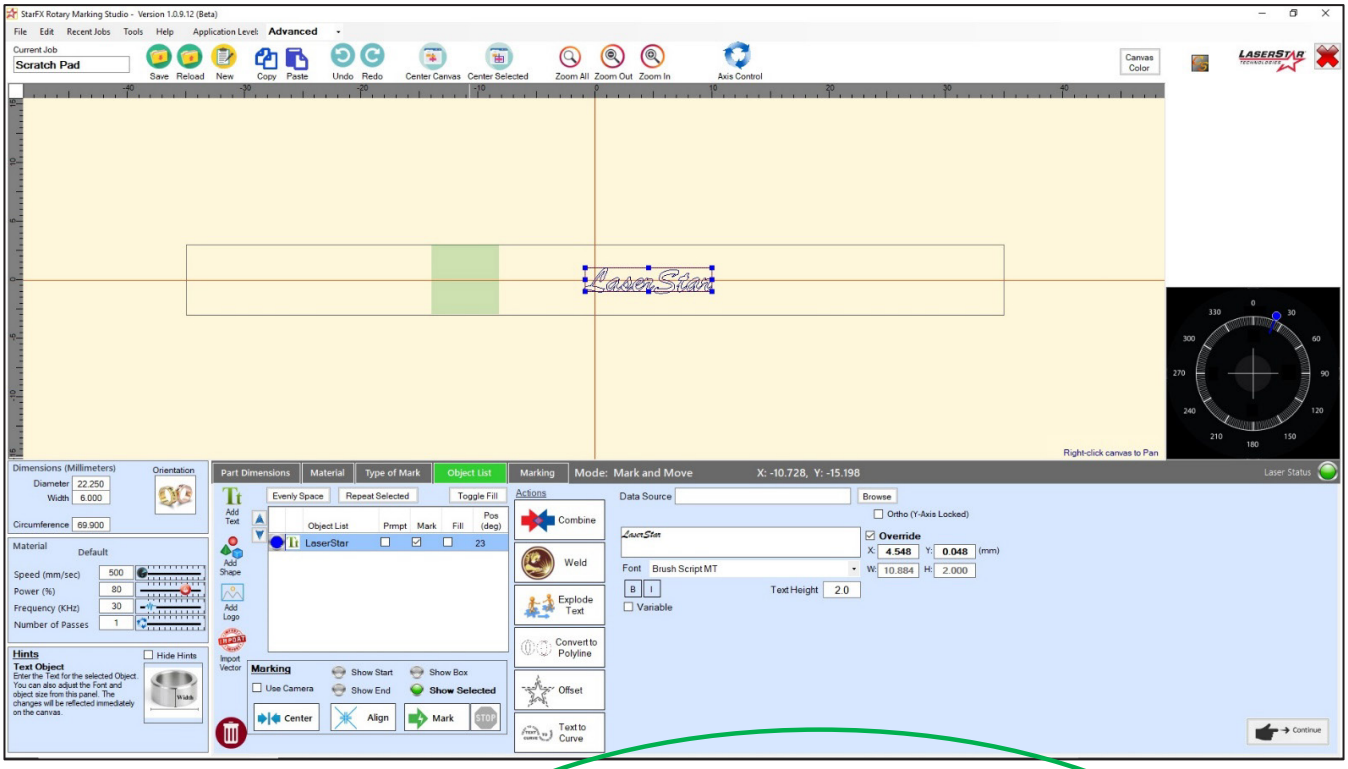


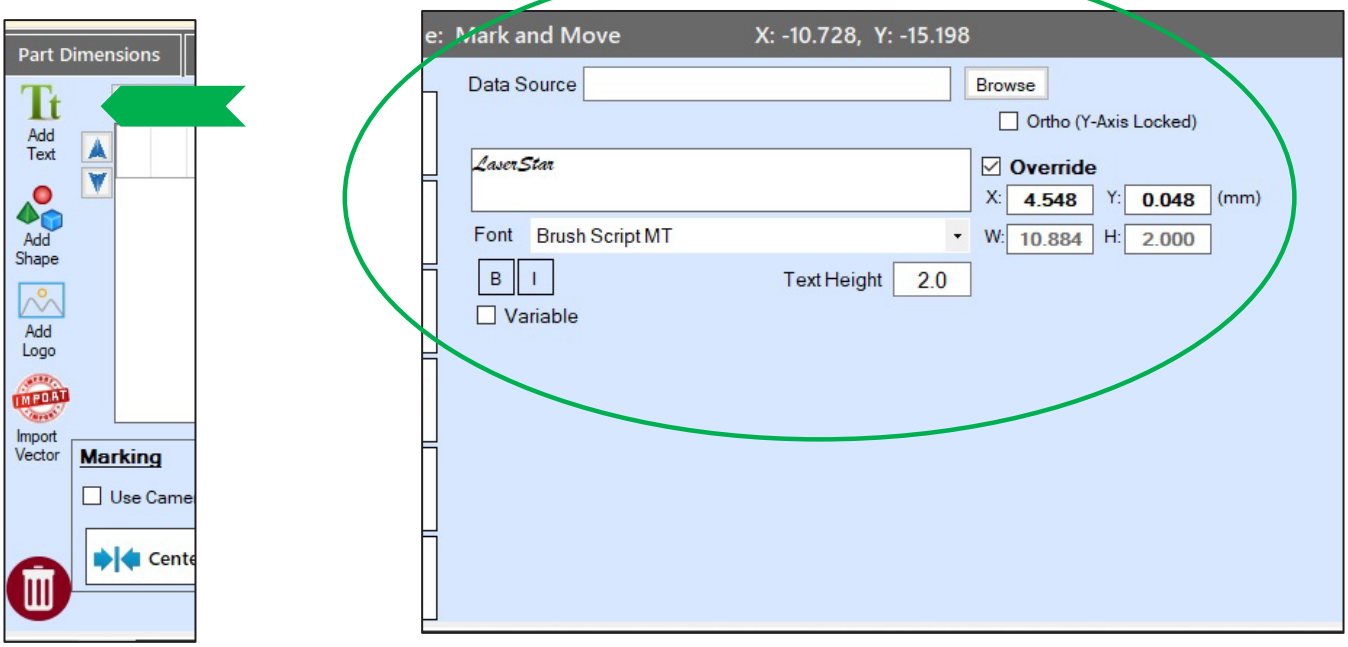

We now get to the actual lasing objects, these are the different objects such as drawings, text, shapes, or logos that you can select.

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# STEP 4: SELECTING OBJECTS TO LASE

## Text Object



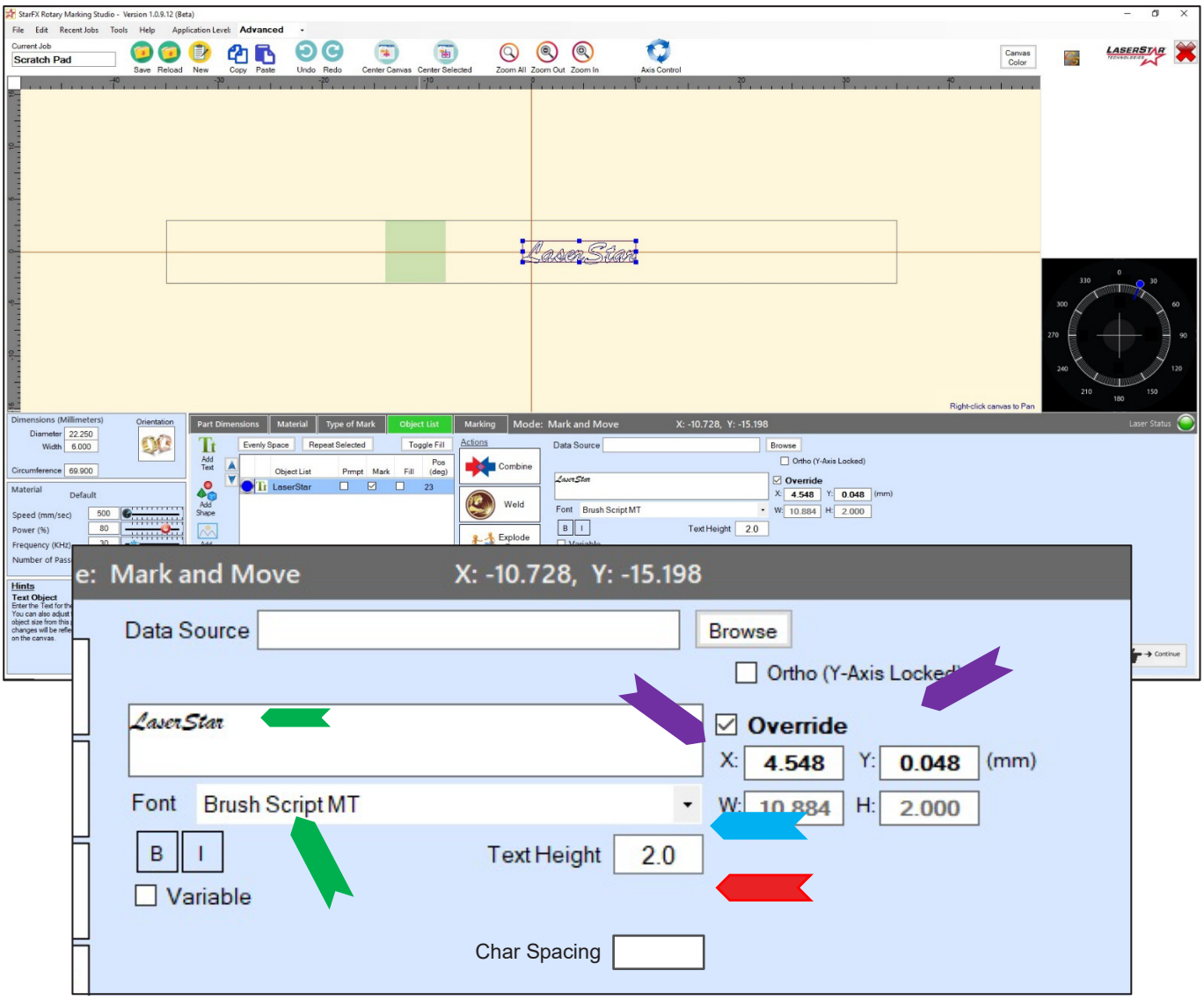

The first is the **Text Object** which comes with all of the normal features such as font, size, position, character spacing, the text itself and a few advanced features not covered in this manual.



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# STEP 4: SELECTING OBJECTS TO LASE

## Text Object



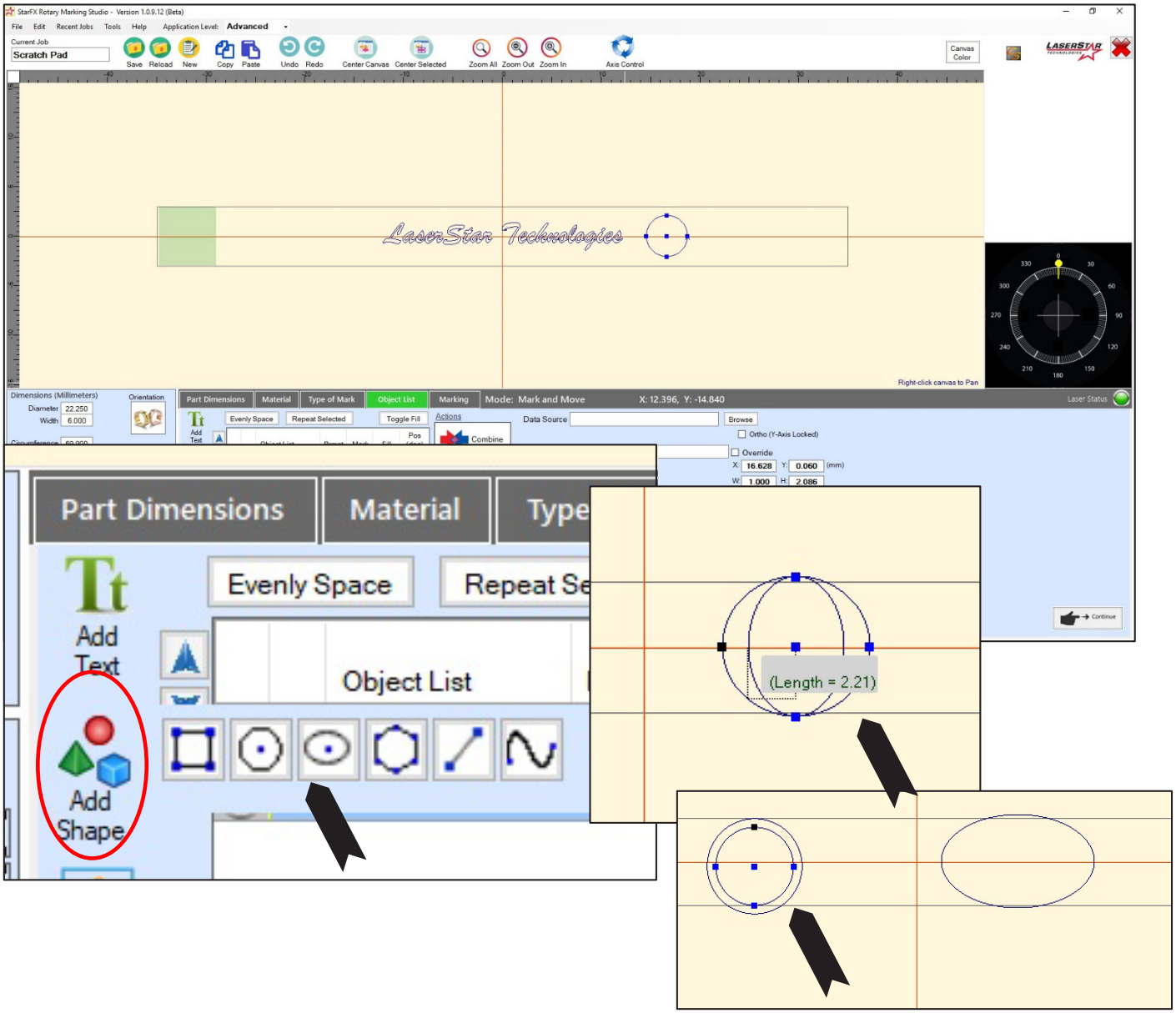

The first is the **Text Object** which comes with all of the normal features such as font, siz
The Text Object as mentioned can be defined with the various properties shown.

1. Font Selection.
2. Font Height.
3. Char Spacing
4. Position can be over-ridden.
5. There are some additional features that are covered in a more advanced training.

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# STEP 4: SELECTING OBJECTS TO LASE

## Shapes



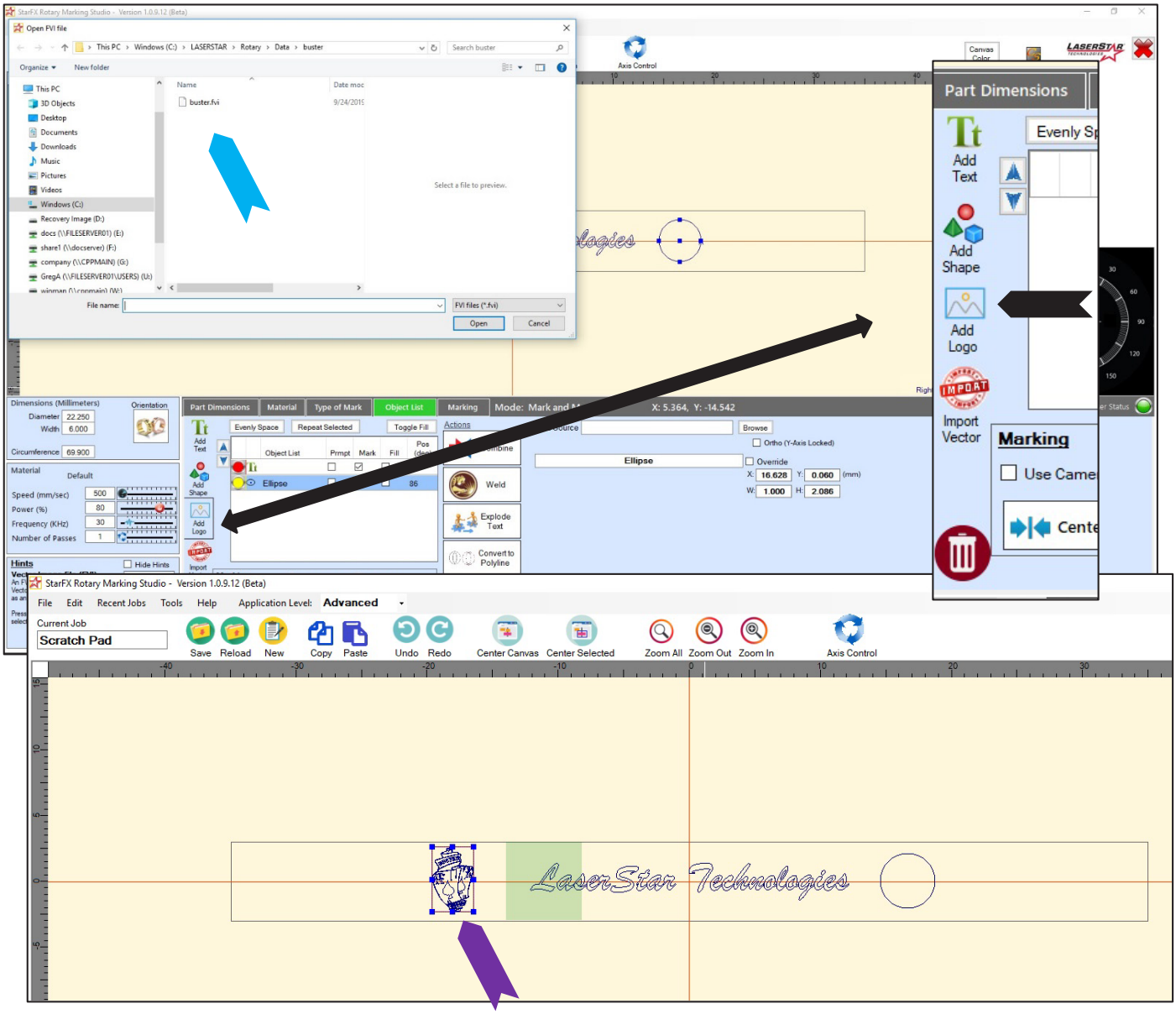

The **Shapes Object** is fairly straight forward, you simply select the type of Shape you want and “Drag and Drop” its size and position on the Canvas (Drawing Area).



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# STEP 4: SELECTING OBJECTS TO LASE

## Logo



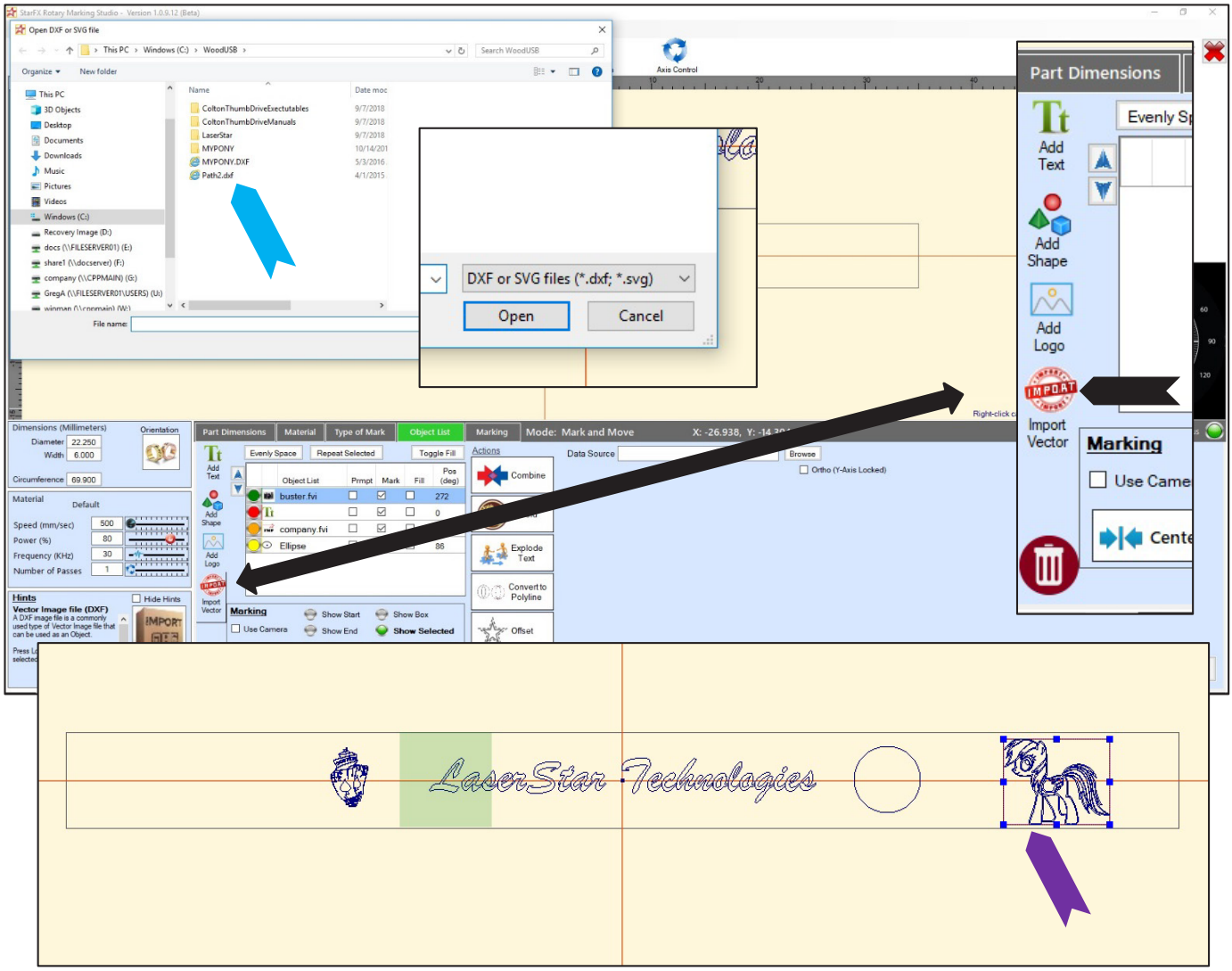

The **Logo Object** is LaserStar's base vector file format and is used across all of our different products from Cutters and Welders to Markers.

1. You select a file.
2. Touch the mouse to the Drawing Screen and "Drag and Drop" the final size and position.

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# STEP 4: SELECTING OBJECTS TO LASE

## Import Vector File




The **Import Vector Object** allows you to bring in vectors from other programs such as a DXF file from a CAD program and a SVG file from a Graphics program.

The procedure is the same as the Logo Object.

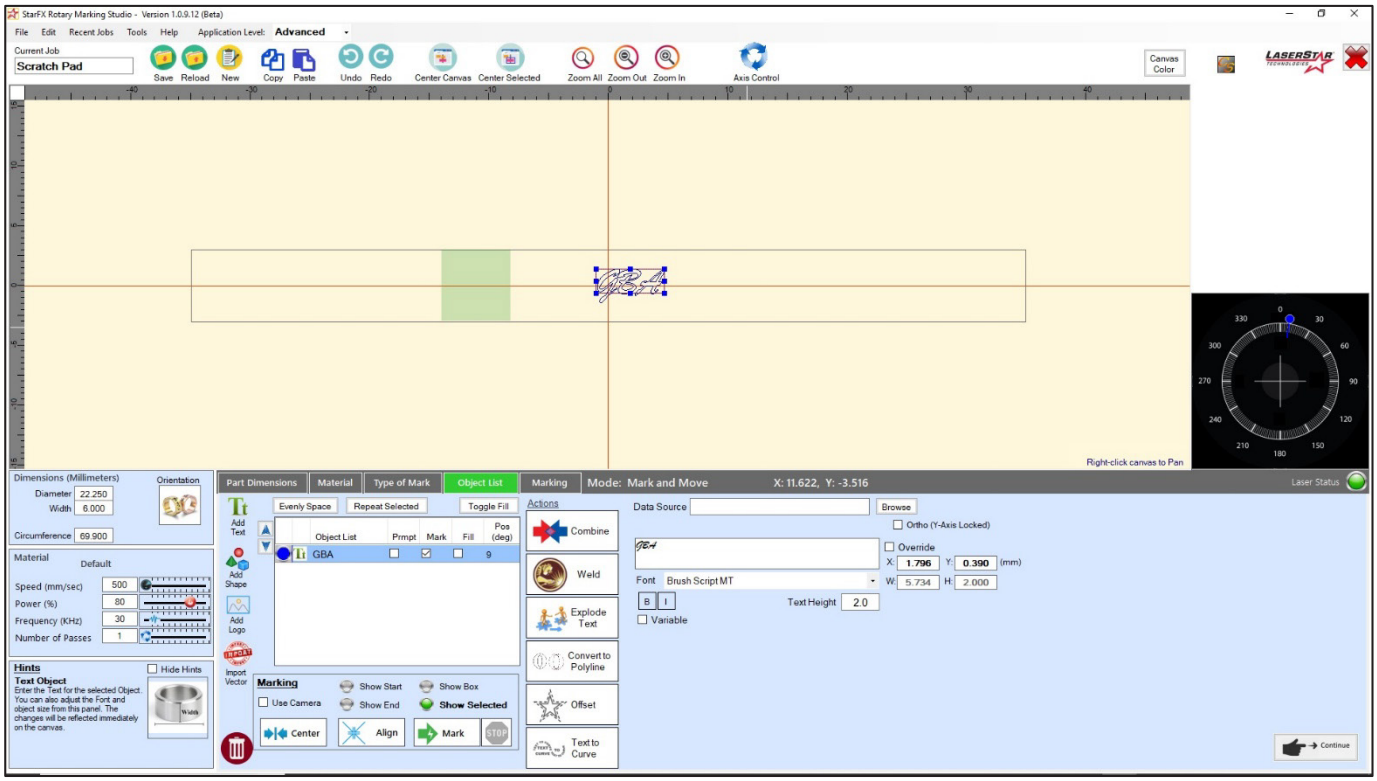
1. You select a file.
2. Touch the mouse to the Drawing Screen and “Drag and Drop” the final size and position.

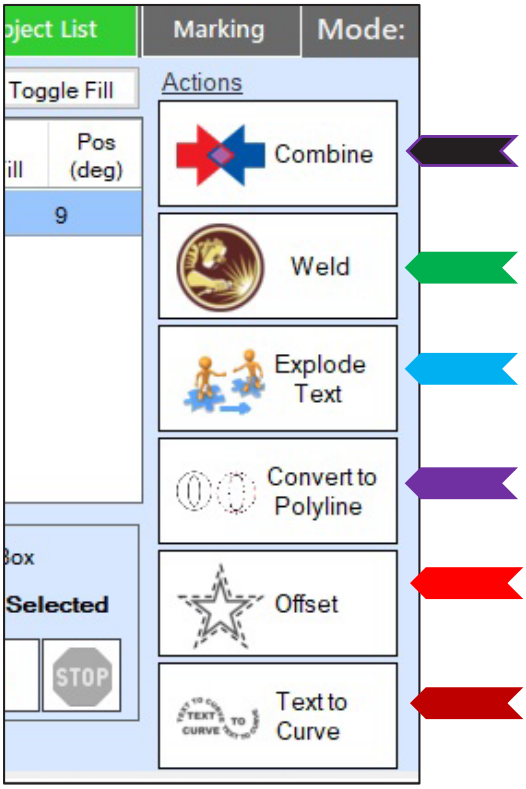


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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features



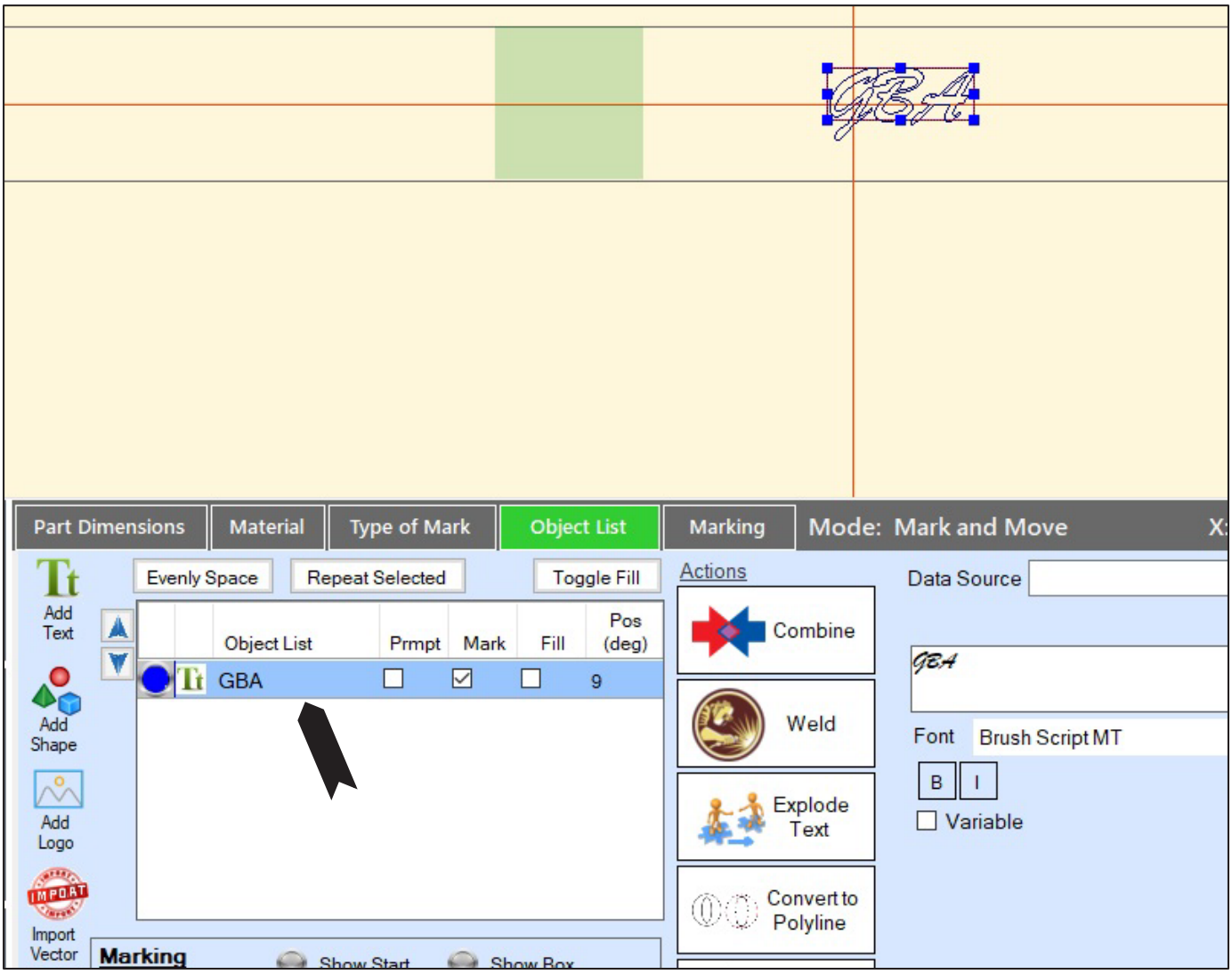

There are some advanced features we will go through now, we will discuss the basic operation of each but to get the full benefit of these features additional training would be suggested.

1. The “Combine” tool – combines multiple objects into one object so the can be filled.
2. The “Weld” tool – Makes overlapping objects into one object and eliminates the intersecting lines.
3. The “Explode” tool – takes text and turns it into a vector object that can be used with the other tools such as the “Weld” tool.
4. “Convert to Polyline” – converts a font to polylines where you can edit the actual characters.
5. The “Offset” tool – creates an offset image of the original either inside or outside.
6. “Text to Curve” – does just what it sounds like, takes your text and aligns it to a curve.

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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features




Start with a **Text Object** using the desired font, size and text.

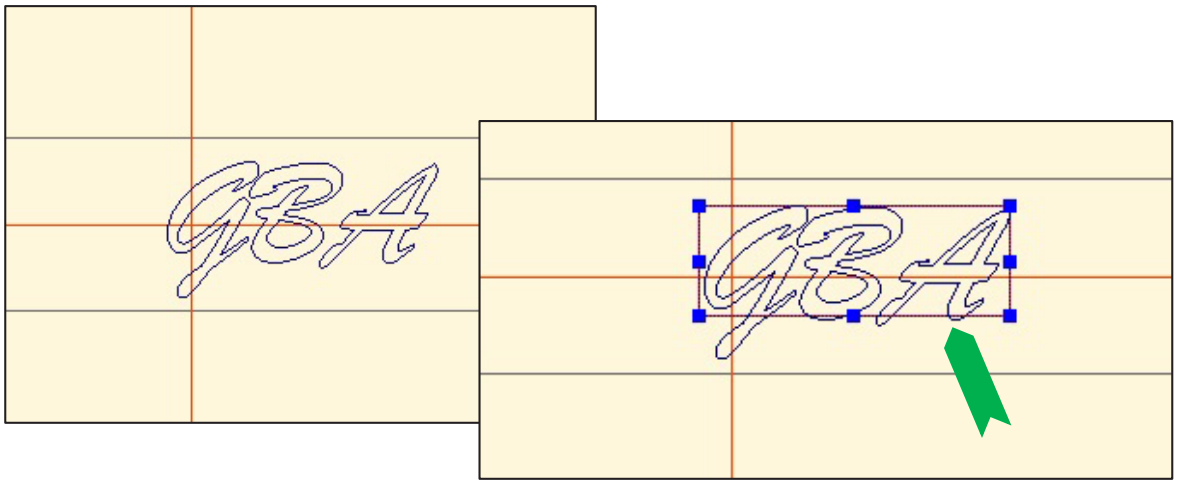
**Welding: Create a Text Object for a Monogram.**

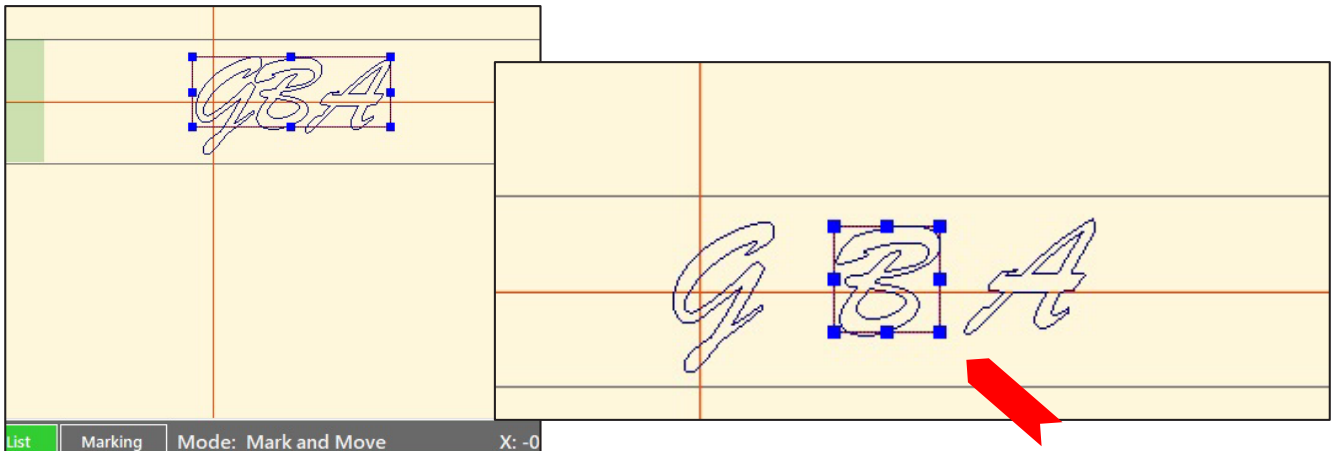


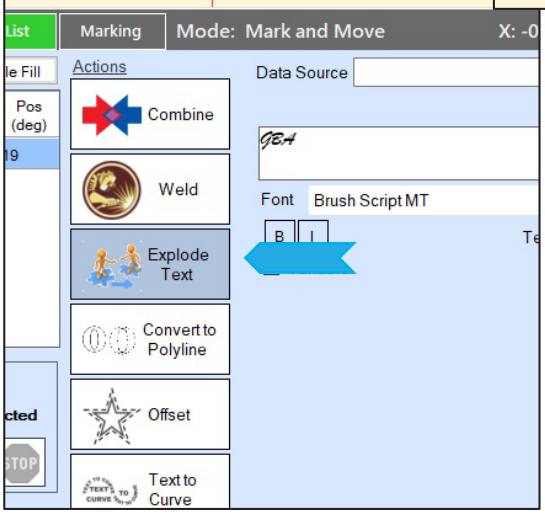
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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features








Select the text to do a final Weld on.

Explode the Text.

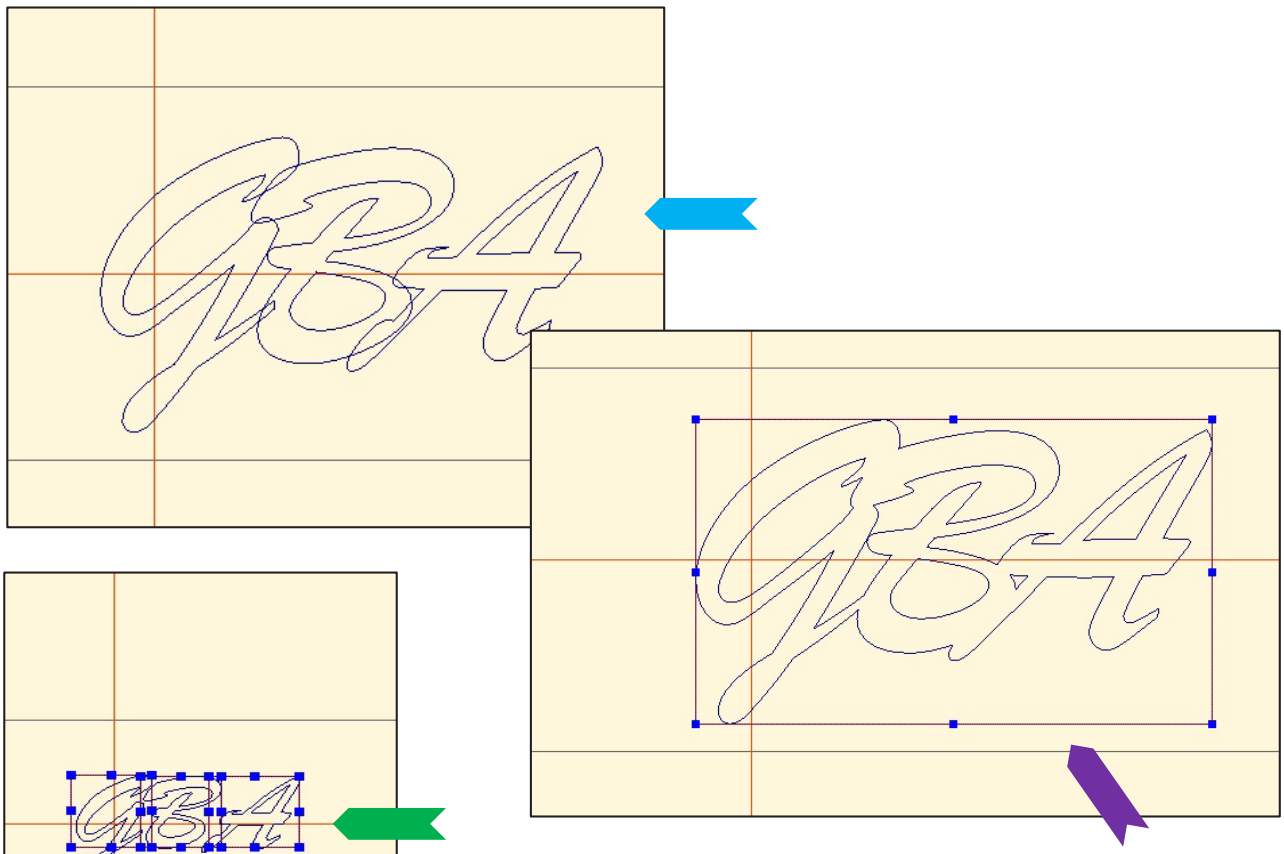
It is now three separate objects that can be moved independently.

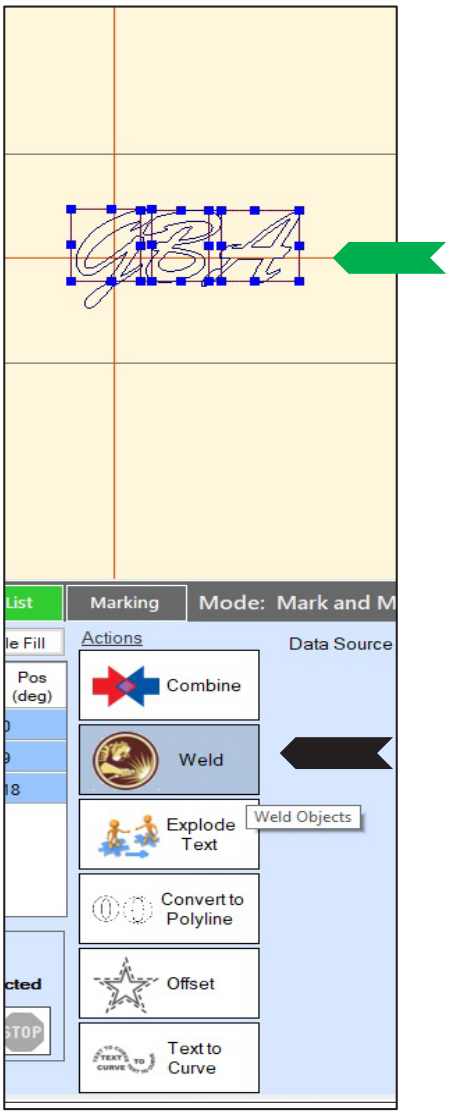
**Welding: Create a Text Object for a Monogram.**

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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features






Select all three characters.

Move the Characters to the desired position.

Pick the “Weld “ tool.

And the Welding” is complete.

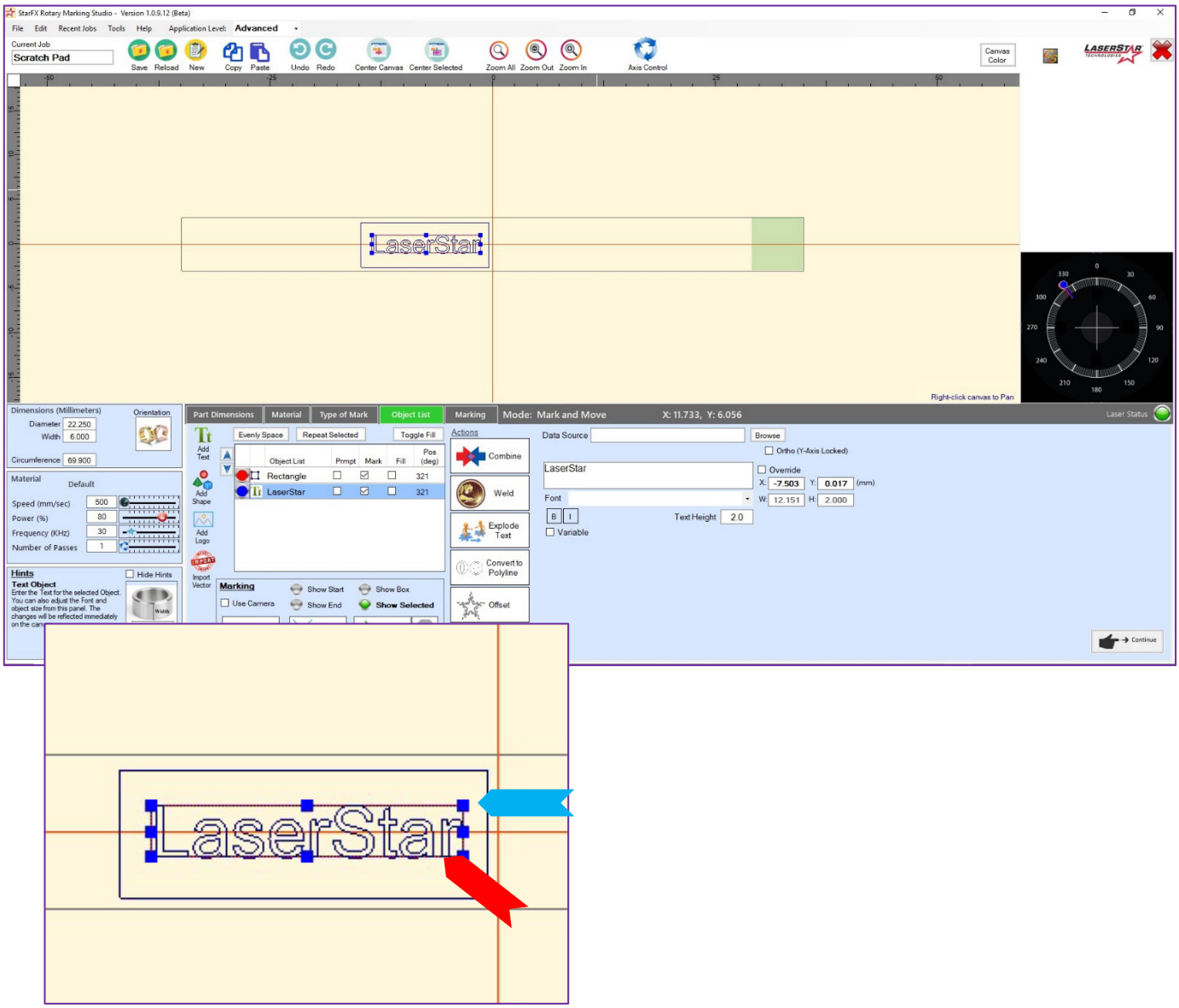
**Welding: Create a Text Object for a Monogram.**



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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features



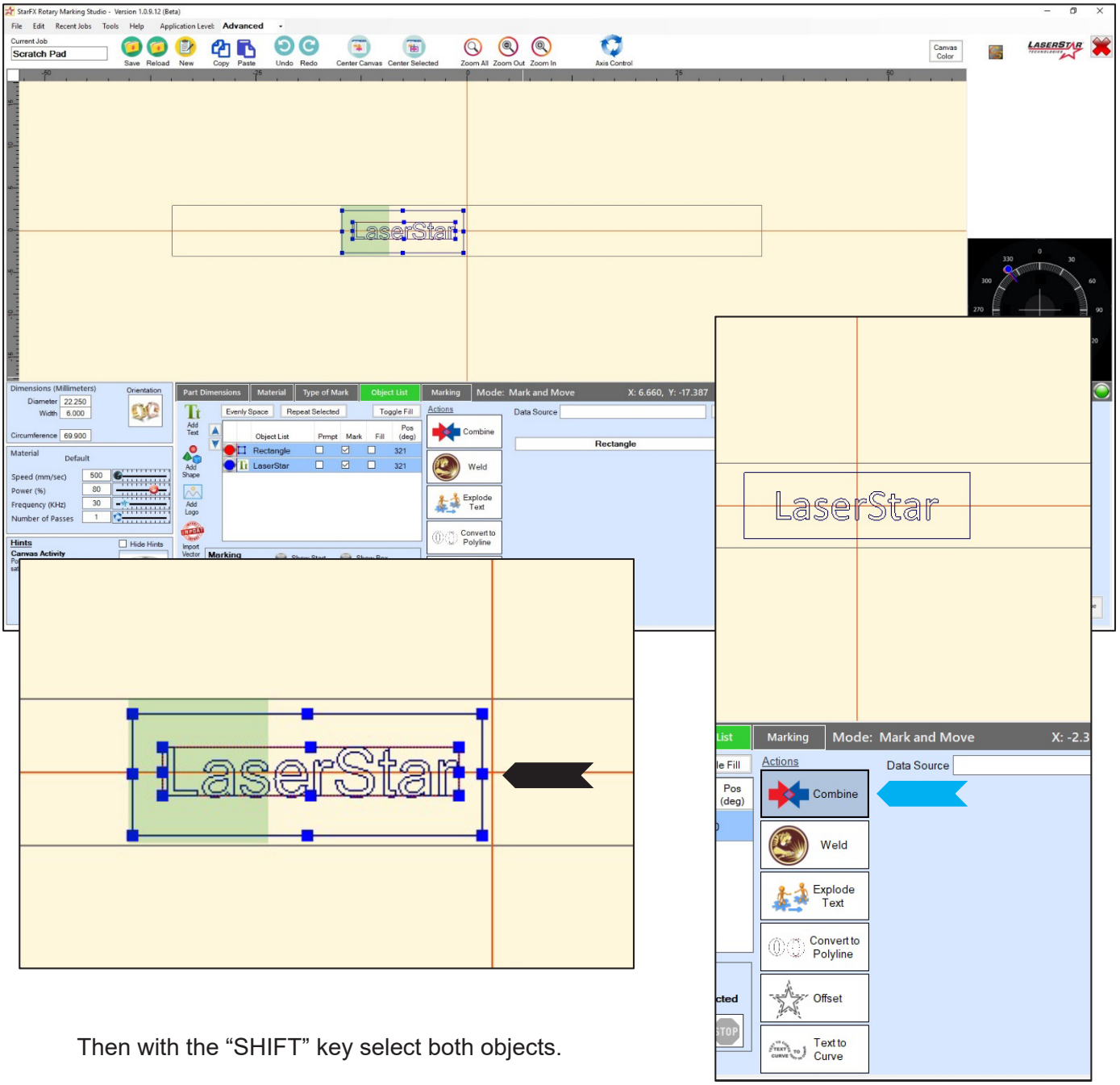

To “Combine” two or more objects, for our example, we will start with a Rectangle and some Text.

**Combine: Merge two objects into one .**

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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features




Then with the “SHIFT” key select both objects.

Finally use the “Combine“ tool to merge the two objects to become one.

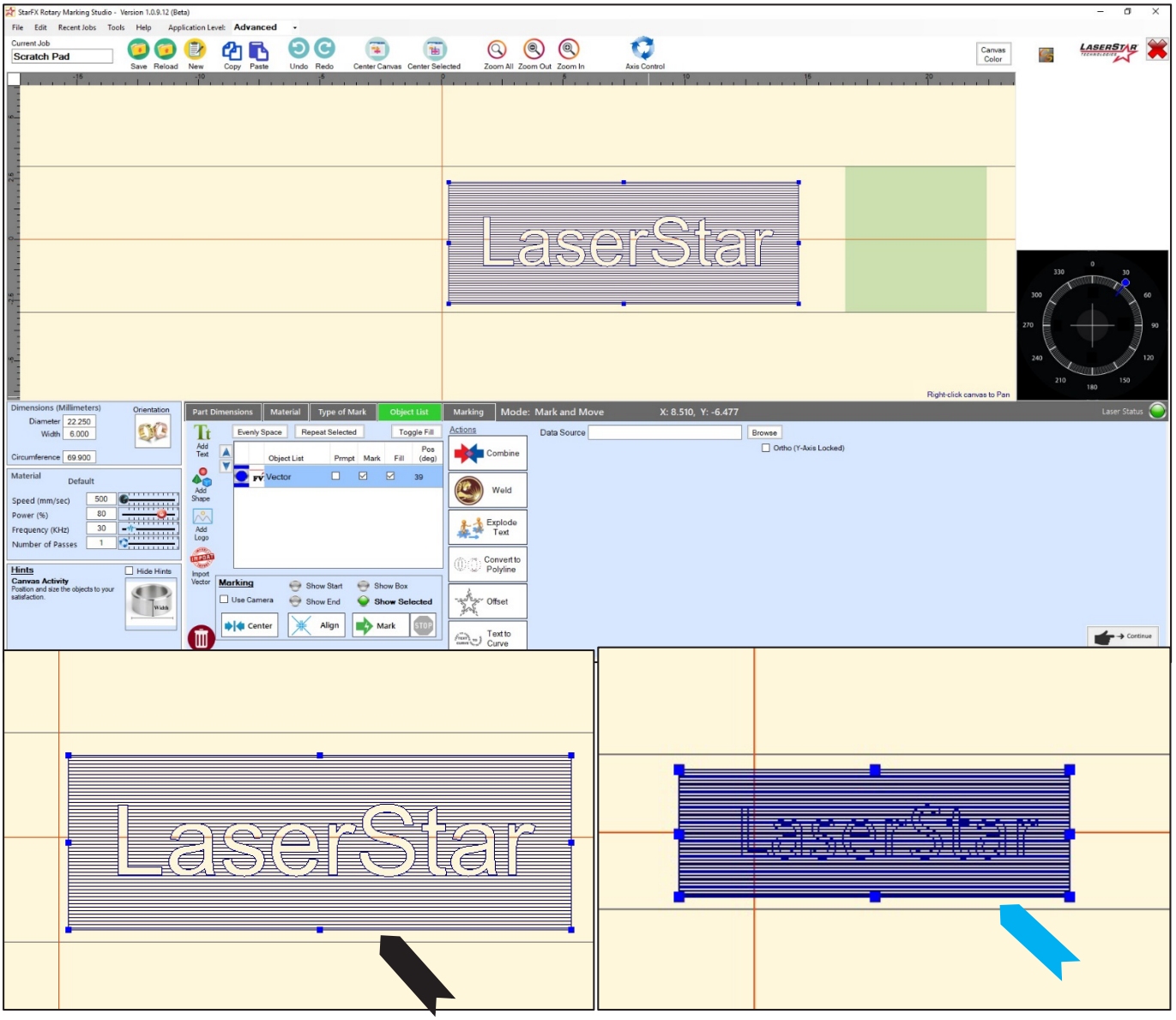
**Combine: Merge two objects into one .**



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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features




Now that you have one object if you apply fill it will fill around the inside part of the new single object that used to be text.

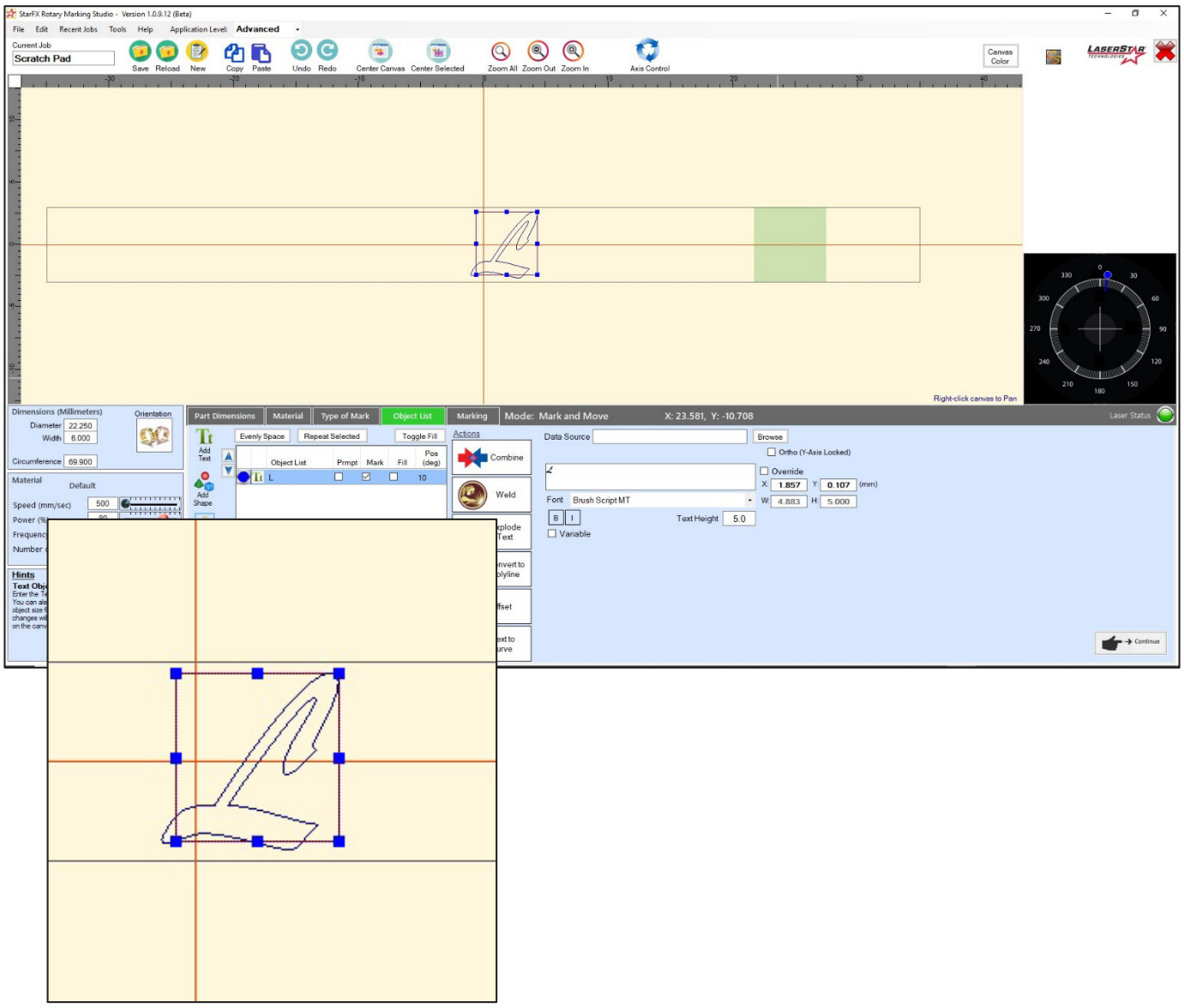
When you had two objects it would fill like this where the fill covered the text because it was filling the Rectangle not the Rectangle and Text.

**Combine: Merge two objects into one .**

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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features




Now that you have one object if you apply fill it will fill around the inside part of the new single object that used to be text.

When you had two objects it would fill like this where the fill covered the text because it was filling the Rectangle not the Rectangle and Text.

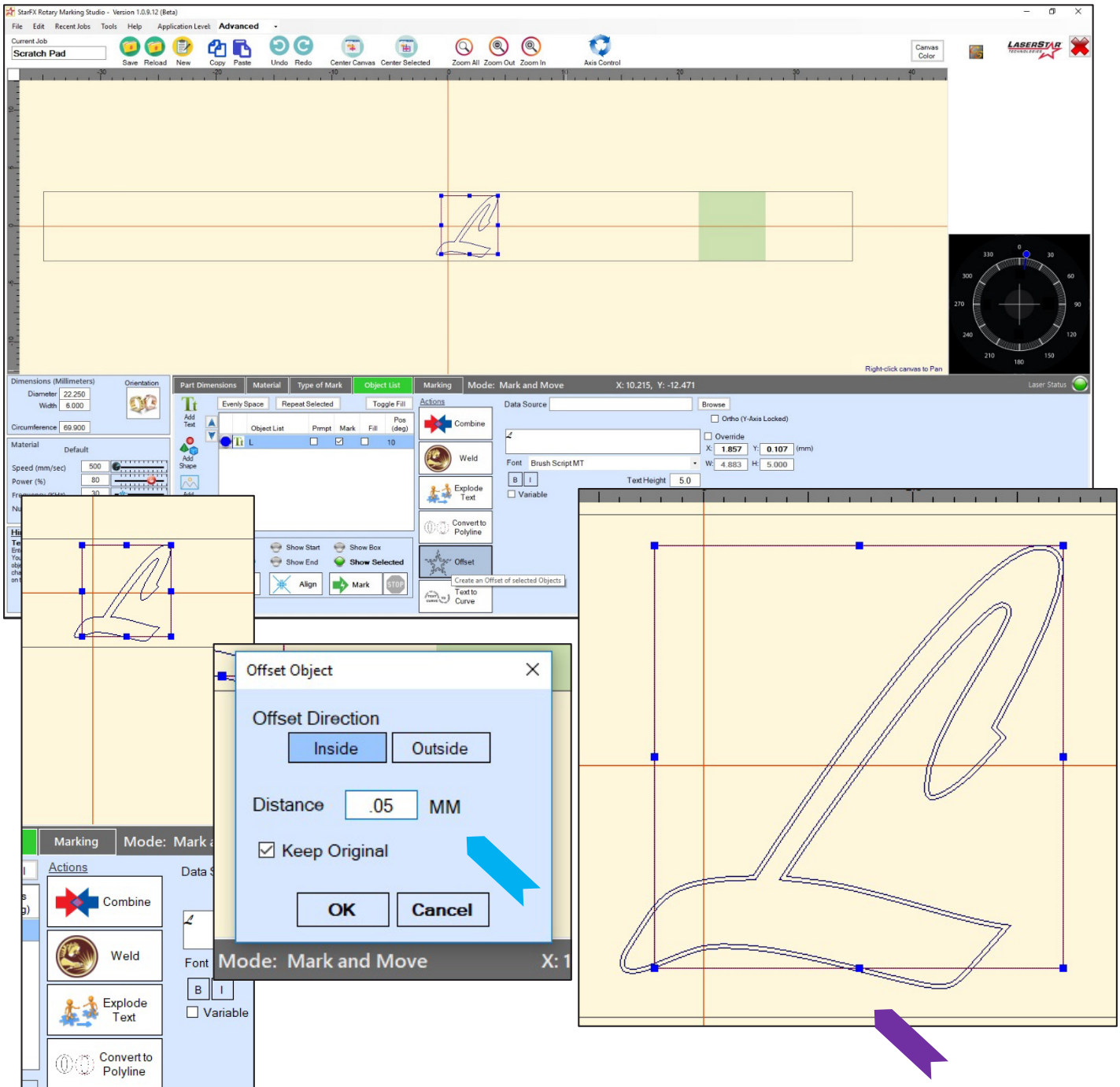
**Offset: Duplicate an image Smaller or Larger than the original.**



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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features




After selecting the object you want to “Offset” you press the ““Offset” button.

You are then asked to enter offset distance and orientation.

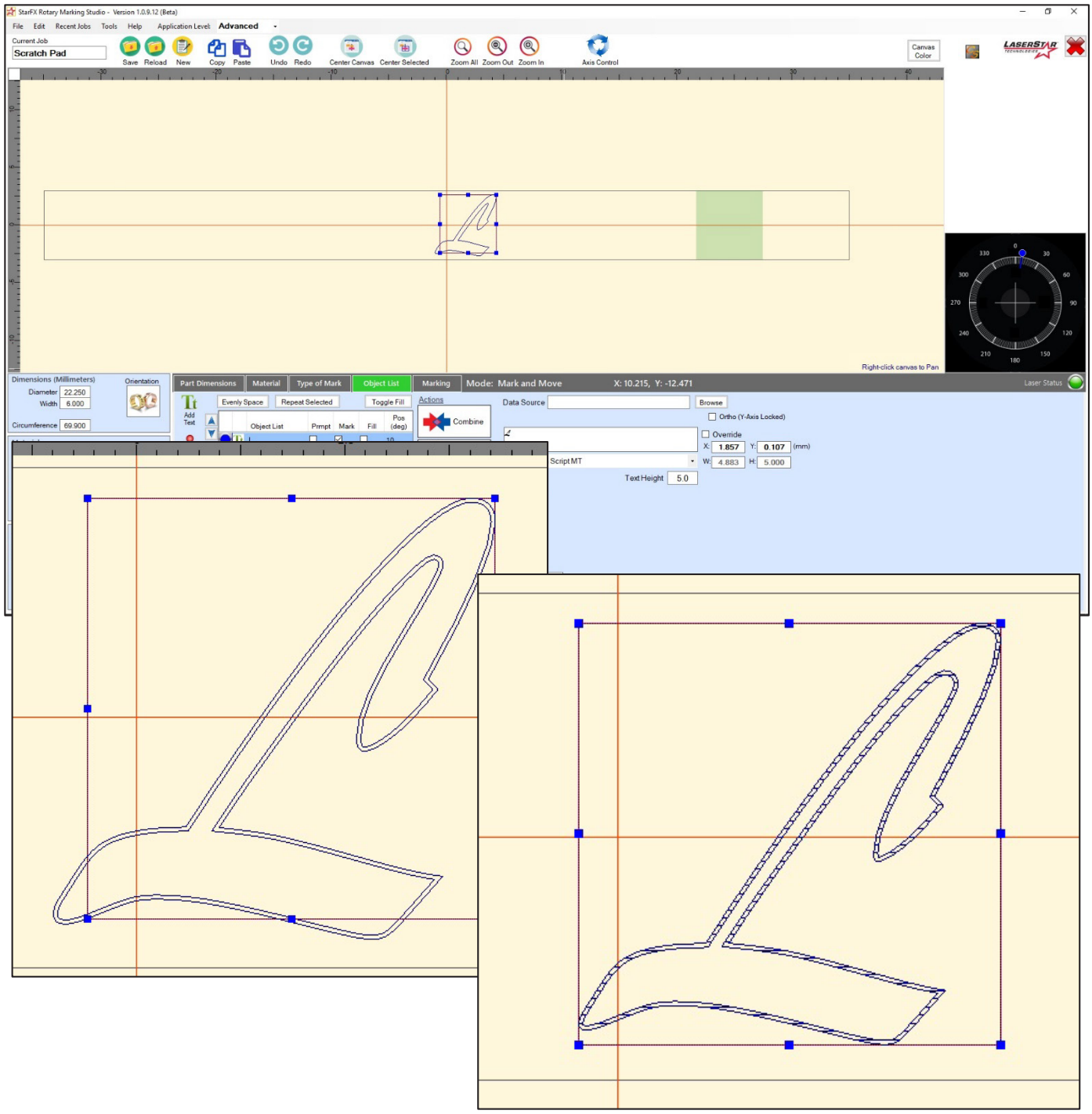
The result is an offset image of the original pattern.

**Offset: Duplicate an image Smaller or Larger than the original.**

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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features




This can be used for many different cosmetic effects such as creating a bolder outline by filling only the outer pattern.

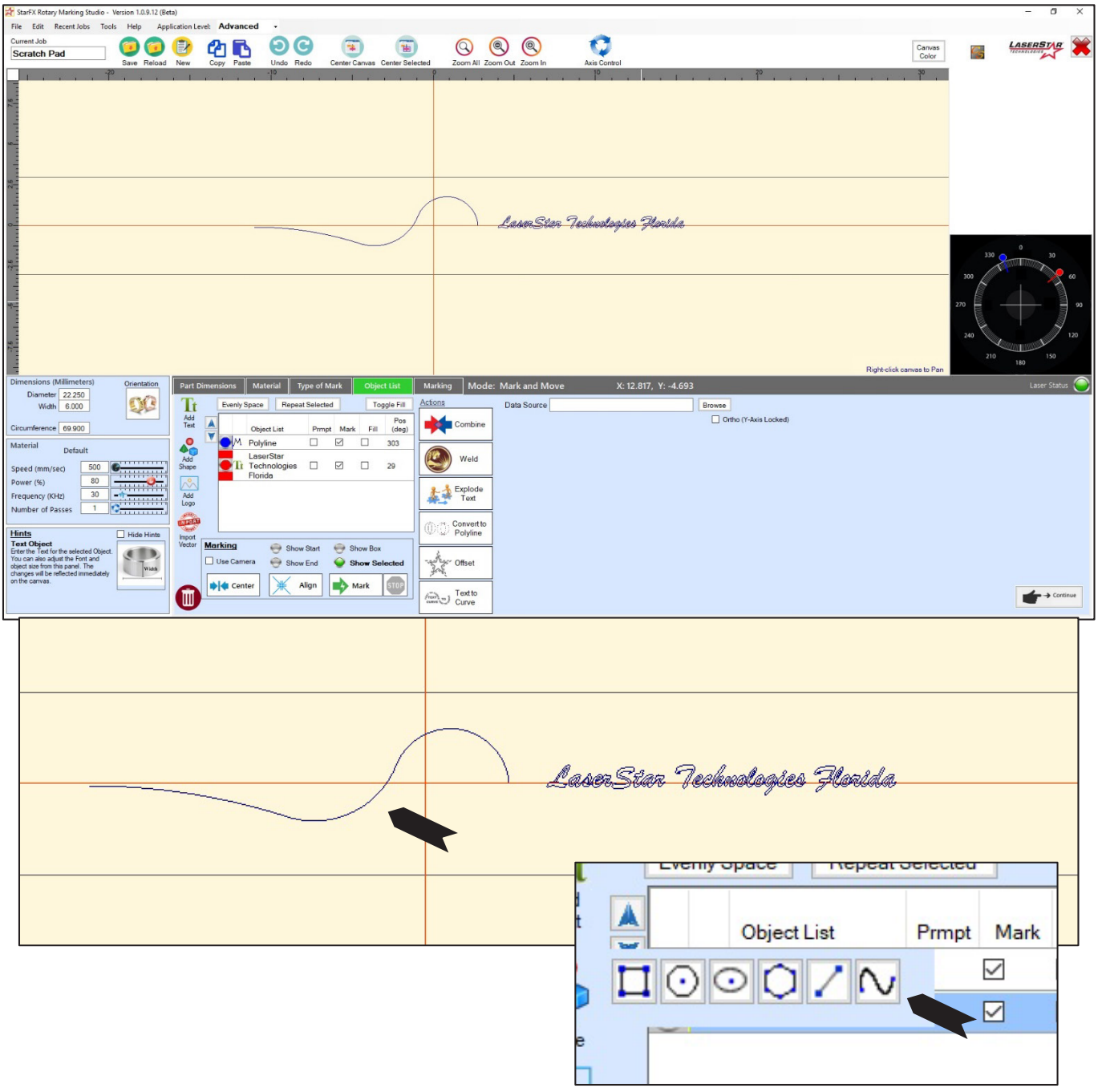
**Offset: Duplicate an image Smaller or Larger than the original.**



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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features



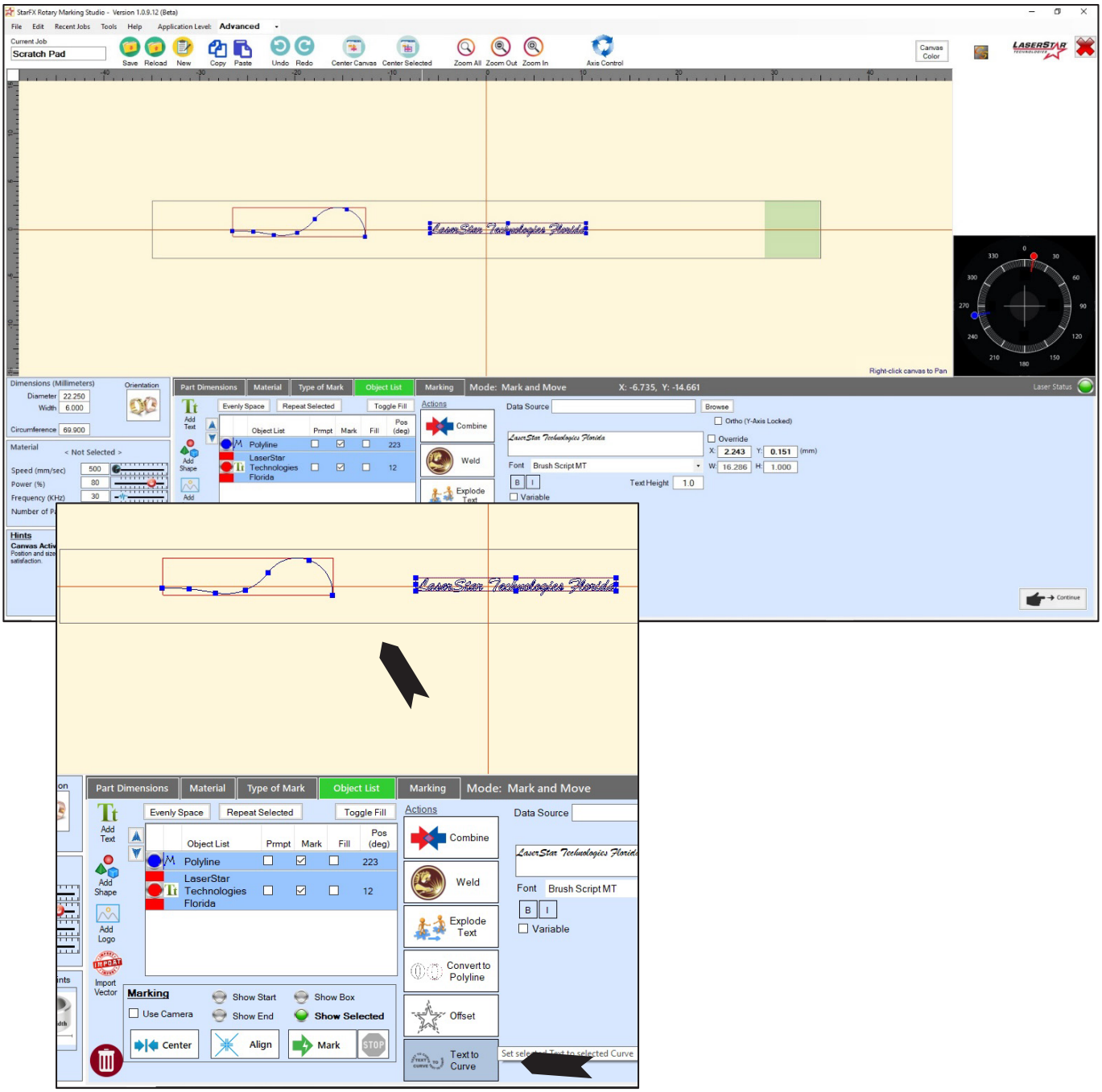

“Text to Curve” will take any text string and apply it to a vectorized shape. This shape was done with the “Arc Shape” tool.

**Text to Curve: Forming text to a shape.**

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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features




Select both the curve and the text and then push the “Text to Curve” button.

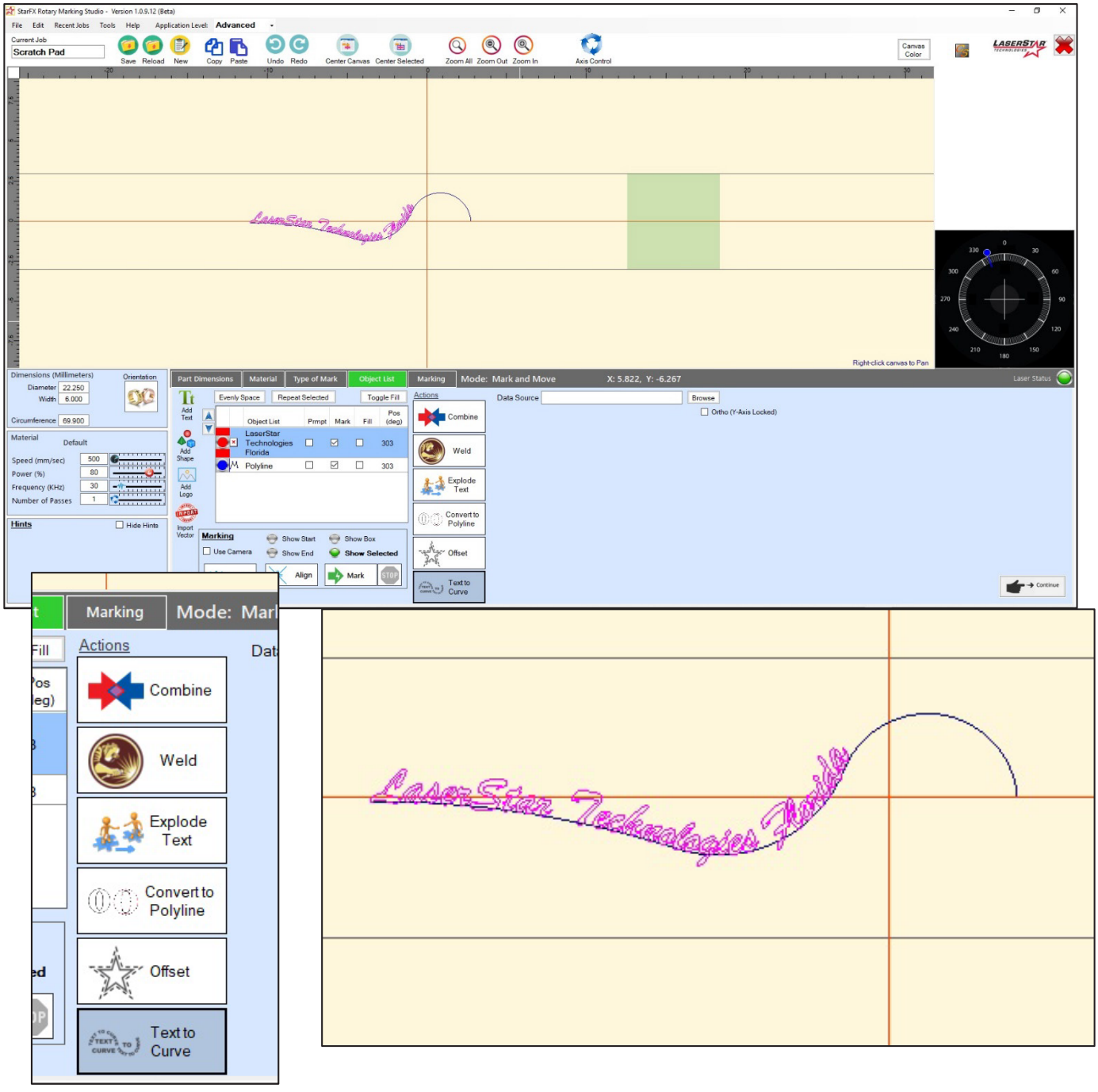
**Text to Curve: Forming text to a shape.**



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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features




The Text is then formatted to fit on the Curve, you can still add and remove characters on the text object.

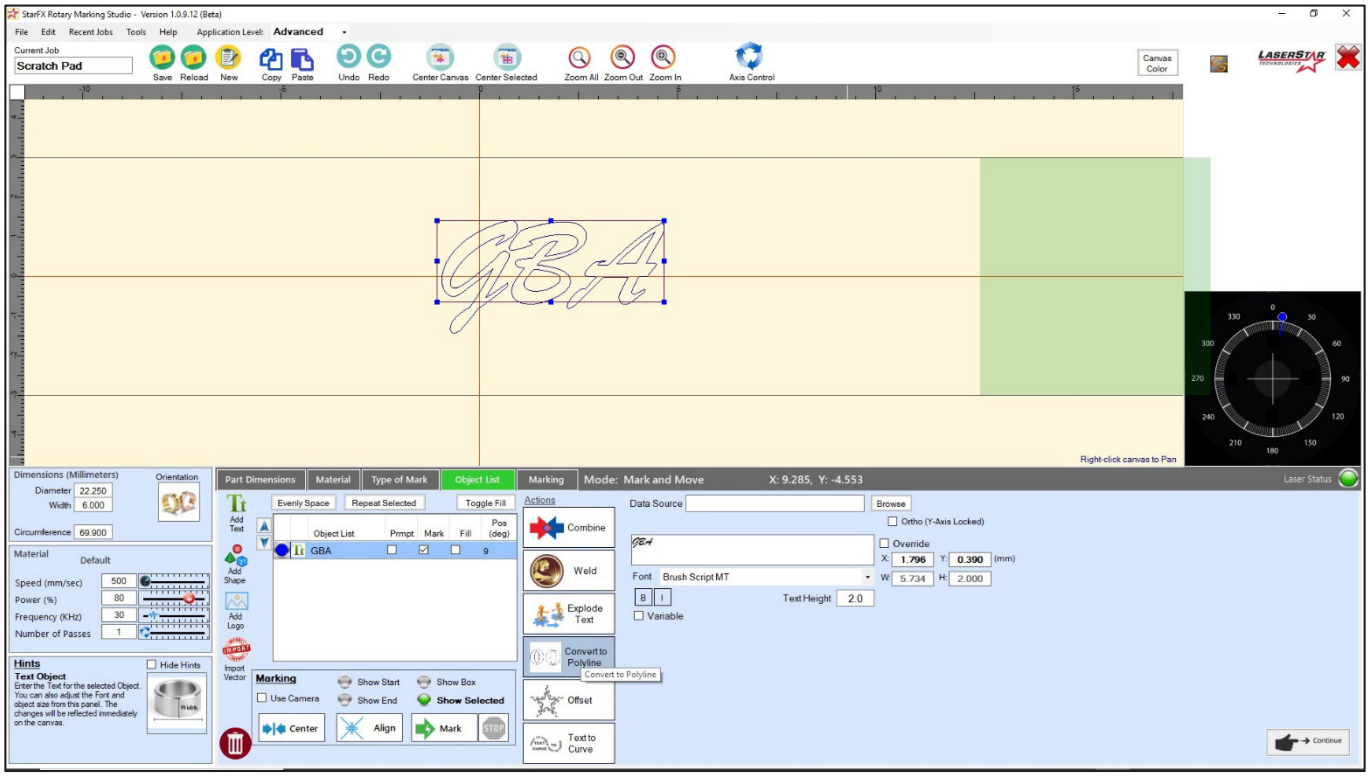
And the curve can be removed if it was just for alignment and not to be part of the final marking.

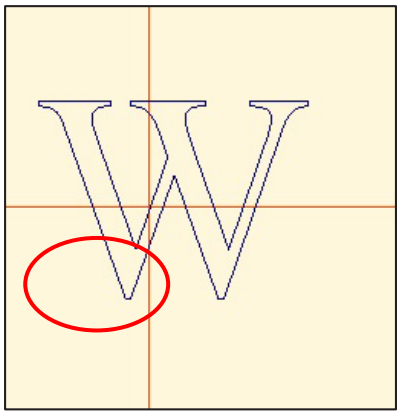
**Text to Curve: Forming text to a shape.**

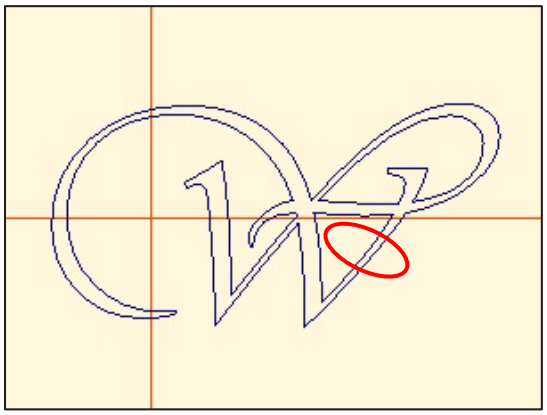
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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features





The “Convert to Text” feature allows the user to actually modify text, to adjust the Windows TTF fonts for various reasons.

1. A cosmetic alteration to create a thinner of fatter character.
2. To adjust a process concern such as the point of a W creating a hot spot in sensitive materials.

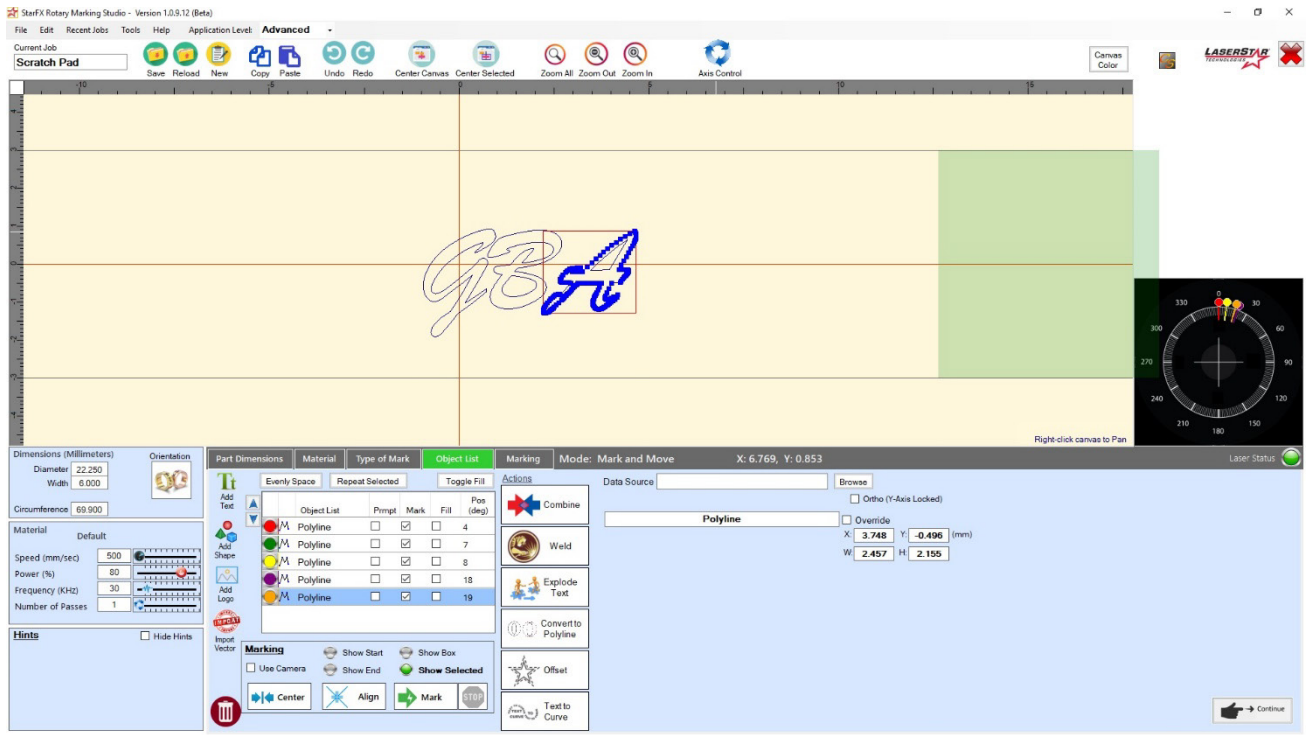
**Convert to Polyline: Making Text editable.**

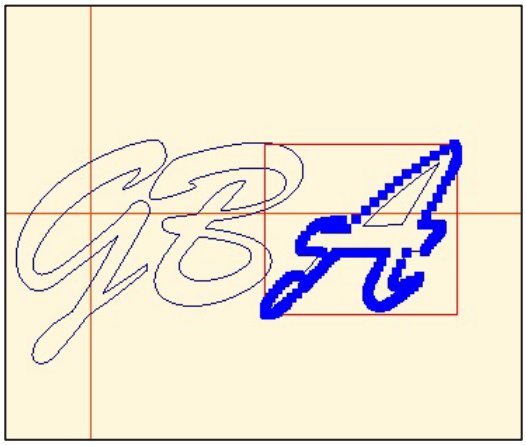


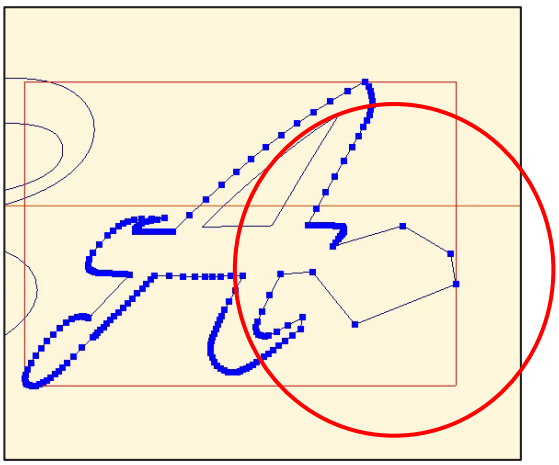
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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features





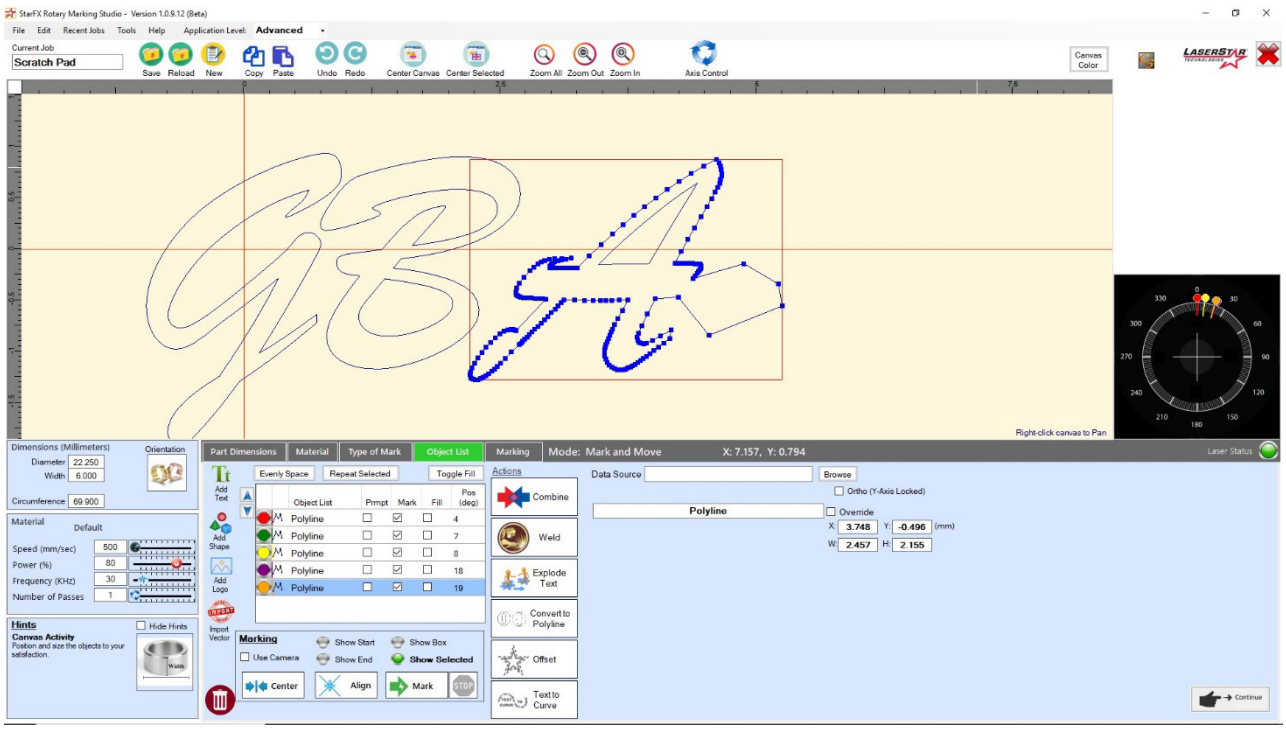
Once a character has been converted to a polyline the individual nodes can be moved around to alter the shape of the character.

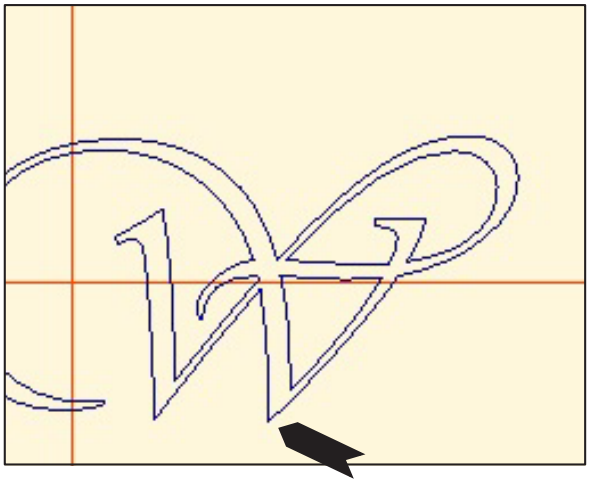
**Convert to Polyline: Making Text editable.**

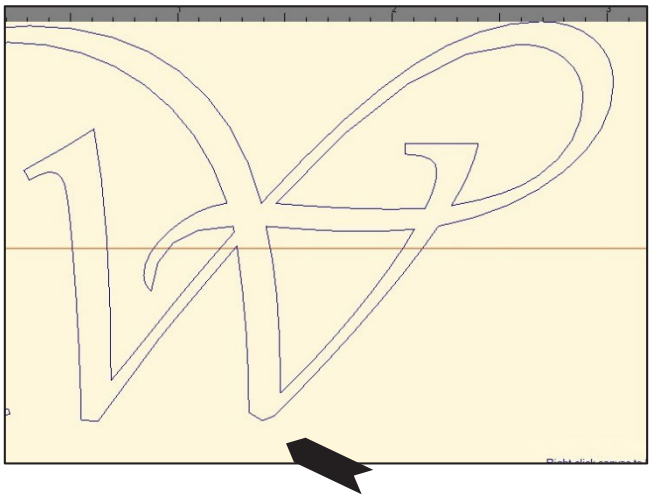
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# STEP 4: SELECTING OBJECTS TO LASE

## Advanced Features





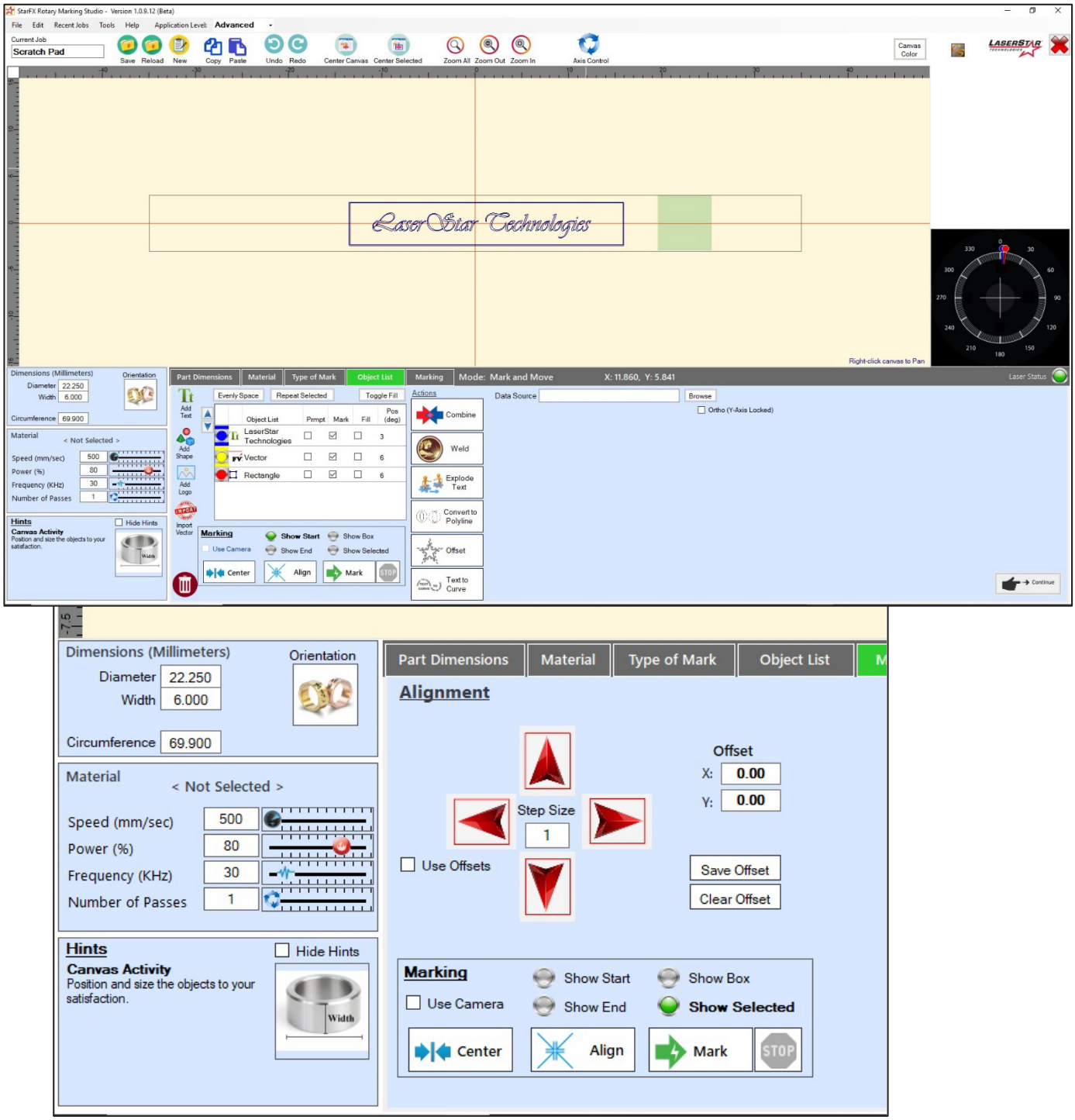
Example of eliminating a hot spot where the points of the “W” are too close together by spreading out the area of concern.

**Convert to Polyline: Making Text editable.**



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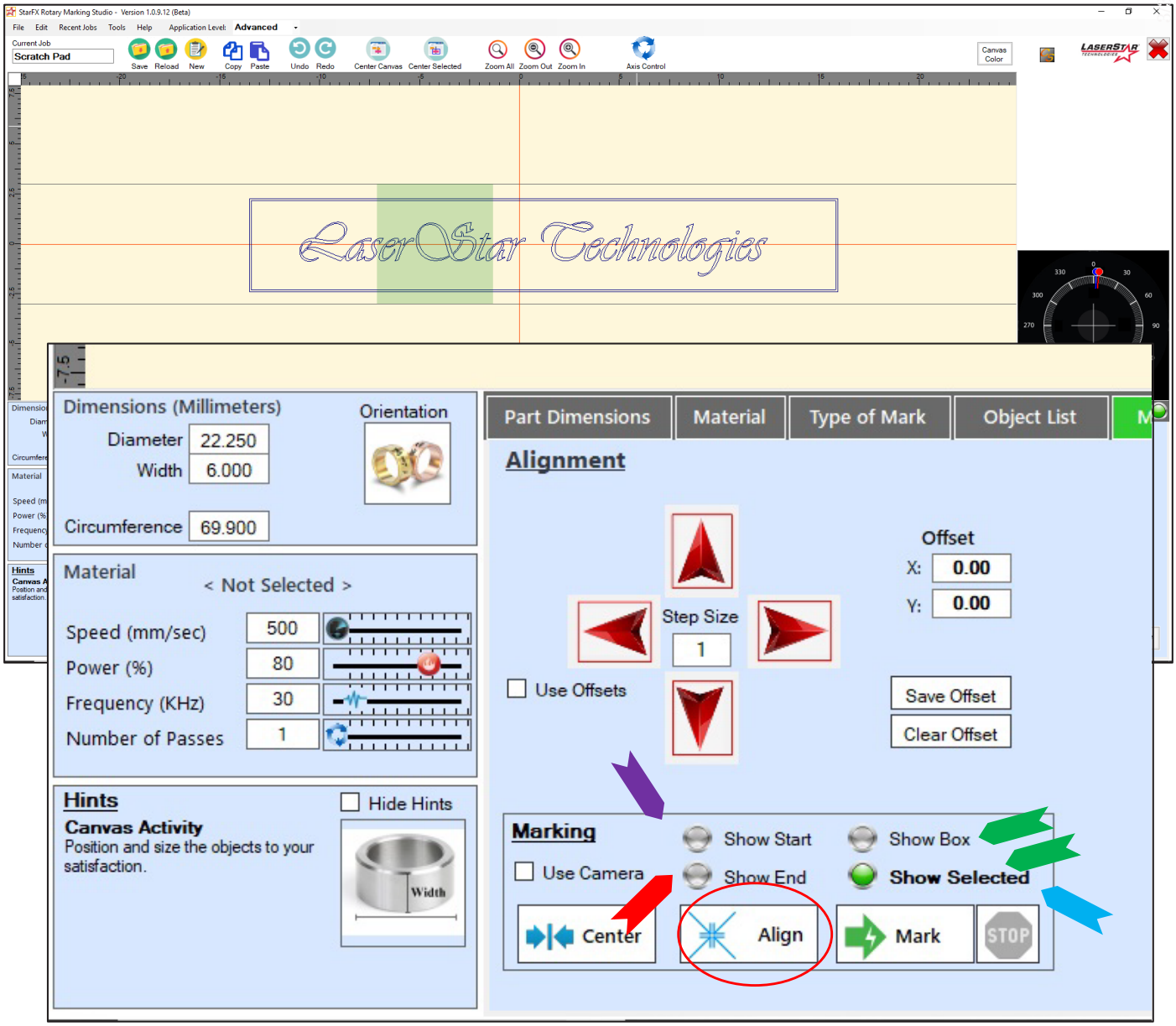
# STEP 5: MARKING THE PART




The Marking Tab has many useful features to discuss that aid in producing a quality mark in the correct location on your part..

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# STEP 5: MARKING THE PART




We will start with **Alignment**, this usually involves using the Red Tracing laser which is safe to look at with the door open.

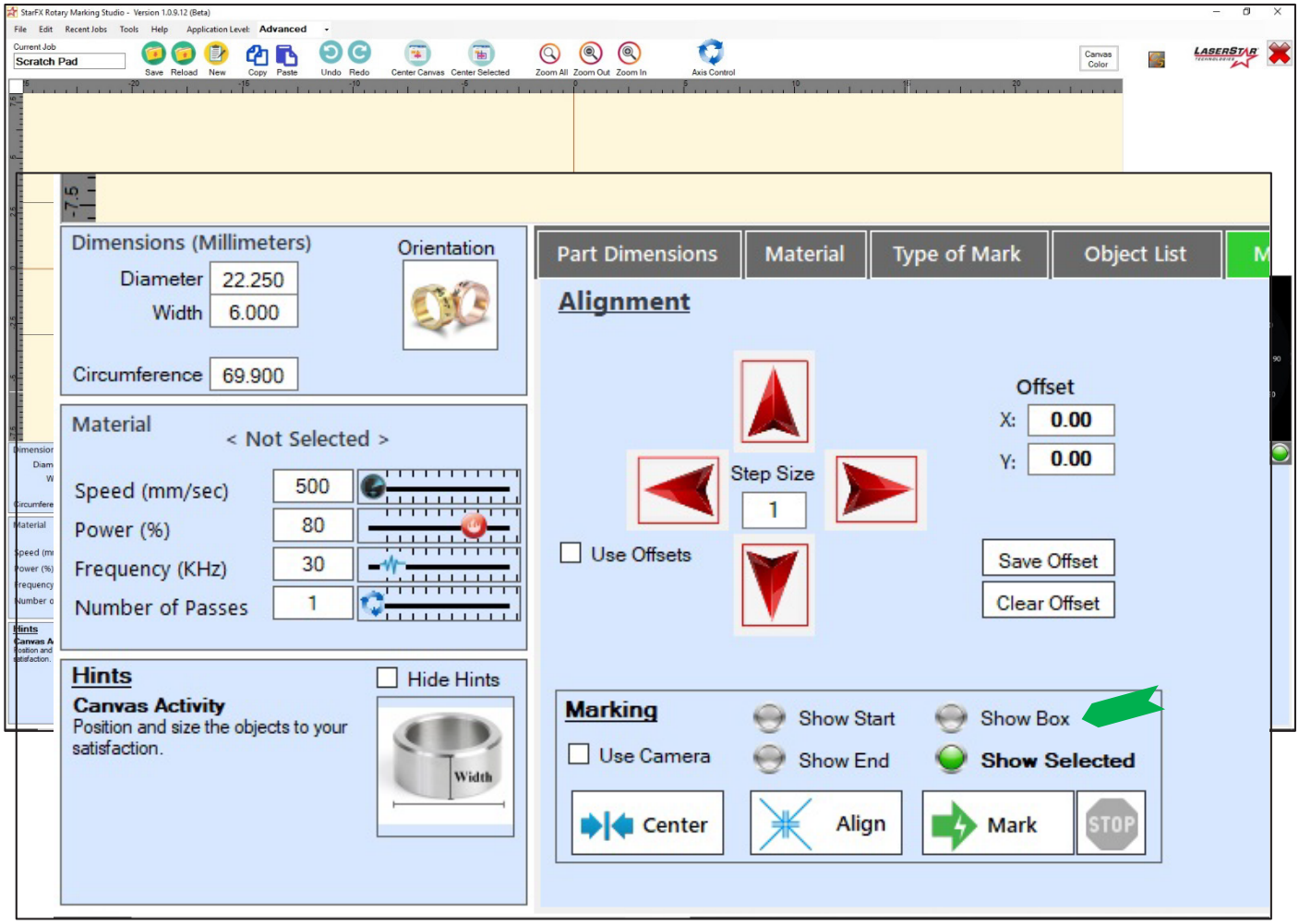
There are four modes you can use with this option –

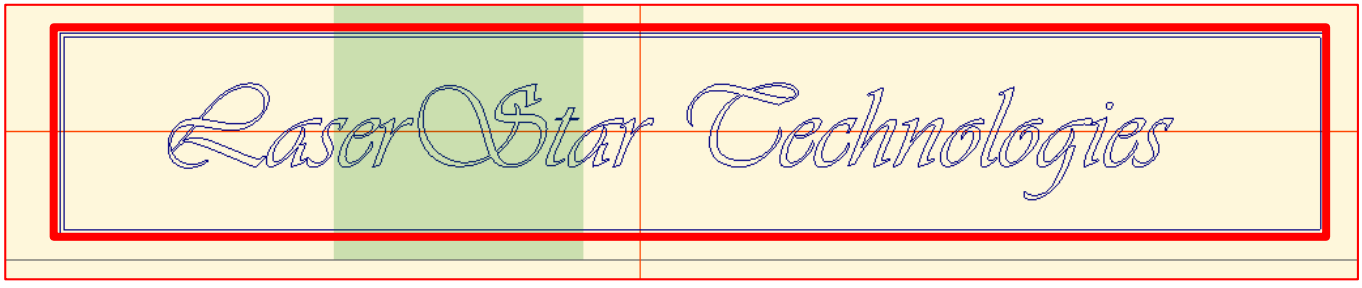
1. Draw a Box around all of the objects – Show Box.
2. Move the rotary and draw each object just like it will do when it marks.
3. Rotate to the starting position and show a red line.
4. Rotate to the ending position and show a red line.



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# STEP 5: MARKING THE PART

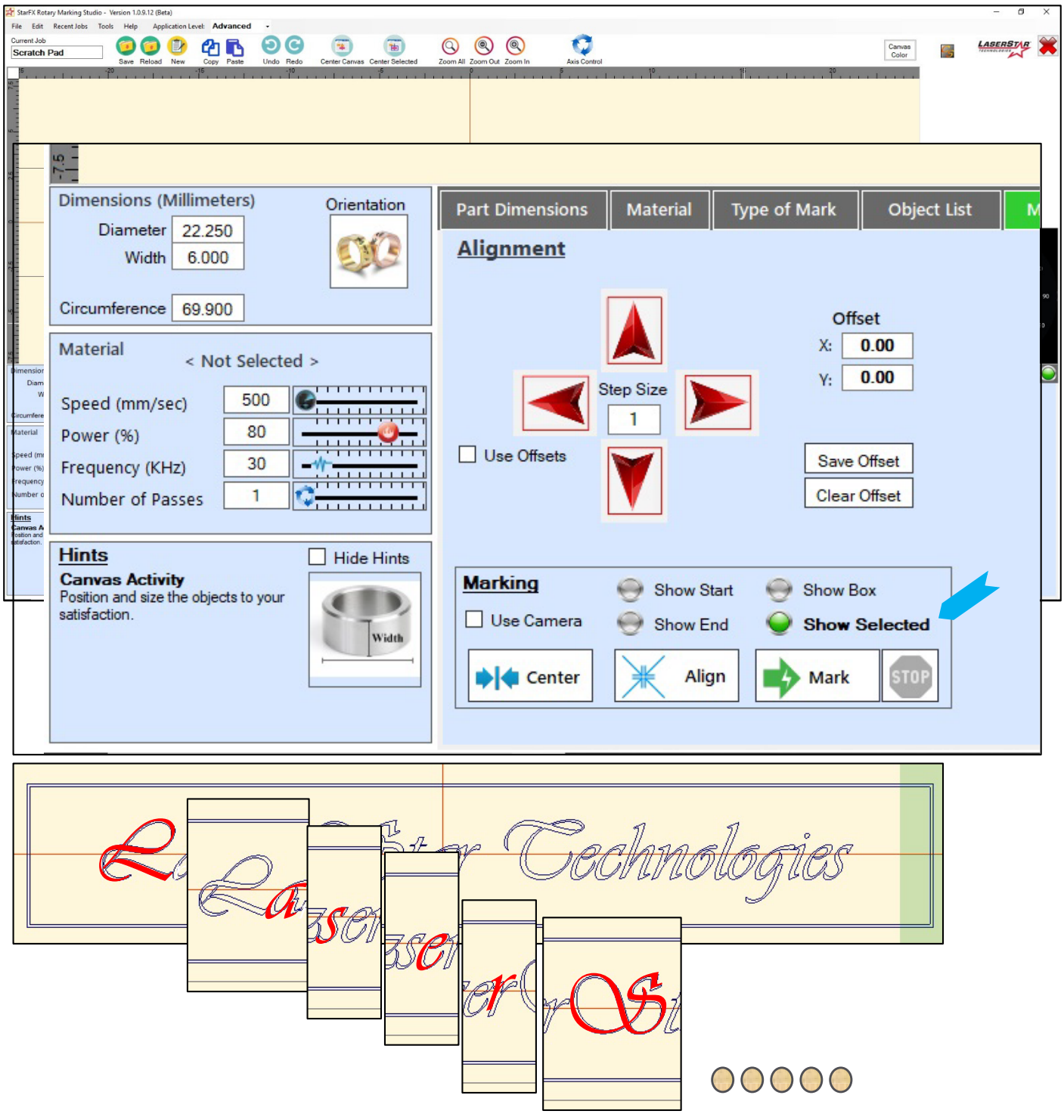



Draw a Box around all of the objects – Show Box.

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# STEP 5: MARKING THE PART

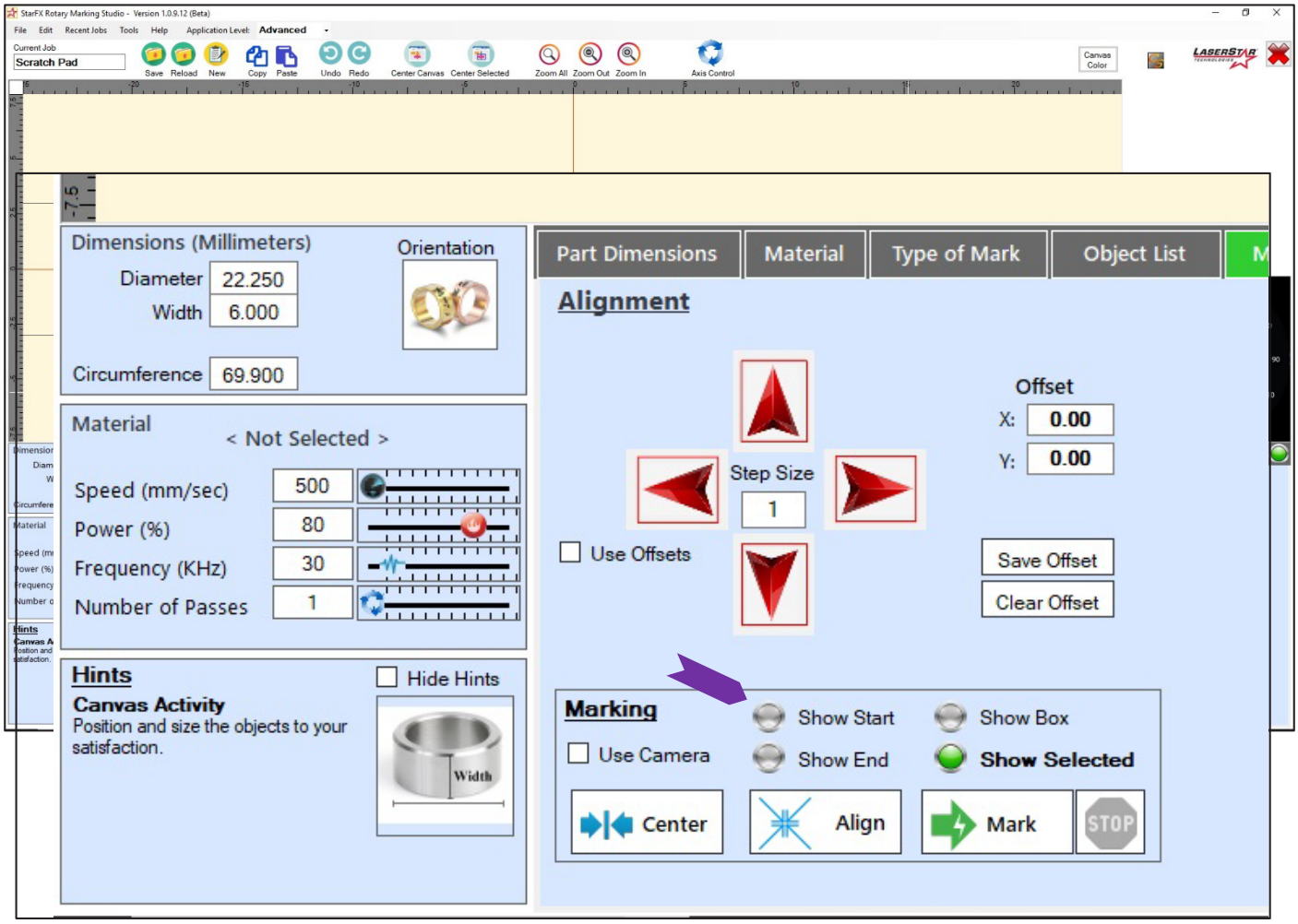



Move the rotary and draw each object just like it will do when it marks.



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# STEP 5: MARKING THE PART



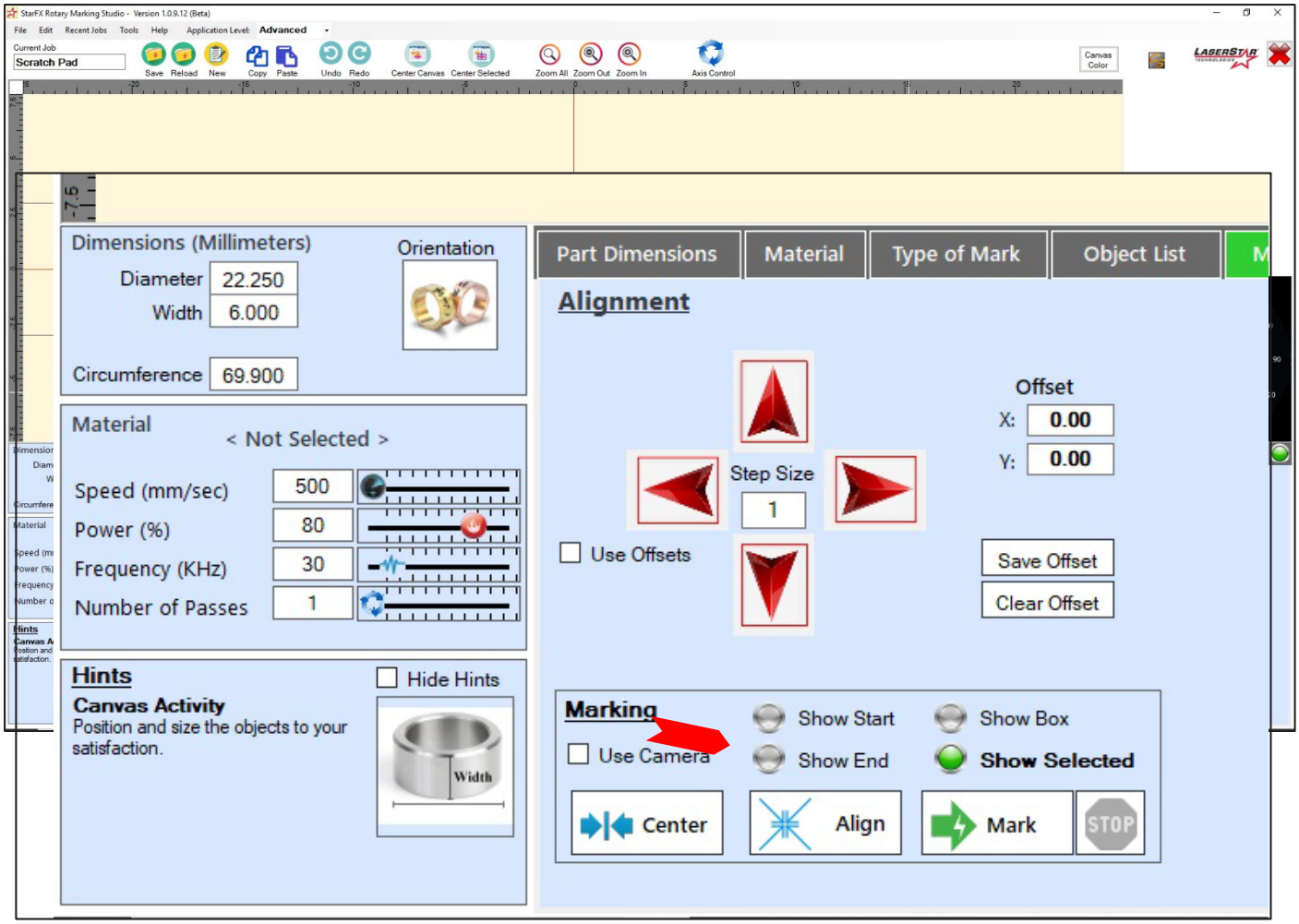


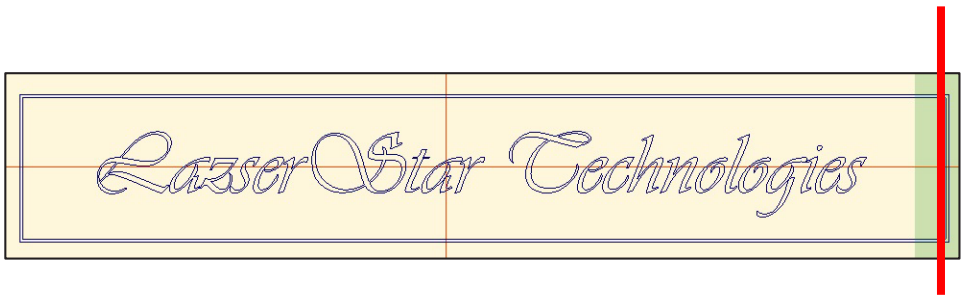


Rotate to the starting position and show a red line.

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# STEP 5: MARKING THE PART



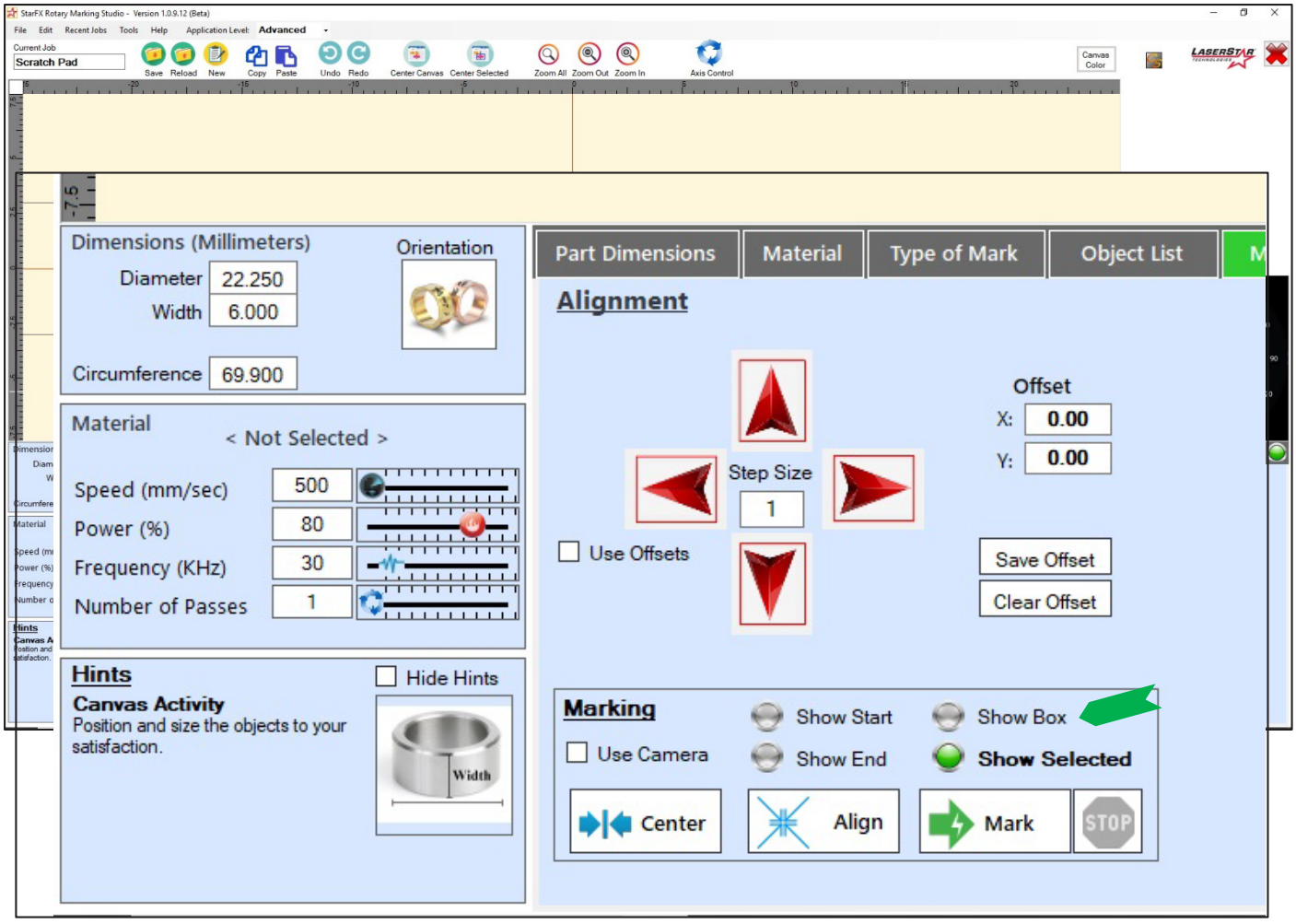



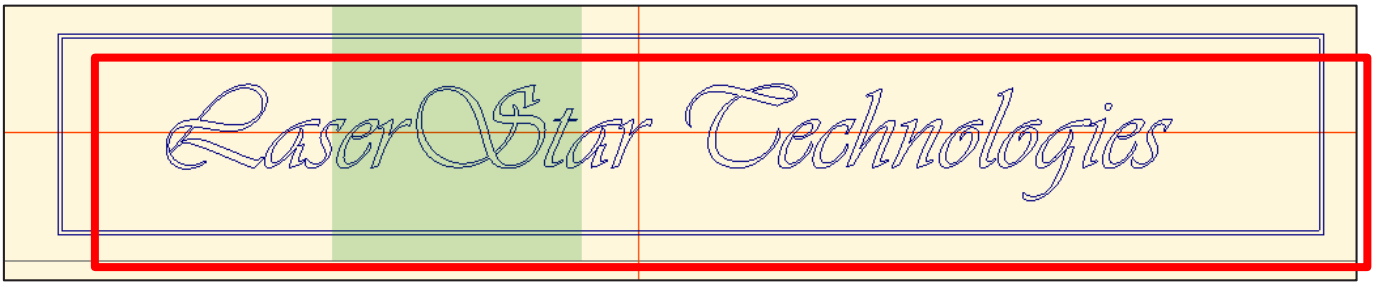

Rotate to the ending position and show a red line.



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# STEP 5: MARKING THE PART



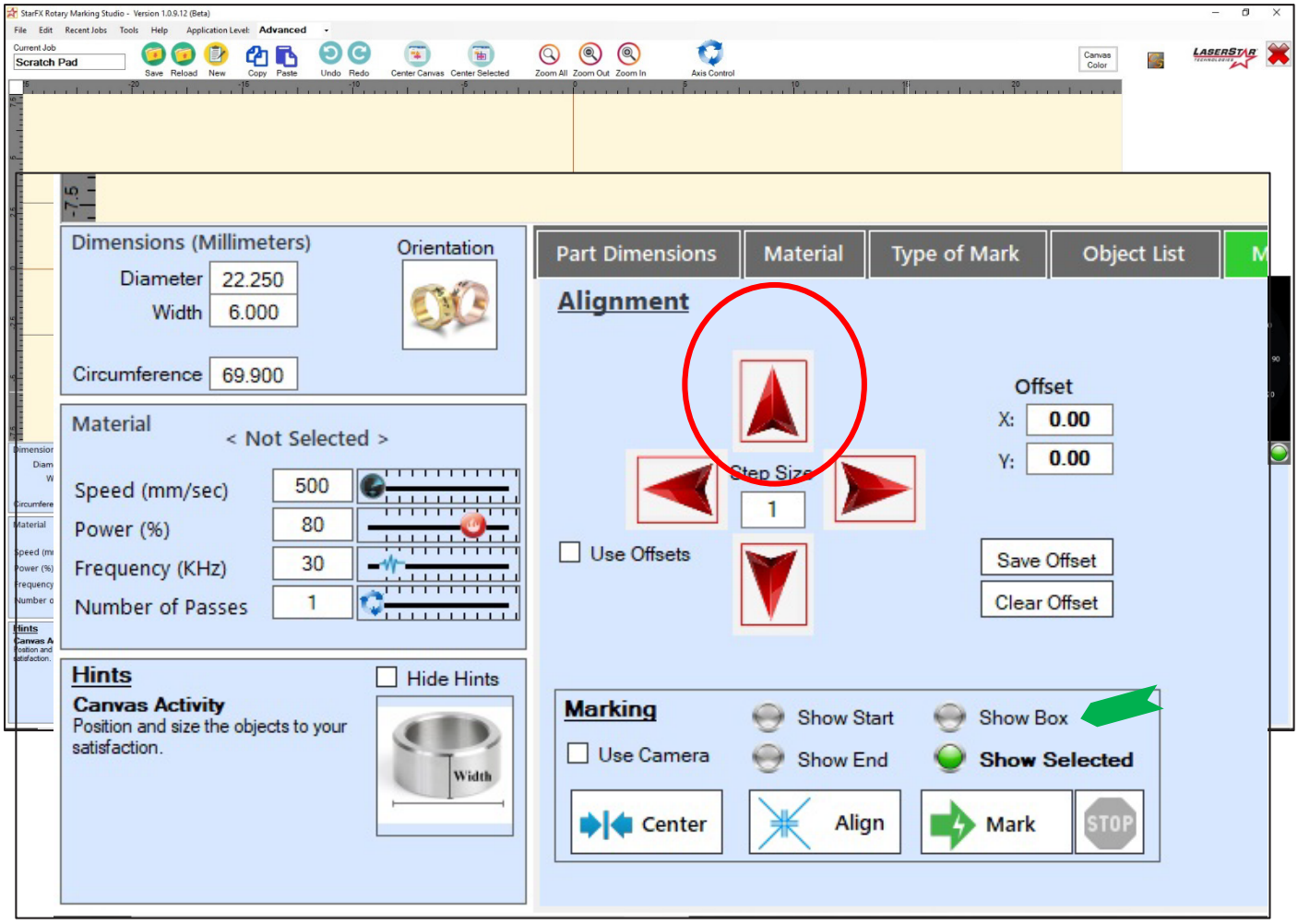



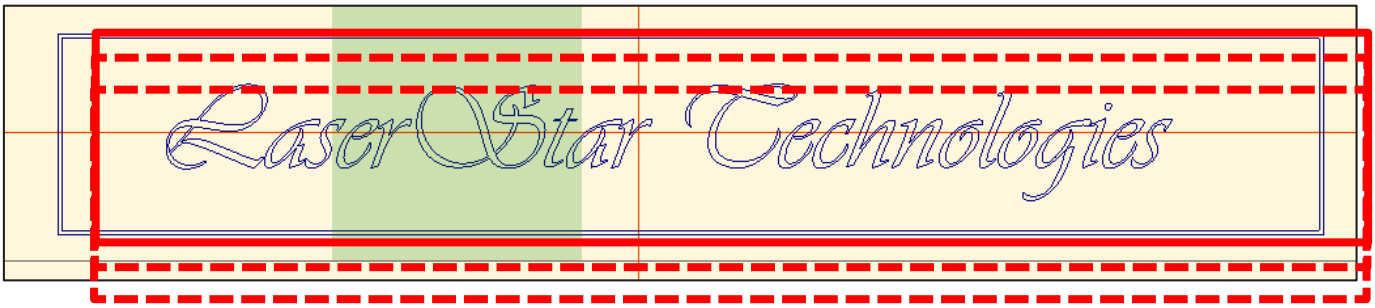

The Red Arrow keys have a very important role different than most alignments on other systems.

By moving the Arrows you will actually move the marking program.

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# STEP 5: MARKING THE PART



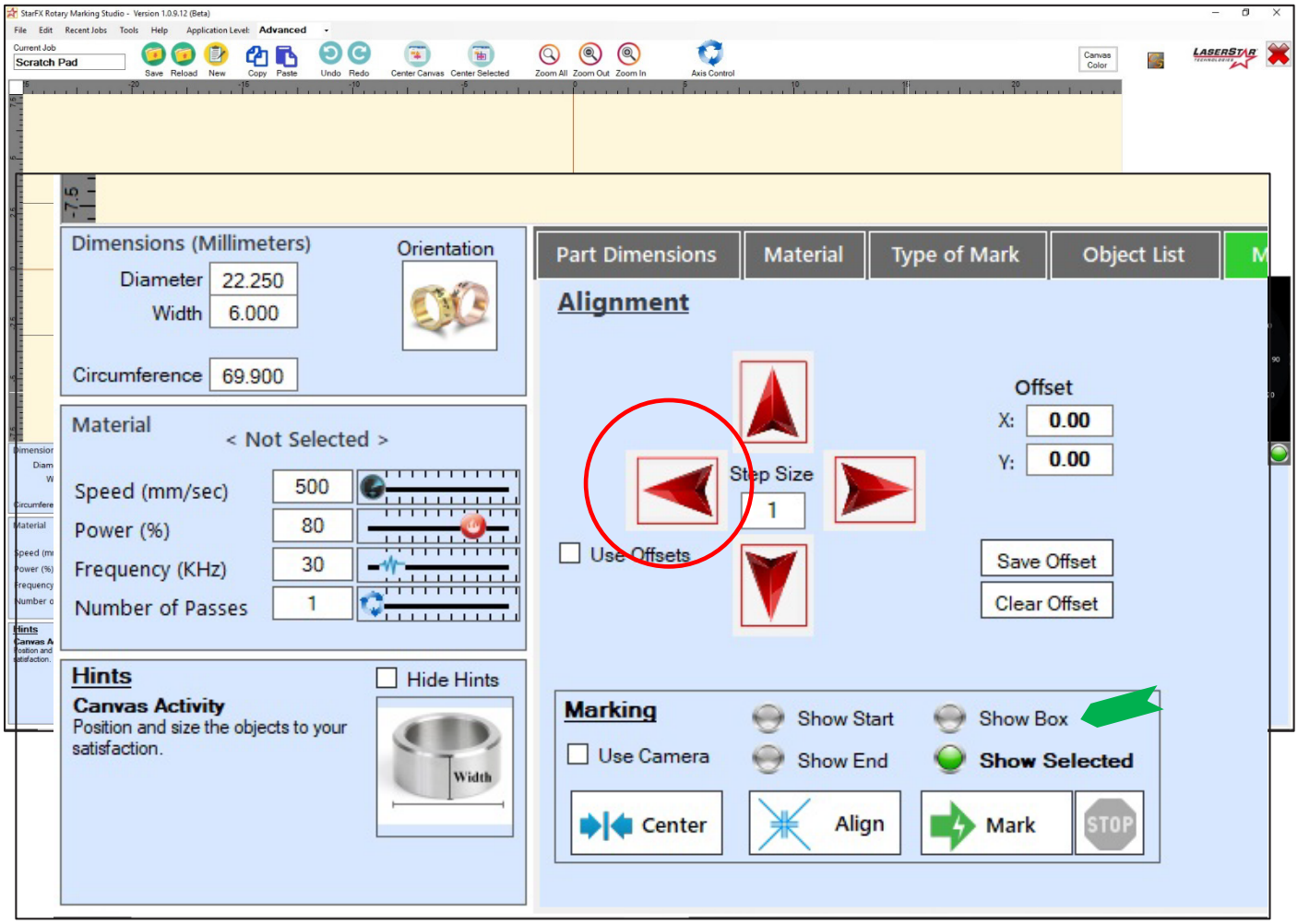

The Red Arrow keys have a very important role different than most alignments on other systems.

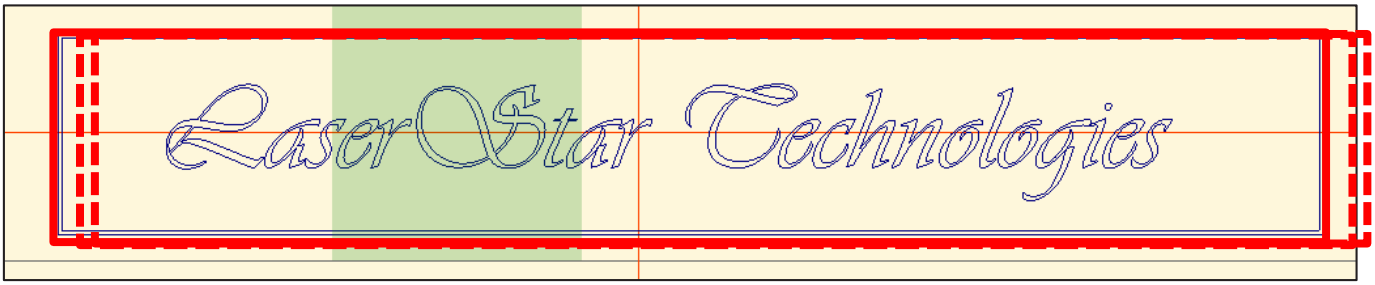
By moving the Arrows you will actually move the marking program.



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# STEP 5: MARKING THE PART

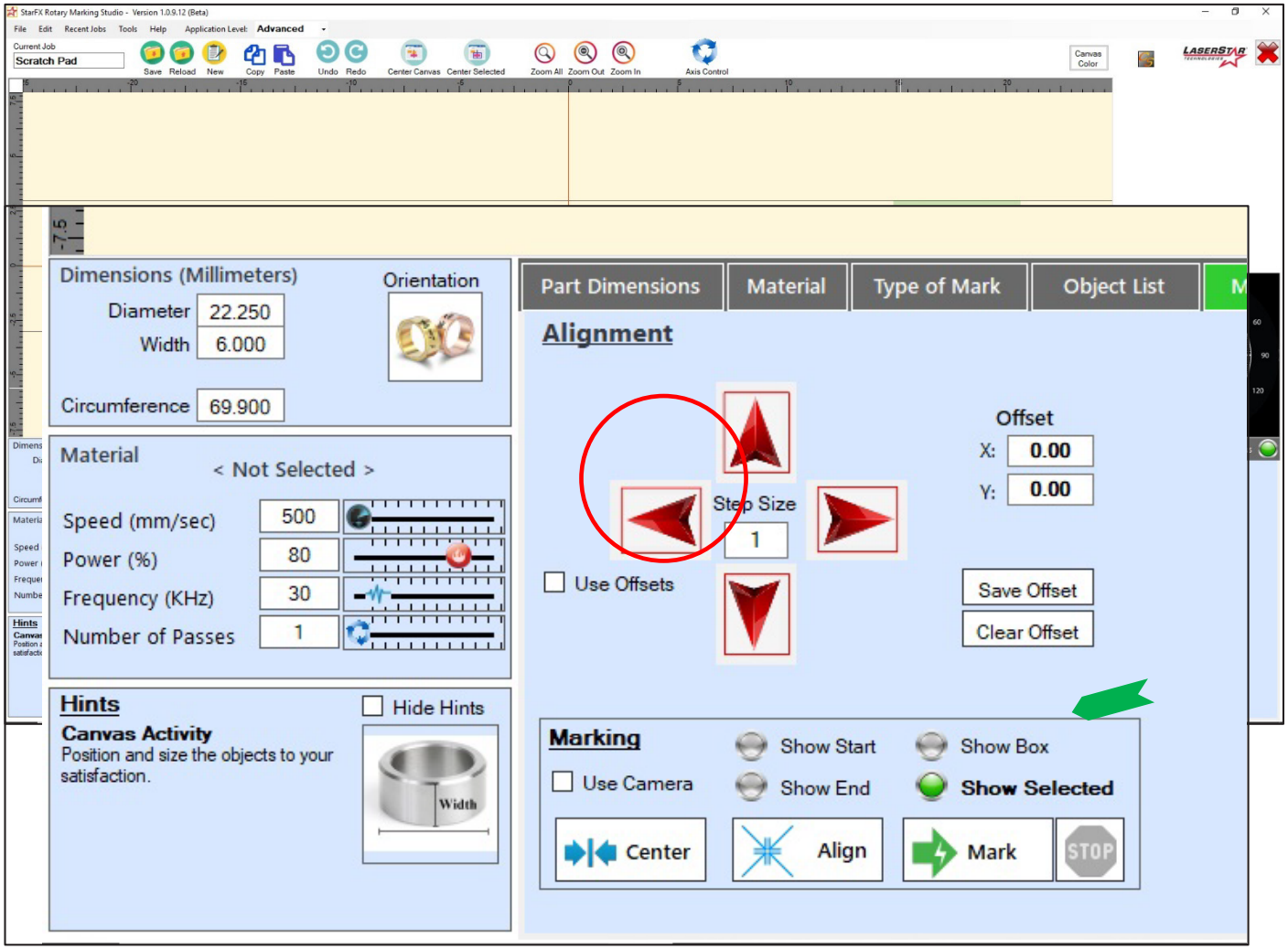



The Red Arrows will literally move the program until you get a perfect alignment, NO M ORE HAVING TO ADJUST THE PART.

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# STEP 5: MARKING THE PART





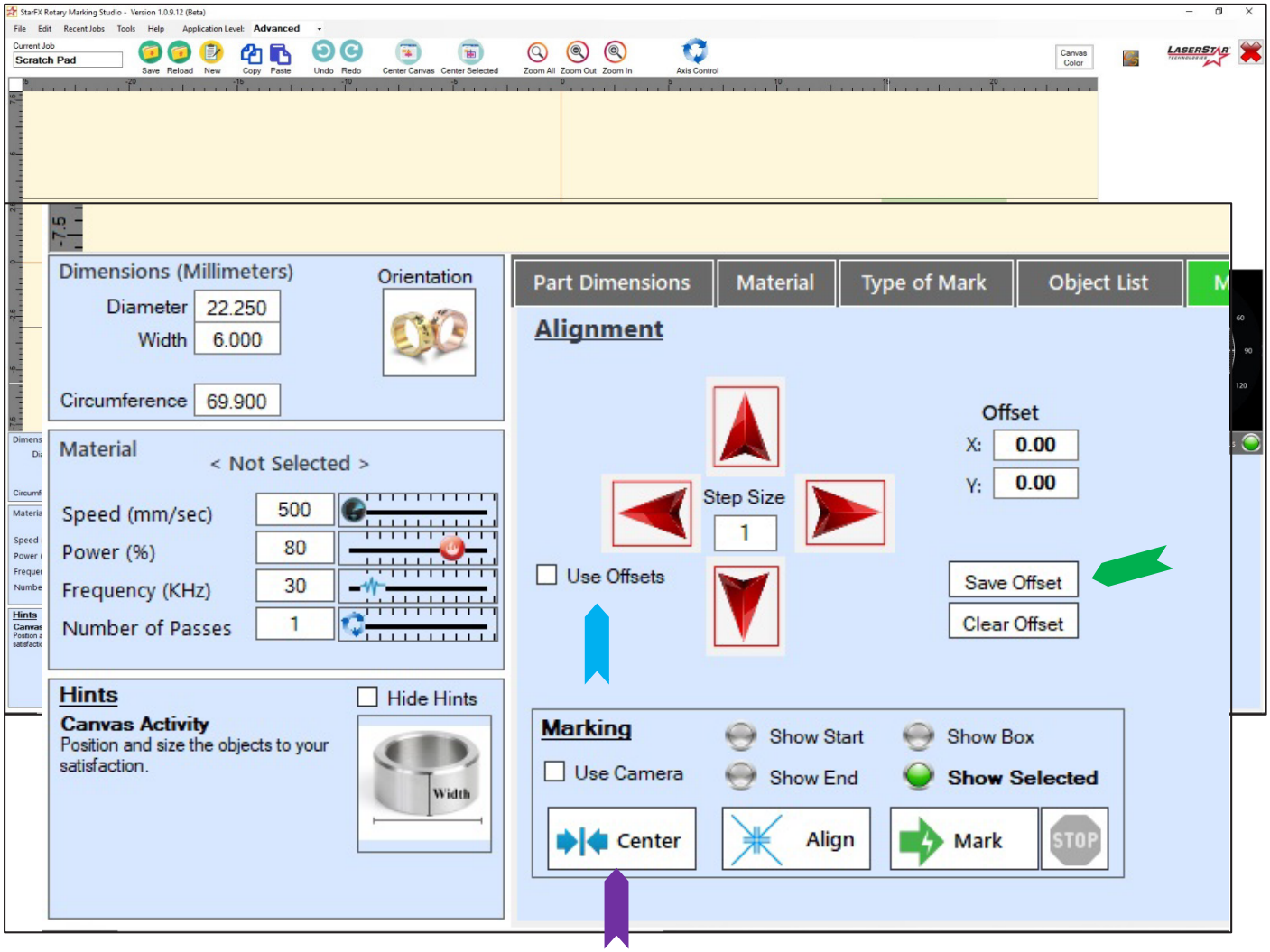

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There is also an Option (not discussed in this manual) for a “Thru the Lens” camera in which you can move the actual program on the camera image of the part.



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# STEP 5: MARKING THE PART



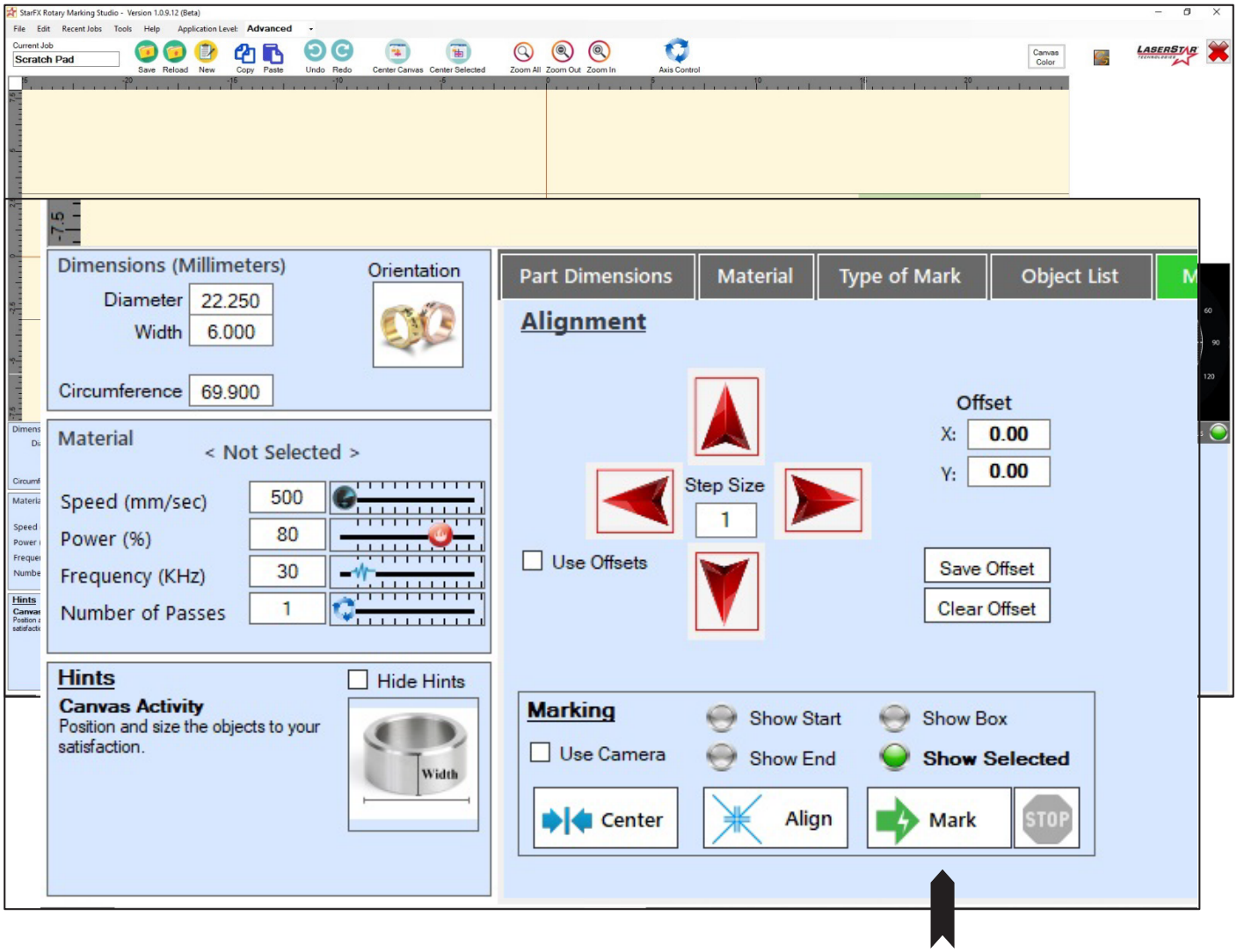

There are a few remaining items to point out.

1. You can save the Offset you come up with to this program if you think it will be permanent such as aligning to a new fixture.
2. You can also ignore the Offsets even if you did save them.
3. You can display a Red Line at the center if the lasing area, this can be useful when aligning a fixture or to align a specific section of a part such as the gemstone so the marking goes around it.



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# STEP 5: MARKING THE PART




The “last but not least” is the Mark Button which is self explanatory.



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# COLORS MODULE

CLICKABLE CONTENT


INTRODUCTION

LENS SELECTION

IMPORTING DXF VECTOR FILE

LAYERS

CREATING THE RECIPE

TEXTURE ADJUSTMENTS

CREATING YOUR OWN COLOR TEXTURE

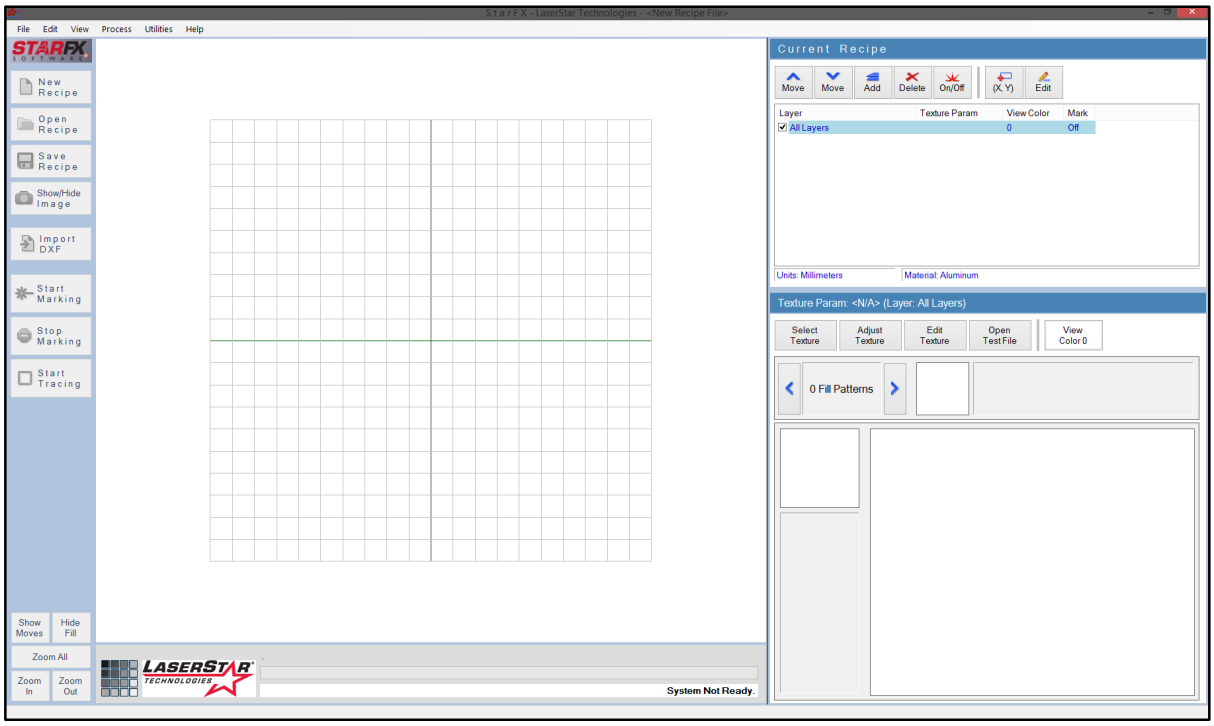
RUN FEATURES

FINAL ADVICE




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# INTRODUCTION



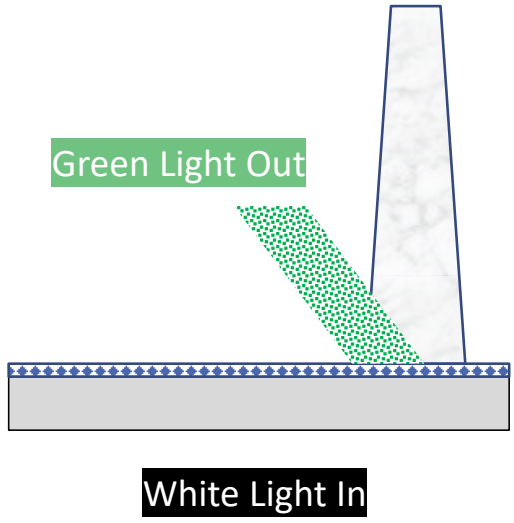

This Manual is structured as a step by step sequence from start to finish of all of the steps required to create a “Recipe” using either the supplied twelve (9) Colors or any Colors created by the user.

It does not cover specific processing parameters but more how to utilize the tools and features of StarFX COLORS.

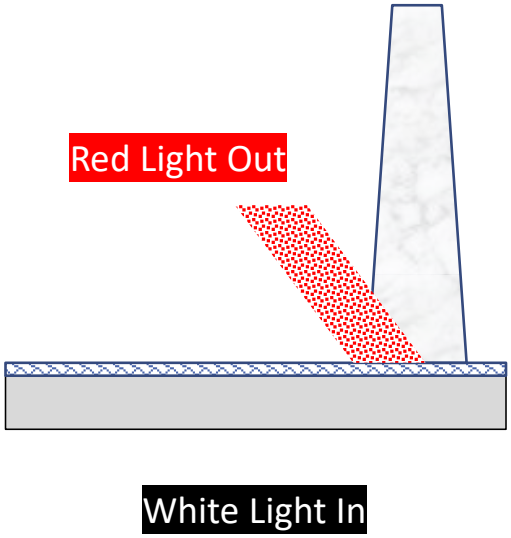
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# INTRODUCTION

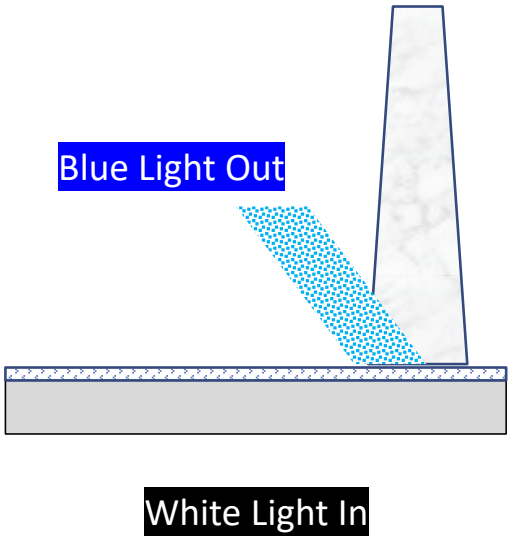
How do Colors work in Laser Engraving?




Oxidation is a process that occurs on some materials when oxygen and the right amount of heat are present.



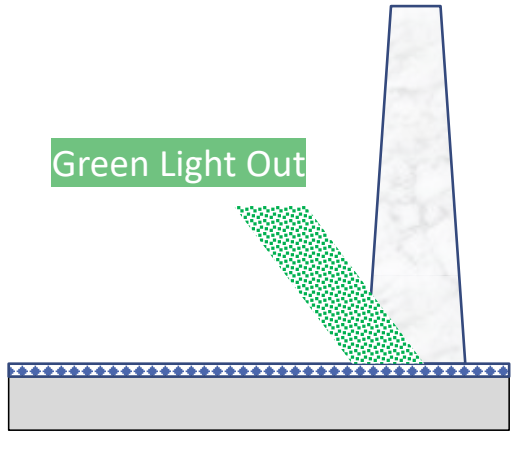

With different amounts of heat in different time intervals this process changes the surface of the parent material in such a way that it reflects a different wavelength of light.

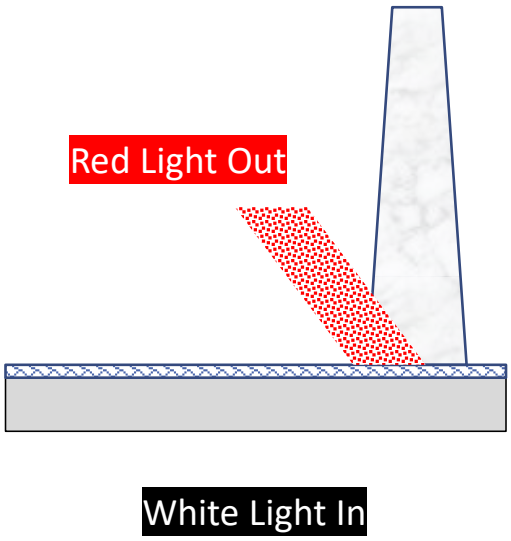


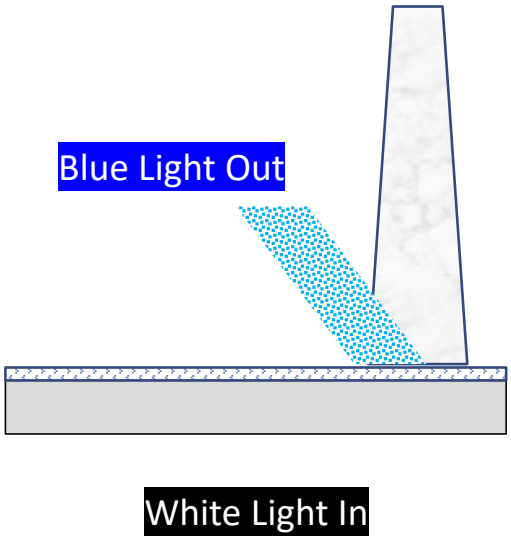



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# INTRODUCTION




**LaserStar Technologies** has spent years of research and development in determining the five or six parameters and their specific settings that can reliably produce colors on various materials.

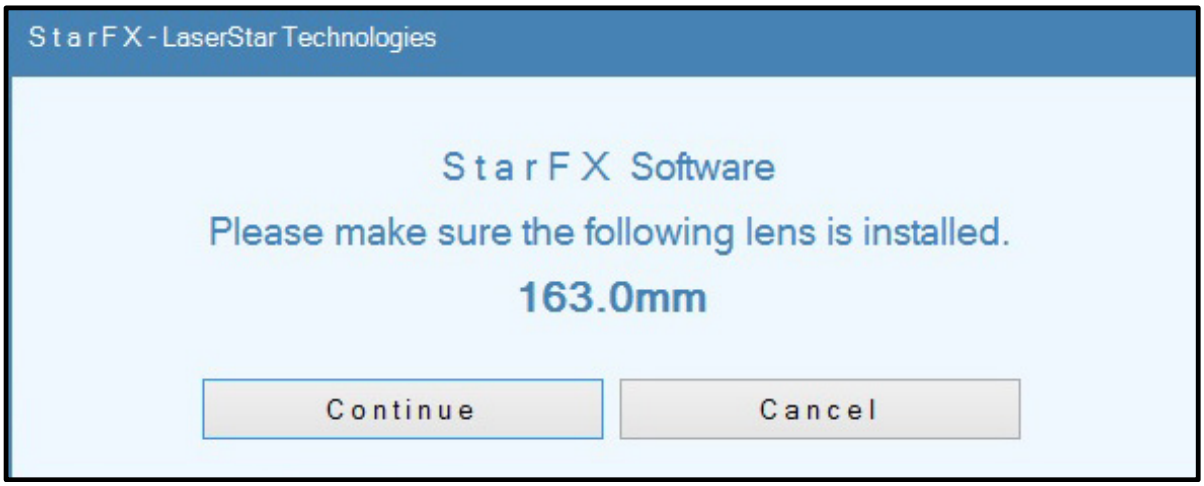
We have done that for over six different laser types and have provided these in our StarFX COLORS  product.

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# LENS SELECTION

All StarFX software starts out by asking you to select from a choice of lenses that are available on your system.

The choices will only show lenses that are appropriate for the current process and that have been installed on the system.



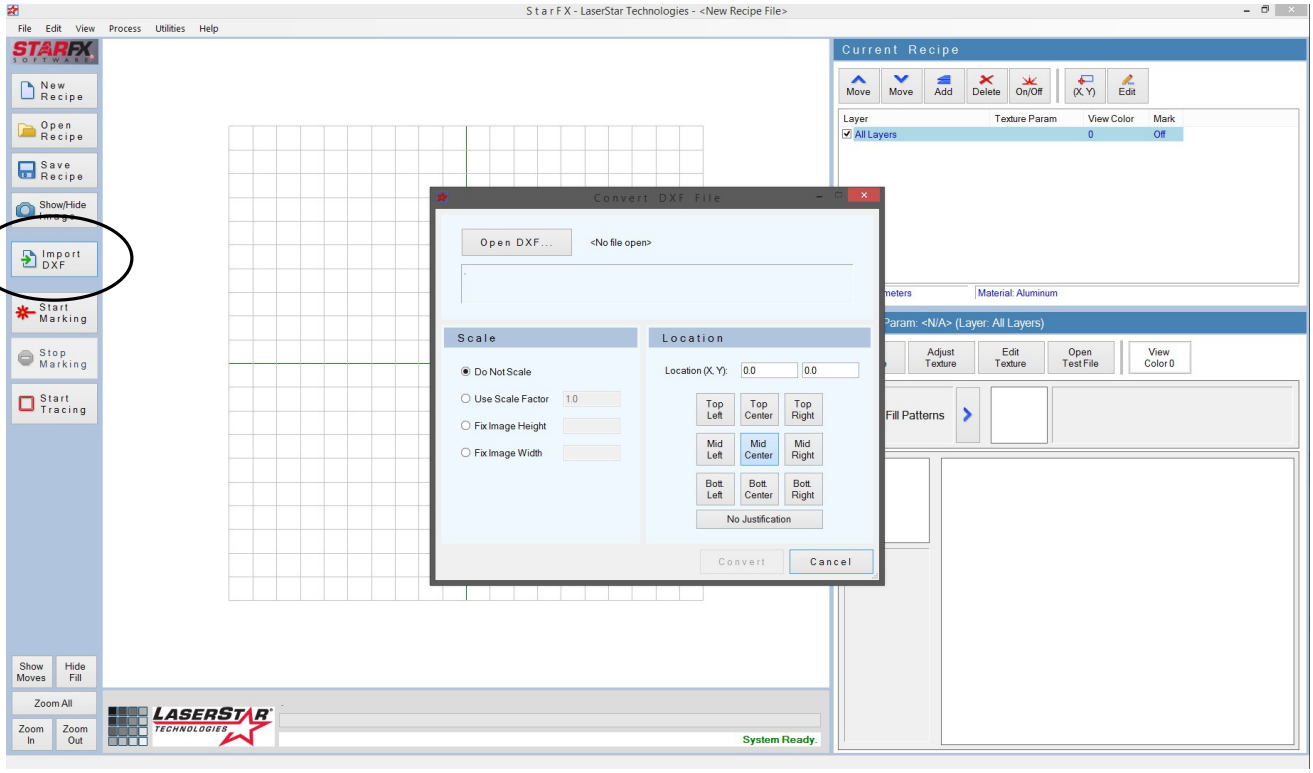

The lens for COLORS processing is typically the 254 mm focal length lens for optimum COLORS use and development.



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# IMPORTING A DXF FILE

We start the process by Importing a DXF file that has been created specifically for StarFX Premier COLORS. This will have parts of the image on various layers that will represent the different COLORS and their affects on the finished product.

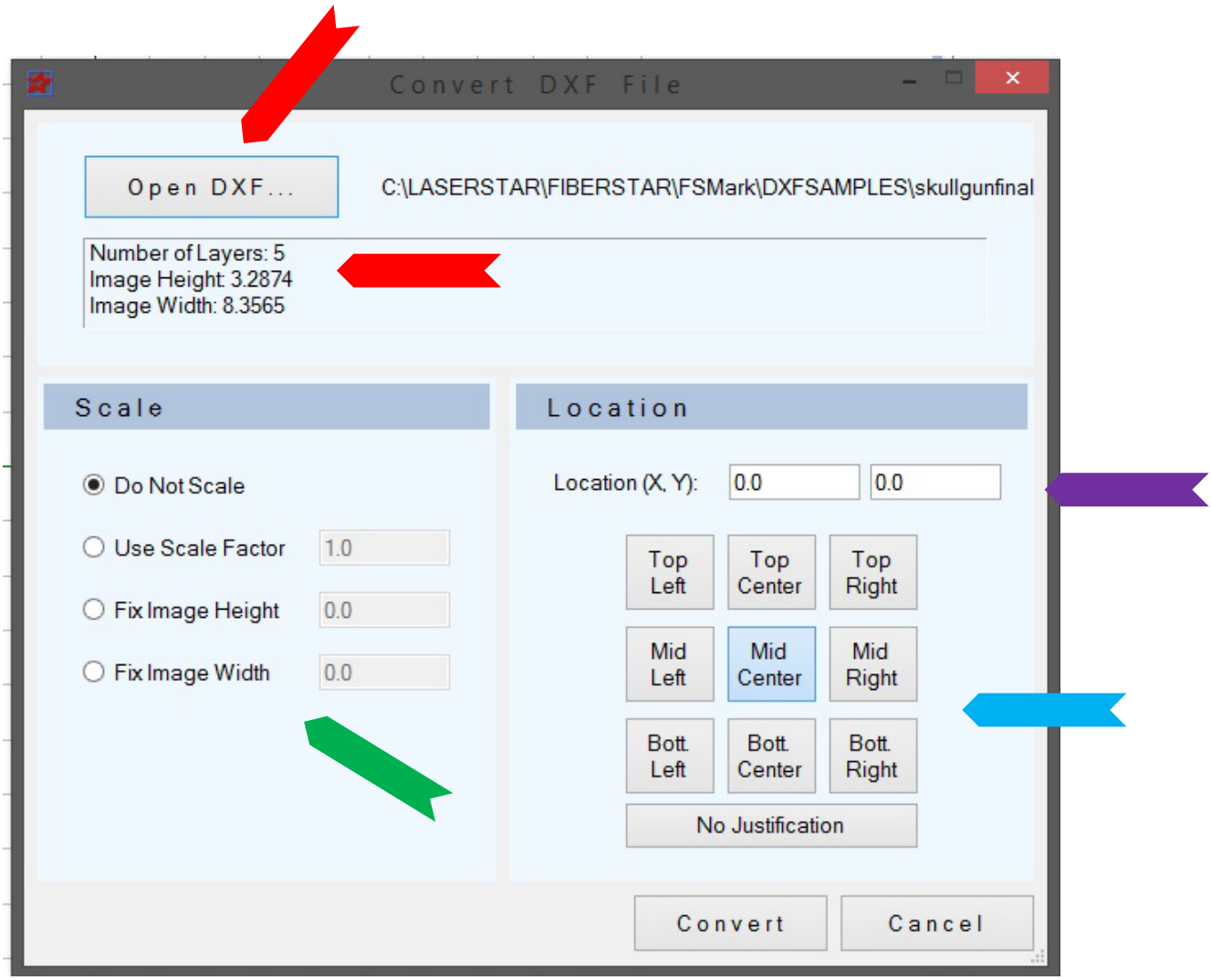



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# IMPORTING A DXF FILE

The Import screen allows you to

1. Select the DXF file, some basic information is displayed about the selected file.
2. Decide if you want to scale the imported vector file or even enter a fixed size to scale to.
3. Enter an XY offset.
4. Select a justification

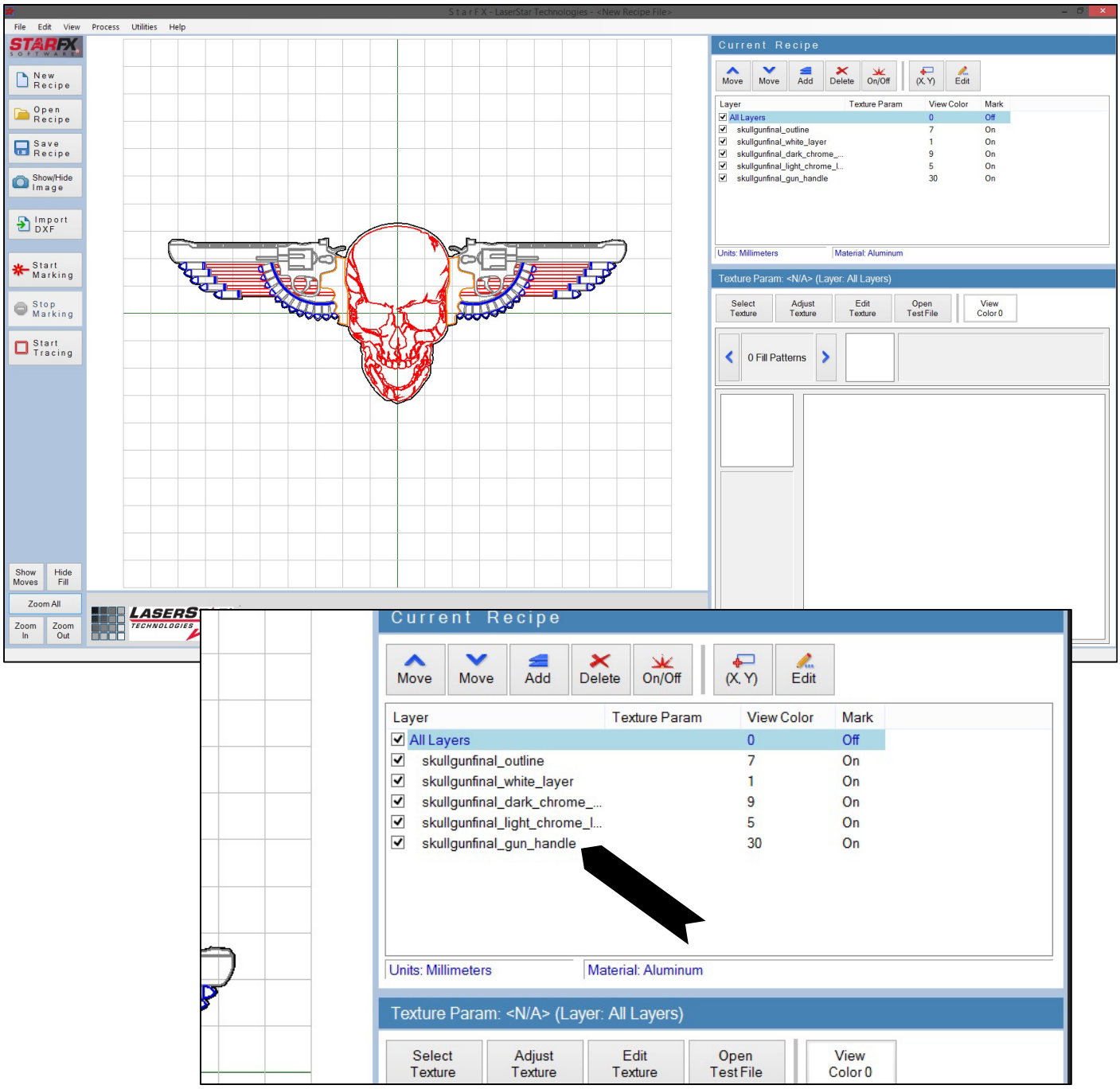





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# LAYERS

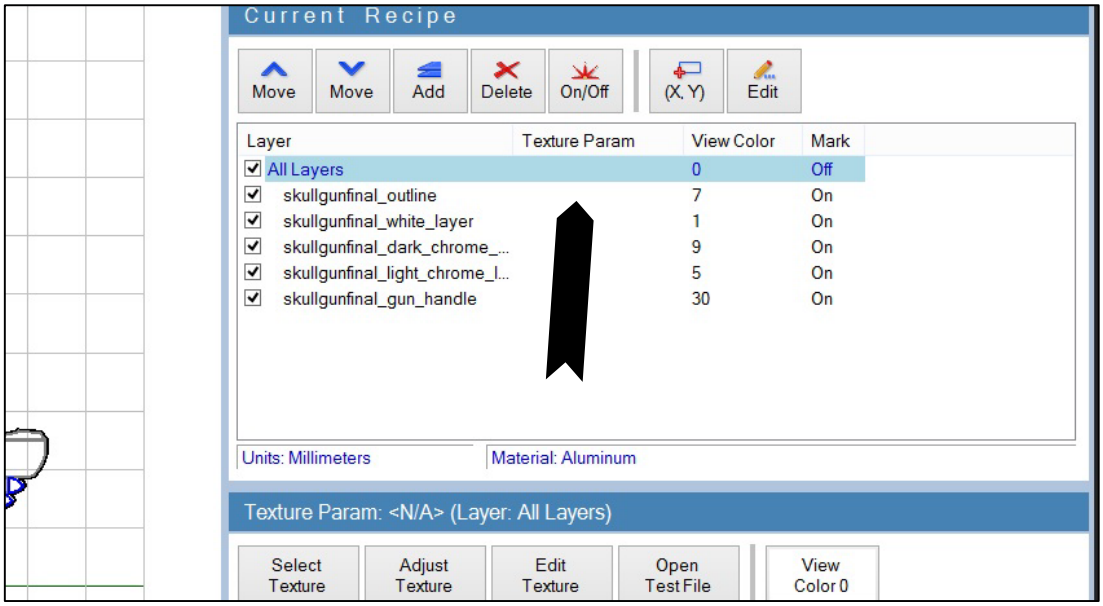
The vector image that is imported is displayed with the same layer numbers, names and colors as the original DXF (CAD) file.

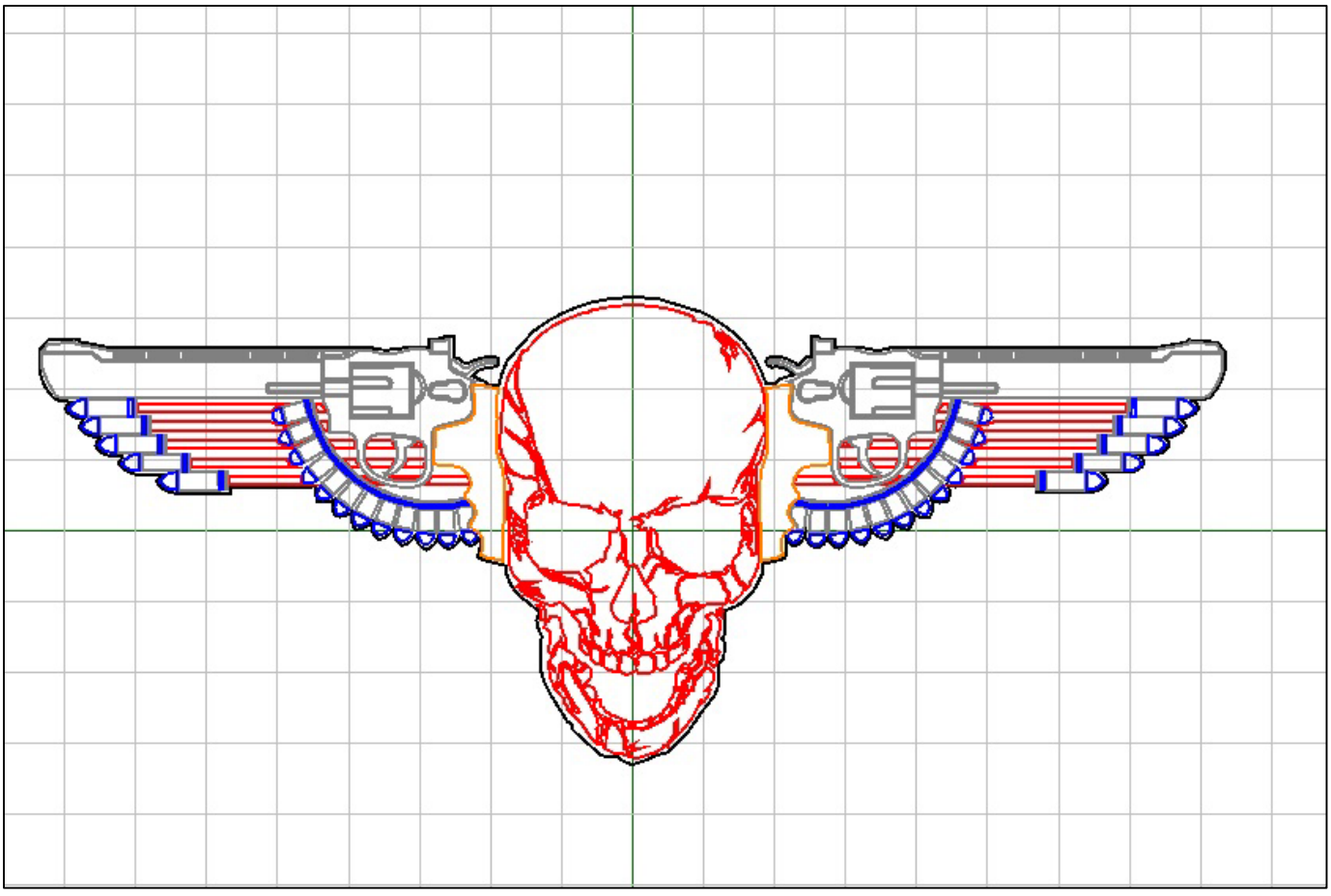



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# LAYERS

Each layer can then be selected and a specific COLOR can be applied to achieve a desired effect.



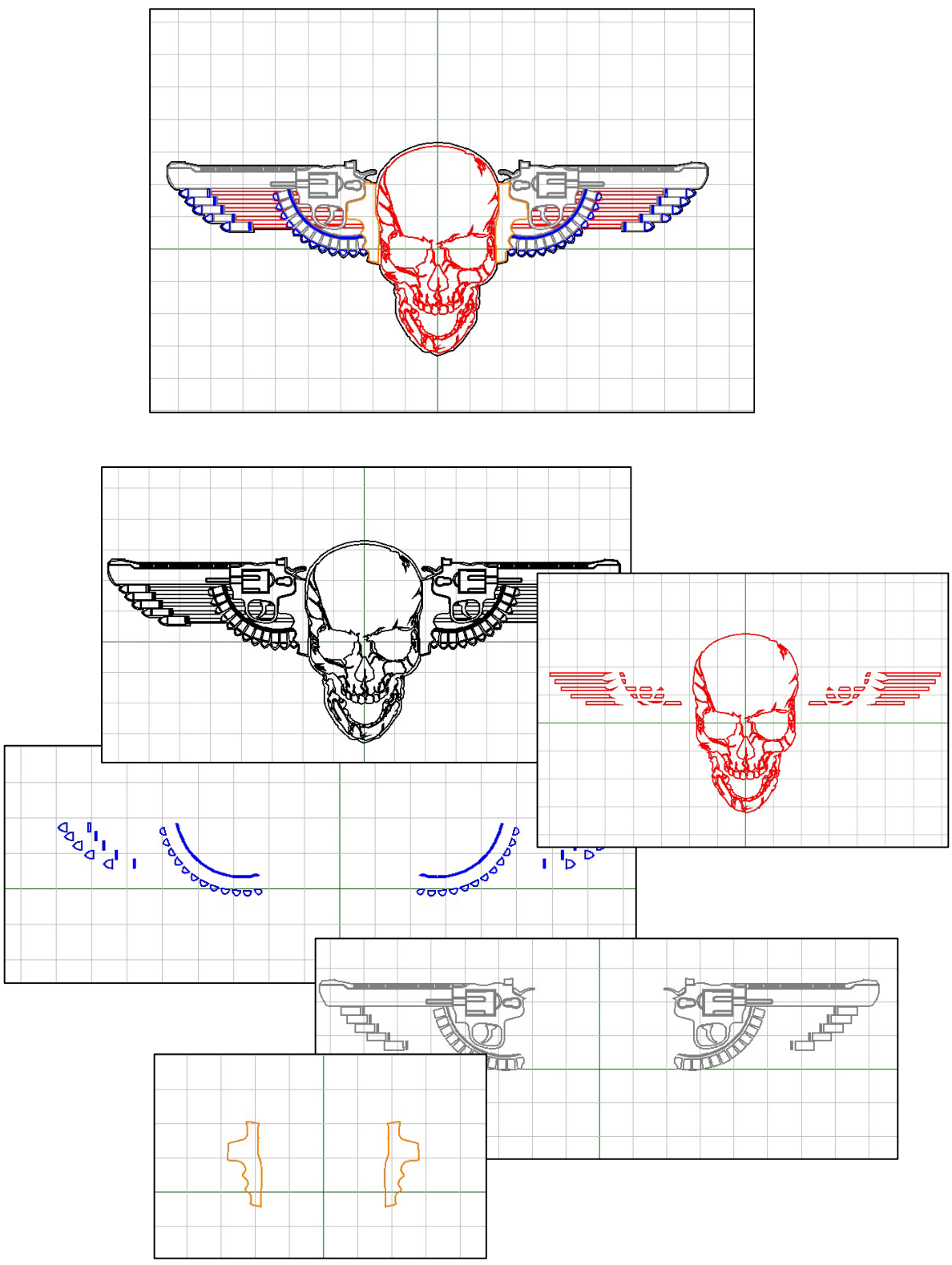





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# LAYERS

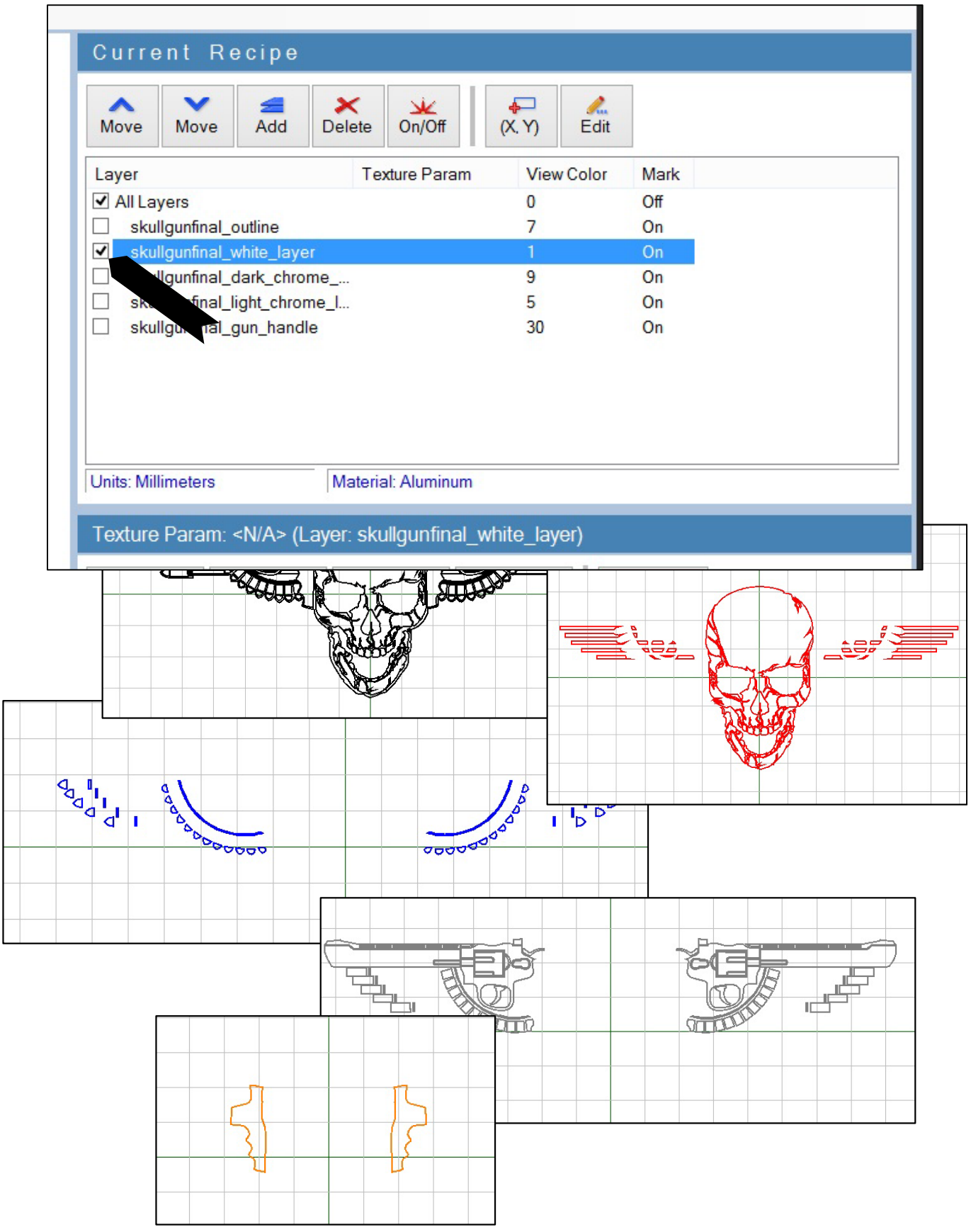
The display of each layer can be turned On or Off to make it easier to know which layer is selected.



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# LAYERS

Checking or unchecking the layer box causes it to be hidden or visible.



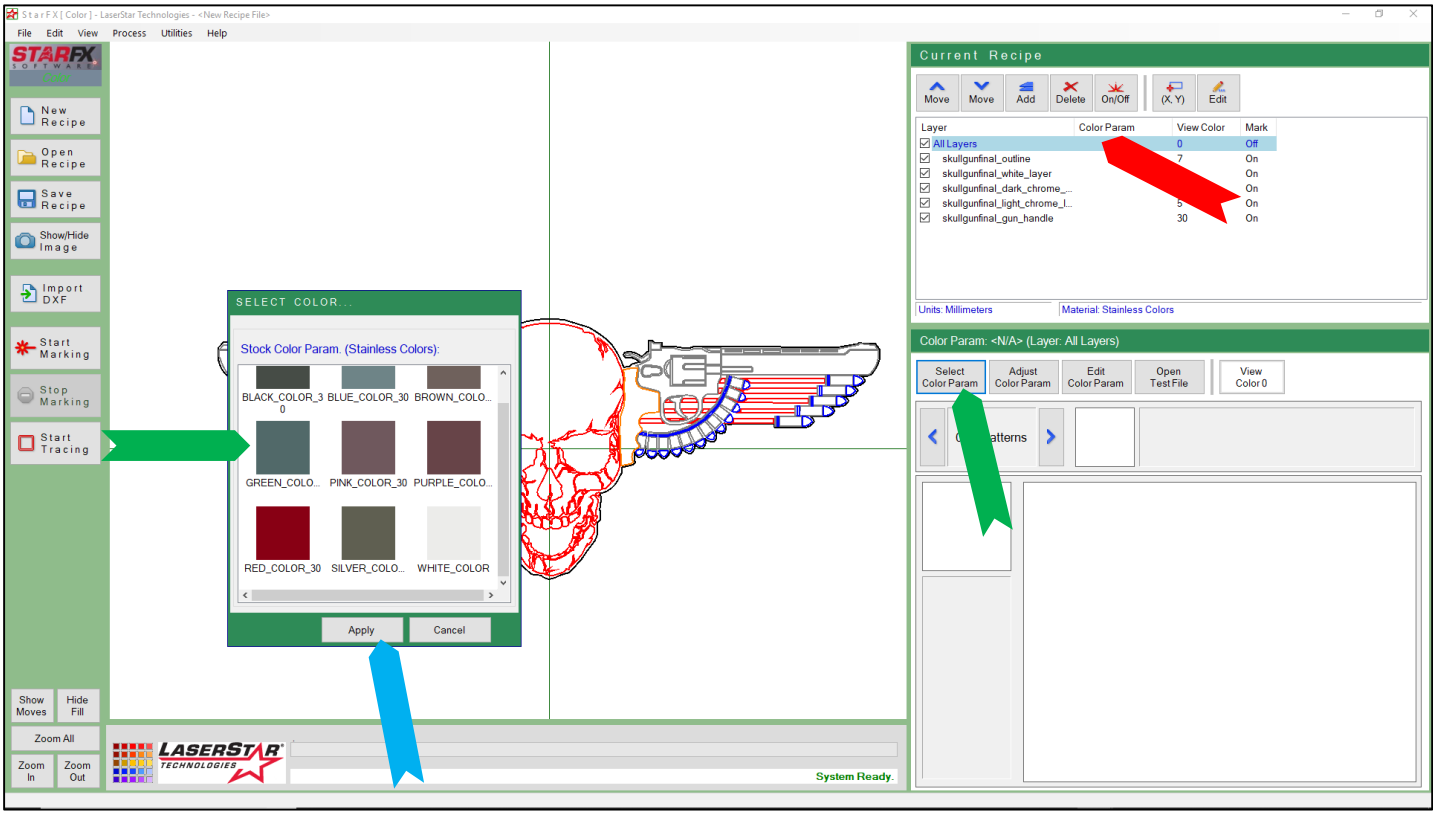



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# CREATING THE RECIPE

The COLORS process begins with the following steps.

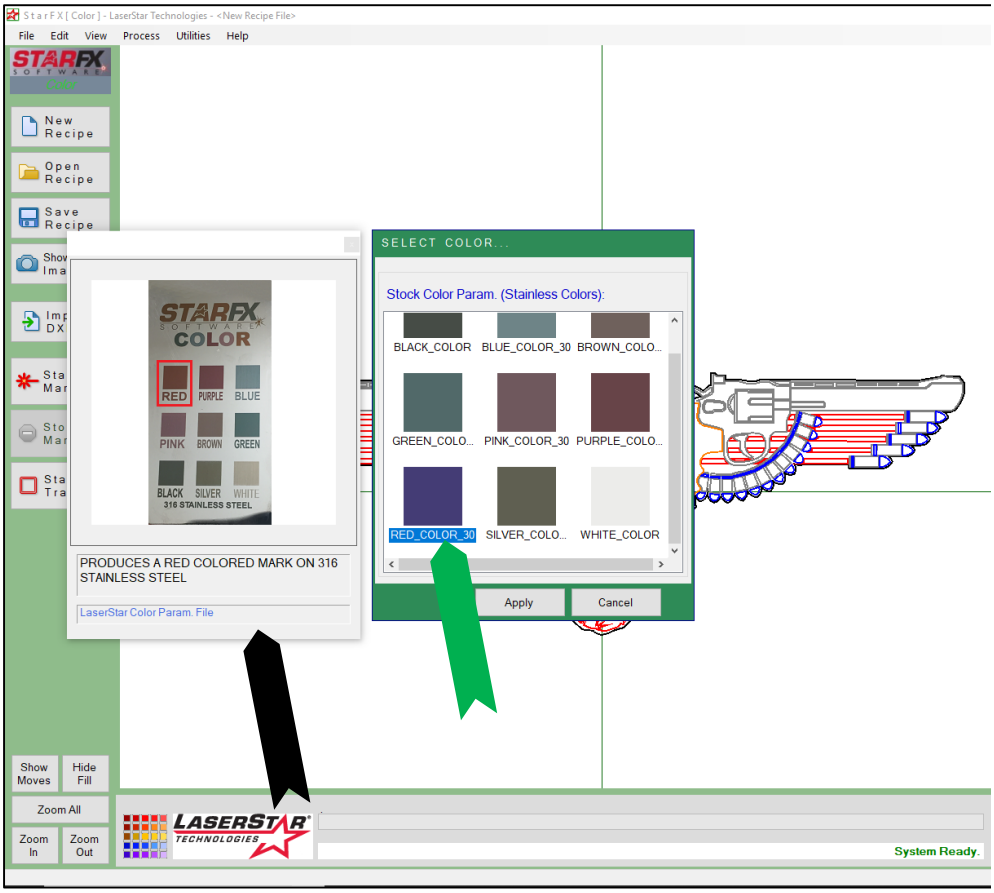
1. Select a layer .
2. Select a COLOR to apply to that layer.
3. After picking the desired COLOR hit the “Apply” button.




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# CREATING THE RECIPE

When you select a COLOR an example will be displayed as to what that contrast might look like.

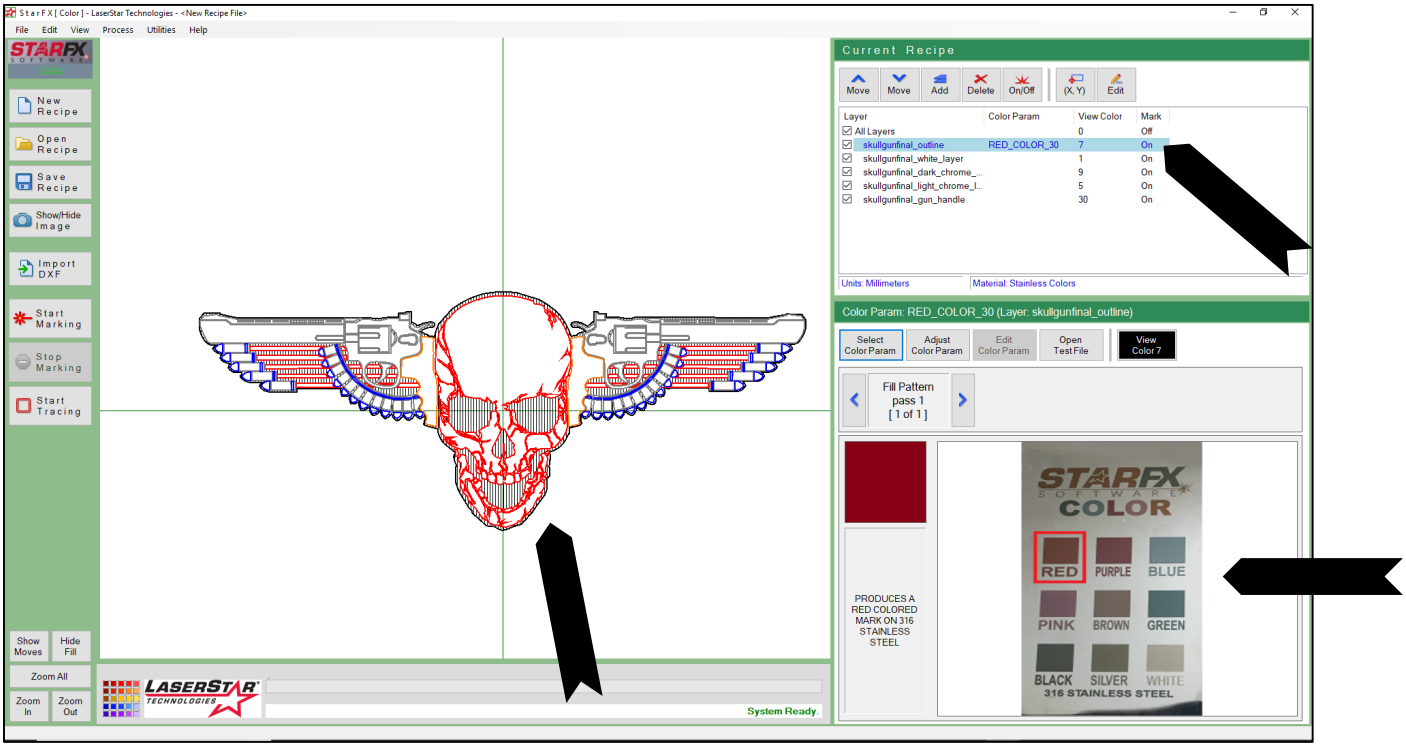





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# CREATING THE RECIPE

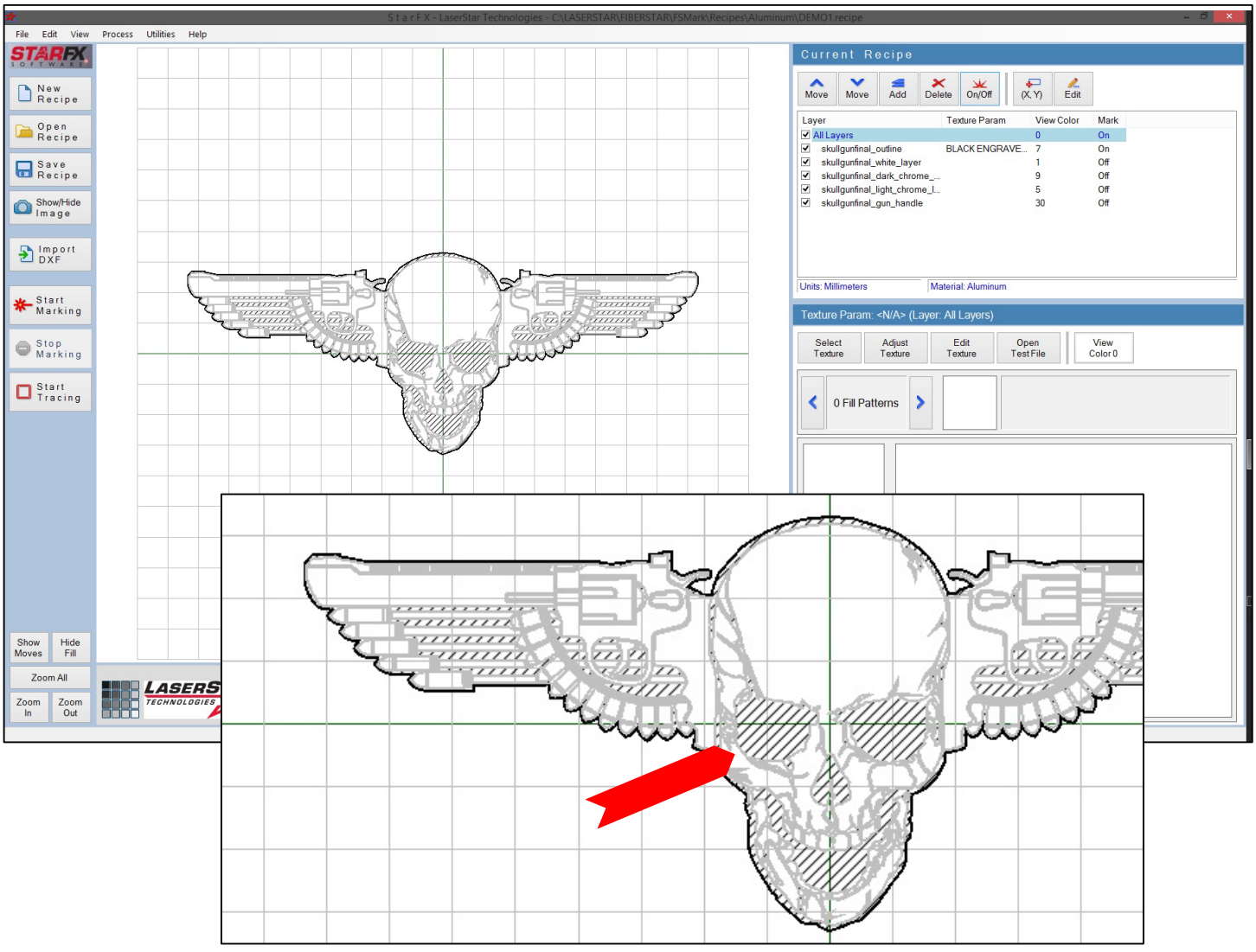
After the Color has been applied it will be displayed as the Color for that layer any time the layer is highlighted.




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# CREATING THE RECIPE

Once a Color has been applied you will see that a fill for that Color has been inserted into the layer on the screen.

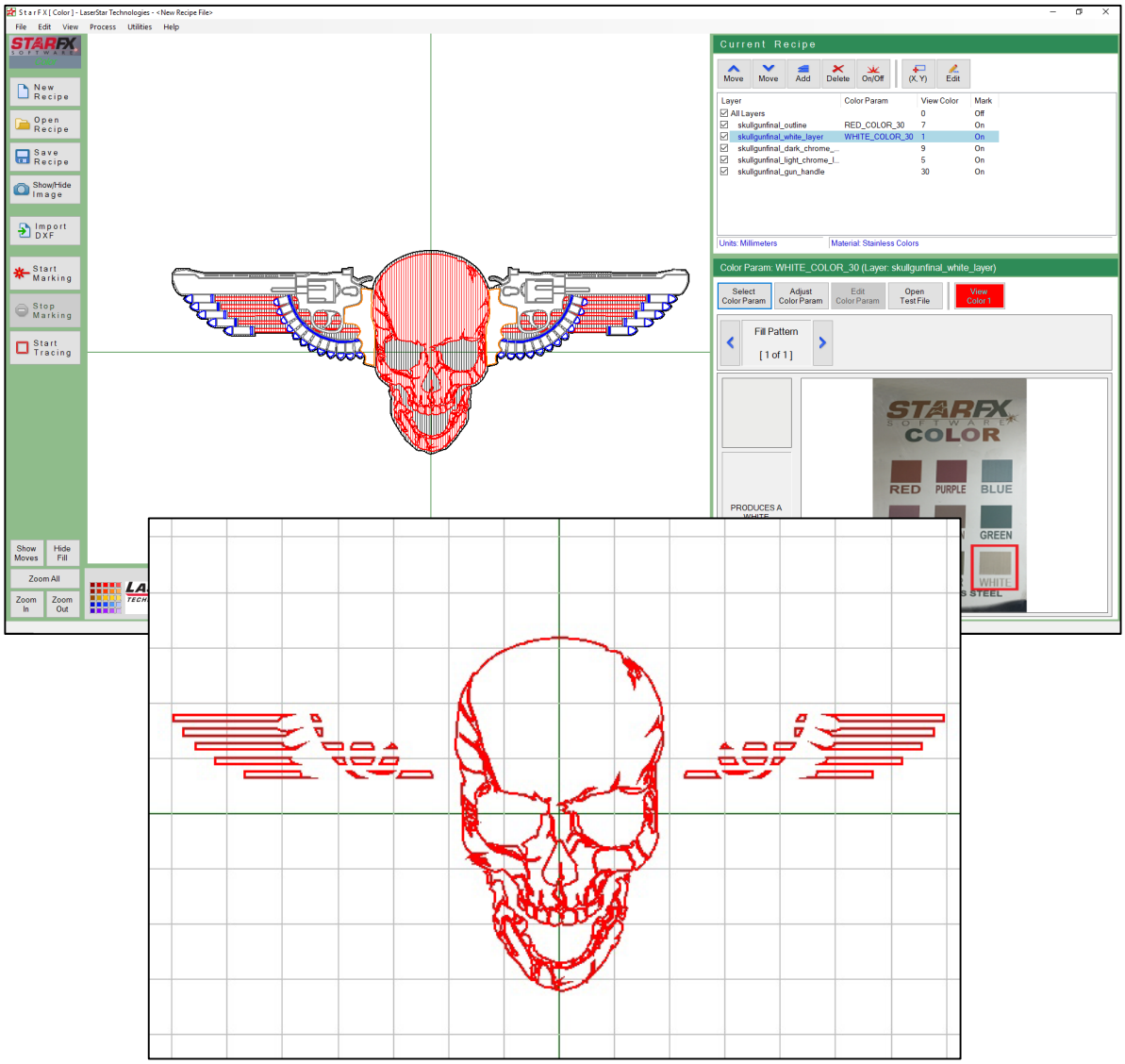





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# CREATING THE RECIPE

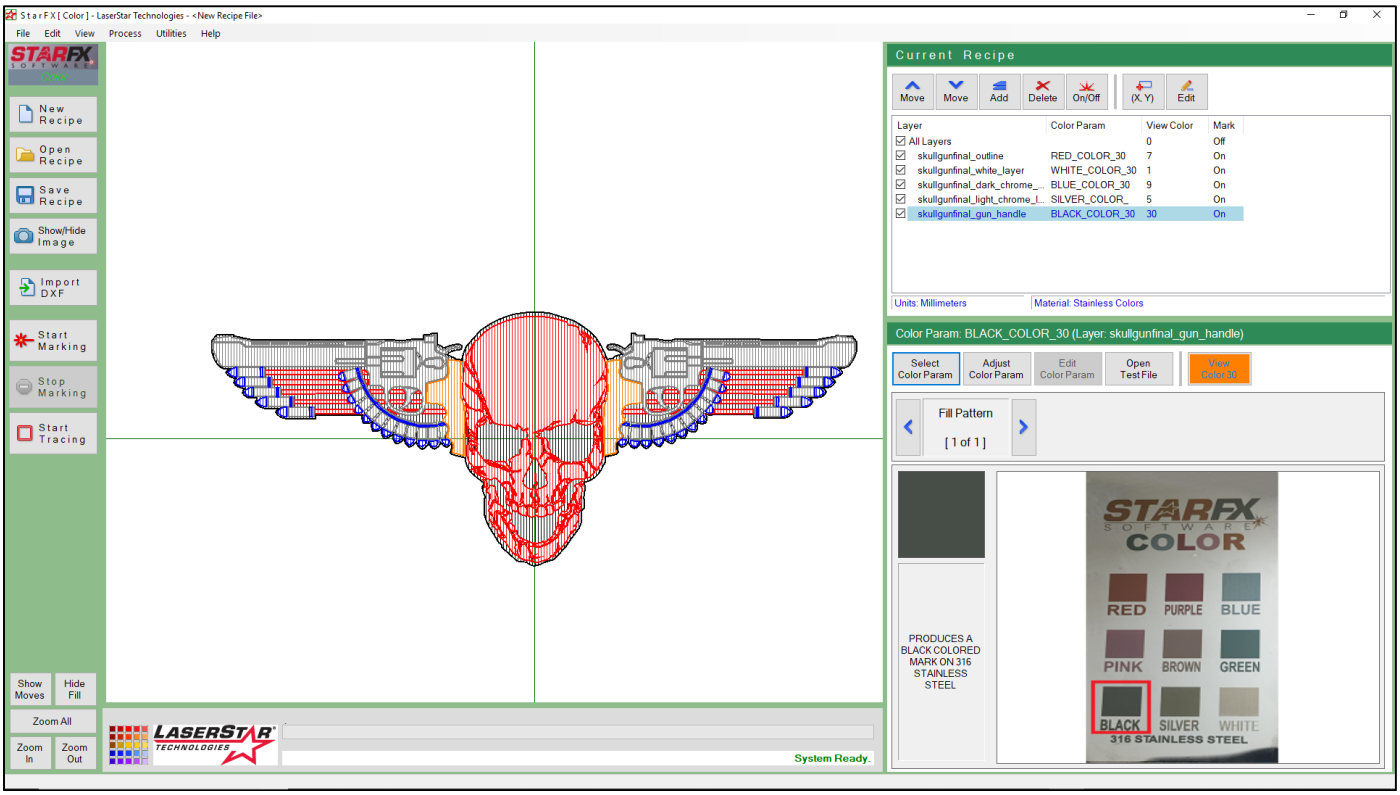
We will briefly go through the rest of the layers and apply an appropriate COLOR to each.




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# CREATING THE RECIPE

Once all of the Layers have a COLOR applied to them you are ready for the next step.





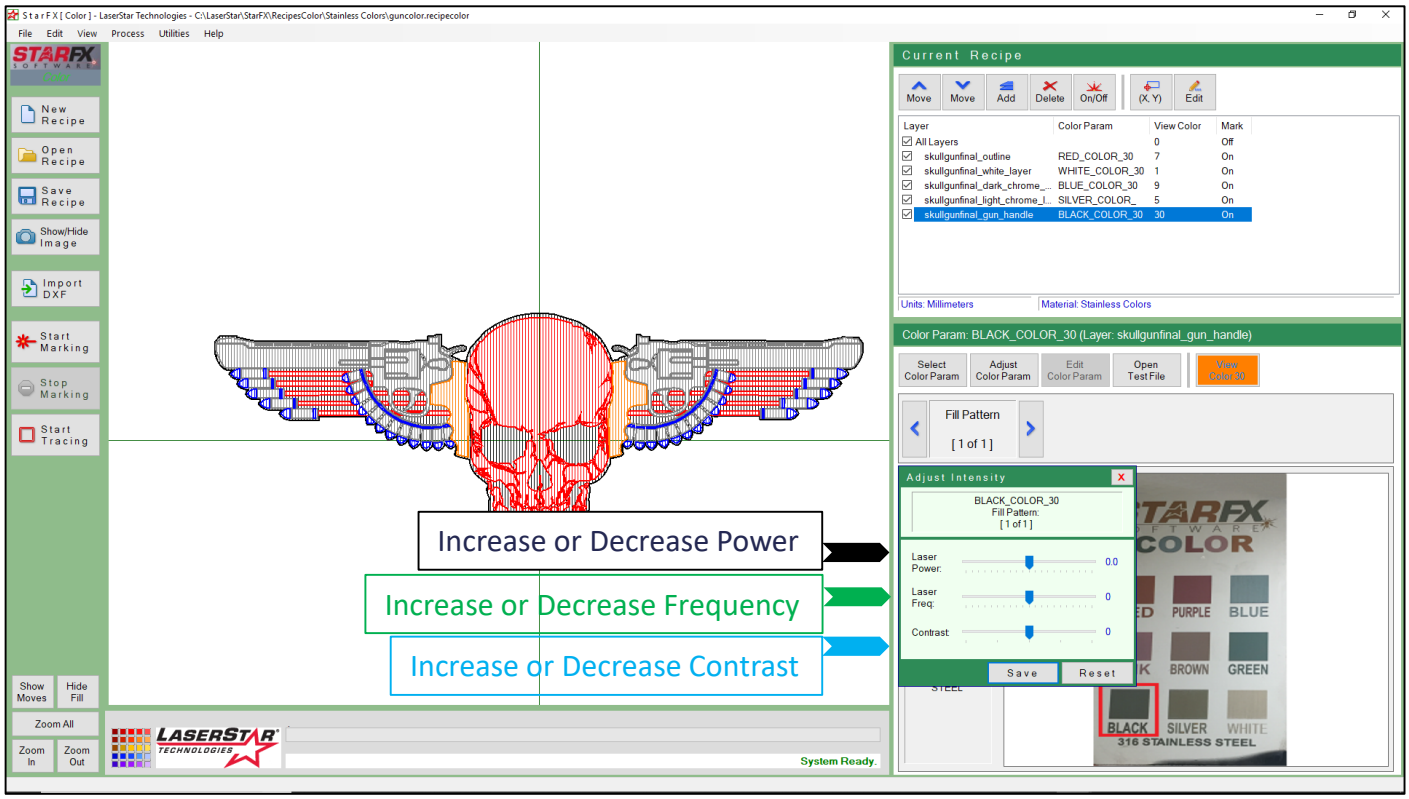

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# TEXTURE ADJUSTMENT

With any Recipe created and especially if you are using StarFX COLORS you can adjust the COLOR settings either permanently or just for a particular Recipe.

You do this by selecting the “Adjust COLORS ” button.

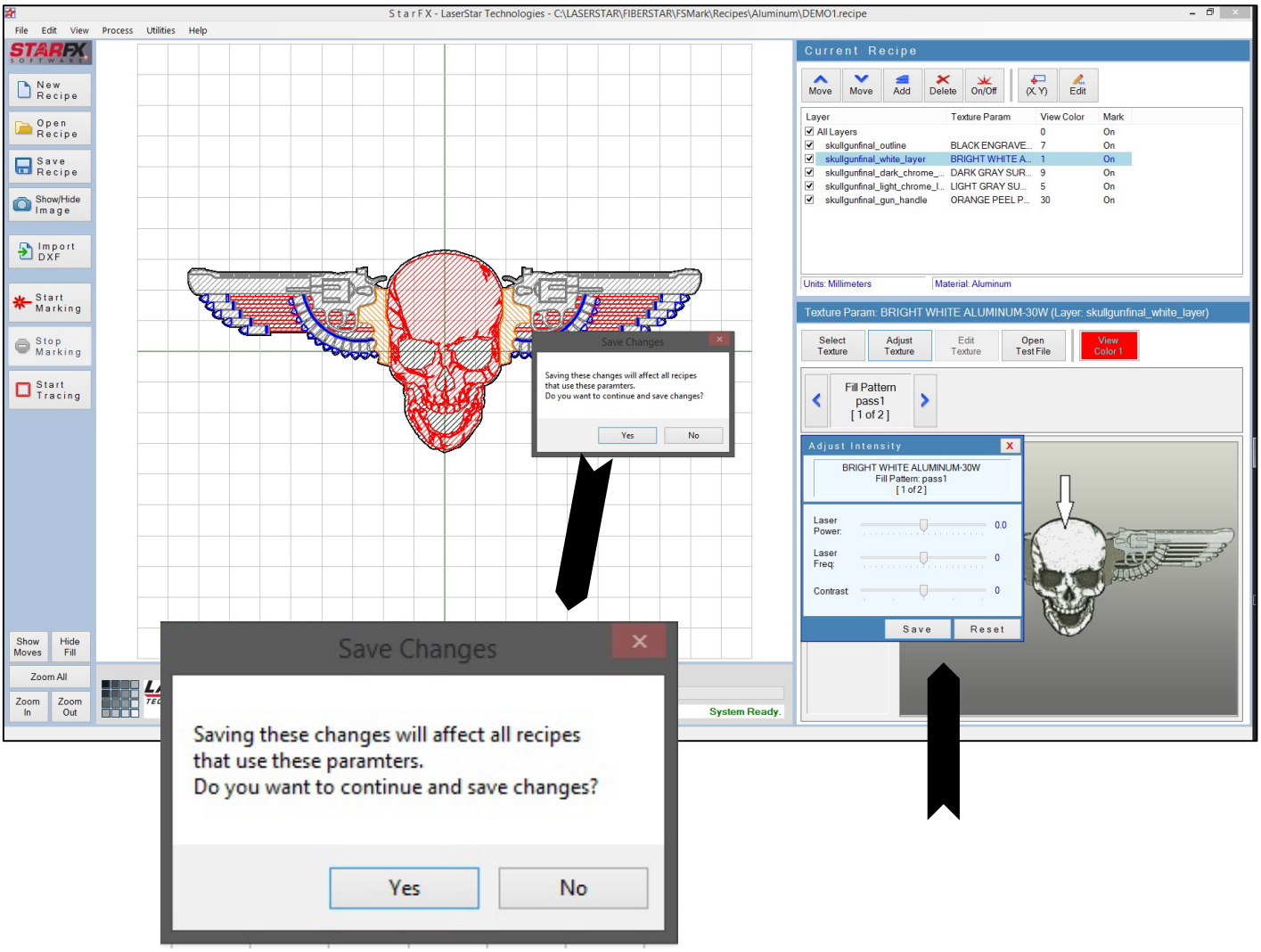
This brings up the adjustment window where you can change the basic settings up or down.




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# TEXTURE ADJUSTMENT

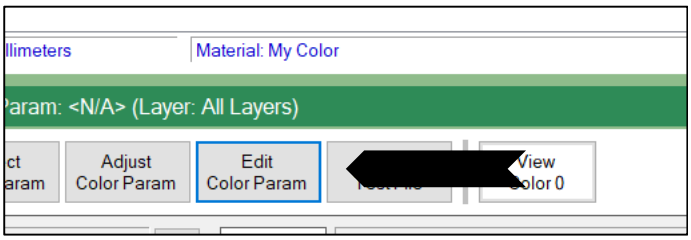
If you want to save the adjusted settings permanently for the COLOR itself then all Recipes that use that COLOR will be affected.





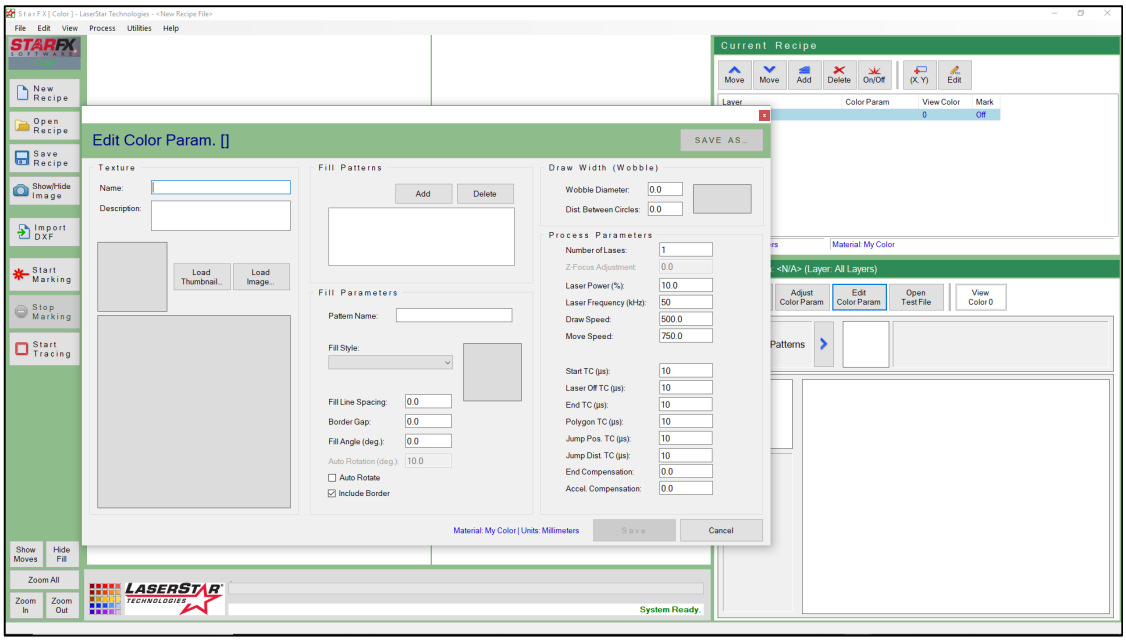

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# CREATING YOUR OWN COLOR TEXTURE




Note: LaserStar COLORS are not editable at this time however the user can create their own new colors.

New COLORS are done in the Edit COLORS Screen.

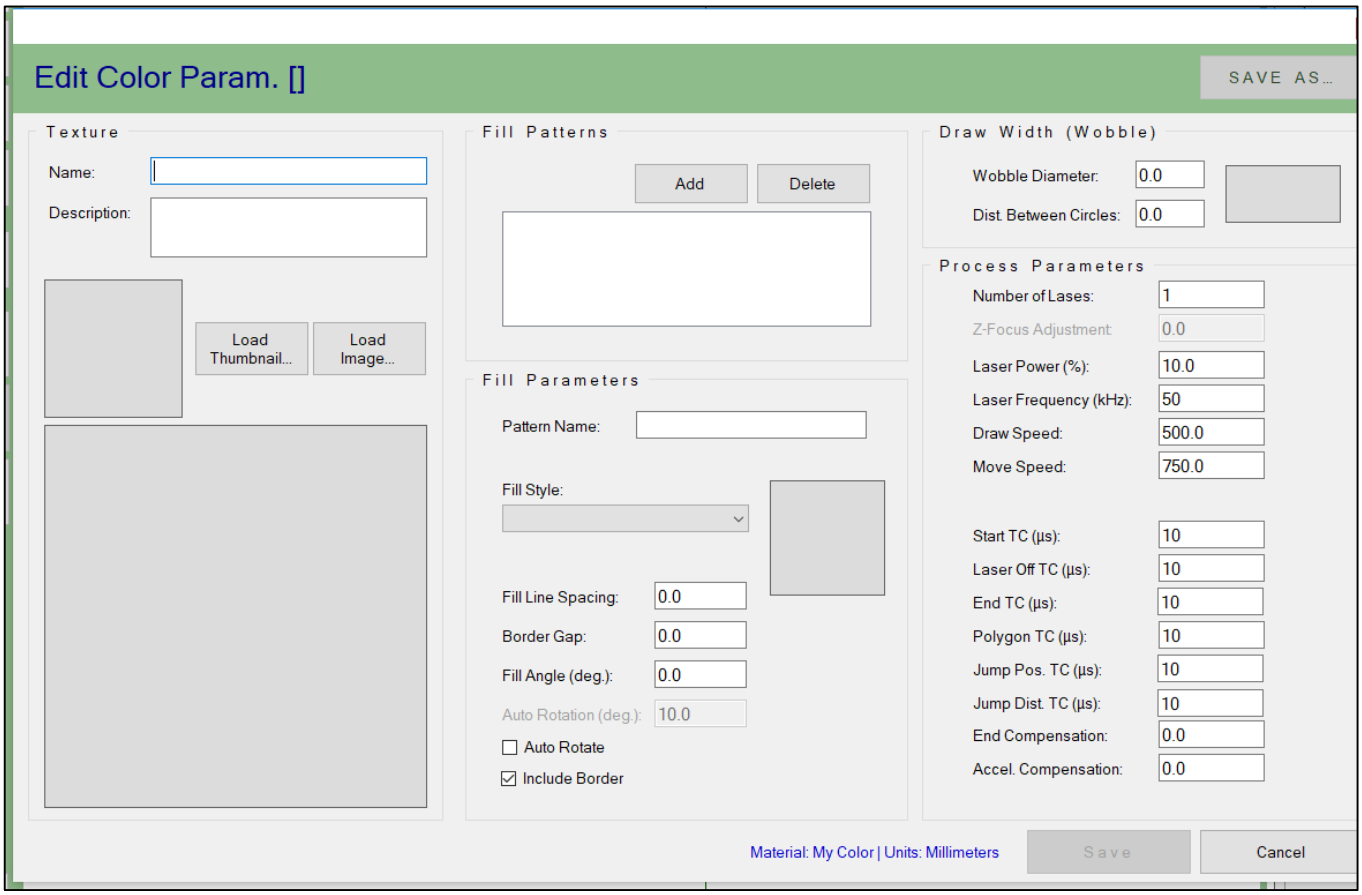



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# CREATING YOUR OWN COLOR TEXTURE

The Edit COLORS Screen allows you to create the process parameters to create new COLORS or Textures for your materials.

However, the selections provided here are for an advanced user and should be done after the appropriate training has been completed, please see LaserStar Academy listings for this.




Click To Access The Video Tutorials

LASERSTAR ACADEMY

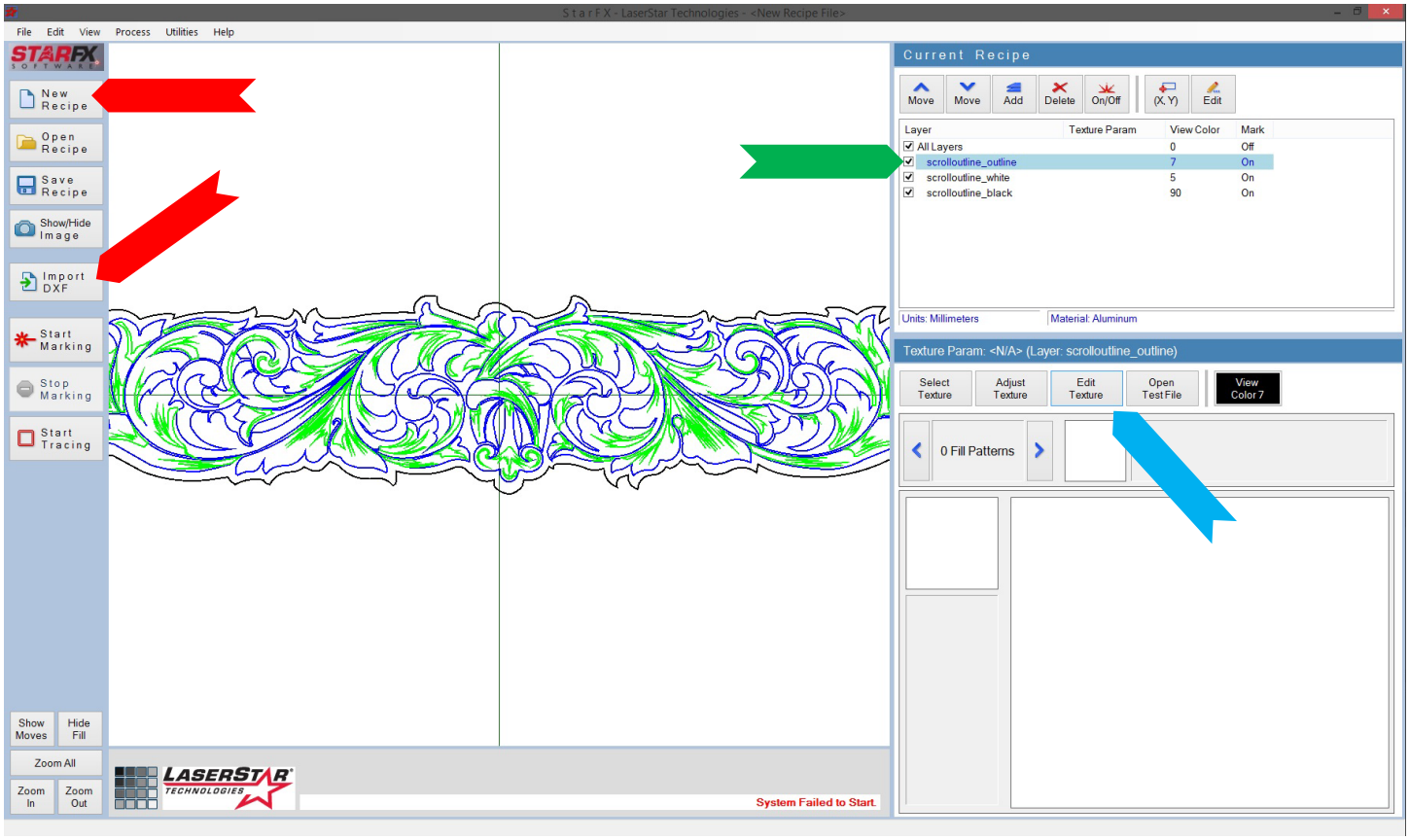


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# CREATING YOUR OWN COLOR TEXTURE

To create your own COLOR you would

1. Create a New Recipe and Import any DXF.
2. Select a layer.
3. Click the “Edit Texture” button.

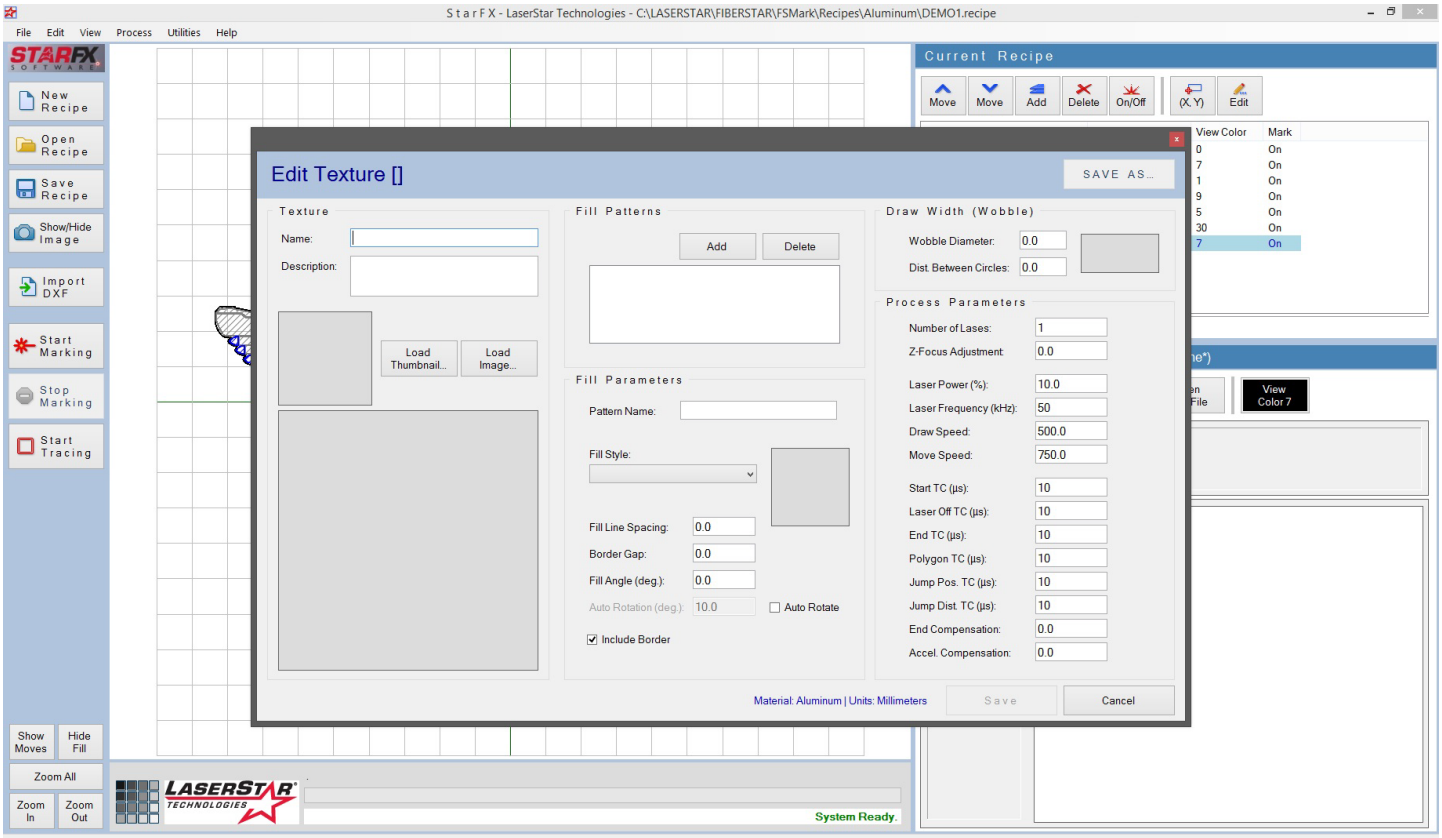



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# CREATING YOUR OWN COLOR TEXTURE

The Edit Texture Screen will come up.

We will go through the different areas of this screen but again it is assumed that the user has all the basic training concerning laser parameters.

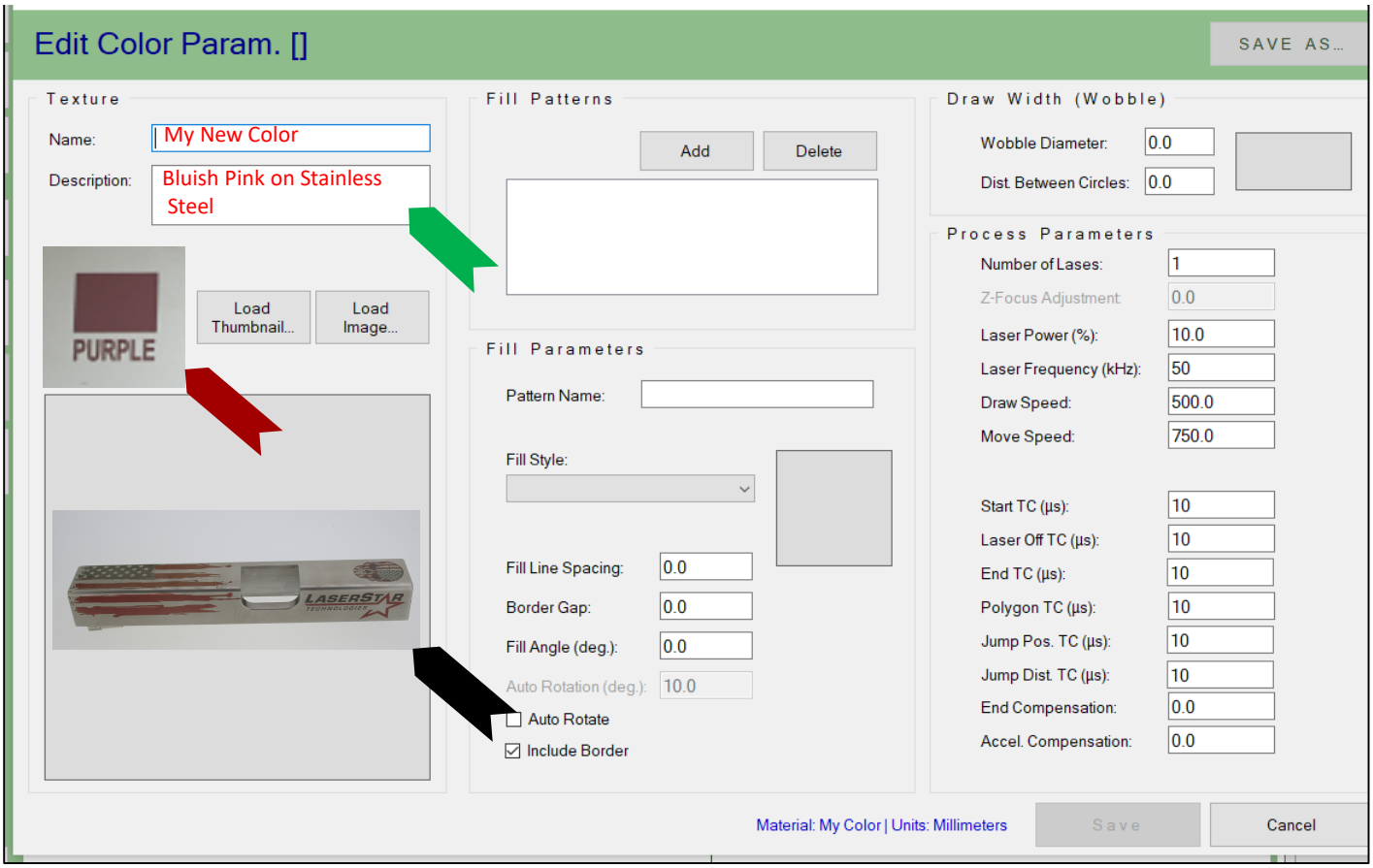





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# CREATING YOUR OWN COLOR TEXTURE

1. The Name is what will appear in all the appropriate areas such as COLORS selection, on the Main Screen display, and others. The Description will help further identify what this COLOR is for.
2. You can add a Thumbnail picture to show what the COLOR looks like
3. You can add Image to show how a final product looks like.

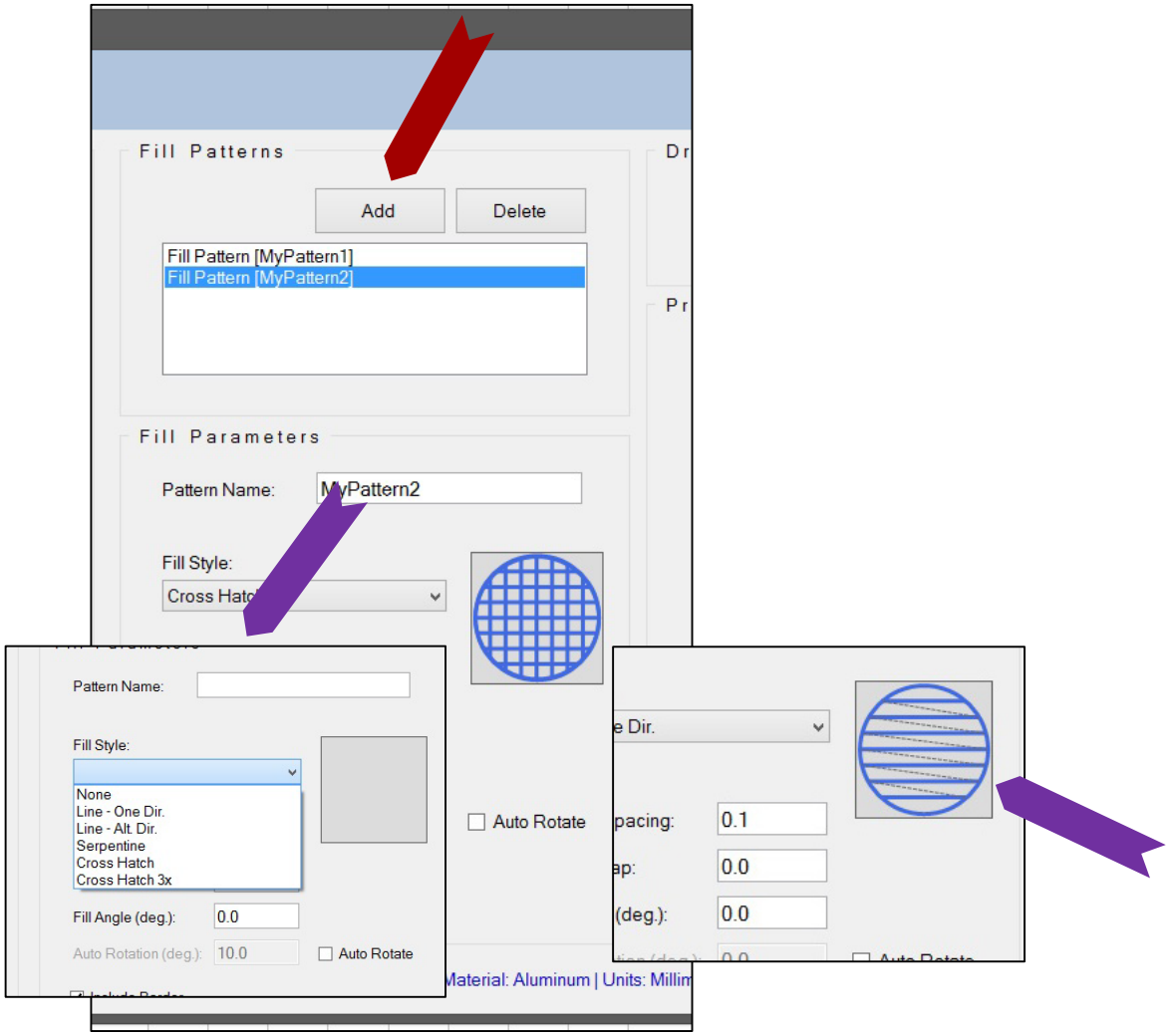



Note: Images can be easily taken with available to you camera and scaled to the right size in the Windows PC Paint program.

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# CREATING YOUR OWN COLOR TEXTURE

1. The COLORS can have any number of passes and each pass can have its own parameters.
2. There are many different types of fill patterns that can be used.




Note: Advanced training is required to create your own colors.

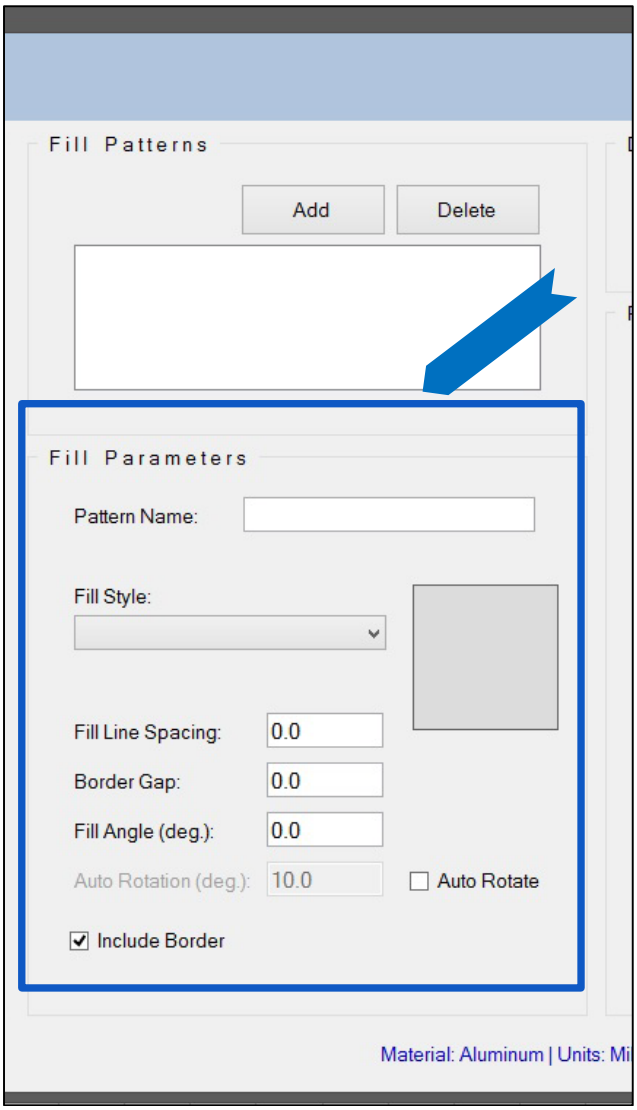


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# CREATING YOUR OWN COLOR TEXTURE

3. Various other parameters for the fill style itself are set here —

   - ☆ Fill Spacing
   - ☆ Border Gap
   - ☆ Fill Angle
   - ☆ Include Border
   - ☆ Auto Rotate

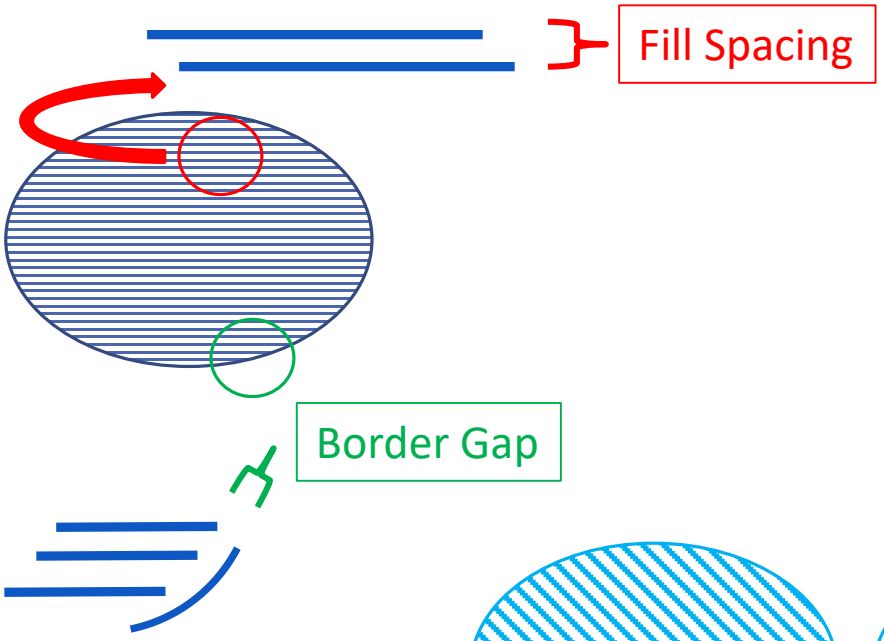


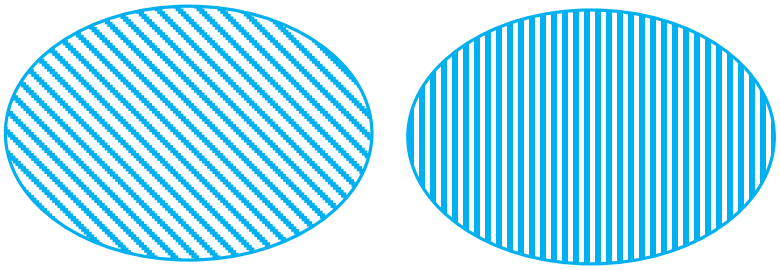

(Continue)

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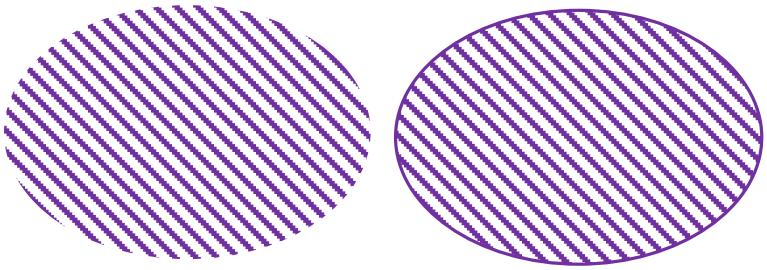
# CREATING YOUR OWN COLOR TEXTURE

The other parameters for the fill style.

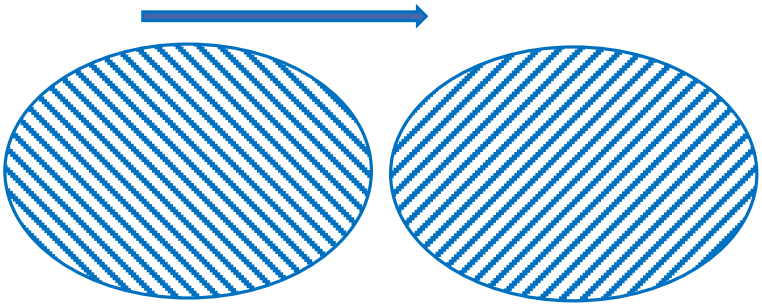


Fill Angle



Include Border



Auto Rotate

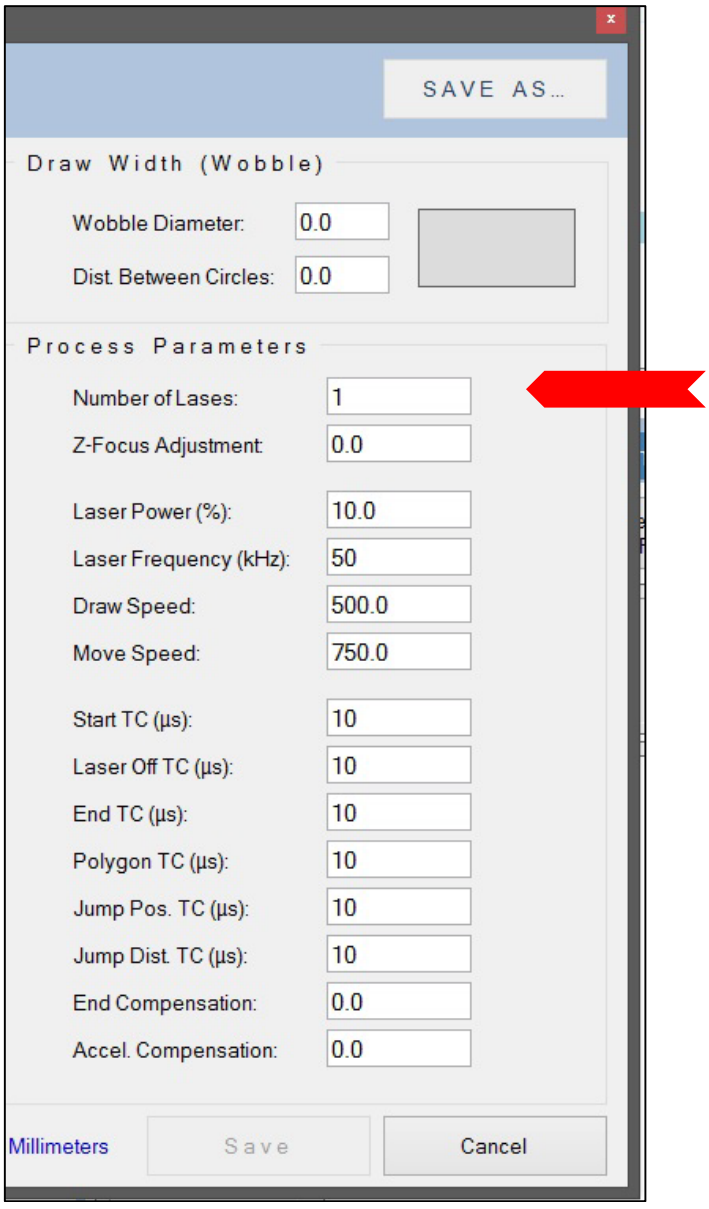


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# RUN FEATURES

It is assumed that the laser parameters have been covered in a previous training so we will just cover the last remaining property.

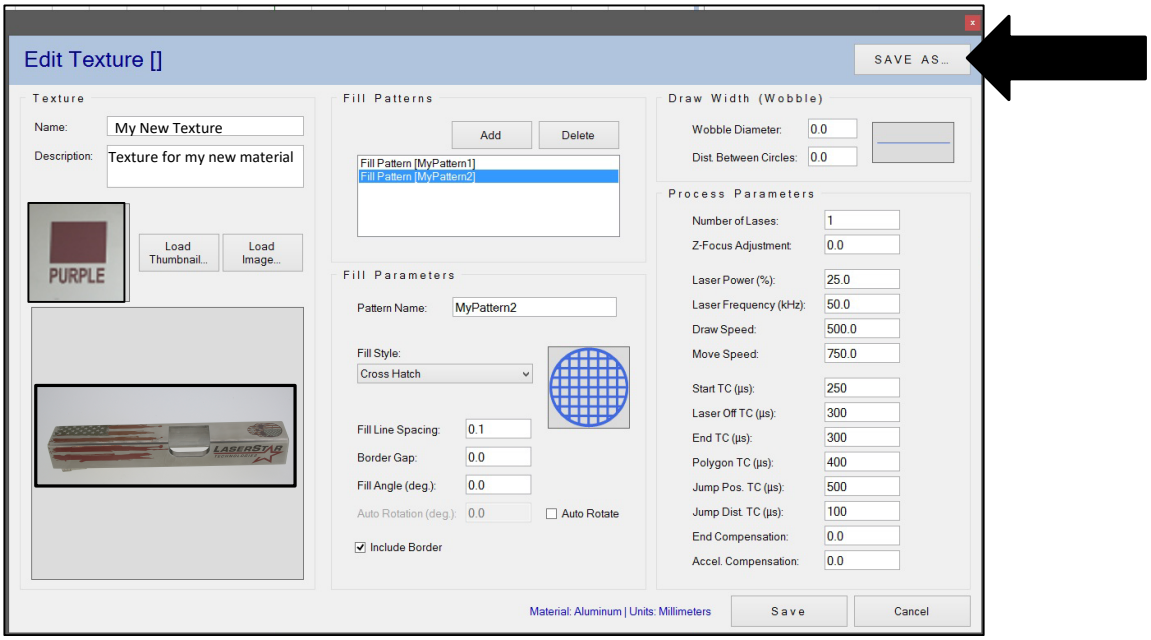
Number of Lases is a number of “passes”.




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# RUN FEATURES

When everything is correct and has been tested on your material “Save” the new COLOR .



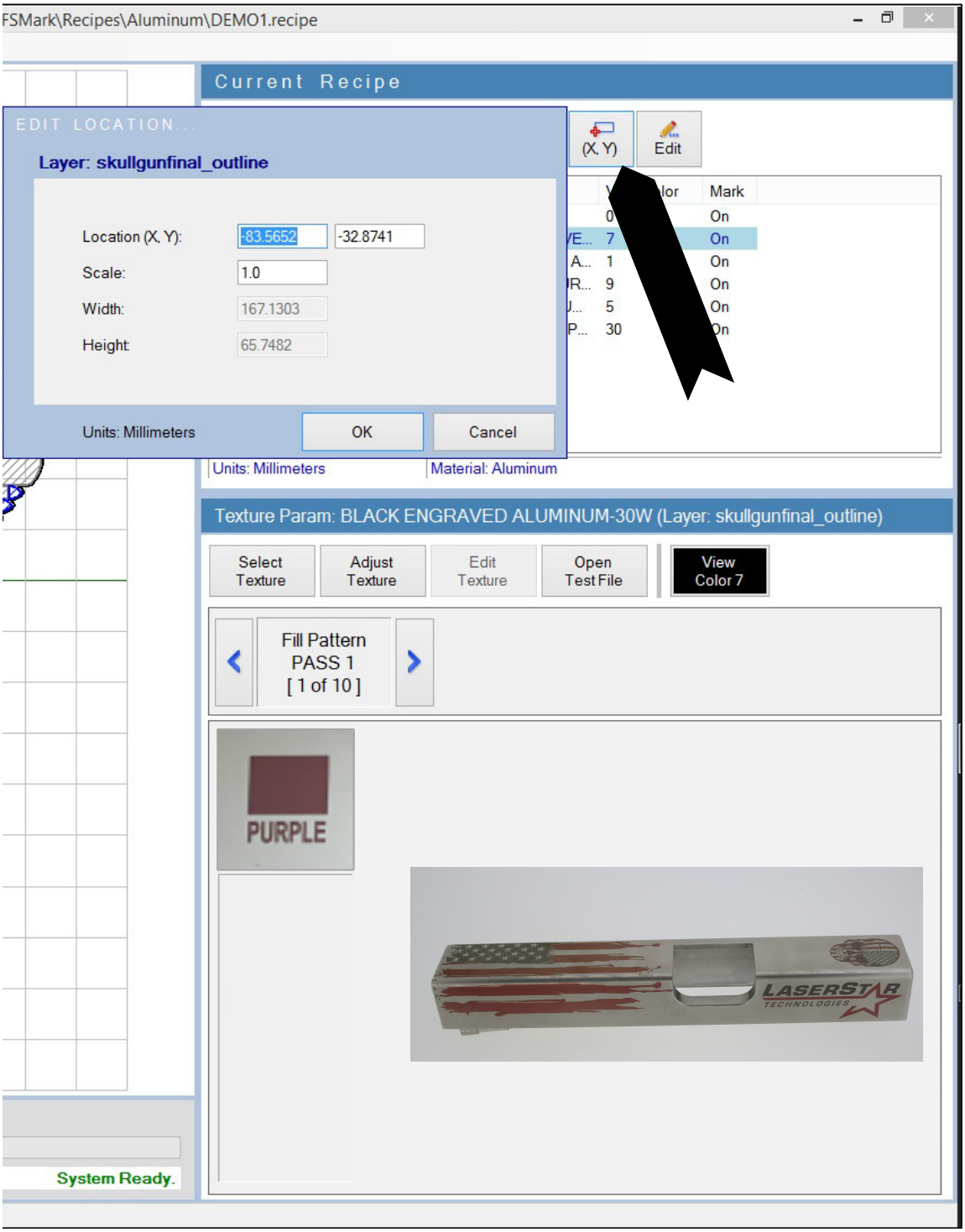



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# RUN FEATURES

There is one feature we have not covered which is to add an XY Offset or a Scale factor to a layer.

This is not recommended because typically all of the layers have a specific relationship to each other but there are some special cases where this could be necessary.

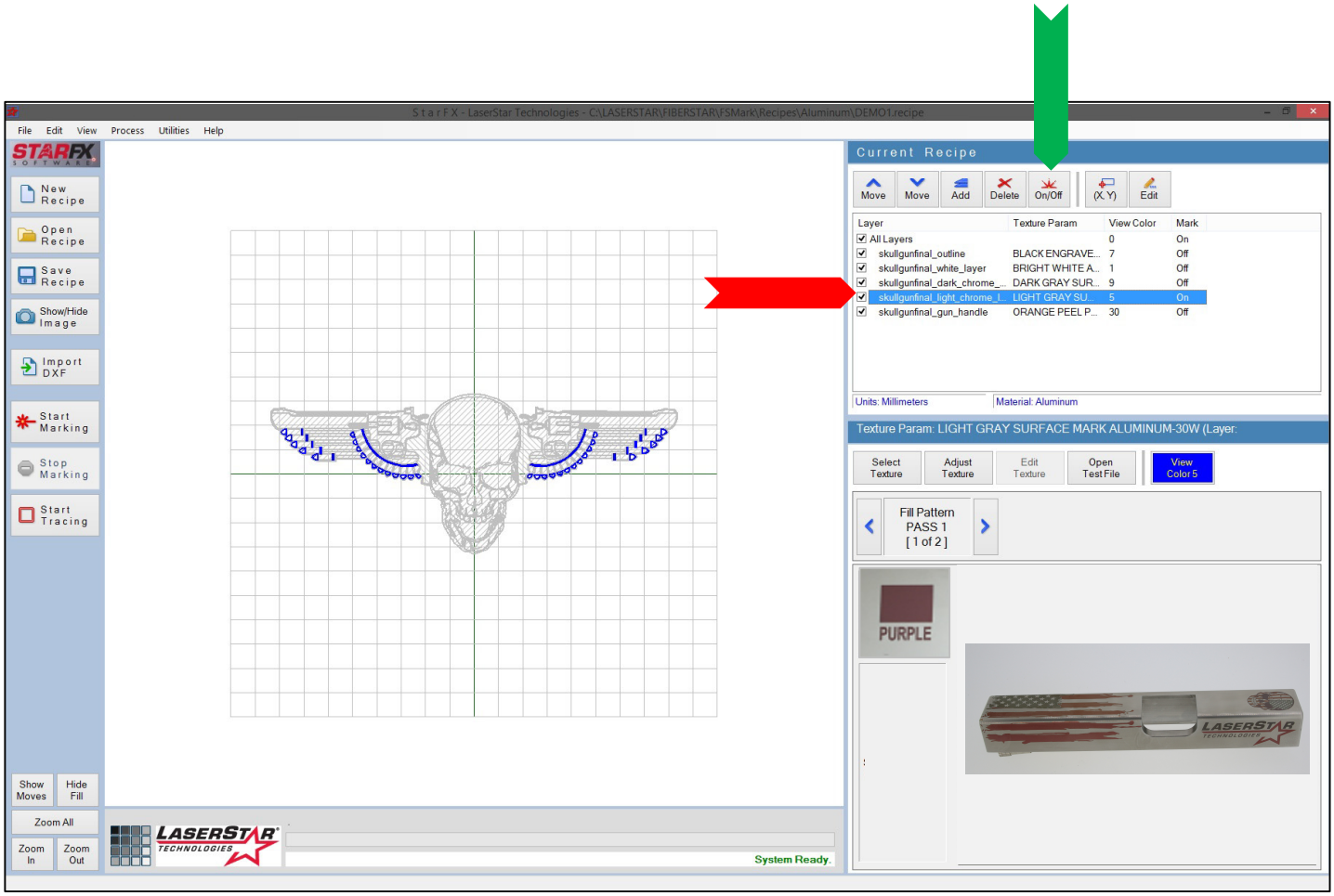



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# RUN FEATURES

Another feature to note that is useful for testing a new Recipe is to turn off the marking of certain layers so you can just test the layer you want.

Highlight the layer you want to turn On or Off and select the “On/Off” button.





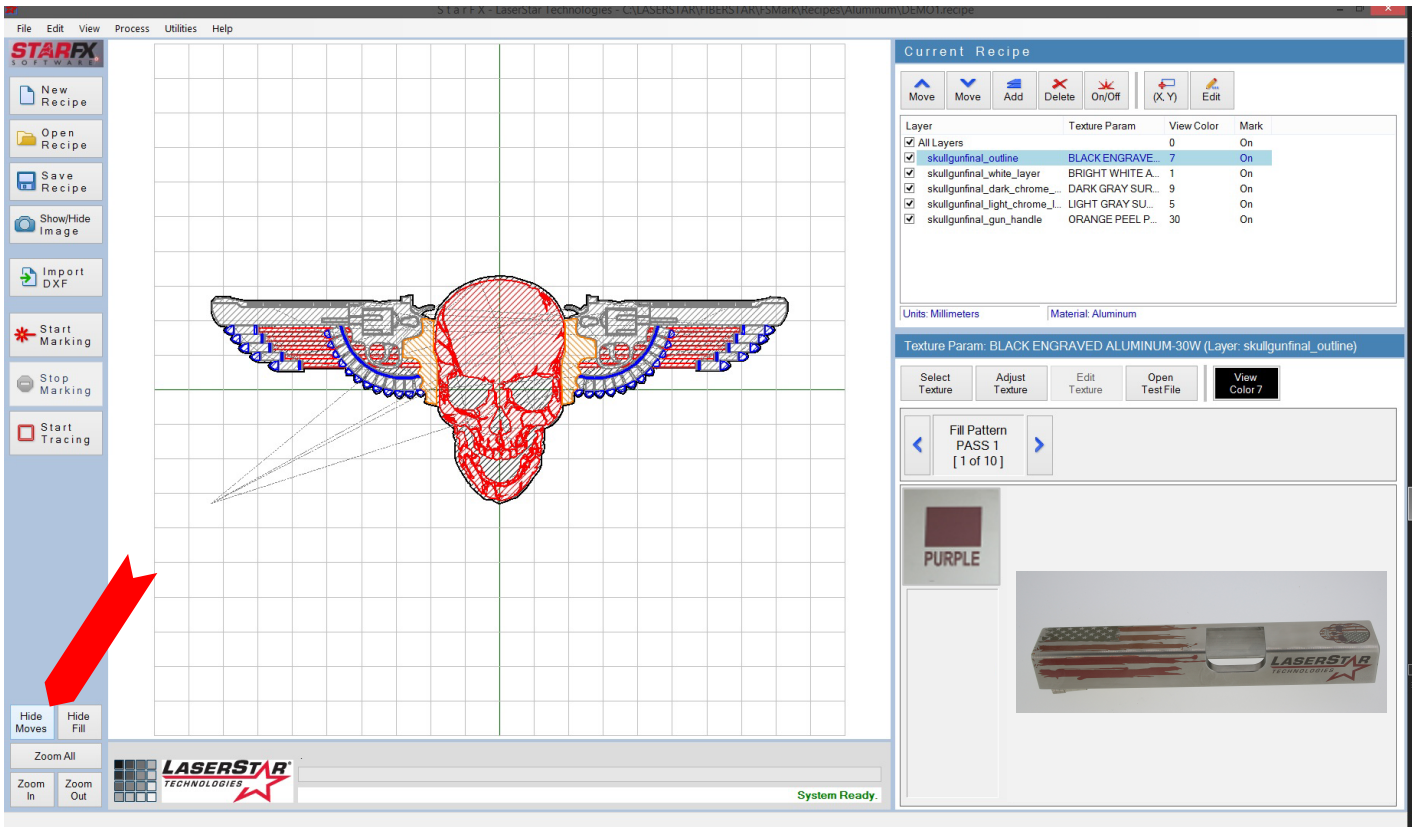

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# RUN FEATURES

A few additional viewing features to point out are.

Show/Hide Moves
Show/Hide Fill
Show/Hide Image

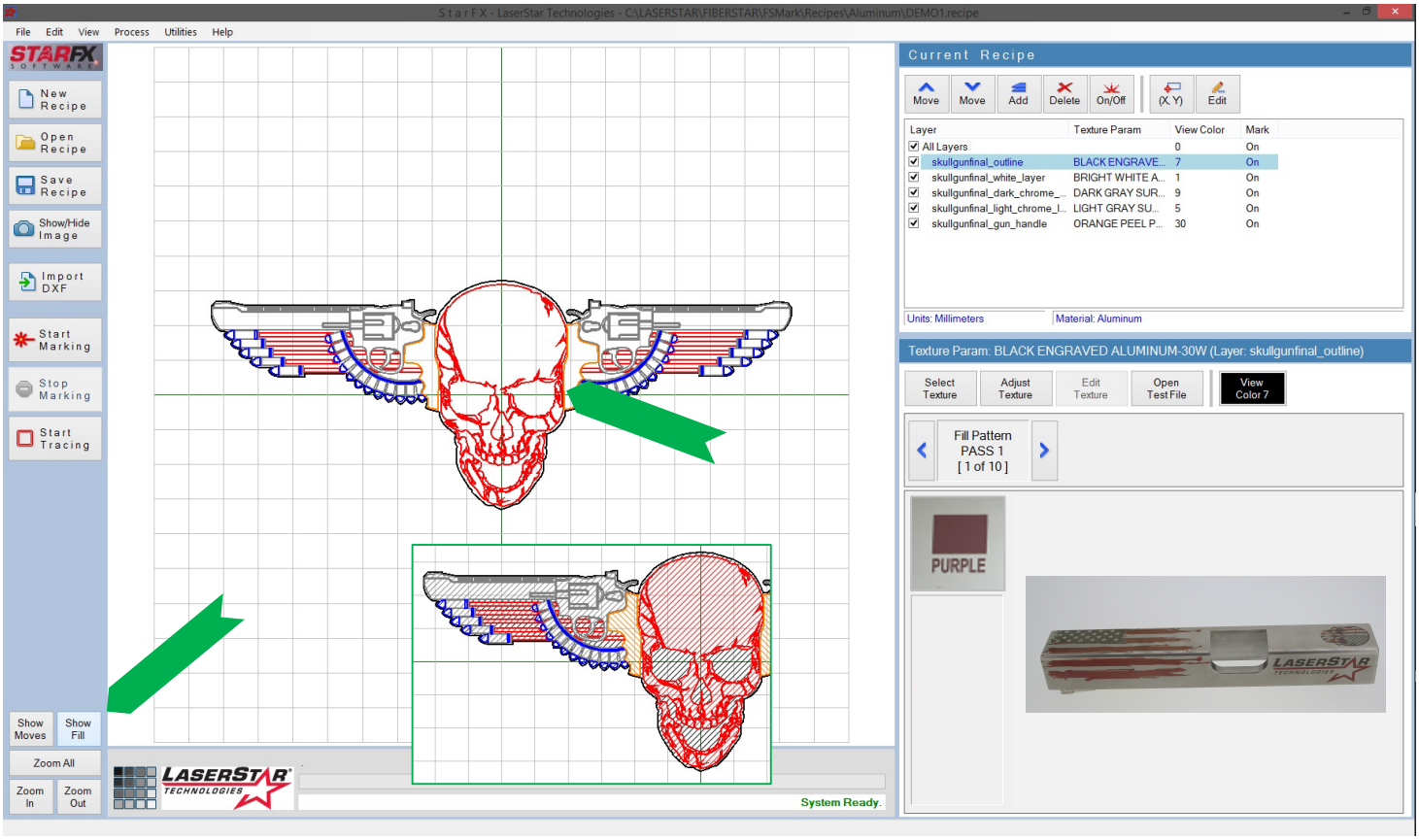
Show/Hide Moves displays how the laser will do the moves and can be useful to see where the DXF starts. This can show inefficiencies in the DXF file.




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# RUN FEATURES

Show/Hide Fill can be used to see the actual original image clearer after all the Fill Patterns been applied.



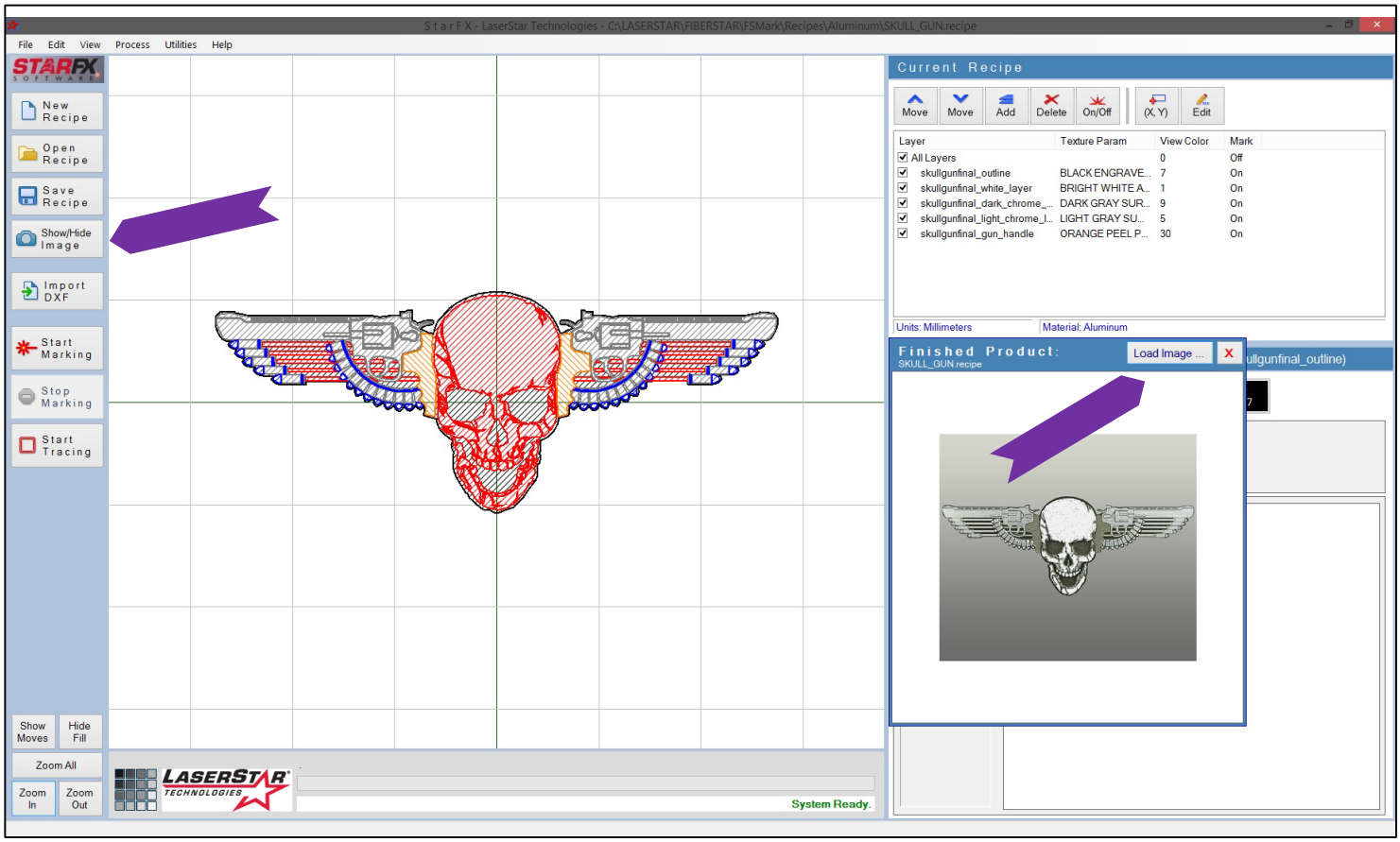



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# RUN FEATURES

The “Show/Hide Image” brings up the picture of the final product if it has been added.

It can be useful to take a picture of the final part and add it here so it is clear what this Recipe produces.



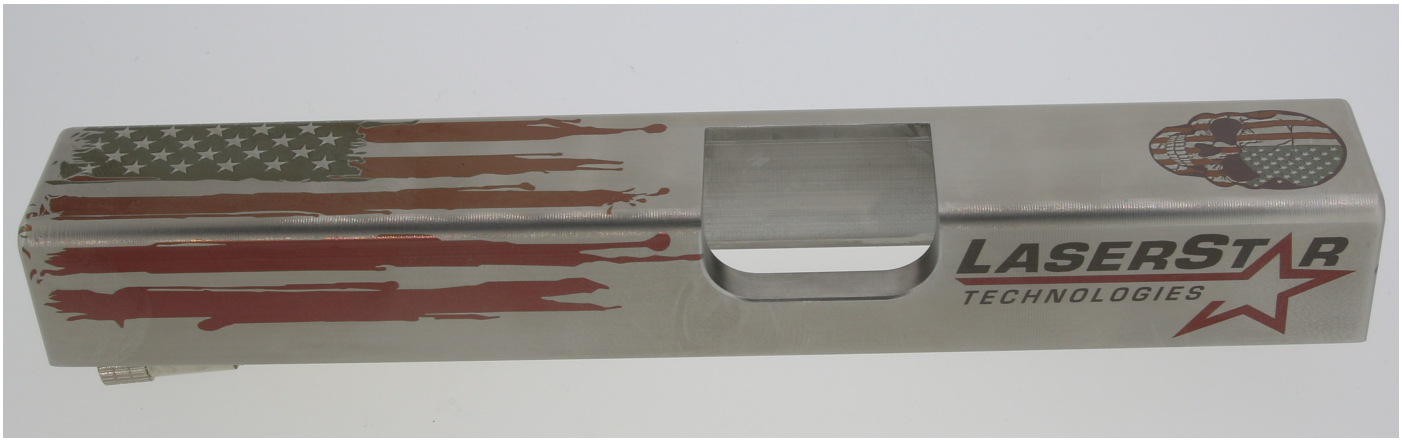

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# FINAL ADVICE

Creating images that are appropriate for StarFX COLORS requires a minimum Graphics background with a basic understanding of vector files and for best results some artistic experience.














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# VARIABLES

CLICKABLE CONTENT

## VARIABLE MANAGER



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# VARIABLE MANAGER

Before we get into the “nuts and bolts” of the Variable Manager and using variables we need to understand what a “variable” is.

**My Text** = Fixed text “My Text”

Typically when you create a text object you know what the text is.

- ☆ Your Name
- ☆ The Name of your company
- ☆ The Name  of your product

This is called “Fixed” text meaning the text is known and defined.

**???????** = Variable text  “text” that is unknown.

But what if you don’t know what the text is going to be. You know the font you want to use, and you know the location on your part , but not the actual text.

For example you are marking a series of High School rings but each one has a different name and you have been given a list of (100) names to mark on (100) rings.

You wouldn’t want to create (100) different programs each with a different name when the only difference is the name.

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# VARIABLE MANAGER

What you would need is a text object that you could define the

- ☆ Font
- ☆ Size
- ☆ Position
- ☆ Material

but not the actual text itself.

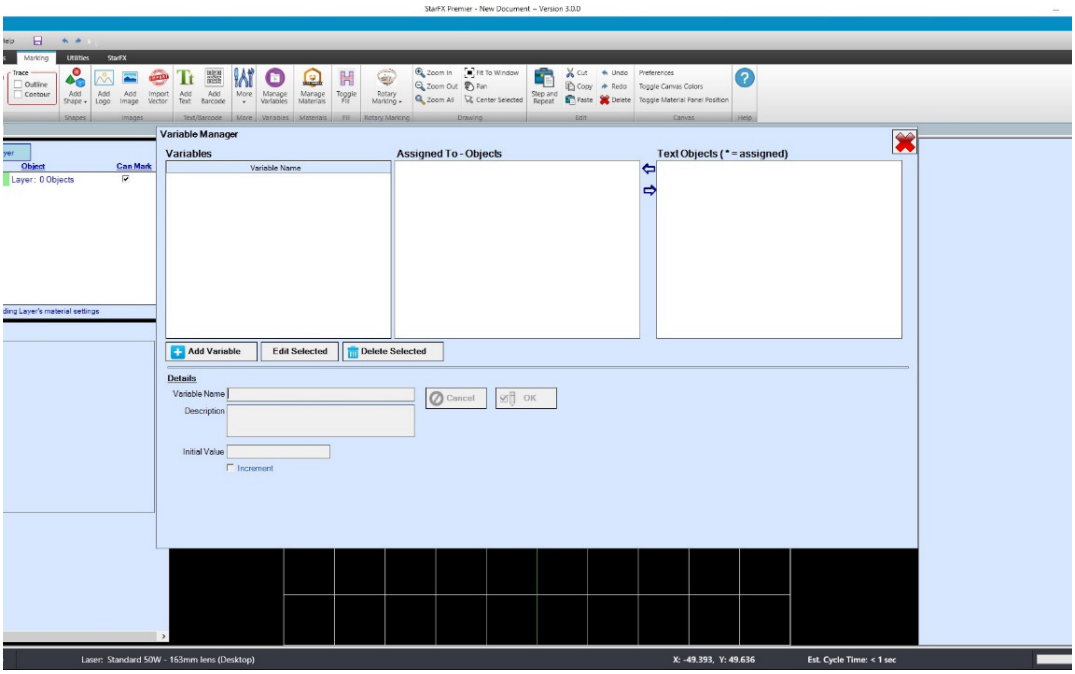
You would need the ability to define the literal text later through some other means (Hint: an Event) at the time you actually lase on the part.

That is exactly what a Variable does.

You can fill in the actual text in many different ways –

- ☆ Read from a text file.
- ☆ Read from a Database.
- ☆ Ask the operator to type in the text.
- ☆ Use an Auto-Incrementing text to lase an incrementing Serial Number.

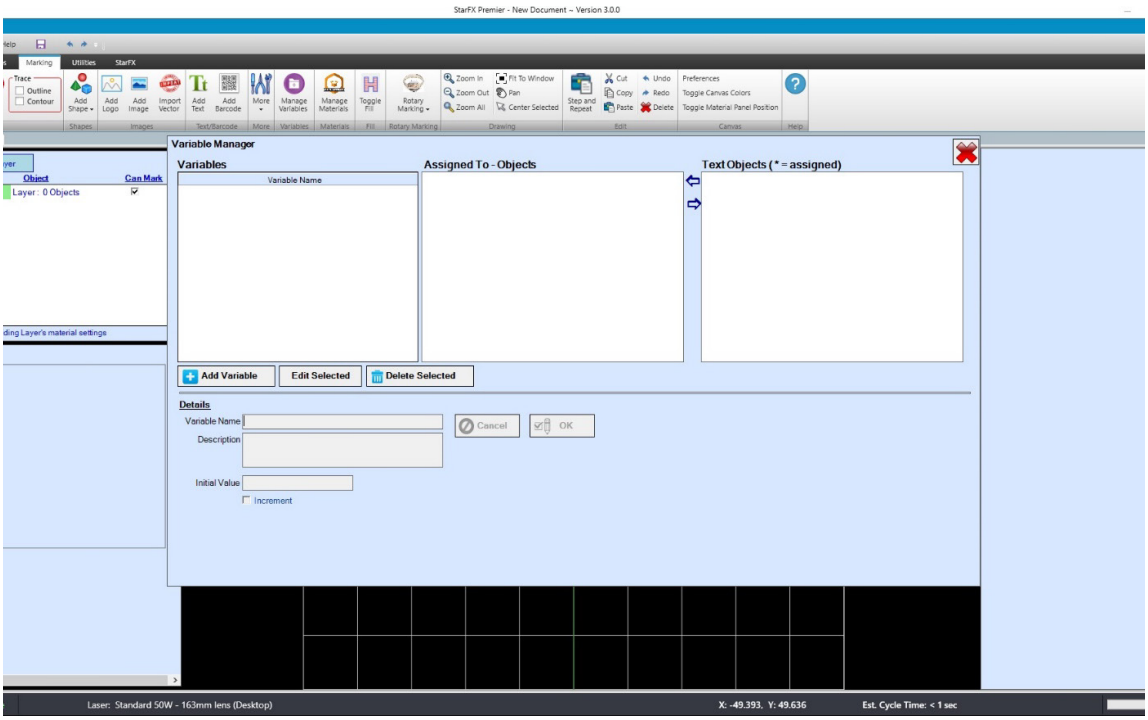
So the **Variable Manager** is next.



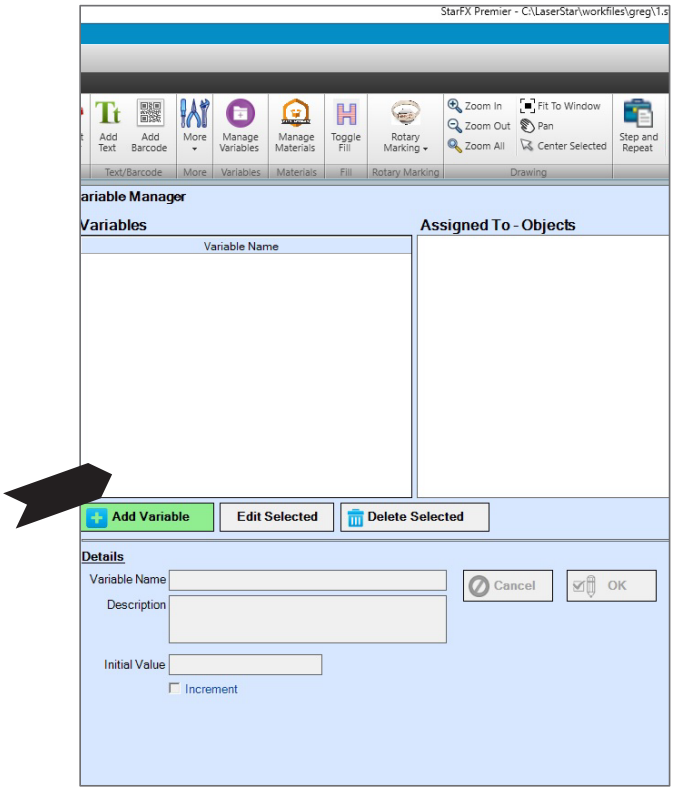



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# VARIABLE MANAGER



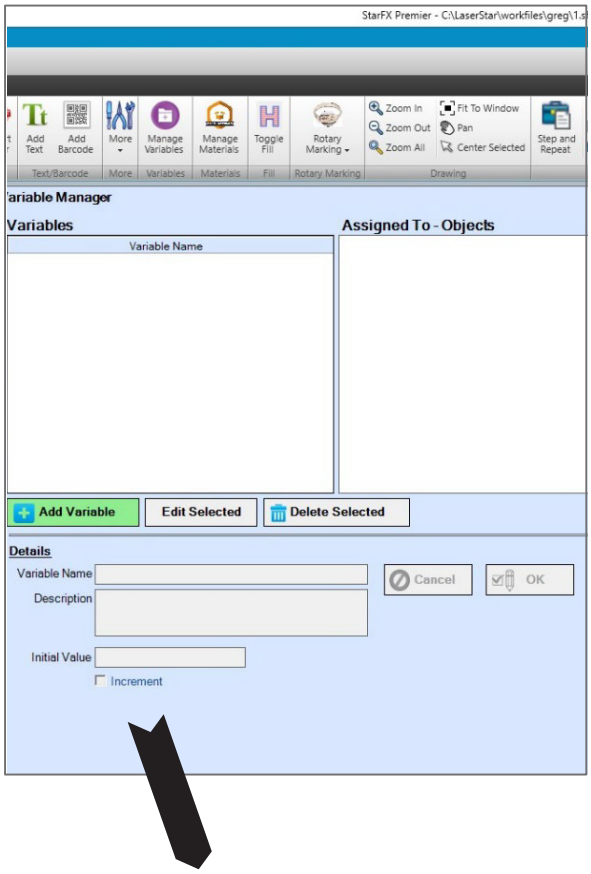

The **Variable Manager** gives you the ability to do several important things that are related to creating and using Variables.



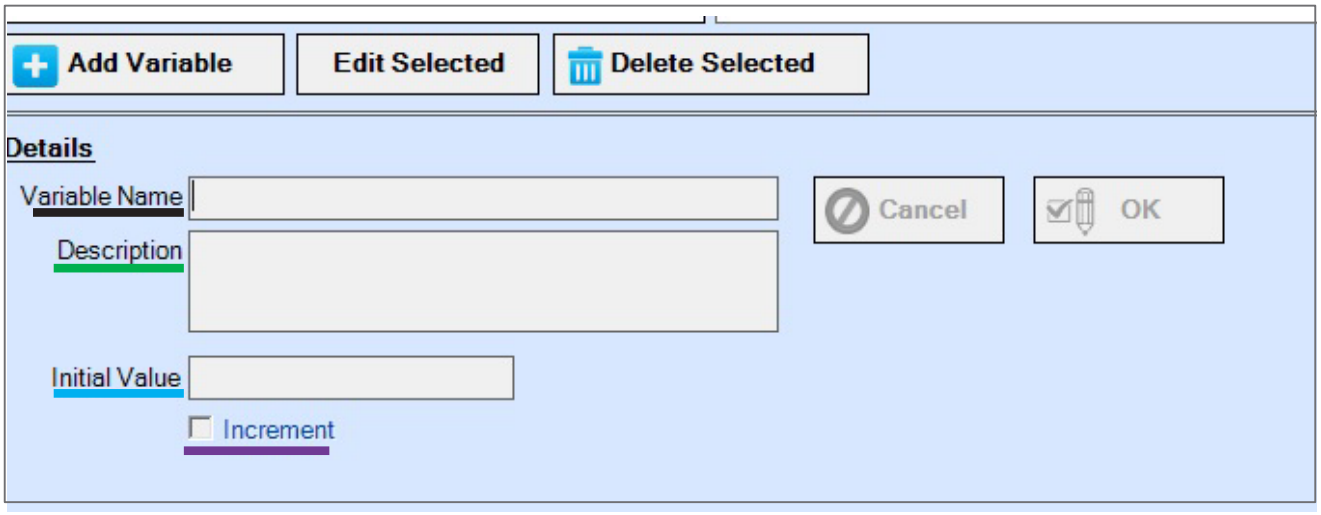

You start by creating or **"Adding"** a new Variable

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# VARIABLE MANAGER




You start by creating or **"Adding"** a new Variable



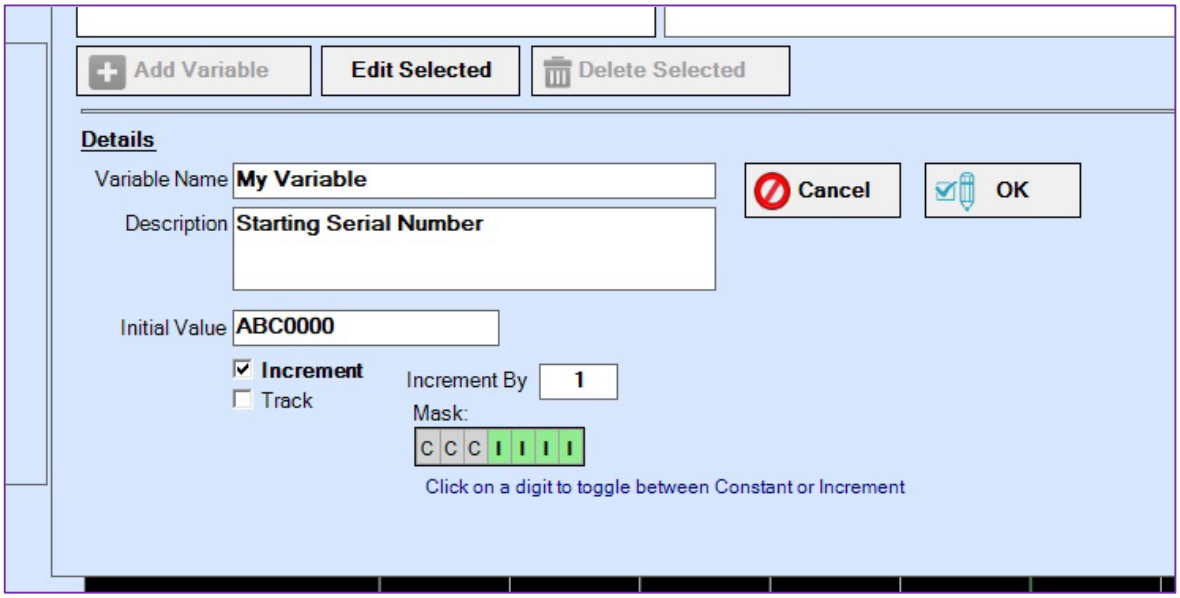

Adding a Variable brings up the Variable information entry section.

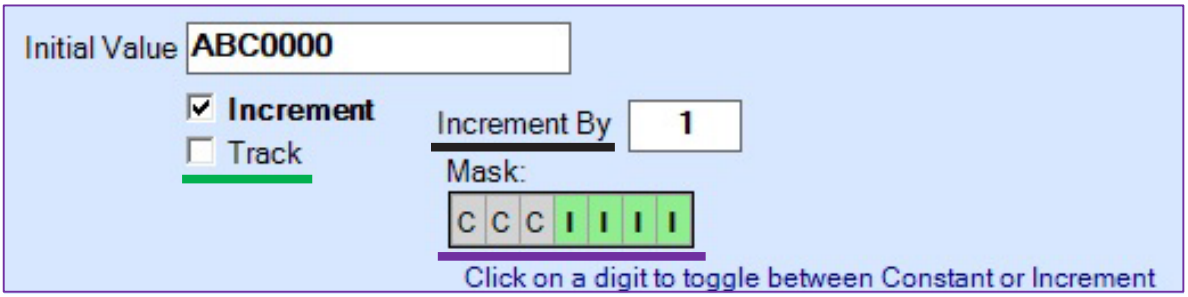
- ☆ Give the Variable a name this is how it will be identified.
- ☆ You can optionally describe what its purpose is – **"Serial Number"**.
- ☆ If you want it to have an initial value such as when this would be an incrementing number.
- ☆ Check Box to increment this Variable.



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# VARIABLE MANAGER



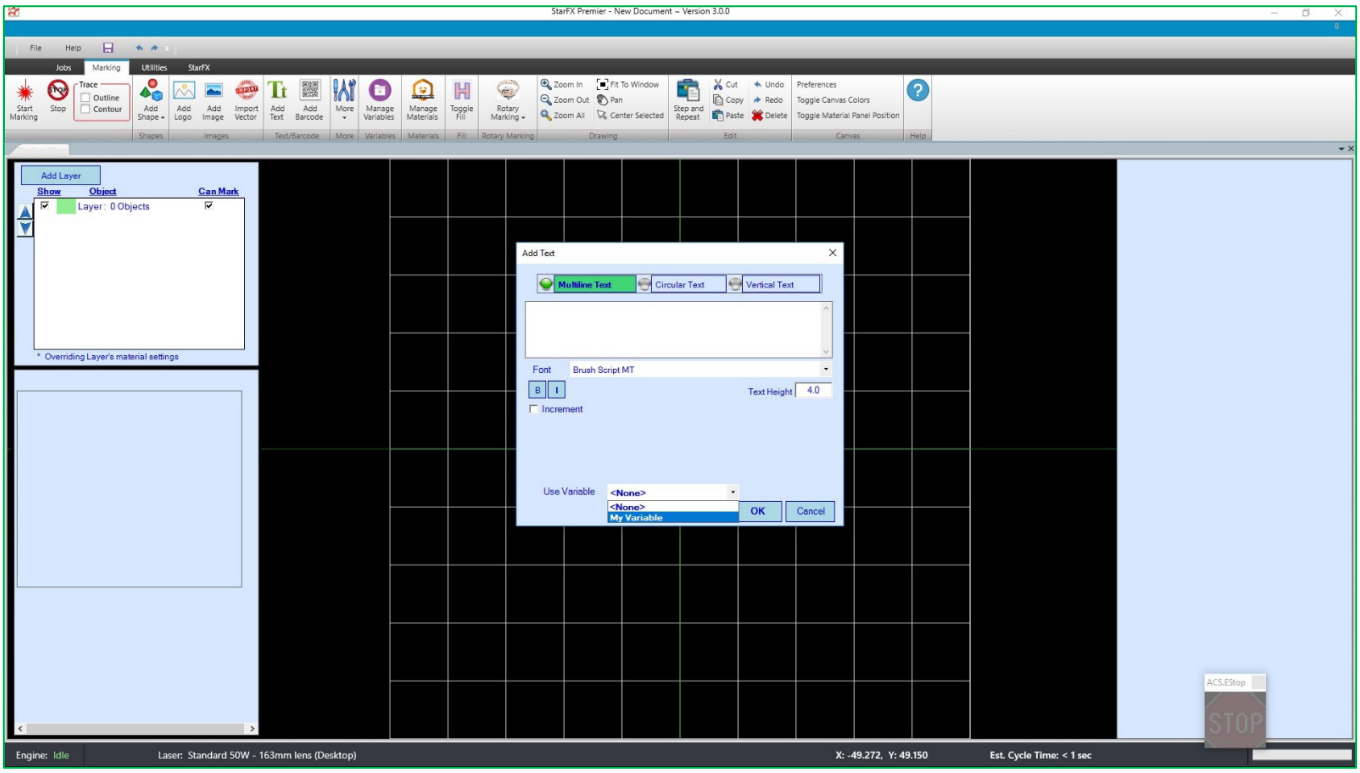



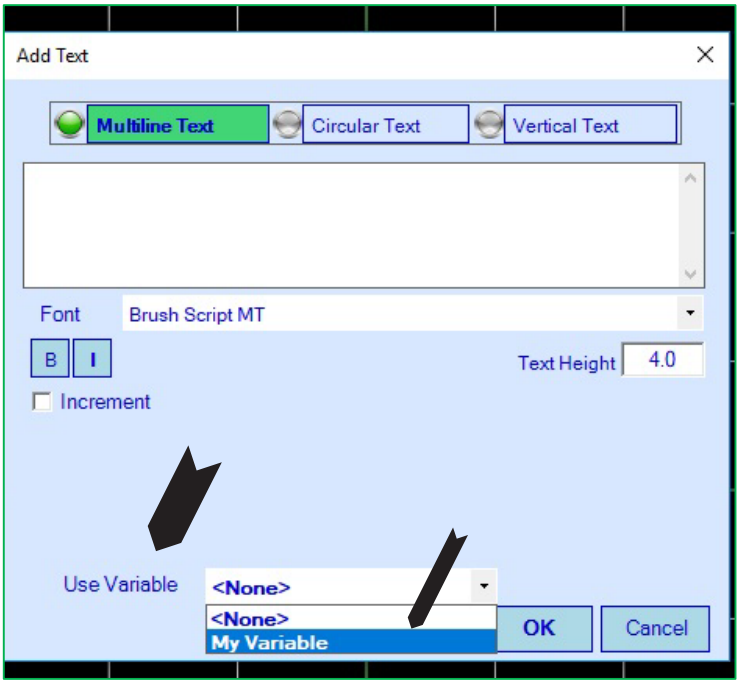

If the Increment Box is checked you are asked to add some additional information.

- ☆ How much to increment on each lase.
- ☆ Do you want to “Track” the Variable which means you record the next value in a file so that the next time you run this part it starts off with the correct value such as is the case with a “Serial Number”.
- ☆ The increment “Mask” allows you to increment only part of the variable if desired.
  - ☆ C signifies that this character will not increment – it is constant.
  - ☆ I signifies that this character will increment.

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# VARIABLE MANAGER




Create a Text Object but instead of typing in text you check the **"Use Variable"** check box.

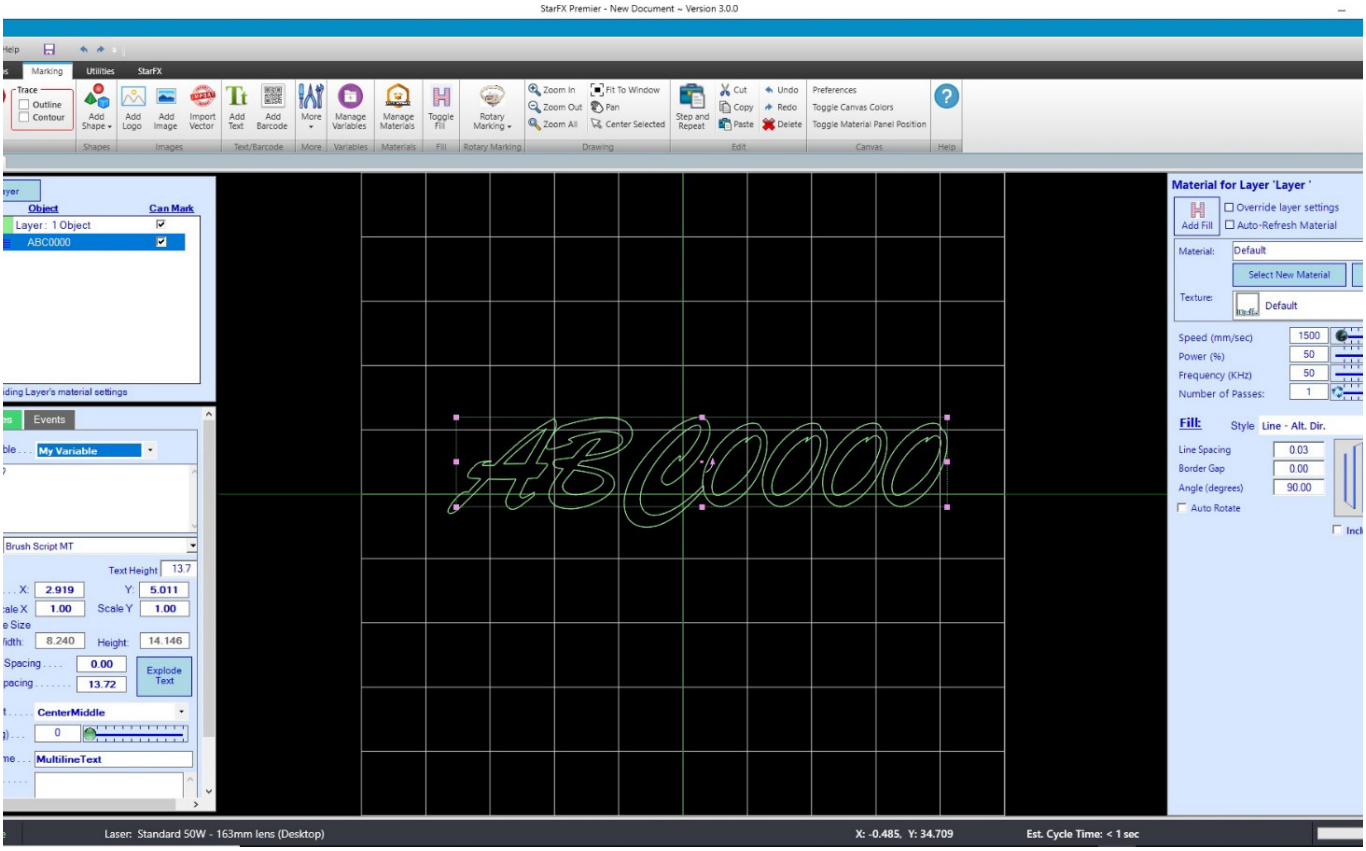
Then select the variable you want to use for this text.

The way you use a variable is shown above.



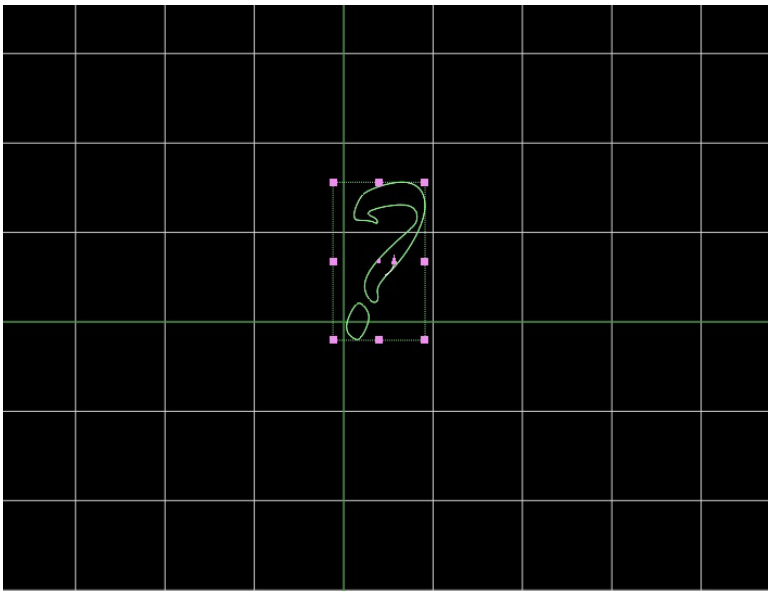
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# VARIABLE MANAGER




Because there was an Initial Value entered in the Variable that value is shown on the Drawing Screen.

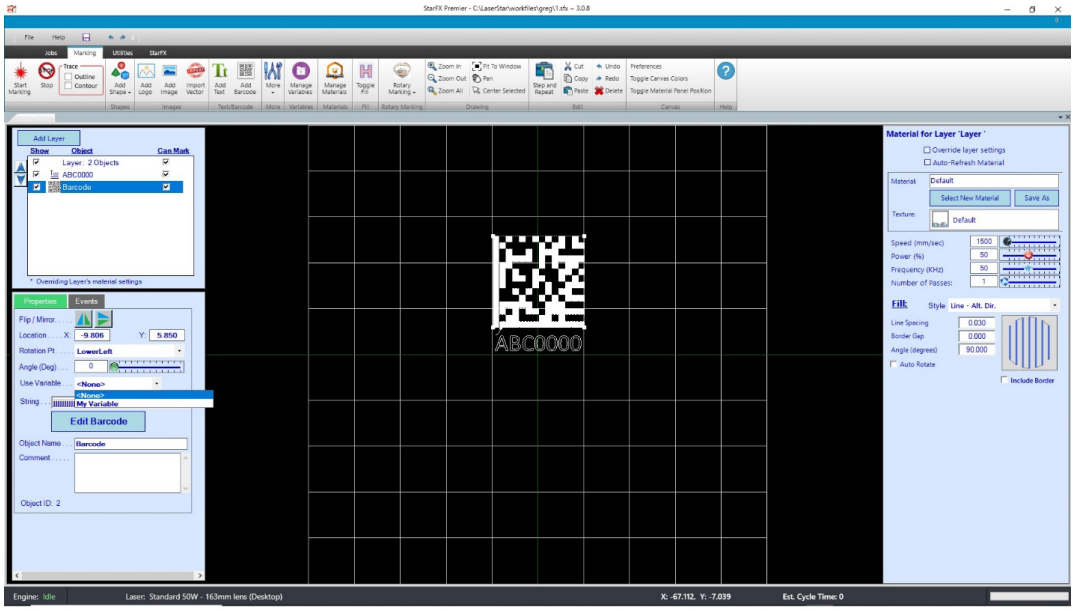
If there was no Initial Value entered you would see a **?** On the Drawing Screen until the source of the Variable was know such as when the source was read from a supplied text file.



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# VARIABLE MANAGER

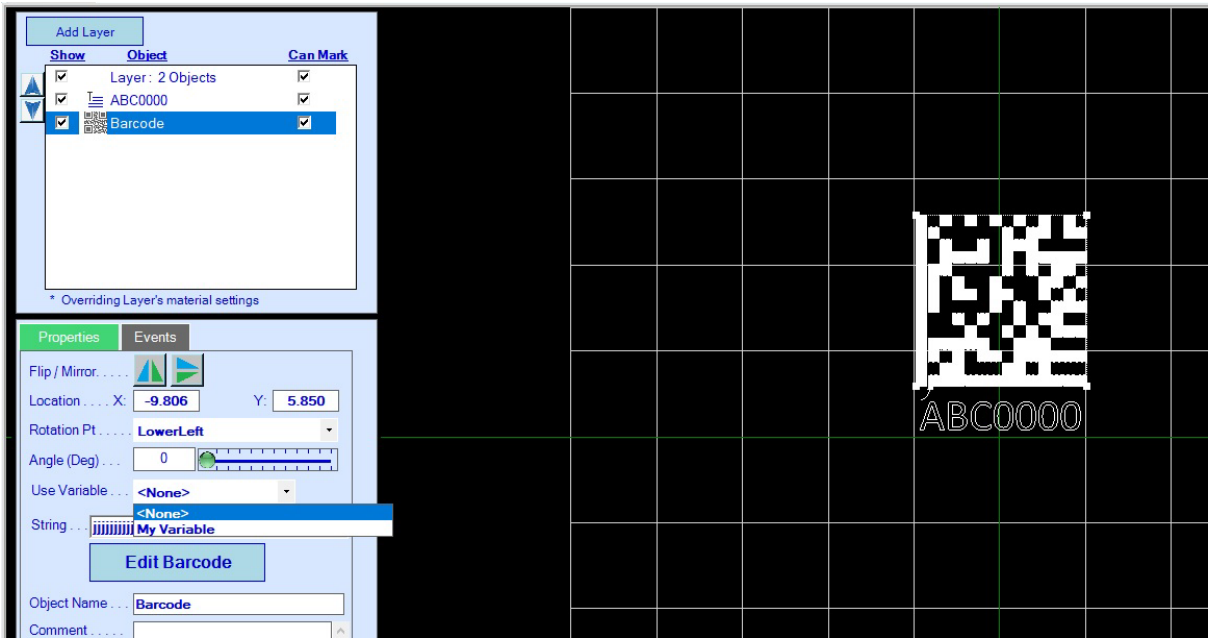
Most uses of a Barcode require what is called a **“Human Readable”** text to show below the barcode image. This is so that if the code is damaged or even if a Reader is not present or available the part information is still viewable.

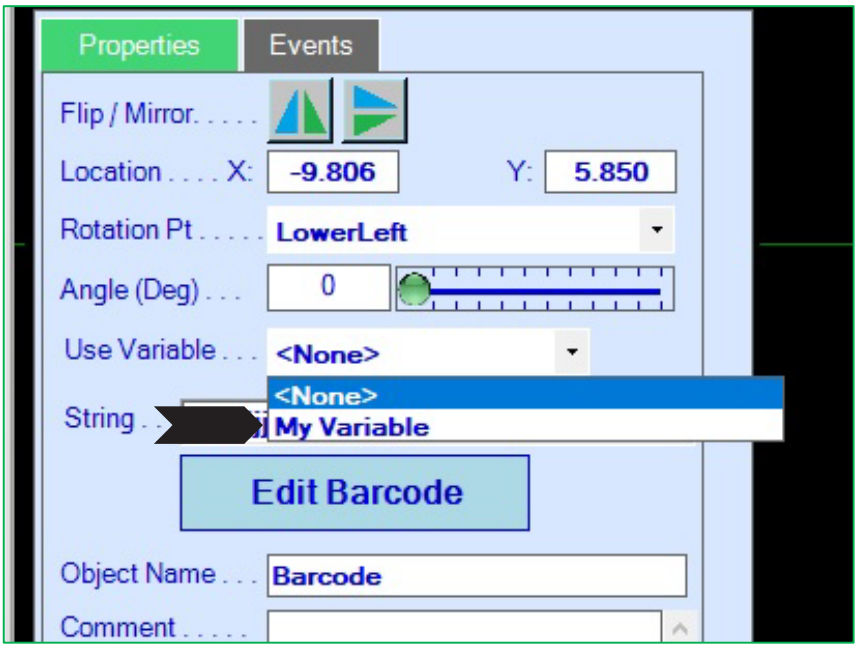





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# VARIABLE MANAGER



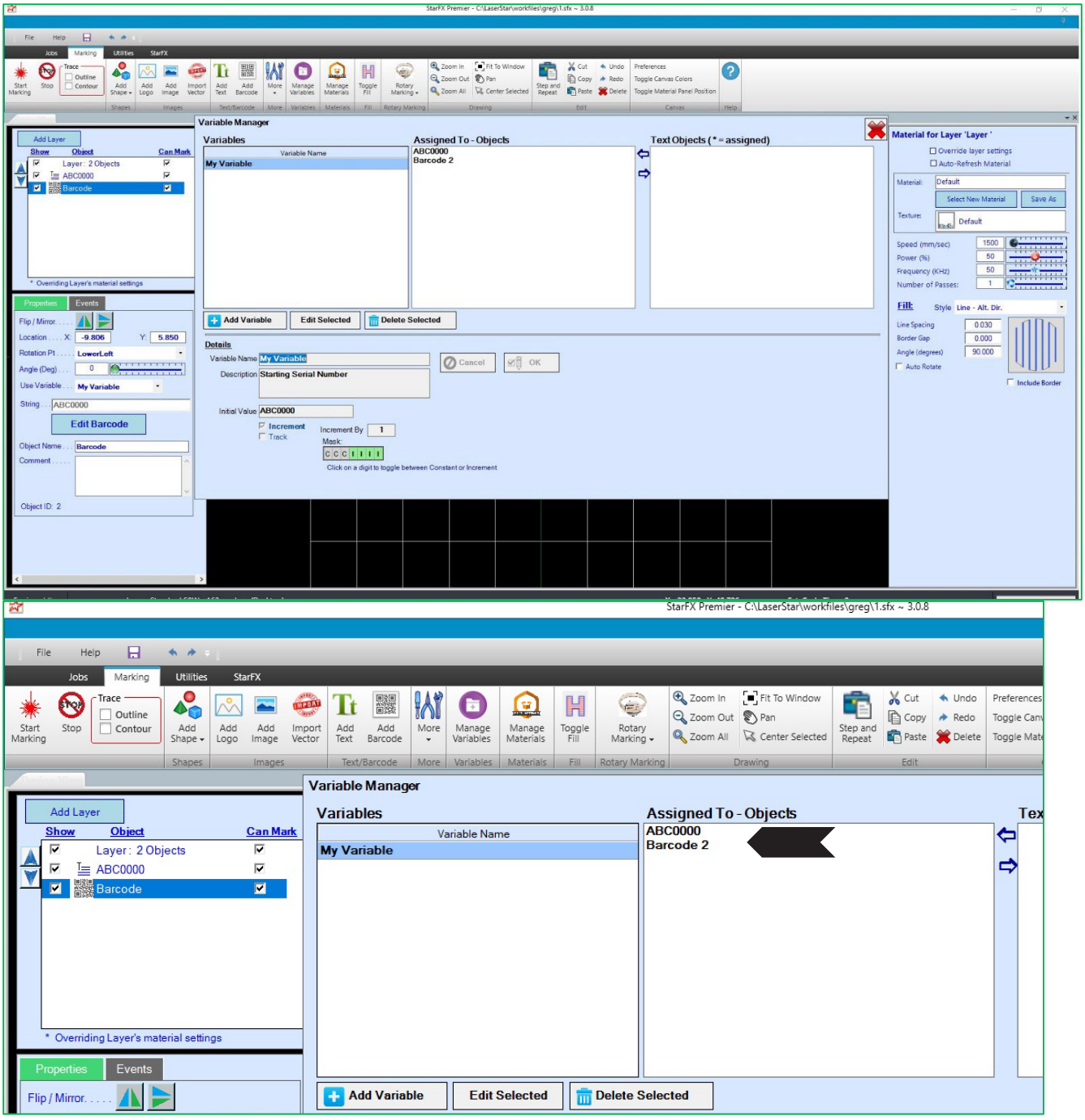




Here we selected the same Variable we created for the Text Object to be used for the actual Barcode data.

Most uses of a Barcode require what is called a **"Human Readable"** text to show below the barcode image. This is so that if the code is damaged or even if a Reader is not present or available the part information is still viewable.

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# VARIABLE MANAGER





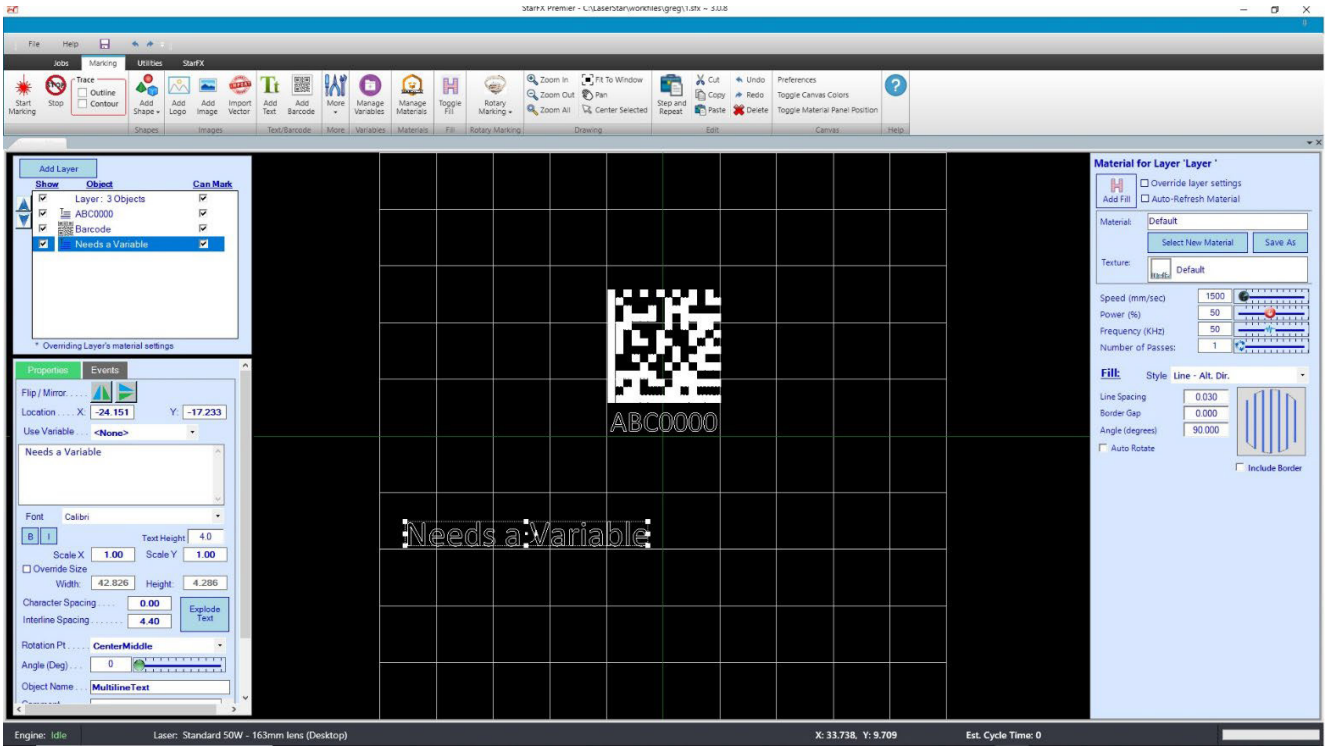


If we go back to the Variable Manger we can see that **"My Variable"** has been assigned to our Text Object and our Barcode.

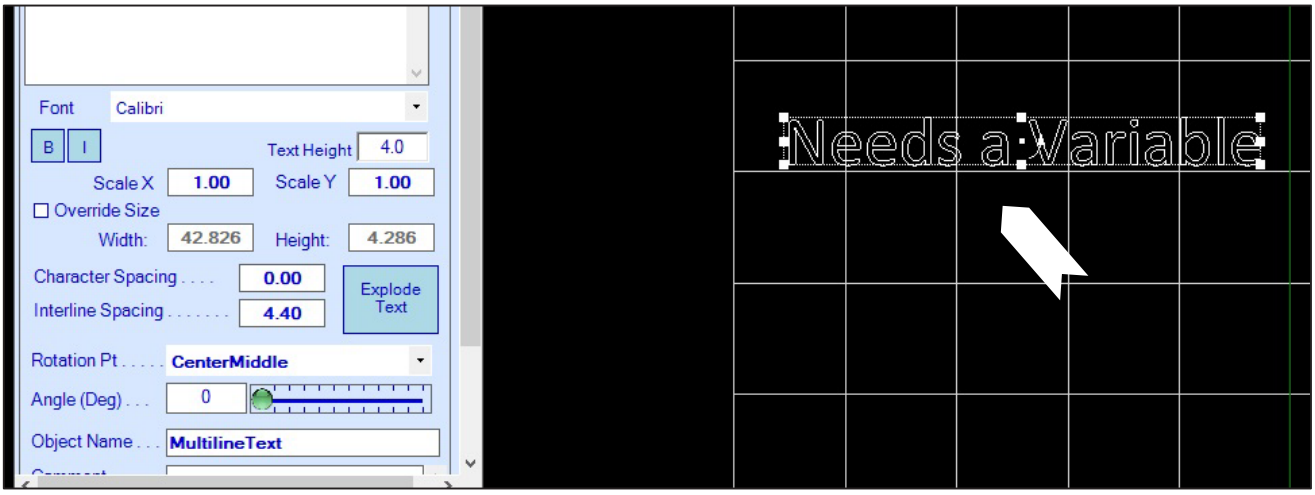


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# VARIABLE MANAGER



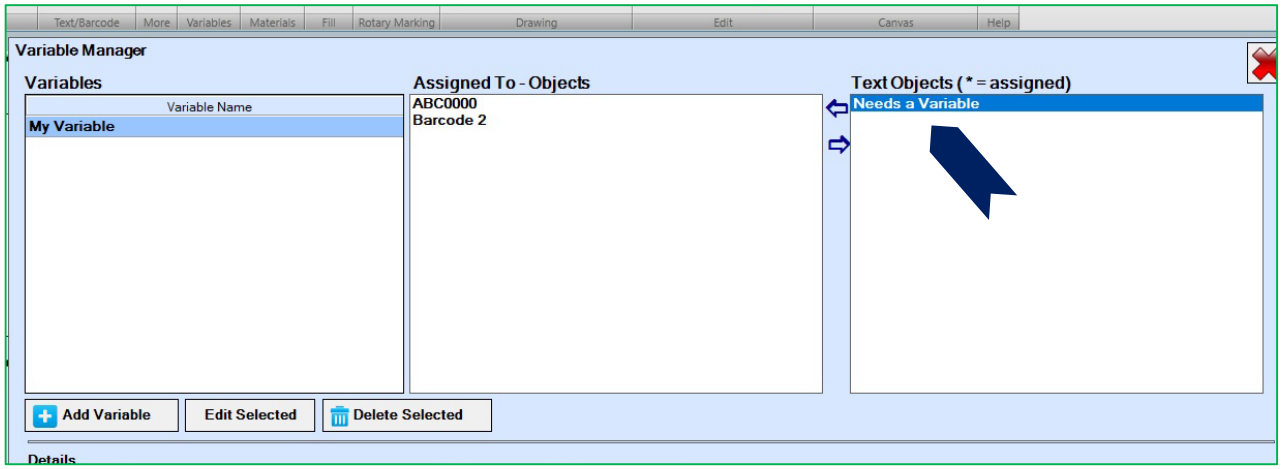

Another route the Variable Manager provides we will demonstrate now.

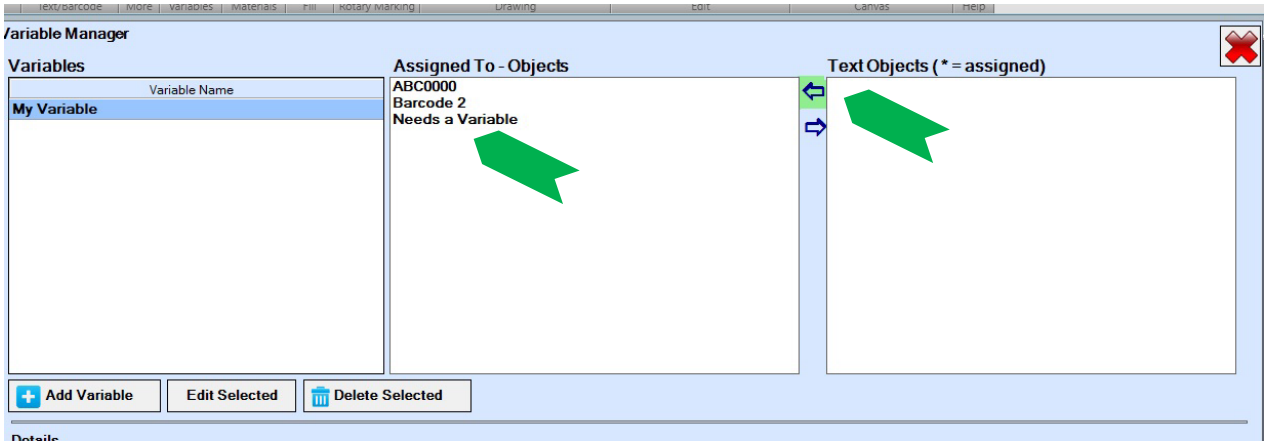



Here we have created a normal Text object ( “Needs a Variable” ) next we will go to the Variable Manager.

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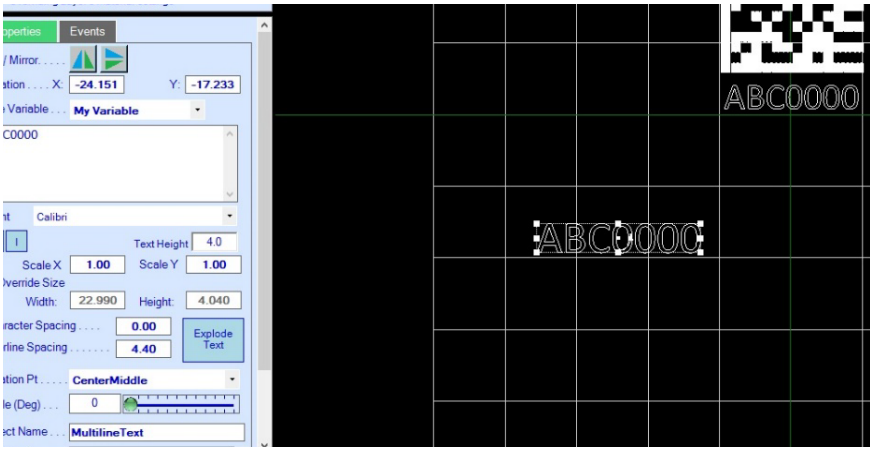
# VARIABLE MANAGER




From the Variable Manager screen you can—

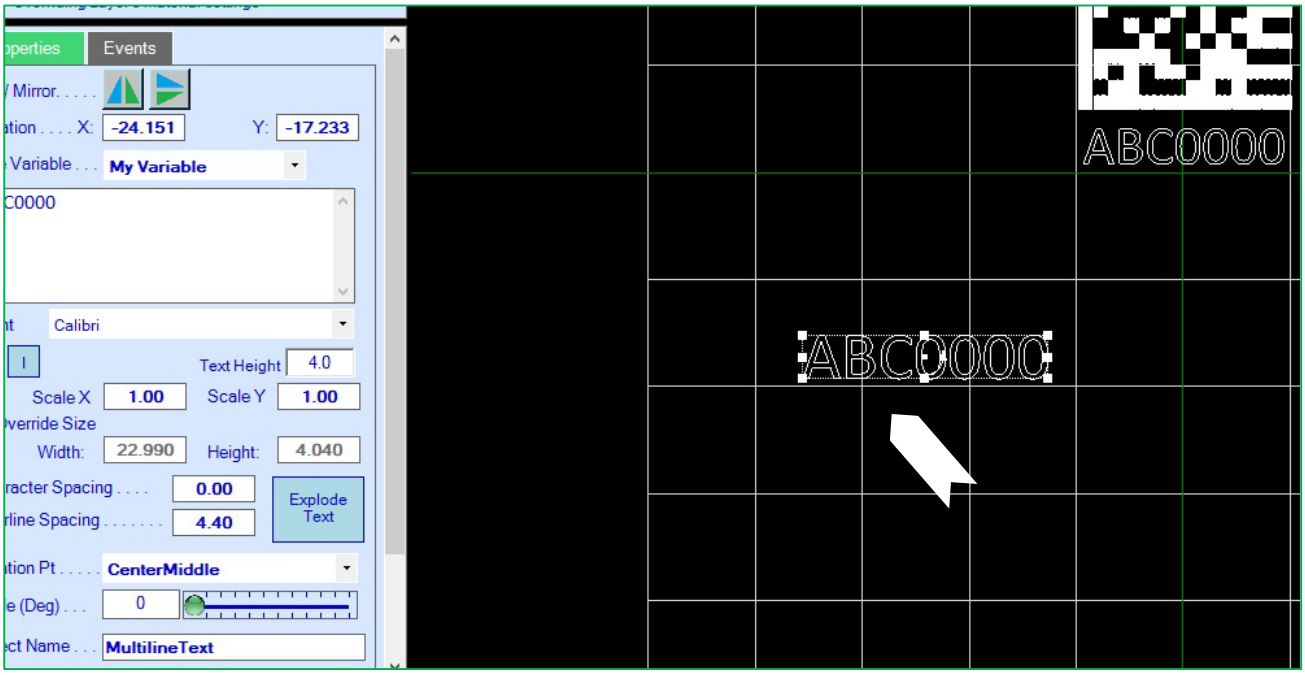
- ☆ Select our new Text Object.
- ☆ Select the “Left Arrow” to move it into the “Assigned to –Objects” column.



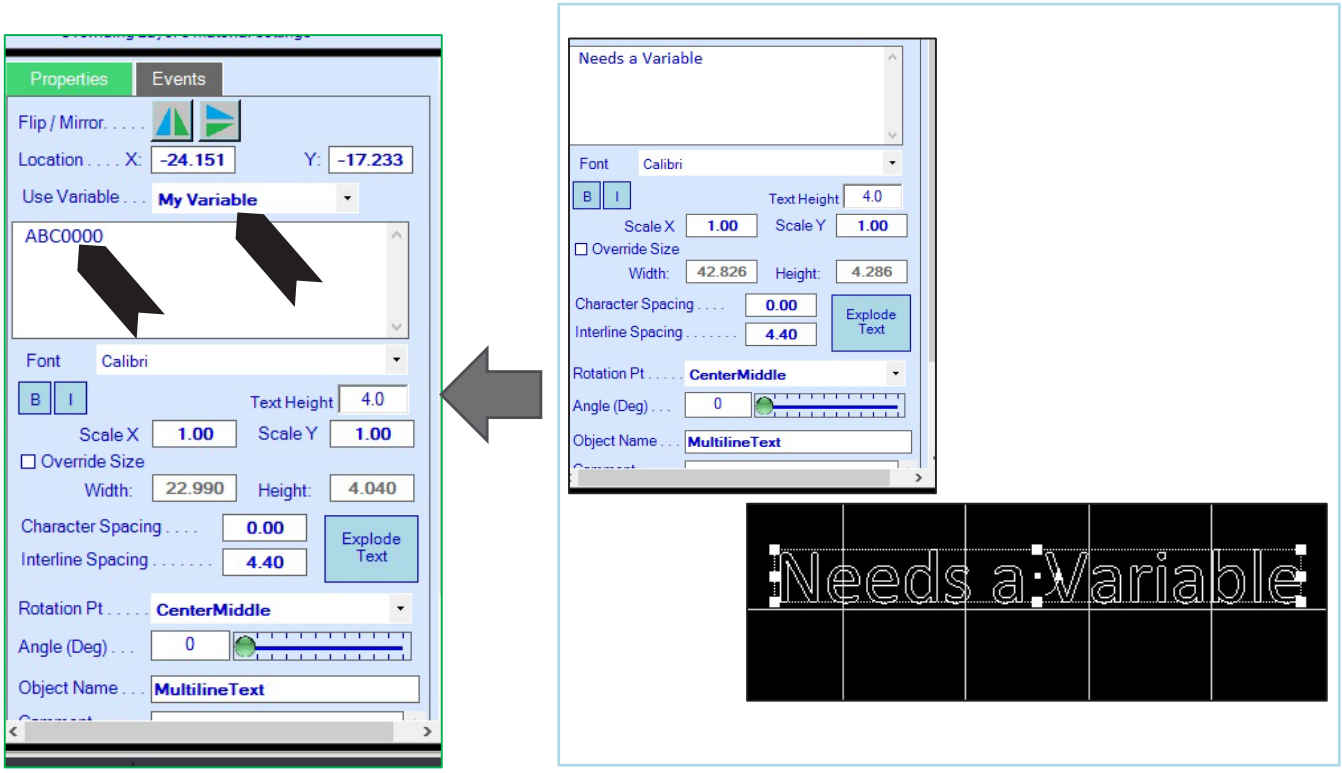



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# VARIABLE MANAGER




Now we can see that the Text Object has been changed to use the variable instead of its fixed text.




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# BARCODE CREATOR MODULE

CLICKABLE CONTENT

## CREATE A BARCODE

## STANDARD BARCODES

## ADAVANCED HEADERS

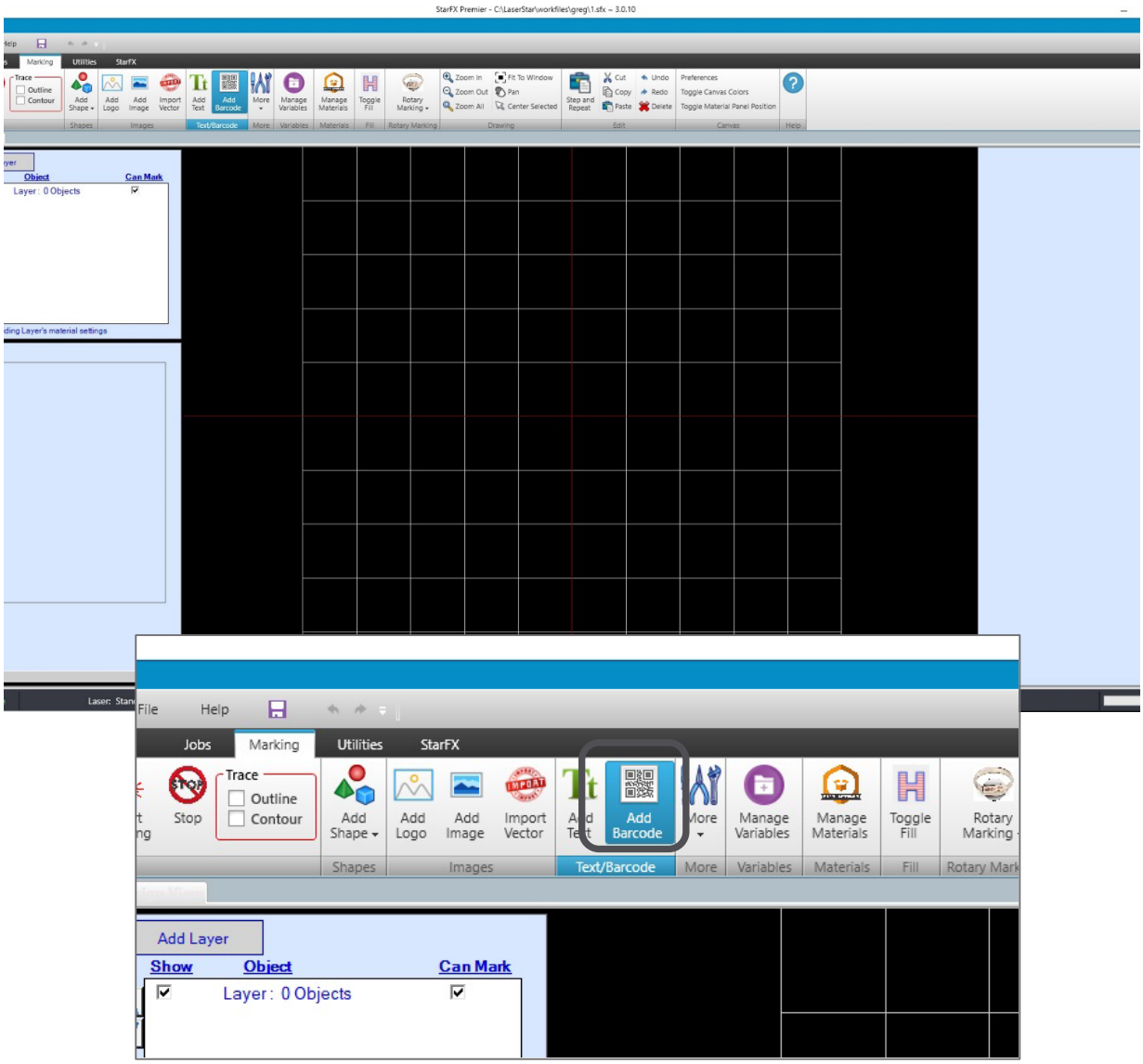
### UID Barcodes

### GS1 Barcodes



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# CREATE A BARCODE



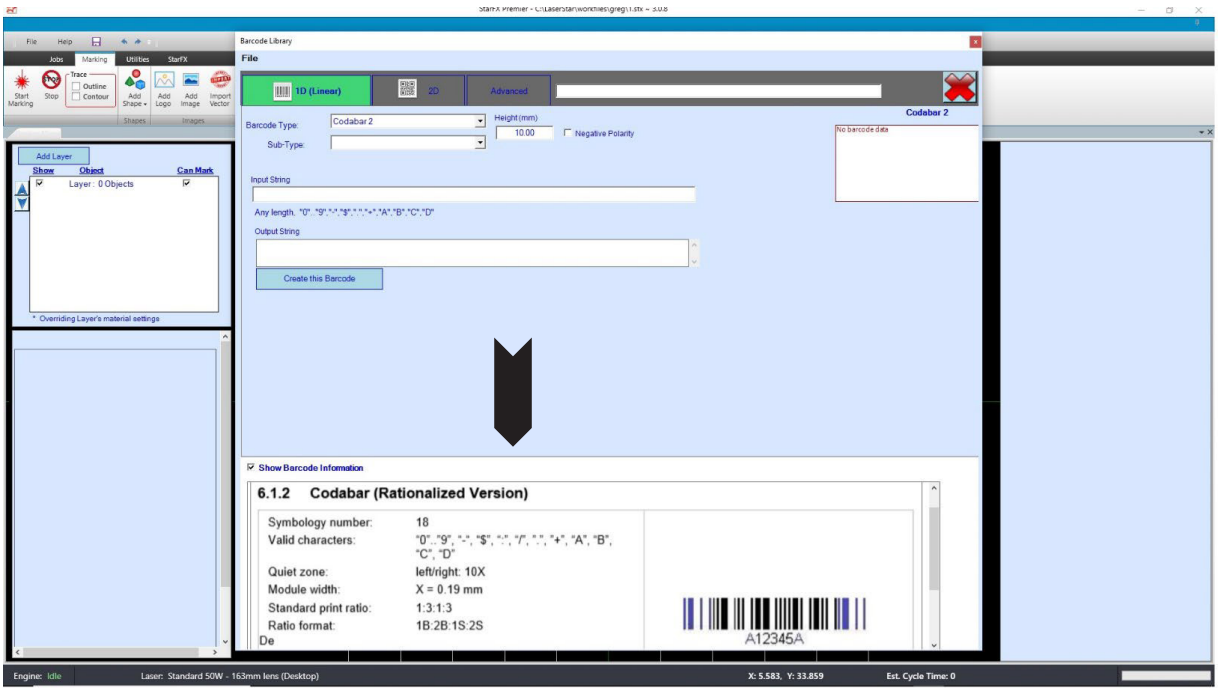

Next we will discuss the “Barcode Creator” this very powerful Tool takes the complexity and mystery out of lasing barcodes on your parts and walks you through the various Barcode types.

It has helpful tips and information on the “Rules” of each barcode type such as how many characters and what type of characters a specific barcode can contain.

*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*

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# CREATE A BARCODE




6.1.2 Codabar (Rationalized Version)

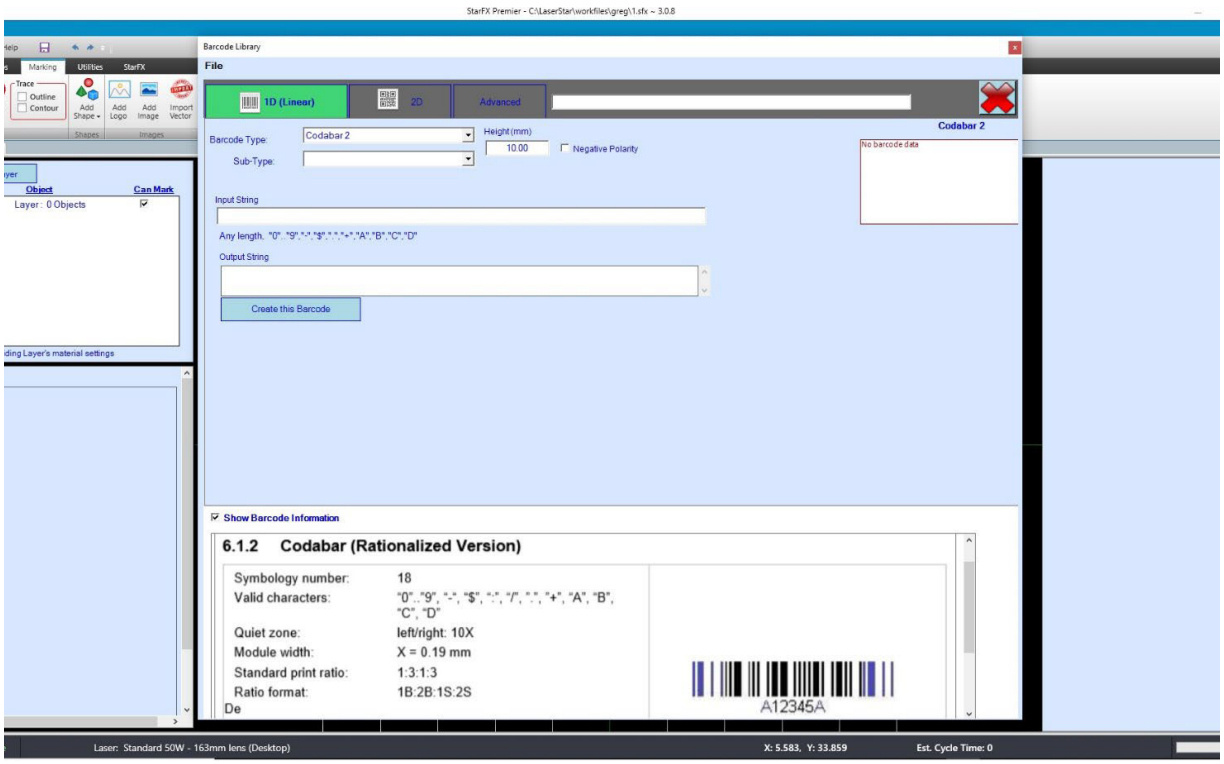
| | |
|---|---|
| Symbology number: | 18 |
| Valid Characters: | “0”,[…],”9”, “-” ,”$”, “:”, “/”, “.”, “+”, “A“, “B”, “C”, “D” |
| Quiet Zone: | left/right 10X |
| Module Width: | X = 0.19 mm |
| Standard print ratio: | 1:3:1:3 |
| Ratio format: | 1B:2B:1S:2S |
| Default check digit: | None (eCDNone) |
| Possible check digits: | User supplied (e.g. Modulo 16) |
| Symbol size: | +/- 0.66 mm Module with Deviation |
| Print control: | C = CODA |

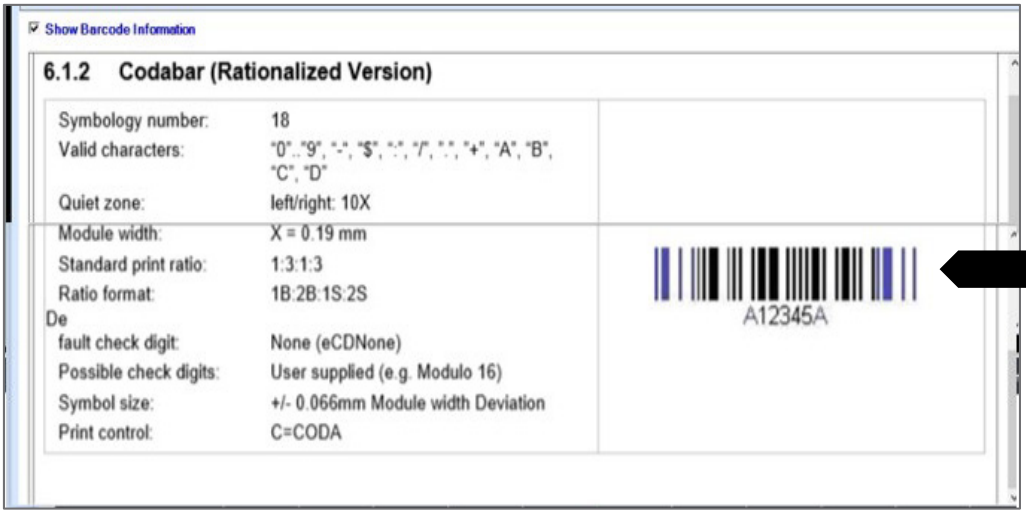
Each Barcode type is supplied with a mini-document with all the pertinent information about that particular code.



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# CREATE A BARCODE

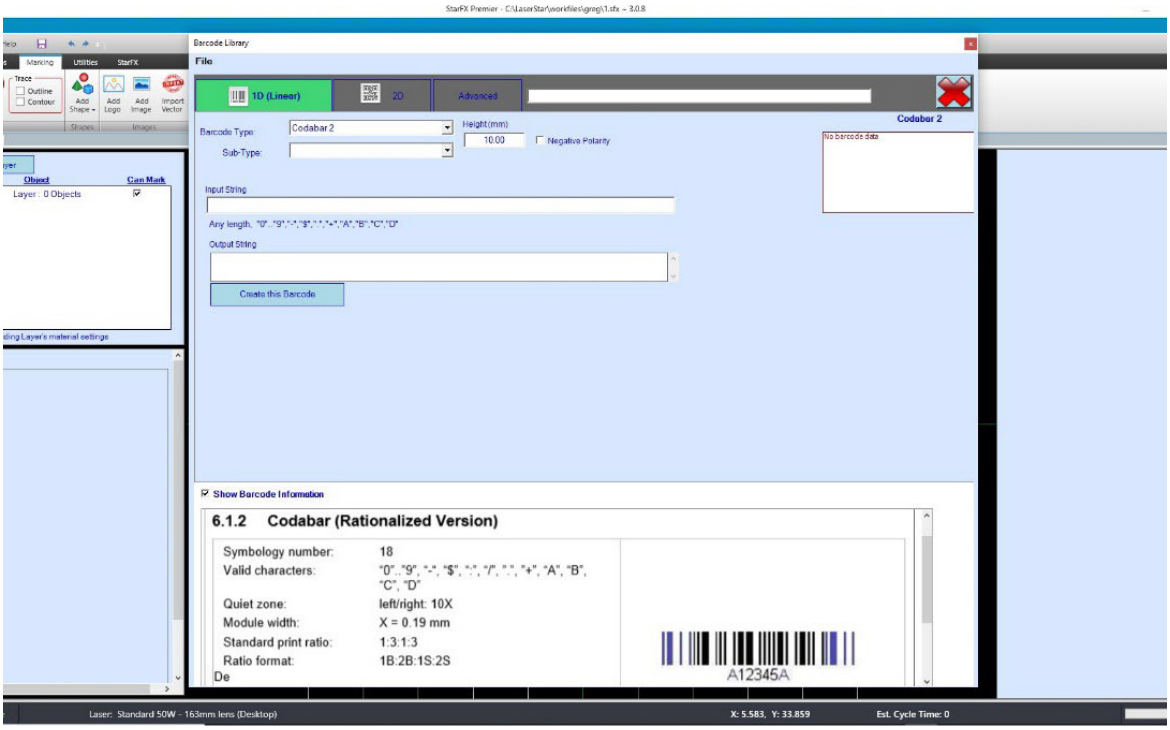



There is also a sample code that can be read and the lased code compared to.

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# CREATE A BARCODE




6.1.2 Codabar (Rationalized Version)

| | |
|---|---|
| Symbology number: | 18 |
| Valid Characters: | “0”,[…],”9”, “-” ,”$”, “:”, “/”, “.”, “+”, “A“, “B”, “C”, “D” |
| Quiet Zone: | left/right 10X |
| Module Width: | X = 0.19 mm |
| Standard print ratio: | 1:3:1:3 |
| Ratio format: | 1B:2B:1S:2S |
| Default check digit: | None (eCDNone) |
| Possible check digits: | User supplied (e.g. Modulo 16) |
| Symbol size: | +/- 0.66 mm Module with Deviation |
| Print control: | C = CODA |

The information box can be critical to understanding how to produce a good code.



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# CREATE A BARCODE

## 6.1.2 Codabar (Rationalized Version)

| | |
|---|---|
| Symbology number: | 18 |
| Valid Characters: | “0”,[…],”9”, “-” ,”$”, “:”, “/”, “.”, “+”, “A“, “B”, “C”, “D” |
| Quiet Zone: | left/right 10X |
| Module Width: | X = 0.19 mm |
| Standard print ratio: | 1:3:1:3 |
| Ratio format: | 1B:2B:1S:2S |
| Default check digit: | None (eCDNone) |
| Possible check digits: | User supplied (e.g. Modulo 16) |
| Symbol size: | +/- 0.66 mm Module with Deviation |
| Print control: | C = CODA |

A few examples will demonstrate this :

Valid characters show what characters are permissible in the selected code.

Above only digits 0 through 9, the special characters shown and uppercase A, B, C, D are allowed.

**Abc000** will fail to read while **ABC000** is a good code.
**XYZ000** will fail to read while **ABC000** is a good code.
**50%000** will fail to read while **50/000** is a good code.

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6.1.2 Codabar (Rationalized Version)

| | |
|---|---|
| Symbology number: | 18 |
| Valid Characters: | “0”,[…],”9”, “-” ,”$”, “:”, “/”, “.”, “+”, “A“, “B”, “C”, “D” |
| Quiet Zone: | left/right 10X |
| Module Width: | X = 0.19 mm |
| Standard print ratio: | 1:3:1:3 |
| Ratio format: | 1B:2B:1S:2S |
| Default check digit: | None (eCDNone) |
| Possible check digits: | User supplied (e.g. Modulo 16) |
| Symbol size: | +/- 0.66 mm Module with Deviation |
| Print control: | C = CODA |

A few examples will demonstrate this :

**Quiet Zone** tells you that there will be a lased space on either end of the code this is used by the reader to determine where the start and end of the barcode is.





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# CREATE A BARCODE

6.1.2 Codabar (Rationalized Version)

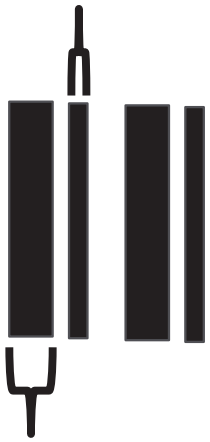
| | |
|---|---|
| Symbology number: | 18 |
| Valid Characters: | “0”,[…],”9”, “-” ,”$”, “:”, “/”, “.”, “+”, “A“, “B”, “C”, “D” |
| Quiet Zone: | left/right 10X |
| Module Width: | X = 0.19 mm |
| Standard print ratio: | 1:3:1:3 |
| Ratio format: | 1B:2B:1S:2S |
| Default check digit: | None (eCDNone) |
| Possible check digits: | User supplied (e.g. Modulo 16) |
| Symbol size: | +/- 0.66 mm Module with Deviation |
| Print control: | C = CODA |

A few examples will demonstrate this :

**Standard print ratio** tells you the ratio of a **“Wide Bar”** to a **“Narrow Bar”** both in the black bars and the white bars or the Lased bars and the Un-lased bars depending on the color or your material.

This ratio is critical to the Bar Code Reader and to a High Grade in the Readers code analysis.

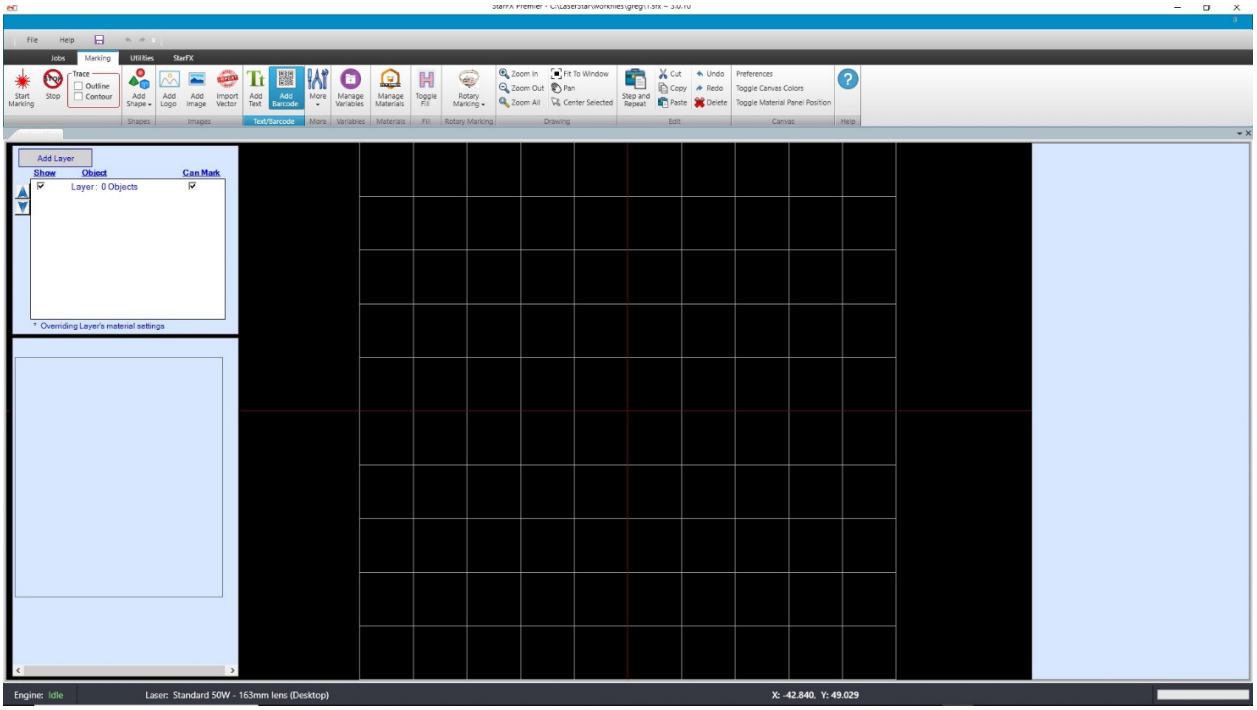
Narrow Bar

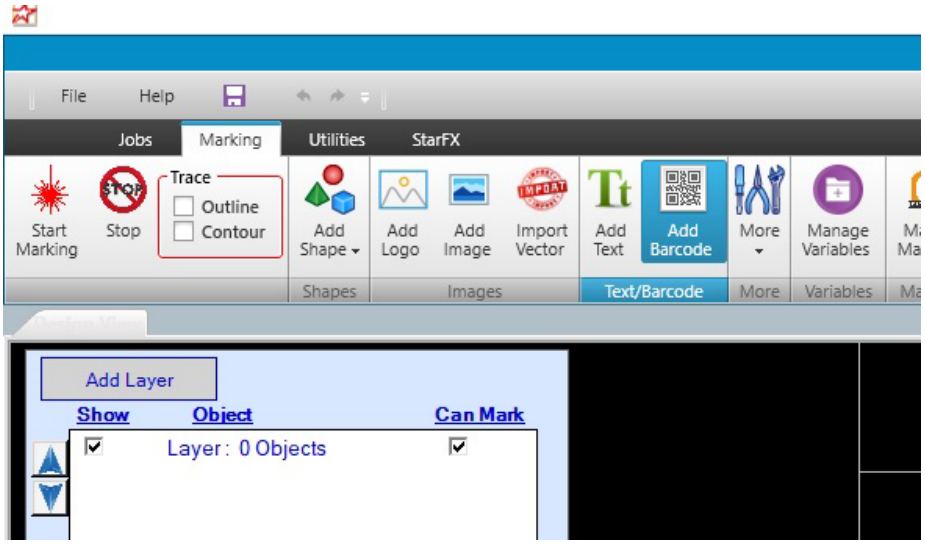


Wide Bar

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# CREATE A BARCODE





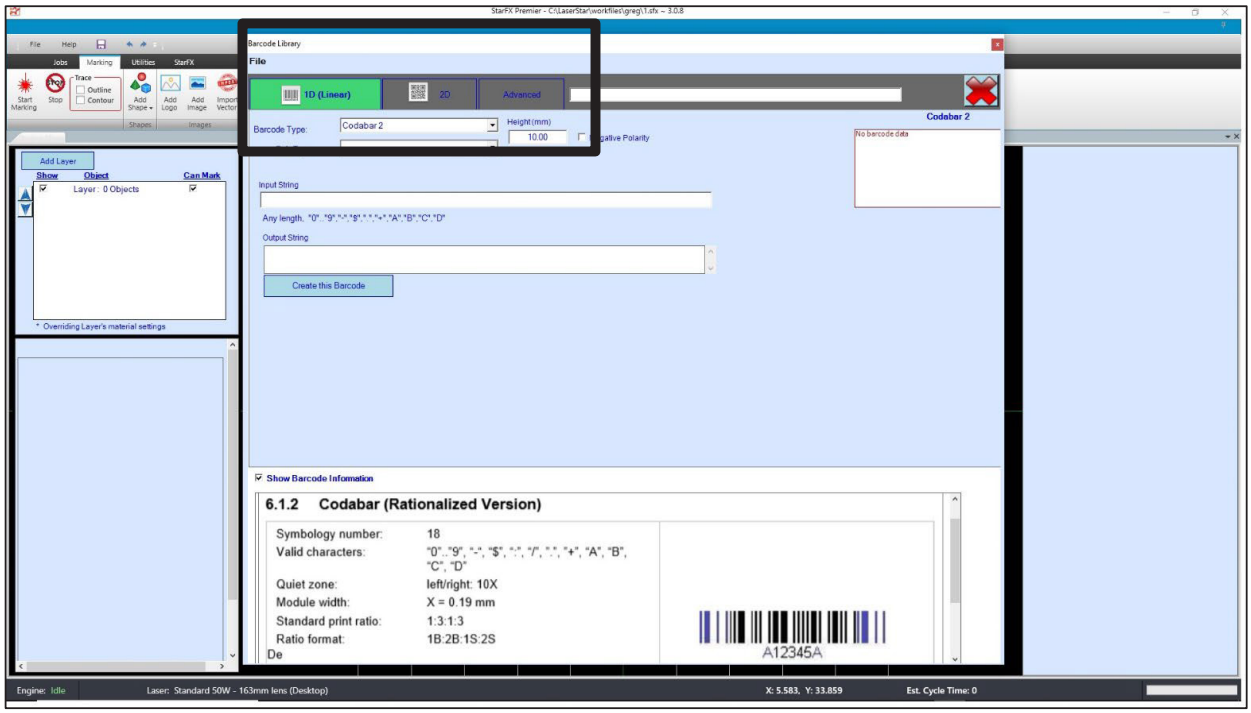

Lets go through the steps of creating a barcode :

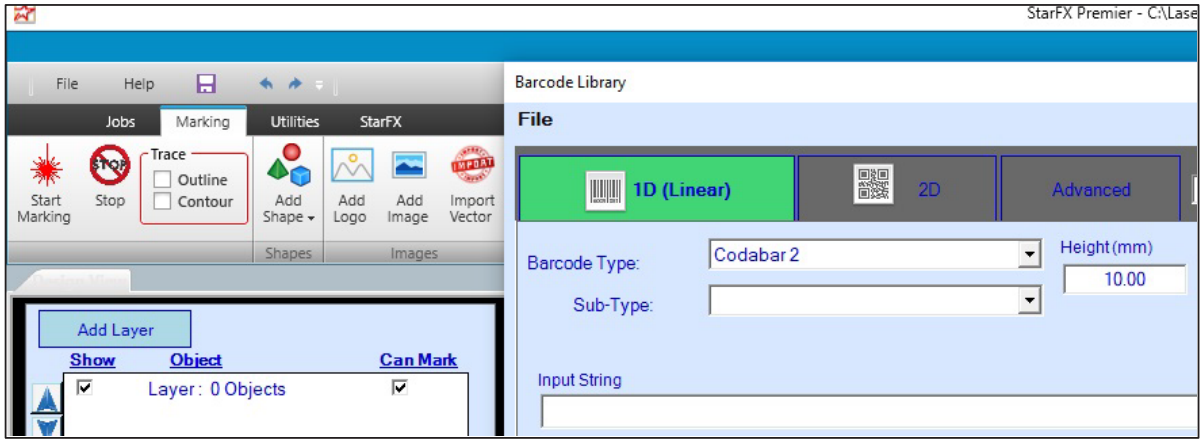
***Step 1*** Select the “Add a Barcode” Tool on the “Ribbon”.



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# CREATE A BARCODE



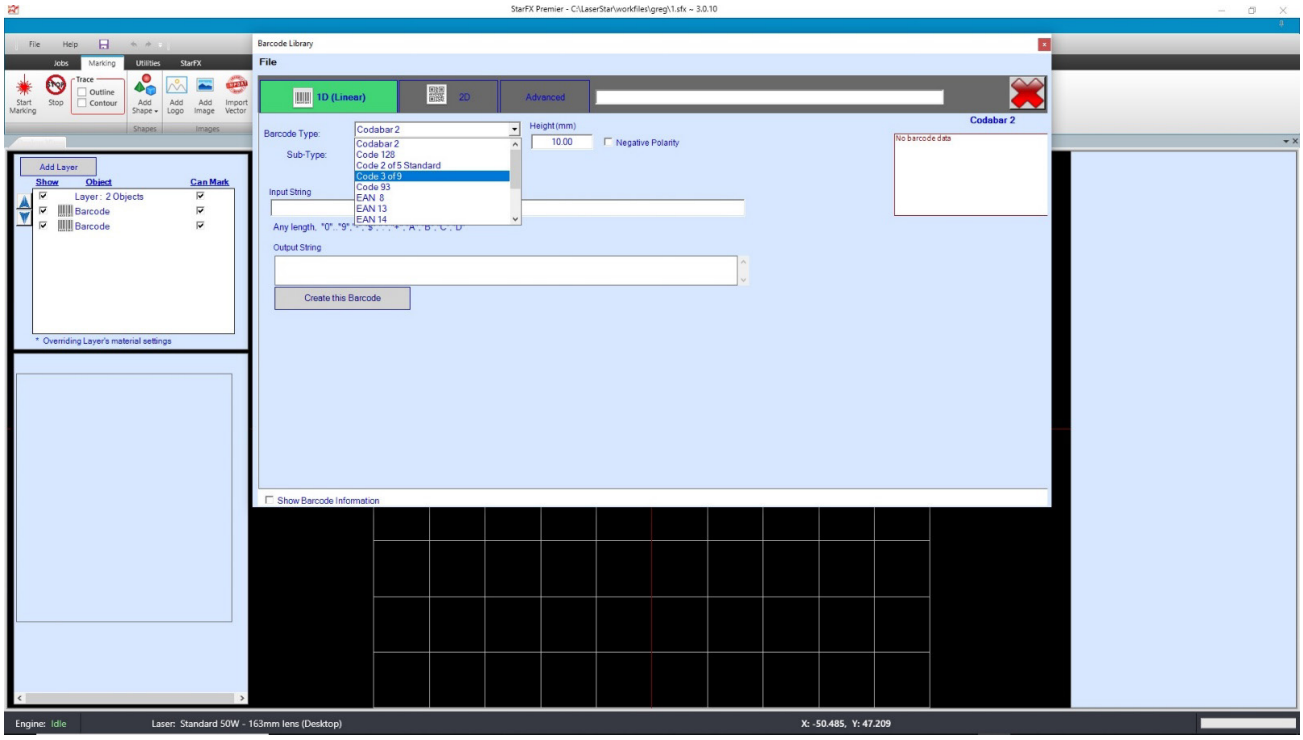

That will bring up the Barcode Creator screen.

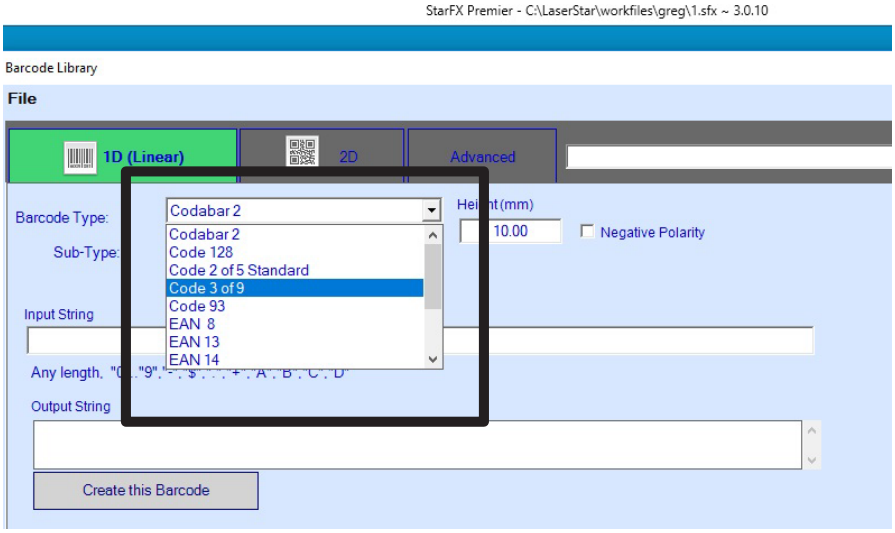
***Step 2*** Select the type of barcode you want to use –

- ☆ 1 D Linear barcode or the traditional barcode.
- ☆ 2 D “Checker Board” Barcode.
  - ☆ ID Matrix
  - ☆ QR Code

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# CREATE A BARCODE



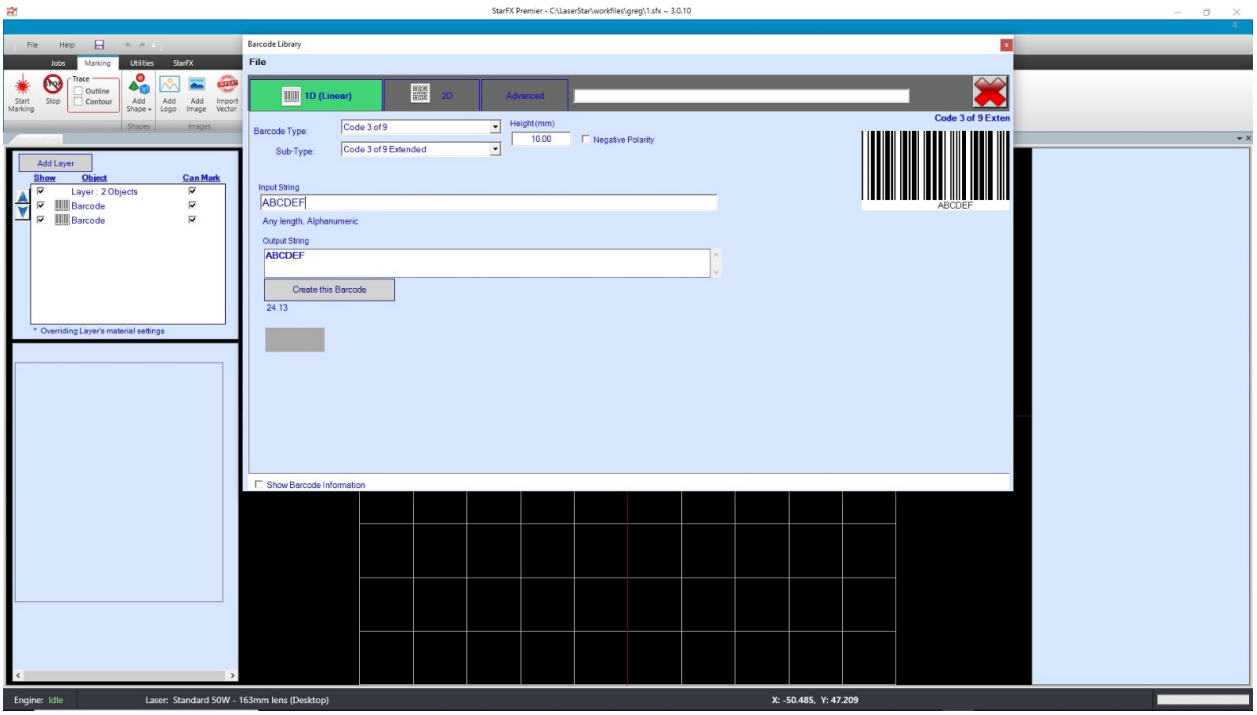

***Step 3*** Next select the Style of Barcode you want to use from the list of standard barcode styles.

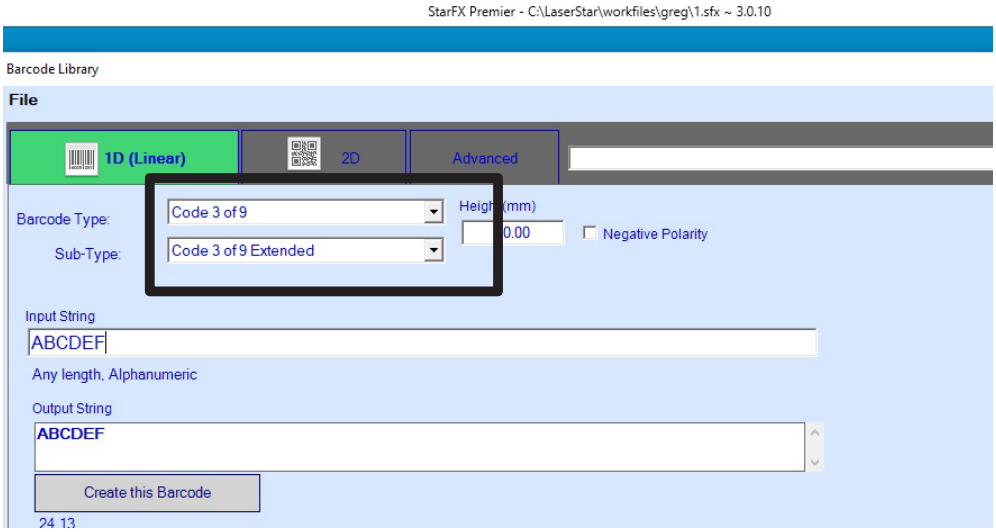
*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*



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# CREATE A BARCODE



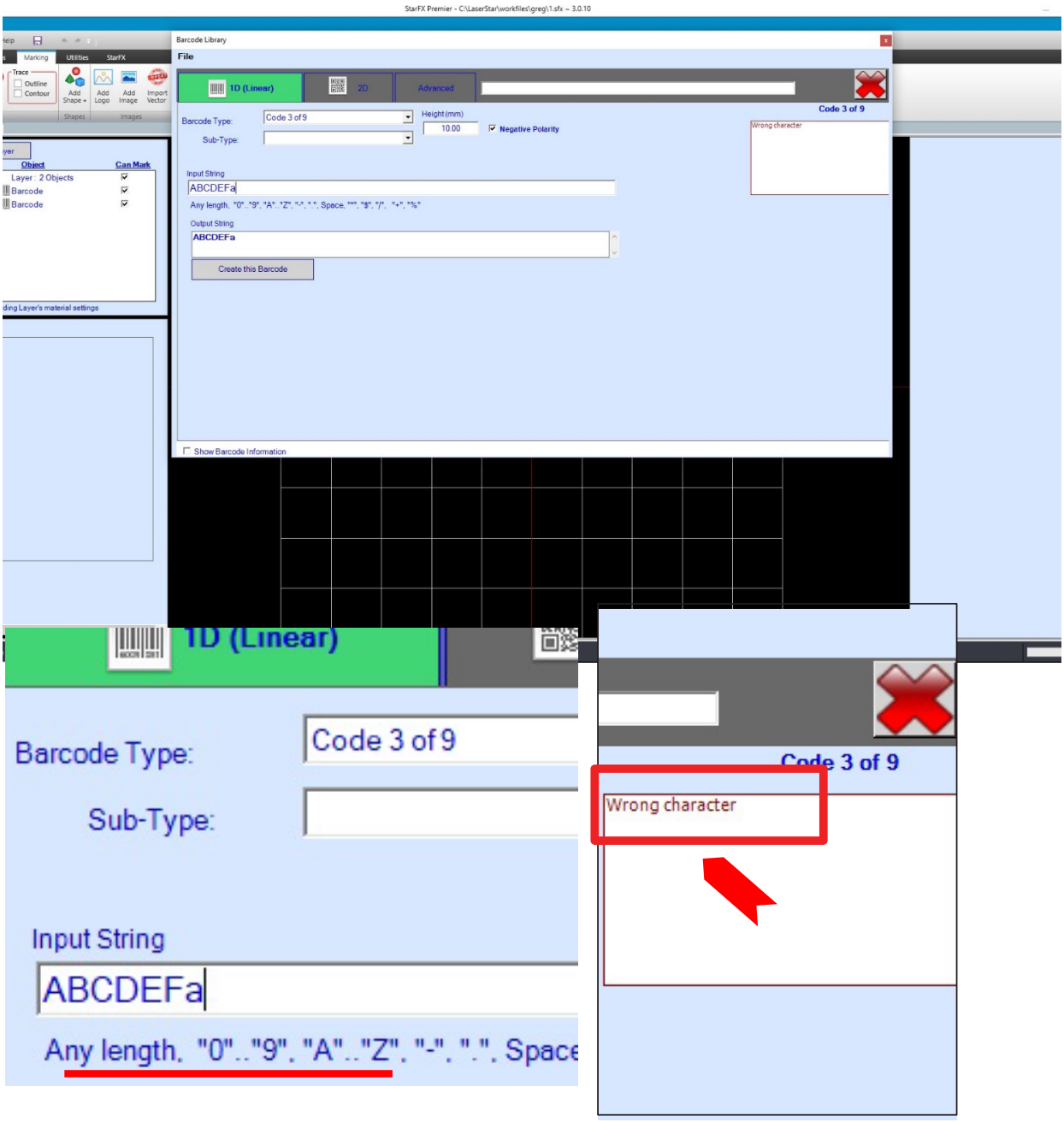




***Step 3*** Check for any Sub Types and select the appropriate choice.

*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*

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# CREATE A BARCODE




***Step 4*** Pay attention to any “rules” that are displayed for this specific code. Here No lowercase characters are allowed.

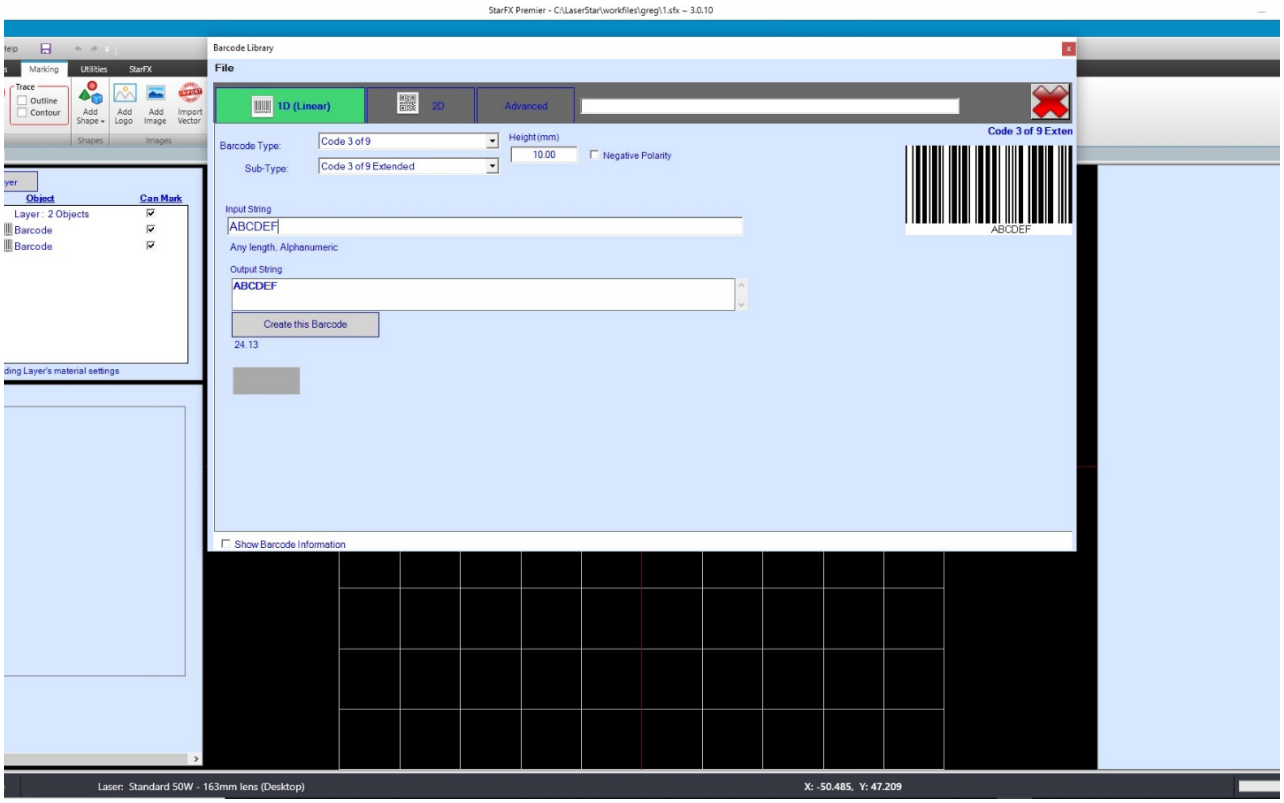
Notice that the Barcode Creator has shown an **ERROR**

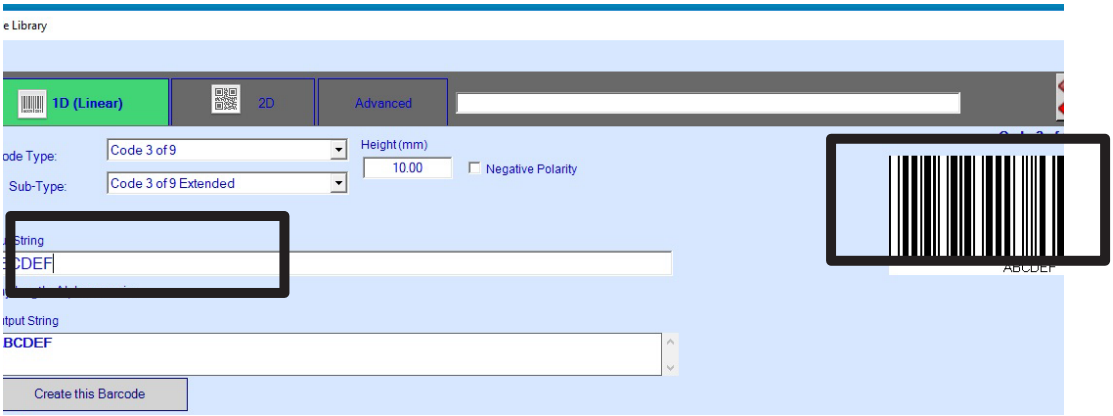
*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*



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# CREATE A BARCODE



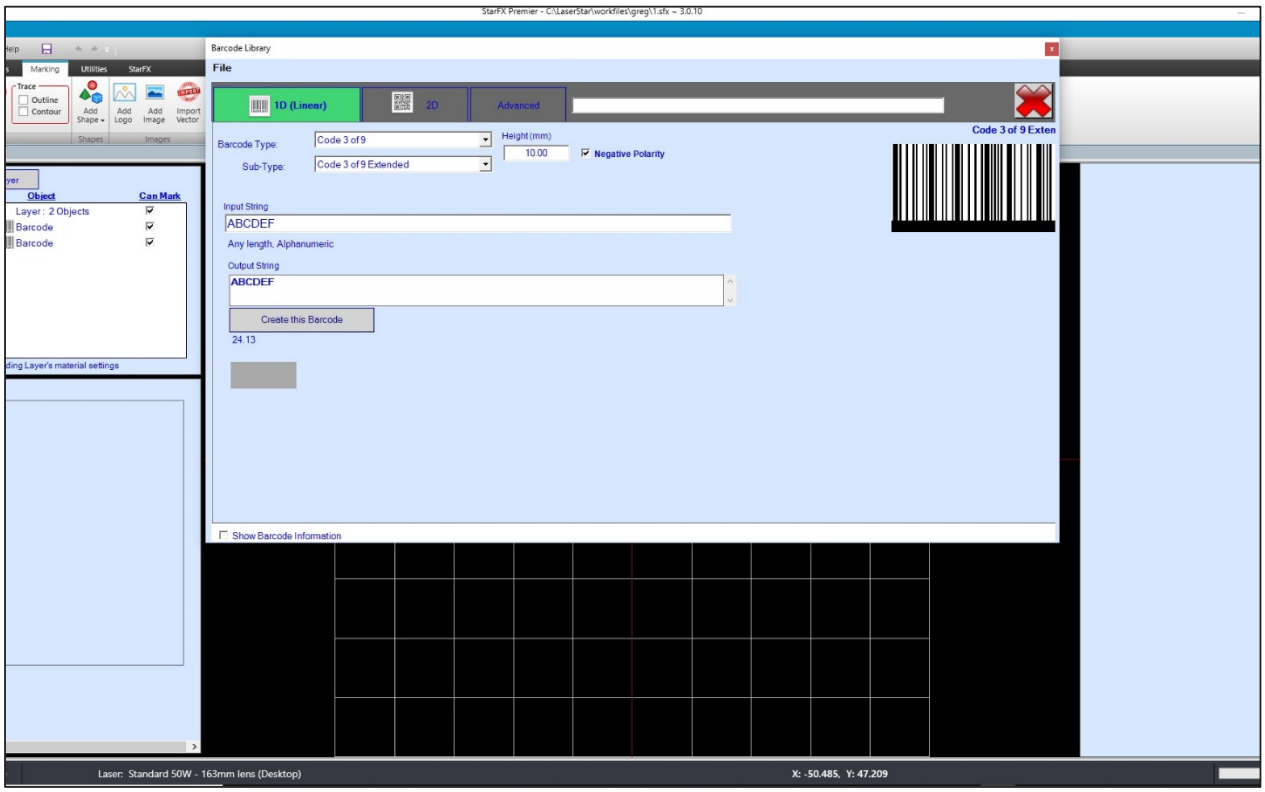

***Step 4*** Enter the text you want to be contained in the Barcode.
Using a Variable is covered in the **"Variable Manager"** Section.

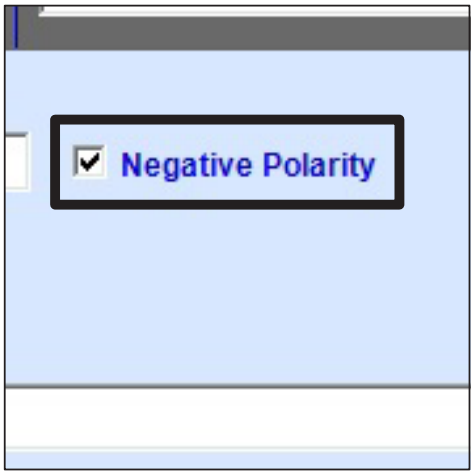
If everything is correct a Barcode will appear in the Code Window.

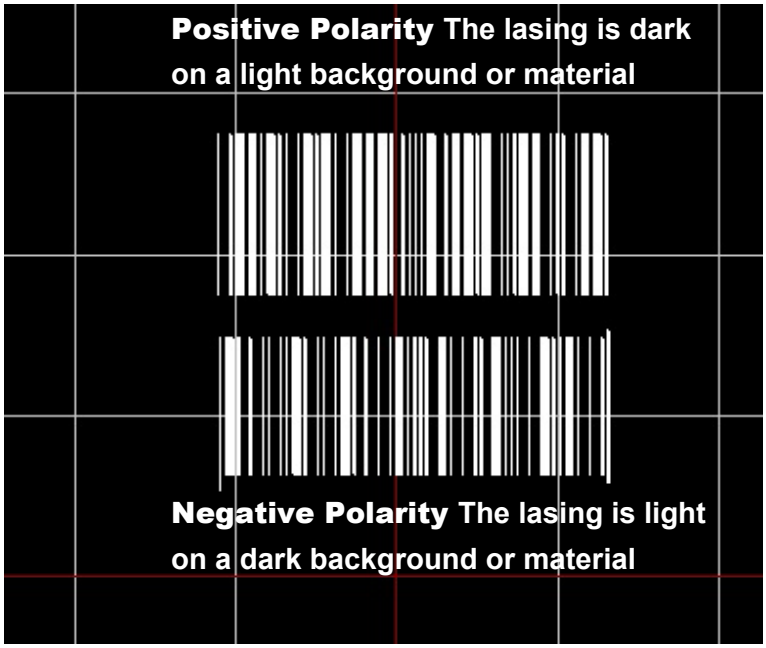
*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*

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# CREATE A BARCODE



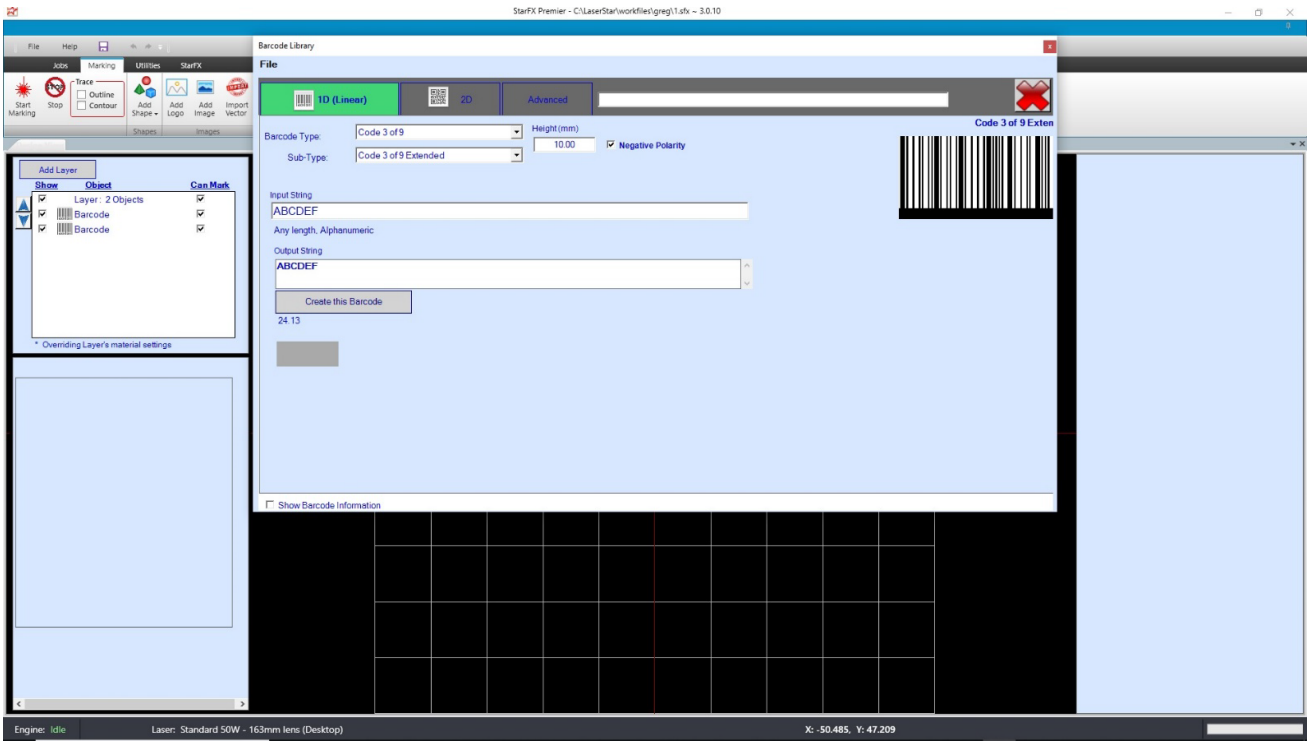

***Step 5*** Select the Polarity you desire Negative is Checked Positive is Un-Checked.

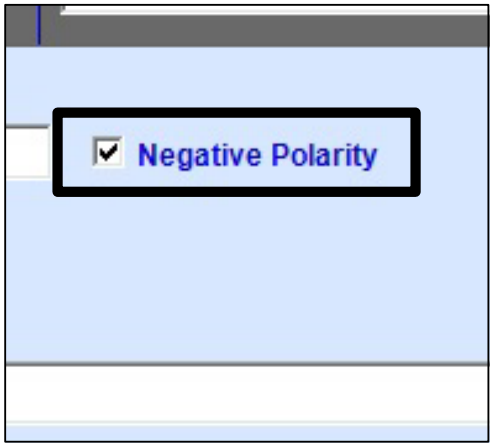
*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*

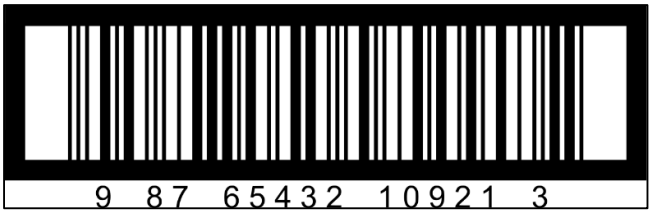


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# CREATE A BARCODE





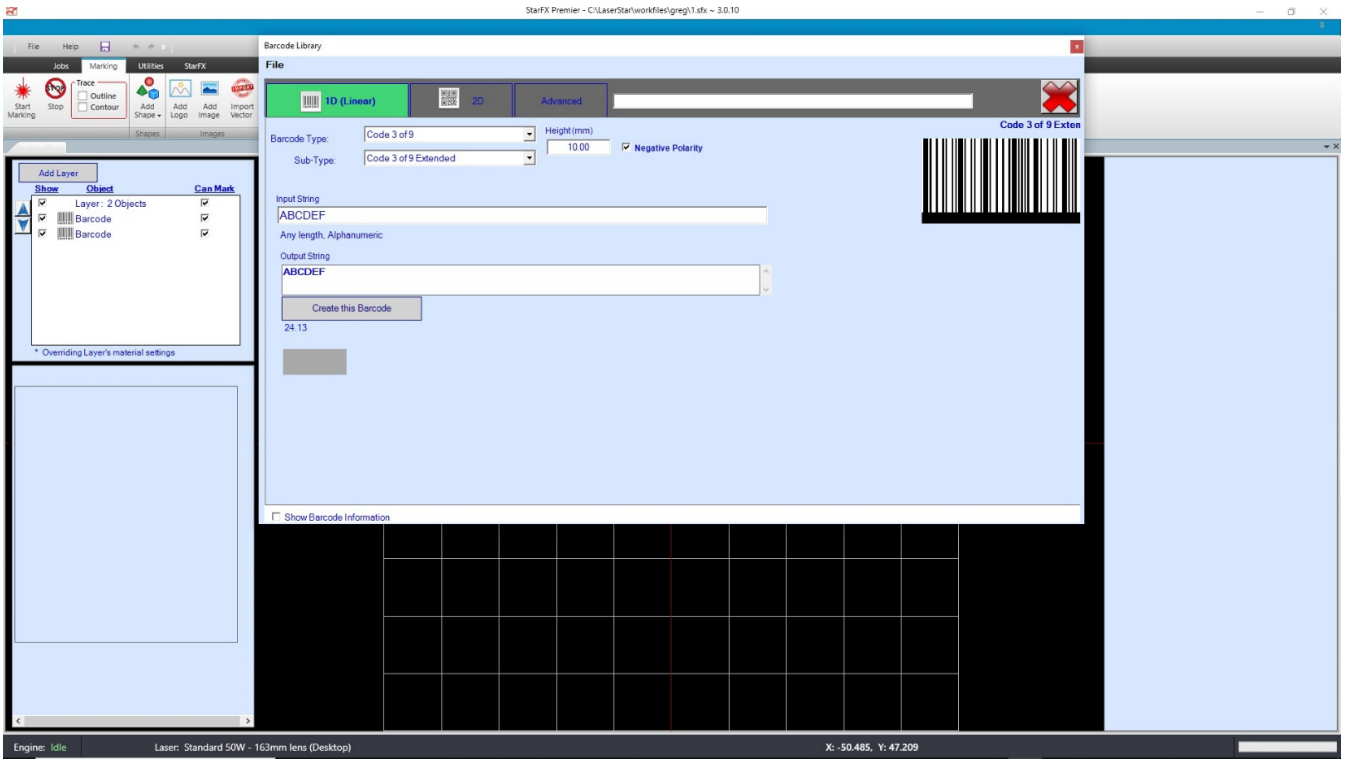


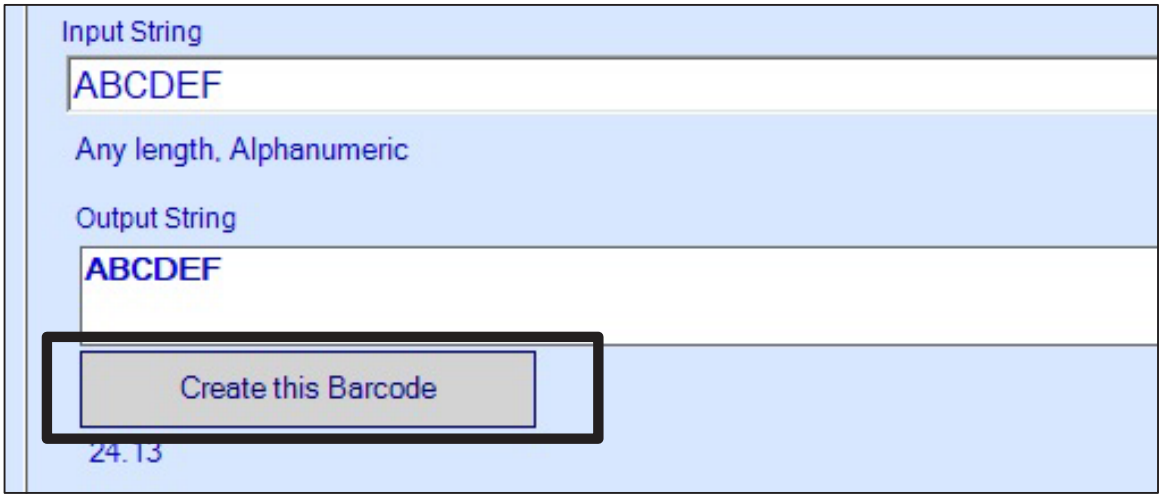
***Step 5*** Select the Polarity you desire Negative is Checked Positive is Un-Checked.

*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*

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# CREATE A BARCODE



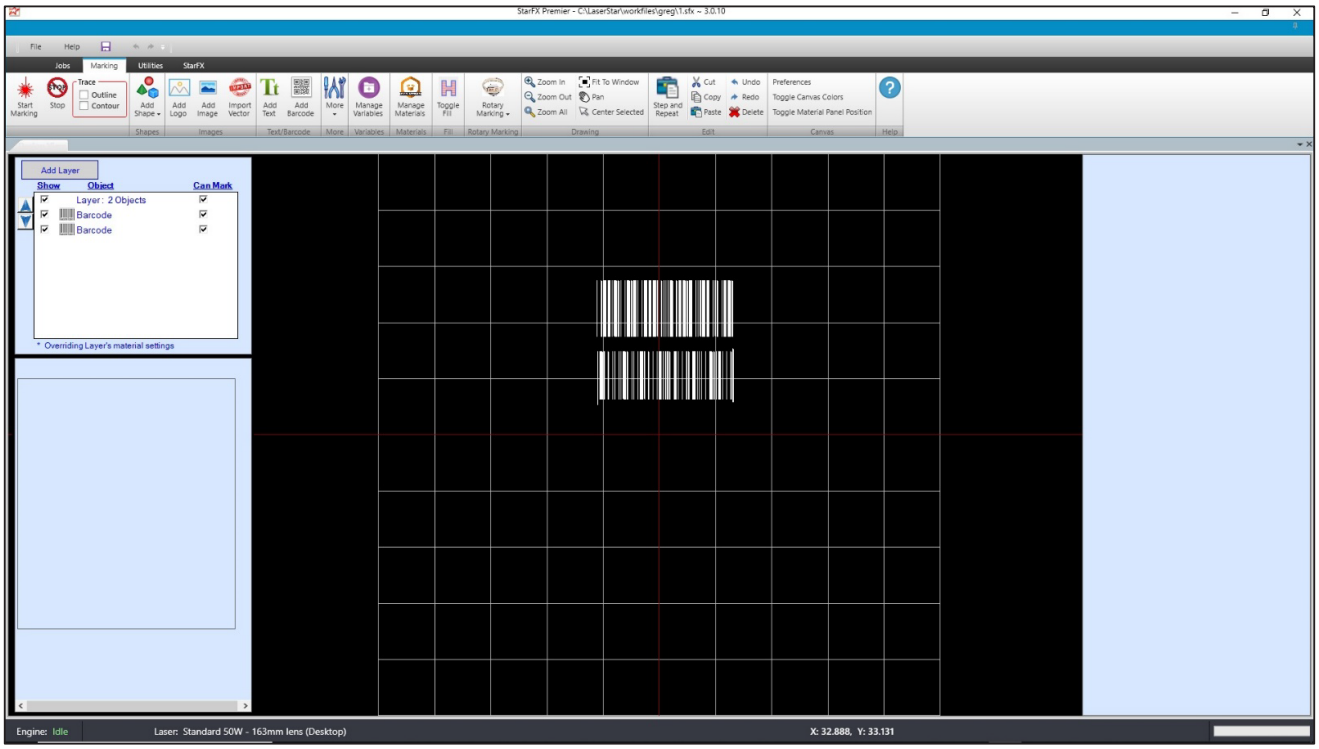

***Step 6*** Select the “Create this Barcode” button.

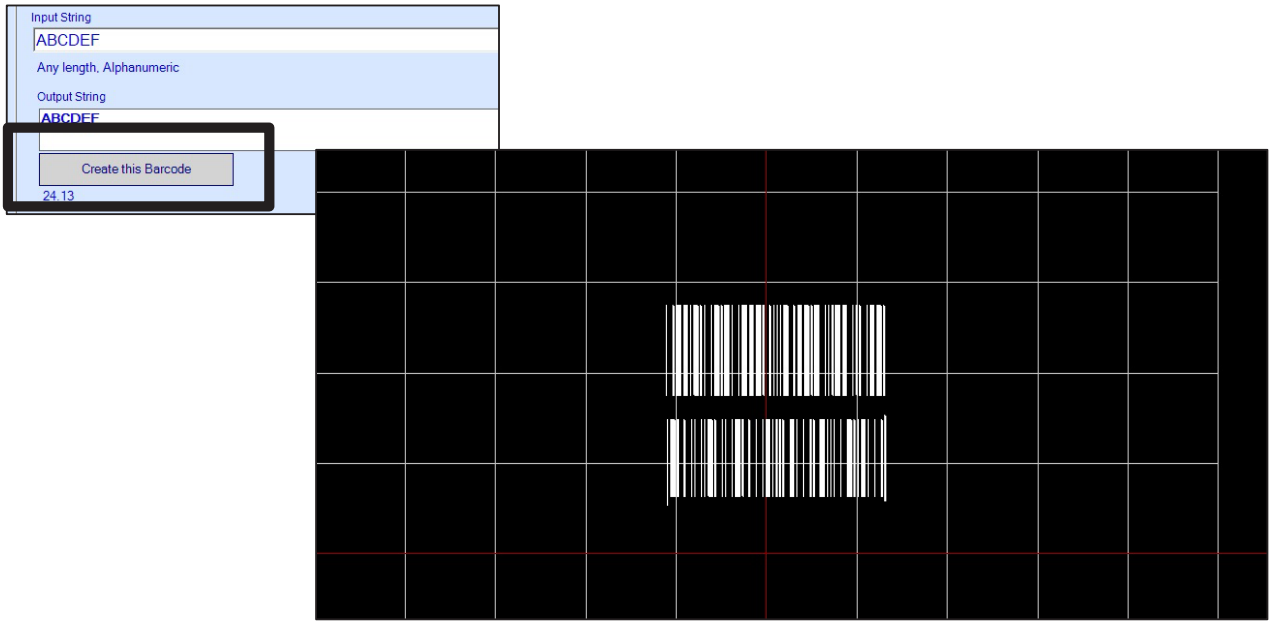
*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*



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# CREATE A BARCODE



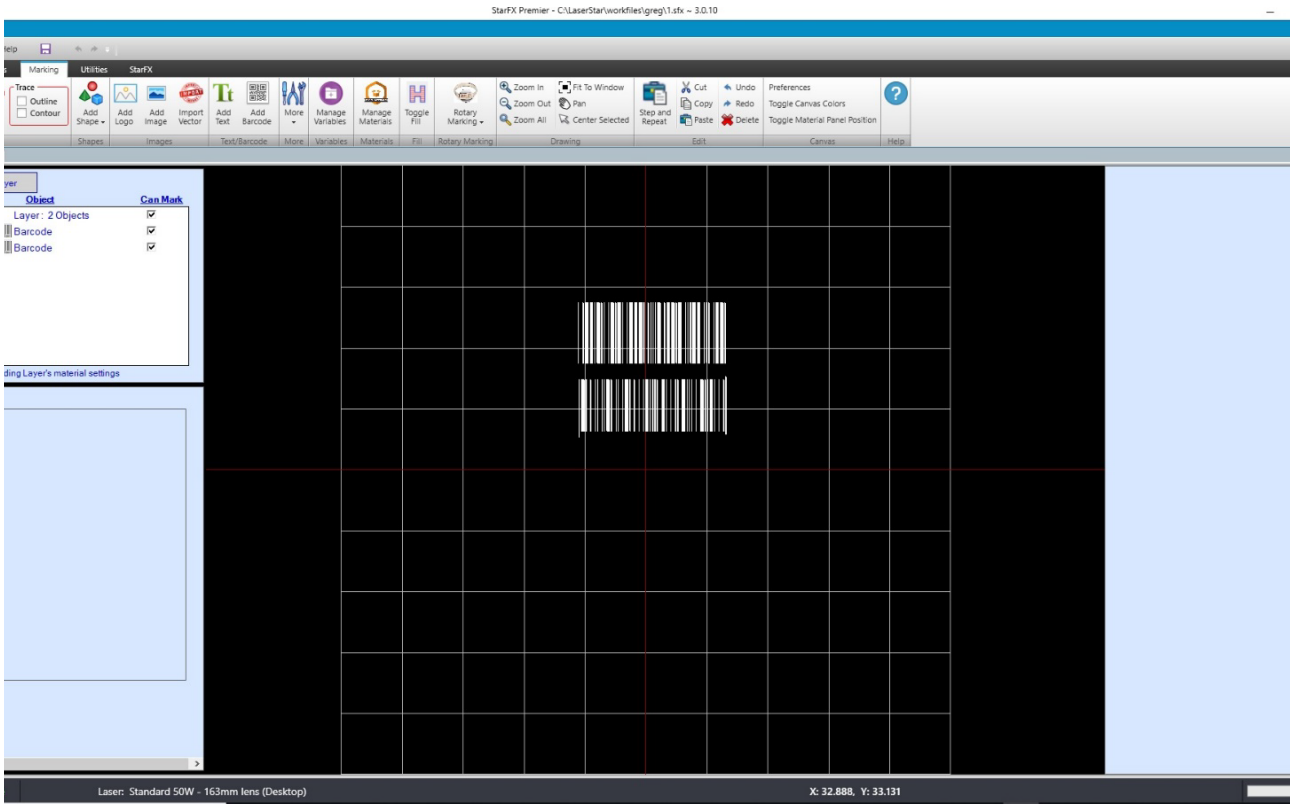




***Step 6*** The Barcodes are then added to the lasing program.

*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*

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# STANDARD BARCODE




One thing to note is that Barcodes cannot be “stretched” remember ow we discussed that there is a certain ratio of the components in a Barcode whether they are squares or bars and this must be maintained. O the only adjustment is a barcode is the height.



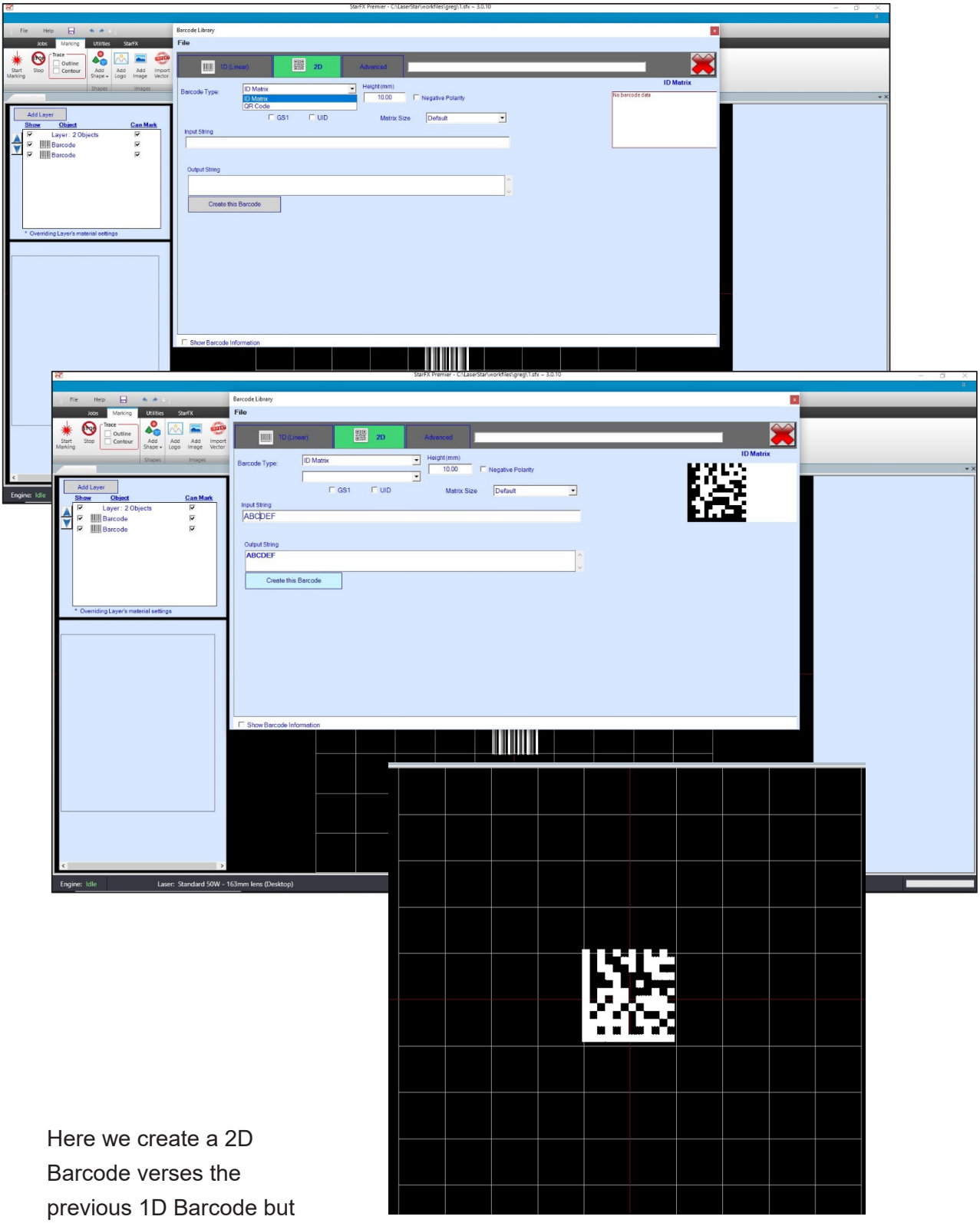
Two different size Barcodes with the same data.

*Note: Go on the Web to find out any information you need to know about the barcode type you have decided to use.*



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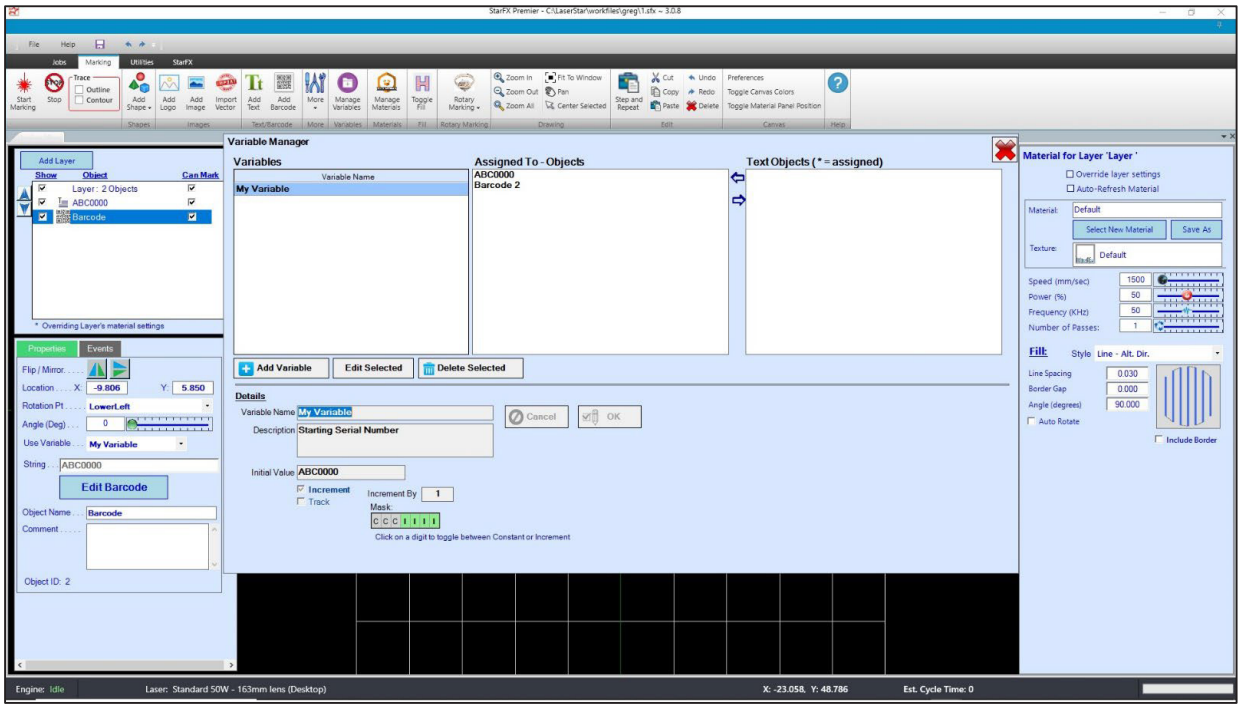
# STANDARD BARCODE




Here we create a 2D Barcode verses the previous 1D Barcode but still use the same data.

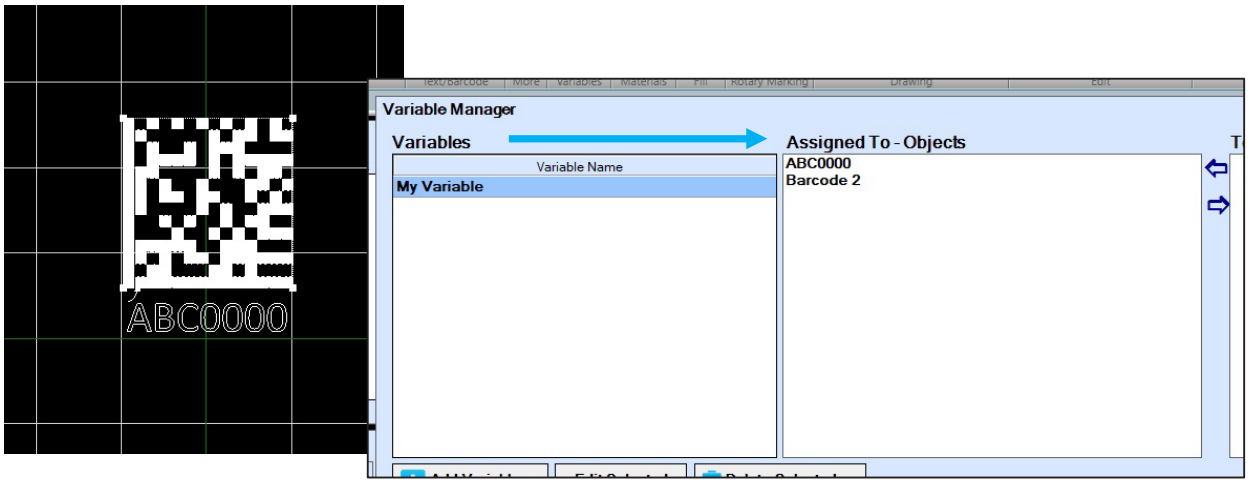
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# STANDARD BARCODE




We will go back to the Variable Manager for a second and we see that we can create a Text Object and assign the same Variable to both the Barcode and the Text Object.

Many barcodes require a “Human Readable” variation of the barcode using the **same variable** keeps both the Barcode and the Text Object in synch even if the data is incrementing or coming from a Database.






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# ADVANCED HEADERS

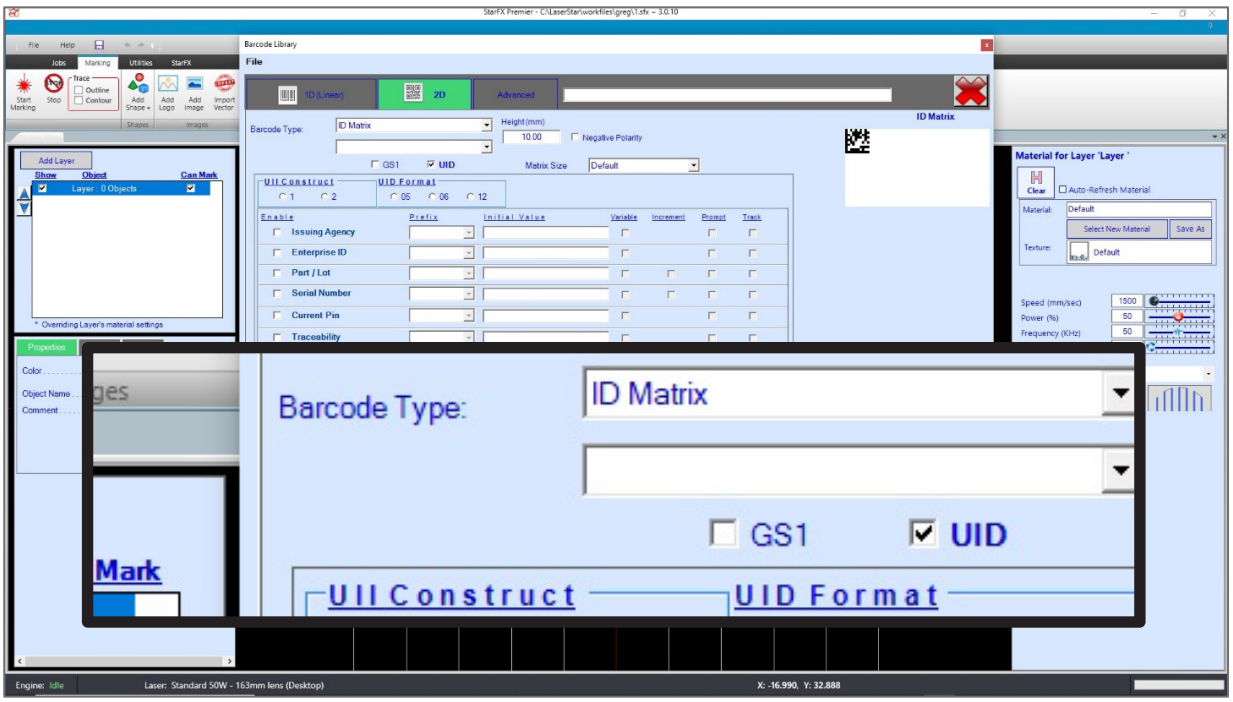
Two of the 2D Barcodes require some additional explanations, these are the UID and GS1 barcode types.

These two barcodes have “mandated” data configurations and they also require characters in the barcode structure that are what is called “unprintable”. That means that these special characters are not on any keyboards and must be associated with specific barcode data.

The UID codes are typically for parts that will be going to Government Facilities while GS1 are reserved for retail requirements.

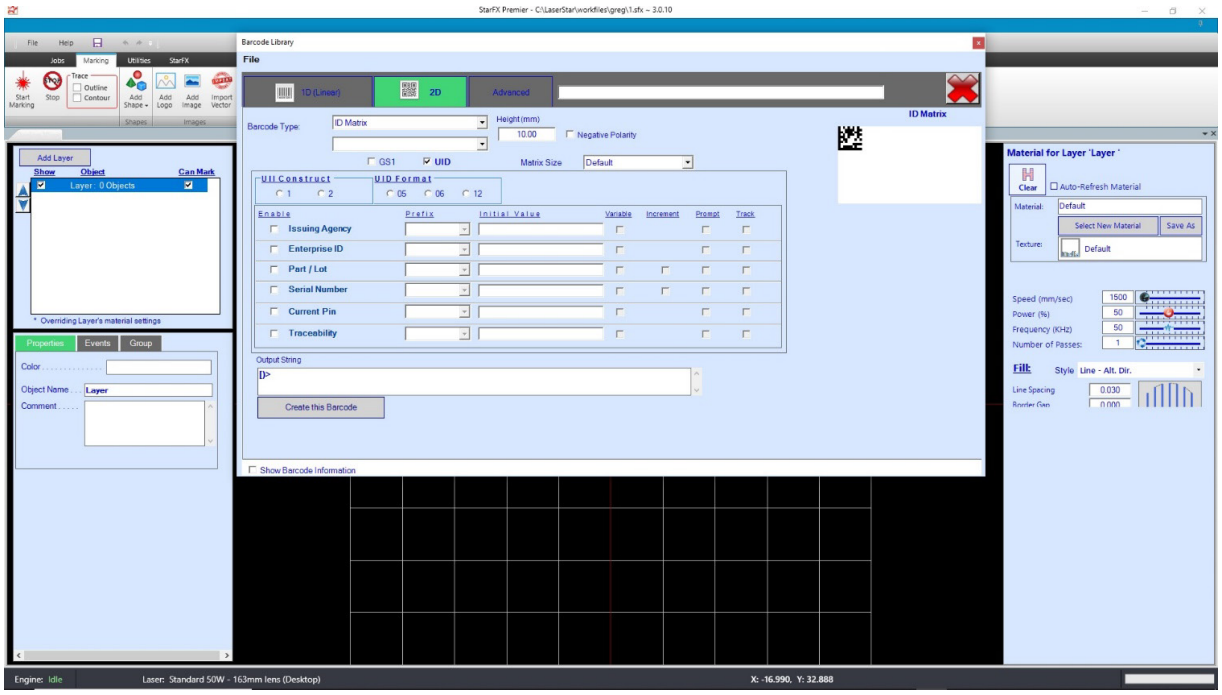
But don’t worry we take care of all of the hard stuff for you.

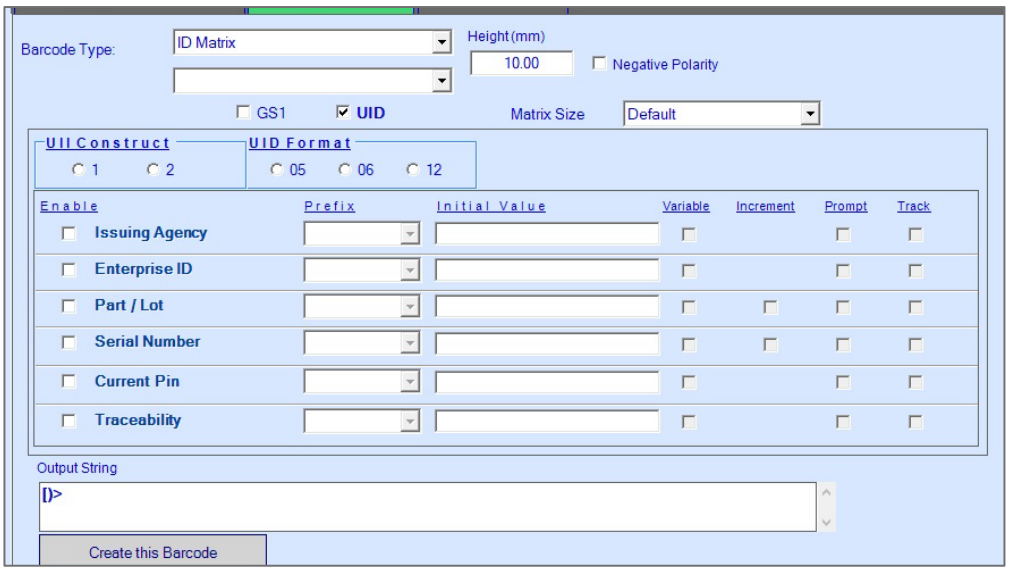
<u>However as with all barcodes do your own research on the requirements of your specific barcode type.</u>




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# UID





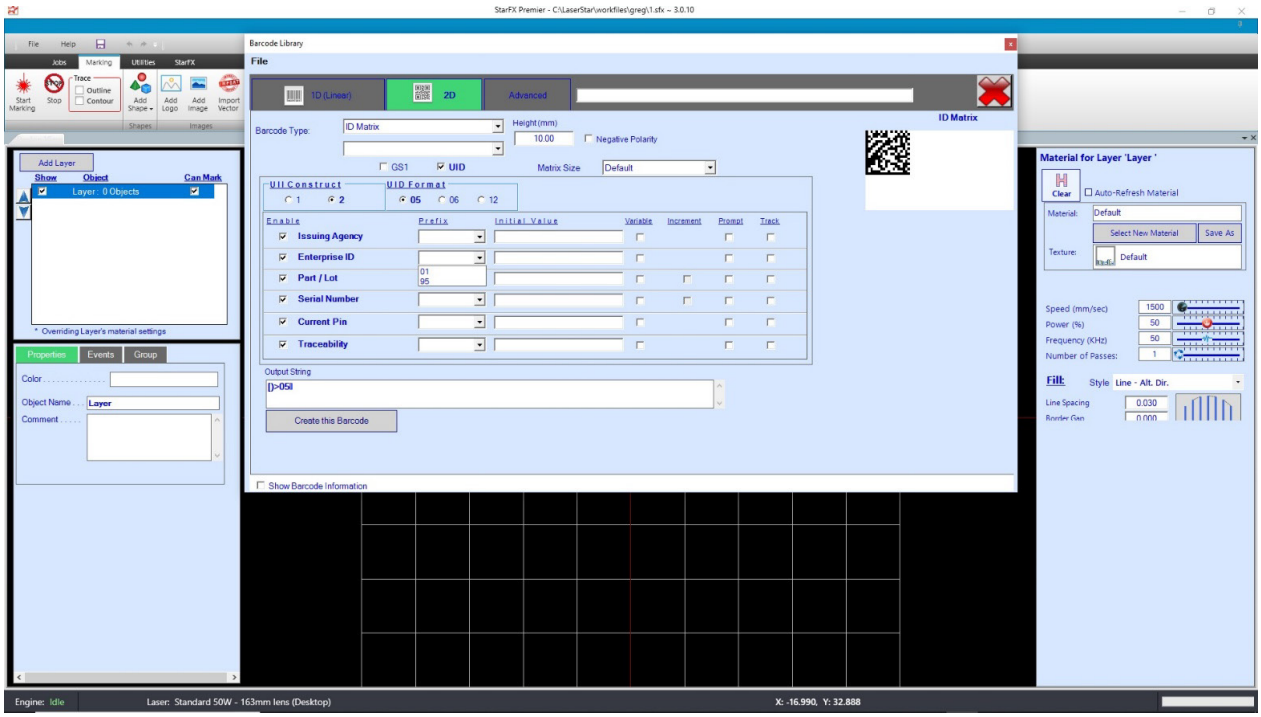

The UID codes have several different sections and changes to each section affect the choices of the sub-sections below them.

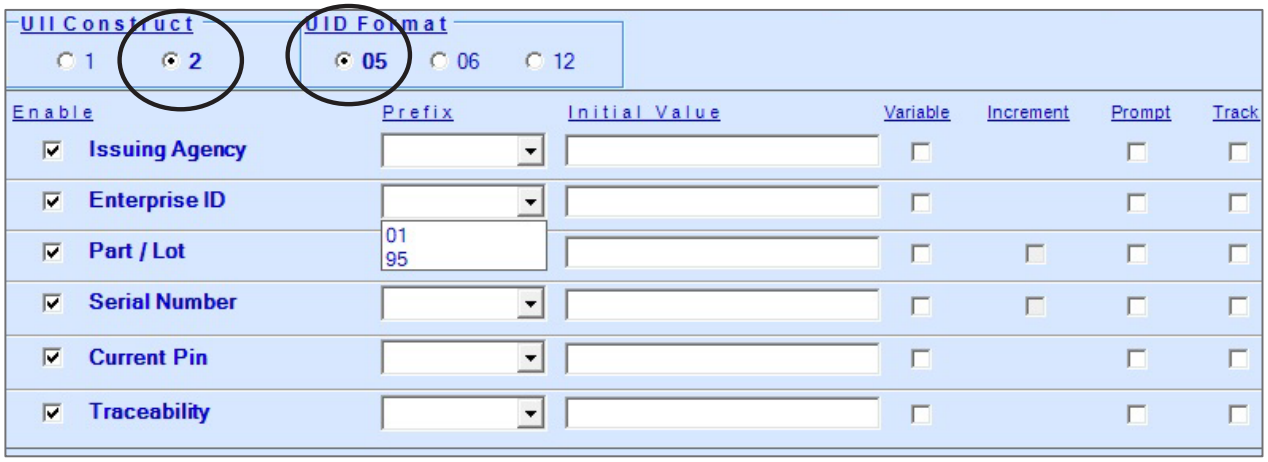
The basic requirements are usually defined to the manufacturer by the Government Facility who is to receive the marked parts.



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# UID



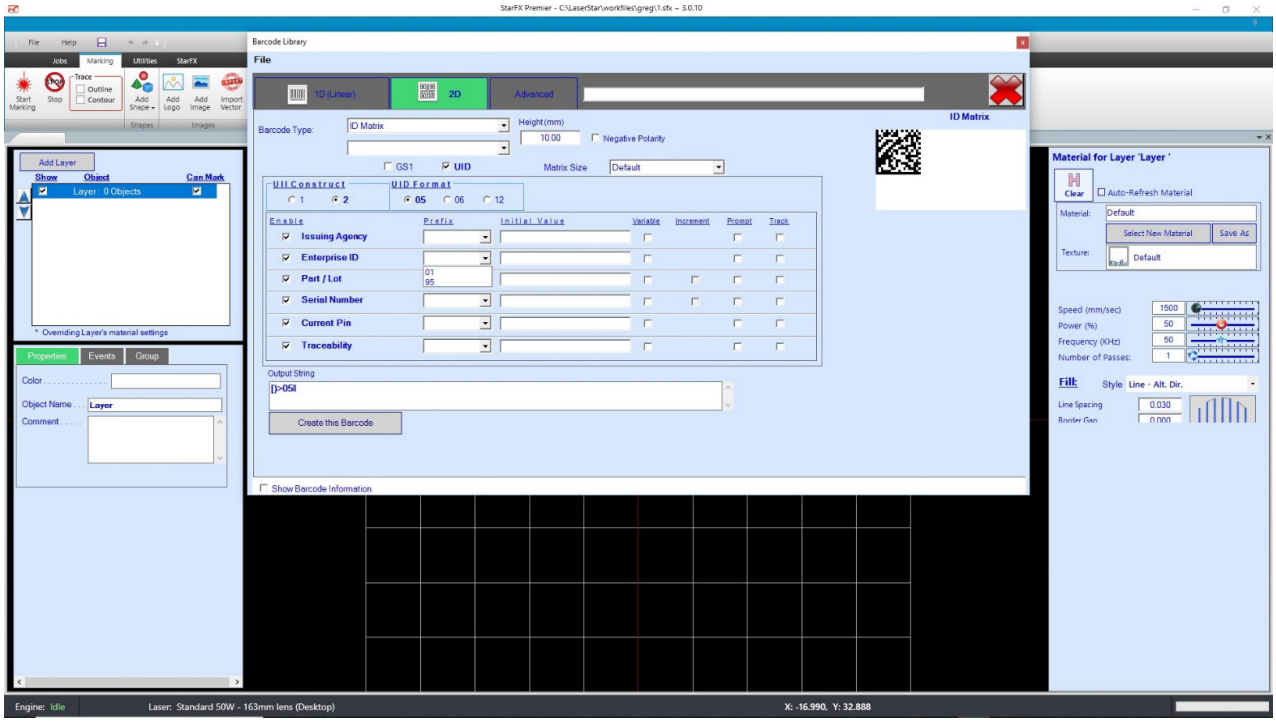


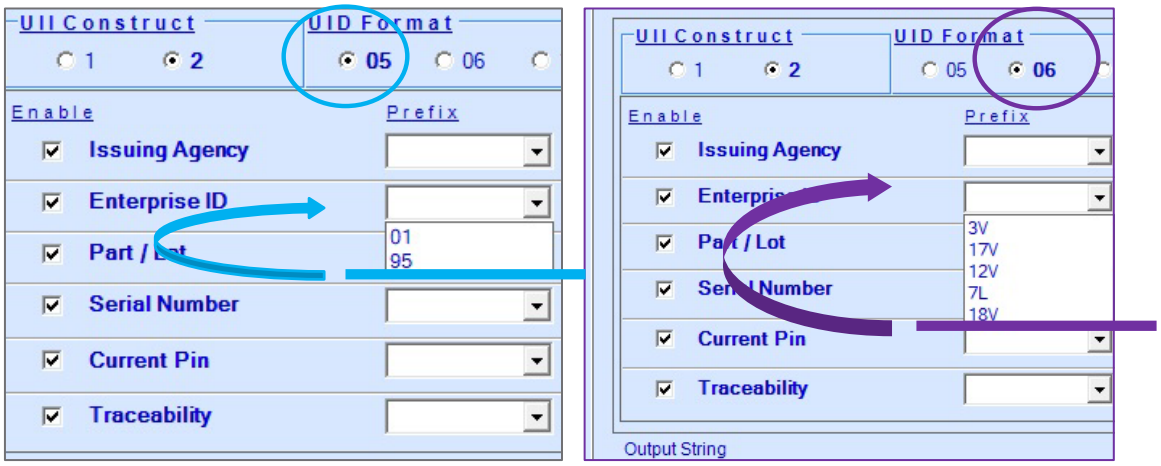

We will go through a few of these to show you how one choice can affect the other choices.

By selecting “Construct 2” and “Format 05” we will view the sub-choices below them.

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# UID



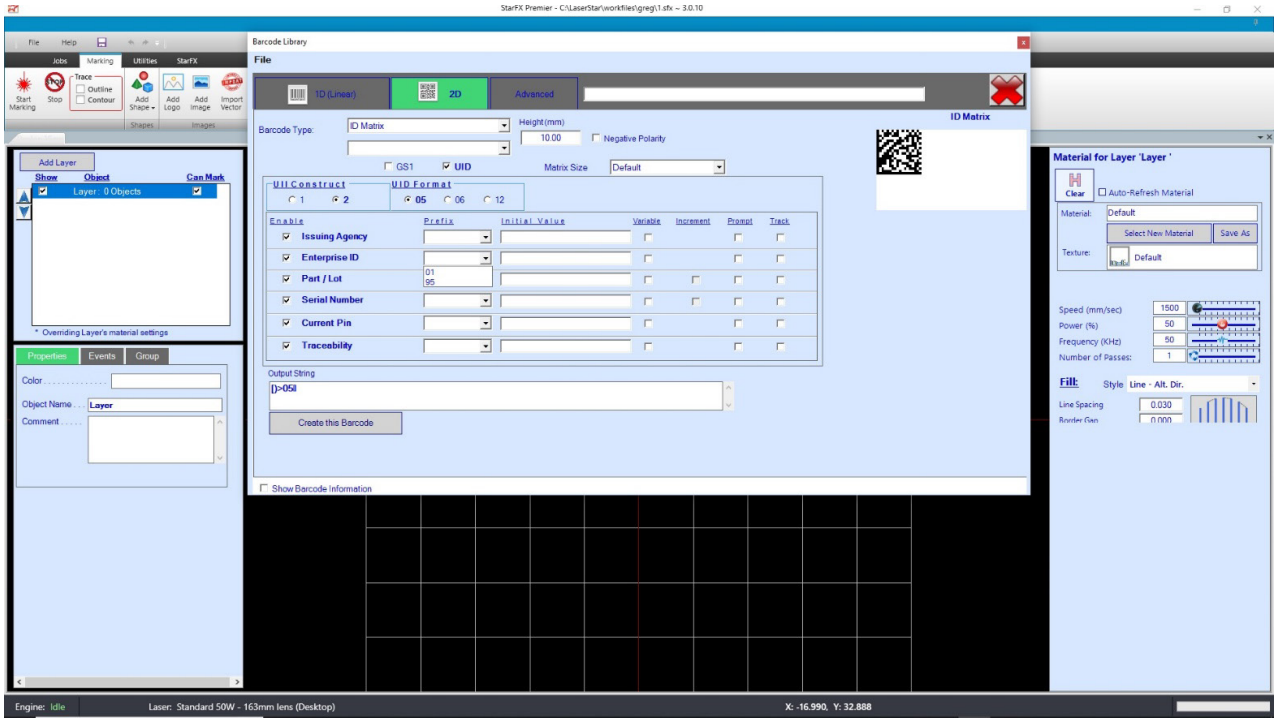


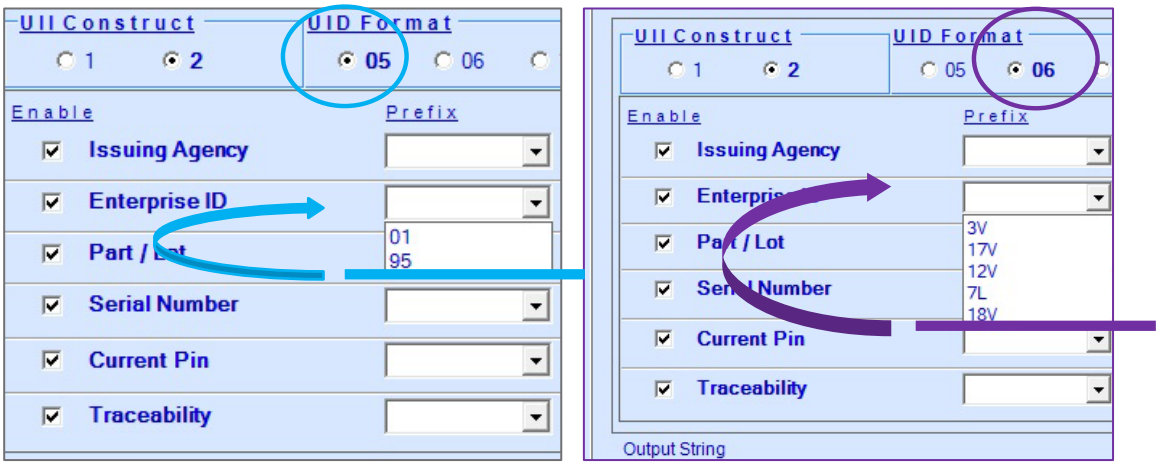

Pay attention to each category on the left such as “Enterprise ID” shown here with first “Format 05” selected and then with “Format 06” selected and notice the different choices available when each is selected.



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# UID

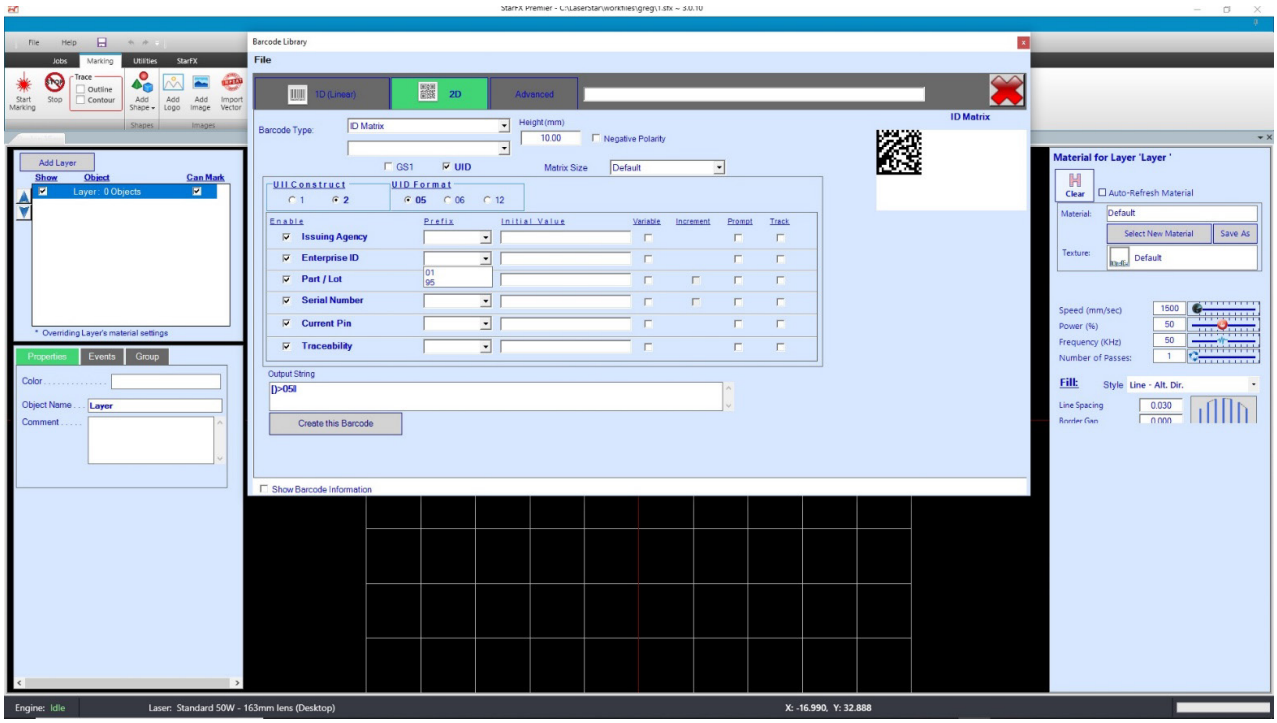


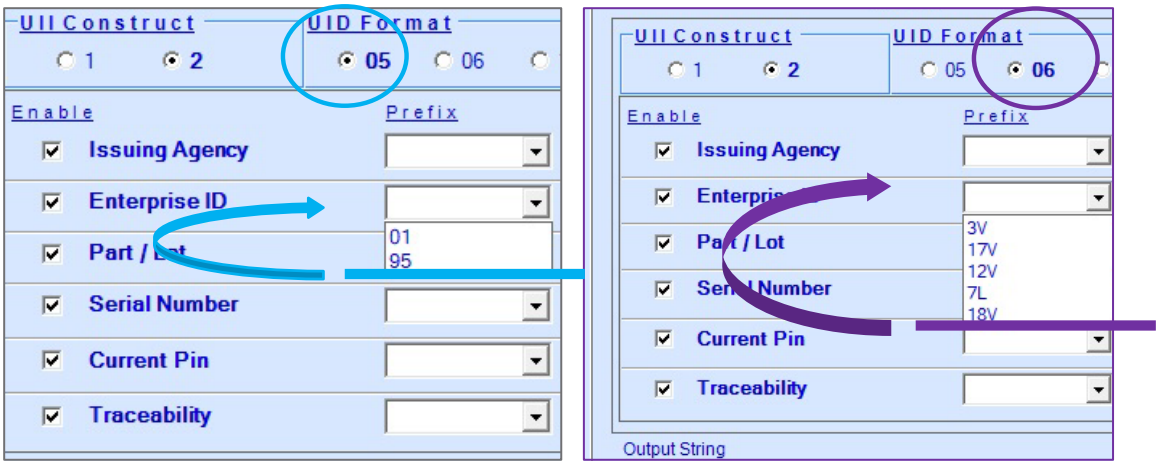



Pay attention to each category on the left such as “Part/Lot” shown here with first “Format 05” selected and then with “Format 06” selected and notice the different choices available when each is selected.

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# UID



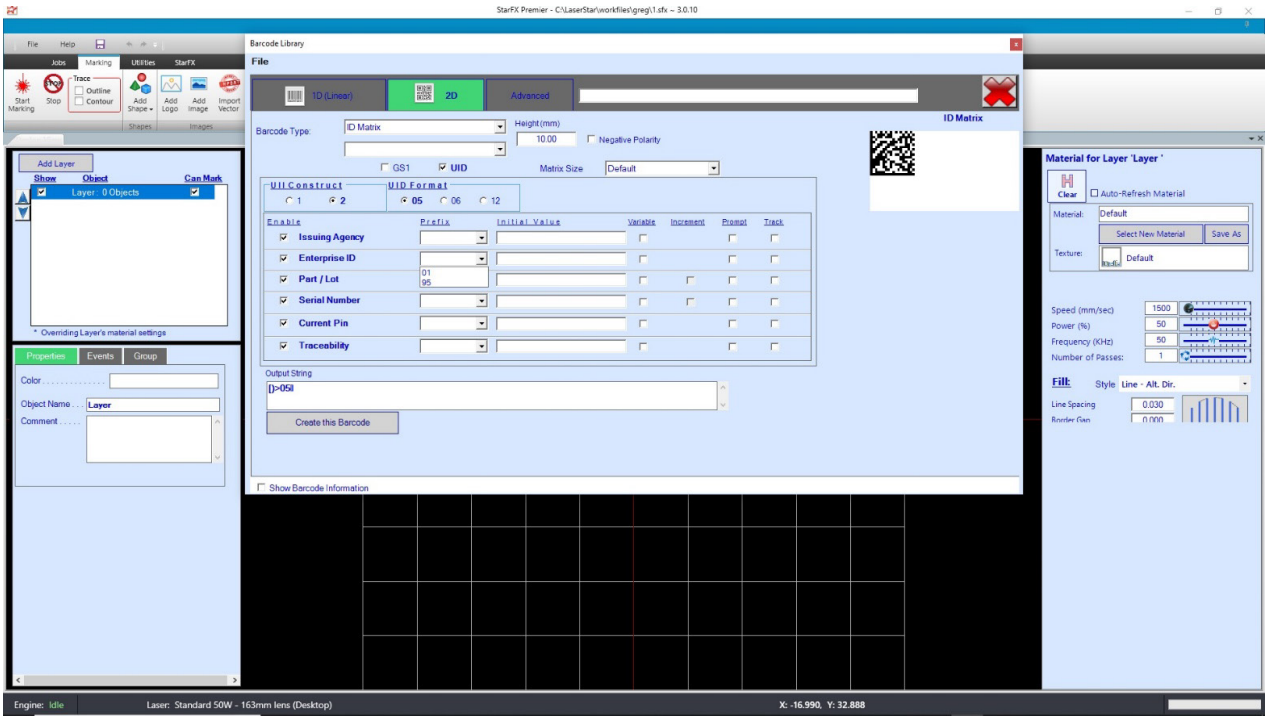


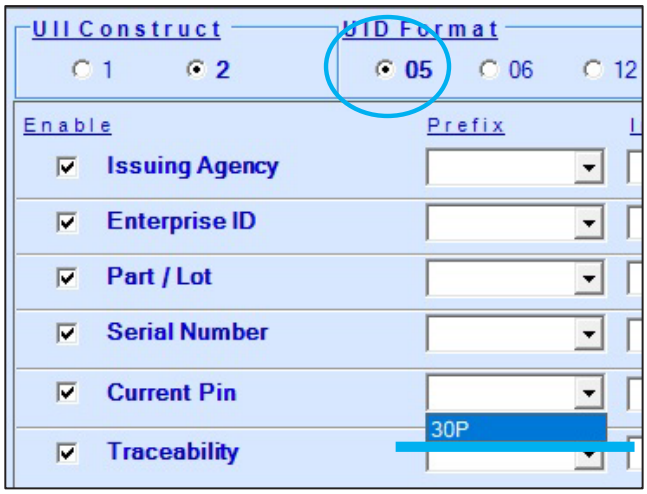

Pay attention to each category on the left such as “Serial Number” shown here with first “Format 05” selected and then with “Format 06” selected and notice the different choices available when each is selected.

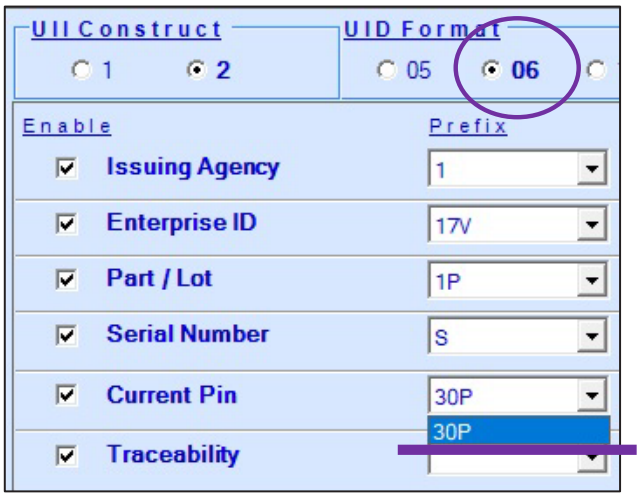


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# UID



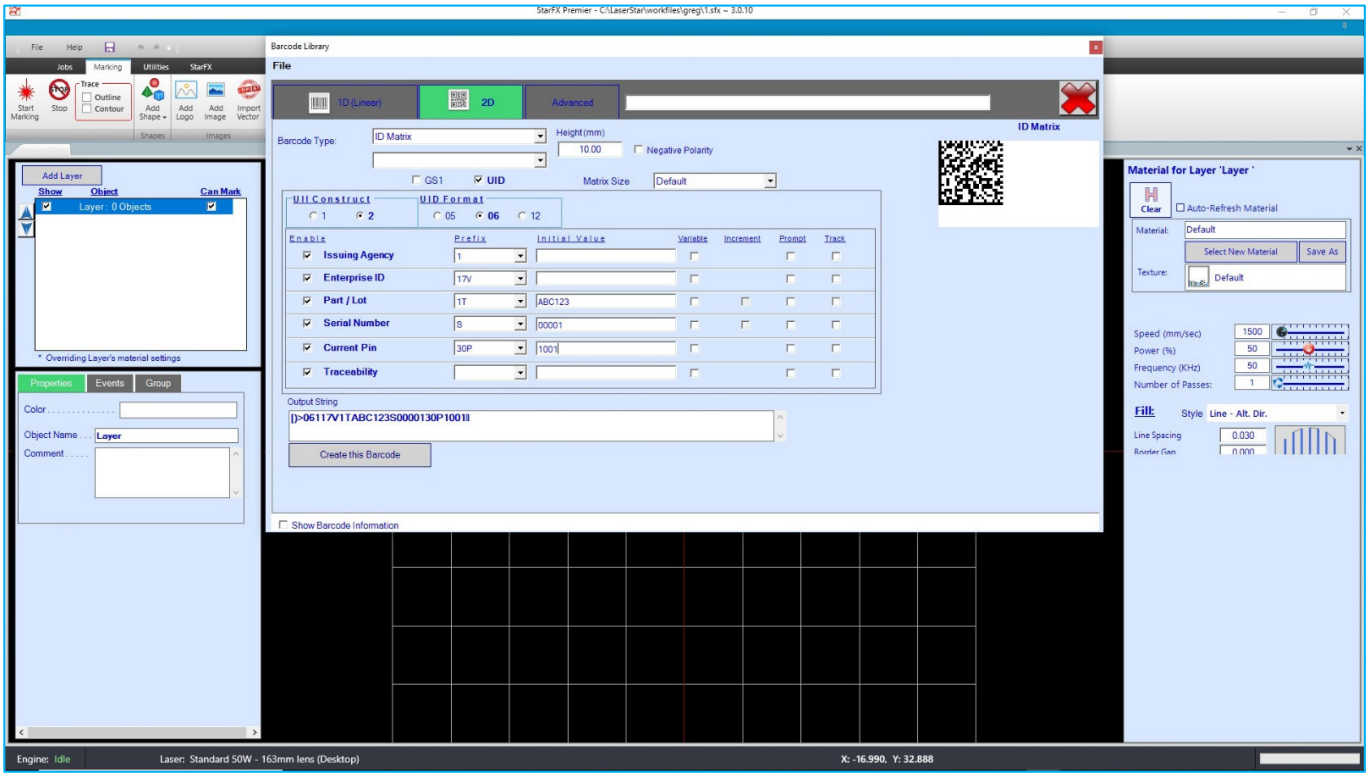


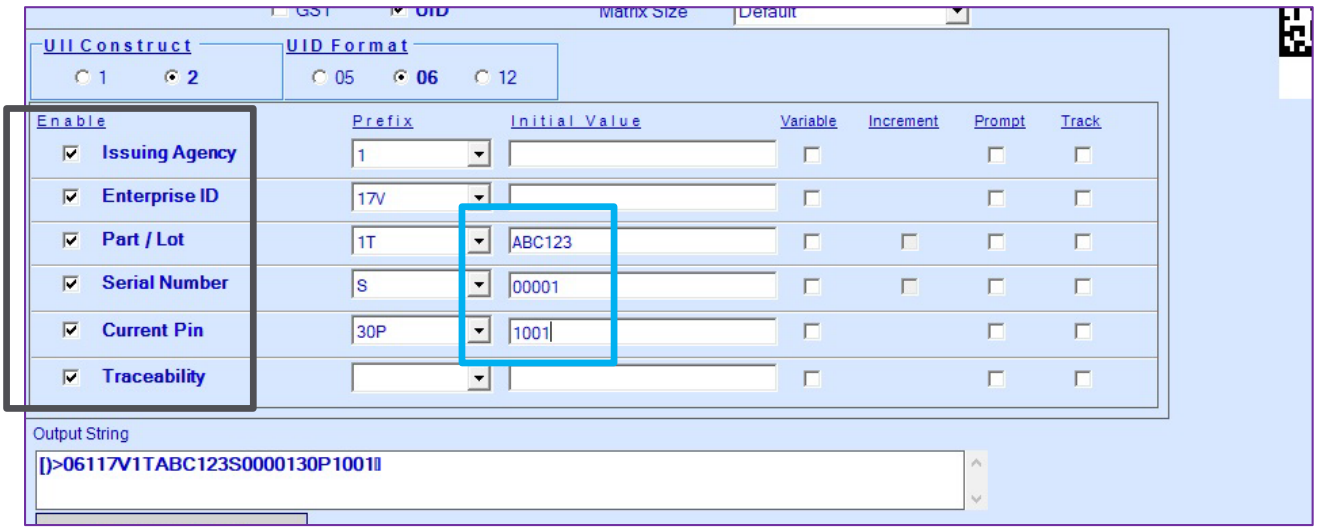




So you can see that the “Construct” and the “Format” play an important role in setting up the barcode.

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# UID



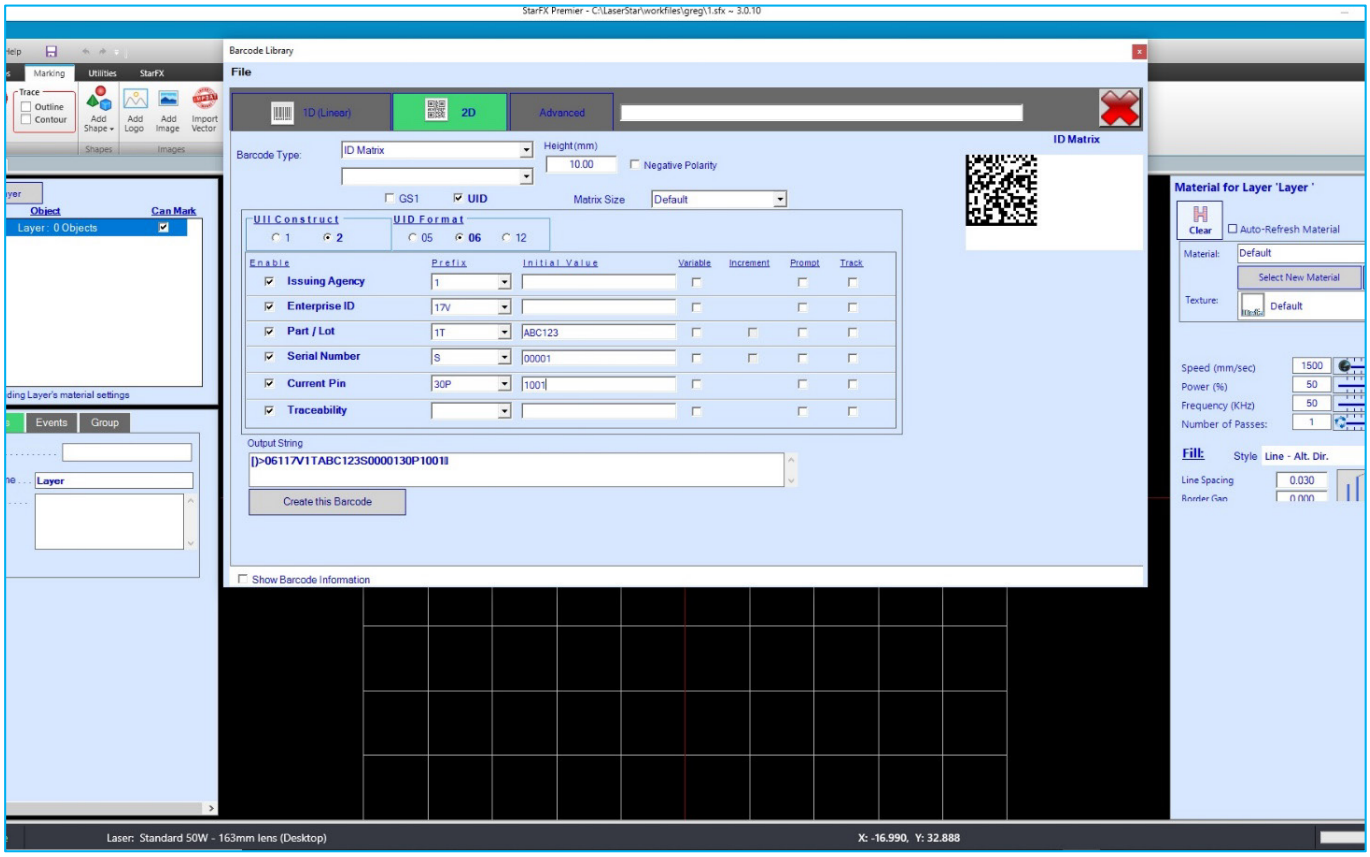



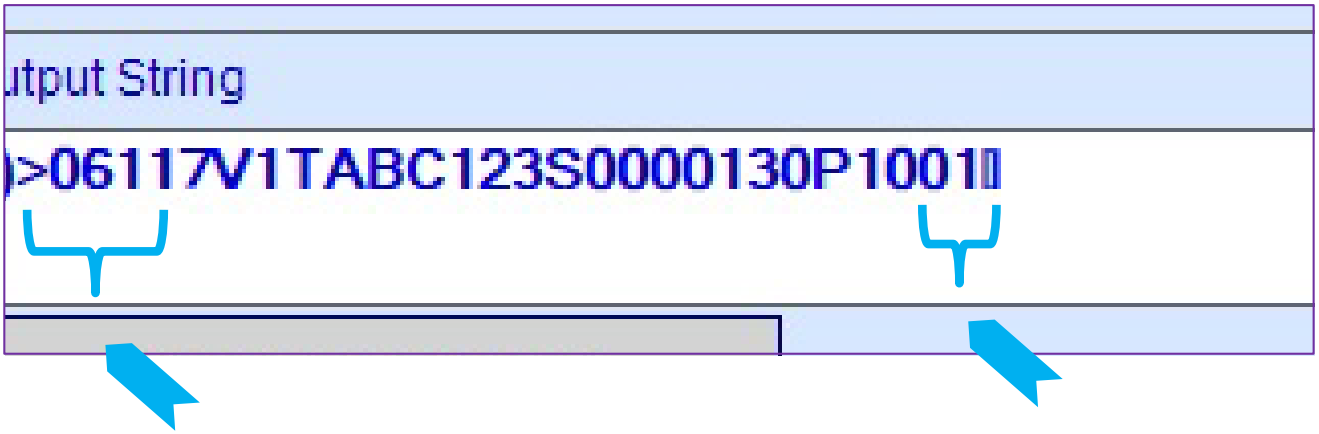

Once the required **Presets** have been selected you can enter the **Data** that is unique to your parts.



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# UID



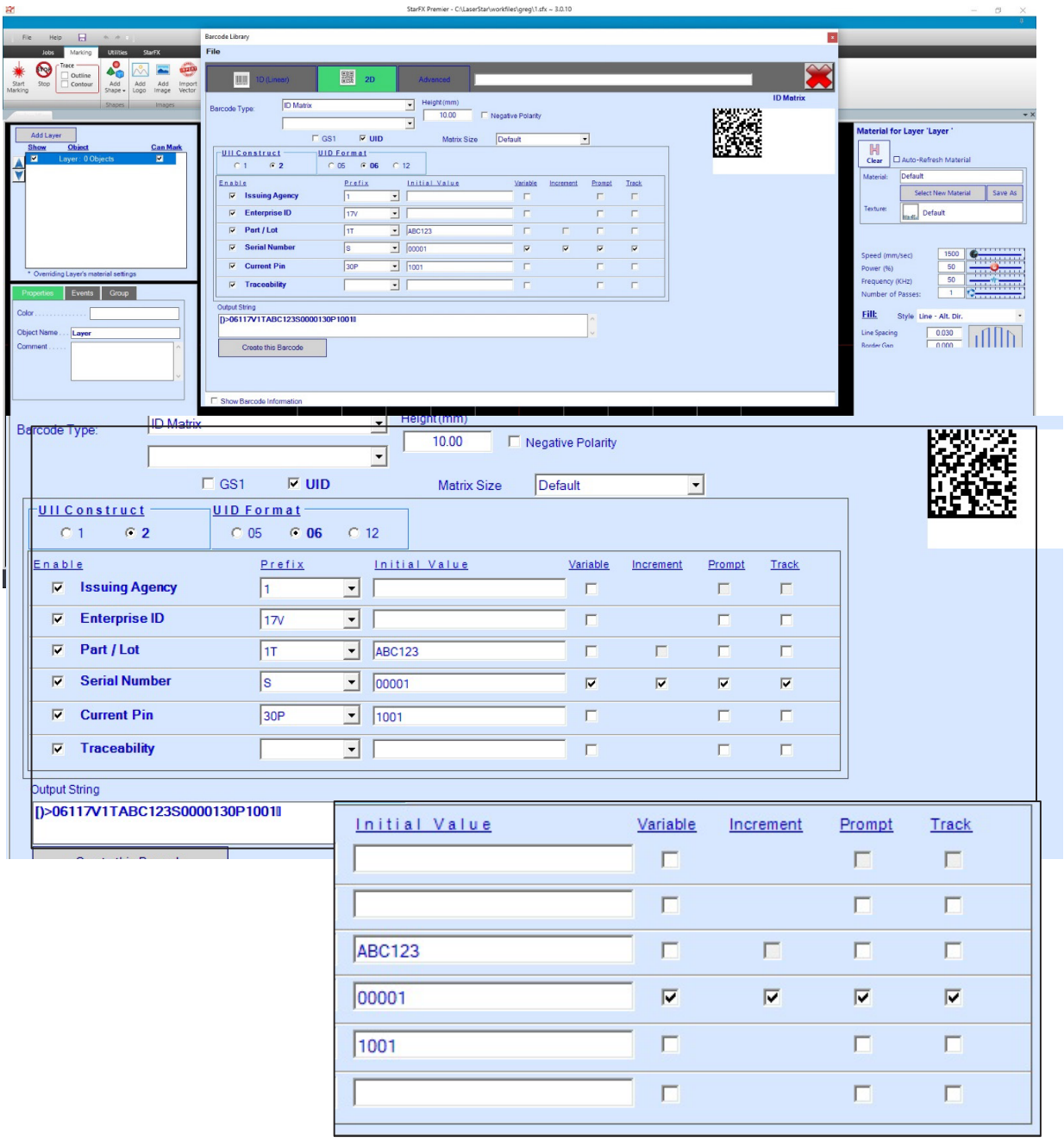




As you look at the “string” or “English” version of the code you can see some of the characters look a little strange. What you see is a “printable” representation of some “unprintable” characters, we convert them to their actual value when we generate the barcode.

Also note that we apply the proper order with the proper preset.

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# UID



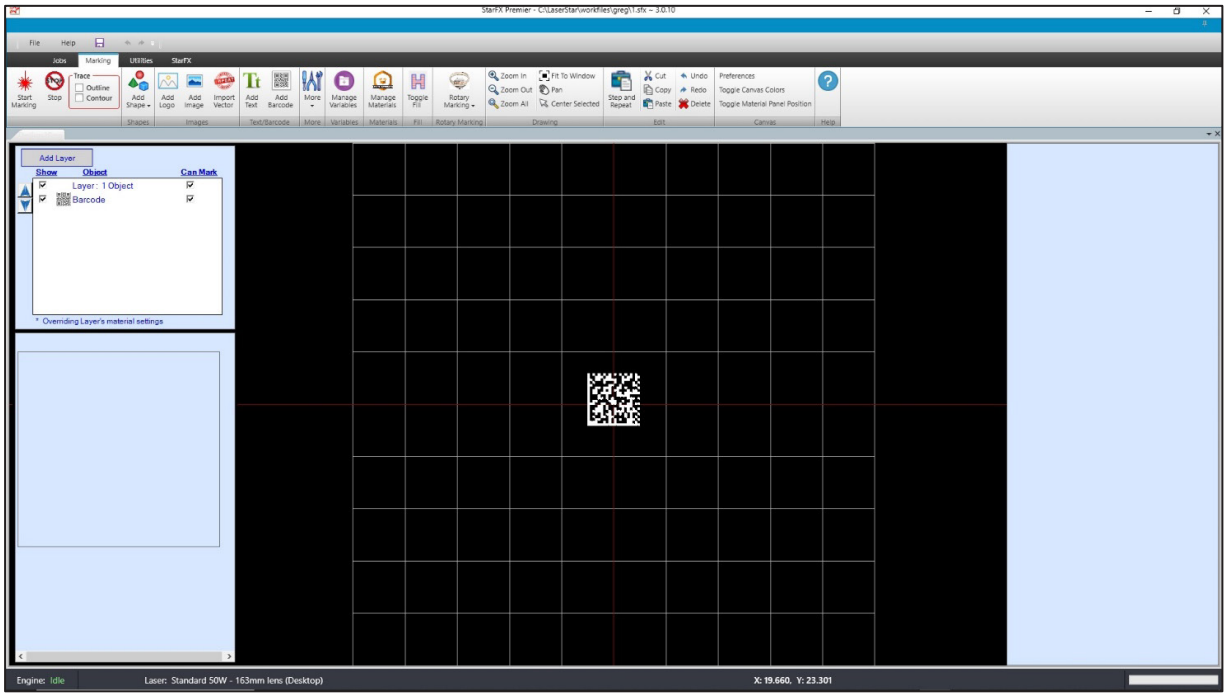

As with other text objects you can use a Variable for each item by simply checking the appropriate boxes to “Increment”, Prompt” for the Data, or “Track” and update the data.

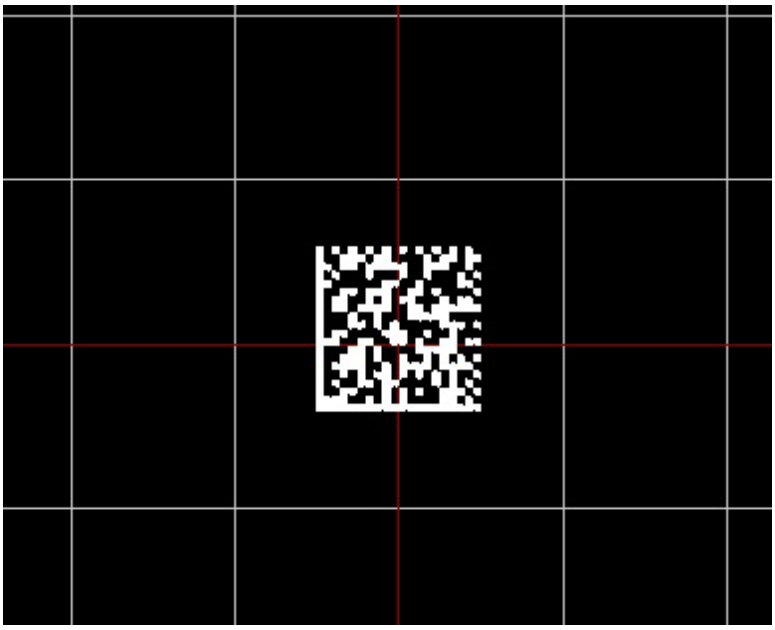
Note that some selections cannot be incremented.



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# UID

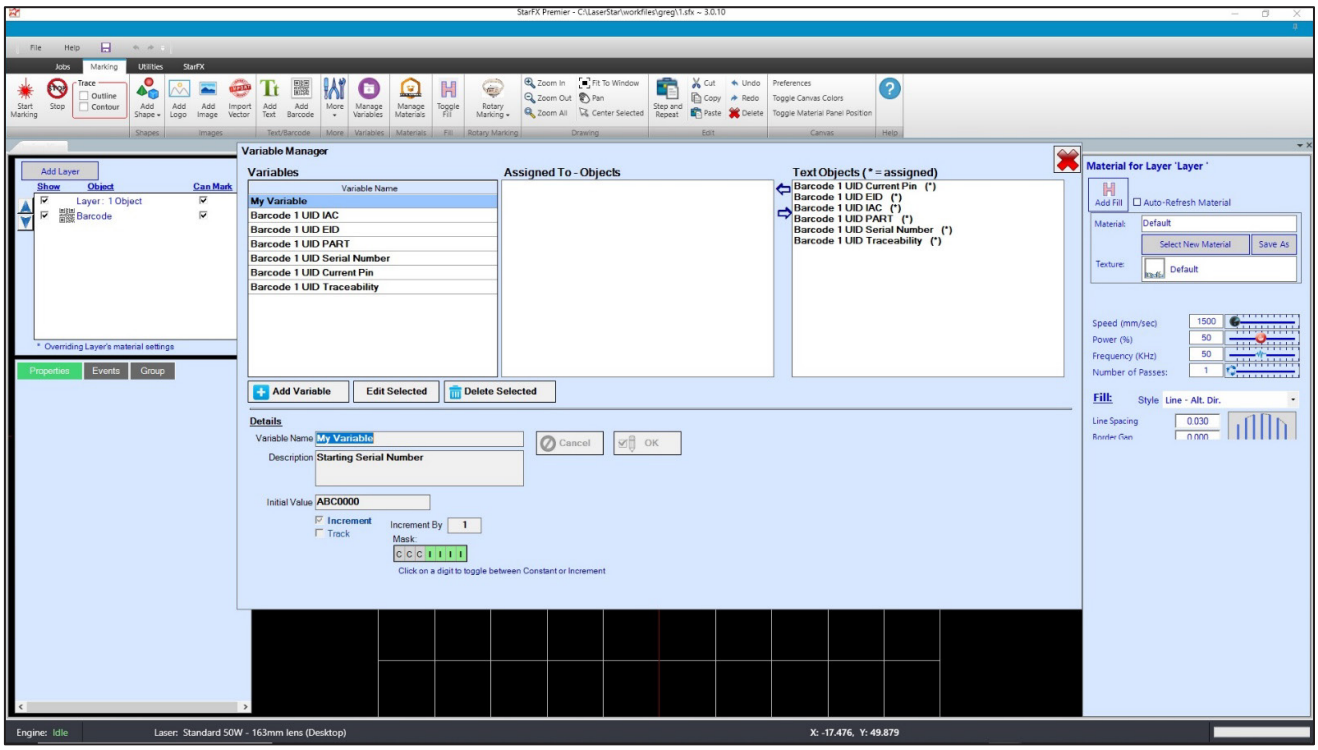


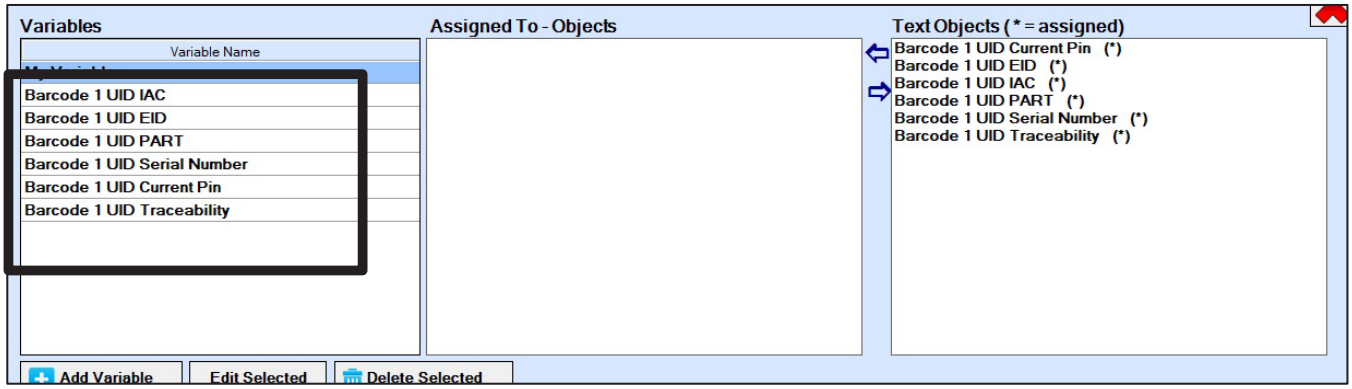



Then just select the “Create Barcode” button and put your Barcode on the Drawing Screen.

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# UID



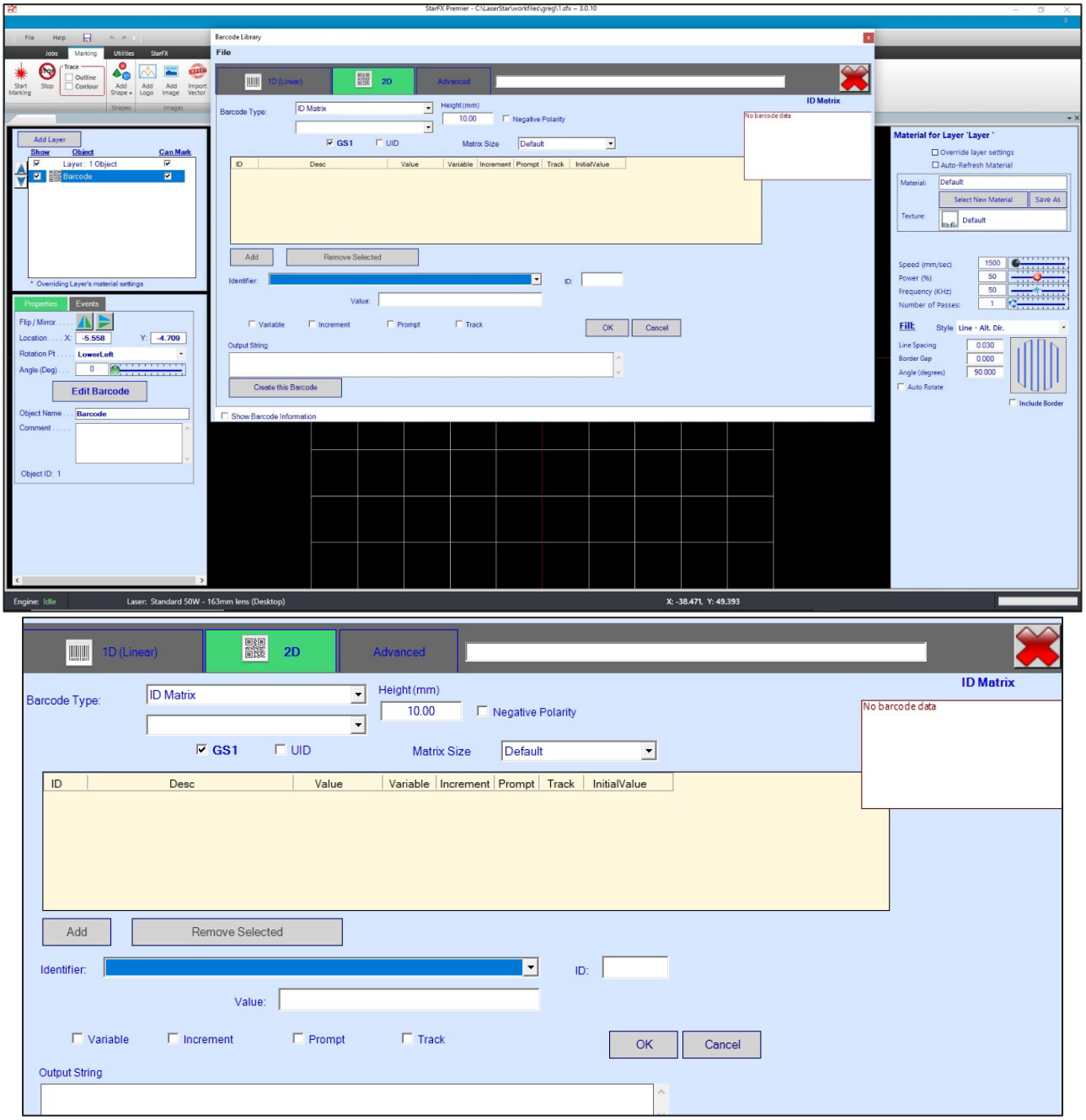




An important thing to note is that the Barcode Creator automatically creates the variables for any items that had the “Use Variable Box” checked.



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# UID

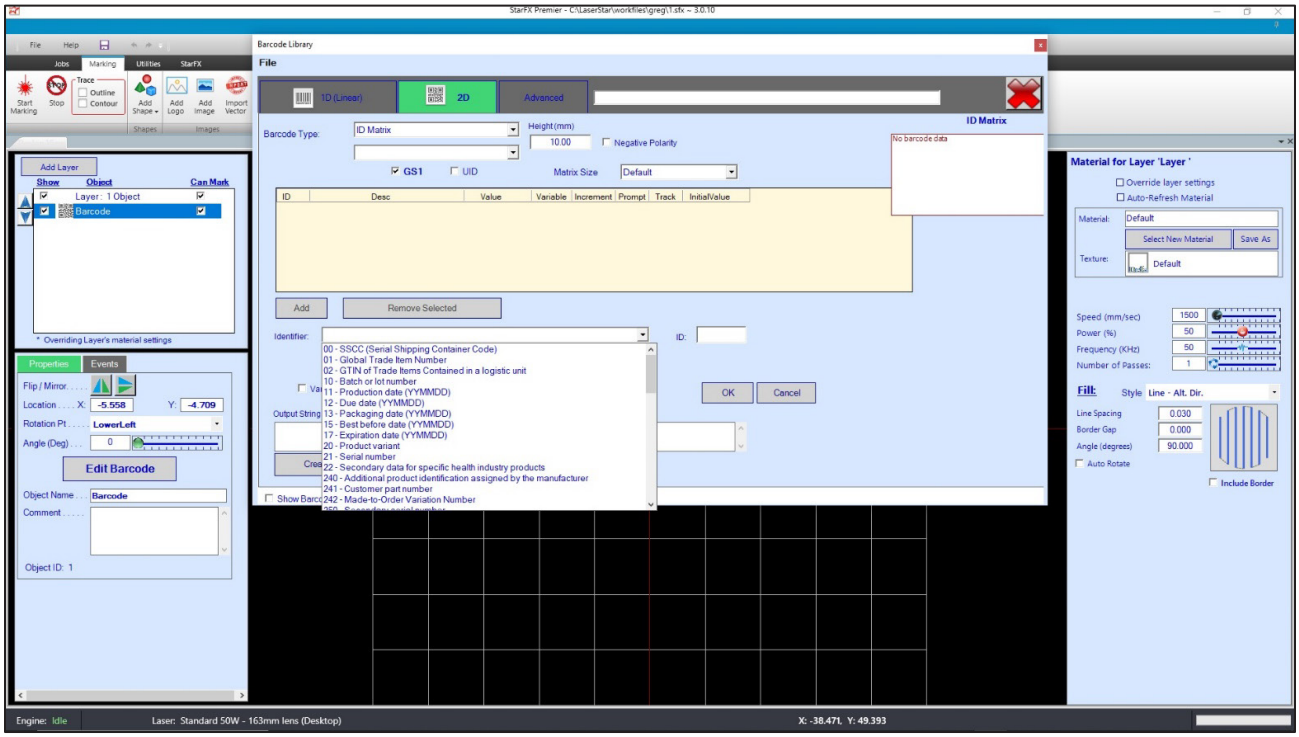



The GS1 Barcodes are similar to the UID codes in that they require specific Presets or data types but obviously data types and rules are different.

Also they again like UID use many “unprintable” characters and the rules can be more specific than UID.

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# GS1







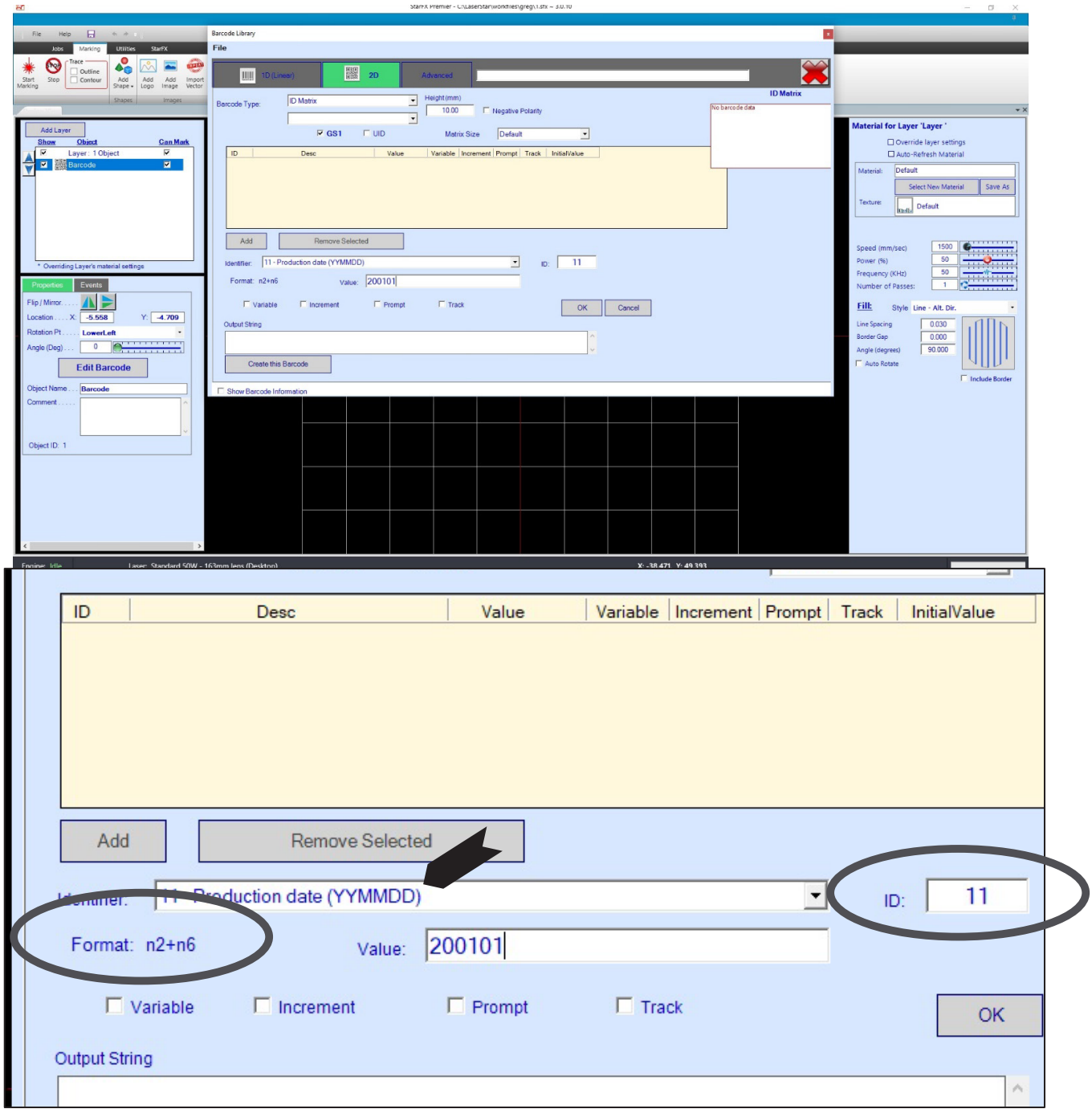
The GS1 Barcodes will require the user to do a little more research into the various data type as there are over 300 specific types and each can have very defined rules.

Get with the Agency that is requiring you to provide this type of Barcode and find out what categories you need to supply in your Barcode.



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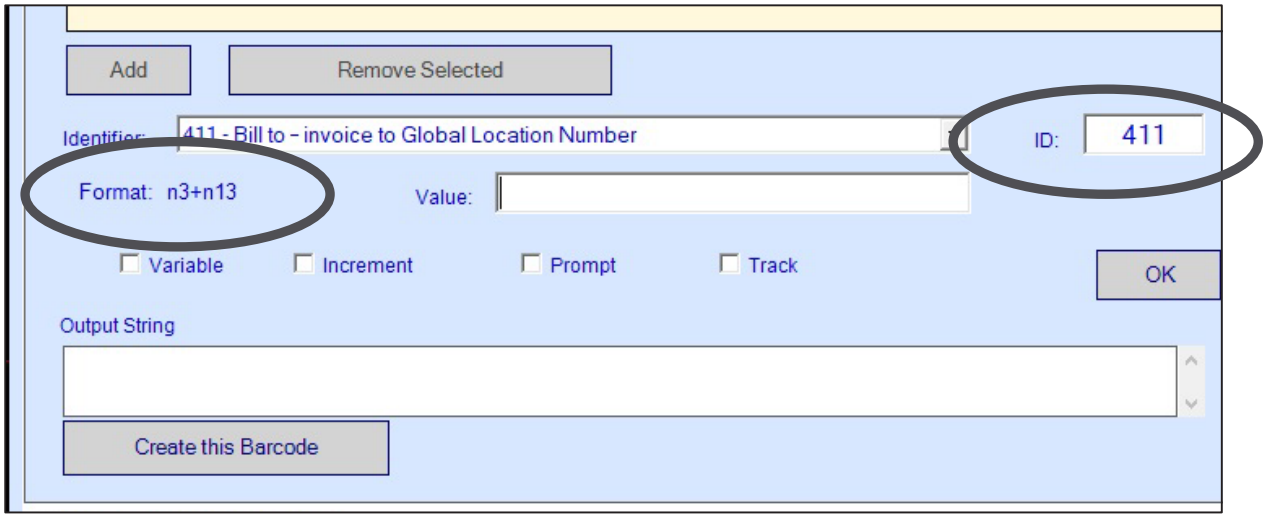
# GS1

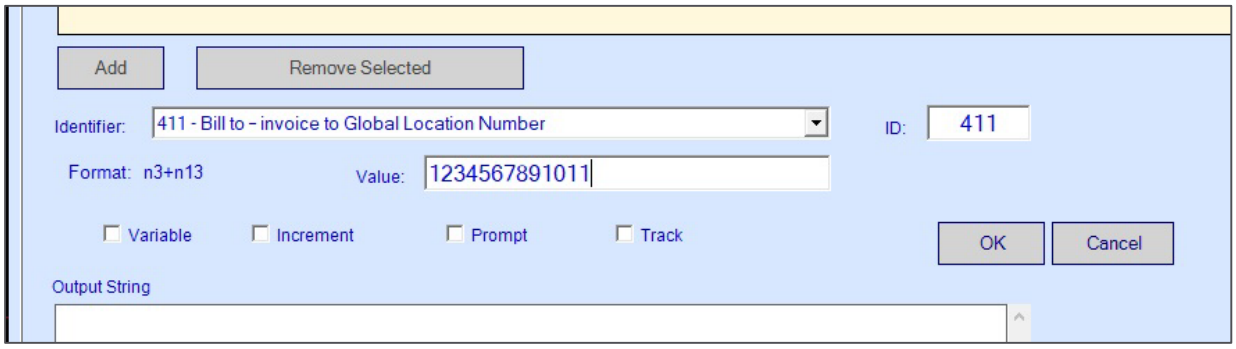



The “Rules” are shown in the “Format” area, here there are first the two characters for the ID (n2) n = Numbers only followed by(n6) 6 Numbers only indicated here as YYMMDD because this is a date code.

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# GS1

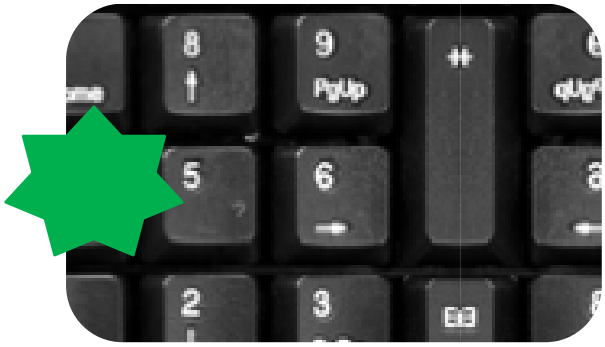



The “Rules” for the code “411” are 3 Numbers (411) and a maximum of 13 Numbers only for data.



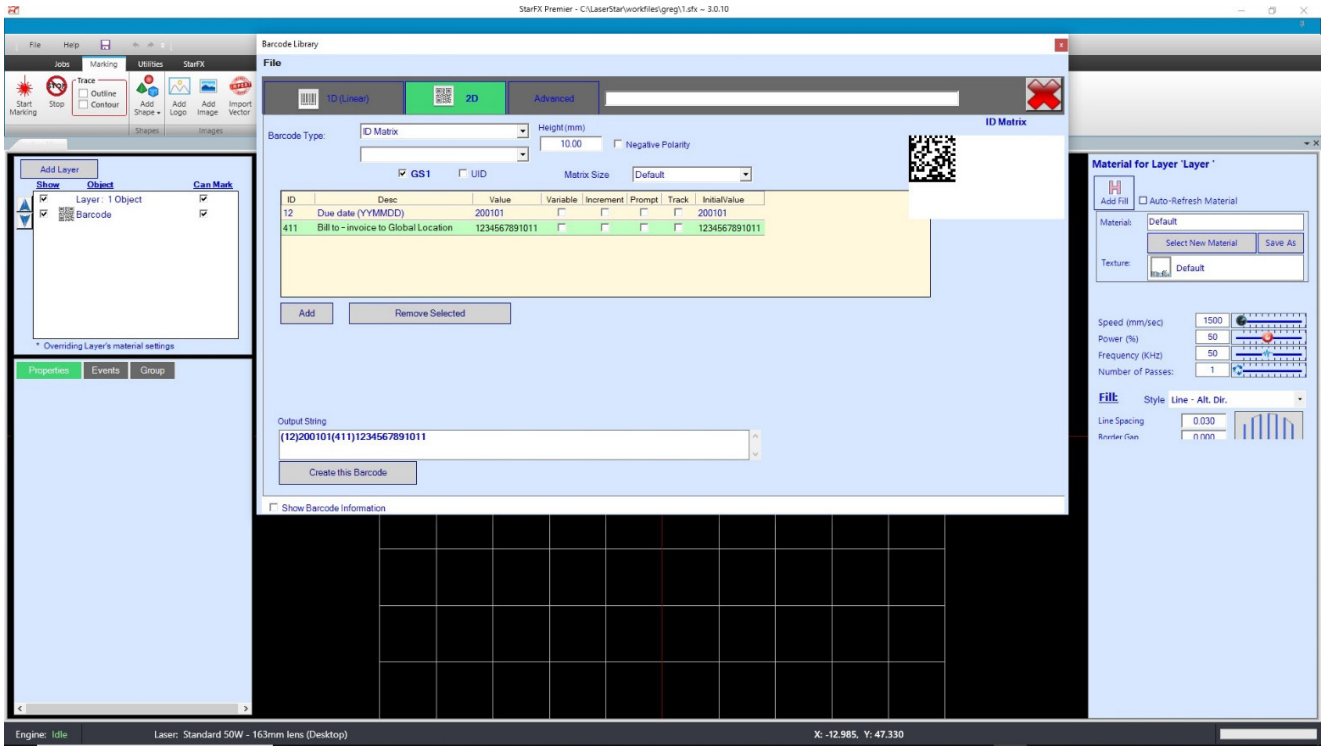
We tried to enter letters (Alpha characters) but the software would not allow us to do that.

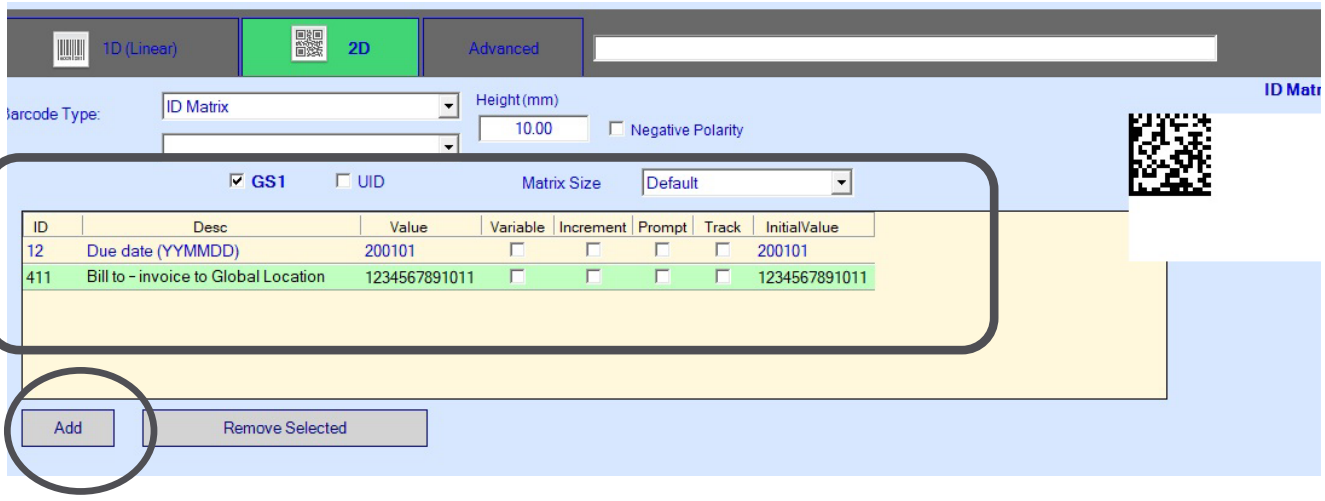




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# GS1

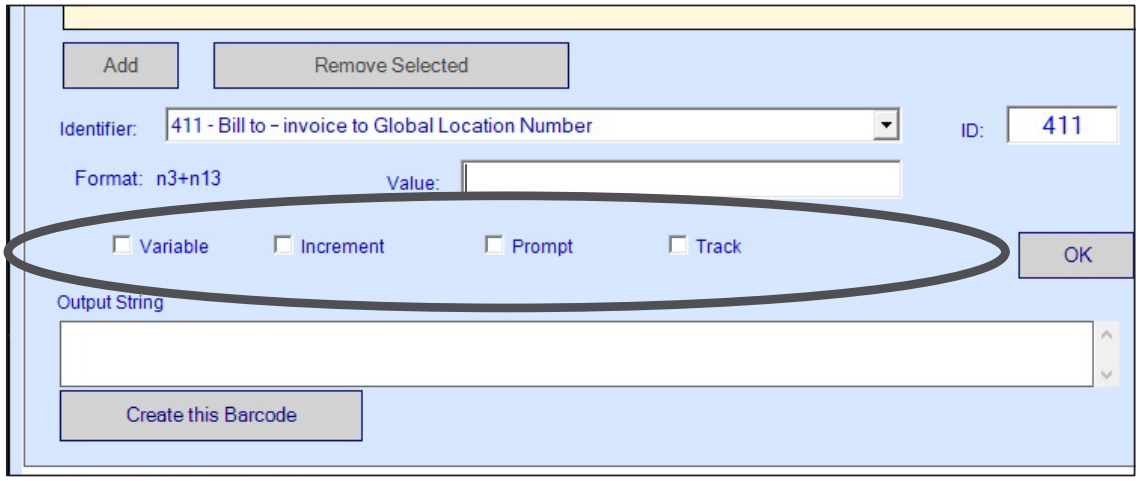


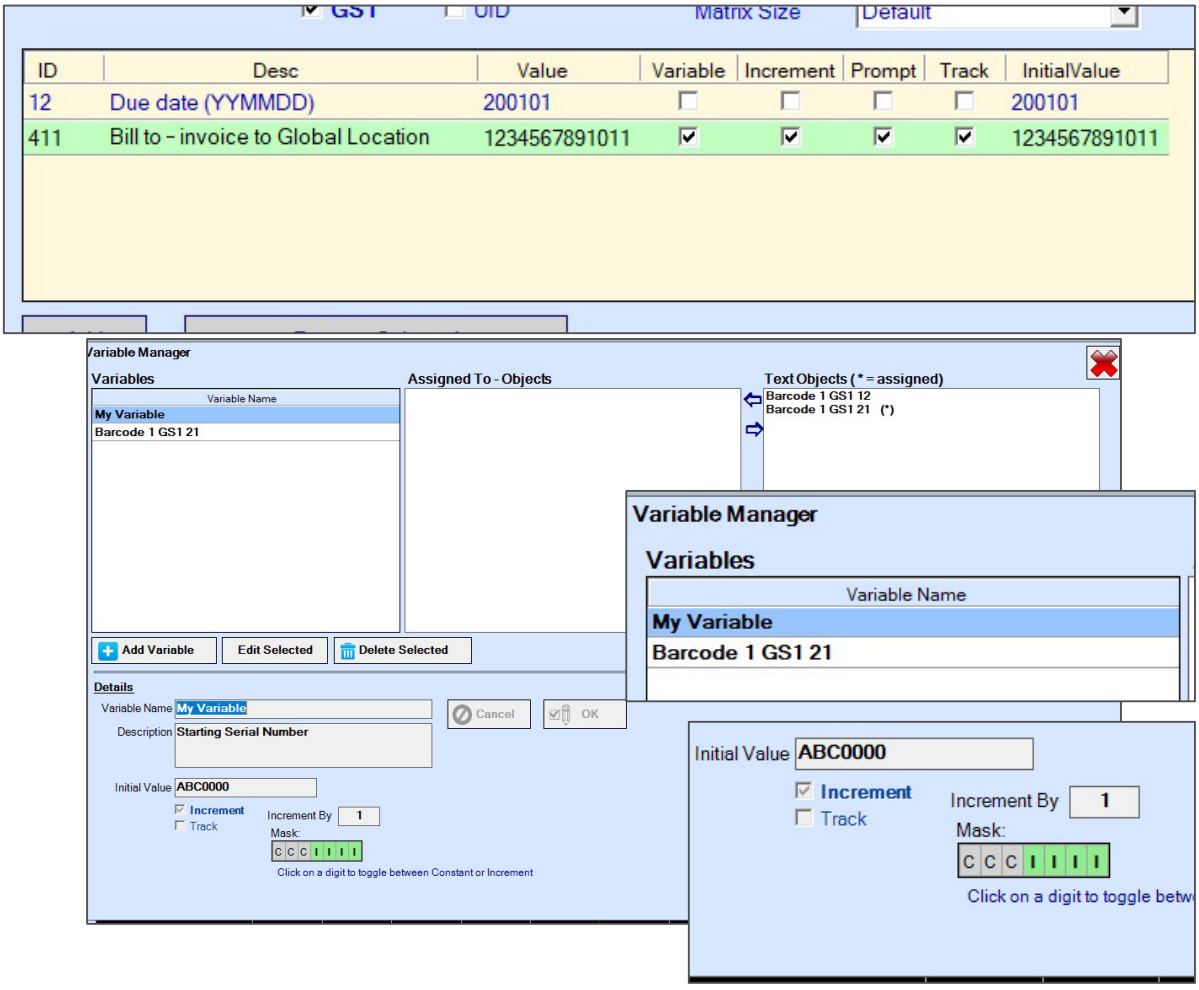

Continue to add all of the data types and their appropriate values (as designated by the receiving Agency) to the GS1 Barcode.

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# GS1




The check boxes for “Variables”, “Incrementing”, “Prompt” and “Track” are also here for any of the data types.

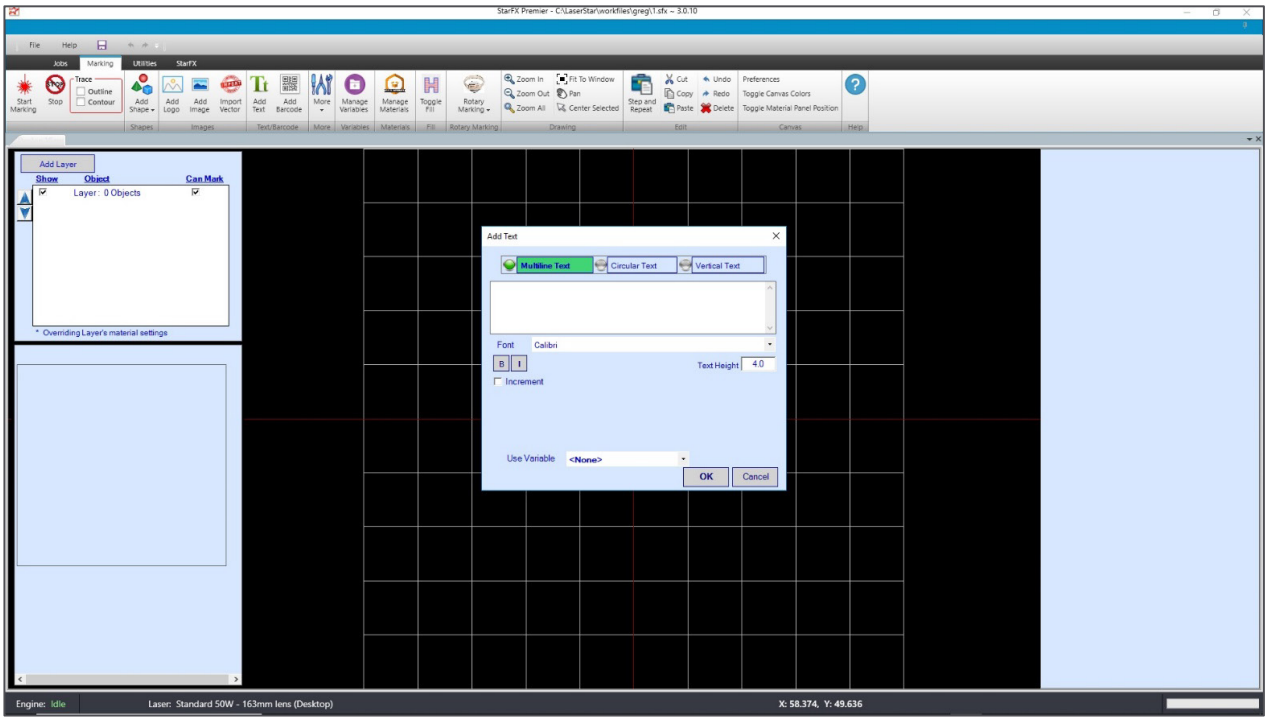




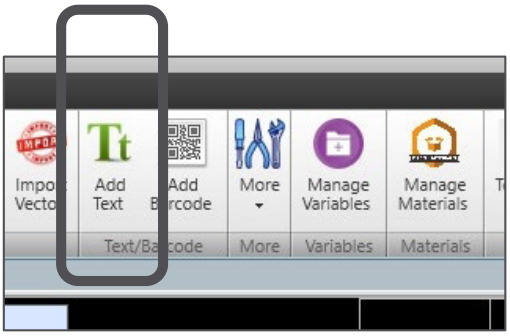

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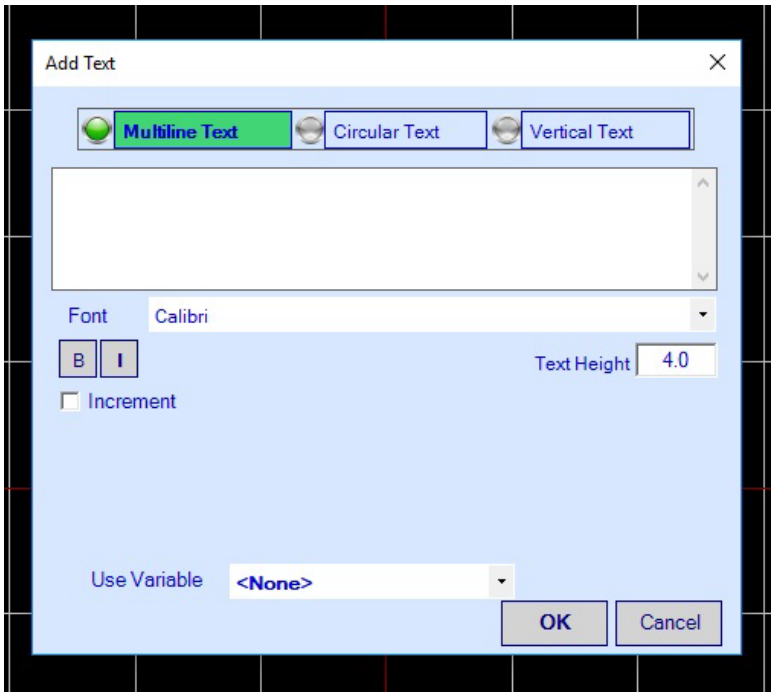
# GS1

## *Step 1:*



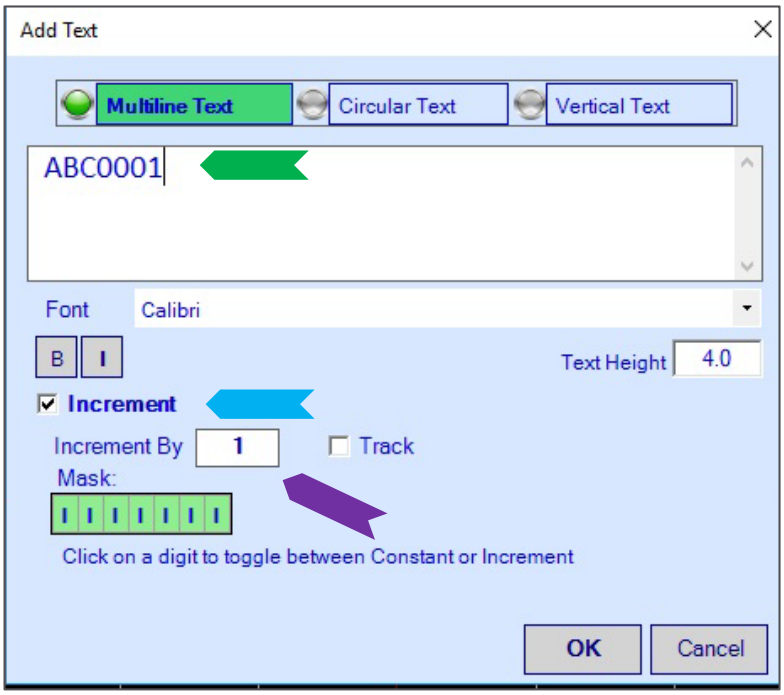

Create a new Text Object, this will bring up the Text Object window.




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## *Step 2:*




Type in a Starting Text or Serial Number.

Check the Increment Box.

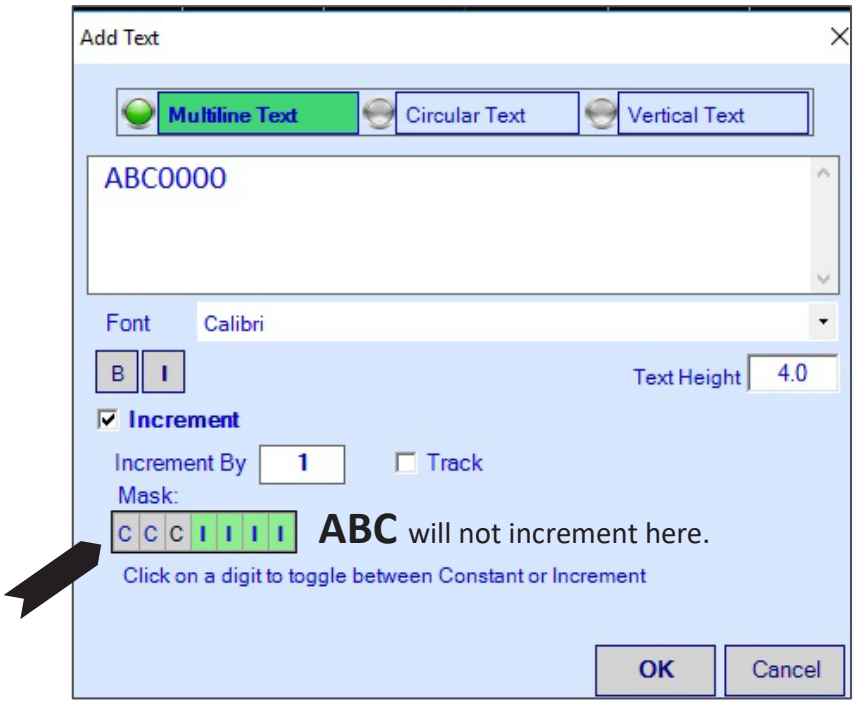
Enter the amount to increment by each time a part is marked.



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# GS1

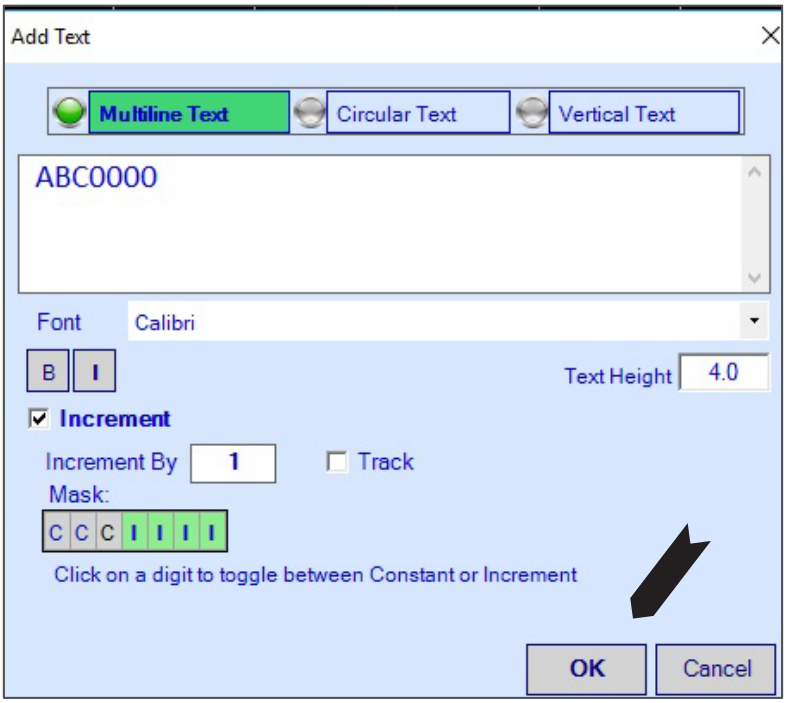
***Step 2:***



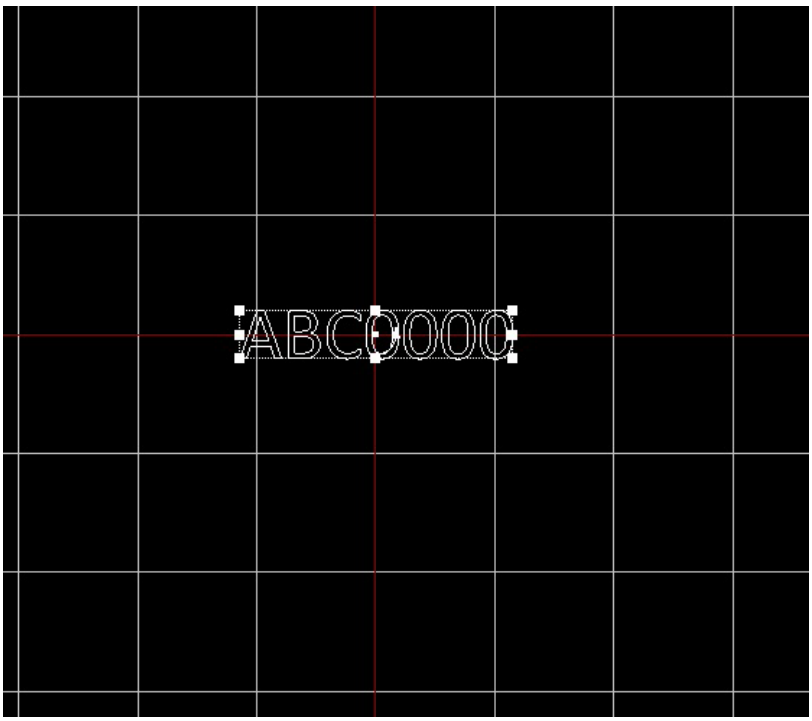

Decide if any of the Text does not want to be incremented and press the mouse on the Mask in the appropriate places.

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## *Step 3:*




Select OK when finished.

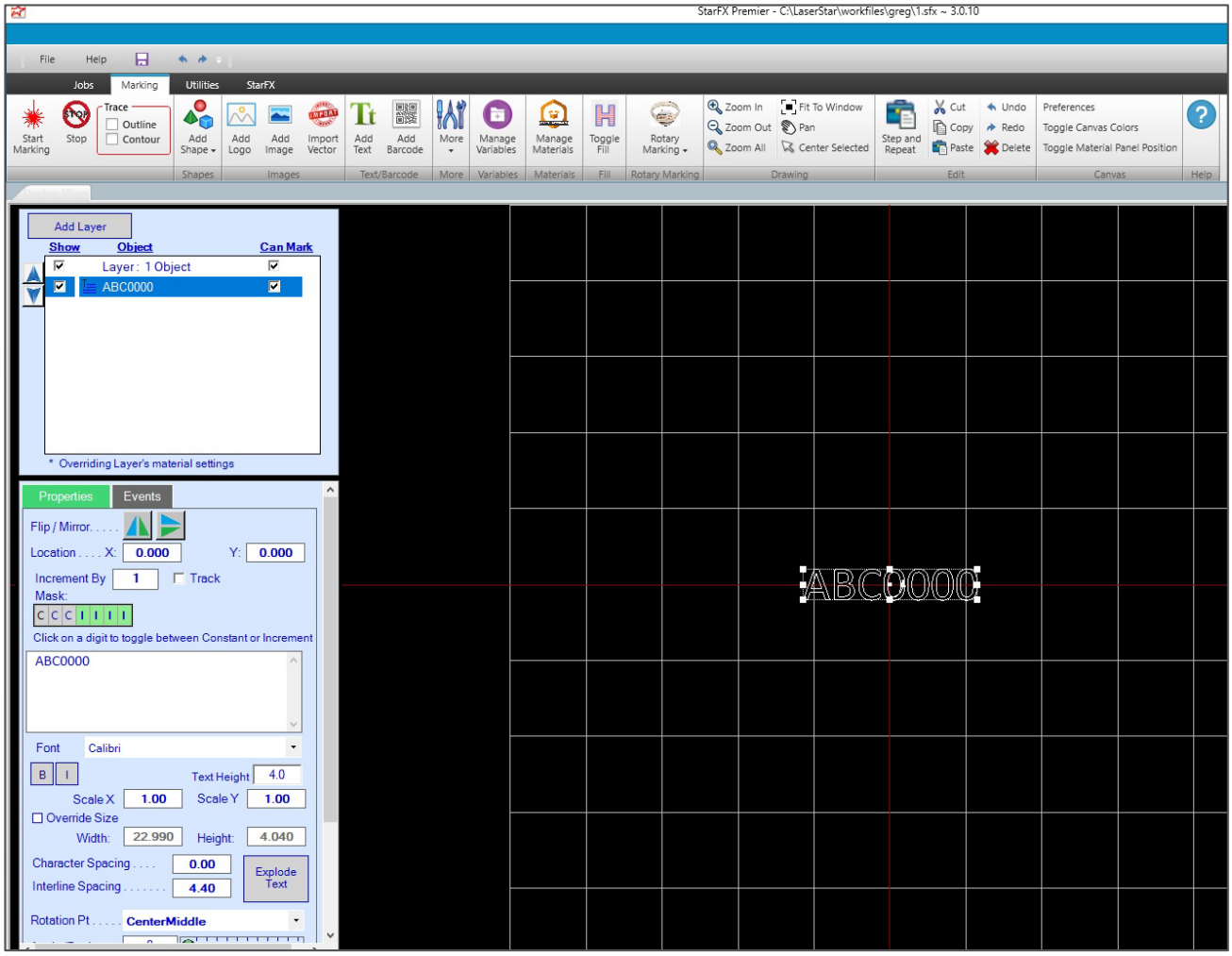





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# GS1

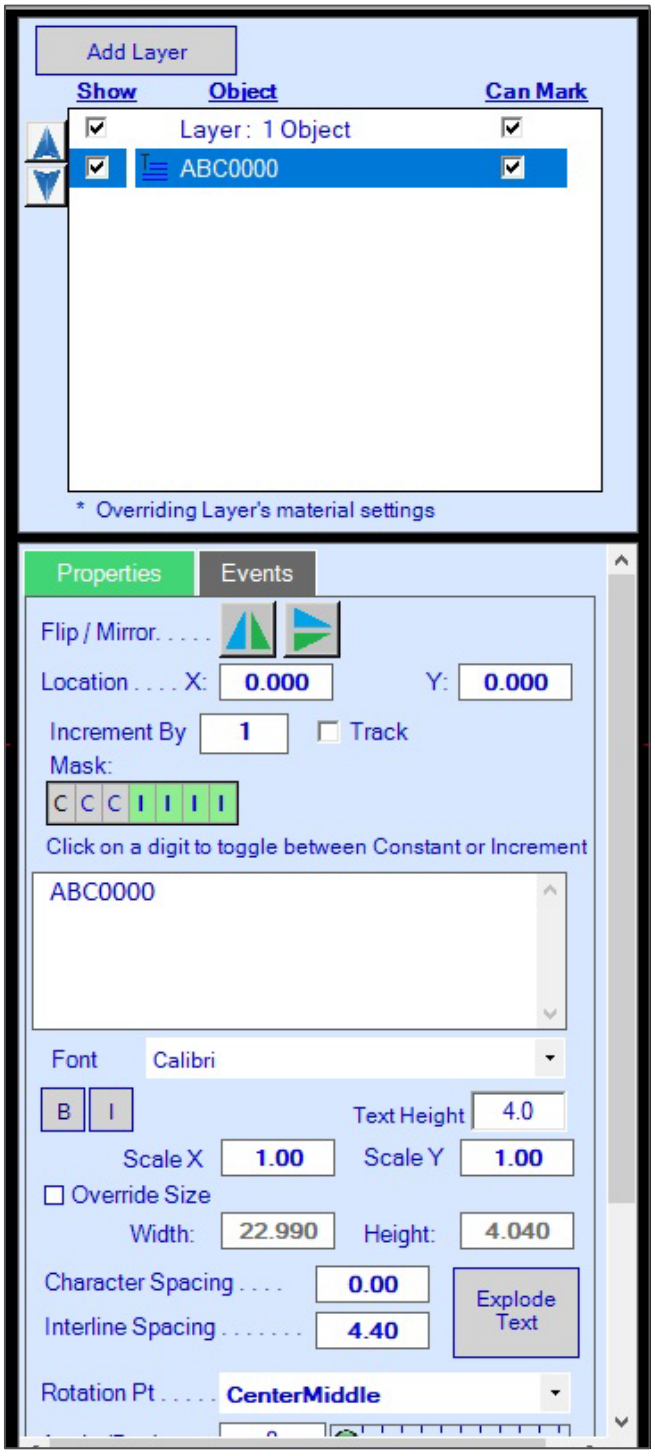
## *Step 3:*




The Text object appears on the Drawing Screen with the Starting Number.

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## *Step 3:*



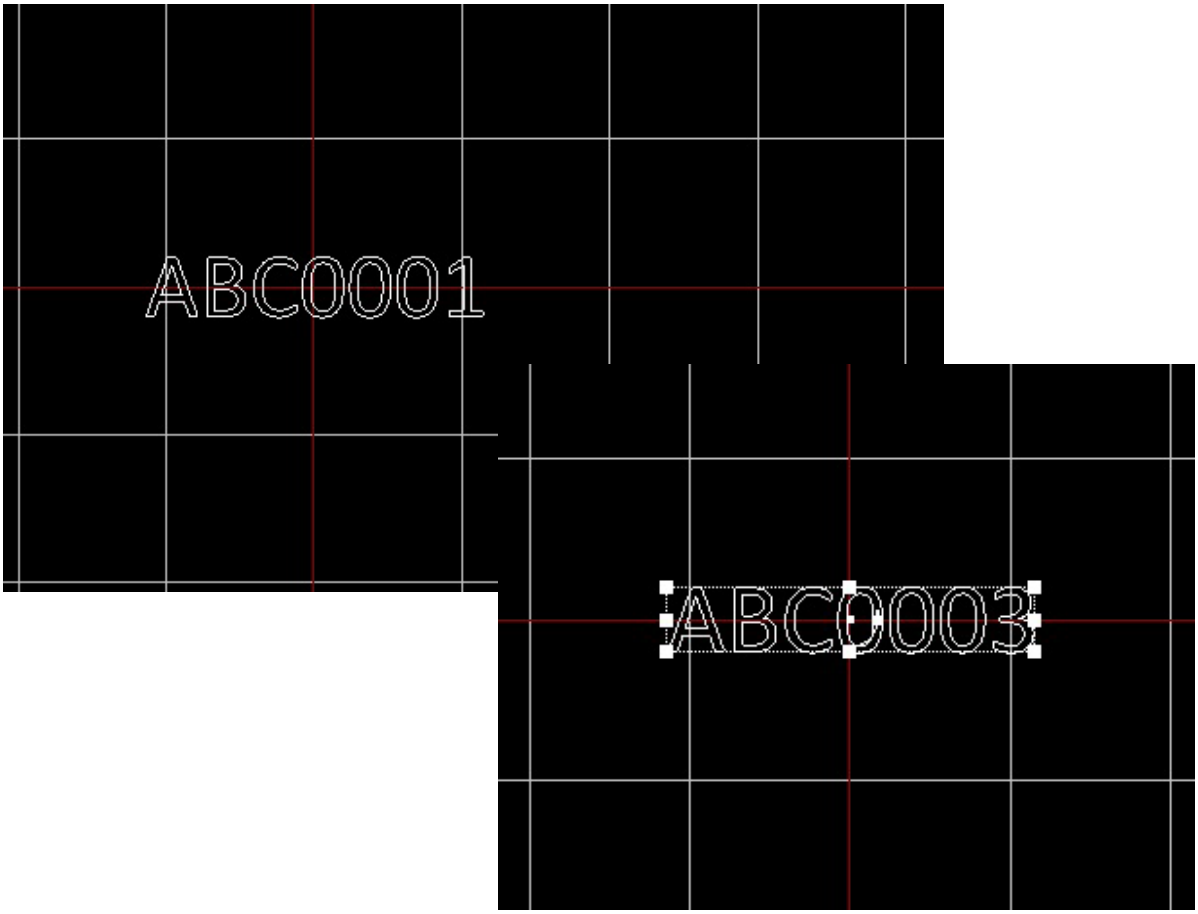

The attributes for the Text Object are reflected in the Properties Tab as shown here.

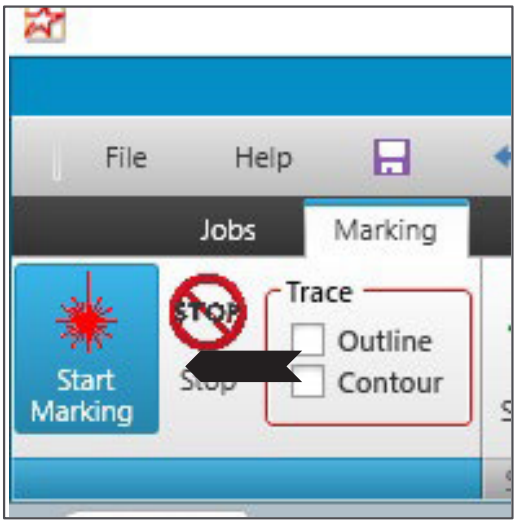


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# GS1

***Step 4:***

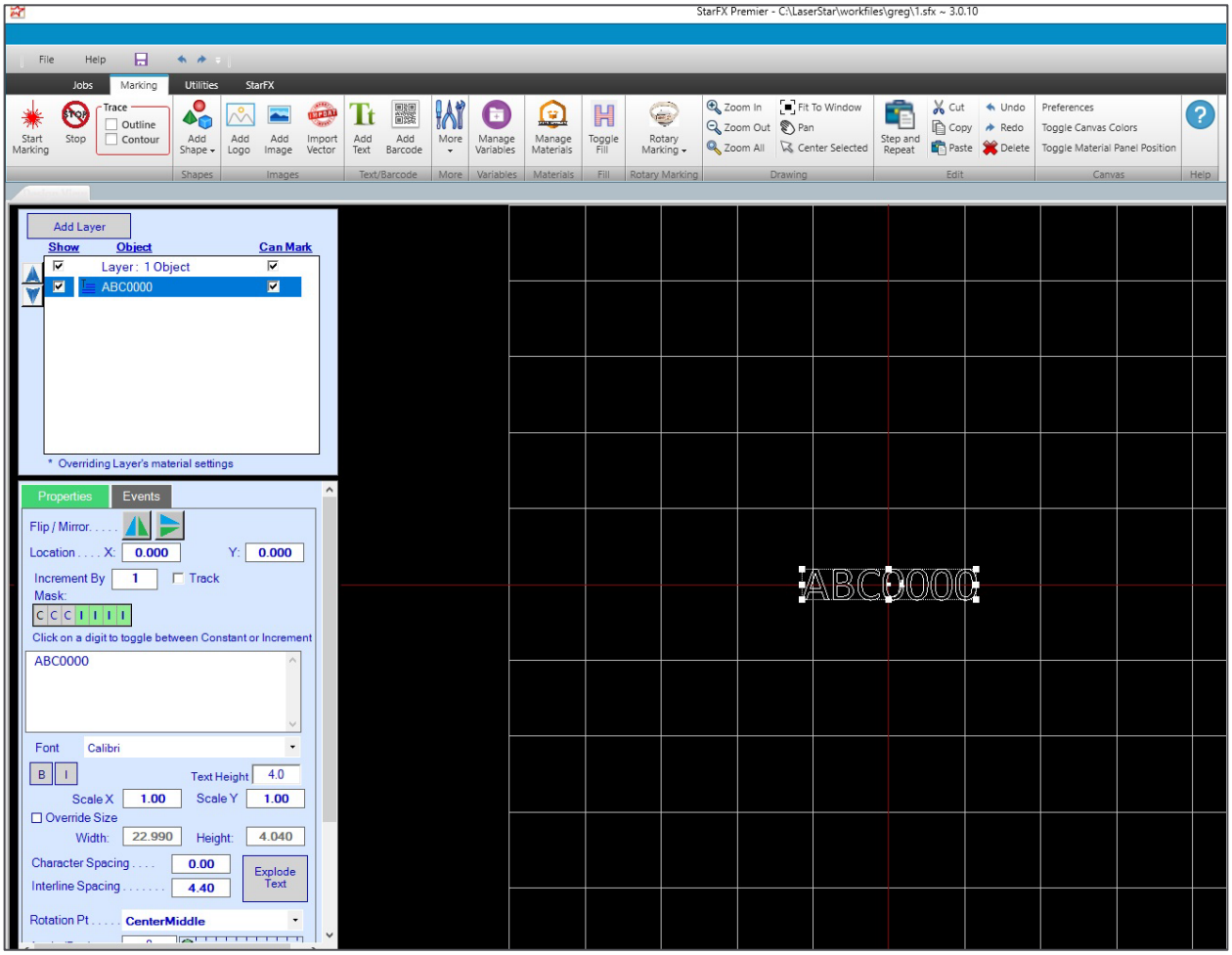


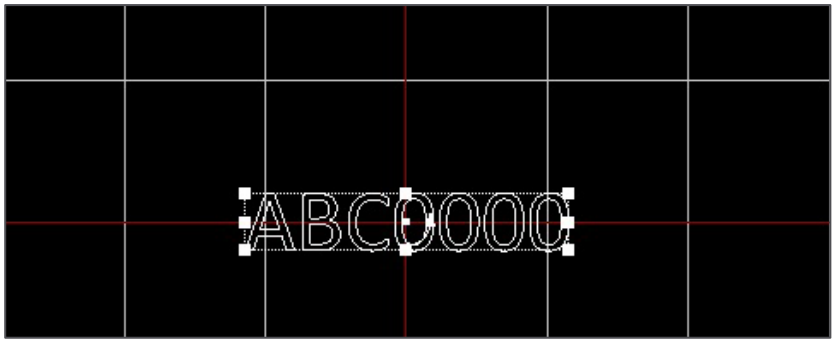




Each time a part is marked the Number increments.

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## *Step 5:*



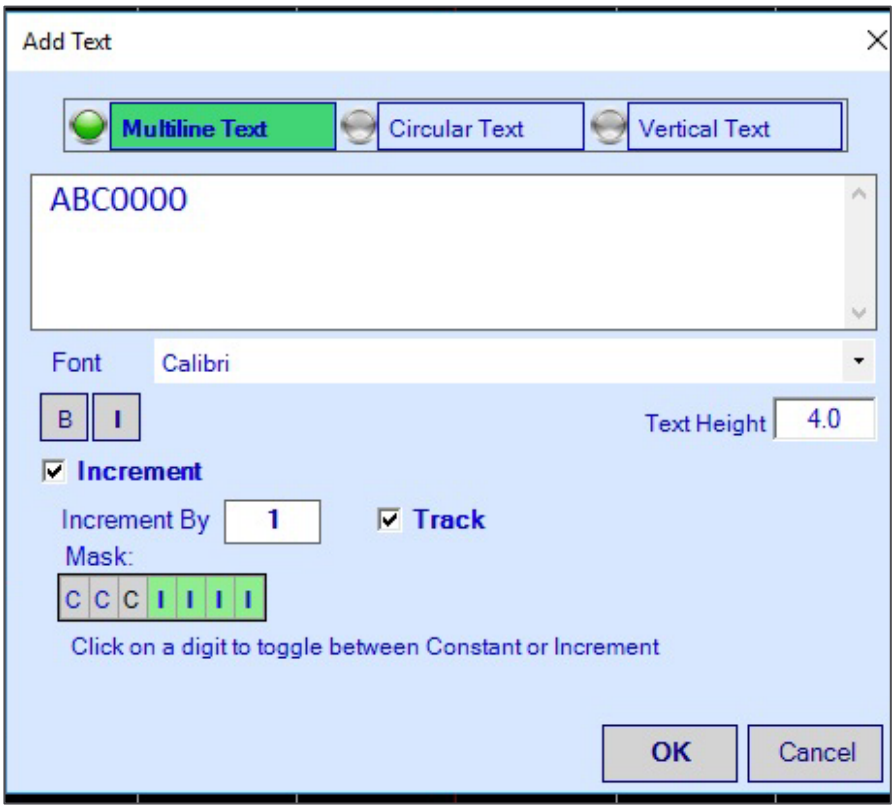

Note that we did not check the Tracking Box so if we restart the program it will start at the original Number.



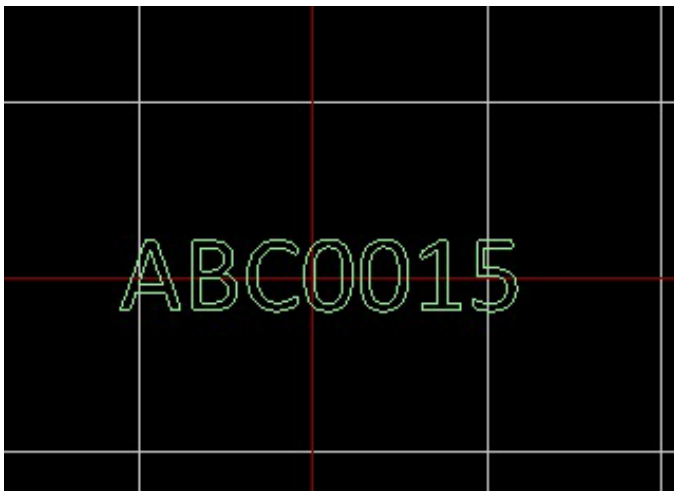
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# GS1

## *Step 1 - 5: Are the same as the Non-Tracking Text Object*




The difference when the Tracking Box is checked is that when you restart the program it will start with the next available Number not the original Starting Number.




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# JOB QUE MODULE

CLICKABLE CONTENT

## JOB MANAGER

## RUN A SINGLE JOB

## CREATE A NEW QUEUE (LIST OF JOBS)

## ADD JOB(S)

## MANAGE QUEUE

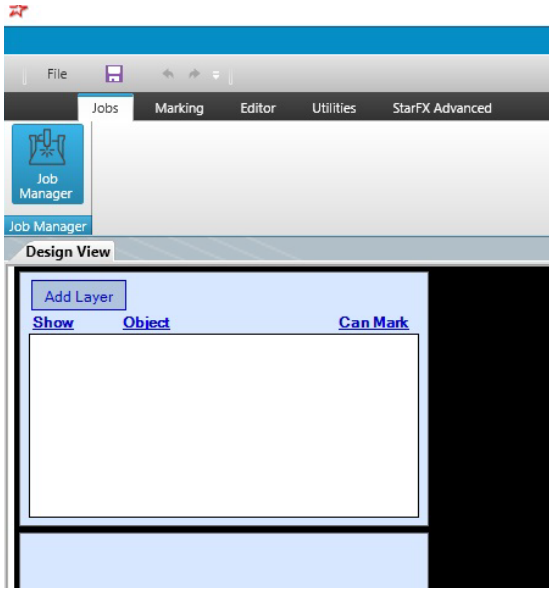
## RUN A PRIORITY JOB

## STATISTICS BUTTON

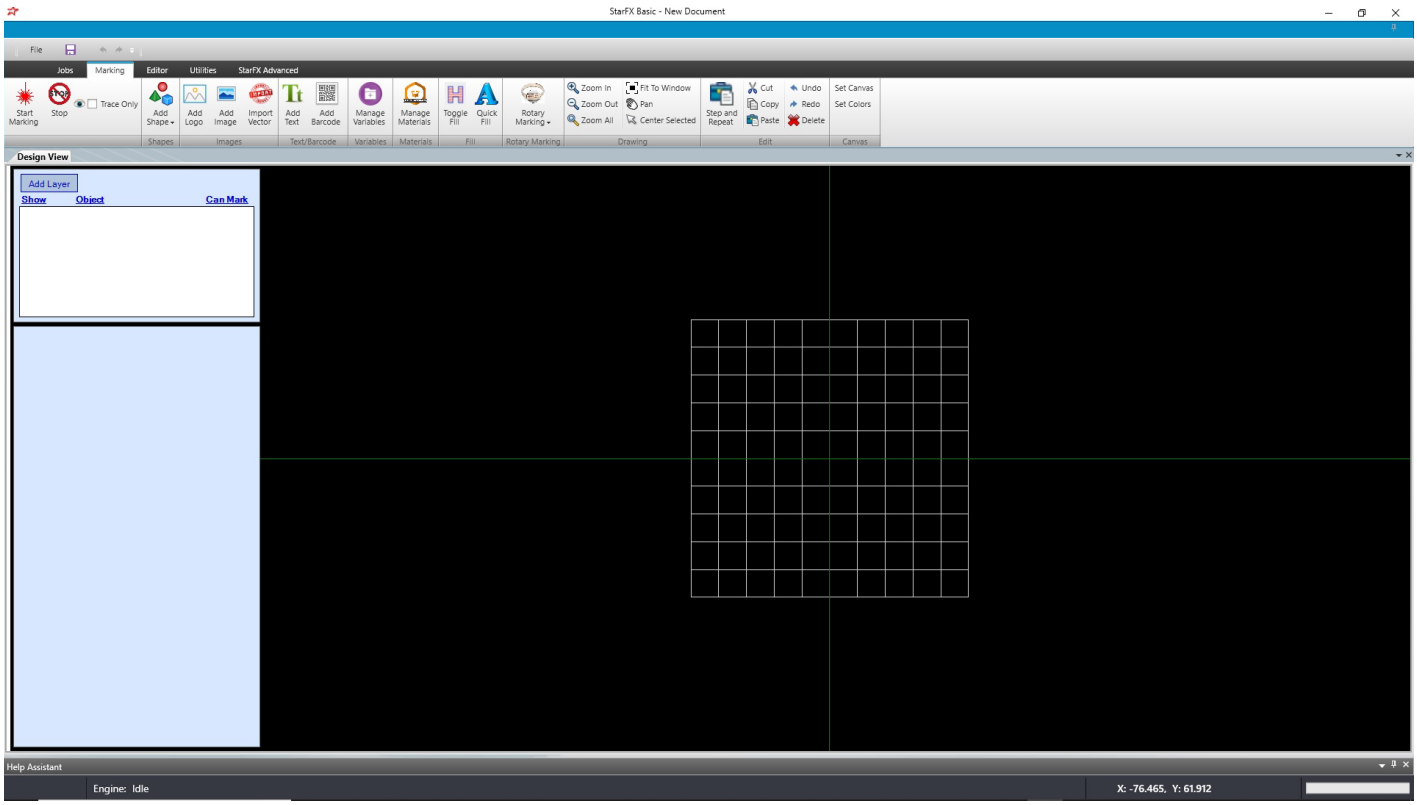


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# JOB MANAGER

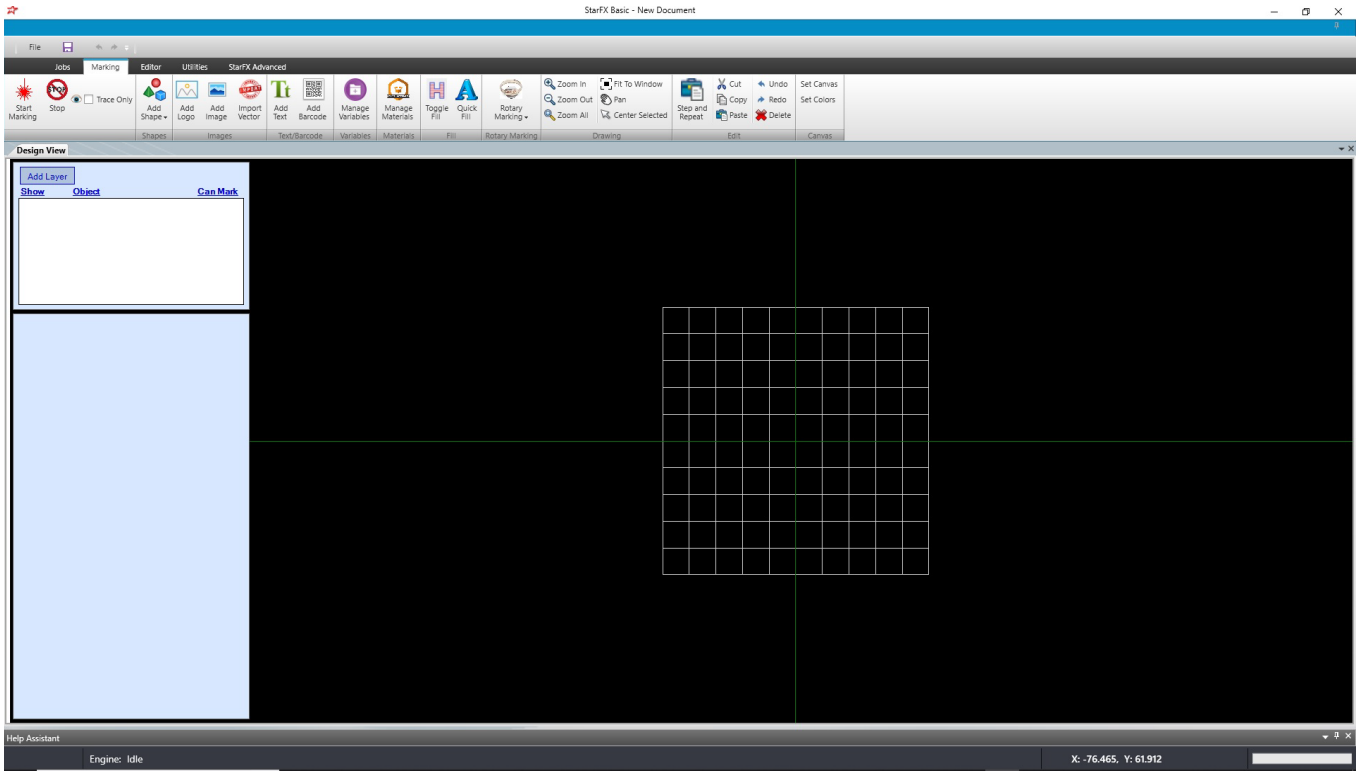



The first item on the Menu section calls up the Jobs Manager. This is where the user can either Run jobs as needed or create a new Job Queue.




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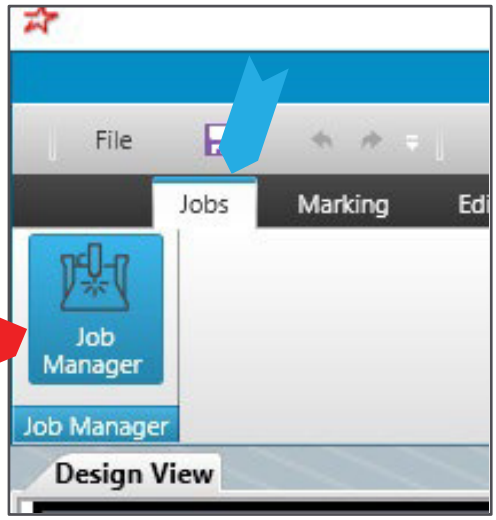
# RUN A SINGLE JOB




To run a Job you select the "Jobs" tab and press the "Job Manager" button.

**Step 1**

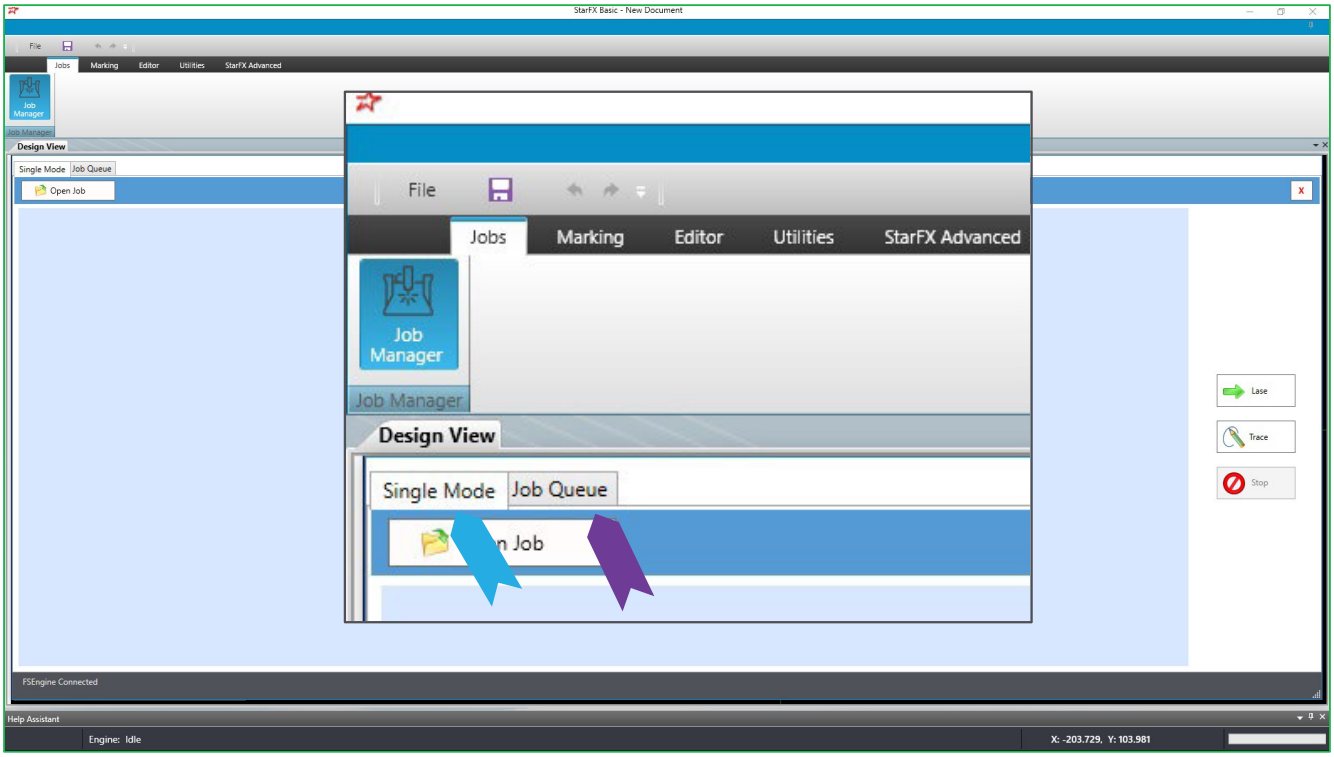
**Step 2**






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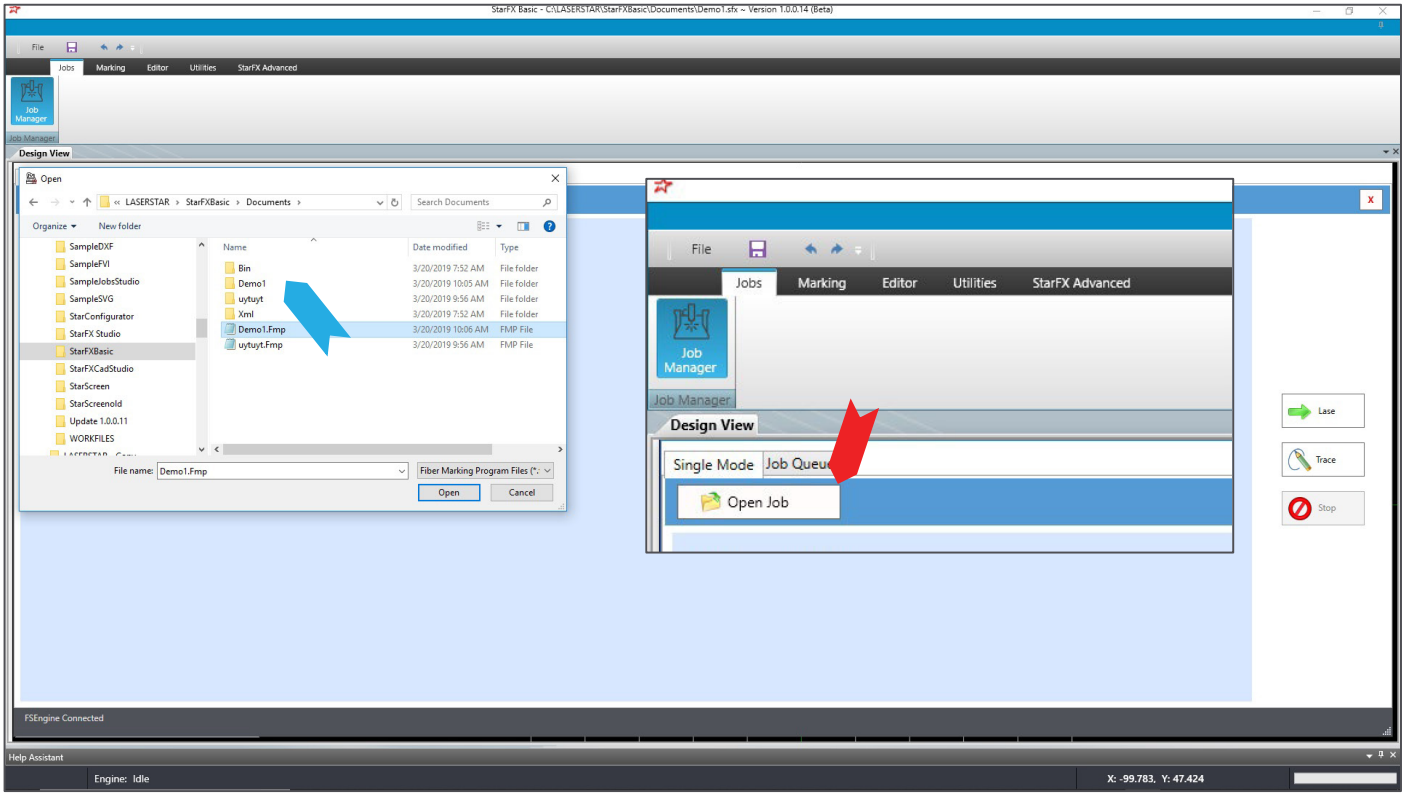
# RUN A SINGLE JOB




The Main Job Screen starts with selecting to run a Single Job or Lasing Program or to setup a Job Que which is a sequence of Jobs to be run in order.

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# RUN A SINGLE JOB



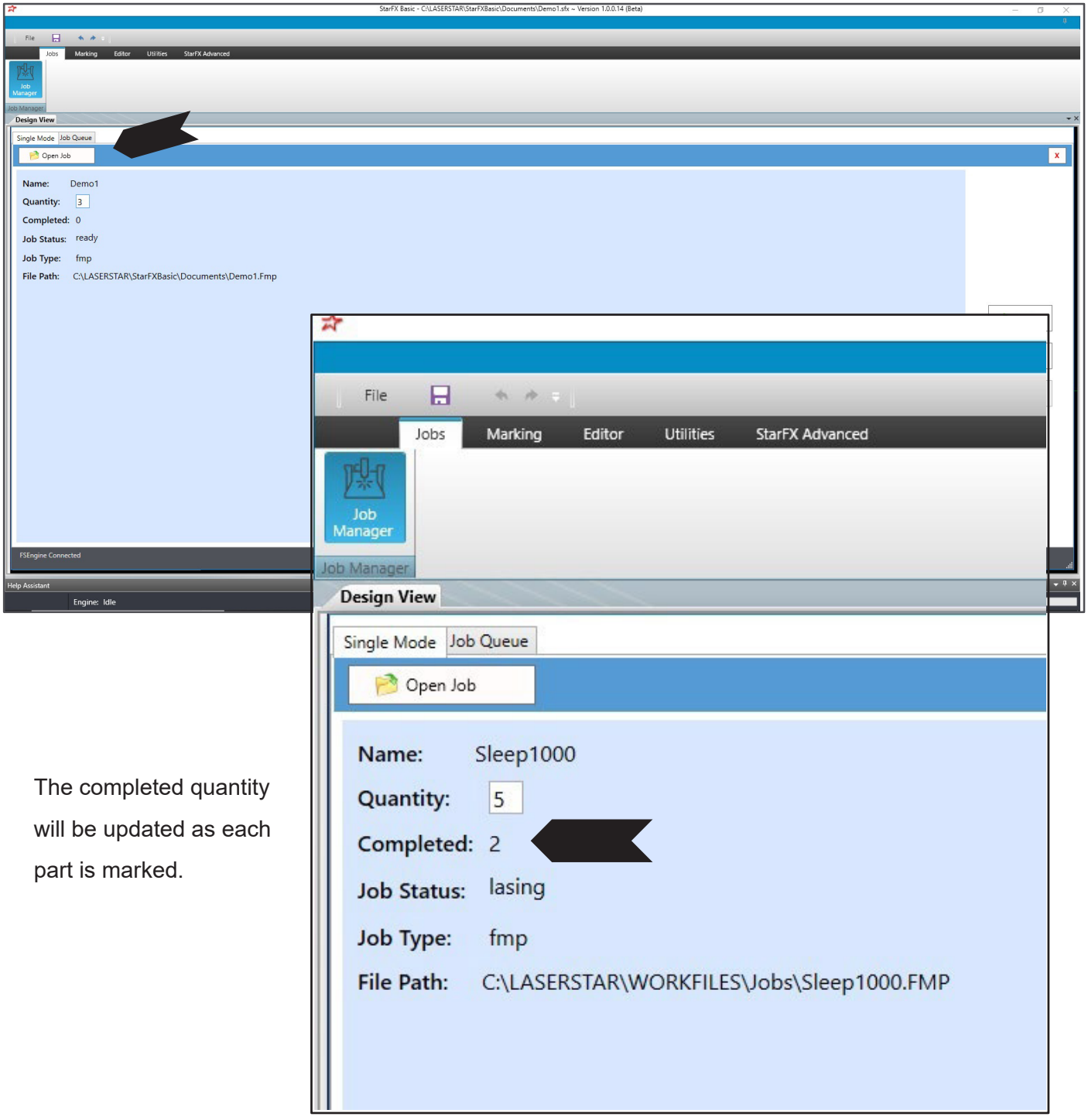

If “Single Job” is selected you then press the “Open Job” button and select the job to run.

*Note: Jobs or lasing programs are files that end in “.fmp”.*



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# RUN A SINGLE JOB



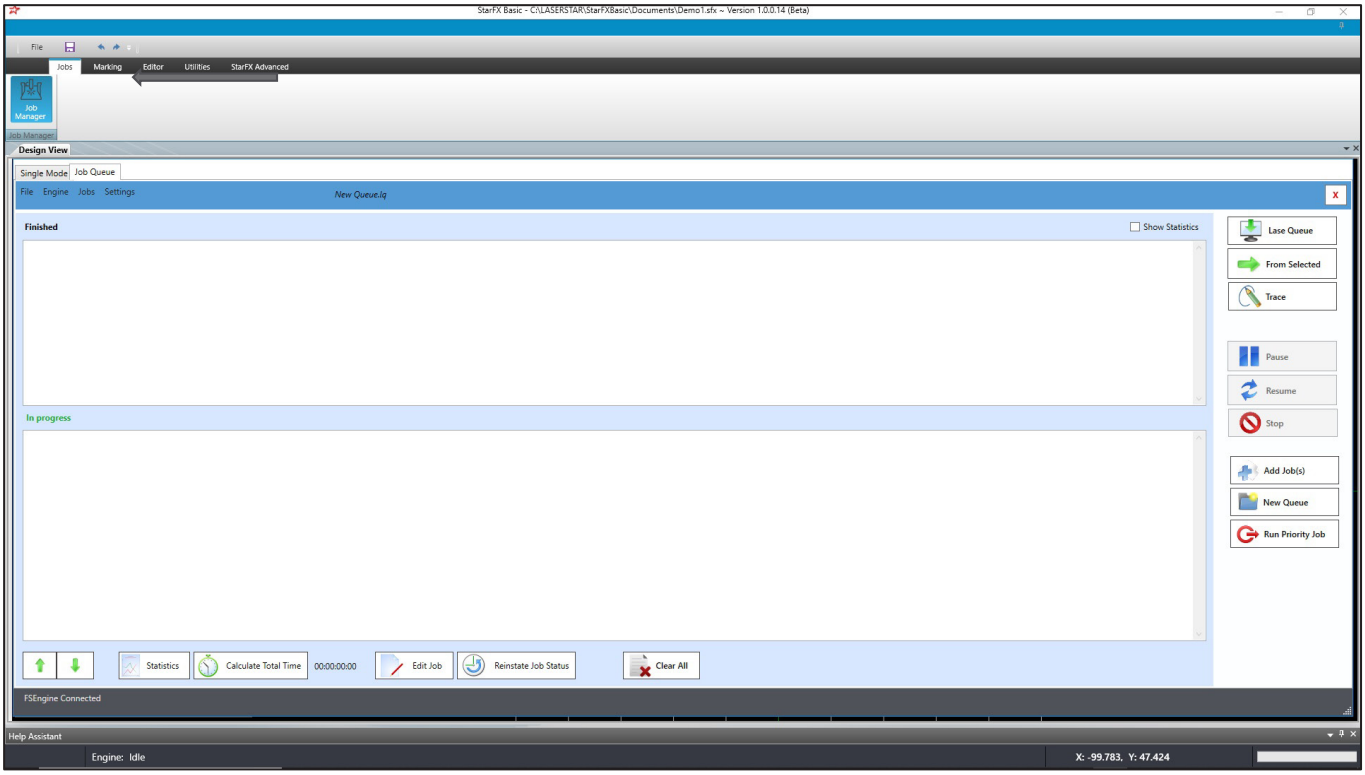

The completed quantity will be updated as each part is marked.

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# CREATE A NEW QUEUE

The second way to run jobs is to create a list of jobs to be run in sequence.

This is called a “Job Que”.

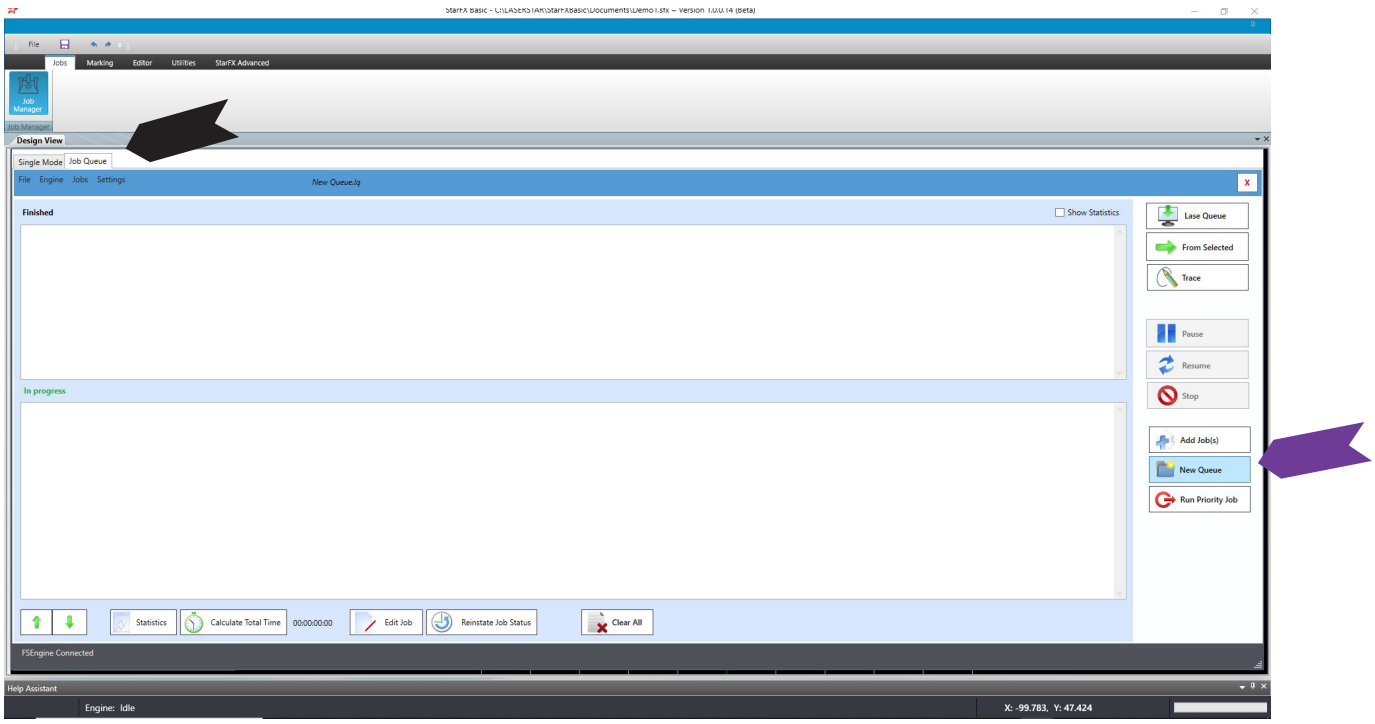



There are many useful features in the Job Que screen, we will go over each one.



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# CREATE A NEW QUEUE



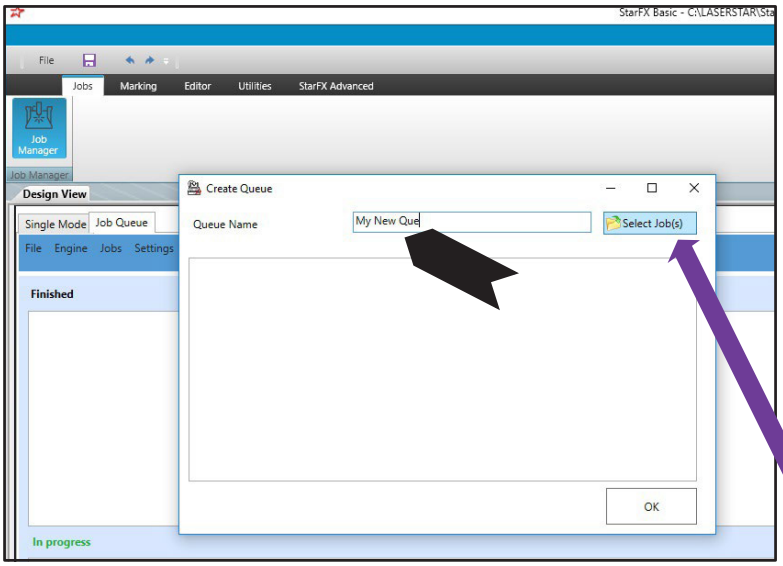

We start by creating a “New Queue” after selecting the Job Queue tab.

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# ADD JOB(S)

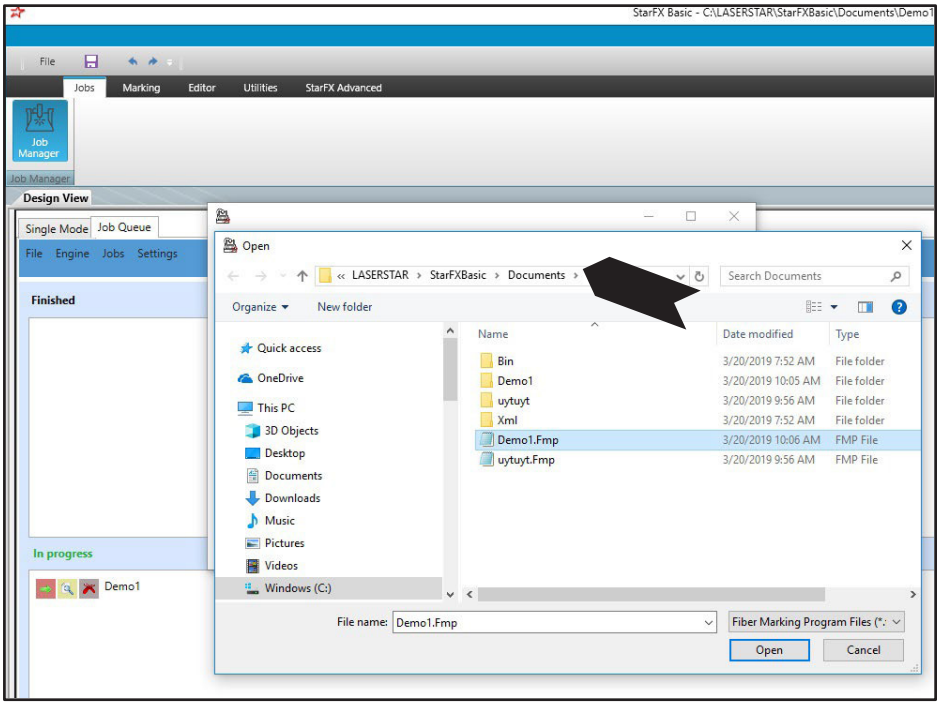
## Step 1

Name the Queue so it can be recalled or run again at a later time.




## Step 2

Select a job to be added to the Queue.



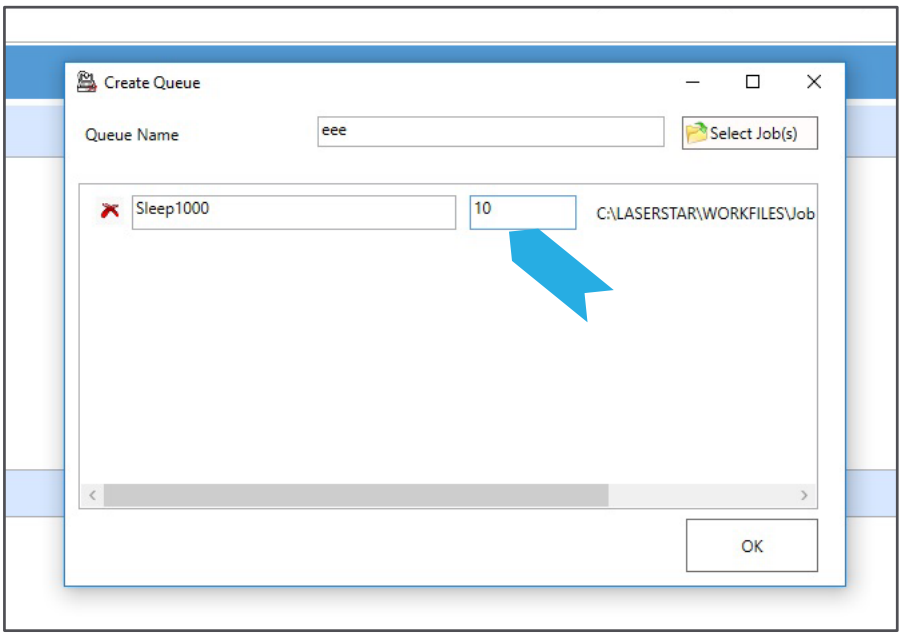



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# ADD JOB(S)

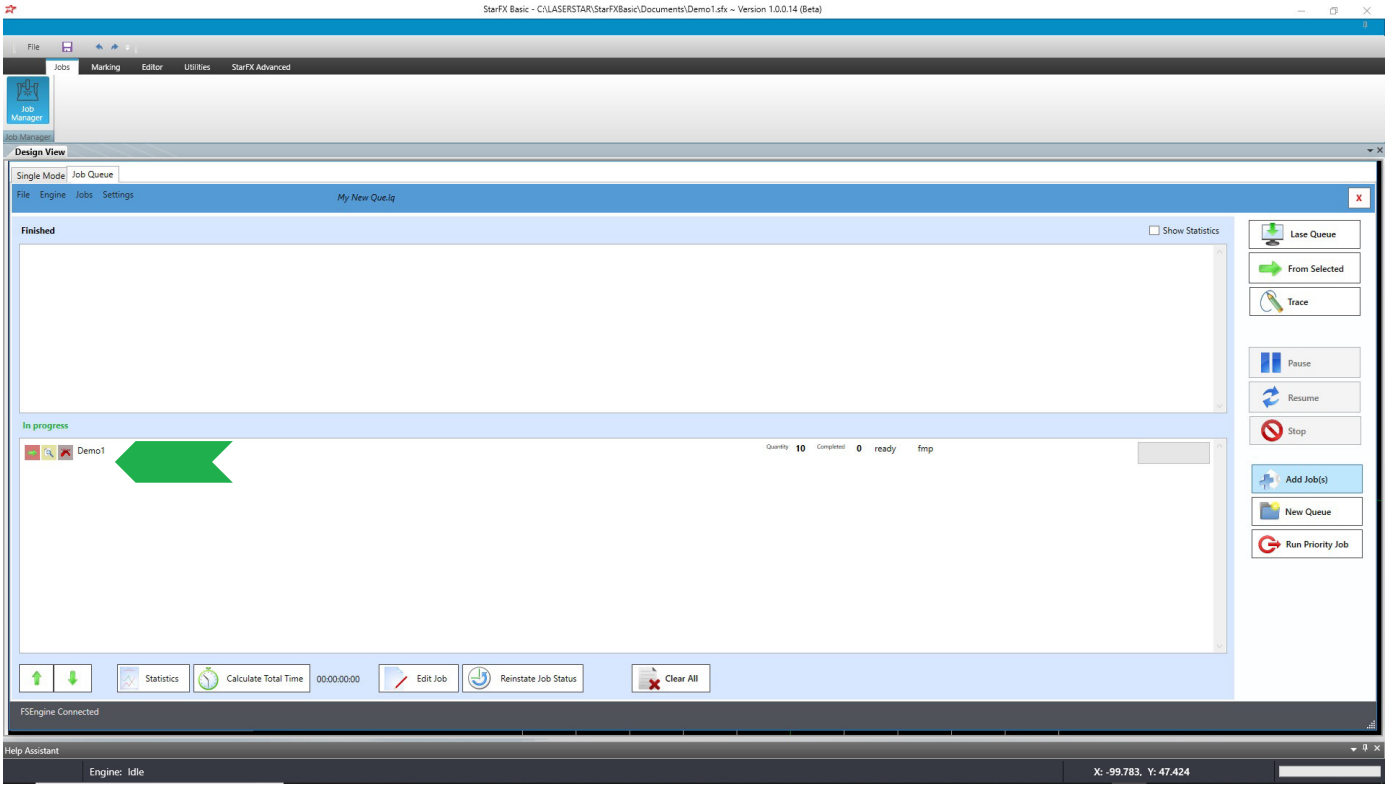
## Step 3

Enter a quantity to be run.



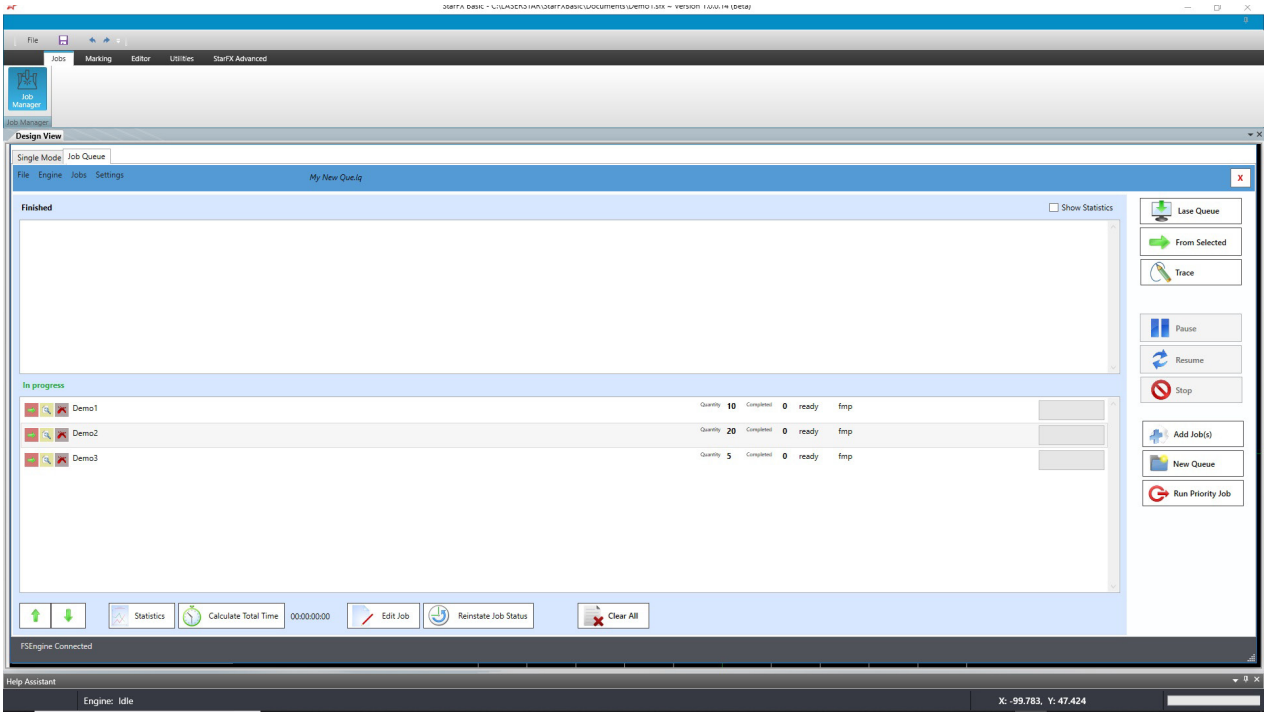

## Ready

The new job will show in the Job Queue list.




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# ADD JOB(S)



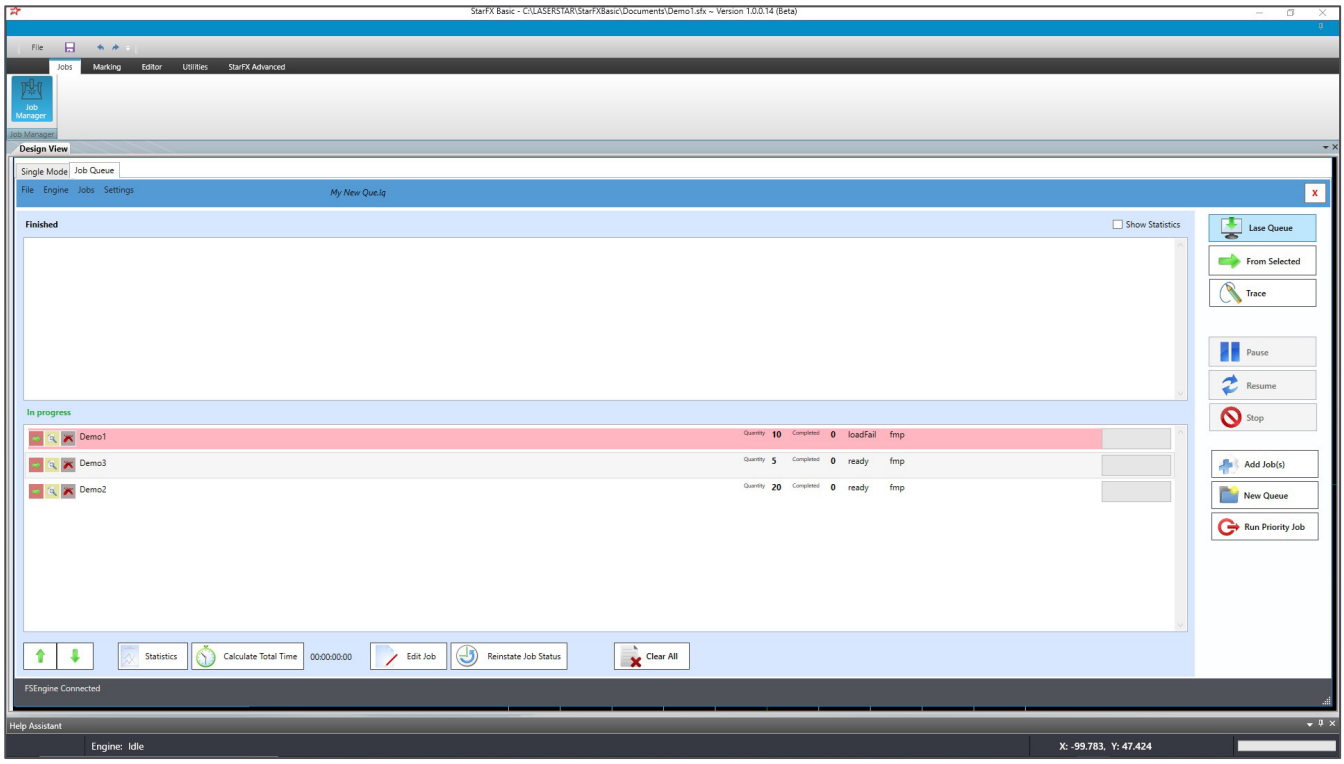

Continue this process until you have added all the jobs to be run in this Queue.

This could be for the next hour or for an entire shift.

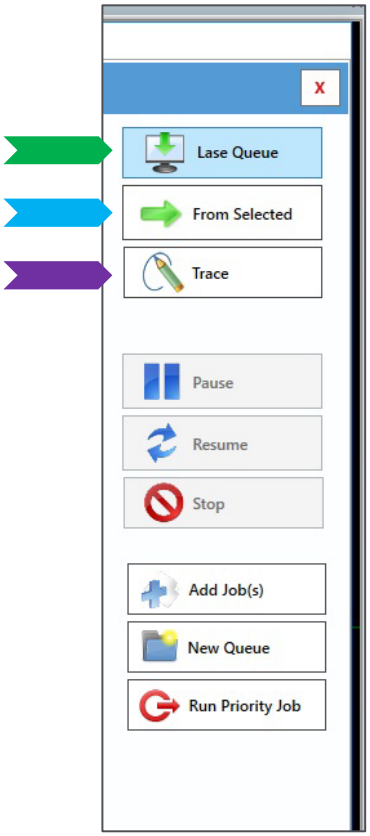


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# MANAGE QUEUE

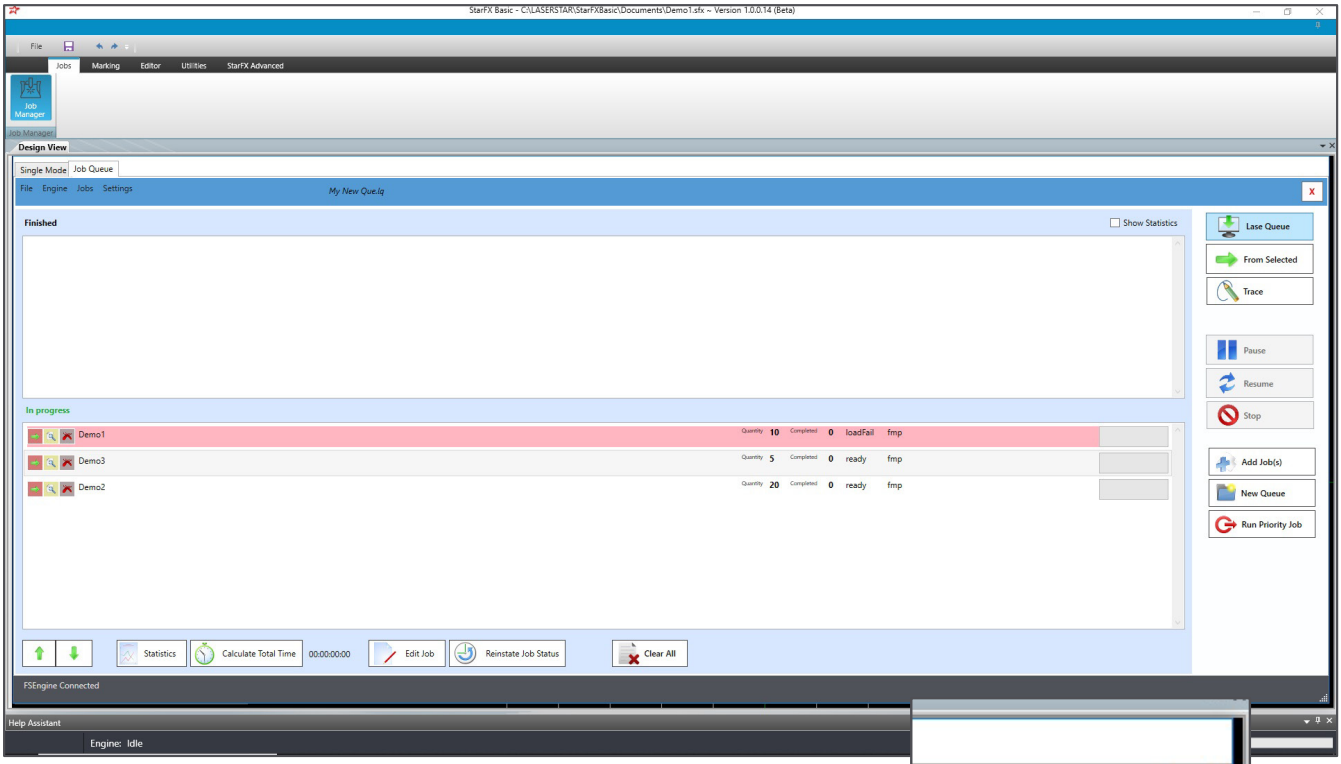


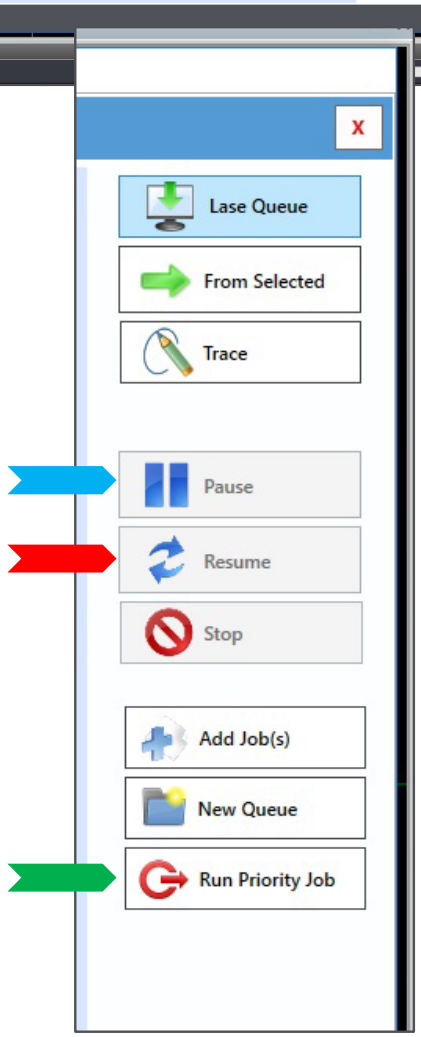

1. You can start the entire Queue from the beginning.
2. You can select a job to start from.
3. Or do a dry run by using the Red Tracing laser.




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# MANAGE QUEUE



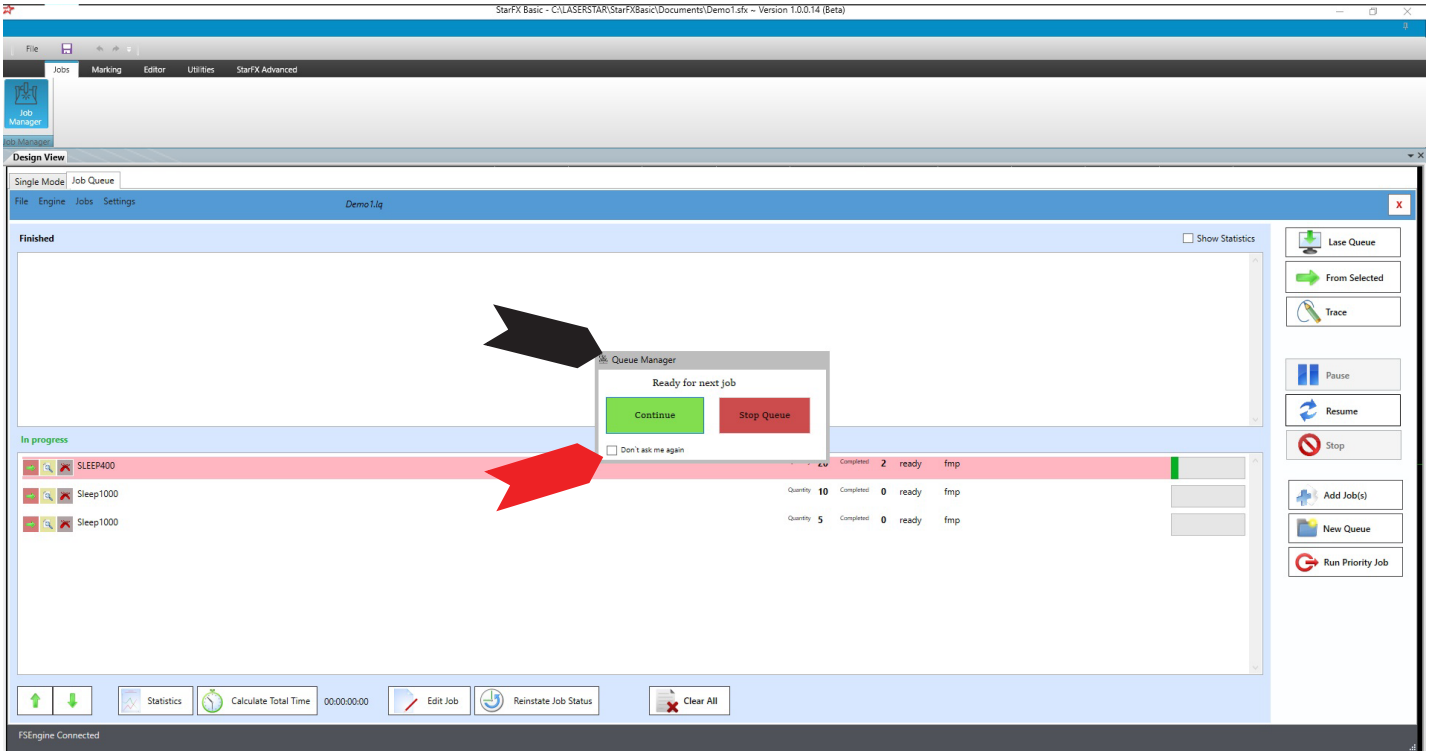

"Lase Queue" will start the Queue from the beginning and then continue through the list. It will only stop if you:

- ☆ Select **"Pause" and "Resume"**,
- ☆ Or press **"Run Priority Job"**.



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# MANAGE QUEUE

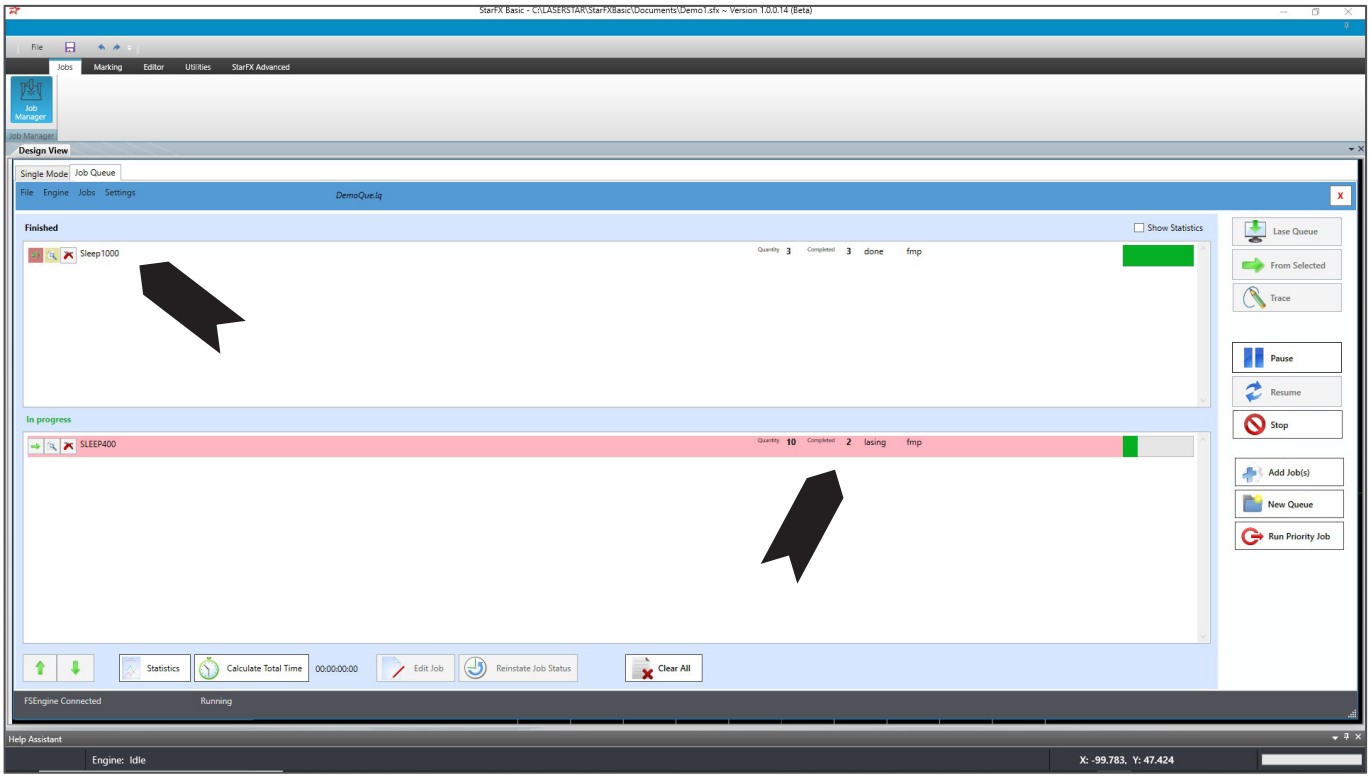



After starting the Queue there are two ways to run:

1. The prompt shown above will appear after each part is complete letting the operator unload the finished part and load a new part before pressing **“Continue”**.
2. By checking the **“Don’t ask me again”** box the system will automatically run through the Queue.

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# MANAGE QUEUE

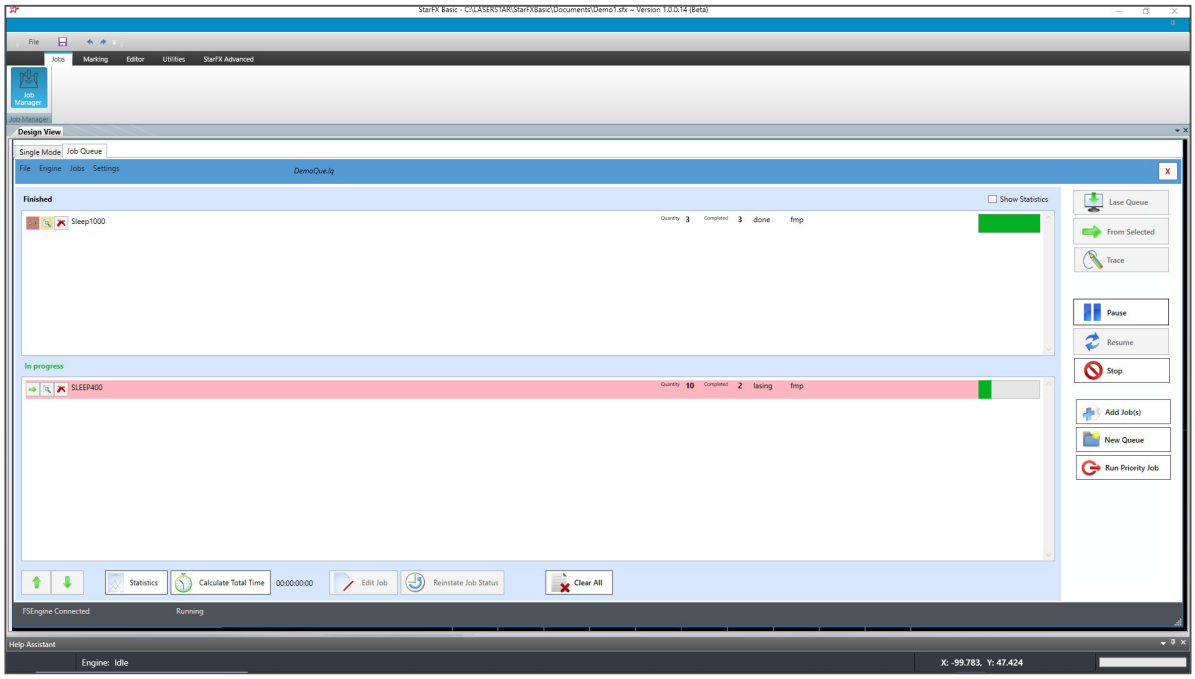



As the Queue progresses completed jobs move up into the **"Finished"** Window and the quantity field of jobs in progress is updated after each part is done.

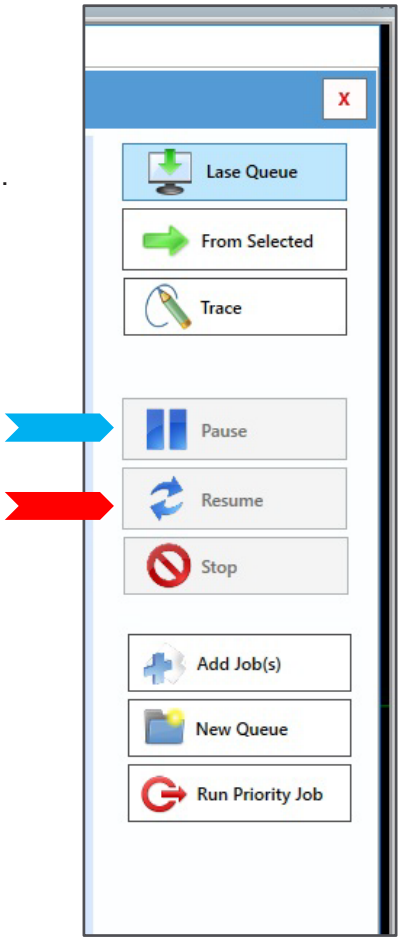


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# MANAGE QUEUE

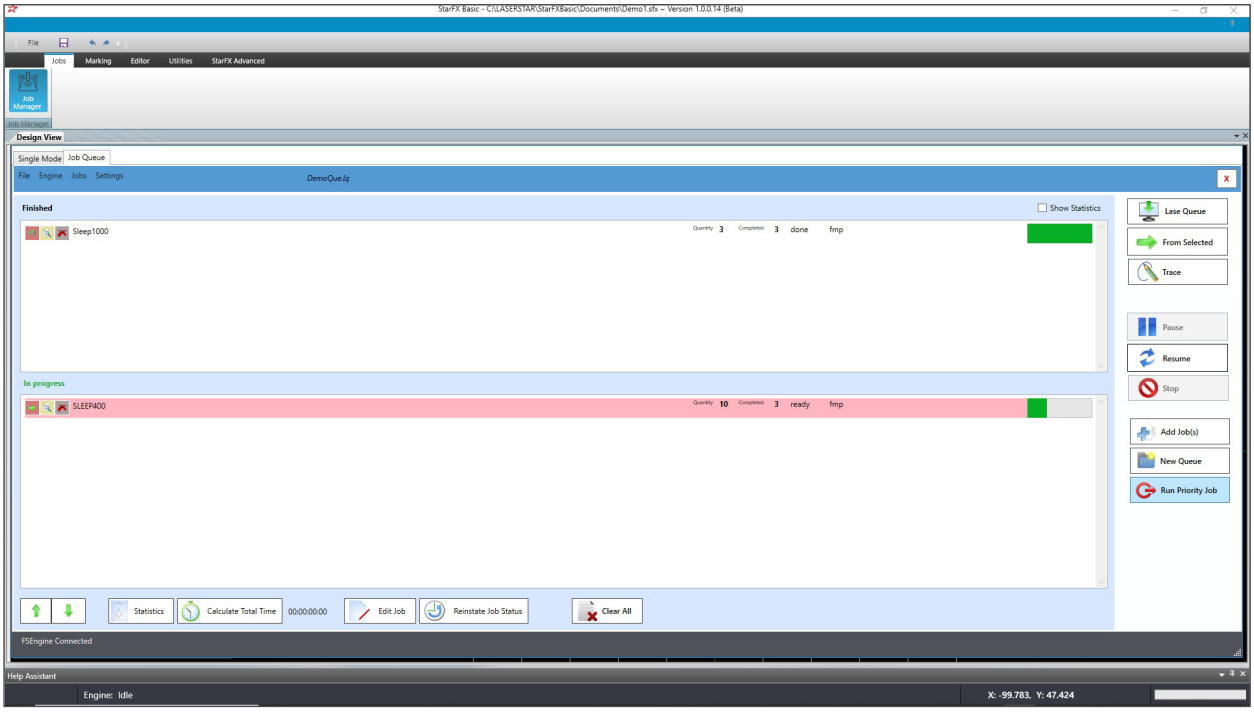



At any time the Queue can be “Paused” and “Resumed”.
This could be for breaks, lunch or shift change.

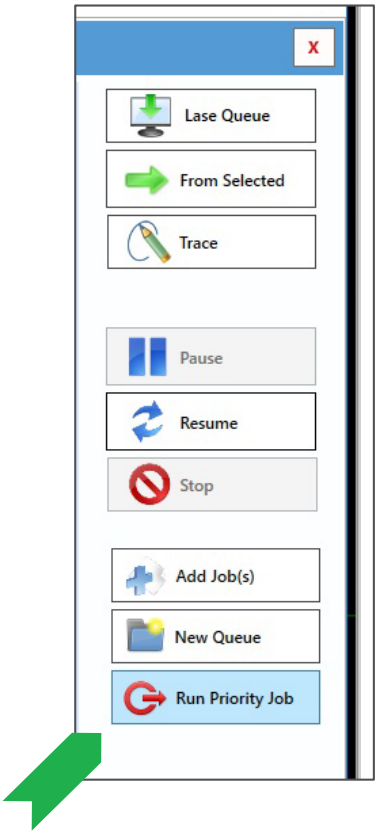



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# RUN A PRIORITY JOB



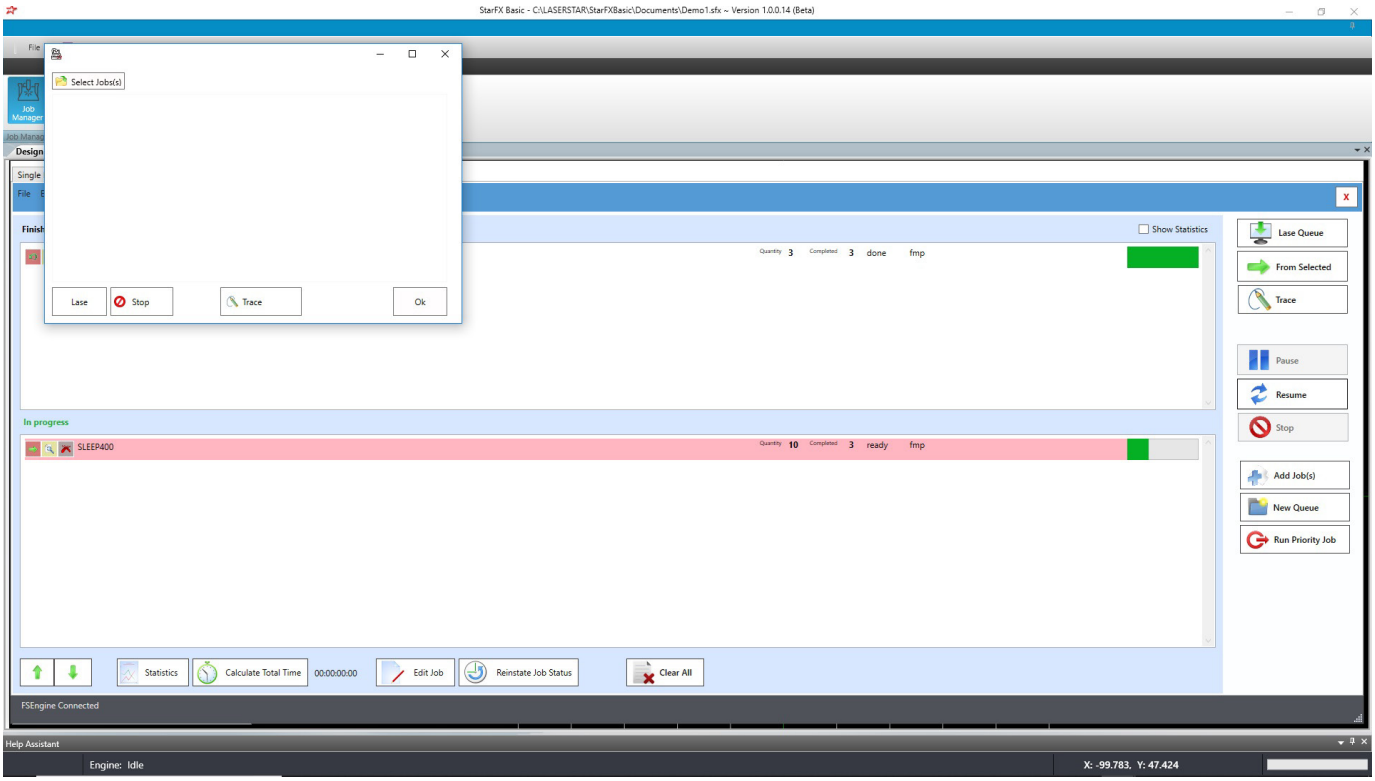

Another important feature is the ability to interrupt the Queue to run an emergency job, such as a rework part.






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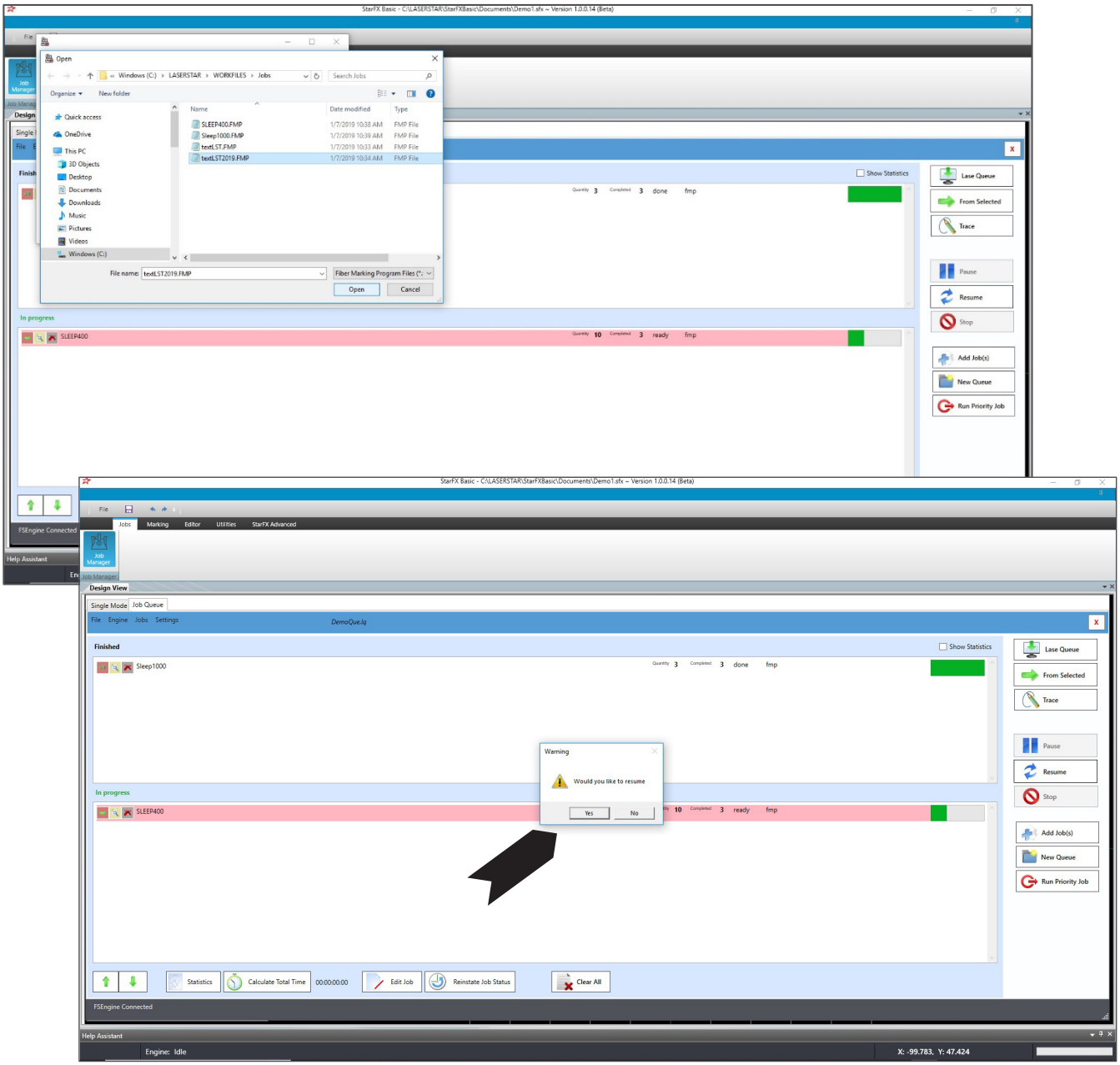
# RUN A PRIORITY JOB




This feature stops the current Queue and lets you select the **“Priority Job”**, align and then run the selected lasing program.

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# RUN A PRIORITY JOB

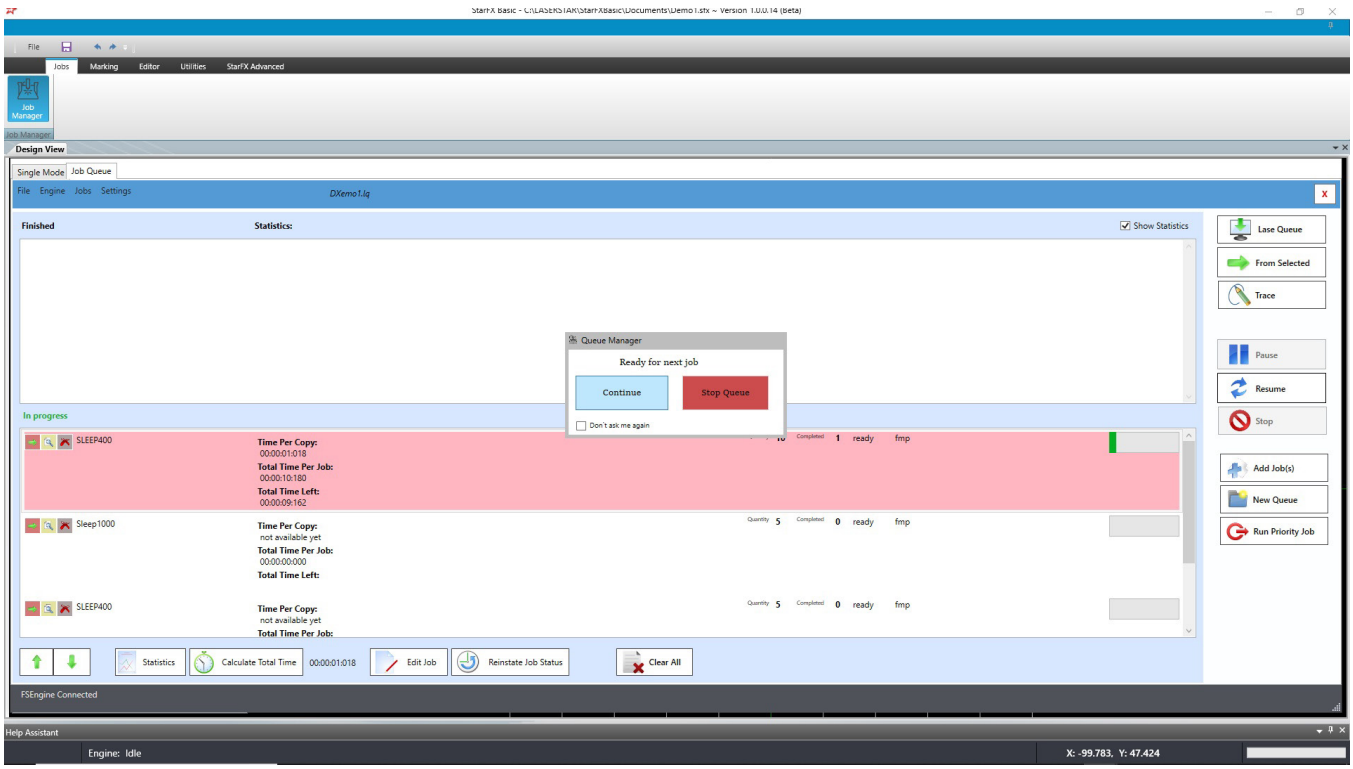



When the **"Priority Job"** is complete you can go right back to where the main Job Queue left off.



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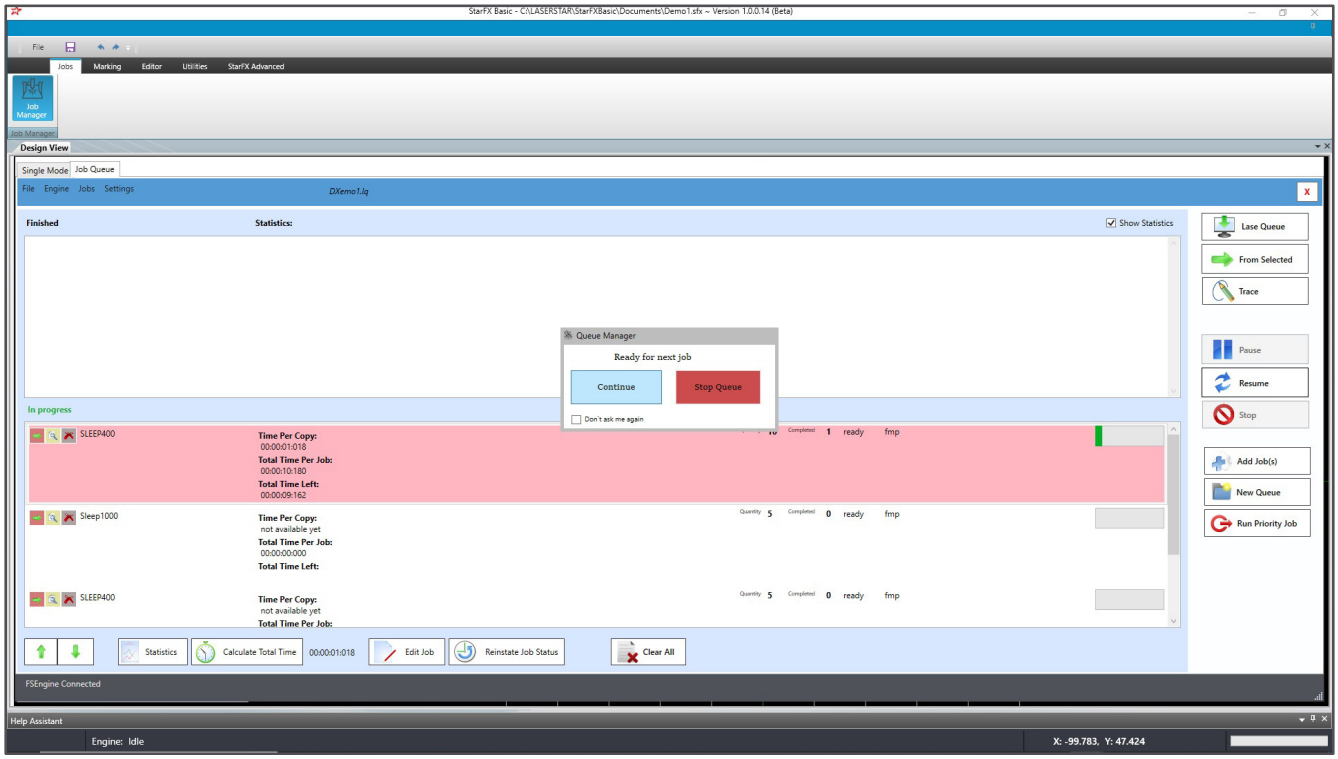
# RUN A PRIORITY JOB

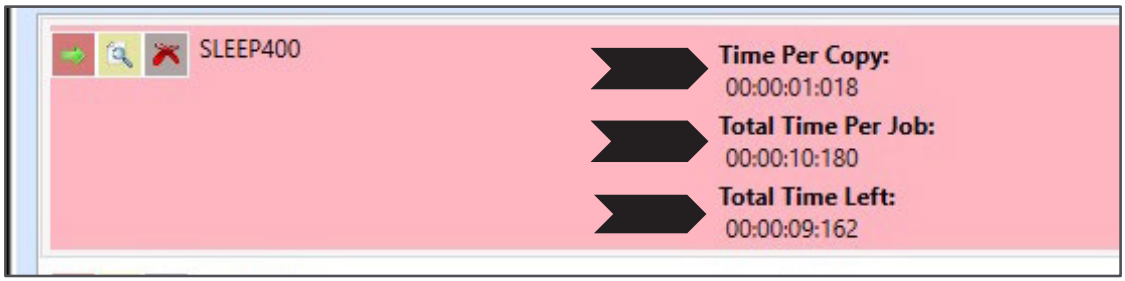



There are some additional features we will go over now that are not directly related to the functionality of the Job Queue but are meant to enhance it.

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# STATISTICS BUTTON



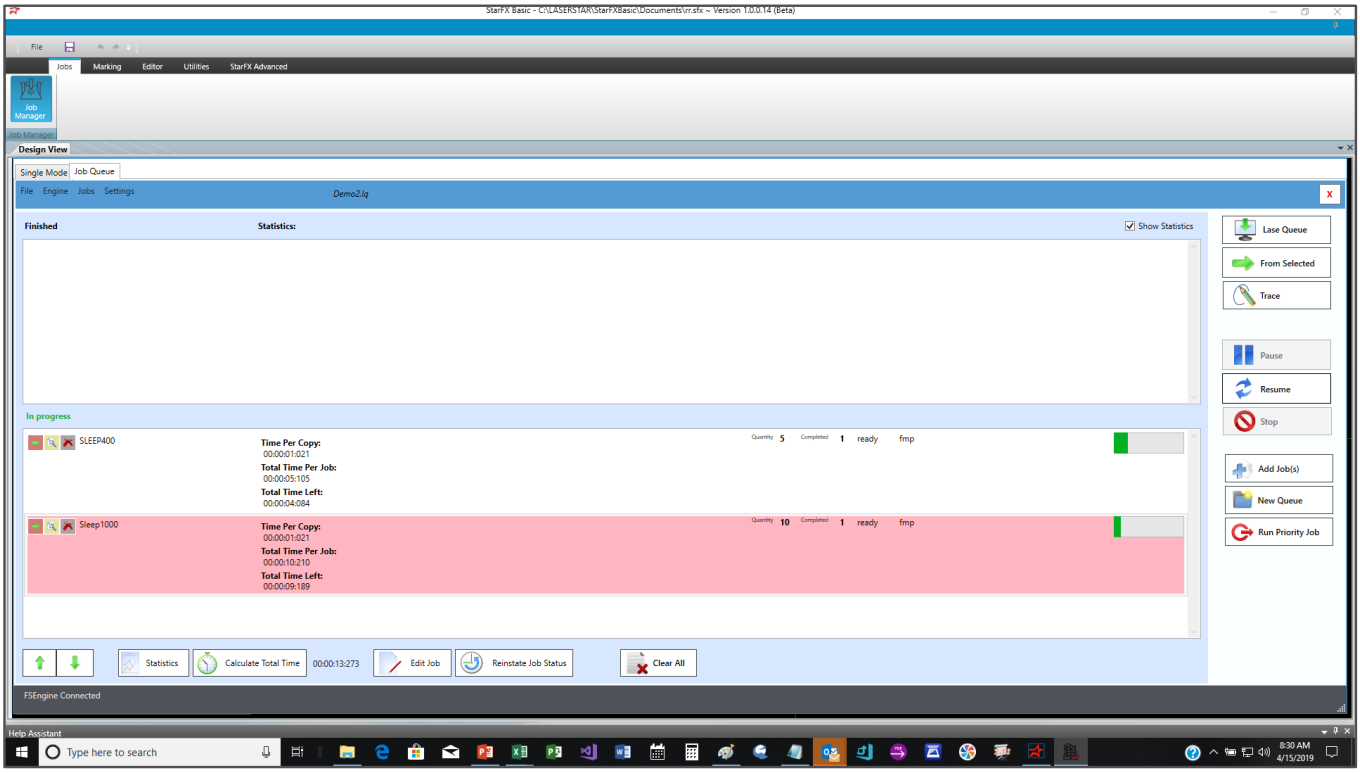




The **"Statistics"** button will show pertinent information about the jobs that are running. The most important feature displayed is the cycle time of a single part, the total time for this run of the queue and the estimated time to complete this job in the queue.



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# STATISTICS BUTTON




Times can be reviewed for decisions on future runs and scheduling choices.

- ☆ Calculate Total Time will show the total time this queue will take to run.
- ☆ The Up and Down

Continue this process until you have added all the jobs to be run in this Queue.
This could be for the next hour or for an entire shift.

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# DRAFTSMAN
# CUTTING SHOP

CLICKABLE CONTENT

## TOOLS GUIDE

## AUTO TRACE

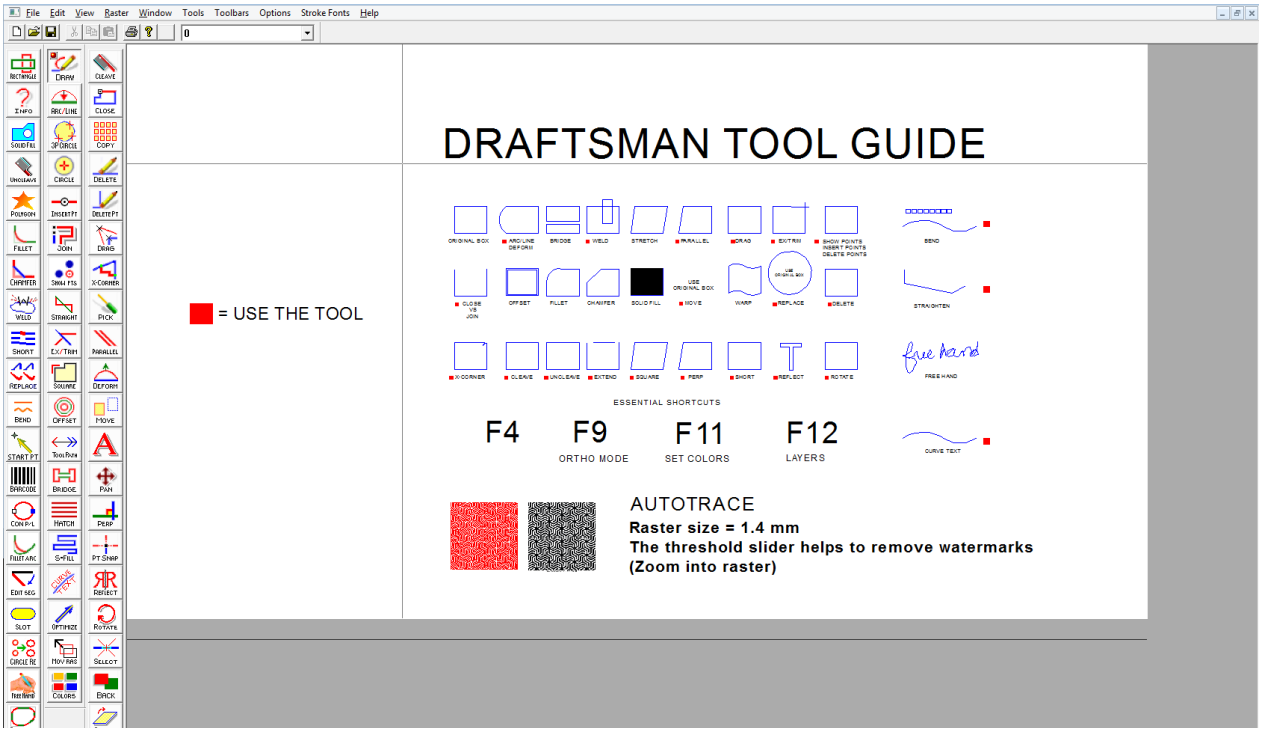


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# TOOLS GUIDE

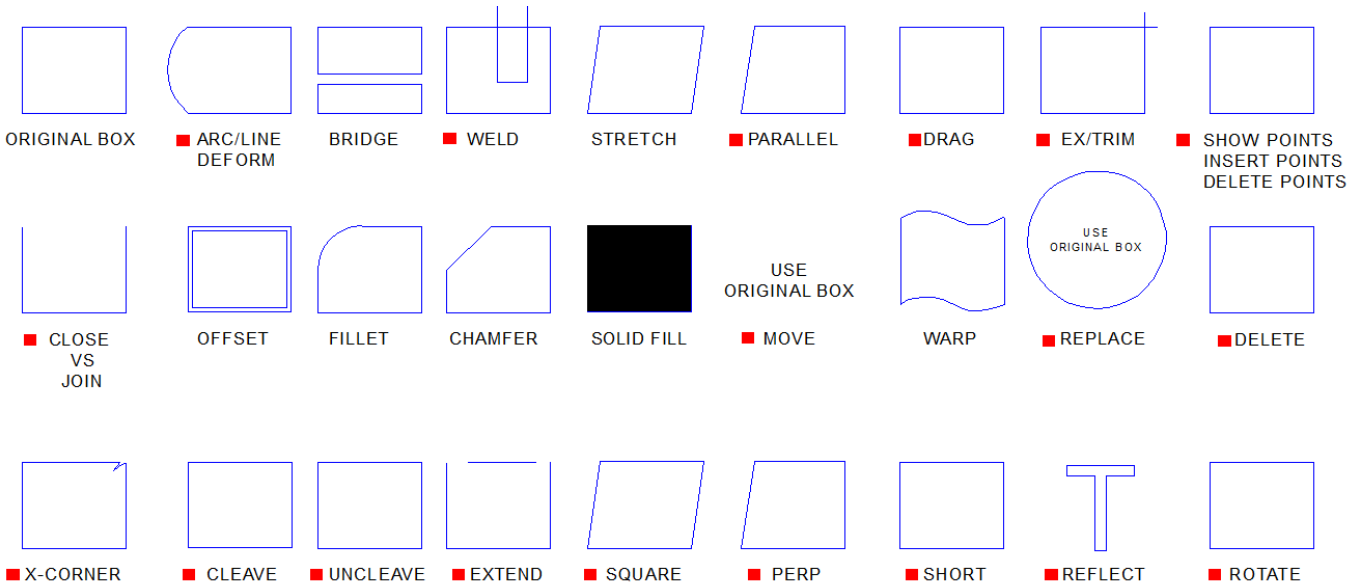
Draftsman Tools: Guide to utilizing vector tools to create and modify custom Vectors

Every LaserStar Technologies StarFX Premier system will come equipped with the Draftsman: Cutting Shop application. This program will allow optimal vectorization and modification that is built to work with machining equipment. The following presentation will go over each tool and provide a detailed explanation of how each tool performs.




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# TOOLS GUIDE




The operator will notice the program has a series of boxes with a name under it. This defines the tool that was either used, or needs to be used to have an affect on the square that shows the tools function. If there is a red ■ next to the name, the tool needs to be used on the square to show the effect. If it does not contain the red ■ the tools has been used and is available for visual inspection.



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# TOOLS GUIDE





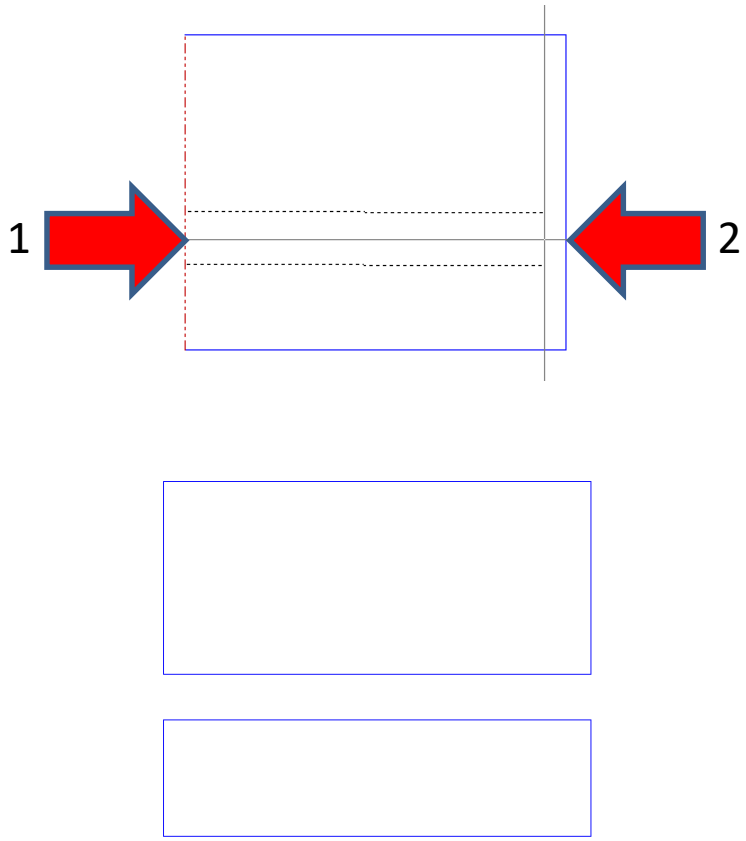

## ARC/LINE DEFORM

The ARC/LINE AND DEFORM tool uses 2 tools
ARC/LINE Tool: Creates a straight line between 2 points that contain an arc
DEFORM Tool: Creates an arc between any 2 points

HOW TO USE: The curved line on the left has the DEFORM tool in use. Select the ARC/LINE tool and select any point on the curved line and it will straighten the arc reverting it back to the original square. Select and use the deform tool by single clicking any place on the line and moving the mouse to the desired arch.

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# BRIDGE

BRIDGE Tool: Selecting two different lines within one object will create a bridge that separates the single object into two objects.

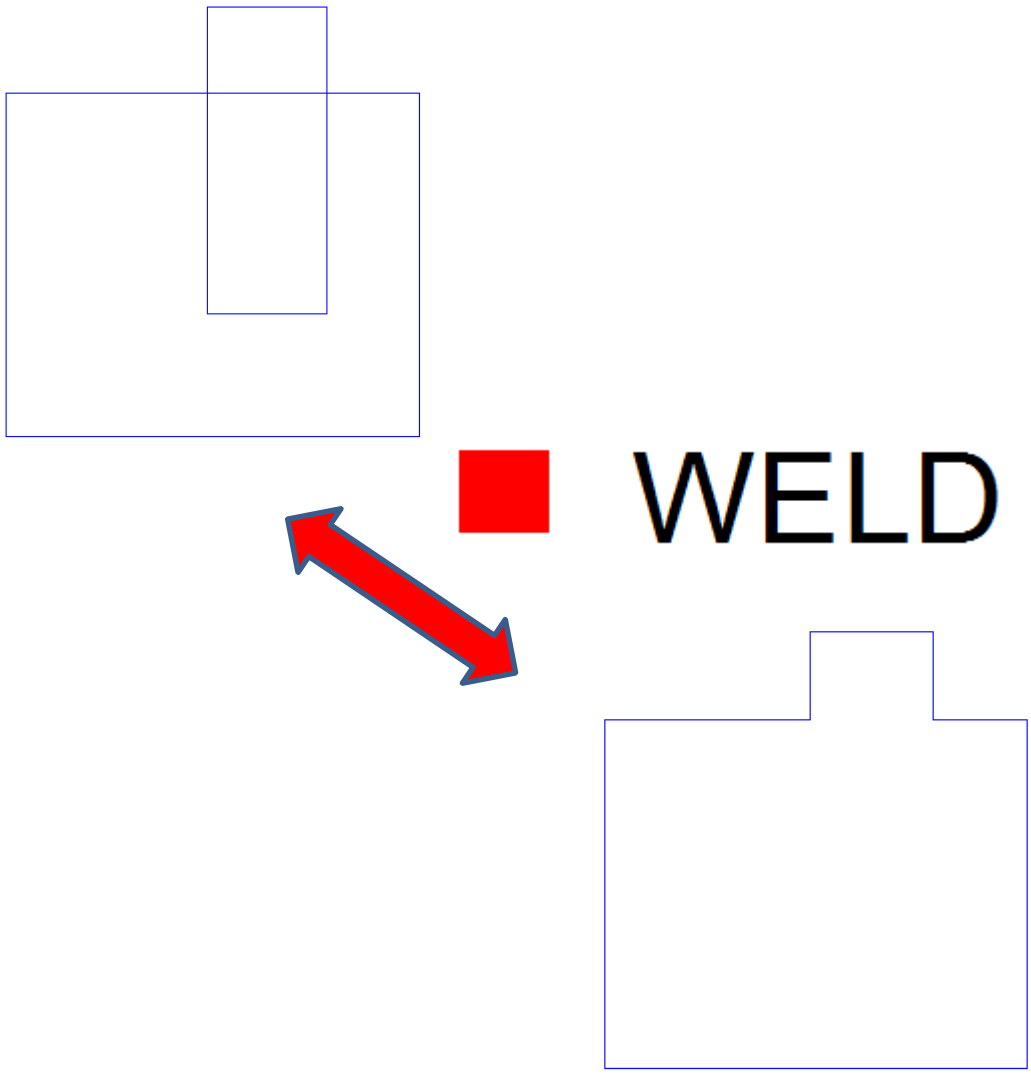
HOW TO USE: Select the BRIDGE tool and left click one side of the square. A dotted line will show the bridge path and size. Drag the mouse to the opposing side of the closed object and left click the desired location. To adjust the bridge width double click with the left mouse and enter the desired value.



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# TOOLS GUIDE



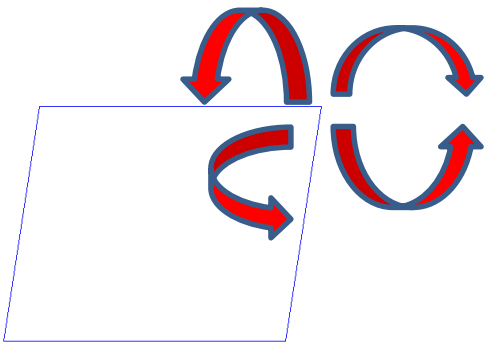




WELD Tool: Selected overlapping objects (that are closed) will be merged at the outer intersecting lines and create a new perimeter.

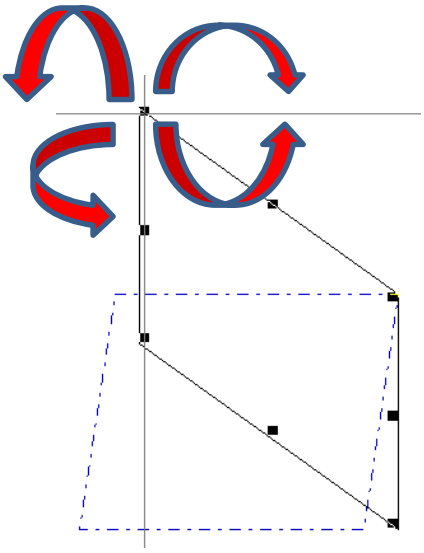
HOW TO USE: After selecting the WELD tool, left click toward the outside of the two objects. A selection window will allow the operator to group select both objects. Once the objects are selected, left click the screen and a status bar will display the progress of the weld.

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STRETCH

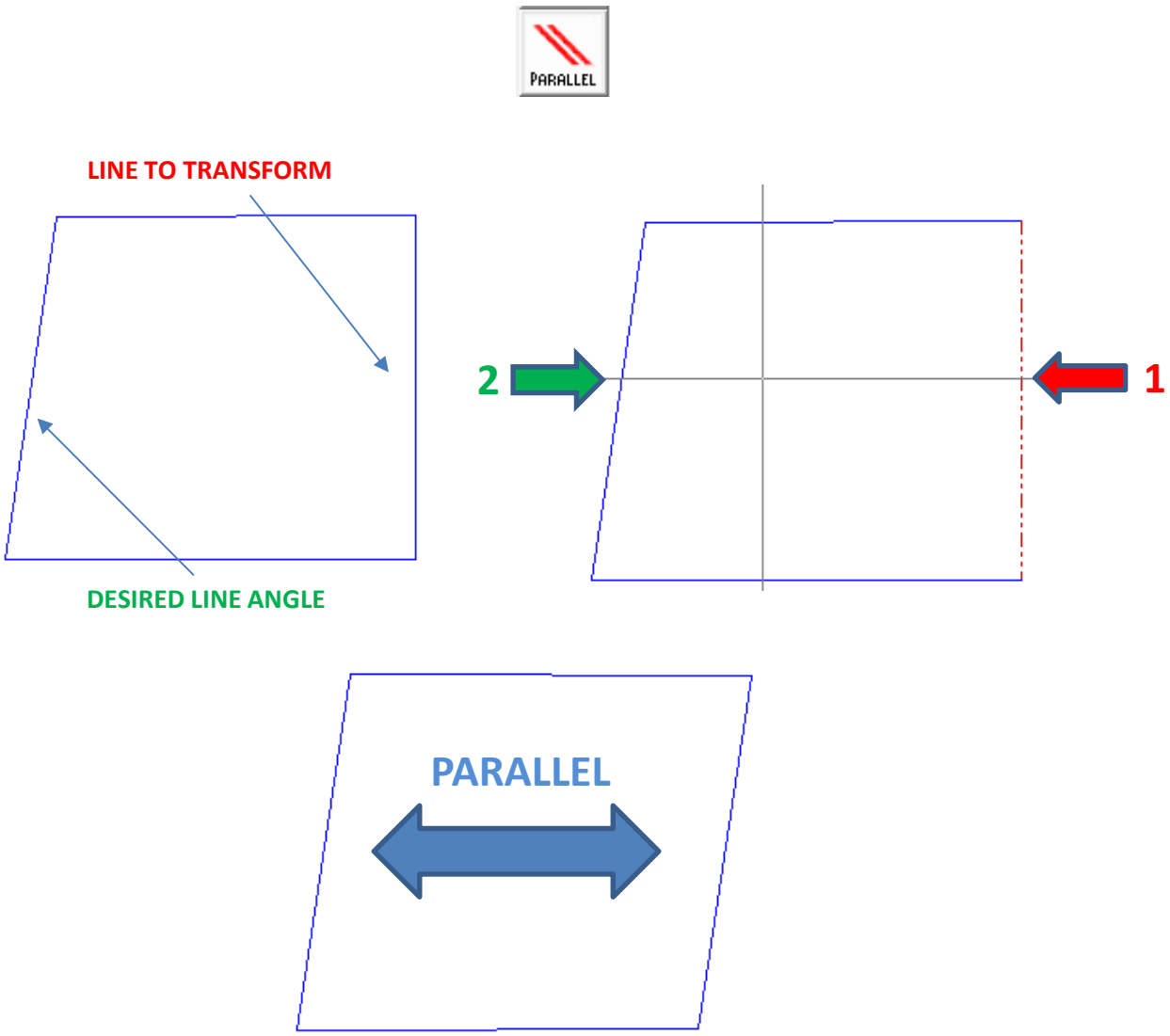


STRETCH Tool: The STRETCH tool allows the operator to morph the shape of an object without maintaining the aspect ratio, size, or squareness while maintaining the position. HOW TO USE: After selecting the STRETCH tool the operator can left click any point/ corner of the object and a black box with 8 smaller black ■ will outline the shape. Select the desired square and the shape will be free formed based off of the movement of the mouse. Once the shape is properly formed the operator can left click the screen a second time and the object will be transformed.



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# TOOLS GUIDE

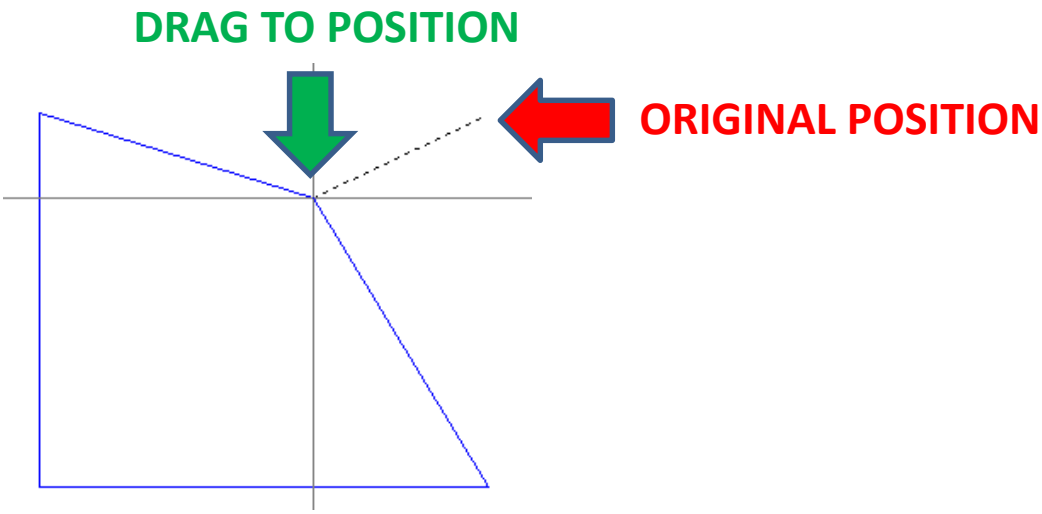



PARALLEL Tool: The PARALLEL tool transforms any straight line to match the angle of another.
HOW TO USE: After selecting the PARALLEL tool the operator will select the line they wish to transform first. Once selected the line will change to a dotted red line. The next step will be to select the line that has the desired angle. The first selected line will change to match the angle of the second selected line.

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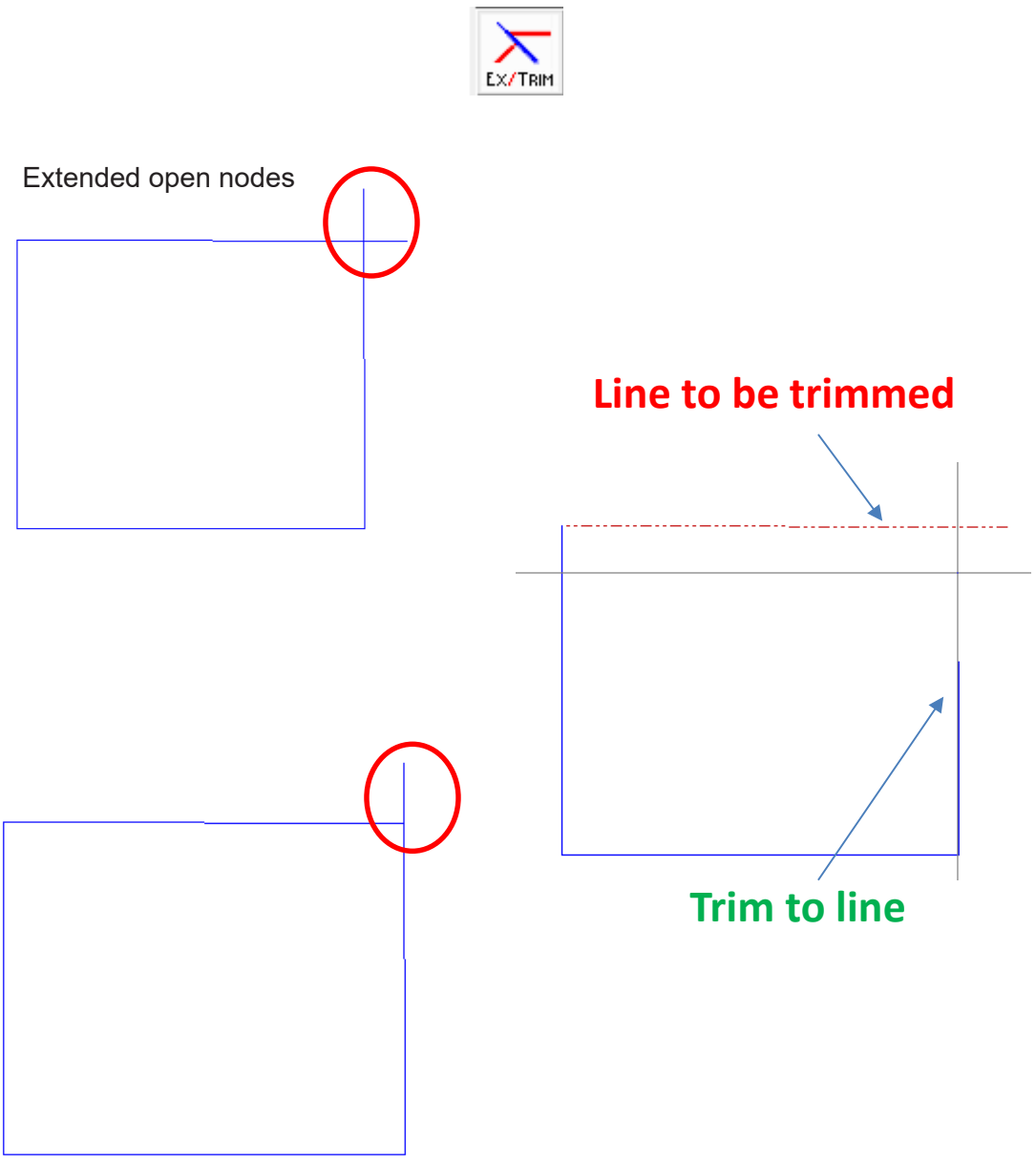

DRAG Tool: The DRAG tool will move a single point while keeping all intersecting lines connected.

HOW TO USE: After selecting the DRAG tool the operator will identify the desired point within the square. Left click the mouse near the point and the node will become a selected movable node. The operator can choose a different location and all connecting lines will adjust to the nodes new location. While selected, the tool will show the nodes original position to compare to the new “drag to” position.



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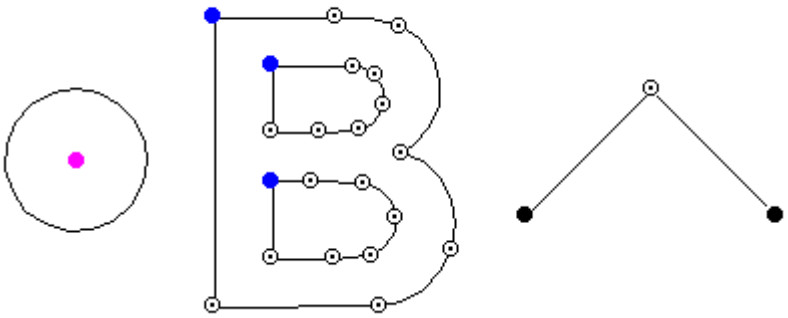
# TOOLS GUIDE




EX/TRIM Tool: The EX/TRIM tool will take any extended line segment and trim it to the select intersecting line.
HOW TO USE: The operator will need to first select the line to be trimmed. Once selected, the entire line will change to a red dotted line. The operator will then select the trim to line where the two lines intersect and the red dotted line will transform to the intersection point.

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SHOW POINTS Tool: The SHOW POINTS tool will allow the operator to see all represented nodes within a vector file.
HOW TO USE: After selecting the SHOW POINTS tool, group select the desired object to view the objects individual nodes and their current status.

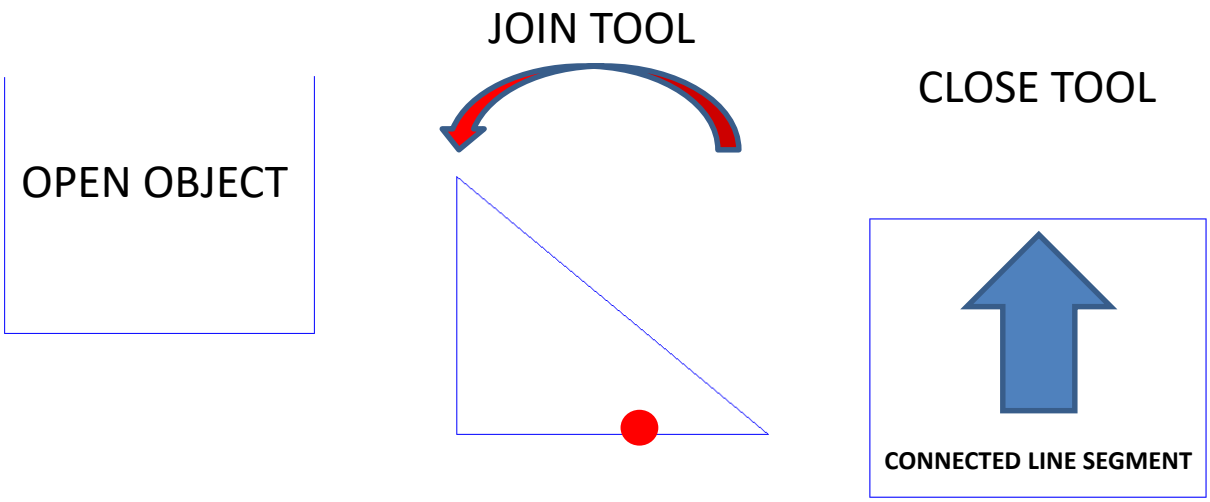
● = Center point of a circle
◉ = Connected node
● = Start and End connected node
● = Unclosed node



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# TOOLS GUIDE



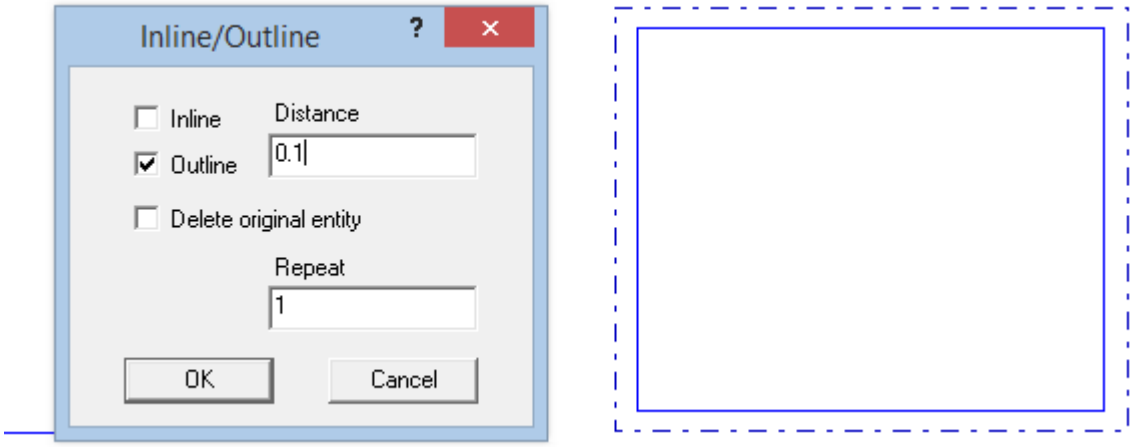




JOIN Tool: The JOIN tool moves the end node to the start node and closes the object.
CLOSE Tool: The CLOSE tool will create a line segment that stretches from the open start point to the end point.
HOW TO USE:
JOIN: The operator will select the open object it wishes to join. Once selected, the node that will be moving will be displayed with a solid red ●. The operator will select the next open node it wants to join to and the connecting line segment will move from the original position to the newly selected nodes position.
NOTE: Multiple open objects can be joined to create a larger closed object.
CLOSE: The operator will select the desired open object and a line segment will stretch from one nodes location to the others creating a closed object.

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# TOOLS GUIDE



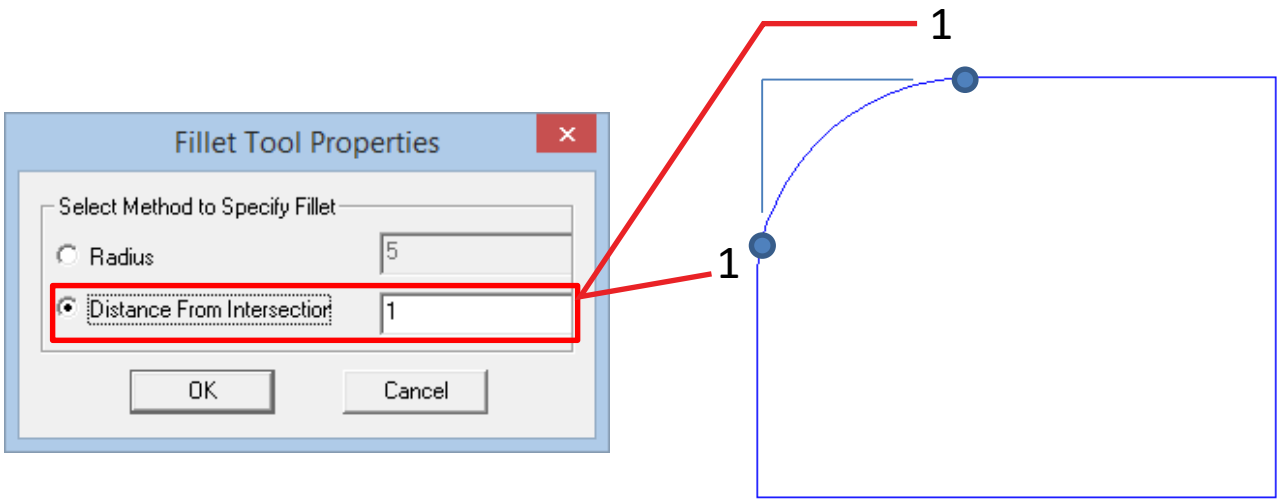

OFFSET Tool: The OFFSET tool will create a node to node trace of an object based off of the defined input for distance.
HOW TO USE: Once the OFFSET tool is selected the operator will left click any closed object and a new menu will be available labeled as INLINE/OUTLINE.

INLINE: Traces the inline
OUTLINE: Traces the outline
DELETE ORIGINAL ENTITY: Will trace the inline or outline and delete the original path
DISTANCE: The unit of measurement that defines the offset for the node to node trace
REPEAT: The amount of times the object will be outlined or inlined


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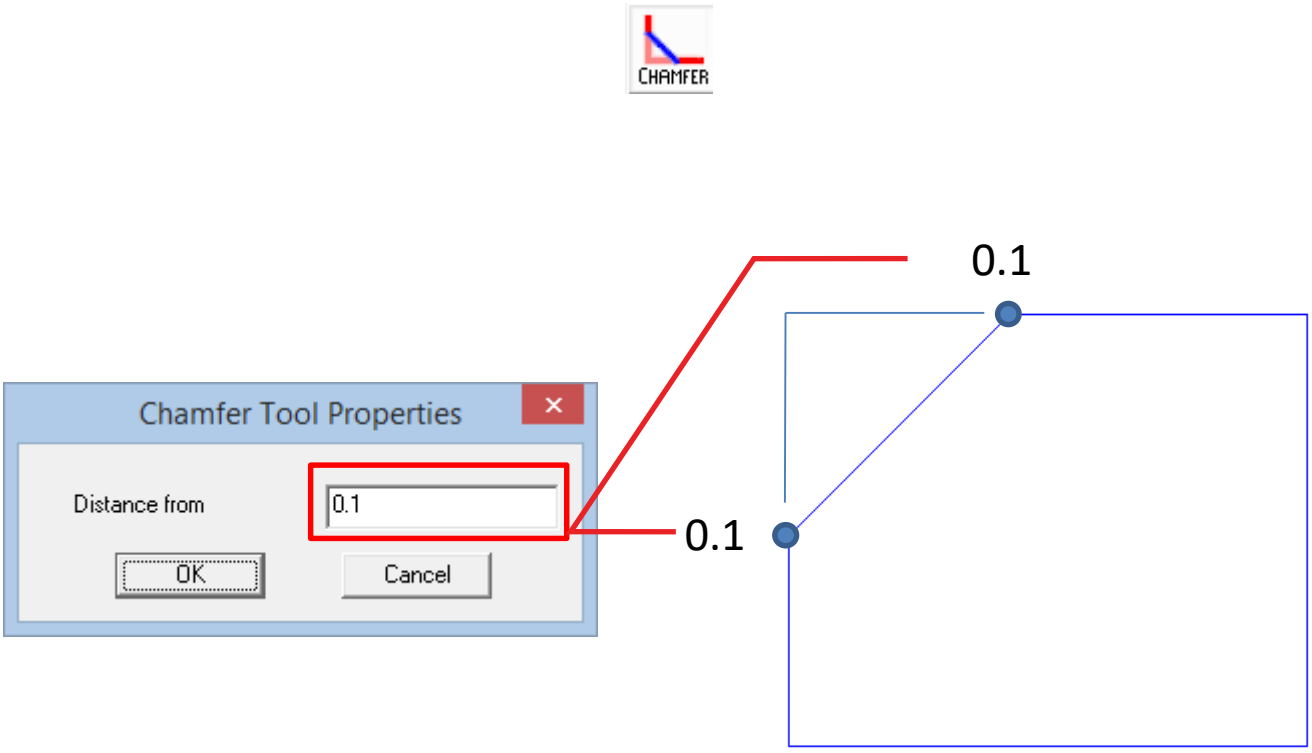
# TOOLS GUIDE




FILLET Tool: The FILLET tool will create a curved radius between two intersecting points. They can be defined by radius or distance from intersection.
HOW TO USE: Once the FILLET tool is selected the operator can define two intersecting lines. Once defined, a new menu will appear labeled FILLET TOOL PROPERTIES that will allow the operator to determine the radius and distance away from the intersecting point.

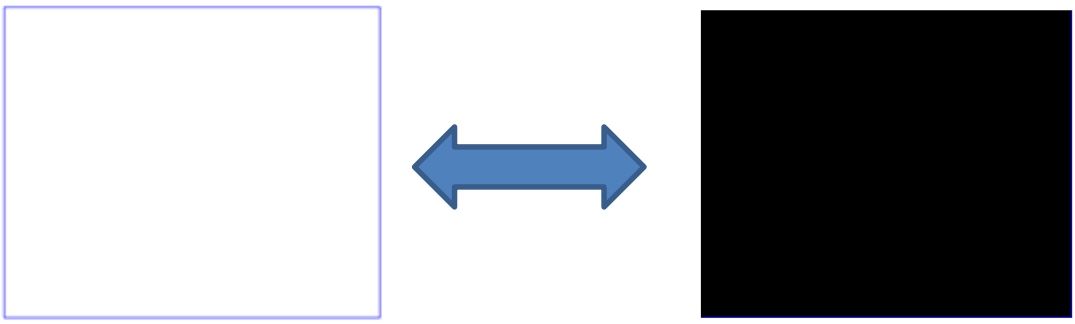
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CHAMFER Tool: The CHAMFER tool will create a straight line between two intersecting points. They can be defined by the distance from intersection.
HOW TO USE: Once the CHAMFER tool is selected the operator can define two intersecting lines. Once defined, a new menu will appear labeled CHAMFER TOOL PROPERTIES that will allow the operator to determine the distance away from the intersecting point.


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# TOOLS GUIDE

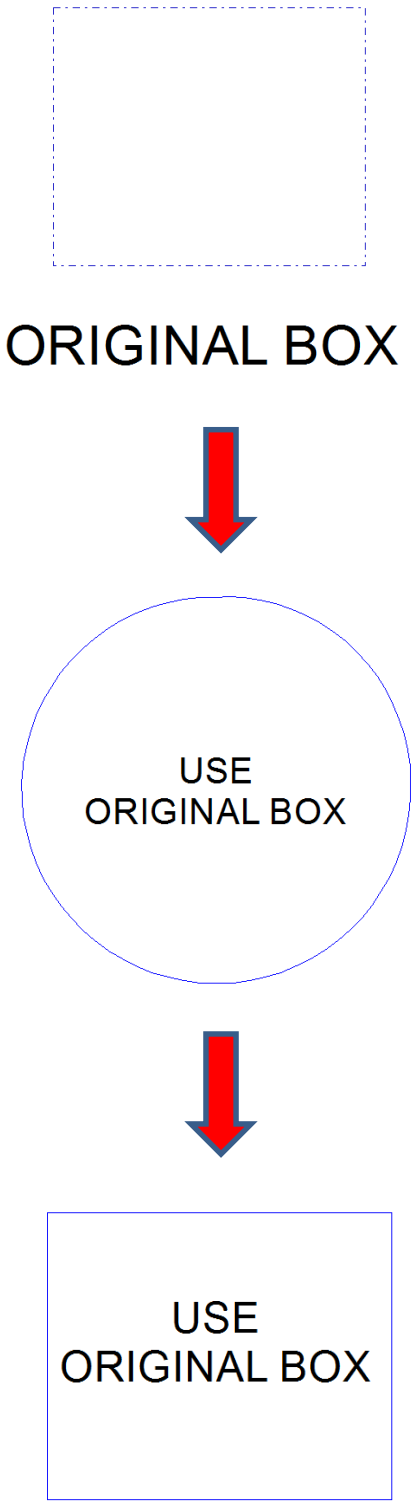


SOLID FILL Tool: The SOLID FILL tool will fill a closed object with a solid color fill.
HOW TO USE: Once the SOLID FILL tool is selected the operator can define a group of closed objects with a solid color fill. Double clicking the design screen will bring up a second menu that allows the operator to define the fill color.

NOTE: This is useful for understanding fill colors versus material colors and the need to invert fill to make an image look correct.
Example: After making a design, change the background color to black and the fill color to white to represent marking on anodized aluminum.

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REPLACE Tool: The REPLACE tool will replace multiple selected objects with a single selected object or vice versa.

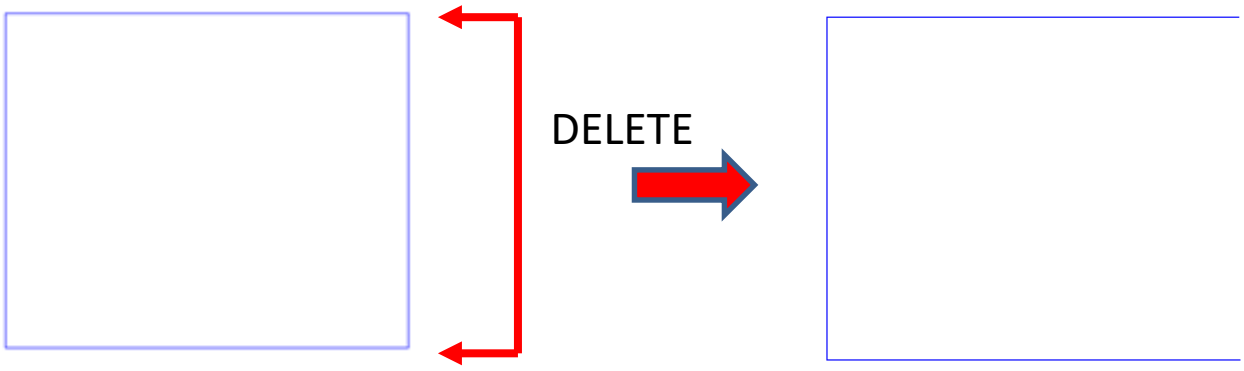
HOW TO USE: Once the REPLACE tool is selected the operator can select single or multiple objects. The selected objects will be the objects used for the replacement. The original box was selected first, the circle was selected second, and the original square replaced the position of the circle.



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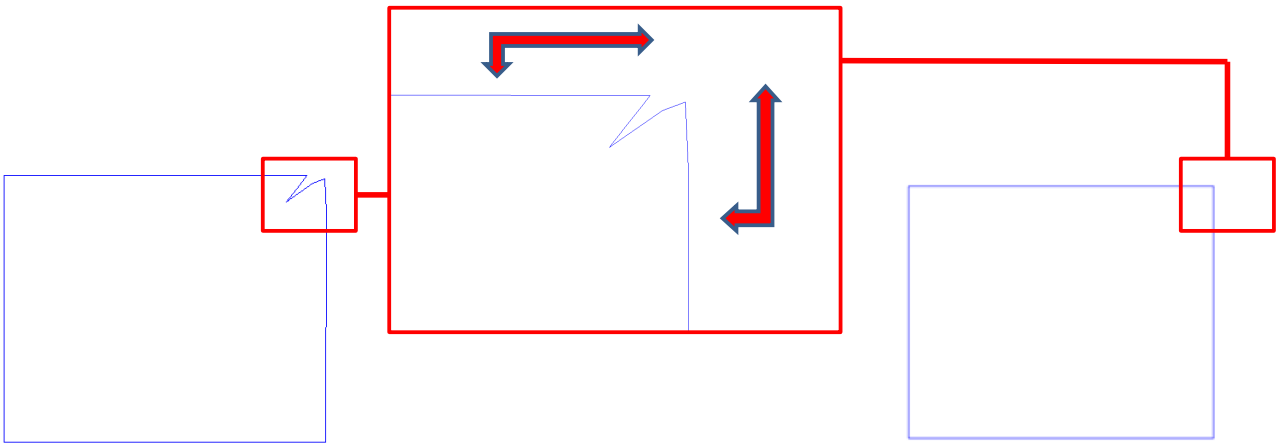
# TOOLS GUIDE




DELETE Tool: The DELETE tool will delete the line segment between two nodes.
HOW TO USE: Once the DELETE tool is selected the operator can select a line segment. The line segment will be removed leaving the two nodes separated and in their original positions.

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X CORNER Tool: The X CORNER tool will extend two selected lines and create a connection where they intersect. All internal nodes (between the two selected segments) will be deleted.
HOW TO USE: Once the X CORNER tool is selected the operator can select line segments that will eventually connect. The lines have to be able to eventually intersect to function correctly.



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# TOOLS GUIDE






DISPLAYING THE AFFECTED NODES



DISPLAYING THE UNCLOSED NODES

CLEAVE Tool: The CLEAVE tool will separate all selected nodes.
HOW TO USE: Once the CLEAVE tool is selected, the operator can select a group of nodes and simultaneously separate them. Each cleaved node will be outlined with a solid red ●. Once unselected the cleaved nodes will convert to a solid black ●. Which represents an unclosed node. Cleaved or separated nodes will not be fillable.

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DISPLAYING THE UNCLOSED NODES



DISPLAYING THE CLOSED NODES

UNCLEAVE Tool: The UNCLEAVE tool will connect any unclosed nodes that are selected.

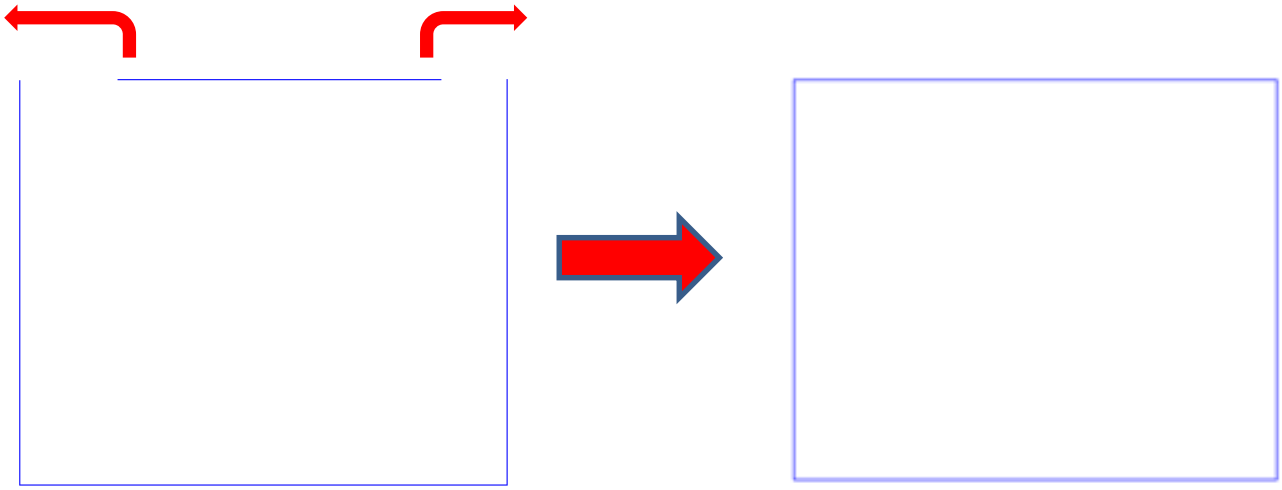
HOW TO USE: Once the UNCLEAVE tool is selected the operator can select a group of nodes and simultaneously connect them. Once the selected unclosed nodes are UNCLEAVED, the operator can confirm the object is completely closed by the solid blue ● that indicates the start and stop position of a fully closed object.



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# TOOLS GUIDE

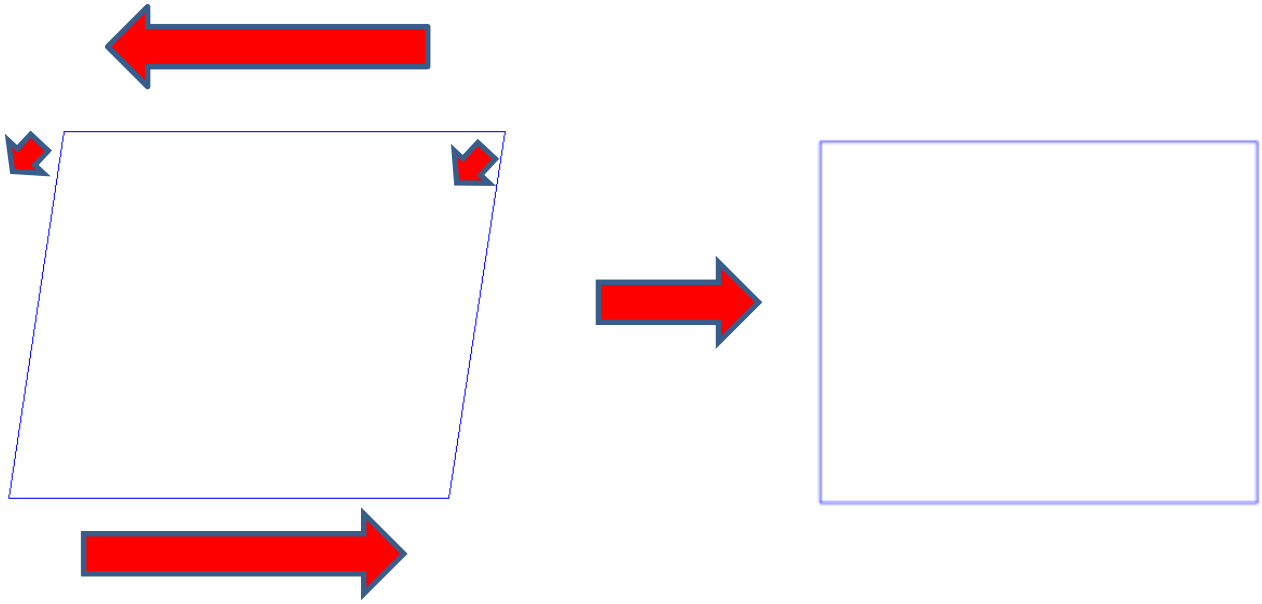


EXTEND Tool: The EXTEND tool will extend a line segment to an open intersecting line segment.
HOW TO USE: Once the EXTEND tool is selected the operator can left click the desired line segment. Once selected, the entire line will change to a red dotted line. By selecting the secondary, or adjacent line segment, the primary line will extend to the secondary node.

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SQUARE Tool: The SQUARE tool will attempt to “angle-up” angles to become 90 degrees

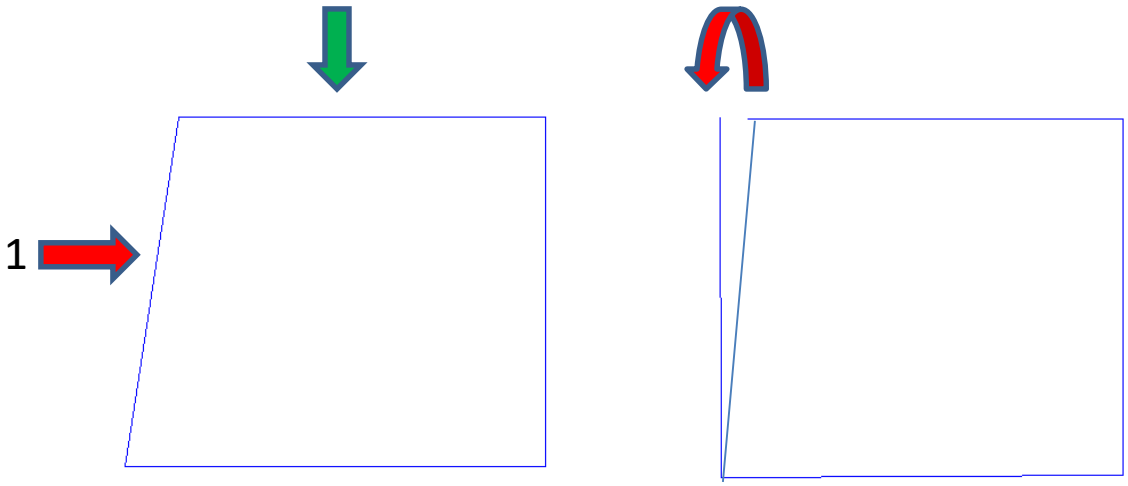
HOW TO USE: Once the SQUARE tool is selected the operator can group select the desired object. Once selected, all angles will attempt to become “more” square. Some joining or reclosing may be required



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# TOOLS GUIDE



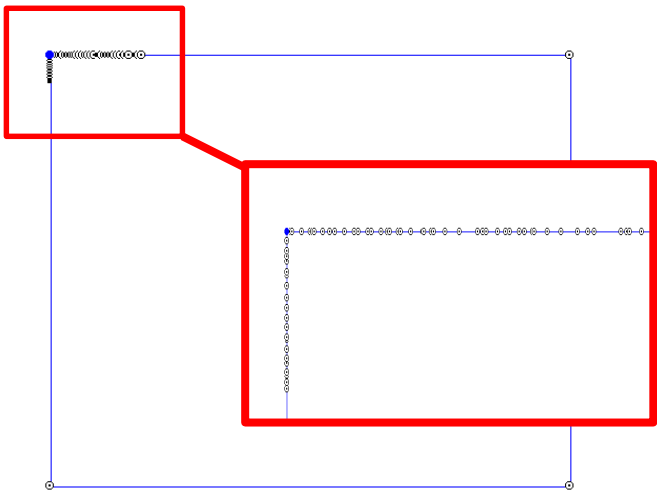




PERP Tool: The PERP tool will make any desired line perpendicular to a secondary line.
HOW TO USE: Once the PERP tool is selected the operator can choose a primary line by left clicking the line segment. A secondary line can be selected and the primary line will become perpendicular to the secondary. Other attached nodes may change position and some joining or reclosing may be required

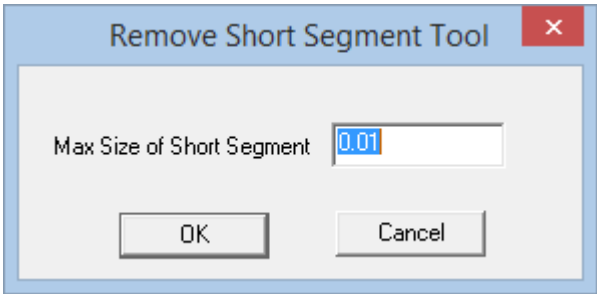
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# TOOLS GUIDE

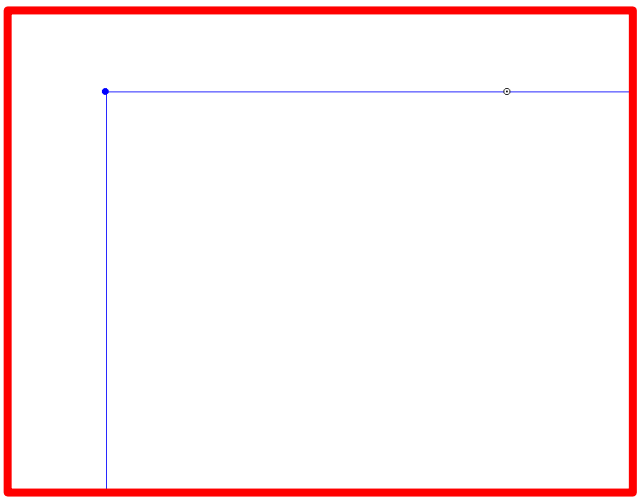








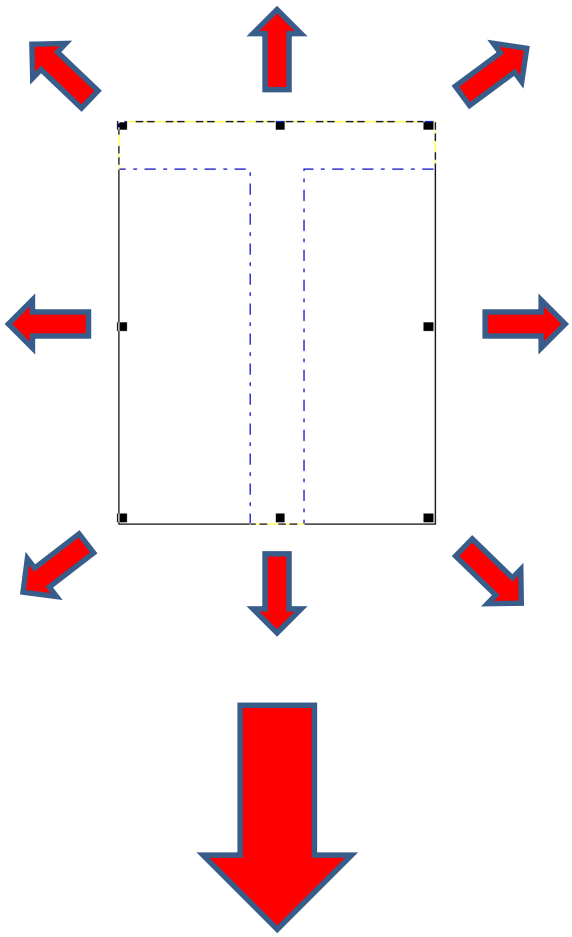
SHORTEN Tool: The SHORTEN tool will remove all nodes within an object as defined by the max value listed in the REMOVE SHORT SEGMENT MENU.

HOW TO USE: Use the SHOW POINTS tool to visually inspect an objects node count. Next, select the SHORTEN tool and double click the design screen. A new menu will allow the operator to define the maximum size between nodes. Once the value is outlined, group select an object and all node points that contain a connecting line segment smaller than the input value will be removed.



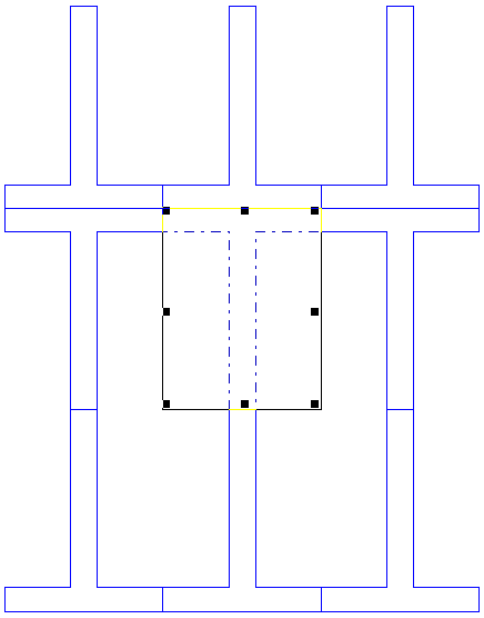
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# TOOLS GUIDE



REFLECT Tool: The REFLECT tool will create a reflected copy of a selected object.

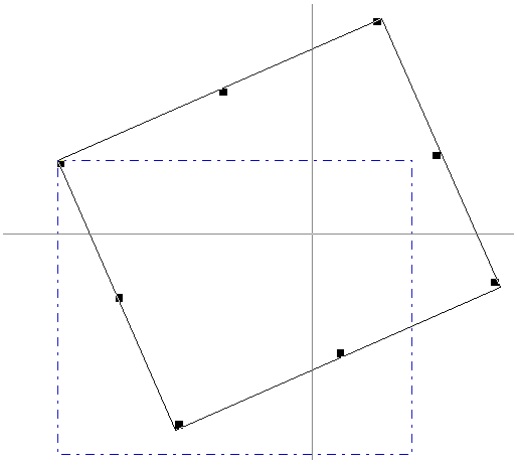
HOW TO USE: Once the REFLECT tool is selected the operator can group select any objects. The selected group will be defined by a blue dotted line and a perimeter box containing 8 solid black ■. The operator can create a reflected copy based off of the selected black ■.



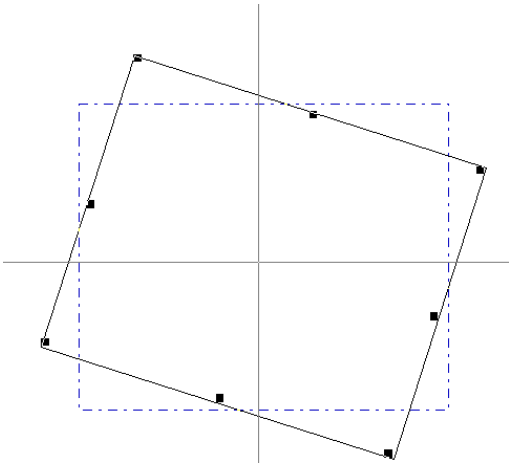
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# TOOLS GUIDE

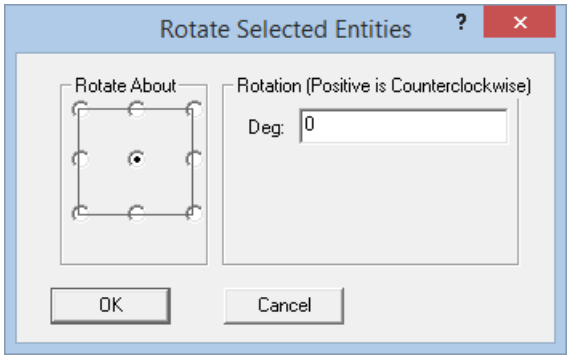


CORNER SELECTION



CENTER SELECTION




USER DEFINED

ROTATE Tool: The ROTATE tool will allow the operator to rotate a selected object.
HOW TO USE: Once the ROTATE tool is selected the operator can group select any object and perform 3 different types of rotations.
CORNER SELECTION: Rotates based off of opposing ■.
CENTER SELECTION: Rotates based off of the center point of the selected object.
USER DEFINED: User defines reference point, rotational direction, and degrees.

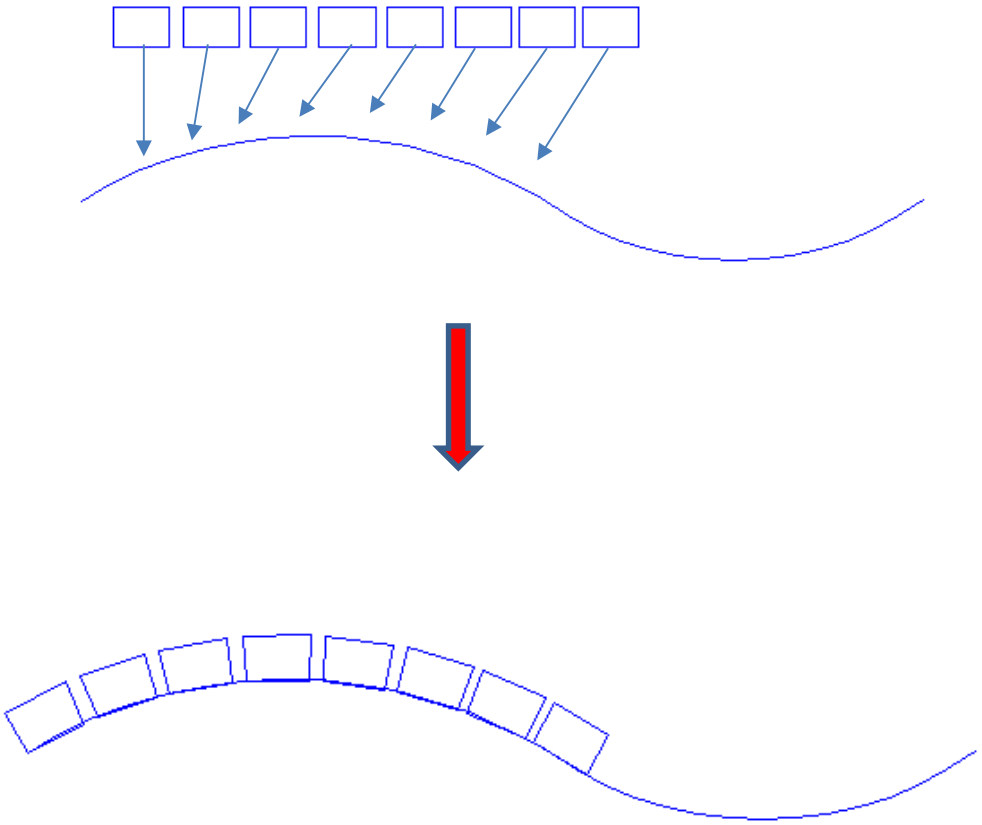


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# TOOLS GUIDE



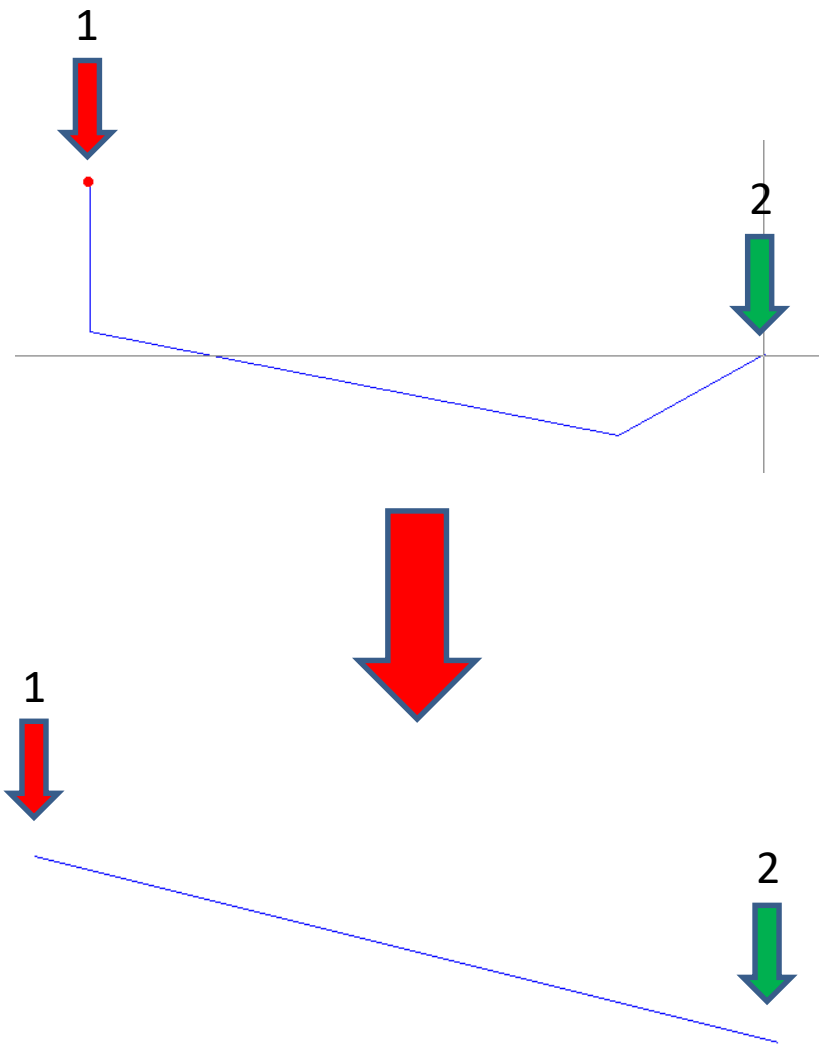
Bend



BEND Tool: The BEND tool will move a group of selected objects and place them along the contour of another.
HOW TO USE: Once the BEND tool is selected the operator can group select a series of objects and reassign their individual positions to follow the contour of a separate line segment.

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STRAIGHTEN Tool: The STRAIGHTEN tool will remove all nodes between 2 selected nodes, creating a straight line

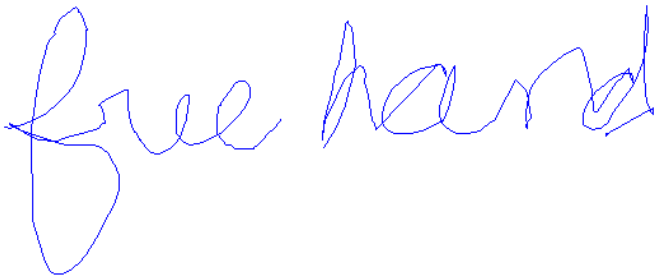
HOW TO USE: Once the STRAIGHTEN tool is selected the operator can select the first defining node that will be used. After selected, the node will be visible with a solid red ●. The operator can select the second node point and all nodes between them will be removed and replaced with a straight line segment.



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# TOOLS GUIDE



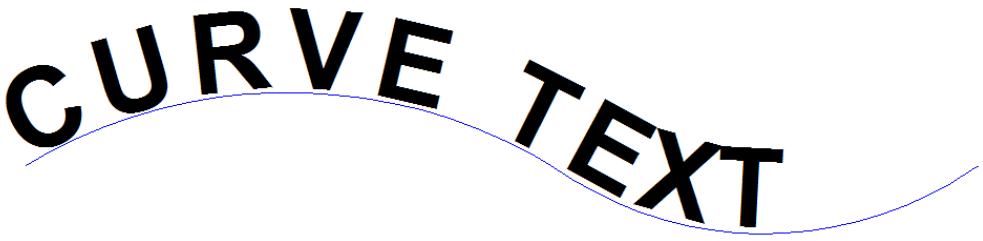



FREEHAND Tool: The FREEHAND tool will allow the operator to draw vector lines without the restriction of having to draw in straight lines, or arcs, as with the Draw tool.

HOW TO USE: Once the FREEHAND tool is selected the operator can freely draw by left clicking to begin drawing a connected line segment and right clicking to end the line segment. This can be very useful for signatures as it works with a touchscreen and can produce a handwritten signature that can be used for deep engraving with the wobble command.

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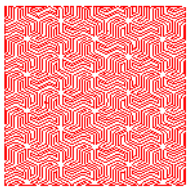

CURVETEXT Tool: The CURVETEXT tool will allow the operator to create text along the contour of another object.

HOW TO USE: Once the CURVETEXT tool is selected the operator can left click the object contour they want the text to follow. Once selected, the operator can define all standard font features such as size, font type, referencing point, and character spacing.



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# AUTO TRACE





AUTOTRACE

**Raster size = 1.4 mm**

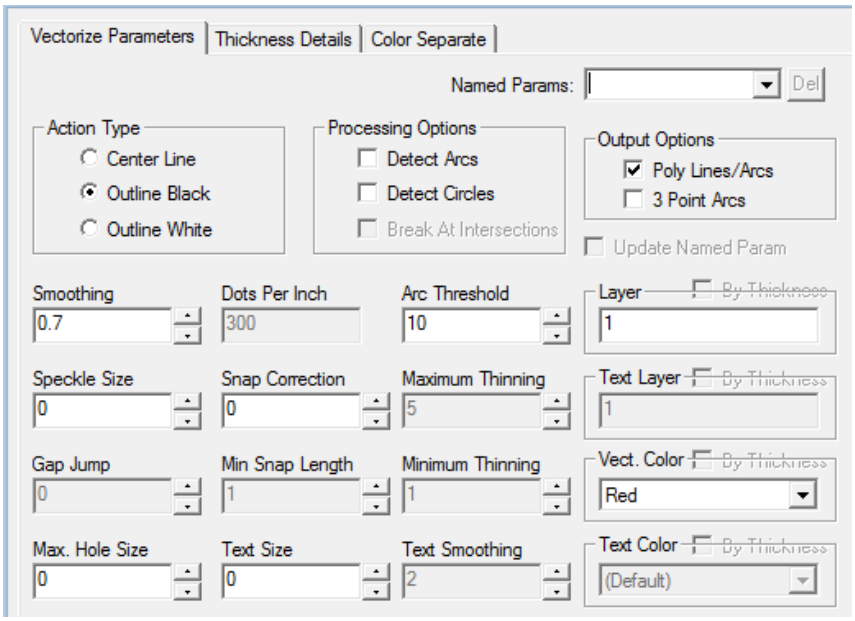
**The threshold slider helps to remove watermarks**

**(Zoom into raster)**

Within the VECTORIZE PARTAMETERS the pixel pitch and resolution will be determined by these base settings. They are a starting point to utilize the software to achieve a smooth trace. The raster that is part of the program is 1.4 mm in size and contains a watermark.

The program's autotrace feature is able to create a detailed relatively smooth vector.

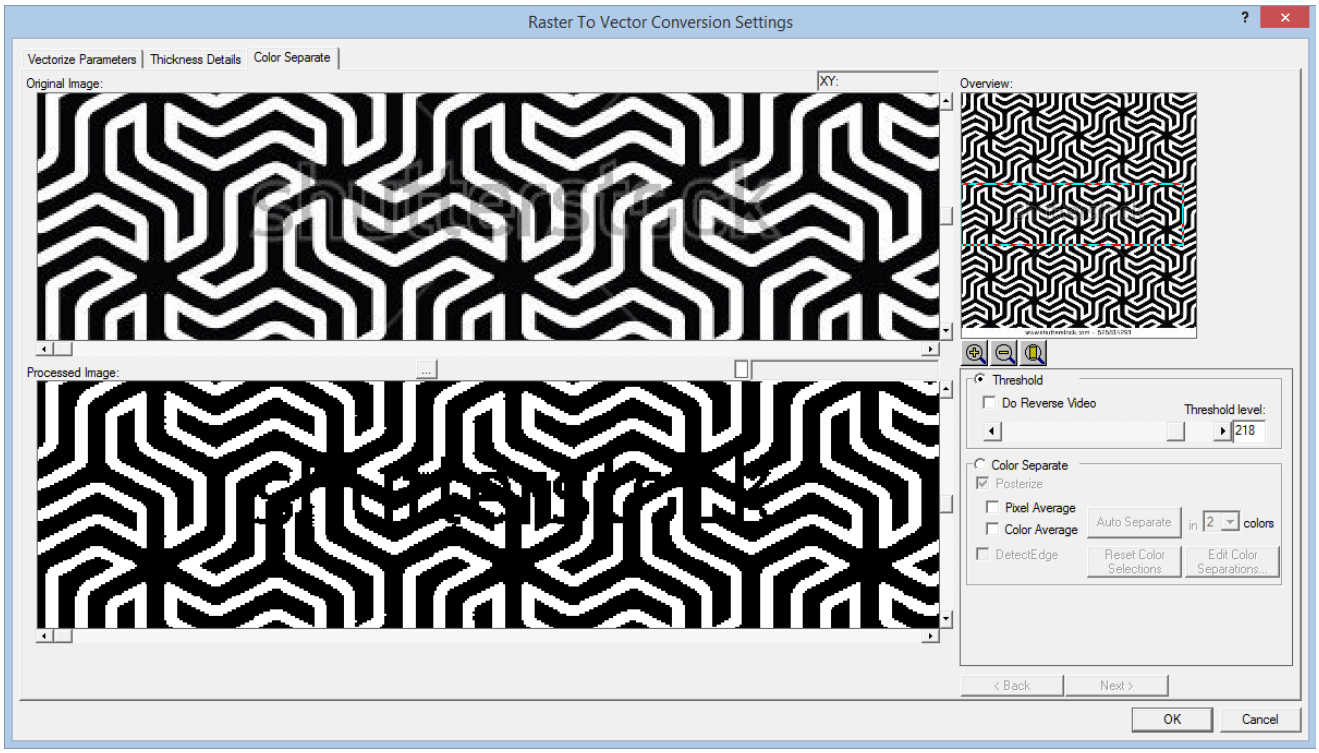
AUTOTRACE SETTINGS




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# AUTO TRACE

## COLOR SEPARATE




The THRESHOLD SLIDER will allow the operator to fine tune the pixel outline. Adjusting this parameter can remove unwanted speckles and watermarks.

Within this menu the operator can also define the image into autotraced multilayers by using the **COLOR SEPARATE** feature and defining the color amount it wants to separate by.

If the image is defined by 4 different colors, the autorace will create 4 different layers and trace the defined colors.



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LASERSTAR®
LEARNING CENTER

# FiberCube® 3801 Series Marking Systems
# Quick Setup Guide




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Phone: 407-248-1142 • Email: Service@LaserStar.net

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**FiberCube® 3801 Series: LM1A, LM1 & LM2 – Quick Setup Guide, Rev. D_01-19-21** **PN 58–9990–558–381**

# FIBERCUBE® 3801 SERIES MARKING SYSTEMS
# QUICK SETUP GUIDE INSTRUCTIONS

**ITEMS NEEDED:** Phillips Head Screwdriver or Power Drill with Phillips Head Drill Bit, 6mm Allen Bit & 7/16" Socket Bit, 5mm & 6mm Allen Wrench, Scissors or Snips, Box Cutter or Knife, Step Ladder

## INSPECTION

1. Before opening the shipping container, be sure to inspect the outside of the crate for apparent damage that may have occurred in transit. If you discover damage, immediately contact LaserStar's Service Department.

2. Identify the TIP-N-TELL indicator (located on the outside of the shipping crate). Check to see whether blue beads are present in the top portion of the arrow on the TIP-N-TELL. If you notice blue beads in this area, immediately contact LaserStar's Service Department.




**No blue beads present:**
**(no tipping of crate)**




**Blue beads present:**
**(crate has been tipped)**

3. Identify the SHOCKWATCH warning sticker (located on the outside of the shipping crate). Check to see whether the center tube of the SHOCKWATCH warning is red. If the center tube is red, immediately contact LaserStar's Service Department.




**Tube is not red:**
**(no shock warning)**



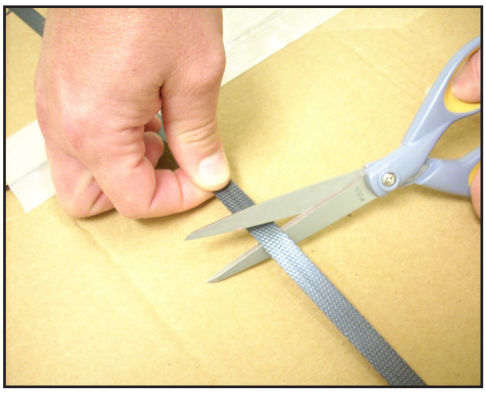

**Tube is red:**
**(shock warning)**

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## UNPACKING

**4.** With scissors, snips, or a knife, cut the banding straps on the outside of the shipping container.



**5.** Using a step ladder, carefully remove the top cover from the crate.

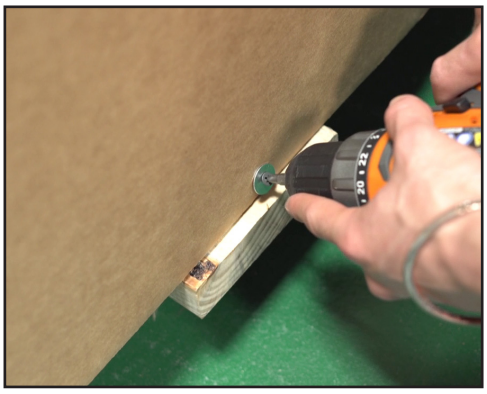



**6.** Carefully remove the foam insert from the top of the laser system.



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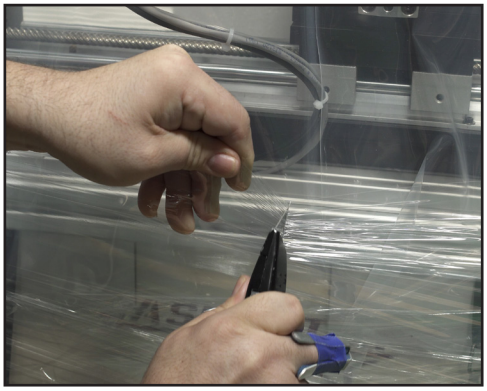
**7.** Remove the screws from the bottom of the skid. **(Note: A power drill with a Phillips head drill bit is helpful.)**



**8.** Two people may then lift and remove the tri-wall corrugated cover. **(Note: Do not discard the cover, packaging, or bracing anchors; these materials can be re-used to ship your laser marker if service is required in the future.)**



**9.** With scissors or a knife, gently cut any shrink wrap that is affixed to the plastic cover; remove the cover from the machine. **(Note: Be sure to save the plastic cover to protect the equipment from dust when it's not in use.)** Gently remove any remaining shrink wrap. **(Note: Be careful not to cut or damage the laser.)**





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**10.** There are four brackets that secure the laser to the skid base. Using a 7/16" nut driver, remove the bracket bolts from the skid. Use a 6mm Allen wrench to remove the bracket bolts from the laser stand. **(Note: A power drill with the appropriate bit is helpful.)**





**11.** Remove the bracing anchors from under the laser. The breaks for the machine will be in the (ON) position. Move the break lever on both breaks to the (OFF) position.



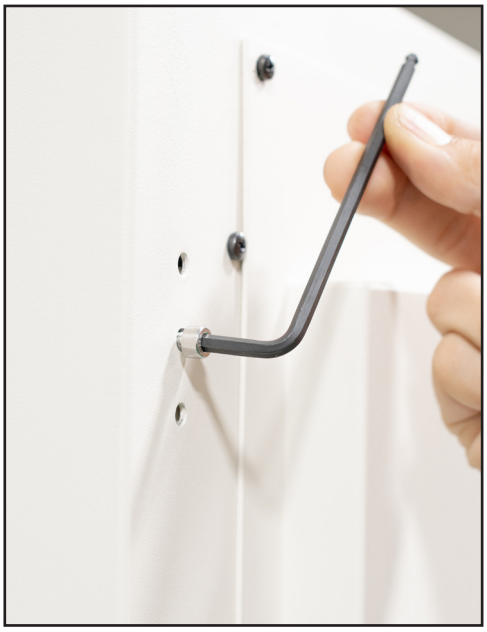


**12.** With two people, you can now move the laser off the skid base, gently lowering the wheels onto the floor. Wheel the laser to the desired location and reset the breaks.



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**13.** Before opening the front door of the laser, remove the two (2) counterweight stabilizer M-5 screws.



## ASSEMBLY

**14.** Locate the shelf, which is secured in bubble wrap; the shelf is set to mount to the right side of the laser stand. **(Note: This is reversible; you can choose instead to mount the shelf to the left side; simply remove the screws that secure the aluminum bar to the shelf and mount the bar on the opposite side.)**



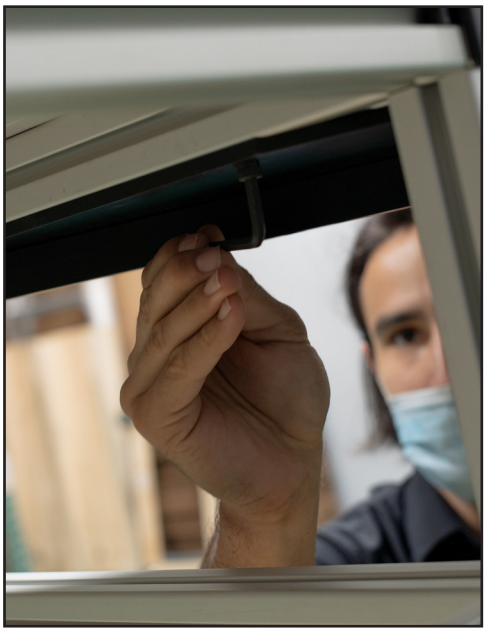

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**15.** Secured in plastic on the right side of the laser stand are two (2) 5mm Allen screws; remove these screws. These will be the mounting screws for the black shelf. You will notice that the rear screw is longer than the front one.



**16.** Place the shorter screw through the front of the shelf and into the nut on the underside of the aluminum stand. Place the long screw into the hole on the back. Tighten both screws with a 5mm Allen wrench.





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## SETUP

**17.** Locate and open the box labeled "accessory kit" and retrieve the following items: keys, remote interlock, power cable, USB hub, and USB cables.






### STOP!

**If you have a 3801 Series Marking System (model LM1A), continue with setup.**

**If you have a 3801 Series Marking System (models LM1 & LM2), skip to step #20.**

**18.** Remove the rear panel from the machine and check the connections; ensure that the power cable, USB, and Axis 2 are plugged in and properly seated. Turn the key switch to the (ON) position.















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**19.** Locate the pendant and place it on the shelf. Locate the small key for the pendant and insert it into the pendant **(model LM1A)**.




**20.** Remove the laptop from the box, place it on the shelf, and plug in the power cable.





**21.** On the rear of the laser housing, locate "Axis 3" and make sure the z-axis is plugged into the port. Plug the USB cables into the "USB LASER" port and "USB DIAG" port (rear of the laser housing). If you purchased a rotary device for your machine, plug the power cable into "Axis 1". **(Note: Make sure the machine is not plugged into power or turned on before plugging in these cables; plugging the cables in while the equipment is hot will result in damage to the motor!)** **(models LM1 & LM2 only)**






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**22.** Retrieve the USB docking station from the accessory kit and plug in the power cable. Plug the two USB cables (located on the rear of the laser) into the USB docking station.






**23.** Plug the mini USB cable (supplied with the hub) into the USB hub. Plug the other end of the cable into a USB port on the computer.



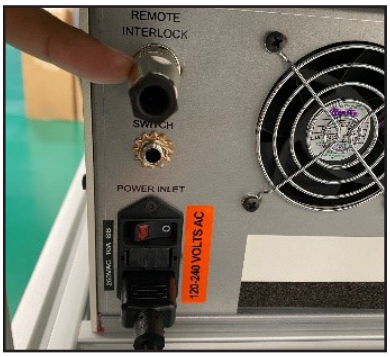
**24.** Insert the key into the front of the laser and the remote interlock and power cable into the rear. **(Note: Reference the photos below for your respective model: LM1A (blue), LM1 & LM2 (green)**




**A:**
**(reference for model LM1A)**

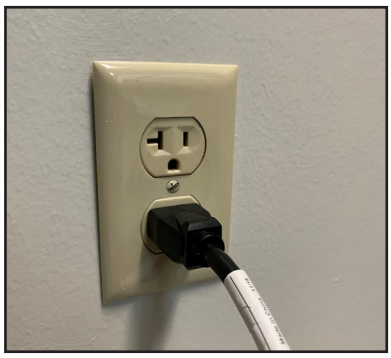


**B:**
**(reference for models LM1 & LM2)**



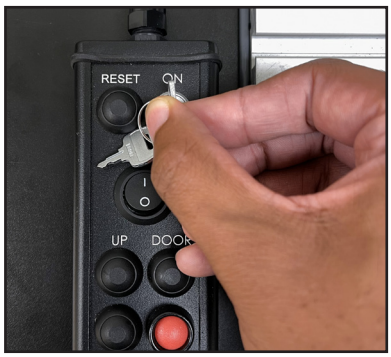

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**25.** Locate the remaining power cables and plug each into a 110V wall outlet.





**26.** Open the front door of the laser, you will notice a white foam block **(do not attempt to remove the block at this point).** Turn the power switch to the (ON) position, the key to the (ON) position, and press the **RESET button**. **(Note: Reference the photos below for your respective model: LM1A (blue), LM1 & LM2 (green)**




**A–1:**
**(reference for model LM1A)**




**A–2:**
**(reference for model LM1A)**




**B–1:**
**(reference for models LM1 & LM2)**



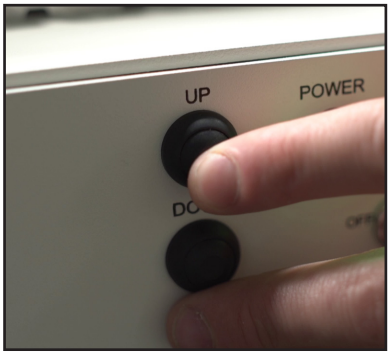

**B–2:**
**(reference for models LM1 & LM2)**

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**27.** Press the **UP button**, the z-axis on the laser will begin to shift upward. Continue pressing the button until the focus head is raised 2" to 3". You may now proceed with removing the foam block. **(Note: Reference the photos below for your respective model: LM1A (blue), LM1 & LM2 (green)**



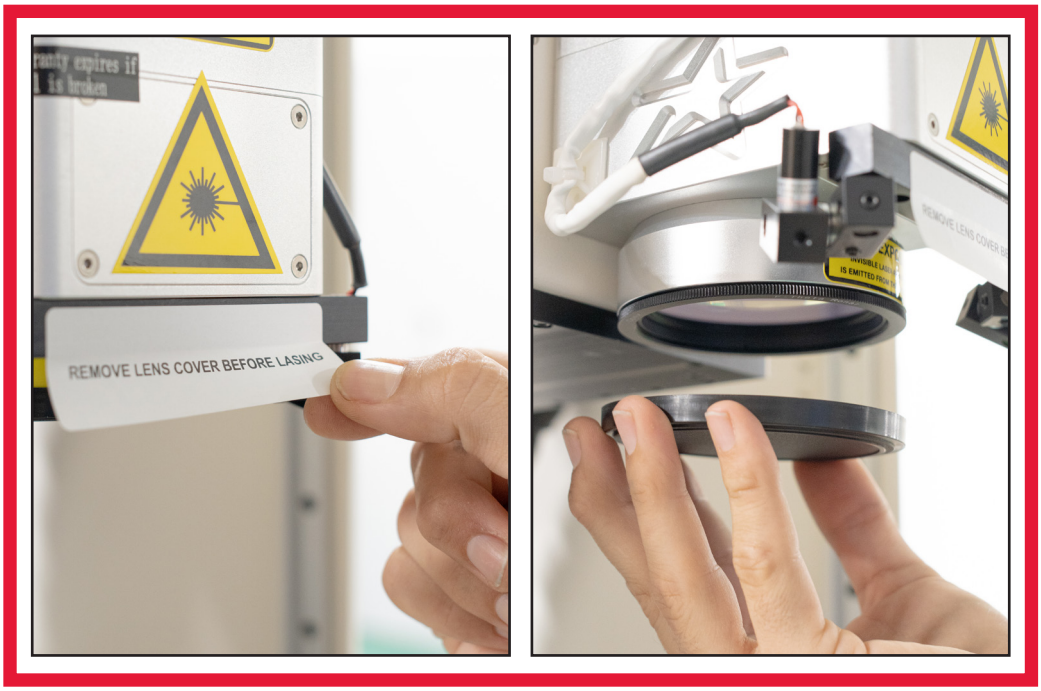

**A:**
**(reference for model LM1A)**




**B:**
**(reference for models LM1 & LM2)**

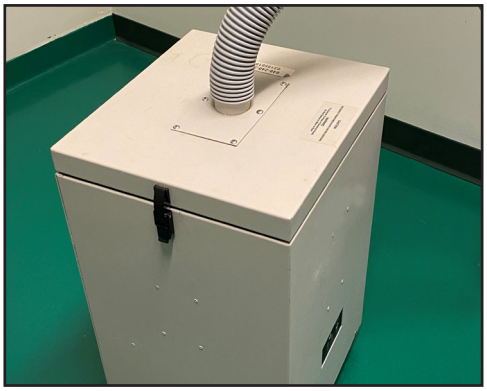


**28.** Note the instructions on the front of the laser head; remove the lens cover from the focus lens. Once the lens cover has been removed, you may remove this label.




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**29.** Unpack your purchased (or previously owned, approved) fume exhaust system and place it next to the machine (if a cyclone adapter option was purchased, setup appropriately).



**30.** Connect the exhaust hose and connect to the exhaust unit and the rear of the lasing chamber, as shown.



**Warning!**

**Operating a laser without an approved vacuum system will void the warranty.**

**31.** Be sure to properly position the interior chamber adjustable exhaust tube to the required marking area to ensure maximum suction.



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**32.** Press the **POWER button** on the laptop; this will boot up the computer.






**Congratulations, you are now ready to begin using your laser marking system! Please proceed to LaserStar Academy to begin your online training.**

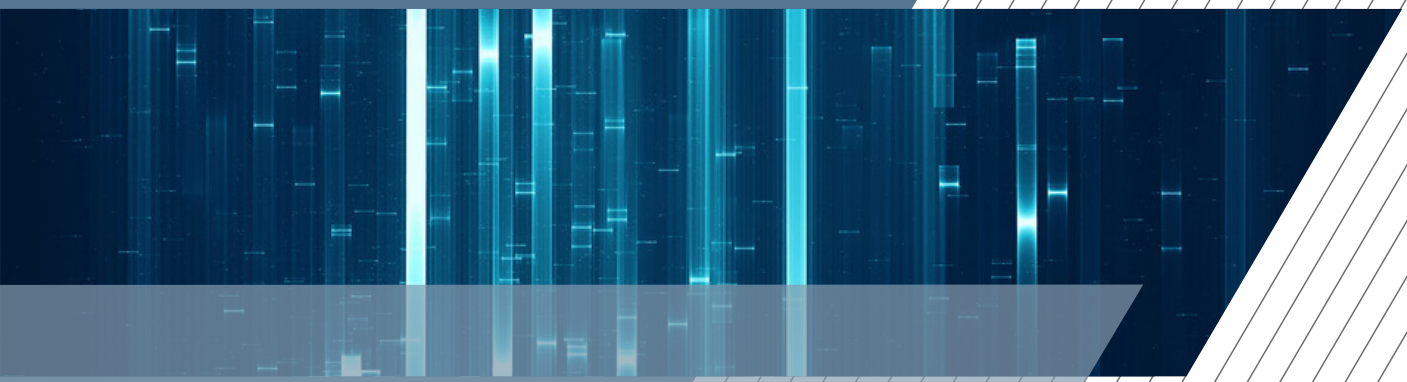
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## Notes

## Notes

**If you have additional questions about your device or would like to provide feedback, a testimonial or present your applications results, please reach out — we'd love to hear from you!**

| LaserStar Technologies: Important Contacts | | |
|---|---|---|
| **Sales & Training** | **Service & Support** | **Corporate Office** |
| (407) 248-1142<br>sales@laserstar.net | 1-888-578-7782 | 2461 Orlando Central Pkwy.<br>Orlando, Florida 32809 |



**For additional resources, learning, and support, including our library of latest video how-to's, be sure to visit us online:**

LaserStarAcademy.com, LaserStar.net & LaserStar.TV