BOSSLASER

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Boss Desktop EVO Operators Manual

A Class IV CO2 Laser Machine

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WELCOME TO THE BOSS LASER FAMILY

Over the years, Boss Laser has provided quality laser solutions, and I am thankful that we have always focused on delivering value not only for our clients but also contributing positively to our community.

Our mission statement is "Boss Laser strives to honor God by positively impacting its clients, employees, and community by providing products and services with Integrity, Honesty, and Value."

Your continued support has allowed us to make an impact not only in our own backyard but yours as well. Boss Laser machines are owned and operated across the world by hobbyists, small businesses, educational institutions, and Fortune 50 companies, just to name a few. But do you know what truly makes Boss Laser successful? You.

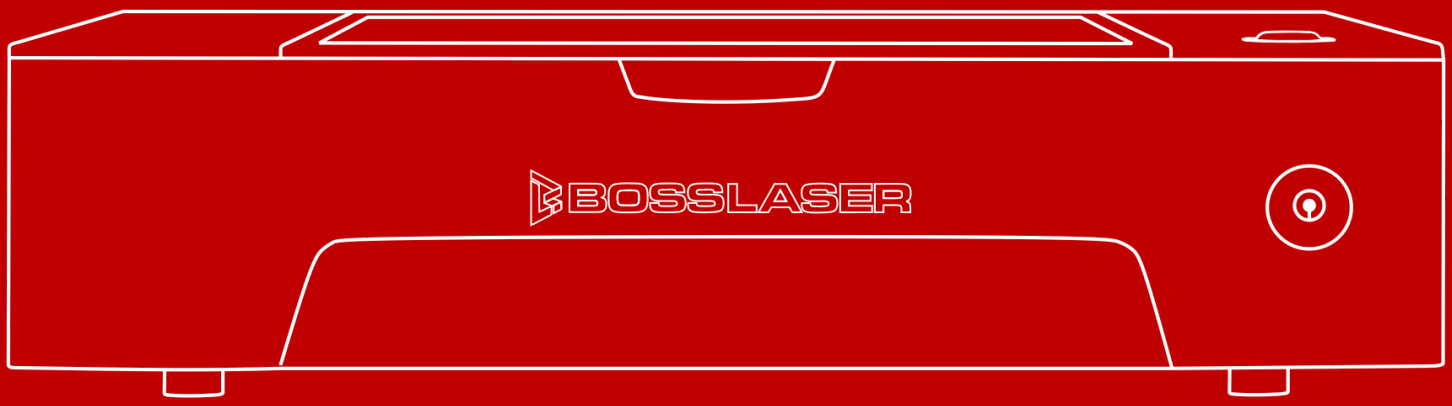
You have given us the opportunity to provide for families both locally and around the globe, whether a Boss Laser is being used in a home-based business that enables a family to have financial freedom, allowing college students at the University of Central Florida to make their designs become a reality, or inching the aerospace industry closer to new explorations and discoveries, you as a Boss Laser owner are the reason why.

When you purchase a Boss Laser machine, you're not just getting the machine, you're getting us, and by us, I mean the 40+ employees who strive to provide top-notch products, services, and support, day in and day out because they want you to be successful.

Owning a Boss Laser machine makes you a part of our family and we are thrilled that you have chosen us to be your laser solution. I can promise you that you now have an army of 40+ people who are rooting for you to succeed and are here to help you along the way.

So, what are you waiting for? Let us get that machine fired up and put to work!

Dan Fox
Owner & Co-Founder



BOSS DESKTOP EVO

EXPLORE EVERY WAVELENGTH OF INNOVATION

We are thrilled you have chosen the Boss Desktop EVO as your laser solution; designed for ease of use, precision, and reliability, the EVO is ready to bring both your creative and professional projects to life.

We recommend printing out this manual to save time in the future. It will guide you through the basic setup of the machine, so keep it close to your computer or machine for easy access while designing files or operating the machine.

Be sure to read the manual in its entirety before operating the machine; this will give you a solid understanding of how it works. We know there can be a learning curve with any new equipment, but with a bit of effort and patience, you will be running your new laser with confidence and efficiency in no time!

Our team is here to support you every step of the way. If you have any questions while reading the manual or setting up your machine, feel free to call us at 407-878-0880 or email techsupport@bosslaser.com. A member of our technical support team will be happy to help!

Welcome aboard, and here is to countless projects and endless possibilities!

BOSS LASER

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1.1 Definition of Procedures

The Boss Laser EVO is designed for cutting and engraving materials like acrylic and wood using a carbon dioxide laser. Inside its protective housing, the laser beam bounces off three mirrors and focuses on your material to create precise cuts and engravings.

To ensure you feel confident when operating your laser, we will go over everything you will need to know about the Boss Desktop EVO in this manual, but most of these sections can be broken down into three basic categories: Operation, Maintenance, and Service. We will provide a general overview of each category below and go into depth throughout this manual.

1.1a Operation

To start operating the EVO, first, program the controller with your desired cutting or engraving pattern. This involves designing your file, creating layers, adjusting settings, and sending the file to the machine.

Once your files are ready, open the hood to place your material on the worktable. After positioning the material, close the hood, and you are all set to initiate the cutting and/or engraving process.

When the EVO is finished, simply reopen the hood to remove your completed work. For larger panels, the machine features front and back passthroughs, allowing you to work with materials up to 3mm thick.

1.1b Maintenance

The best way to keep your machine performing optimally is to keep up with maintenance by setting a schedule. Maintenance includes routine cleaning and re-greasing the gantry rails, cleaning the lens and mirrors, and removing any dust or particles.

As a reminder, these procedures are to be performed with the machine off as your safety is our number one priority.

1.1c Service

Service includes initial installation and alignment of the machine, as well as repair when needed. Your EVO should arrive ready to go, but you may need replacement parts or to conduct minor repairs in the future. Procedures during service may require the machine to be turned on.

Boss Laser recommends that only trained service personnel, such as a Boss Laser Technician, complete service or repairs unless directed by a Boss Laser Technician. Always call Technical Support if you are unsure what to do when servicing your machine.

1.2 Warranty Disclaimer

This Limited Warranty applies to the laser machine itself, and all parts purchased from Boss Laser, LLC.

This Limited Warranty covers any defects in material or workmanship while the machine is operating under normal use and for its intended purpose during the warranty period.

During this Warranty Period, Boss Laser, LLC will repair or replace any part or product that is proven defective while the machine is being used under normal conditions and for its intended purpose. This does NOT include labor and/or on-site tech support.

The Warranty Period for the Laser Equipment will begin on the day of arrival and will be covered for 2 years for the machine chassis, 1-year for the Laser Tube, and 30 days for consumables such as lenses, honeycomb table, and mirrors.

All parts and replacement parts are under warranty for one year from the day of arrival, the only exception to this warranty are the consumables which include, but are not limited to, the optical lens, mirrors, honeycomb table, knife blades, etc..., which have a 30-day warranty from the date of arrival.

This Limited Warranty does not cover any problem that is caused by: conditions, malfunctions or damage not resulting from defects in material or workmanship (ex. modifications done to the machine).

All modifications that are made to the machine must have written consent from Technical Support or the warranty will be voided.

Lack of proper maintenance of the machine will also result in a voided warranty.

To obtain a warranty service or part you must first contact Technical Support via phone (407-878-0880) or email (techsupport@bosslaser.com) to determine any issues and the most appropriate solution for the machine.

2. Safety Information

2.1 Laser Classification

The Boss Desktop EVO Laser System is a Class 4 laser product, as defined in International Standard IEC 60825-1.

The Boss Desktop EVO complies with 21 CFR 1040.10 and 1040.11, the Federal Performance Standards for Light-Emitting Products, except for deviations pursuant to Laser Notice No. 50, dated May 8, 2019. The Center for Devices and Radiological Health, of the US FDA, issued Laser Notice No. 50 to permit manufacturers to classify and manufacture their products in accordance with the International Standard.

During normal operation, the laser's output is safely contained within the EVO's cabinet. The main access door is equipped with a safety interlock that automatically shuts off the laser if opened during use.

The visible beam from the Laser Diode Pointer (Red Dot Pointer) is accessible for positioning. This pointer uses similar technology to a laser pen pointer, so, like those, it is important to avoid direct eye exposure. We have taken every measure to ensure the Laser Diode Pointer (Red Dot Pointer) is as safe as possible. Its beam path is securely positioned inside the cabinet, so under normal operation, no hazardous levels of laser radiation can escape.

The standard reference for laser safety is the American Standard for the Safe Use of Lasers, Z136.1-2000, developed by the American National Standards Institute (ANSI). This reference is the basis for many of the federal regulations for laser and laser system manufacturers, and for the Occupational Safety and Health Administration (OSHA) laser safety guidelines. It contains detailed information concerning proper installation and use of laser systems.

While the ANSI standard itself does not have the force of law, its recommendations, including warning signage, training, and the designation of a laser safety officer, may be compulsory under local workplace regulations when operating laser systems above Class I. It is the operator's responsibility to ensure that the installation and operation of the Boss Laser EVO Laser System is performed in accordance with all applicable laws.

Copies of ANSI Standard Z136.1-2000 are available from:

LIA™
THE LASER INSTITUTE

Laser Institute of America

12424 Research Parkway
Suite 125
Orlando, FL 32826
(407) 380-1553

2.2 Essential Safety Information Before Using Your Machine

Before setting up and turning on the machine, all operators are required to read this manual carefully and adhere to the operating requirements & specifications. As a reminder, the Boss Desktop EVO is classified as a Class IV laser machine, meaning that radiation exposure is a possibility if proper safety precautions are not followed. We understand that the number of safety precautions can be overwhelming to first-time laser users, therefore, we have provided a bulleted list below to give you a quick reference guide.

2.2d Trained Personnel & Bystanders

- Anyone who has not read this manual should abstain from using the laser machinery, as it can cause harm to the machinery, the operator, and bystanders.
- If using this laser machinery in a shared area, allow only qualified personnel or people to operate the laser machine.
    - Each person who enters the area while the machine is in operation should have general laser safety knowledge and any person who operates the machine should read this manual first.

2.2e Pre-Operation & Environment Requirements

- Prior to operating the machine, all doors, covers, hoods, and safety mechanisms should be in place.
- The ideal environment for the EVO is dry, free from pollution, vibration, high voltage, or strong magnets.
    - The machine should be in an ambient temperature of 39° - 104° Fahrenheit (5°-40° Celsius), with 5% - 95% humidity with no dew.

2.2f Material Hazards

- While a multitude of materials can be engraved, etched, or cut with your Boss Desktop EVO, it is important to be careful when processing a new material.
- Do not place any reflective material or objects in the machine as reflective material can cause the laser beam to deflect, causing damage to the machine, surrounding areas, or bystanders.
- Do not stack materials in the laser machine to be cut as this can increase the chance of a fire.
- Do not put flammable or explosive materials near the machine as this can increase the risk of fire and/or explosion.

2.2g Fire Hazard

- Materials within the machine and surrounding areas can catch fire if not monitored closely and it is important that the machine is not left unattended while running.
    - If you must leave the area where the machine is firing, press the “Pause” button, then start where you left off when you return.

- We recommend having a CO2/ABC fire extinguisher on hand and near the machine to minimize damage to the machine and the surrounding area in case of a fire.

2.2h Hazardous Fumes & Proper Ventilation

- Ensure there is proper ventilation in the area the machine will be running in.
- Smoke, fumes, and particles can be exhausted from the machine while processing materials.
  - These should be exhausted via an external exhaust port to the outside or via a fume and odor extractor.
- Certain materials can produce toxic fumes and hazardous gases when processed by a laser machine.
  - It is important to review the MSDS of any material to ensure it is safe to be processed with a laser machine.

2.2i Electrical Safety

- The Boss Desktop EVO uses electricity to power the machine, which increases the risk of electrical shock if not managed properly.
- Do not disassemble the machine without prior approval and direction from Boss Laser Technical Support, otherwise, the warranty may be voided and injury or death from electrical shock may occur.
- Ensure all sources of power are unplugged prior to conducting service and maintenance on the machine.
- The operating voltage of this machine should be 110v 60Hz.

3. Fire & Hazardous Materials

⚠ WARNING: This machine uses high heat to engrave, etch, and cut material. At no point should the machine be left unsupervised while it is in use as doing so can result in a fire, causing substantial damage to the machine and the building it resides in. Any damage caused by the fire that is not due to defects in workmanship, or the machine itself, will NOT be covered by the Limited Warranty.

⚠ HAZARDOUS MATERIALS: All materials considered hazardous to the health of the machine, the operator(s), and any bystanders while in use are NOT recommended to etch, cut, or engrave. These materials can produce toxic fumes or cause the machine to not function properly and need replacement parts. Processing hazardous materials can void the warranty of the machine.

Materials that should NOT be cut, etched, or engraved:

- Polycarbonate
  - Fumes produced by polycarbonate can cause irritation in the eyes, skin, and respiratory tract.
- PVC Compounds
  - Fumes produced by Polyvinyl Chlorine when exposed to elevated temperatures can cause irritation to eyes, skin, and the respiratory tract.

- Vinyl
  - Fumes produced by Vinyl that have Chlorine can cause irritation in the eyes, skin, and respiratory tract.
  - This material should not be exposed to elevated temperatures.

Most materials have a Material Safety Data Sheet (MSDS), which can tell you whether materials are safe and/or can be exposed to high heat. Any material containing Chlorine is not safe for your laser, the machine operator(s), or bystanders. If you are still unsure about the material after reviewing the MSDS and its properties, contact Technical Support. We would be happy to try and identify the safety of the material and whether it can be processed with a laser machine.

4. Laser Safe Materials

Lasers use heat to cut, engrave, etch. Some materials react beautifully while other materials can have less than a desirable effect. It is important to know the material with which you are working. Some materials like PVC are easy to cut but give off a Chlorine gas that is not healthy for the machine or the operator. New materials come out daily, so if you are unsure if the material is safe, contact Technical Support and we will try to identify its properties and determine if it is possible/safe to be processed with a laser.

To make this process a little bit easier, we have created a list of materials we know are safe for the machine. It is important to review the information below to ensure you are not attempting to cut or engrave a material that is not meant for your machine.

Plastics:

- ABS (Acrylonitrile Butadiene Styrene)
- Acrylic (Also known as Plexiglas, Lucite, PMMA)
- Delrin (POM, Acetal)
- High Density Polyethylene (HDPE)- Melts Badly ⚠
- Kapton Tape (Polyimide)
- Mylar (Polyester)
- Nylon – Melts Badly ⚠
- Polyethylene Terephthalate Glycol (PETG)
- Polyethylene – Melts Badly ⚠
- Polypropylene – Melts Somewhat ⚠
- Styrene
- Two-Toned Acrylic – This is two-layer colored acrylic where the top layer is a distinct color than the base color and is used for signs, plaques, and instrumentation panels.

Foam

- Depron – Often used for RC planes.
- Ethylene Vinyl Acetate (EVA)
- Gator Foam – Hard shell does well but, the foam core gets burned and eaten away.

Textiles & Others:

- Cloth- Leathers, suede, felt, hemp, cotton
- Paper – Cardstock, cardboard
- Rubber – These can only be used if they do not contain chlorine Teflon (PTFE, Polytetrafluoroethylene)
- Woods – MDF, balsam, birch, poplar, red oak, cherry, holly, etc.

Materials that cannot or should not be cut:

- Metals (exceptions for etching = Using TherMark/LaserBond or powder coated tumblers)
- Polycarbonate (PC, Lexan) due to the fumes.
- Any material containing chlorine.
- PVC (Cintra) - contains chlorine.
- Vinyl - contains chlorine.

5. Laser Safety & Policies

Primarily, BE CAREFUL. Laser machines are a powerful tool, and the proper precautions should be taken, just as if you were working with any other high-powered tool or machinery. These machines are designed to cut and engrave with highly focused heat energy and can be dangerous. You should never leave your machine unattended while it is in operation and do not let an inexperienced or unfamiliar person operate your machine at any time.

Always keep any access covers on and the top lid closed whenever the machine is in operation. Avoid any direct exposure and do not stare at the laser beam while the machine is operating. Notice and understand all the warning labels located on your machine.

The following safety measures must be strictly implemented and be abided by to ensure the safety of the machine and the individual operating it. Boss Laser, LLC shall not be held responsible for any damage or injuries resulting from improper use or dismantling of the laser machine.

- NEVER operate laser machinery unless you have been trained.
- ALWAYS use protective eyewear, or keep the lid closed.
- ALWAYS be sure to keep the Exhaust Fan running while the machine is in use.
- NEVER set anything on top of the laser and/or on the worktable while not in use.
- NEVER leave the laser unattended while it is running. This will ensure that you are able to see or hear any abnormalities/potential hazards.
- ALWAYS maintain the machine's environment free of heavy pollution, such as strong magnetic electrical interference.
- NEVER use unapproved or unsafe materials, such as Polyvinyl Chloride (PVC) or any materials that emit noxious gases, as these gases can cause harm to your central nervous system.
- NEVER operate the laser near flammable or explosive substances as the UV light beam that is emitted is not visible and poses a fire hazard.

- NEVER lift the lid of the machine while it is running.
- NEVER engrave or try to cut reflective material as the laser beam can reflect and deviate (bounce around) which can cause blindness or severe injury, requiring medical attention.
- NEVER push or pull the laser head and its gantry while the laser is running.
- NEVER dismantle the laser machine as this can disrupt the laser and its high voltage/pressure parts and can cause harm or injury.
- ALWAYS clean out the collection tray(s) to prevent accidental hazards.

In Case of a Fire:

- Press the EMERGENCY STOP button located on the right side of the machine.
- Lift the lid.
- Quickly blow out the flame(s).
    - Use a Co2 fire extinguisher for serious flames.

6. Safety Features & Regulatory Compliance

6.1 Safety Features

Boss Laser has incorporated specific safety features into the EVO Laser System to meet the requirements of 21 CFR 1040.

These safety features include:

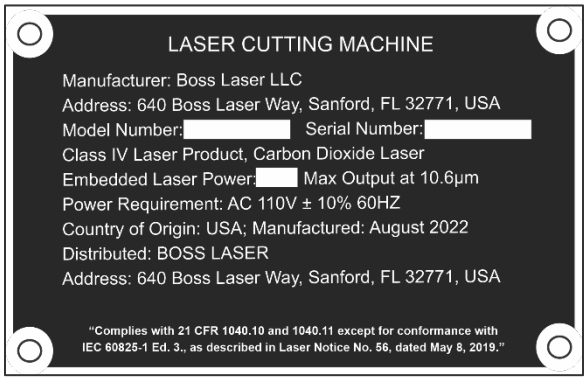
- A fully enclosed safety cabinet that contains the engraving laser and its beam path.
- Dual interlock systems to prevent the laser from firing if the main access door is open.
- A visible indicator light (blue ring around the start button) illuminates when the laser is operating.
- Manual reset that enables the laser to resume operation after an interruption of fire caused by a remote interlock or a power loss lasting over 5 seconds.
- An emergency stop button to instantly halt laser emission.
- A viewing window on the safety enclosure, designed to limit laser radiation exposure to the eyes.
    - Laser safety glasses are provided for when pass-through doors are in use.
- A remote interlock functions when the terminals of the connector are not electrically joined.
    - Human access to all laser radiation from the laser product more than the accessible emission limits of Class I and table VI shall be prevented.

6.2 Safety & Regulatory Labels

21 CFR 1040 requires that certification, identification, and warning labels be placed on laser products. The labels affixed to the outside of the Boss Laser EVO system are shown throughout the following pages, with their locations specified. These labels are put in place for the safety of the machine and the operator, it is important that you pay attention to these warning labels and adhere to them. If these warnings are not followed, it could cause considerable damage to the machine and injuries to the operator.

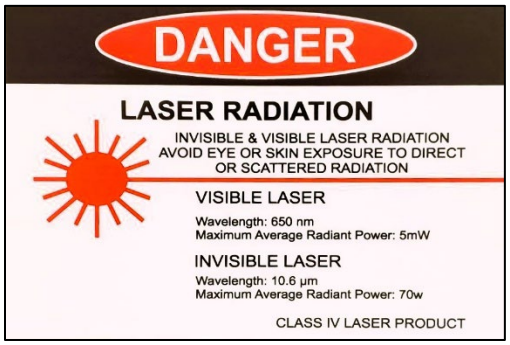
6.2a Certification & Identification Label

The "Certification" and "Identification" labels are combined into one label. The label can be found on the back right side of the machine.



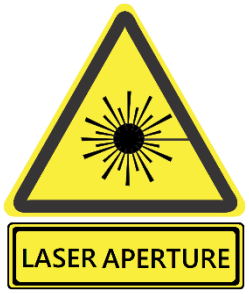
6.2b Warning Logotype

The "DANGER: Visible & Invisible Radiation" warning label can be found on the front right side of the machine. Staring at the laser beam can cause damage to the eyes and touching the laser beam can cause serious injuries. Having the doors closed will protect your eyes and skin from injury.



6.2c Laser Aperture

The "LASER APERTURE" warning labels can be found inside of the working area on the back left-hand side of the gantry, and on the laser head. The first aperture warning label is where your laser beam will bounce from mirror #1 to mirror #2. The second aperture warning label is where your laser beam will exit the laser head.

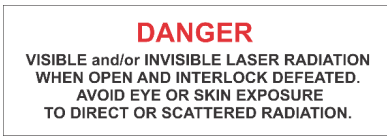


6.2d Non-Interlocked Protective Housing

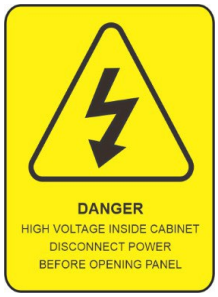
The "DANGER" labels for non-interlocked doors are located on the machine body next to the doors that are accessible/removable, like the pull out Catch Tray and pass-through doors. This machine produces laser radiation & all doors to the machine should be closed when the laser is operating.

6.2e Interlocked Protective Housing

The "DANGER" labels for interlocked protective housings are located on the machine body next to every door that are accessible when interlock is defeated, like the hood.

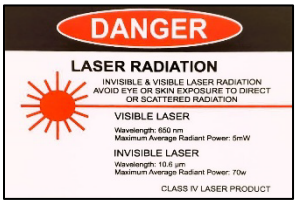


6.2f Electrical Safety



The "DANGER: High Voltage" sticker can be found on the inside of the right-hand bottom cabinet, on the power supply. This warning indicates that precautions should be taken when touching or handling any electrical components of the machine. Please make sure to disconnect the laser from all power sources prior to opening these cabinets or handling any of the internal electrical components.

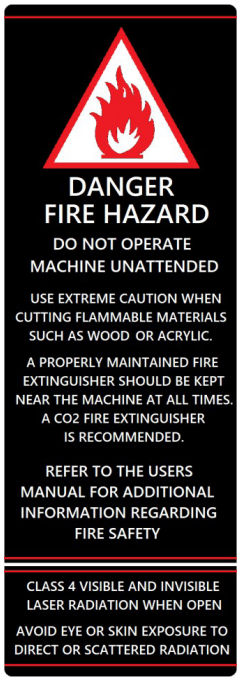
6.2g Laser Tube Handling



The "DANGER: Laser Radiation" label and the "Laser Aperture" label can be found on the Laser Tube, which will be located on the backside of the machine inside the rear/top access panel. The laser beam will be initiated in the Laser Tube itself, and it is important to have all panels and access doors closed prior to firing the laser. Also, make sure to disconnect your machine from any power source prior to handling the Laser Tube or its components. Protective eye wear and clothing must be worn if any access panels or doors are open while operating the machine.

6.2h Danger Fire Hazard

The "DANGER FIRE HAZARD" warning label can be found on the top right-side of your machine above the LCD Screen and it is crucial to the health of your machine. The laser beam emitted from the machine is extremely hot and can cause any material to catch fire. DO NOT leave the machine unattended while the machine is firing. Any fire that arises due to disregarding this warning is not covered by the warranty and any damage will be at the cost of the machine owner.



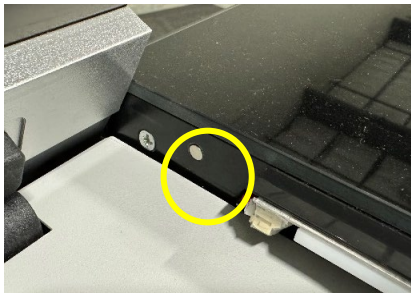
6.2i Warning Hands Pinching

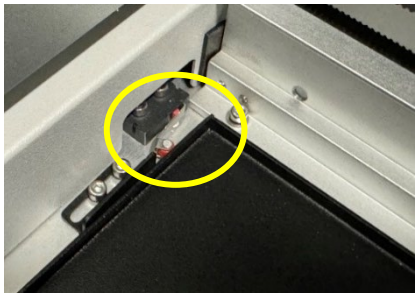
The Warning Hands Pinching label can be found inside of the machine near the back on the Exhaust Fan and Rotary cover. Please use caution and keep your hands and fingers away from the Exhaust Fan when the machine is ON to prevent the risk of injury. Please note that loose clothing, jewelry, and hair can be pulled into pinch points. The machine should always be turned OFF when working in the vicinity of any pinch point hazard.

6.3 Safety Design Features

6.3a Safety Interlocks

There are three safety interlocks on your Boss Laser EVO machine, two for the hood and the other for the removable tray. When the hood is closed, the interlock switch (proximity & mechanical) will be activated, closing the circuit, and enabling the machine to work normally. When the hood is open, the safety interlock switch(es) will be disengaged, opening the circuit, making the machine inoperable and will not allow the machine to output the laser beam. This interlock procedure will follow the same concept for the mechanical interlock switch for the removable tray. Below, indicated by the yellow circle, shows where they are located on the machine.



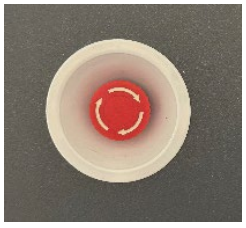


6.3b Key Control (Master Switch)

The Key Control switch is installed as part of the control panel. The Key Control switch controls the hot wire of the main circuit. When this switch is turned off, the machine is powered down.

6.3c Emergency Stop Switch

The emergency stop switch, which is located on the right side front of the machine, controls the live wire of the main circuit, and when the main control switch is turned off, the machine will power down.



6.3d Laser Status

The machine comes equipped with light indicators showing what the status is for the machine. When the machine is turned on and resetting to the origin, after it has finished, the light indicator will show green, showing its idle/ready state. When the machine is running a file & the laser is firing, the light indicator will show blue. If the hood and/or removable tray is open, in which the safety interlocks have been disengaged, the light indicator will show red.

Idle/Ready State

File is Running & the Laser is Firing

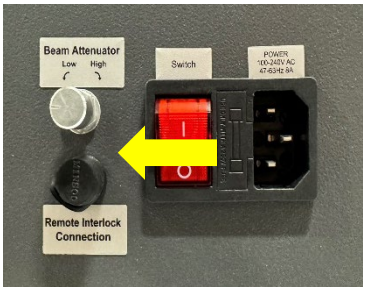
A safety interlock has been disengaged

6.3e Personal Protective Equipment (PPE)

Laser Safety Glasses are included with the machine, they can be found inside the toolbox. All eyewear provided meet or exceed ANSI Standards for the Boss Laser Safety Systems. The Laser Safety Glasses should be worn when the pass-through doors are being utilized.

6.3f Remote Interlocks

The machine incorporates a remote interlock connector (located at the back of the machine). The included Remote Interlock Not In-Use Jumper will be used if the end user does not desire to use their own remote interlock. Please note that the Remote Interlock Not-In-Use Connector (Jumper Plug) must be installed, or the machine will go into an alarm state and will not run.



Remote Interlock Not-In-Use Connector (Jumper Plug)

7. Accessing Our “How To” Videos and Manuals

We strive to provide support for our customers, which is why we have a variety of videos and manuals to assist our customers during the use or setup of their machine. In this manual, certain pages will contain a QR code. This will indicate that there is a video located on our website that will be able to guide you through this process or give you a better idea of how something is done.

Scan this QR code to access our Instructional Videos.

Scan this QR Code to access our Manuals Online

7.1 How to Access the Manuals on the USB

1. Your Boss Laser EVO will come with a USB that contains the LightBurn software and a few of our manuals. The first step is to plug in the USB that accompanied the machine.
2. Next, there should be two folders within the USB, a “USB (LightBurn)” folder and “USB (For Boss Laser EVO)” folder. There will be manuals in each folder.
3. In the “USB (LightBurn)” folder, there will be the manuals for the LightBurn software and a "READ ME" (for installing LightBurn).
4. The “USB (For Boss Laser EVO)” folder will contain the “EVO Manual,” “Controller Card Schematic” and a "User's Manual of RDC644XG Control System."

8. Unpacking Your Boss Desktop EVO

Your new laser will be delivered in a wooden crate like the one pictured below. Please be sure to have the necessary tool(s) on hand when unpacking the crate. A flat head screwdriver can be used to unlock the metal tabs to remove the lid of the crate.

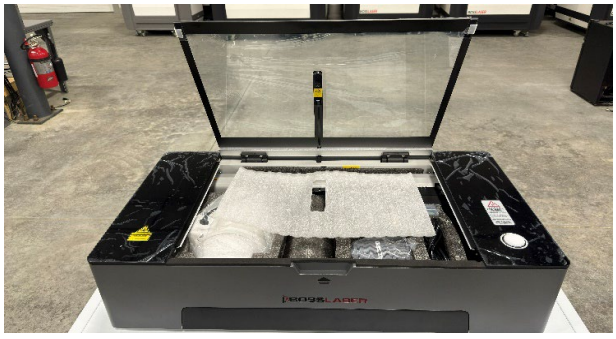
Unpacking Your Boss Desktop EVO

While most of our machines arrive unharmed, we urge you to inspect the crate upon delivery to ensure that no damage has occurred while in transit. Damage can include pierced wood, smashed sides, or an open portion of the crate. If there seems to be any damage to the crate, take pictures prior to removing the bands.

If no damage is visible on the outside, proceed to the opening of the crate. If there is damage to the crate, contact your Sales Consultant or Client Services Coordinator and send them pictures so we can report that damage to the carrier. The machine is insured for its full value while in transit and if it is damaged to the point of needing parts or replacement, the carriers are particularly good at covering those costs, but the damage must be reported within 24 hours of delivery.

Once you have the lid of the crate off, remove the honeycomb tray and foam packaging inside to reveal the machine. Two straps that are wrapped around the machine can be used to lift it out from the crate. Set the machine on a hard, flat, and stable surface. It is pertinent to have two people available to lift the machine from the crate with proper lifting practices to minimize the chance of injury or damage.

After placing the Boss Desktop EVO on a sturdy surface and removing the straps, remove any transparent plastic wrap from the machine and open the hood of the laser, as shown below.



Unpacking Your Boss Desktop EVO

Once the hood of the laser has been opened, on the laser bed there will be the Exhaust Fan, Exhaust Tubing, Power Cord, and Exhaust Flange.

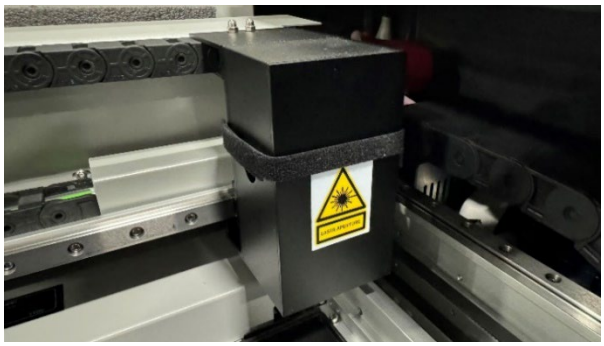
Depending on what options you purchased with your laser, the crate or pallet will have several boxes. If you think anything is missing from your machine or crate, please contact your Sales Consultant or Client Services Coordinator.

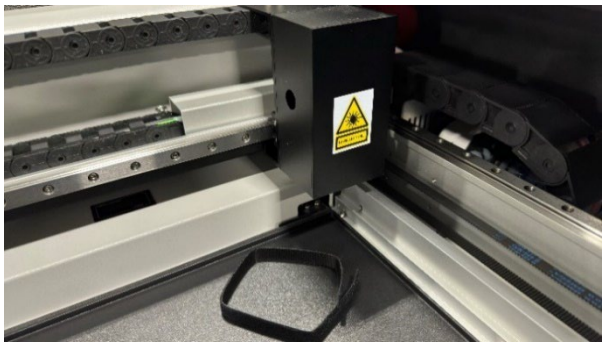
The loose components in the crate/machine should contain the following items:

- Exhaust Fan & tubing.
- A Toolbox that contains necessary software, accessories, or parts (extra lenses).
- Additional accessories such as: rotary attachments, cleaning kits, etc.

Some machine crates might come with a pallet; this pallet will contain any accessories that did not fit in the crate. If you receive a crate with only the machine and no extra pallet or boxes of components and/or accessories, contact your Sales Consultant or Client Services Coordinator as soon as possible.

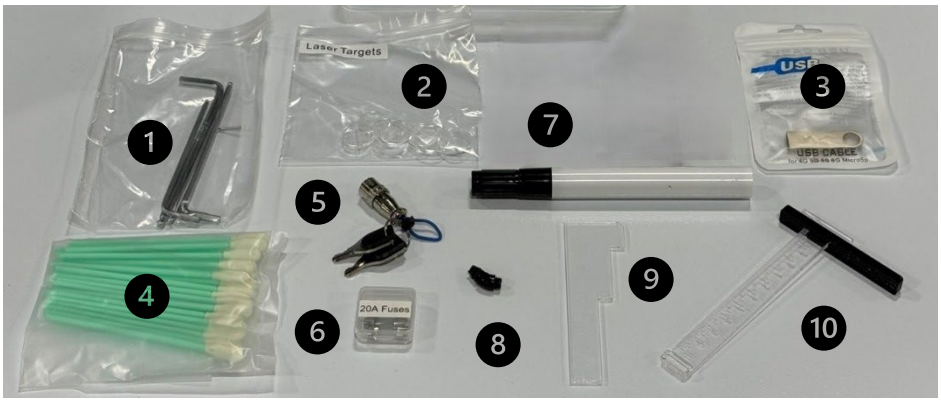
After the machine has been inspected for damage and all the components/accessories have been accounted for, be sure to remove any foam or padding from inside or outside of the machine. Remove any plastic/Velcro ties used for securing the laser head from moving while in transit.





8.1 Toolbox Contents

Your toolbox will contain a variety of items, be sure to put them back in the toolbox or in a designated area after each use as the items in the toolbox are used for testing, maintenance, and operation of the machine. It is important not to lose these items.

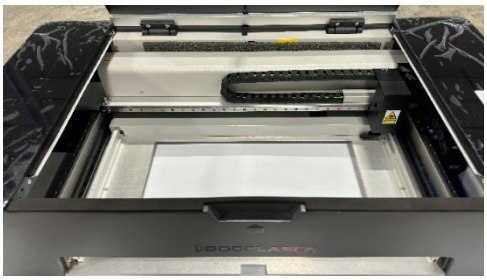


1. Allen Key Set **2.** Laser Targets **3.** USB **4.** Cotton Swabs
5. Ignition Keys & Remote Interlock Connector Bypass **6**. 250V, 20A Fuses **7.** Marker
8. Air Nozzle Elbow **9.** Focal Guide **10.** Ruler

8.2 Installing the Honeycomb Tray

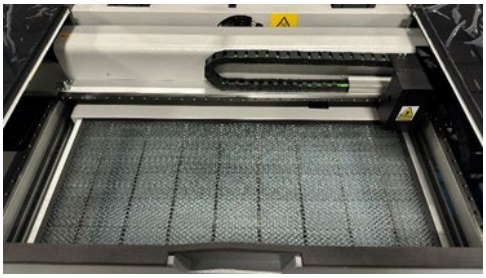
Your Boss Desktop EVO will come standard with a honeycomb tray. The honeycomb tray supports materials during cutting and engraving, allows for debris and smoke removal, reduces back reflections, and minimizes material contact, leading to cleaner, more precise cuts, and improved safety by dispersing heat effectively. Follow these instructions for installing the honeycomb tray.

1. Remove the front cover tray from the machine.

2. Now, locate the honeycomb tray slots. They will be right above where the cover tray was removed. After locating the slots, insert the honeycomb tray into the slots within the machine.


3. Ensure the honeycomb is fully inserted into the machine, as shown in the following images.

4. After the honeycomb tray has been fully inserted into the machine, re-insert the cover tray into the designated slots of the machine.
    a. NOTE: Be sure that the cover tray contacts the interlock switch on the back right-hand corner as this will ensure the interlock is triggered/engaged properly.

8.3 Exhaust Fan & Fume Extractor Overview

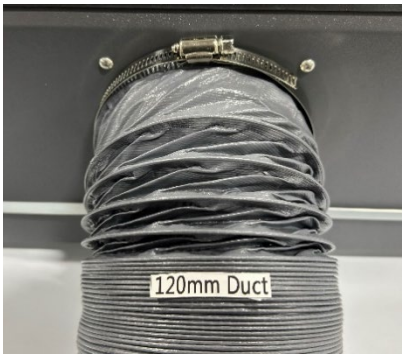
The laser vaporizes material as it moves along the axis, this generates substantial amounts of smoke. The exhaust of your machine and its importance cannot be overstated as it is necessary to remove harmful fumes and smoke produced by the laser machine. Some materials such as leather or wood generate larger amounts of smoke than other materials.

If you purchased a Fume Extractor with your Boss Desktop EVO, skip to section 8.3b on page 26. If you did not purchase a Fume Extractor, the exhaust must be ducted to the outside and away from any area where animals or humans congregate. When ducted correctly, a laser can be placed in an office, garage, or spare room.

If you are cutting or engraving materials that will produce substantial amounts of smoke or fumes, industrial size in-line fans can be purchased from websites like Grainger and other industrial supply warehouses. All EVO machines will need a 6" Exhaust Fan with a minimum of 250 CFM's (**included with the machine**).

The Exhaust Fan must be turned on and used each time the laser is running and in use.

8.3a Setting Up Your Exhaust Fan



First, ensure your machine is placed in an appropriate area that has an option for venting. This can include a door, window, duct, etc... You will need to exhaust your machine outside if you are using an Exhaust Fan.

Remove the exhaust blower and exhaust tubing from the crate/machine, as well as your exhaust hose clamps. You will take the 120mm exhaust tubing and place it on the exhaust port, located on the back side of the machine (this will be a 4.6" metal circle). Once the tubing is placed on the exhaust port, take one 120mm exhaust hose clamp, and place it over the tubing and the exhaust port. Once the exhaust hose clamp is properly placed, tighten it down so there is a snug fit with minimal room for fumes to escape.

After the first end of the exhaust hose has been placed and secured, take the second 120mm exhaust hose clamp, and place it on the other end of the exhaust tubing. Next, place the exhaust tubing and clamp on the intake port of the Exhaust Fan with the reducer attached to the Exhaust Fan, as shown below. After it is correctly positioned, tighten down the exhaust clamp as you did the first time.

Finally, take your second piece of exhaust tubing, which is **150mm**, and third exhaust hose clamp (for the 150mm) and attach them to the exhaust out port of the Exhaust Fan. Tighten down the exhaust clamp as you did the previous clamps.

Now that your Exhaust Fan has been properly set up, take the other end of your exhaust tubing and place it where you will be able to exhaust smoke and fumes. If you are going to be exhausting your machine through a duct or other fabricated output, you may need another exhaust hose clamp to ensure that it stays secure.

8.3b Setting Up Your Fume Extractor

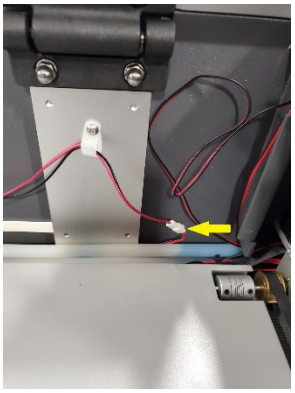
A Fume Extractor is an upgrade to the standard Exhaust Fan and would allow you to exhaust your machine inside without needing to vent the fumes/exhaust externally. If you order a Fume Extractor for your Boss Desktop EVO machine, it will be drop shipped from the manufacturer and come separately from the machine. The following instructions are solely for installing the Fume Extractor and should only be followed when the Fume Extractor is installed.

If you would like to purchase a Fume Extractor or replacement filters for your current Fume Extractor, scan this QR code. The FiltraBOX Micro is recommended for the Boss Desktop EVO.

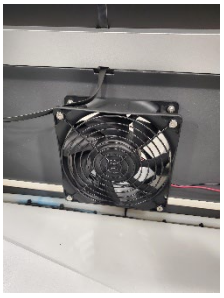
To correctly set up your Fume Extractor, you will need to remove the existing integrated Exhaust Fan from the back of the Desktop Evo machine. To do so, please turn the machine completely OFF and make sure that there is nothing inside of the machine except for the cover tray.

You will need to open the hood and then slide the machine gantry all the way to the front so you can have the space necessary to access the Exhaust Fan and Rotary Port cover. You will then need to remove the four screws shown below that are securing the cover to the machine. The machine should always be OFF when working on the Exhaust Fan as it is a potential pinch point hazard.

After you have removed the Exhaust Fan and Rotary Port cover, you will then need to disconnect the Exhaust Fan from the wire connector pictured in the image to the right highlighted by the yellow arrow. This will disconnect the Exhaust Fan from the integrated Power Supply Unit.



Now that the Exhaust Fan power source has been disconnected, you will need to remove the integrated Exhaust Fan from the machine. The photo on the left will show you what the Exhaust Fan looks like from the back/inside of the machine. The photo on the right will show you what the Exhaust Fan looks like from the back/outside of the machine.



The following image to the right will show you the location of the 4 Allen-Head screws on the back side of the machine for the removal of the Exhaust Fan. Please remove these screws and remove the Exhaust Fan from the machine. Once the Exhaust Fan has been completely removed, you may place the 4 Allen-Head screws back in their place to cover the holes.

Please make sure that the integrated Exhaust Fan is completely removed and disconnected from the machine before connecting the FiltraBox Micro, as this could cause negative pressure and potentially create a small electrical current.

You will now need to remove the exhaust tubing (120mm & 150mm) from the crate/machine, as well as your exhaust hose clamps. You will then take the 120mm exhaust tubing from the crate/machine and place it on the exhaust port, located on the back side of the machine (this will be a 4.6" metal circle). Once the tubing is placed on the exhaust port, take the one 120mm exhaust hose clamp, and place it over the tubing and the exhaust port. Now that the exhaust hose clamp is properly placed, tighten it down so there is a snug fit with minimal room for fumes to escape.

After the first end of the exhaust hose has been placed and secured, take the second exhaust hose clamp, and place it on the other end of the exhaust tubing. Next, place the exhaust tubing and clamp on the intake port of the Fume Extractor with the reducer attached to the intake port. After it is correctly positioned tighten down the exhaust clamp as you did previously. Please remember that your Fume Extractor may look different than the image shown on this manual as some Fume Extractors have intake ports located on the top and others are located on the back.

To view the appropriate operator's manual for your Fume Extractor, scan the QR code for your Fume Extractor below.

FILTRABOX
MICRO
OPERATORS'
MANUAL

8.4 Water Tank, Pump, & Flow Sensor

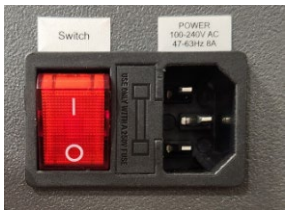
All Laser Tubes on the Boss Desktop EVO are water-cooled, and the machine will not fire if the water is not going through the Water Flow Sensor and Laser Tube. Distilled water is highly recommended.

8.5 Air Pump

The air pump comes preinstalled in the machine with the respective tubing. The tubing is then connected to the laser head nozzle to direct the airflow through the nozzle and onto the material. The air pump will turn on when the file is running, and the laser is firing.

8.6 Turning ON Your Boss Desktop EVO

Prior to turning on your Boss Desktop EVO for the first time, ensure that all components have been removed from the worktable, including any plastic/Velcro ties used for securing the laser head from moving while in transit. Take the female end of the power cord, as shown in the image below on the left-hand side and plug it into the male outlet on the back side of the machine, as shown in the image below on the right-hand side.



After plugging the power cord into the Boss Desktop EVO, it should look like the image below.

Setting Up Your Boss Desktop EVO

Now that one side of the power cord has been plugged in, plug the male end of the cord into a female 110V 20-amp power outlet, as shown in the images below.

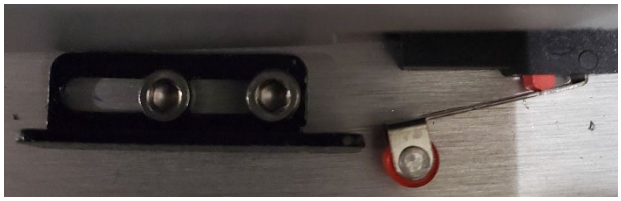
Once the power cord has been plugged into the machine and a 110V 20-amp wall outlet, we can flip the power switch on the back of the machine. This is a red rocker switch next to the female cord outlet, as shown in the image below. When the power is turned on, the light on the switch will glow red. If the power is off, the light will be off.

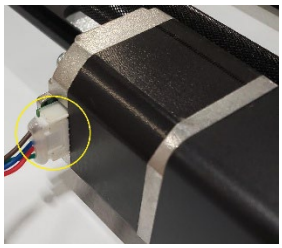
After turning the power switch on, we must ensure the emergency stop button on the machine is in the "up" position and not pressed down. To do this, locate the emergency stop button on the front right-hand side of the Desktop EVO. Once the button is located, start by pressing down on the emergency stop button. If the button will not press down any further, the emergency stop is already engaged. If you were able to press down on the emergency stop button and hear a faint "click," you have now engaged the emergency stop button. To disengage the button, turn the button clockwise and release until the emergency stop button is no longer engaged and pops up.

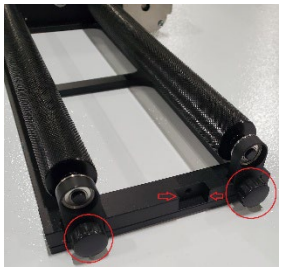
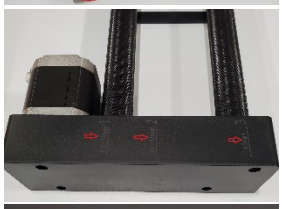
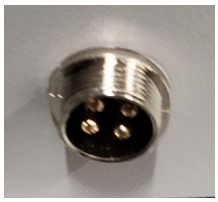
Now that the Emergency Stop button is disengaged, locate the machine ignition switch located on the right-hand side of the machine. Next, locate the ignition key from your toolbox. Insert the key into the ignition switch and turn clockwise to turn the machine ON.

8.7 Connecting the Desktop Evo Rotary

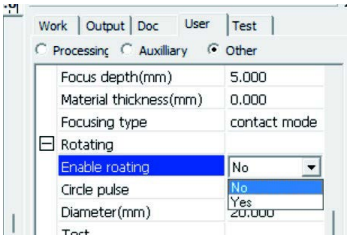
Please follow the following steps ***only*** if you are going to use the Desktop EVO Rotary.

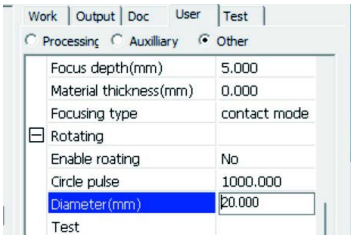
- Turn the Desktop EVO OFF.
- Remove the cover tray and the honeycomb and set them aside where they will be safe from damage.
- Cover the exposed area of your worktable with a non-reflective plank that will cover the entire workspace.
  - As an example, an MDF plank can be used.
  - ⚠ Warning: Failure to place the panel in position that totally covers the workspace may present a fire hazard.
- With the cover tray removed, find the expose Tray Interlock Switch on the interior right-hand side.
  - 
- Move the Tray Interlock Switch into a closed position by pushing down on the switch and sliding the nearby metal bracket to the right.
  - Never leave the switch in this position after completing your work.
  - When you are finished, reenable the Switch before leaving the work area.
  - 
- Flip the Rotary (Toggle) Switch on the right-hand side from Standard to Rotary to deactivate the standard Y-axis motors and drivers and activate the Rotary drivers.
  - 

- Connect the small 6-pin connector of the Rotary Cable to the Rotary Motor as shown below if it hasn't been connected yet.
  - 

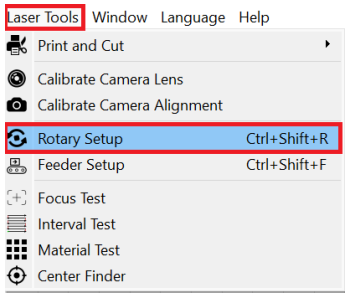
- Adjust / move the Rotary Axis rollers to the appropriate axis based on your part diameter by using the Roller Adjustment Knobs.
    - Unscrew the desired knob, manually pull that roller away from the motor shaft end and then place the roller on the desired available motor shaft and slot.
    - Please make sure to secure the rollers once they are moved by tightening the knobs.
    - Depending on the diameter of your part, you may need to put Risers at the bottom four corners of the Desktop Evo by placing them under the current feet.
    - Please note that the Risers may only come with the Desktop EVO when a Rotary is ordered with the machine.
    - 
    - 
    - 
- Connect the big 4-pin connector of the Rotary cable to the Y Axis Connector port on the left-hand side of the interior of the machine.
    - 
- Place the Rotary on the left-hand side of the workspace as desired/needed and align the support frame flush with the left side of the workspace.

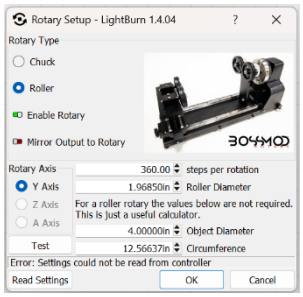
- Place your workpiece on the rollers and then gently move the gantry forward as needed to align the laser head with the center of your workpiece.
- Turn the Desktop EVO back ON and allow the head to go home.
- Once the machine has finished the home sequence, use the arrows on the Control Panel to bring the laser head over top of your workpiece, and then press the Origin button on the Control Panel where you would like the file to start.
- Enable the rotary axis function on your RDWorks V8 software by locating the Enable rotating function under the User tab and choose Yes, then set your Circle Pulse and Diameter settings and click OK.





- If you have upgraded to the Lightburn Software, enable the Rotary axis function on your Lightburn Software by clicking Laser Tools and then Rotary Setup, and making sure that Enable Rotary is ON (Green).





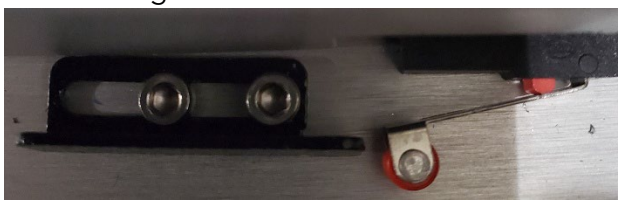
- Measure and fill in the object Diameter.
  - To measure Diameter, you can use either a ruler or a caliper, but a caliper provides a more accurate reading.
  - For a curved-surface object, take the average value of the Diameter of the actual engraving range of the measured object (The average value of the left, middle and right of the engraving range position).
- ⚠ Warning: **ONLY** engrave objects that the distance between its surface to the top of the laser mounting board is 50.8 mm or less.
- Adjust the Circle Pulse parameter as needed.
  - Do not forget to update the parameters of your workpiece every time you change to an object with a different diameter.
- You should now be ready to run your file.
  - We recommend placing painters' tape on your workpiece and running the first file with very little power, just enough to mark the tape and not the workpiece, so you

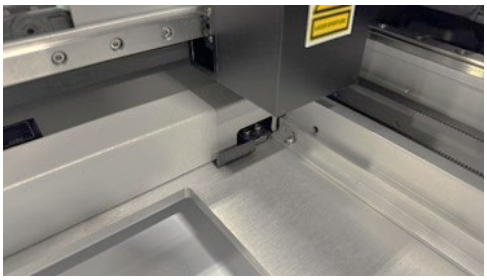
can see the design results and make the necessary tweaks prior to marking on the workpiece itself.

8.8 Disconnecting the Desktop Evo Rotary

Please follow these steps ***only*** after you have finished using the Desktop EVO Rotary.

- Turn the Desktop EVO OFF.
- Gently slide the gantry forward.
- Flip the Rotary Switch on the right-hand side from Rotary to Standard to activate the standard Y-axis motors and drivers and deactivate the Rotary drivers.
  - 

- Disconnect the Rotary cable from the Y Axis Connector port on the left-hand side.
- Remove the Desktop EVO Rotary from the machine.
- Remove the non-reflective plank cover from the machine.
- Move the Tray Interlock Switch into an opened position by sliding the nearby metal bracket on the right-hand side to the left.
  - 
- Reinstall the cover tray and honeycomb back into the machine.
  - Please make sure that the cover tray reengages the Tray Interlock Switch or the machine will not run.
  - NOTE: Once you have completed this setup, the cover tray will engage this interlock.



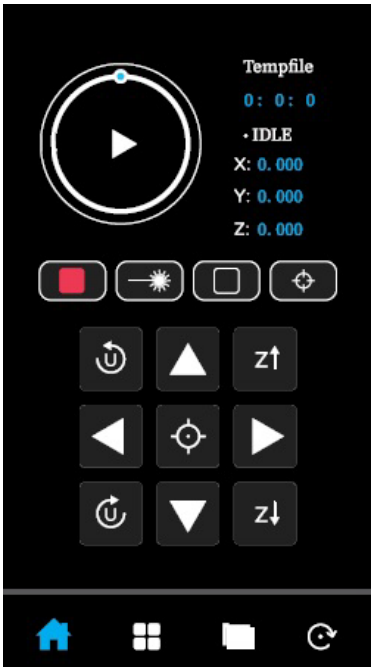
- Gently move the gantry back.
- Turn the Desktop EVO ON and let it finish the homing sequence.
- Disable the Rotary axis function on your RDWorks or Lightburn Software.

9. Operating Your Boss Desktop EVO

9.1 Introduction to Your Touchscreen

9.1a Home Menu

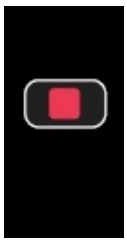
After turning on your Boss Desktop EVO, your touch screen will illuminate with a display that is like the image on the right-hand side of the page.



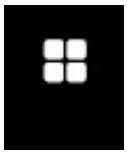
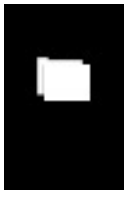
This touchscreen will be your controller of the EVO Desktop. It is where you will select files, set your positioning, start your file, and so much more!

To ensure you feel comfortable operating your Boss Desktop EVO, we will review what each button/icon is, what it does, or how it controls the machine.

Feel free to bookmark this page or print it out so you can reference it while running your EVO Desktop.

Button	Function	Definition / Purpose
	Progress Bar	The progress bar will be shown between the inner and outer circle that surrounds the Start / Pause function. As your file is running, the progress bar will begin to fill with color to showcase the progress of your file.
	Start & Pause	The Start & Pause function will be located on the home menu of the touchscreen on the top left-hand side. The ▶ icon will appear when the machine is currently not in use and ready for a file to be run. The ⏸ symbol will appear when the machine is currently in use and a file/job can be paused.
	Stop	The Stop function can be seen on the left-hand side of the home screen menu, identifiable by the red square. This button can be used to stop a file completely while being run. Be careful when using the Stop button, as your file will not resume if the Stop button is pressed. If you need to pause the laser and resume a file, be sure to press the Pause button.
	Laser / Pulse	The Laser / Pulse function can be found on the right-hand side of the Stop button. This button is used to test the dot size or for troubleshooting purposes.

Button	Function	Definition / Purpose
		If using the Laser / Pulse button with the door open, safety glasses should be worn to protect the eyes of the operator and any bystanders.
	Frame	The Frame function can be located on the right-hand side of the Laser / Pulse button on the home menu of the touchscreen. This button will allow you to see where your laser will cut and/or engrave the file on your piece of material. This function can assist you in framing your artwork on a piece of material to ensure the positioning of your file is accurate.
	Auto Focus	The Auto Focus function can be located on the right-hand side of the Frame button. The Auto Focus button allows for the laser head to position itself at the appropriate focal depth from the material to ensure the laser cut and engraves as efficiently as possible. When the Auto Focus button is pressed, it will cause the laser head to jog down, touching the material, then jogging back up to the appropriate height. ***It is important to remember that Auto Focus should only be used on solid materials like wood or plastic. Triggering the Auto Focus on very thin or flexible material like paper or foam can cause damage to the laser head and honeycomb table, as well as set the focal depth at an inappropriate height.**
	Left & Right Arrow / X-Axis Arrows	The Left & Right Arrow buttons, otherwise known as the X-Axis Arrow buttons, can be seen on the 3x3 grid on the home menu of the touchscreen. These arrows will allow you to move your laser head left or right along the X-Axis.
	Up & Down Arrow / Y-Axis Arrows	The Up & Down Arrow functions, otherwise known as the Y-Axis Arrow buttons, can be seen on the 3x3 grid on the home menu of the touchscreen. These arrows will allow you to move your laser head up or down along the Y-Axis.
	Z-Axis Movement	The Z-Axis functions are located on the 3x3 grid of the home menu of the touchscreen. These buttons will allow you to move your laser head up and down along the Z-Axis, in simple terms, move the laser head closer to the worktable or farther away. This function can be used to manually focus your laser head, as described later in this manual.
	U-Axis Movement	The U-Axis Buttons are located on the 3x3 grid of the home menu of the touchscreen. These buttons are for when using the rotary for the Boss Desktop EVO, allowing you to rotate your rotary clockwise or counterclockwise.

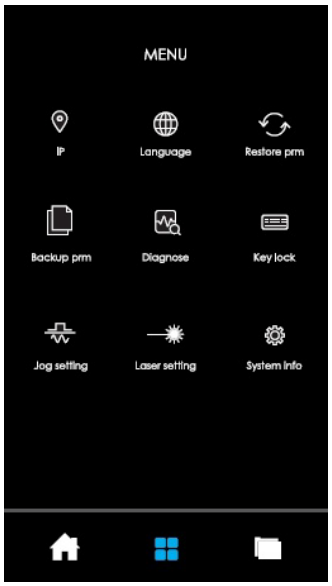
Button	Function	Definition / Purpose
	Origin	The Origin function is in the middle of the 3x3 grid shown on the home menu of the touchscreen. This button allows you to set the origin of the selected file. Setting the origin tells the laser "This is where I want my file to be engraved/cut."
	Home Menu	The Home Menu icon will take you to the Home Menu so you can utilize any of the buttons/functions mentioned in section 9.1a
	Main Menu	The Main Menu icon is located at the bottom of the touchscreen. The Main Menu is where you will find options to change the preferred language, adjust laser settings, and look at system information. These items will be reviewed in Section 9.1b.
	Files	The Files icon is located at the bottom of the touchscreen. This button will allow you to access files that have been sent to the EVO Desktop for engraving and/or cutting. You will use this button to select a file that has been sent to the laser from your compatible design software, like LightBurn.
	Reset	The Reset icon is located on the bottom right-hand side of the Home Menu. This button will reset your laser without having to turn off the machine, which is healthier for the machine than a full shut down of power. This function can be used to reposition or "home" the laser head without turning off the machine. An example of when to use this function is if the laser head skipped or lost positioning. *It is important to remember that the Reset function will stop the file in the middle of a run, it will not resume the file.

9.1b Main Menu

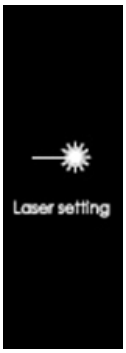
The Main Menu of your Boss Desktop EVO is where you will find machine settings, preferences, and information, such as, options to adjust laser settings, change your preferred language, and look at system information.

We will review the buttons/functions located on the Main Menu throughout this section. The Main Menu can be found by pressing the icon consisting of four squares at the very bottom of the touchscreen on any menu, as shown in the image to the right-hand side.

It is important to be careful when adjusting machine settings for the Boss Desktop EVO. If you are unsure of changing something on the Main Menu, please contact Boss Laser Technical Support to ensure your EVO continues to perform as it should.



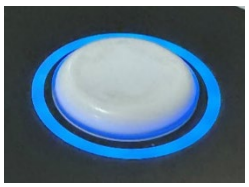
Button	Function	Definition / Purpose
	IP	The IP interface is used for setting up the EVO's IP address. After pressing the IP icon, the current IP address of the EVO will be shown. To modify the IP Address, press the dialog box, and a small keyboard will appear. Input the desired IP address and press "OK."
	Language	The Language interface is used for changing the language the machine will display text in. To change the language of the machine, press the Language icon. When the language window opens, the highlighted language is the current language the machine is set to. To change this, press the desired language and press "OK" to confirm the change.
	Restore PRM	The Restore PRM interface is used to restore the machine to its factory default settings and parameters for Jog Mode, Step Length, Pulse Mode, and Laser Time.
	Backup PRM	The Backup PRM interface is where you would be able to select backup parameters for the machine for the Jog Mode, Step Length, Pulse Mode, and Laser Time.

Button	Function	Definition / Purpose
	Diagnose	The Diagnose interface will display the input/output (I/O) ports information for the EVO Desktop. Pressing the Diagnose icon will show system hardware information.
	Key Lock	Pressing the Key Lock will lock the home interface. If the interface is locked, the parameters such as current processing file name, processing progress, and processing time, amongst other parameters will be displayed normally, but only locking operations can be performed. Once the interface has been unlocked, the screen will return to the normal home interface. If the unlocking is unsuccessful, the screen will return to the locked home interface.
	Jog Setting	The Jog Setting allows you to choose the type of laser head movement, the two options are “Jog” and “Continuous.” The laser will be set to Continuous by default. Setting the machine to “Jog” would allow the laser head to move a set distance in millimeters when you press the arrow buttons on the Home Screen. Most often, the mode should be set to “Continuous” unless you are troubleshooting the machine.
	Laser Setting	The Laser Setting allows you to select the type of laser mode you wish to use; the two options are “Pulse” and “Continuous Wave (CW).” When set to “Pulse,” each time you press the Start button, the laser will emit the laser beam for the time entered in milliseconds. Setting the machine to “Continuous Wave (CW)” would allow the machine to fire the laser continuously once the Start button is pressed until the Start button is released.
	System Info	System Info allows you to see the control board’s information for the Boss Desktop EVO.

9.1c Emission Indicator Button

The emission indicator can be seen in the images below. The emission indicator is a safety feature and will glow blue when the machine is emitting a laser beam.

Idle/Ready State



File is Running & the Laser is Firing

A safety interlock has been disengaged

9.1d Emergency Stop Button

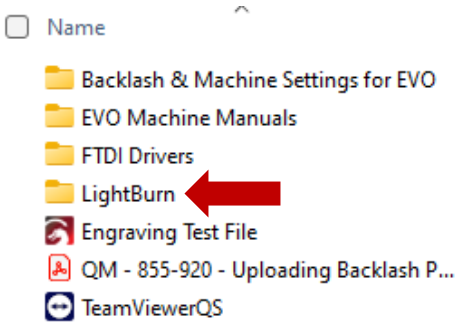
The Emergency Stop button can be seen in the image to the right. The Emergency Stop is a safety feature and should be used in case of an emergency. If the button is engaged, it will be pushed down. If the emergency stop is in the up position, it is disengaged. For your machine to turn ON, the Emergency Stop must be disengaged.

9.2 Software Installation

Your Boss Desktop EVO machine will come standard with the RDWorks/LaserWorks V8 software, there is an option to upgrade to the LightBurn software. If interested in upgrading, there is a download for a free 30-day Trial on your USB drive that was in your Toolbox.

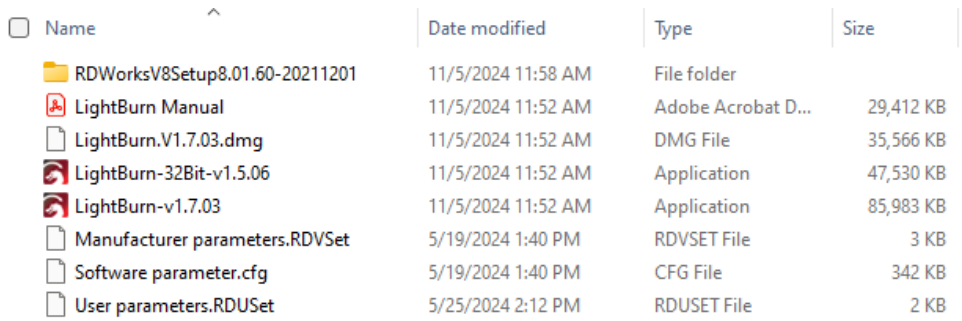
To download Lightburn or RDWorks/LaserWorks V8, plug the USB drive into the computer you will be using to send files to the Boss Desktop EVO. On this USB drive, there will be different folders and files, it is important to keep this USB drive somewhere safe, so you do not lose it.

After plugging in the USB drive into your computer, open the folder labeled "LightBurn". This will house both the download for RDWorks/LaserWorks V8 and LightBurn. After opening the "LightBurn" folder, you will see the LightBurn software download available, as well as a folder that is labeled "RDWorksV8Setup8.01.60-20211201".



If downloading LightBurn, double click on the LightBurn download labeled "LightBurn-v1.7.03" (The version may vary based on the time you purchased your Boss Desktop EVO. Download the most recent version on your USB drive).

If downloading RDWorks/LaserWorks V8, double-click the folder labeled "LaserWORKS v8.01.60," then double-click the file labeled "RDWorksV8Setup8.01.60-20211201" (The version may vary based on the time you purchased LightBurn, download the most recent version).



Name	Date modified	Type	Size
RDWorksV8Setup8.01.60-20211201	11/5/2024 11:58 AM	File folder	
LightBurn Manual	11/5/2024 11:52 AM	Adobe Acrobat D...	29,412 KB
LightBurn.V1.7.03.dmg	11/5/2024 11:52 AM	DMG File	35,566 KB
LightBurn-32Bit-v1.5.06	11/5/2024 11:52 AM	Application	47,530 KB
LightBurn-v1.7.03	11/5/2024 11:52 AM	Application	85,983 KB
Manufacturer parameters.RDVSet	5/19/2024 1:40 PM	RDVSET File	3 KB
Software parameter.cfg	5/19/2024 1:40 PM	CFG File	342 KB
User parameters.RDUSet	5/25/2024 2:12 PM	RDUSET File	2 KB

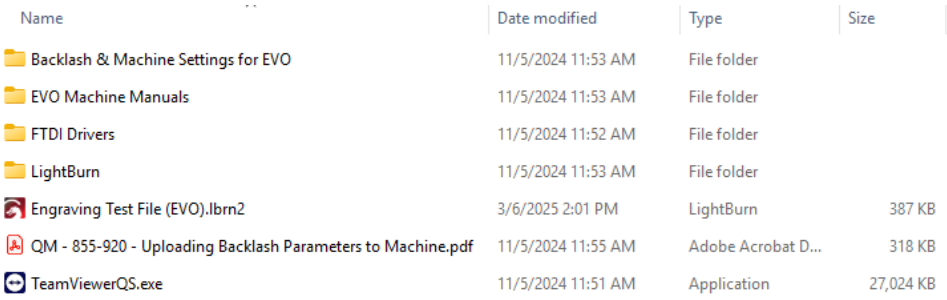
After initiating the download of your software, use the QR code below to download the installation instructions for your appropriate software.

Lightburn Software Installation Guide

RDWorks/LaserWorks Installation Guide

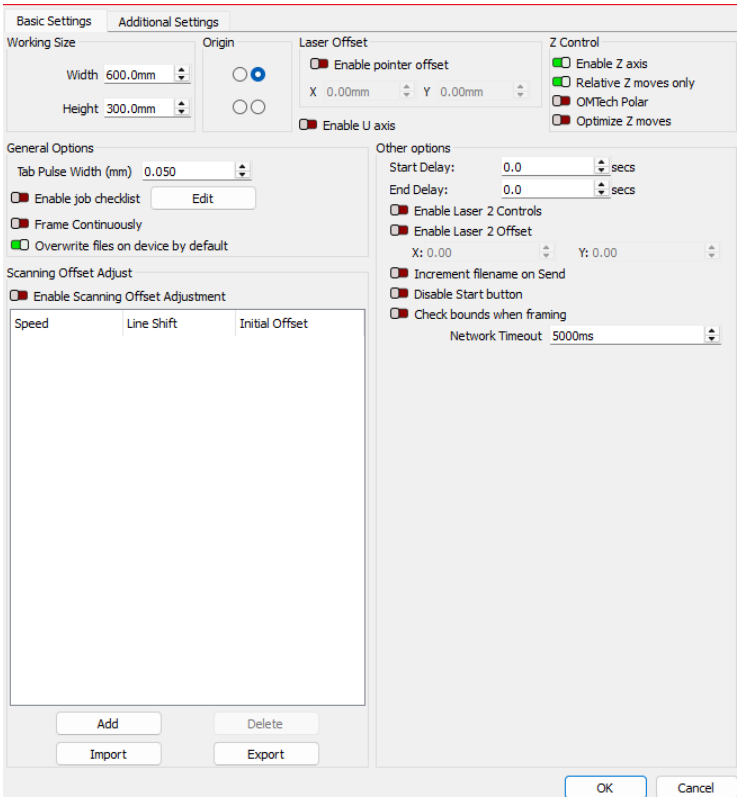
9.3 Upload Backlash Parameters for the Boss Desktop EVO

First, locate your Boss Laser USB Flash Drive that comes with your machine. Next, plug your USB into the computer that you will be operating your laser machine with. Within the USB drive, there will be a folder containing your Backlash Parameters, see the image below for reference.



Note: Before continuing, make sure you have the latest version of LightBurn installed on your computer. You will need to have version **0.9.24 or later** for this function to be available.

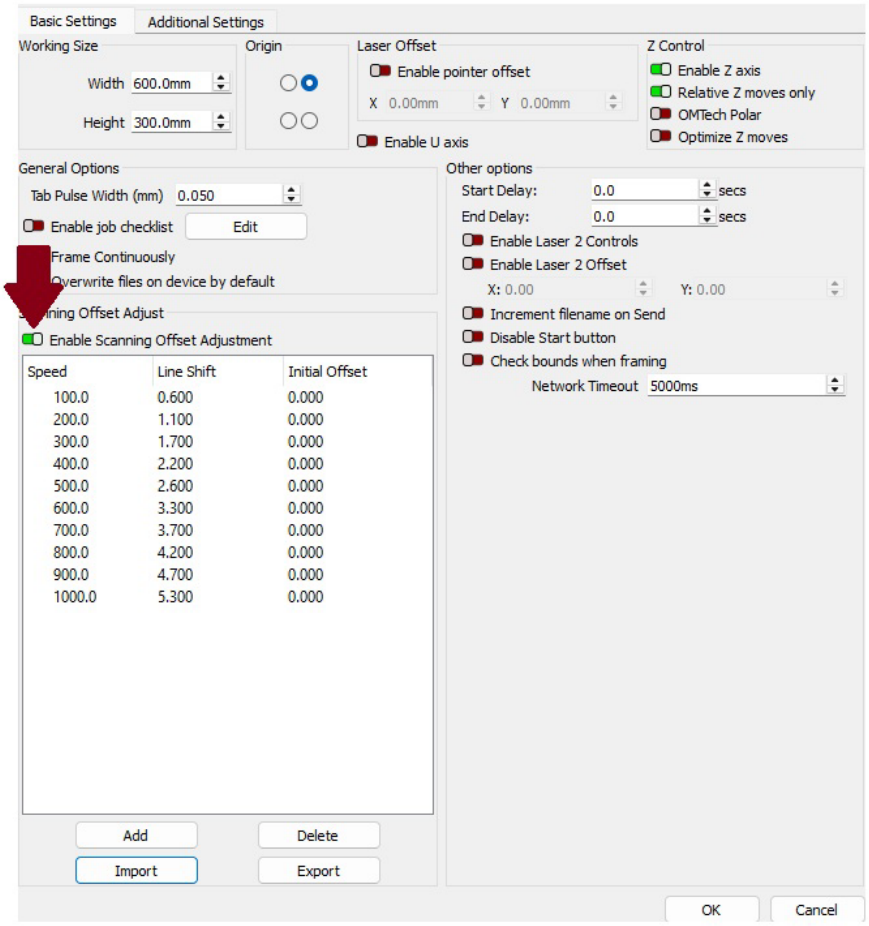
Next, open your Lightburn Software and navigate to the top-left hand corner of the screen. Click "Edit" and then click "Device Settings" from the dropdown menu. The device settings will look like image below.



Upload Backlash Parameters for the Boss Desktop EVO

In "Device Settings" click the "Import" button located on the bottom left-hand side of the window. After clicking "Import" locate the folder with your Backlash files inside. Find the file titled "EVO Backlash Settings.lbso" in the **Backlash & Machine Settings for EVO folder**."

After you select the file and it has been uploaded to the "Device Settings" window, the "Scanning Offset Adjustment" section should automatically populate a list of Speeds and Line Shift Parameters, see example below.



Be sure that the "Enable Scanning Offset Adjustment" toggle is turned ON prior to continuing, see example above indicated by the arrow. After that toggle is switched ON, click "OK."

You have now successfully imported your Backlash Parameters in Lightburn for your machine.

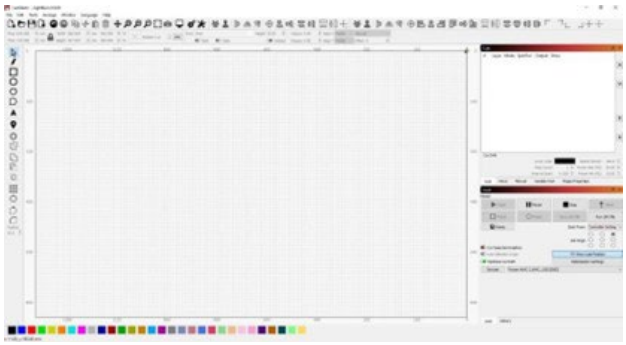
Note: The backlash settings are file specific. For any changes made to the backlash settings to take effect, you will need to re-download the file into the machine.

9.4 Running your First File on the Boss Desktop EVO

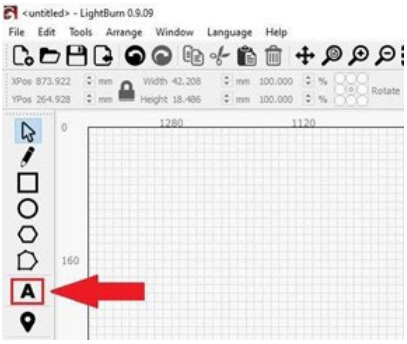
If using LightBurn, continue to section 9.4a below. If you use RDWorks/LaserWorks, skip to Section 9.4b on page 47.

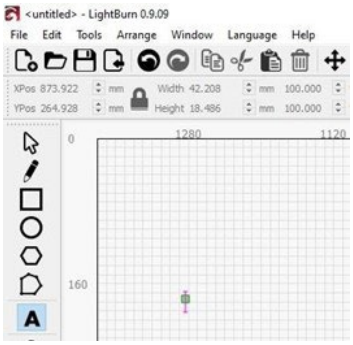
9.4a "Hello World" Using LightBurn

After installing LightBurn and adding your Boss Desktop EVO as a new Device in LightBurn, you are ready to engrave your first file. If LightBurn is not already open, open the LightBurn software, your screen should look like the image on the right-hand side.

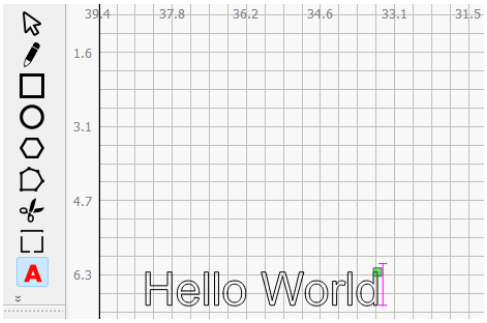


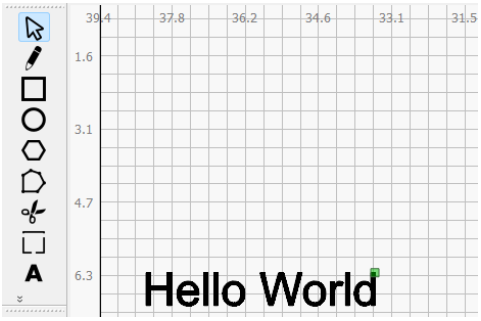
On the left-hand side of the screen click the Text icon. This icon is the letter "A," as shown below in the image on the left-hand side. Once you have selected the Text icon, click anywhere on the grid space in Lightburn and a text cursor will appear, as shown in the image below on the right-hand side.





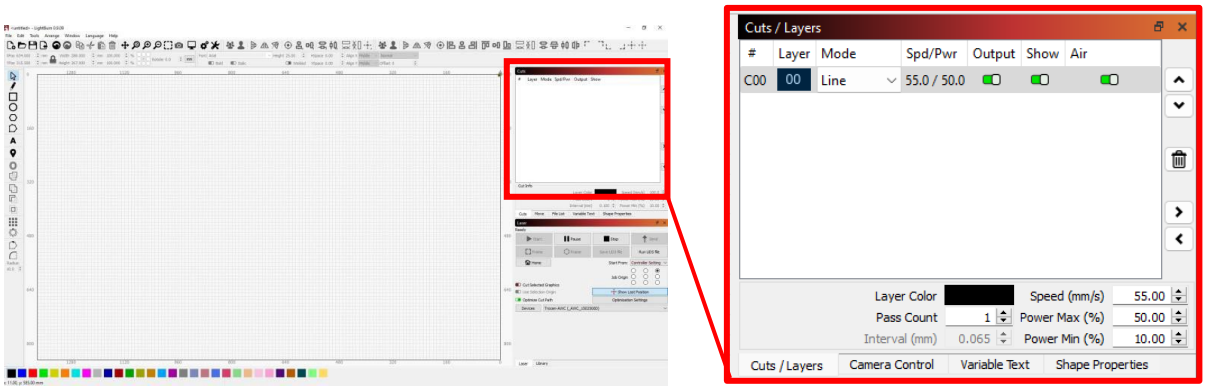
For this first file, we are going to type "Hello World," as shown in the image below on the left-hand side. As you can see, the "Hello World" text is an outline. This means that the laser is going to cut that layer of the file or just engrave lines (depending on the layer settings), whereas if the text is filled in, it would be filled in as shown in the image below on the right-hand side.



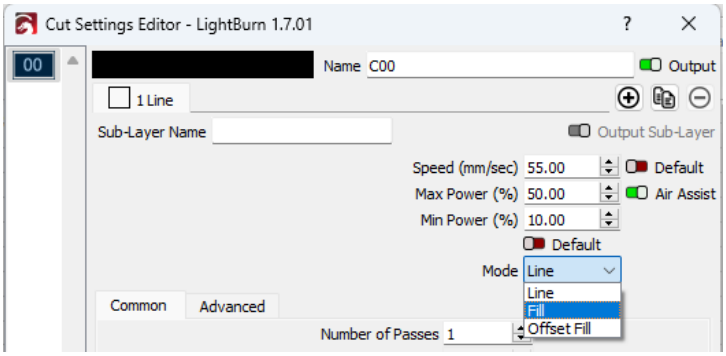


Running Your First File – Hello World

For this exercise, we are going to engrave this file. The mode will need to change from a "Line" layer to a "Fill" layer, as well as change the settings so it will engrave properly. To do this, locate the "Cuts / Layers" window on the right-hand side of the screen in LightBurn, as shown in the image below.



Now that you have located the "Cuts / Layers" window, double-click on the layer to open the layer settings window. After that window has opened, the first thing you will need to change is the "Mode" settings from a "Line" to a "Fill," as shown below.



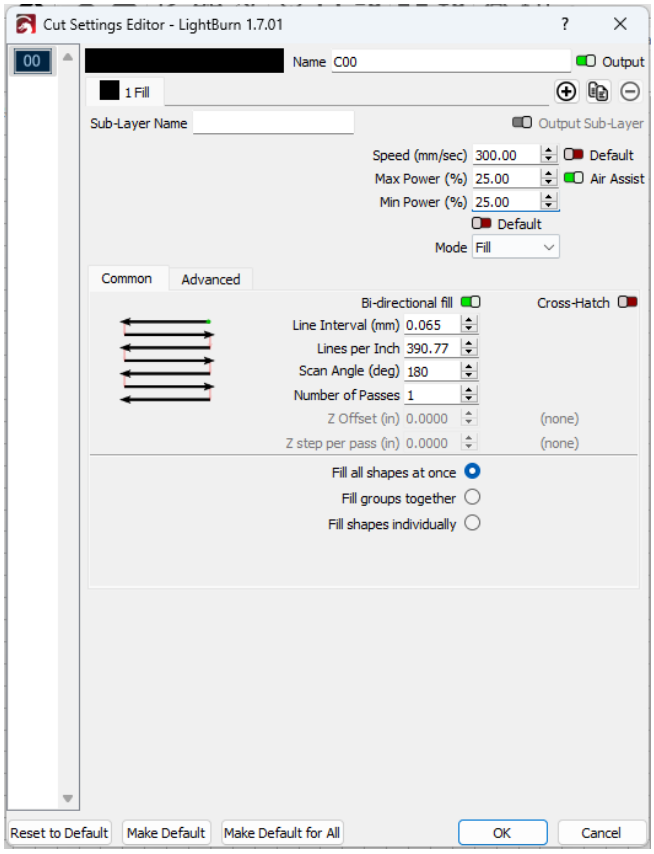
Now that the layer has been set to "Fill," we can change the settings for our Speed, Power, and the Line Interval. In the same window you change your layer mode, change the following settings:

- Speed (mm/s): 300mm/s.
  - Speed will vary depending on your file (size, detail, proximity to the edge of the table, etc.)
  - The speed is limited to a maximum output of 1,000mm/s.
- Max Power (%): 25%
- Min Power (%): 25%
  - In most instances, your maximum and minimum powers will be the same, but in some instances, you may need or want to set them at different percentages.

- An example of this may be cutting materials like wood. The laser may slow down as it cuts curves, potentially creating a burned edge. You can turn down the minimum power as the laser slows down to cut more intricate details.

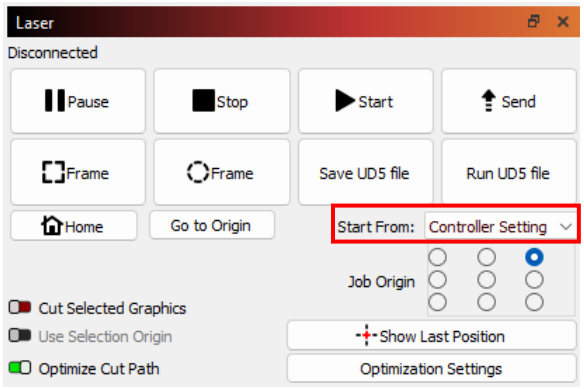
- Line Interval (mm): 0.065mm
  - Adjusting the line interval will adjust the distance in which the laser fills an engraving layer, the smaller your line interval, the more lines per inch and the more detailed the engraving. However, having a smaller line interval will increase the time it takes to engrave a file because the laser must make more passes.

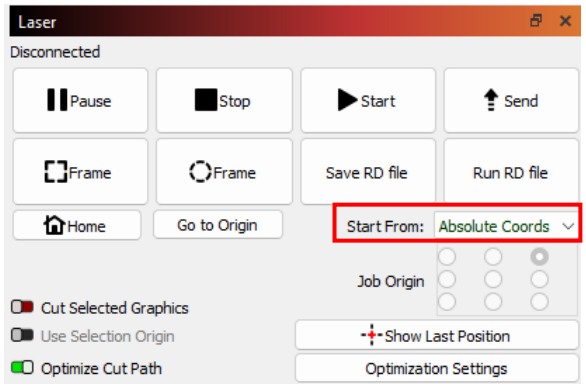
Once you have adjusted all the necessary settings in LightBurn, press the "OK" button on the bottom right-hand side of the pop-up settings window to save the settings.



After saving the settings for your "Hello World" layer, the "Start From:" position needs to be changed. To do this, locate the "Laser" options section of LightBurn on the right-hand side of the LightBurn software, as shown in the next image on the left.

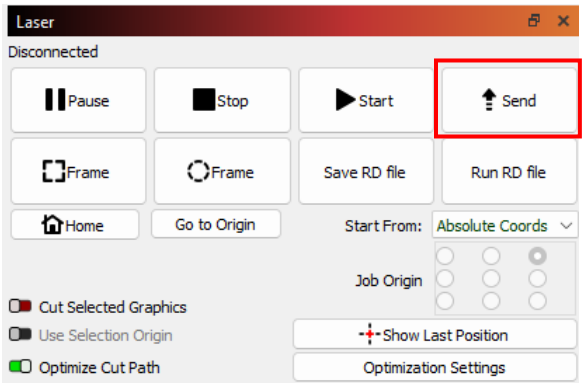
After locating the "Start From:" setting, change it from "Controller Setting" to "Absolute Coordinates/Absolute Coords," as shown in the next image to the right. Depending on where the artwork (for this example, "Hello Word") is placed on the grid space, this is where the laser head will accurately move to in respect to the worktable and begin the engraving/cutting process.

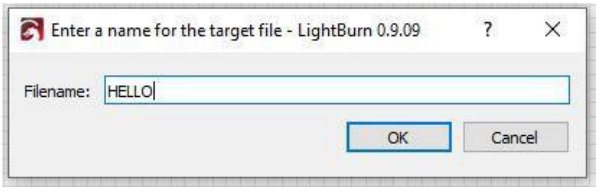




The next step in this exercise is sending the file to the laser machine. Prior to doing this, be sure the black USB cable is plugged into the machine and your computer for a successful file transfer, the machine must be turned on for this.

Now locate the "Send" button, as shown in the image on the left below. After clicking the "Send" button, a new window will appear, allowing you to name the file, we will name this file "HELLO," as shown in the image below on the right. After naming the file, click the "OK" button.



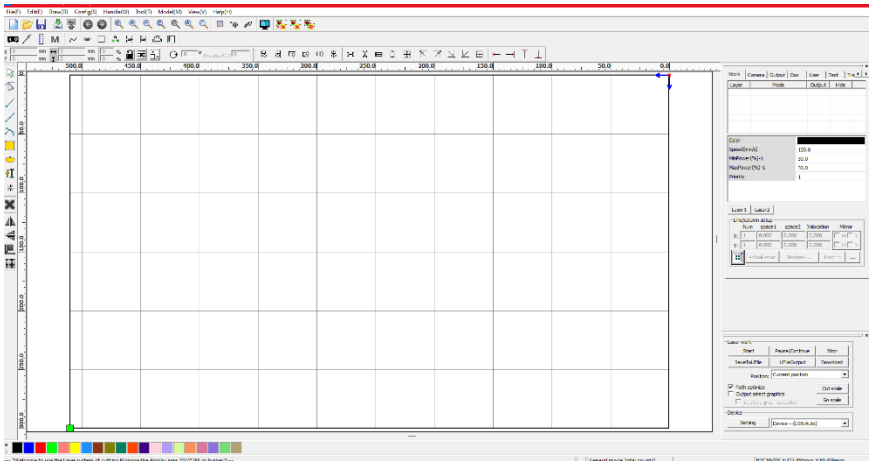


To continue with the "Hello World" exercise, skip to section 9.5 Selecting the File on Your Boss Desktop EVO on page 50 of this manual.

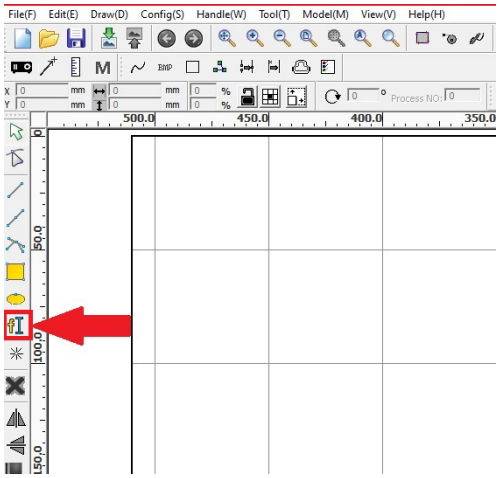
9.4b "Hello World" Using RDWorks/LaserWorks

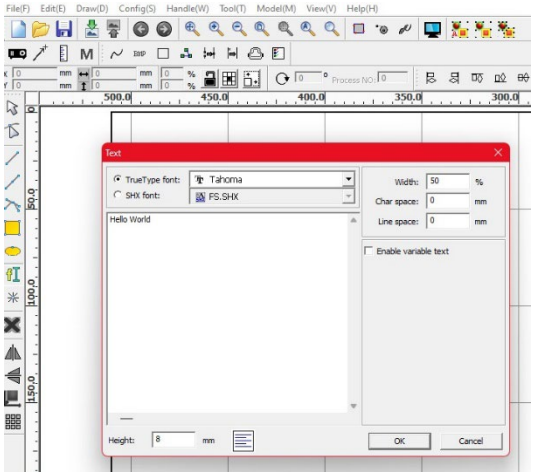
After installing RDWorks/LaserWorks and adding your Boss Desktop EVO as a new Device, you are ready to engrave your first file. If RDWorks/LaserWorks is not already open, open the RDWorks/LaserWorks software. Your screen should look like the following image.

Running Your First File – Hello World

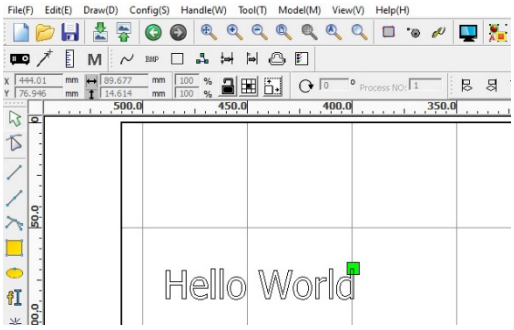


On the left-hand side of the screen in RDWorks/LaserWorks, click the Text icon, as shown below in the image on the left. Once you have selected the Text icon, click anywhere on the grid space. A new window will appear with a text box as shown in the image below on the right-hand side. Type “Hello World” in the text box and press “OK” to save the changes.



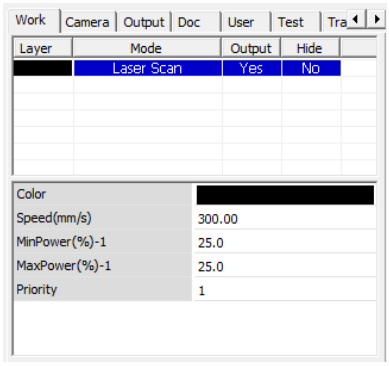


After clicking “OK,” the window should close and the “Hello World” text should appear on the grid space, as shown in the image to the right.



Running Your First File – Hello World

The next step is to change the settings of the "Hello World" layer we just created. To do this, locate the "Work" Tab on the top right-hand side of RDWorks/LaserWorks. It will look like the image on the right.

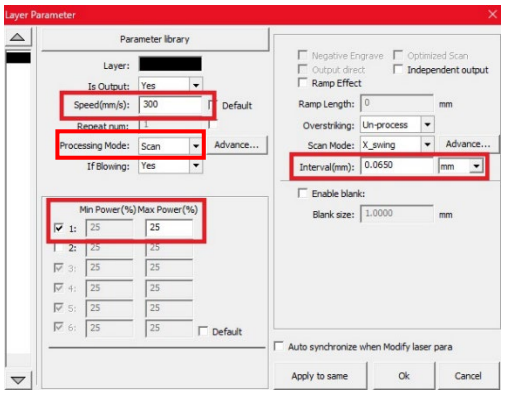


After locating the "Work" tab, double-click on the "Hello World" layer, it should be the only layer in the "Work" tab.

A new window should pop up. This window is called the "Layer Parameter" window. This is where you will adjust the settings of your layer. We will be changing our settings for the Processing Mode, Speed, Power, and Line Interval.

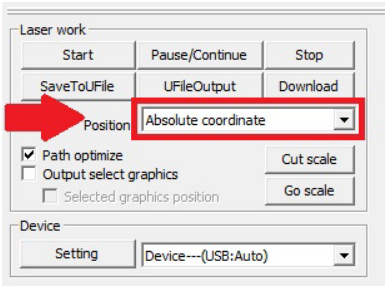
- Processing Mode: Scan
  - A "Scan" layer is for engraving, whereas a "Line" layer is for cutting or thin line engravings.
- Speed (mm/s): 300mm/s.
  - Speed will vary depending on your file (size, detail, proximity to the edge of the table, etc.)
  - The speed is limited to a maximum output of 1,000mm/s.
- Max Power (%): 25%
- Min Power (%): 25%
  - In most instances, your maximum and minimum powers will be the same, but in some instances, you may need or want to set them at different percentages.
  - An example of this may be cutting materials like wood. The laser may slow down as it cuts curves, potentially creating a burned edge. You can turn down the minimum power as the laser slows down to cut more intricate details.
- Line Interval (mm): 0.065mm
  - Adjusting the line interval will adjust the distance in which the laser fills an engraving layer. The smaller your line interval, the more lines per inch, and the more detailed the engraving. However, having a smaller line interval will increase the time it takes to engrave a file because the laser must make power passes.

Once you have adjusted all the necessary settings in LightBurn, press the "OK" button on the bottom right-hand side of the pop-up settings window to save the settings, as shown in the image on the right.



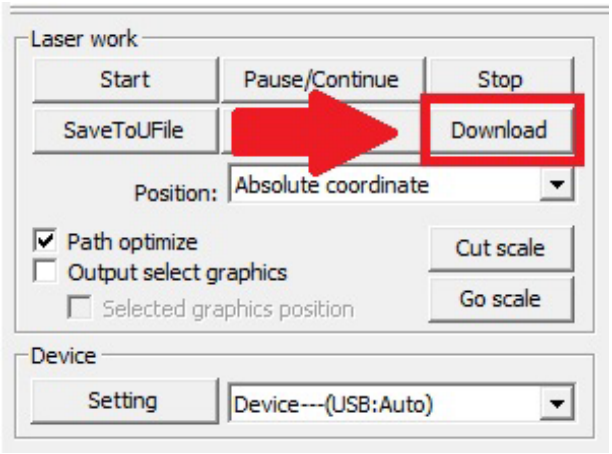
After saving the settings for your "Hello World" layer, the "Position" setting needs to be changed. To do this, locate the "Laser work" options section of RDWorks/LaserWorks on the right-hand side of the software.

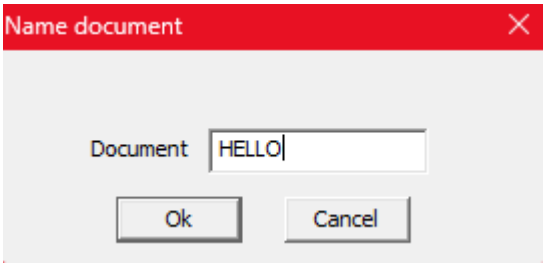
After locating the "Position" setting, change it to "Absolute Coordinates/Absolute Coords," as shown in the image to the right. Depending on where the artwork is placed on the grid space (for this example, "Hello Word"), this is where the laser head will accurately move to in respect to the worktable and begin the engraving/cutting process.



The next step in this exercise is sending the file to the laser machine. Prior to doing this, be sure the black USB cable is plugged into the machine and your computer for a successful file transfer, the machine must be turned on for this.

Now locate the "Download" button, as shown in the image on the left below. After clicking the "Download" button, a new window will appear, allowing you to name the file. We will name this file "HELLO," as shown in the image below on the right. After naming the file, click the "OK" button.



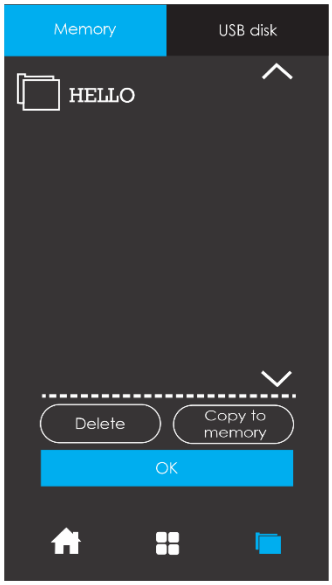


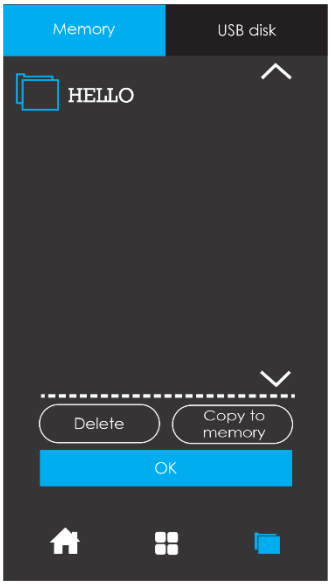
9.5 Selecting the File on Your Boss Desktop EVO

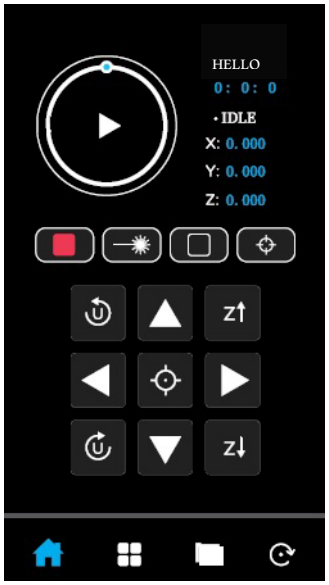
After sending the file to your Boss Desktop EVO from RDWorks/Laserworks or LightBurn, navigate to the touchscreen of the EVO Desktop and press the "Files" icon at the bottom of the touchscreen, as shown in the image below.

This will open the list of files currently loaded onto your Boss Desktop EVO Desktop, as shown in the next image on the left-hand side. Find the one titled "HELLO" and press it to select it. Once the file is selected, it will turn blue, as shown in the middle of the next image. After selecting the file "Hello," press the "OK" button at the bottom of the screen.

After selecting "OK," you should be taken back to the home screen and the file name should be seen at the top right-hand side of the home screen, as shown in the next image on the right-hand side.



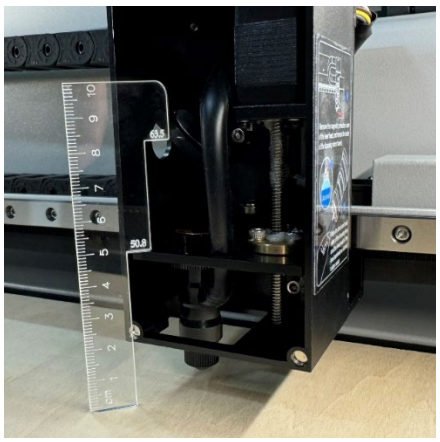




9.6 Focusing the Laser Head

Now that your "Hello World" file has been sent to the machine and selected to be run, we need to manually focus the lens within the laser head. Focusing the lens is an important part of running this laser machine, the lens must be focused each time a material with a different thickness is placed on the working table. The laser uses highly focused light energy to do its job and the focusing of the lens is necessary. Thankfully, it is quite easy.

The first step in focusing your laser head is placing your material on the worktable. Next is locating the focal guide from your toolbox. The focal guide will need to be placed on the bracket that holds the lens housing, inside the enclosure, as shown in the image below to the right.



While the focal guide sits on the ledge of the bracket, use the Z-up and Z-down arrow keys on the touchscreen to move the lens housing up or down. (It is best to hold your focal guide in place while

you move the laser head). Once the material meets the focal guide at the bottom, your lens is now focused!

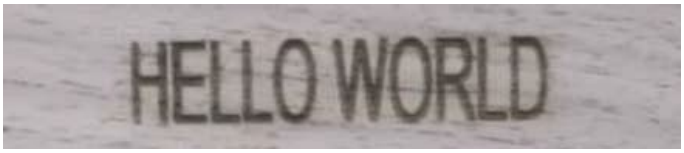
NOTE: Always be careful when focusing your lens. Do not allow the material to collide with the lens housing. This can cause SERIOUS DAMAGE to the laser head bracket/assembly.

You can also use the **Autofocus Function**  as well. Just make sure you have the laser head above your material. Then when the autofocus button is pressed, the laser head will move down towards the material then bounce back up to the correct focal height that was initially set by the factory.

9.7 Running Your "Hello World" File

Once the file is sent to the machine and the laser head is appropriately focused on the material, you can now run your file by pressing the **white button** on the machine with a green LED light or the "Play" button on the touchscreen.

After the job is finished, open the lid, and see that the "HELLO WORLD" has been engraved according to the settings applied, as shown below.



This concludes the exercise and now that all the steps have been provided for you to run this job correctly, you will be able to apply these steps to different applications to help you run your machine efficiently and effectively.

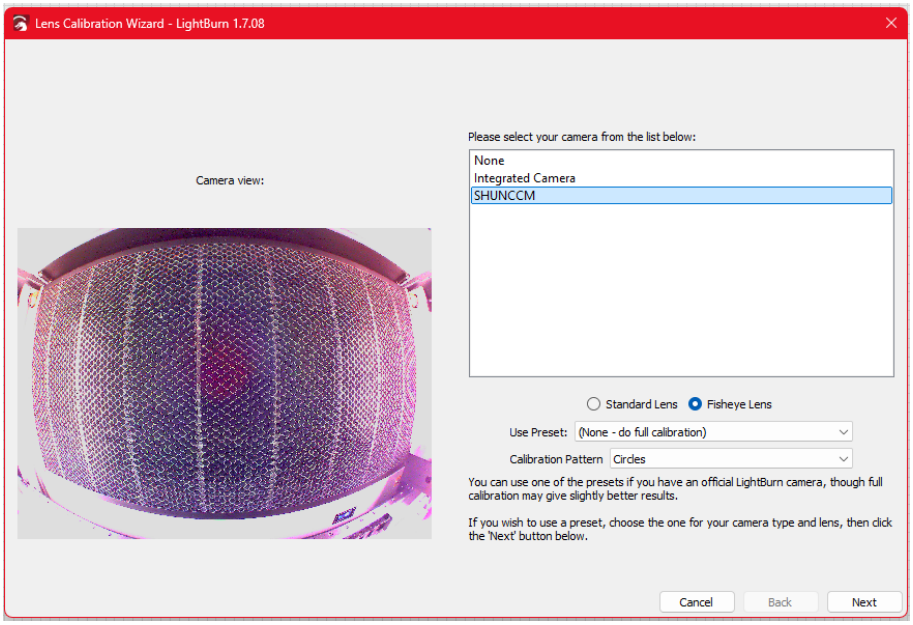
10. Calibrating the Camera

LightBurn Software Camera Calibration:

Disclaimer: The EVO camera is intended to provide a full view of the bed and your application. It is not intended to be used for precise positioning or alignment of your material.

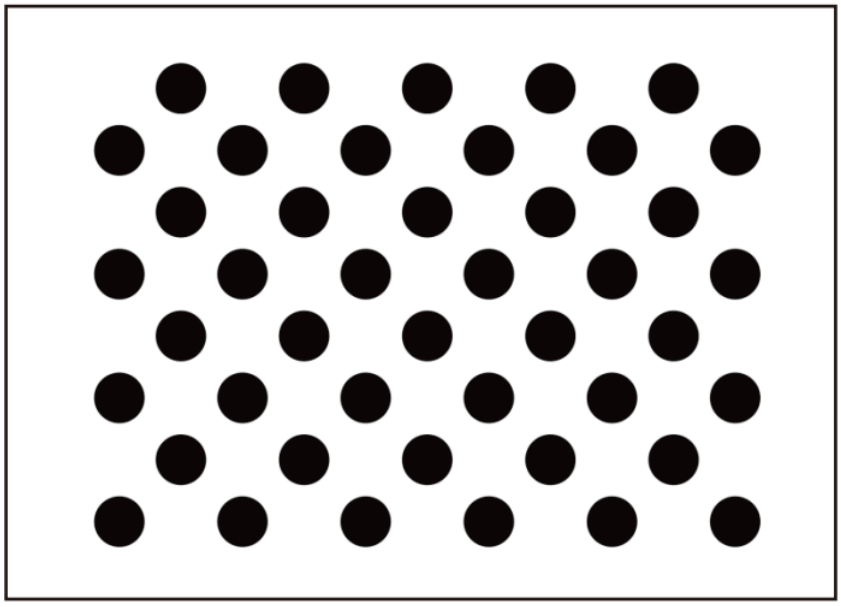
Step 1. Connect the USB A to USB A cable from the Camera Cable port located at the back of the machine and into your PC. Then turn on the machine and launch LightBurn.

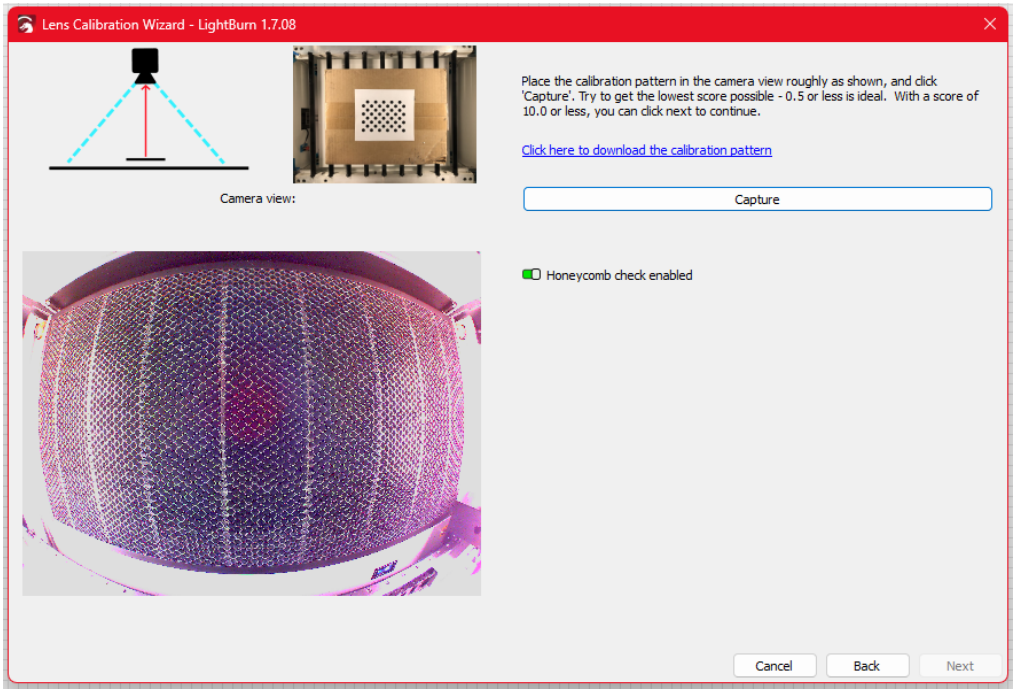
Step 2. Run the Camera Lens Calibration Wizard in LightBurn. This will be under **Laser Tools > Calibrate Camera Lens.** The Lens Calibration Wizard window should appear, and your EVO camera (SUNCCM) should be listed under the camera list. Select this and the **Fisheye Lens** option and the **None – do full calibration** preset. If your version of LightBurn is at least **1.7.00**, there is a new calibration pattern option, **AprilTags**, as well as the Circles that can be selected for this calibration process. For this exercise, we will use the Circles pattern.



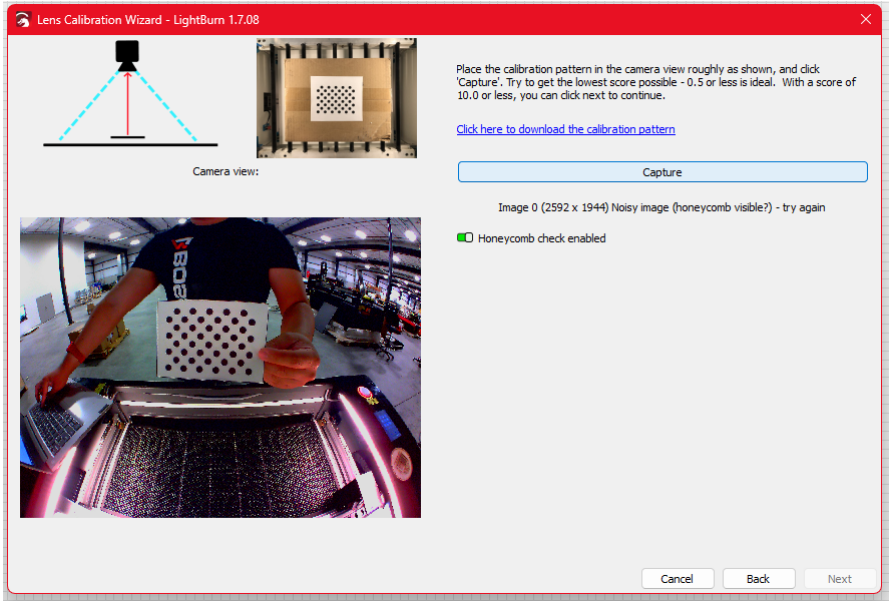
Calibrating the Camera

Step 3. This circle image below will need to be printed out. Please resize (with proportional scaling) to approximately 148mm x 105mm (5.8" x 4.1") and it should have at least 6mm (1/4") of white space around the pattern. Taping/Sticking this onto a hard surface (ex. cardboard, piece of wood, etc.) will help to keep the image flat to provide more accurate readings during the calibration. If any part of the circle pattern is not flat, it can reduce the accuracy rating in the coming steps.





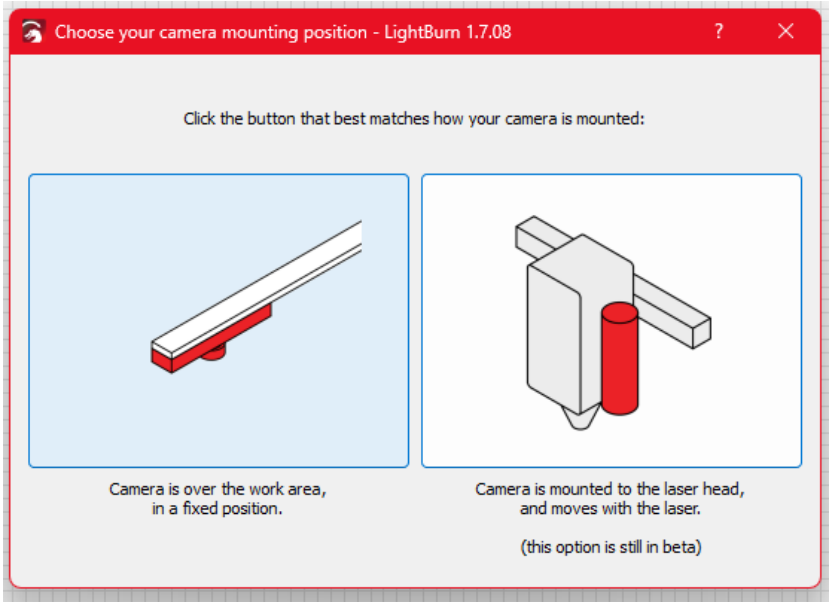
Step 4. Click on the Capture button while holding up the circle pattern as shown below. Please note that the circle pattern will need to be held up as shown below at each pattern location image capture during the Lens Calibration Wizard process. The circle pattern should never be inside the machine during this **Step 4** procedure.



After clicking on the Capture button, there will be a score you will receive located under the Capture button. You want to try and get the lowest score possible – 0.5 or less is ideal. If you do get a score of 1.0 or lower, you can continue to the next pattern location by following the image on the Lens Calibration Wizard. When you don't get a score lower than 1.0, you can recapture the current image and/or go back to the beginning and try again.

Once all the required captured images are done, you can click on **Finish** to complete the Lens Calibration Wizard.

Step 5. Now with the lens calibrated, we are going to move on to the **Lens Camera Alignment Wizard**. This is located under **Laser Tools > Calibrate Camera Alignment.** Once launched, select the correct button to match the camera mounted in the machine, highlighted in blue below:



Step 6. Select the EVO camera listed then click **Next**. From here, please follow the steps within the Camera Alignment Wizard to finish up this alignment process. Once you've finished all the necessary steps, click **Finish**.

Step 7. Now that everything is aligned, open the Camera Control window in LightBurn. This should be a separate tab in the area where you have the Cuts / Layers, Move, and File List tabs. If you do not see this, you may need to enable this window by going to **Window > Camera Control** at the top of the screen's toolbar. Click the **Update Overlay** button to capture the workspace of the EVO. If the tolerance between the software and actual marking ***is within 1 - 2mm***, the camera calibration was done successfully. If it is outside this, you will need to run the Lens Calibration & Alignment again.

11. Maintaining Your Boss Desktop EVO

11.1 Optics

Before any machine leaves our facility, it is put through a quality assurance process and these optics are already aligned and ready for use. Therefore, there is no need for adjustment to the mirrors, tube, or bracket. There is a possibility that the optics may have shifted in transit but, we recommend calling technical support prior to making ANY adjustments.

The Laser Tube and optics are the heart of the machine. It is important to understand the basics which will allow you to get the most out of your machine. Once tuned, the laser machine should stay aligned for months of work. Check the alignment of the optics once a month to ensure no bumping or mechanical failure has occurred.

11.1a Focal Lens

This is the lens that is used to focus the laser beam, and it should be cleaned at least once per week. It is possible to clean the lens while it is mounted in the focal lens tube. If there is any type of fire or large issue with smoke or fumes, it is advised to check and clean the lens.

When cleaning the lens, use denatured alcohol as the cleaning solvent and then use a lens tissue or cotton swabs to apply the solvent. Lens cleanings alcohol-free wipes will also do the trick, but we recommend having a Boss Laser Lens Cleaning Kit, which can be purchased on our website. DO NOT scrape the lens! Only use soft fabrics and approved solvents when cleaning the lens. Only use a soft swirling motion when applying the solvent and then use a dry swab in a soft swirling motion to evaporate the solvent completely.

The lens surface is difficult to see in normal lighting. To see any dirt on the lens, look at the reflection in the lens. (Think of this like when you take glasses off your face to see any smudges or scratches in the lenses. You usually cannot see them until you have held them away from your face and in a different angle of light).

Make sure not to leave any dirt, smudges, or water on your focal lens. The focal lens should be replaced if it is cracked, chipped, the coating is scratched, the core of the lens is darkened, the coating is wearing off or any other considerable damage is found that could impact the laser beam passing through the focal lens. Some minor blemishes are acceptable, but these problems waste power and will result in reduced laser power at the target material. Any dirt, contamination, or damage to the lens will cause the lens to deteriorate more quickly.

11.1b Mirror #3

This mirror is in the laser head and located directly above the focal lens and needs to be cleaned at least once a month.

If there is any incident of fire or any substantial amounts of smoke/fumes, it is advised for you to check the mirror and clean it. It is possible for this mirror to be cleaned in the mounting bracket, but it is highly advised that the mirror be removed from the bracket and cleaned.

When cleaning the mirror, use denatured alcohol as the cleaning solvent. Use a lens tissue or cotton swabs to apply the solvent. Lens cleaning alcohol-free wipes will also do the trick, but we recommend having a Boss Laser Lens Cleaning Kit, which can be purchased on our website. DO NOT scrape the mirror, only use soft fabrics and approved solvents when cleaning the mirror. Only use a soft swirling motion when applying the solvent, then use a dry swab in a soft swirling motion to evaporate the solvent completely.

Make sure not to leave any dirt, smudges, or water on your focal mirror. The mirror should be replaced if it is pitted/scratched, rusted, discolored from heat damage, or any other considerable damage is found. Some minor blemishes are acceptable, but these problems waste power and will result in reduced laser power at the target material. Any dirt, contamination, or damage to the mirror will cause the lens to deteriorate more quickly.

11.2 Mechanical Components

11.2a Nuts & Bolts

If you are concerned about these items rusting, then you should apply a thin coating of silicone base grease. One application per year should suffice.

11.2b Rubber Belts

The rubber belts should be checked for appropriate tension at least every six months. You should expect the two side belts to be the same tension and should be adjusted and tensioned on the same maintenance schedule. These side belts work together to move the gantry from front to back. If one belt is tensioned more often than the other, that belt could become stretched out more than the other. It is difficult to describe the appropriate tension of the belt but, there should be no slack, sagging or flapping. If the belt is worn on one side, it would be best to check the bearing alignment and ensure that there is no damage. There are many laser machine designs but the method of changing the belt tension should not be too complex. It is normally a method of tightening a screw and then applying a lock nut to keep the screw in place.

11.3 Machine Component Maintenance

11.3a Air Filters

If a Fume Extractor was purchased with the machine, there will be filters installed within that Fume Extractor. These air filters work best when air can move freely from one side to the other while catching dust, fumes, and other debris within the air. If the air filter is dirty, the air pressure will be reduced. The main application of a Fume Extractor is to clean the air and absorb the dangerous smells and fumes that some material can produce. Some of these gases can be caustic, nauseating, volatile, corrosive, or even deadly. It is best to use multiple stages of filters to catch particles of varied sizes. New filters can be ordered from Boss Laser by contacting Sales.

11.3b Exhaust Fan & Tubing

Cleaning the Exhaust Fan and tubing is crucial for maintaining proper ventilation, ensuring optimal performance, and preventing fire hazards. Be sure to clean your exhaust system every 1-3 months to ensure the longevity and safety of your Boss Desktop EVO.

To start, turn OFF and unplug the EVO, and disconnect the tubing from the machine and Exhaust Fan. Use a vacuum cleaner to remove dust and debris from the fan blades, housing, and tubing. Be gentle to avoid damaging the components. If necessary, use a soft-bristled brush to clean the fan blades and hard-to-reach areas. For tubing, a pipe-cleaning brush works well to remove residue. After cleaning, inspect the fan and tubing for any damage. If you notice damage, contact Technical Support to see if any components should be replaced.

Reassemble the exhaust system, ensuring all connections are secure and aligned properly. Finally, power on the machine to verify that the exhaust system is functioning effectively.

11.3c Water Chiller & Coolant

First, automotive antifreeze should NEVER be used as a laser coolant. Use only distilled water. In the absence of distilled water, tap water can be used as a last resort). The coolant should always be clean and clear. It is a frequent problem for the coolant to become infested with mold. This often will look like murky green water with algae built up on the inner walls of the hoses. This issue can be solved in just a few steps.

1. Flush out the bad water from the water reservoir.
2. Create absolution of water and 20% bleach.
3. Cycle the bleach-water solution for about 30 minutes then flush out this water.
4. The safety flow sensor could also be full of mold; the best solution is to take it apart and clean it with soft brush or pipe cleaners.
    i. Make sure to re-assemble the sensor correctly and without leaks.
    ii. It is possible that harsh cleaners could creep into the sensor electronics and cause permanent damage.

✎Note: The water should be changed AT LEAST once a month.

11.4 Storage, Environment, & Maintenance Schedule

11.4a Storage of the Boss Desktop EVO

Keep the laser machine in a clean, dry, and warm location with no vibration. Make sure there are NO MATERIAL(S) left on the worktable when the machine is not in use.

11.4b Environment & Humidity

Humidity can cause the metal parts of the laser machine to rust. All metal at some point can rust. One unexpected metal surface is the laser mirrors, and it is best to try and control the humidity level in the laser work area. Clean the mirrors and check for oxidation as a problem. Replace the mirrors that do not meet your expectations of performance.

11.4c Maintenance Schedule

The easiest way to follow a cleaning schedule is to use a calendar and keep it close to your machine. Write the dates that you want to do maintenance on. Some maintenance is needed on a regular basis while other cleaning could be an immediate requirement after a fire or a large amount of smoke or fumes. A laser machine that has a lack of maintenance could result in a laser that is not working properly or at all and remember that lack of maintenance can void your warranty.

11.4d Machine Memory

There should always be little to no files stored on your machine's memory. Many files can cause the controller card to have a slower reaction time. If the machine's memory is pushed to its limits, it has the possibility to crash the controller card and/or lock up the entire machine. This machine is just like a computer, if you acquire many files over time, it will cause the operating system to slow down.

12. Common Diagnostic Solutions

12.1 Laser is Not Turning On

First, make sure that the electrical outlet is working, plug in a lamp or phone charger to ensure that it is the machine and not the outlet. Check the simple stuff first.

- Is the Emergency Stop Button pressed?
- Is the ON/OFF power switch (located at the back) turned into the off position?
- Is the cord plugged into the machine and electrical outlet?

12.2 Machine is Turning on, But Not Firing

The laser has multiple protection modes built in to prevent injuries or damage to the machine. Problems with any of these modes can prevent the machine from firing but the laser head will still move around as if the machine is working correctly.

- Check to see if the water pump is working and flowing water throughout the tube.
    - If no water flow is detected by the machine, it will not fire.
- Ensure that the machine hood & front tray are closed.
    - Our machines come with interlocks to prevent the machine operating when the hood and front tray are open and not secured.

12.3 X or Y Axis Slop Over Error / Frame Over Error

When running the “Frame” and/or “Start-Pause” button, the slop/frame error message will appear only if the object(s)/image(s) being executed on the worktable is overextending (too big or not enough space on the worktable for the file to be done). You may also be getting a red-light indicator around the white button when this issue occurs.