



## Laser Marking Machine

BB-L3

### User manual

- ◆ Make sure to read the User Manual before using this machine.
- ◆ This product's appearance and specifications are subject to change without notice for performance improvement and ease of use some parts may be different the pictures shown in this Manual.

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# Precautions for use

Please be sure to read and follow the instructions below for safe use.

Intended use: BB-L3 is intended for laser marking

- The instructions below are intended to prevent personal injury and property damages.
- Please read carefully and use the machine properly.



Caution

If you do not follow these instructions, injury or property damage may occur.



Warning

If you do not follow these instructions, users may be seriously injured.

## ■ Precautions related to power



Warning

Do not use damaged cord or loosened outlet.  
➤ It may cause electric shock or fire.



Warning

Do not put multiple power plugs into one inlet simultaneously. It may cause fire due to overheated inlet.



Warning

Do not pull a plug by the cord. Do not touch a power plug with wet hands.



Caution

When the machine is not in use for a long period of time, pull out the power plug.



Warning

If smoke comes out from the machine during use, turn off the machine immediately and call the dealer or our service center.



Warning

Plug-in the provided power cable only to the grounded outlet (power mains). If the outlet (power mains) is not ground-wired, set the grounding separately.

## ■ Precautions related to use



Warning

Do not use this machine in a place with oil, smoke, moisture, dust or water.  
➤ It may cause electric shock or fire.



Warning

Do not put a candle or cigarette button the machine. Avoid any heating apparatus like heater when using this machine.

➤ It may cause failure or fire due to overheating.



Warning

Be sure to place the machine body only on a stable level surface.



Warning

Be sure not to be caught or jammed between the paths of each axis of the machine.



Caution

When temperature falls below freezing point, the machine may not work properly. In this case, please sustain the room temperature in the place where you use this machine for normal operation. Please make sure the temperature in the place where you use the does not fall below the freezing point.



Warning

Do not put water or small metal materials on the machine.

➤ Due to negligence or vibration of the machine, the materials may fall and cause injury, fire or failure by overheating or short circuiting.

➤ If water gets into the machine, it may cause electric shock or fire.



Warning

Do not disassemble or modify the machine.  
➤ It may cause fire, electric shock or failure. Please contact the dealer or our service center for inspection, calibration and repair.



Caution

Performance and quality of marking and cutting may vary depending on materials such as highly reflective materials (silver).



Caution

We will not be held responsible for damage caused to machine by misuse or poor care.



Warning

Be sure to keep out of the reach of toddlers and children. Their curiosity or carelessness may cause injury.

# Precautions on laser machines



The tests carried out demonstrate the safety and reliability of the laser when it is used properly. However, the operator must be aware of the precautionary regulations aimed at avoiding possible harm to people or damage to the equipment itself.



**Incorrect application of the safety regulations during the practical use of the machine described in this manual can lead the user to harmful exposure to laser radiation. Follow the procedures carefully. RED Technology Co.,LTD declines all liability for damage caused by negligence in applying the indicated safety regulations.**



The control and operation of the laser generator (CLASS 4) in a way other than its intended purpose may result in the exposure of dangerous laser radiation. Be careful that if a body part (e.g., eyes, skin, etc.) is exposed to such laser radiation, you could suffer serious damage.

Class IV lasers generate risks not only by direct or reflected radiation but also by diffused radiation. These laser sources can pose a significant hazard for the skin and the risk of fire of inflammable materials. For these reasons, the user must establish all radiation containment measures to ensure that it is terminated at the end of its useful process. Furthermore, the operator must be informed of the risks from exposure to laser radiation and must be equipped with the appropriate PPE (personal protective equipment), which consists of certified protective goggles against laser radiation.



Make sure that you are not exposed to the laser directly. It may result in blindness. Do not stare at the specular/diffuse reflection of laser without personal protective equipment.

⟨RADIATION VIEWING CONDITIONS⟩

The laser output by the resonator is to be considered a highly collimated and intense monochromatic light source. Thanks to these characteristics it can be considered a very

bright “point source”. This means that its “image” is then focalized on the Retina in a very small spot with dangerously high power density! If, on the other hand, the beam becomes divergent and scatters to a non-reflecting screen, there then will be an “extended viewing” of the image, with a significantly less dangerous power density. Therefore, different types of radiation viewing can be distinguished in relation to how the radiation itself can be accessed and consequently, different degrees of risk.

- Direct viewing of the laser beam

This type of viewing is the most dangerous and can occur at the outlet of the laser aperture, after removing the lenses. It must be avoided in every way! No protective goggles can be considered a valid means against direct viewing of the beam.

- Direct viewing of the beam after mirror reflection

This can occur by directing the beam on a reflective surface. Viewing a mirror reflected beam on a flat surface is extremely dangerous, just like direct viewing.

- Direct viewing of the beam at the output of an Optical fiber

Connecting the Optical fiber from the resonator. Viewing the beam is dangerous up to a significant distance. Filters and goggles cannot guarantee safety.

- Viewing the beam directly after focusing

This occurs if the laser beam is not extinguished on a suitable absorber at the end of its useful path. Viewing the beam is dangerous up to a significant distance. Filters and protective goggles can guarantee safety for brief exposure, as long as they are the right size and certified.

- Scattered viewing of the Laser beam after focusing

This is the most common viewing condition for equipment in an operative setting. Viewing the beam is not dangerous if not at a short distance, but adequate filters and Goggles can guarantee safety, even for long exposure.

***Do not stare at the specular/diffuse reflection of laser. It may result in blindness.***

Radiation is invisible however; being close to the visibility threshold causes the eye to receive it almost entirely with no pupillary reflex. If we add that it is generally very intense, it can be extremely harmful or lethal for the vision.

Certain precautions must be followed so as to avoid permanent personal injury.

All people who may be exposed to harmful laser radiation levels must know when the laser is active, and if so, they must wear protective eyewear.

Due to the high power, the laser integrated in the machine causes laser light to be reflected by flat surfaces. Reflected light is potentially dangerous to the eyes and skin. The electromagnetic emission with micrometric wavelength is located in the far infrared and is therefore invisible, so it is not clear where the reflected beams are directed.

- CAUTION: Direct viewing of a laser beam can cause irreversible damage to the eye.

- CAUTION: It is essential to protect yourself from the beams of reflected light because they can be sufficiently intense to cause permanent damage to the eyes or skin.

- CAUTION: The laser in question falls under class IV. Class IV lasers generate risks not only by direct or reflected radiation but also by diffused radiation. These laser sources can pose a significant hazard for the skin and the risk of fire of inflammable materials.



Make sure that your body part is not in the operating range. It may result in skin damage such as burns.



If subjected to intense laser radiation, even for a brief duration, or to less intense but long lasting radiation, both the cornea and the retina can burn and be irreparably damaged. This consequence is quite realistic in the case of direct viewing a class IV Laser beam. If subjected to direct focalized radiation, even the skin can burn. Furthermore, it must be considered that collateral radiation can coexist with the main radiation in the ultraviolet: long exposure can cause skin carcinoma.



**Do not use the machine for purposes other than those intended. Otherwise, you could be damaged by laser radiation.**

Appoint a laser safety manager and have him keep monitoring a laser risk and fully understand safety measures. According to each country's laws, the safety measures for the class-4 laser system are mandatory.

(During machine maintenance and control, make sure that the laser radiation is stopped, and safety goggles are put on. The eye/skin exposure to laser radiation can result in serious damage.)



In order not to reduce the safety level of the equipment, the User must adopt conforming behavior and in the best possible safe conditions. Therefore, the need arises to develop a Standard Operating Procedure (SOP) in relation to the maneuvers to be carried out for commissioning and decommissioning the equipment. This procedure, which is illustrated near the installation, must be used as a reference for the Operator and will be written in their own language.

Personnel training will be essential, which must be aimed at:

- Familiarizing with the operating procedures of the system.
- Knowledge of the biological effects of radiation on Eyes and Skin
- Understanding the need for Personal Protective Equipment (PPE)



**If you wear a pacemaker, do not come near the machine or work area.**

It generates electromagnetic waves and can cause malfunction to the heart rhythm device.

**NEVER dismantle or remodel the machine randomly.**

Otherwise, you could be exposed to laser radiation and suffer eye/skin damage. In addition, exposure to a high-voltage part can result in an electric shock.

An additional risk may be posed by a fire outbreak from processing materials other than those for which the equipment is intended.



- CAUTION: If the intended use of the source is changed, for example for material process applications, collateral risks may arise due to fumes and vapors being generated which may be irritating or toxic if not removed and filtered properly before releasing them back into the environment.
- CAUTION: Since there is a risk of fire when processing flammable materials, it is essential to follow the instructions provided by the manufacturer when commissioning the machine.
- CAUTION: Do not subject material to the laser radiation other than what the equipment was built for.

Electricity is certainly the most serious collateral risk associated with a laser device, which may also be fatal. This can arise when the warnings and procedures imposed by the equipment manufacturer are not observed. Unauthorized and inexperienced personnel must never carry out any type of intervention on the electrical part. The safety devices must never be removed and their efficiency must be checked regularly.

- **CAUTION: Do not modify the electrical part unless you are an expert.  
Do not remove the protective devices.**
- **CAUTION: When processing flammable materials, it is essential to follow the instructions provided by the manufacturer when commissioning the machine.**



Make sure that you have a system which emits the dust and haze which are generated during operation. The warranty does not cover the system damage or failure resulting from corrosive haze.

If, for example, during the processing in the intended use of the Laser source, the material is subjected to alterations and produces irritating and/or toxic fumes or vapors, these must be removed and filtered before releasing them back into the environment.

An additional risk may be posed by a fire outbreak from processing materials other than those for which the equipment is intended.

- **CAUTION: Do not subject material to the laser radiation other than what the equipment was built for.**
- **CAUTION: Since there is a risk of fire when processing flammable materials, such as plastics, it is essential to follow the instructions provided by the manufacturer when commissioning the machine.**

**If any defect is found, do not use the machine  
and contact the Service Center (+82-70-7011-0905) or seller.**

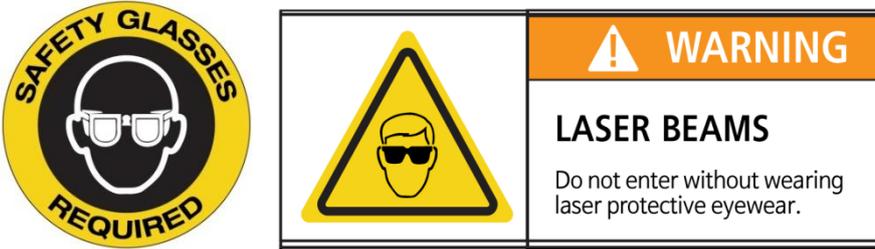
## <Safety Labels>

The laser system has seals in some points. For no reason whatsoever must the seals be broken or removed. The sealed parts, in fact, can only and exclusively be opened by the manufacturer. Labels and plates must not be removed or damaged. For any replacements, contact the seller or the manufacturer.

Breaking or removing seals affixed to the laser system by the manufacturer immediately renders the warranty on the entire laser system null and void.

## <Warning Labels>

This label indicates that the operator must be informed of the risks from exposure to laser radiation and must be equipped with the appropriate PPE (personal protective equipment), which consists of certified protective goggles against laser radiation.



This label indicates the presence of the laser without specifying the class it belongs to.



This label indicates the presence of the laser, specifying the class it belongs to.



## <For your safety>

Carefully read the warnings in this section before using the laser machine. Make sure that all warnings and instructions displayed on the machine are observed. The following warnings are indicated to ensure our machines are used safely and to prevent damage or injury to operators or other persons.

Make sure that you have taken all the precautions indicated in the manual; all precautions are important for personal and work safety.

### THE LASER MACHINE CAN BE DANGEROUS

Protect yourself and others from potential serious injury or death. Always wear protective eyewear. Keep children away from the machine. Persons with pacemakers must stay away from the machine, unless they have specific medical permission. Operators may be exposed to certain risks when using lasers. Laser machine is safe if the necessary precautions are adopted. Risks related to marking are limited to handling manufactured machines. The process itself is extremely safe. In any case, it is important to delegate

machine use only to authorized personnel. The installation, maintenance and repairs of the machine must be delegated to manufacture personnel or to its authorized engineers.

### **ELECTRICAL DISCHARGES CAN BE FATAL**

Contact with live electrical parts can have fatal consequences or cause severe burns. Incorrect installation or grounding the machine can be dangerous.

- Do not touch live parts. Remove the power cable from the power socket before installing or performing maintenance on the machine.
- Install and ground the machine properly, in accordance with the user manual and in full compliance with local regulations and standards.
- Turn the machine off after use.
- Do not use cables that are weak or damaged, with an insufficient section or poorly connected.
- Make sure the cables are positioned away from sources of heat.
- Use the device only if it is in perfect condition. Make sure that the damaged parts are immediately repaired or replaced.
- Make sure that all the cover panels remain fixed and in place.

### **SWITCH THE MACHINE OFF IMMEDIATELY IN CASE OF MALFUNCTIONING**

If smoke or unusual odors are emitted from the equipment, **immediately unplug the power cable**, while taking care to prevent burns or damage. Continuous use of the laser machine in such conditions can cause serious injury and/or damage. The device must only be examined by manufacture technical personnel or by their authorized engineers.

### **DO NOT ATTEMPT TO DISMANTLE THE EQUIPMENT**

The internal components of the device can cause injury. If the machine malfunctions, it must only be repaired by skilled manufacture personnel.

### **DO NOT USE IN THE PRESENCE OF FLAMMABLE GAS**

Prevent the risk of explosion or fire by not using the equipment in environments saturated with flammable gas with minimal ventilation. Always keep a fire extinguisher nearby.

### **FUMES AND GAS CAN BE HAZARDOUS TO HEALTH**

The laser processes produce fumes and gas. Inhaling these can be dangerous to human health.

- Keep your head away from the fumes. Do not inhale the fumes.
- Do not cover any part of the machine.
- Carefully read the instructions for the various types of materials that can be laser welded.
- It is preferable to use a large room specifically designed for the equipment to be used. If the room is small, make sure it is well ventilated.
- Do not weld near degreasing, cleaning or steaming areas. The heat can react with the vapors, thereby producing very toxic and irritating gas.
- Make sure the materials used do not contain impurities that could produce fumes or gas during laser marking.

### **LASER CAN GENERATE A FIRE OR EXPLOSION**

Sparks and overheating can be generated during the processing of the marking materials and cause a fire and/or burns. Accidental contact of the overheated parts with the gas cylinder could cause an explosion.

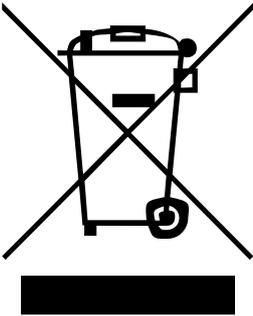
- Do not laser weld where the sparks could come into contact with flammable material.
- Remove all flammable objects found near the laser machine. If this is not possible, cover them correctly with flame retardant material.
- It is important to be aware of the risks of fire: always keep a fire extinguisher nearby.
- Actively supervise the machine during operation.

## LASER RADIATION CAN CAUSE INJURIES TO THE RETINA AND BURNS TO THE SKIN

Uncontrolled reflections of the LASER beam can cause burns or, in the worst case, irreversible damage to the retina. Never weld on reflective objects. **Keep children away when using the equipment.**

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## <WASTE SEPARATION>



This machine must be disposed of in special waste containers.

The following instructions are intended exclusively for cases where the equipment is used in European countries:

- This machine must be disposed of in special waste containers. Do not dispose of with household waste.
- For further information, please contact the local authorities responsible for waste disposal.

**\* For safe operations (Laser Class 1 Safety),  
Stay alert all the time when using the laser system.\***

## Laser generator specifications

This machine uses a laser generator. In accordance with IEC60825-1, JIS C6802 and FDA(CDRH) Part 1040.10, CLASS 4 was adopted.

- **CLASS 4: Approach to laser is very dangerous to the eyes and skin. An emitting laser may cause fire or explosion.**

Type	<u>Ytterbium Doped Fiber Laser</u>			
Model	BB-L3-20W	BB-L3-30W	BB-L3-60W	BB-L3-100W
Output	20W	30W	60W	100W
M <sup>2</sup>	<1.5		<1.8	
Maximum Pulse Energy	0.8mJ		1.5mJ	
Pulse Repetition Rate Range	25~600 KHz	37~600 KHz	1~4,000 KHz	
Pulse Width	200ns	200ns	2~500ns	
Speed Range	4,000mm/s			
Wavelength	1,064nm			
Output Beam Diameter	7.0±0.5mm			
Cooling Method	Air-cooled			
Polarization	Random			
Anti-Reflection Protection	Yes			
Built-in Guide Laser	Yes			
Class (Main Source)	Class 4			
Power Supply Voltage	24VDC		48VDC	
Dimension (mm)	245x200x65		325x260x75	350x280x112

In addition the red laser 'CLASS 2' is used as a guide laser.

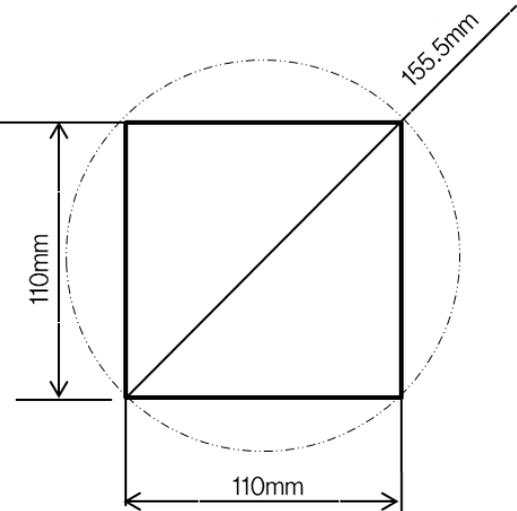
- **CLASS 2:** A Class 2 laser is relatively weak. It normally would not harm an eye unless a person deliberately stared into the beam. Laser protective eyewear is normally not necessary. A Class 2 laser is not a skin or materials burn hazard. However, even a Class 2 laser can be a distraction, glare or flash blindness hazard for pilots and drivers. NEVER aim any laser towards an aircraft or vehicle that is in motion.

Class	Class 2
Output	<1mW
Wavelength	650nm

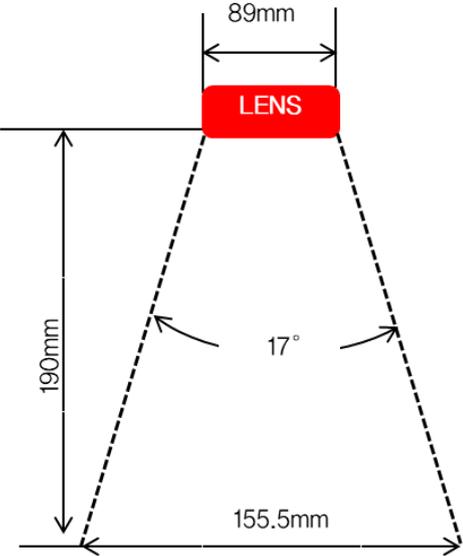
# Laser Range

If a body part or flammable material comes into the range of laser radiation, it may result in eye/skin damage or fire. Cover it with a proper shield which has decent reflection and thermal properties considering the risk of such range.

(The marked distance represents the maximum width. It may differ from actual values.)



[Marking Zone]



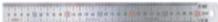
[Laser Range According to the Diagonal of Marking Zone]

# BB-L3

## 1. Contents of the box

The BB-L3 provides the following accessories.

Their composition may differ depending on the options.

Name		Picture	Quantity	Usage
BB-L3			1EA	Laser marking machine
Power Cable			1EA	Power supply ※ Use the power cable connected to the grounded outlet. Unless the outlet is grounded, separately ground the machine.
USB Cable			1EA	PC connection
Program Installation USB			1EA	Design & marking software installation USB
User Manual			1EA	Operating manual
Clamp Set	Clamp		1SET	Position support
	Clamp Bolt (M5-12mm)		4EA	For holding materials in place.
L-wrench (4mm)			1EA	Tool for tightening/replacement of bolt.
L-wrench (3mm)			1EA	Tool for setting the focus pointer.
L-wrench (2mm)			1EA	Tool for setting the focus pointer.
Ruler			1EA	
Clamp Pin (6Ø)			2EA	For holding an optional clamp in place.
Back port cover			1EA	For protecting the material from scratches. ※ Use the power cable (Right angled) and USB cable (Left angled).

\* Optional (Purchased separately)

Power Cable (Right angled)			1EA	Power supply ※ Use the power cable connected to the grounded outlet. Unless the outlet is grounded, separately ground the machine.
USB Extension Cable (Left angled)			1EA	PC connection
Medal Clamp Set	Medal Clamp		1EA	For holding a variety of shape of materials in place.
	Pin		6EA	For holding of irregular shaped material.
Medal Clamp Set (Center fixing type)	Medal Clamp (Center fixing type)		1EA	For holding a variety of shape of materials in place.
	Pin		6EA	For holding of irregular shaped material.
L type clamp			1EA	For holding a variety of shape of materials in place.
Rotary Clamp Set	Chuck Handle		2EA	-Rotary clamp-tightening handle - External device fine adjustment knob controlling handle
	Chuck Finger (4mm)		3EA	For holding rings when marking thin ring's inner/outer diameter
	Chuck Finger (2mm)		3EA	For holding <u>thin</u> rings when marking thin ring's inner/outer diameter
	Finger Skin		1SET	For protect chuck fingers.
	Finger Spanner		1EA	Tool for tightening chuck fingers.
	Auto Tilt Rotary Clamp		1EA	For holding ring materials in place. * <u>4mm chuck finger is included.</u>
	Anti-drop pin (6Ø) (18mm)		1EA	For preventing clamp falling.
Honeycomb Table Set	Honeycomb Table		1EA	For holding materials in place for cutting process.

	Honeycomb Table Tray		1EA	Tray for Honeycomb Table
Anti-Curling Clamp			1EA	For holding a thin plate in place.
Blower Set	Blower		1EA	Dust & smoke discharge
	Blower Hose (100Ø)		2EA	Blower connection hose (2.5M)
	Hose clamp (4inch)		3EA	For connecting to blower and hose. ※ <u>Please be careful of the cut surface of the hose clamp as it may cause injury.</u>
Auxiliary Power Device Set	Auxiliary Power Device		1EA	Auxiliary power device is required when using the dust collector.
	Power cable		2EA	Supplies power and connects to the machine.

※ There may be parts not homologous with the manual.

## 2. Specifications

Model	BB-L3-20W	BB-L3-30W	BB-L3-60W	BB-L3-100W
Laser safety classification	Class 1			
Dimensions	404 mm(W) x 590 mm(D) x 556 mm(H) / 16 in(W) x 23 in(D) x 22 in(H)			
Max.engraving area	110mm x 110mm / 4.3in x 4.3in			
Maximum material height	100mm / 3.94in			
Maximum Z-axis height	100mm / 3.94in			
Effective space inside the chamber	350 mm(W) x 170 mm(D) x 100 mm(H) / 13.7 in(W) x 6.6 in(D) x 3.9 in(H)			
Safety cover height (When open)	266 mm / 10.4 in (From base plate)			
Maximum material weight	20kg			
Weight	45kg	46kg	50kg	54kg
Power consumption	290W	340W	520W	730W
Cooling system	Air-cooling type			
Frequency	50/60Hz			
Operating voltage	AC 100~240V			
Blower power port	100~220V/2A ※ <u>Auxiliary Power Device must be used if the external blowers or dust collectors have more than 2 Ampere.</u>			
Temperature	15 - 35 C			
Humidity	10 - 90 %			
Purposes	Metal marking, Ring inner diameter marking, Ring outer diameter marking, etc.			

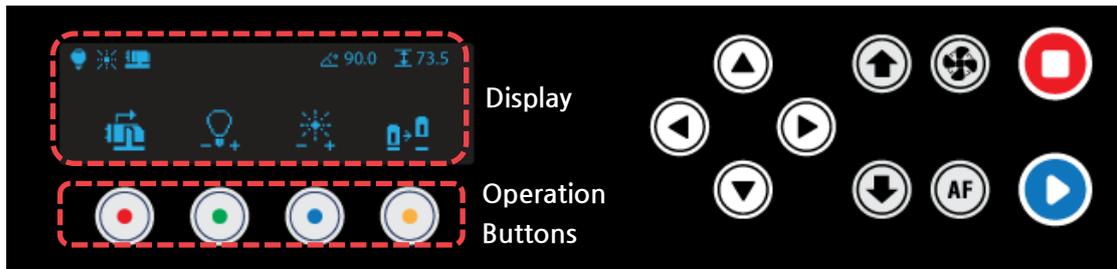
### 3. Descriptions

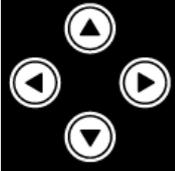
#### (1) Machine



A	Status Indicator	The device status can be checked through the blinking interval of the status indicator.
B	Power Switch	Turn on/off the power switch.
C	Safety Door	Press [Safety Door] to open/close the cover automatically. ※ Once the program is connected, the cover is automatically opened.
D	Laser-shielding Display	Protects the eyes from laser radiation during laser marking. ※ Wavelength to protect: 1064nm/ Optical density: OD6
E	Scan Head	 A laser irradiation part. Do not stare at the specular/diffuse reflection of laser. It may result in blindness.
F	Docking Station	Connects the rotary clamp with the machine.
G	Control Panel	Controls the power button and marking machine.
H	Emergency Switch	Emergency stop switch.
I	External device fine adjustment knob	Left and right fine movement of the rotary clamp position by using chuck handle.
J	Vacuum Inlet	Connects the duct hose to the outlet and removes dust generated during machine processing.
K	Outlet for Vacuum	Connects the blower power. <110~220V/2A> ※ <b>Auxiliary Power Device must be used if the external blowers or dust collectors have more than 2 Ampere.</b>
L	AC Power Inlet	Connects the power adapter and supplies power to the marking machine. ※ <b>Use the power cable connected to the grounded outlet. Unless the outlet is grounded, separately ground the machine.</b>
M	USB Port	Connects the USB cable plugged into the cable.
N	IO Port	Signal in/output terminal for external device connection ※ <b>The external IO port input to the machine must be 5V, 50mA or less.</b>

## (2) Keypad



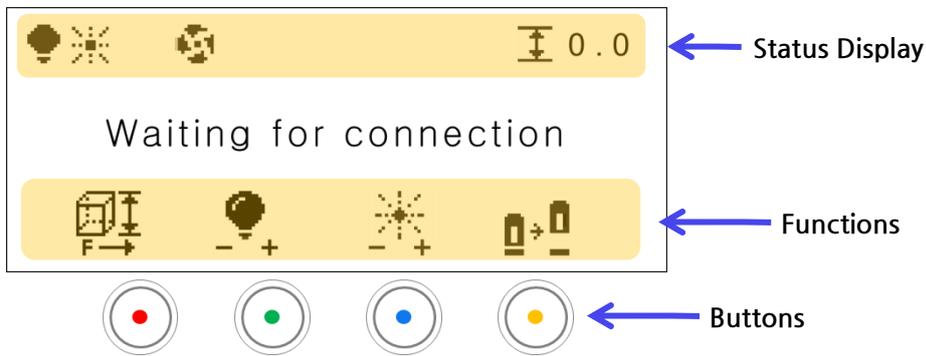
Display	Status display
Operation Buttons	Depending on the situation, it performs the function indicated on the display.
	<p>Direction Key (X,Y)</p> <ul style="list-style-type: none"> <li>· Moves marking area.</li> <li>· Rotary:   (X) Moves tilting angle</li> <li>  (Y) Moves A axis</li> </ul>
	<p>Direction Key (Z)</p> <p>Moves Z-axis up and down</p>
	<p>Vacuum ON/OFF</p> <p>Vacuum dust collector power button.</p> <ul style="list-style-type: none"> <li>· <b>Automatic control:</b> Starts automatically when engraving and stops automatically after engraving is completed. Auto off delay function: Dust collection until the remaining dust after engraving is completed. (software setting)</li> <li>· <b>Manual operation:</b> When the user manually turns on the dust collector, automatic control is deactivated. When the engraving is finished, the user must stop it.</li> </ul>
	<p>Auto Focus</p> <ul style="list-style-type: none"> <li>· <b>AUTO FOCUS:</b> If the button is pressed shortly (immediately released), move and the laser focus to the material height automatically.</li> <li>· <b>*Auto focus is activated when the program is connected.</b></li> <li>· <b>*Only for flat marking</b></li> <li>· <b>*Auto focus maximum measurement Height: 55mm</b></li> <li>· <b>*Materials that do not reflect the laser pointer precisely, such as acrylic, glass, red anodized aluminum, or chrome-plated pendants, cannot use auto focus or have poor accuracy.</b></li> <li>· <b>MENU:</b> If the button is pressed for a long time (2 second or longer), enter the menu mode. <ul style="list-style-type: none"> <li>1: Product Info</li> <li>2: Status LED Brightness</li> <li>3: Reset Memory</li> </ul> </li> </ul> <p>Press and hold  button until it beeps (more than 2 seconds) to run the menu.</p>

	<b>Start</b>	Starts marking when pressed for a long time (2 seconds or longer). · <b>Repeat marking:</b> Press and hold the  button to finish marking, then double-click the  button to mark repeatedly when marking the same work.
	<b>Stop</b>	Stops marking

### (3) Display

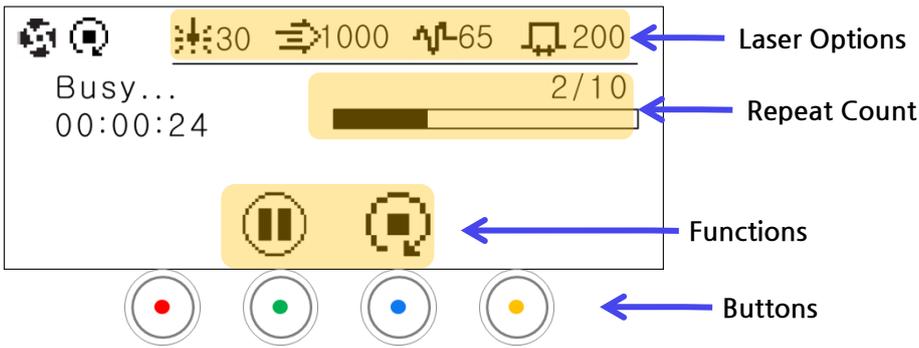
In the built-in display, you can check the status of each function, messages, and selected functions. Icons are displayed differently depending on the functions. The functions performed by the 4 buttons at the bottom of the display change depending on the situations.

#### [Flat-Standby mode]



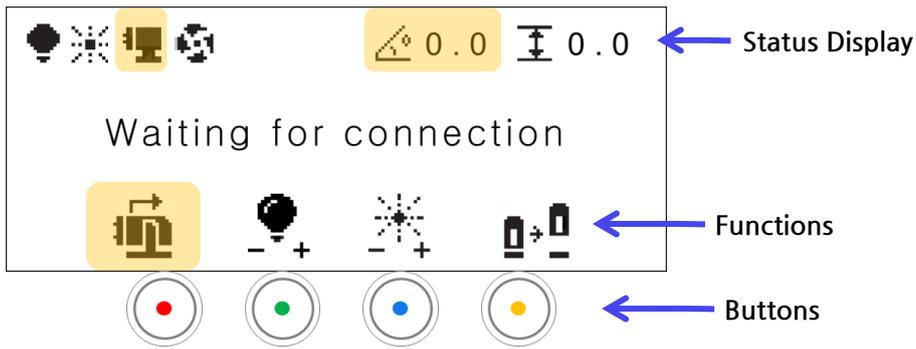
Status Display		LED Light	Brightness levels
		Focus Pointer	Brightness levels
		Dust Collector	ON/OFF status (Not displayed when OFF)
		Z-axis Position	Z-axis Position: Material height
Functions		Height	<p>•If the button is pressed shortly (immediately released): Press the button and move the laser focus to the preset height. <b>F1 → F2 → F3</b></p> <p>•If the button is pressed for a long time (released in 2 second or later): Once the button is pressed for a long time (2 second or longer) after adjusting the laser focus moving height, the preset values are saved.</p>
		LED Light	<p>Brightness levels</p> <p>•4 levels of brightness control, Each time the button is pressed, the level changes and the level cycles.</p>
		Focus Pointer	<p>Brightness levels</p> <p>•4 levels of brightness control, Each time the button is pressed, the level changes and the level cycles.</p>
		Cover	Opens/closes the front cover.

[Marking Mode]

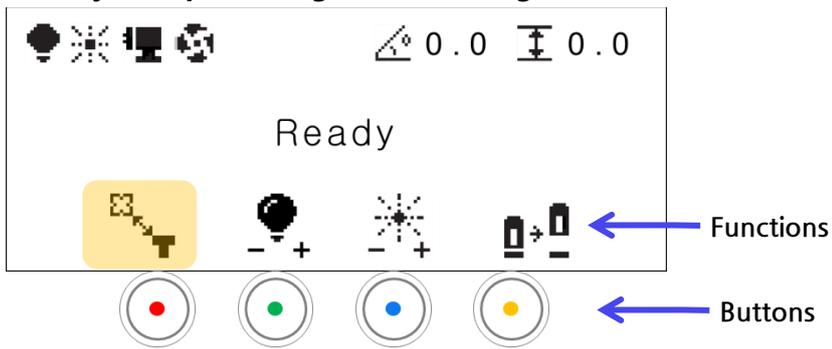


Status Display		Stop after current operation	It does not stop marking immediately, but after completing the marking in progress.
Laser Options		Power	Displays set laser power value
		Speed	Displays set laser speed value
		Frequency	Displays set laser frequency value
		Pulse width	Displays set laser pulse width value
Time left		The remaining time until marking completion is displayed. *Calculate the time required for the 1st cycle.	
Repeat Count		When setting a repeat count, the number of repeats is displayed. (Example: 2/10 → performing 2 times out of a total 10 markings)	
Functions		Pause	<p>Pause the operation in progress</p> <p><b>Restart:</b> Closes when the cover is opened and restarts</p> <p><b>Cover</b> Cover open after pause</p>
		Stop after current operation	<p>End repeated marking in progress.</p> <p>It does not stop marking immediately but stops after completing the marking currently being performed.</p>

[Rotary clamp]



[Rotary clamp marking area checking]



Status Display		Rotary Clamp	Displays the mounting of the rotary clamp
		Angle	Displays tilting angle
Functions		Rotary Clamp	Rotary clamp release button
		X-axis/Tilting	<p><b>*When checking the rotary clamp marking area</b></p> <ul style="list-style-type: none"> <li>·Moves when tilting axis is active.</li> <li>·When the X-axis is activated, the position moves in the X-axis direction.</li> </ul>

#### (4) Status indicator

There is a built-in status indicator on the left and right bottom of the BB-L3 to indicate the device status, so you can easily check the device status.



The status is displayed at the blinking speed of the status indicator, and the status expressed through the indicator is as follows.

Status	Blinking Interval
Computer connecting	— — —
Waiting	—————
Operating	— — —
Notification	— — — — —
Error	— — — — —

If the **AF** button is pressed for a long time (2 second or longer), enter the menu mode.

· MENU:

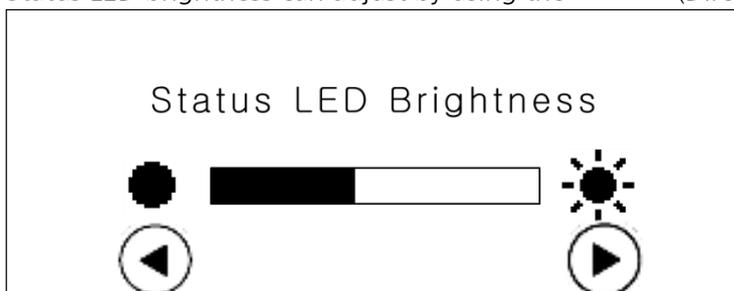
1: Product Info

2: Status LED Brightness

3: Reset Memory

Press and hold  button until it beeps (more than 2 seconds) to run the menu.

Status LED brightness can adjust by using the   (Direction X) buttons.



## 4. Installation

- ※ Please follow the instruction below in order to use the solution.
- ※ This program requires Windows OS 7 or higher.

### (1) Installation of marking machine

BB-L3 is a desktop laser marking system. Marking cannot be done with only the machine. It should be connected to the personal computer, and the program provided should be used together for marking.



Plug the USB cable into the port on the back of the machine and computer's USB port.  
Plug the power cable into the outlet.

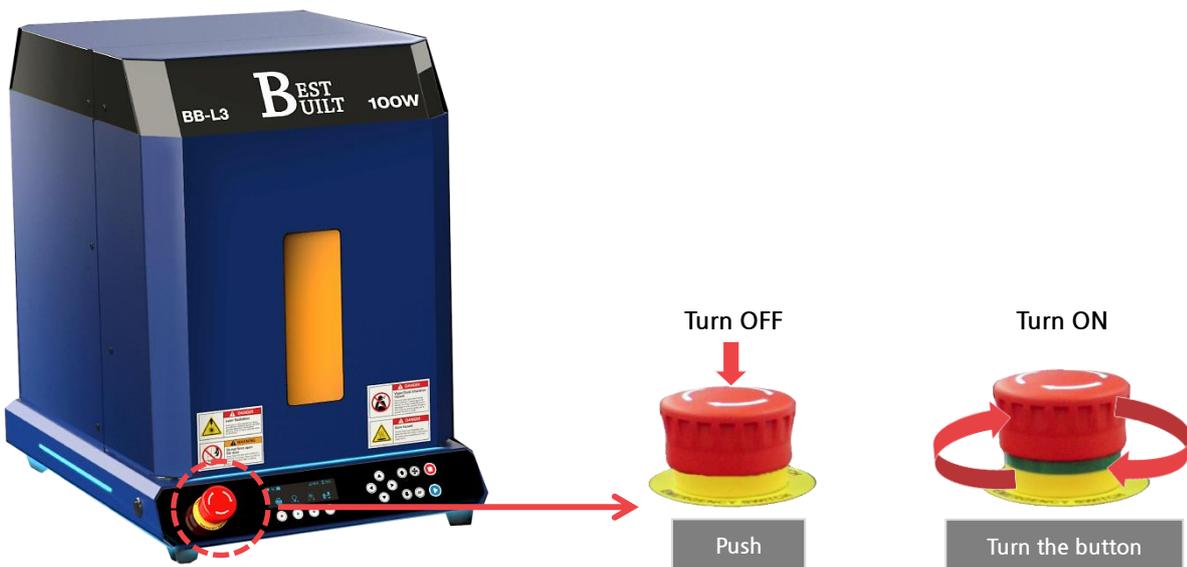
And switch on the machine.

[Power switch]



[Emergency Switch]

※If the machine is not turned on, check the emergency switch.



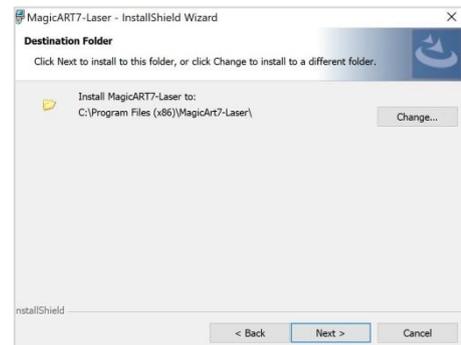
## (2) Program installation

Insert the USB into your computer's USB port, Follow the instructions below to install the software. Install program will be automatically run and program installation will proceed in the following order. If the program does not run automatically after the USB is connected to your computer, run Install program on My Computer's USB drive.

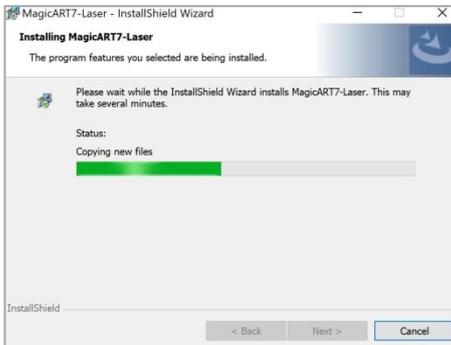
### 1. Setup wizard.



### 2. Select installation folder.



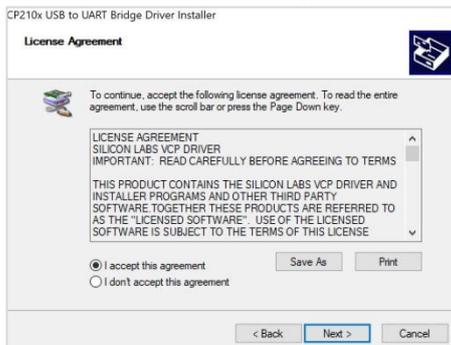
### 3. The file is copied onto the hard disk.



### 4. USB driver setup wizard.



### 5. Check [I accept the agreement], then click [Next].



### 6. After check the [Status: Ready to use], Click "Finish" button to complete.



### 7. Click "Finish" button to complete program installation.



## - Program Description

Once the installation is completed, the following icon appears on the desktop. The description of the icon is as follows:

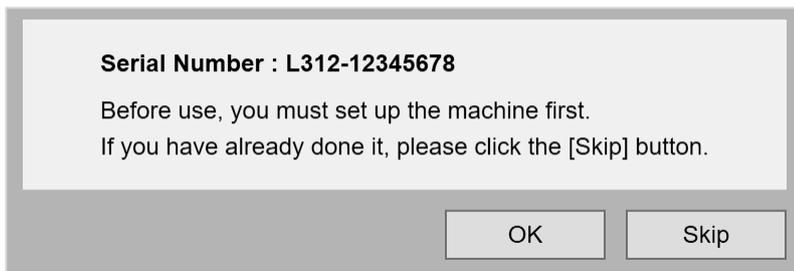
	As a design & marking software program, it features the following functions: marking design, marking option, Toolpath setting, transfer of Toolpath data.
	As a machine setting program, It features the following functions: Laser focus, Guide laser, Rotary origin, Manual calibration.

## -Program serial number

After installation, the machine serial number is recognized and the correction value stored in the server is automatically called and set.

-Press the [OK] button to restart the program automatically after the setting is completed.

-Press the [Skip] button to skip this process and the setting value is not set automatically.

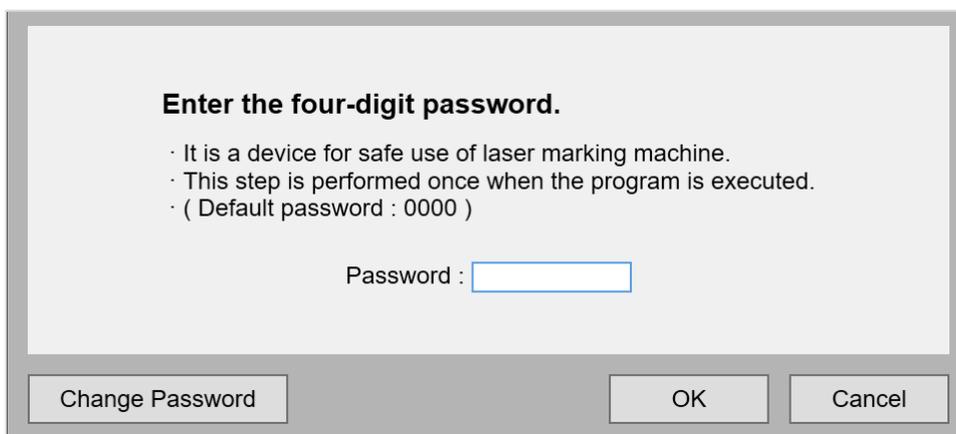


## - Program password

Only administrators can use the program by using the program password.

Please make sure to change the default password.

The program default password is [0000].

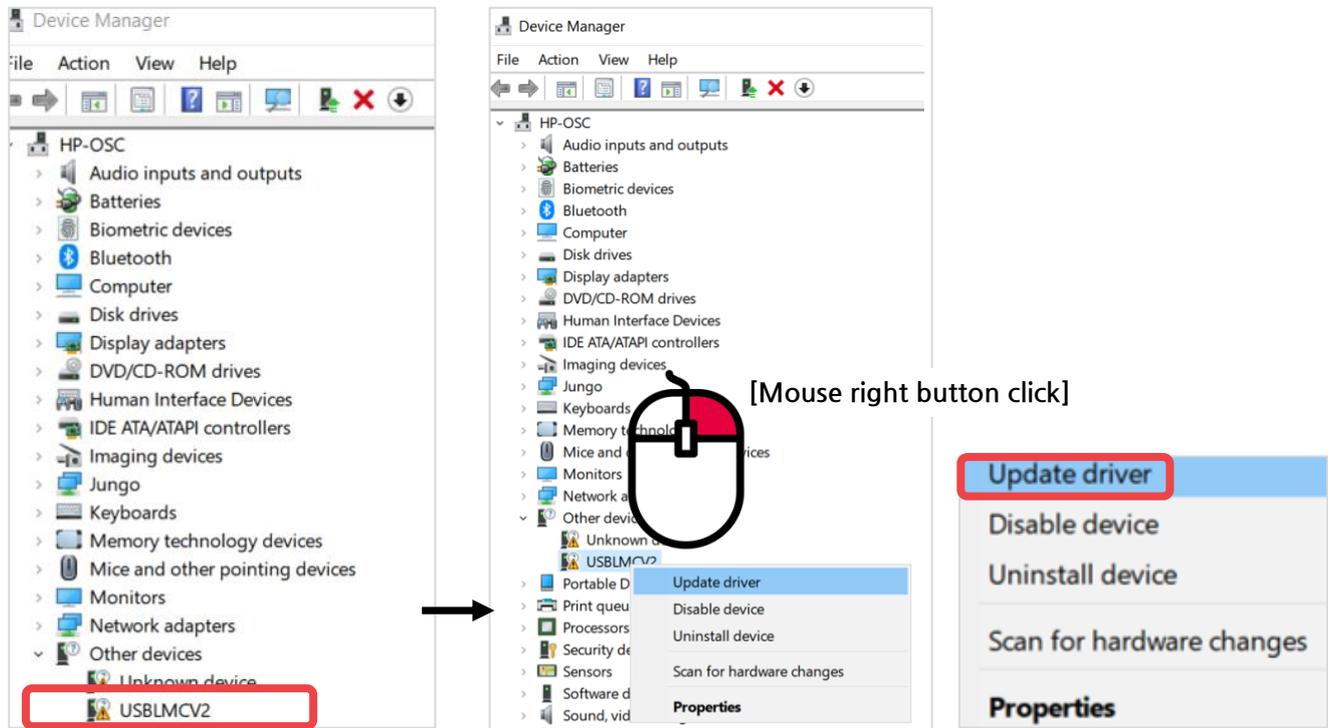


### (3) Driver installation

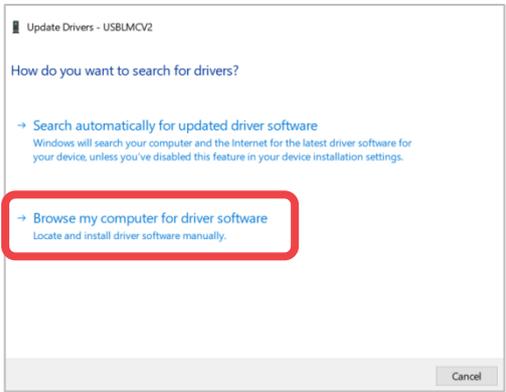
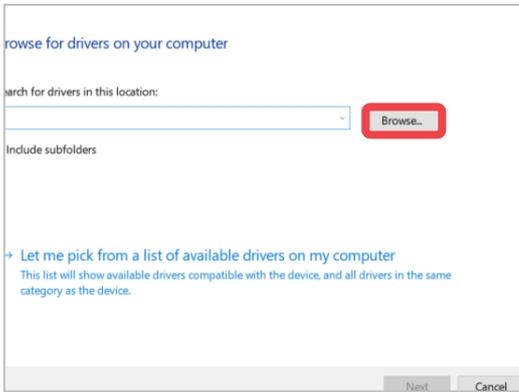
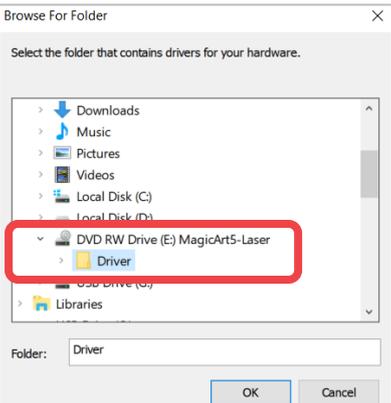
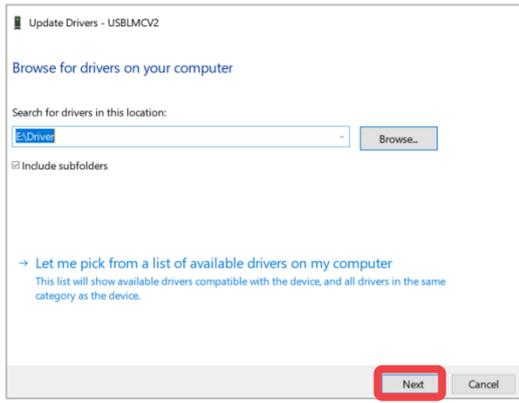
※ If driver installation is not installed automatically, it is a manual installation method.

※ Please turn on the machine, and connect the machine with USB cable.

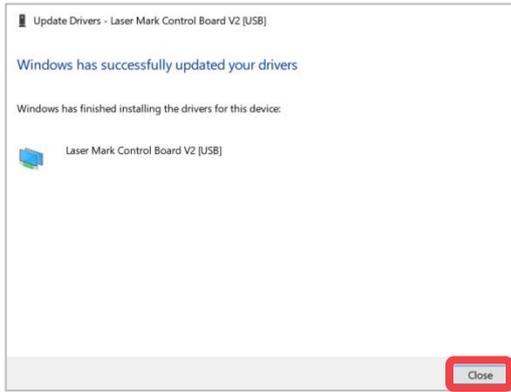
1. Go to **[Device Manager]**, and select the **[USBLMCV2]** using by the mouse right button. Then select **[Update driver]**.



2. Follow the instructions below.

<p>① Select <b>[Browse my computer for driver software]</b>.</p> 	<p>② Click the <b>[Browse]</b> button.</p> 
<p>③ Select the <b>[Driver]</b> folder from the installation CD file.</p> 	<p>④ Add the <b>[Driver]</b>, then click the <b>[Next]</b> button</p> 

5. Click “Close” button to complete program installation.

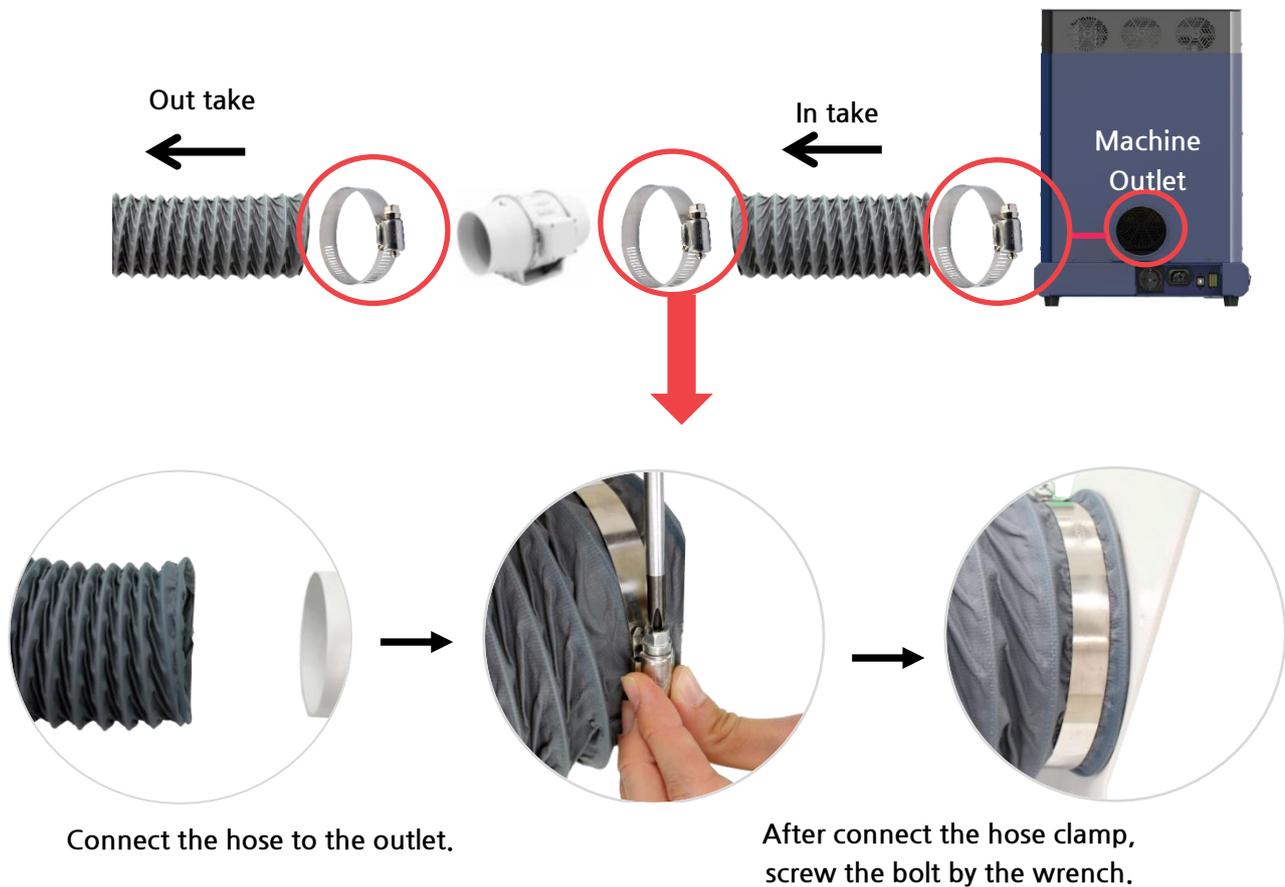


#### (4) Installation of the blower

※Blower set is purchased separately.

※ Please be careful of the cut surface of the hose clamp as it may cause injury.

Order to connect the blower.



## (5) Auxiliary power device setup (for external devices)

※Auxiliary power device set is purchased separately.

Auxiliary power device is required when using the dust collector.

This device must be used if the external blowers or dust collectors have more than 2 Ampere. Otherwise, this may result in a machine failure.



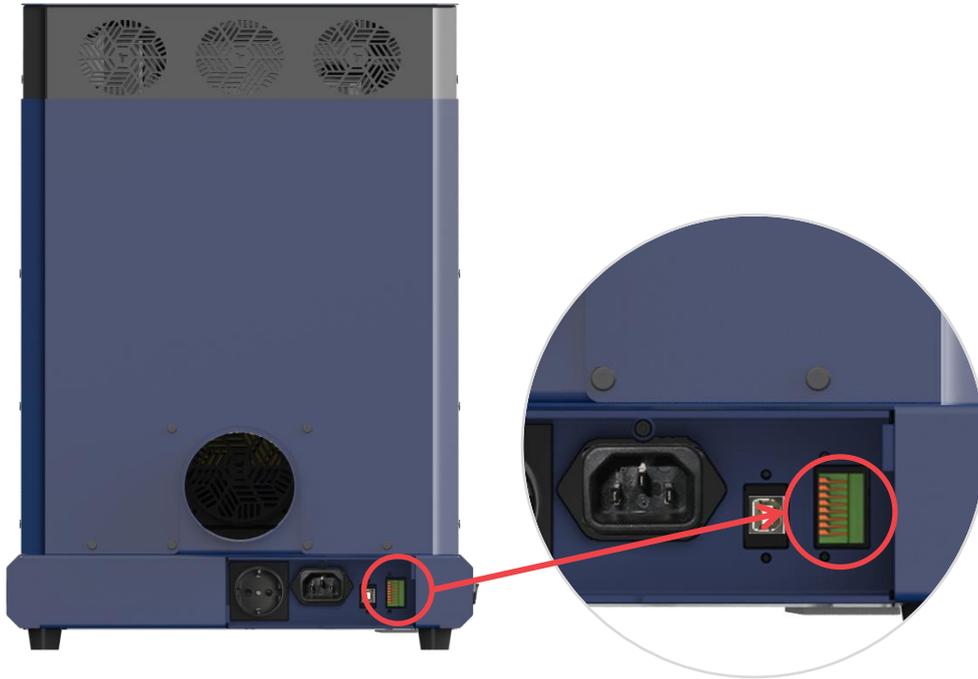
Connect the auxiliary power device to the laser machine. (Refer to the picture below)



## (6) IO Port in/output

※ The external IO port input to the machine must be 5V, 50mA or less.

BB-L3 has a function that outputs machine operational status through the IO port on the rear side and receives external signals through the IO port to control operation.



In order to operate an external device by linking to BB-L3 status signal output, connect the signal line linked to the OUT port outputting the status to the external device. To activate BB-L3 by external-device status signal, connect the external-device signal line to the IN port linked to BB-L3 operation. Each IO port function is as in the following table and plan;

	Power	+5V Power: +5V power necessary to connect external devices
	Output	Laser Start: Auto laser engraving start upon +5V (High) signal output from an external device
	Output	Laser Stop: Immediate laser engraving stop upon +5V (High) signal output from an external device
	Input	Laser ON Signal: +5V (High) signal is input to an external device upon laser engraving start.
	Input	Laser OFF Signal: +5V (High) signal is input to an external device upon laser engraving end.
	Input	Blower On/Off Signal: When the dust collector is ON, +5V (High) is input to an external device; and, if OFF, GND (Low).
	Power	GND: GND power necessary for external-device connection

\*\*Input: Signal received by an external device

\*\*Output: Signal received by the equipment

## 5. Operation of the marking machine

Turn on the machine. Then, the system performs self-diagnose as follows. Unless a problem is found, it goes into a standby mode with confirmation sound.

### (1) Self-diagnose procedures when the system is turned on

1. In case there is a detected axis, move it out of the sensing zone.
2. Check the cover sensor.
3. Check the z-axis sensor and return to the origin point.
4. Return to the origin point.
5. Confirmation sound and standby

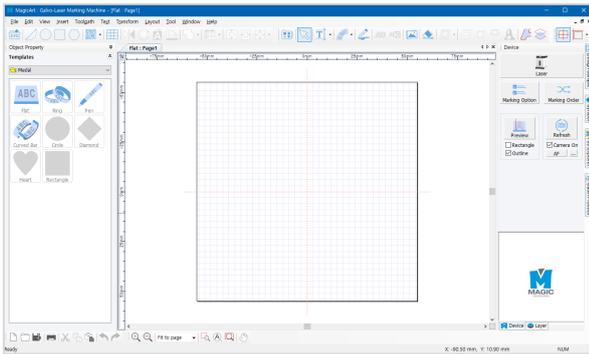
### (2) Marking procedures

- 1) Turn on the marking machine.

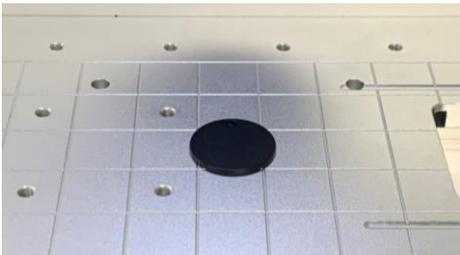


※ If the machine does not turn on, check the emergency switch.

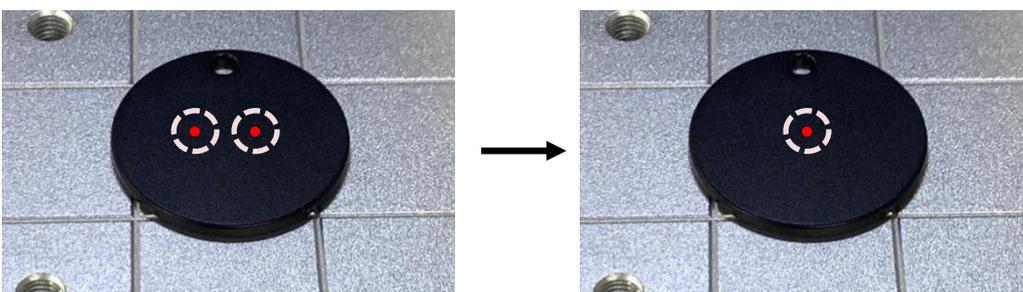
- 2) Start the program and connect it to the machine.



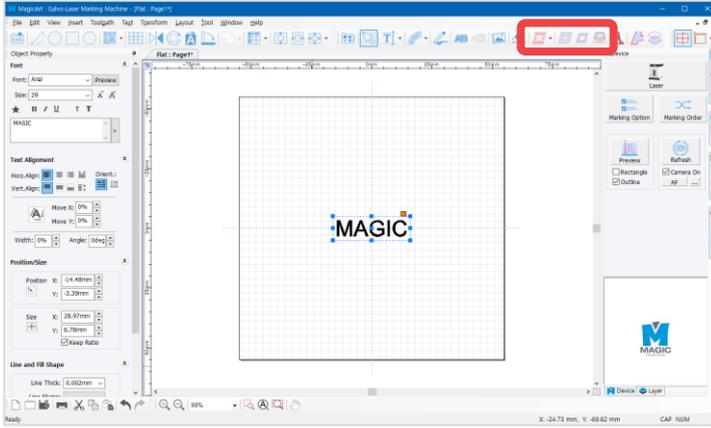
- 3) Put the material on the work area.



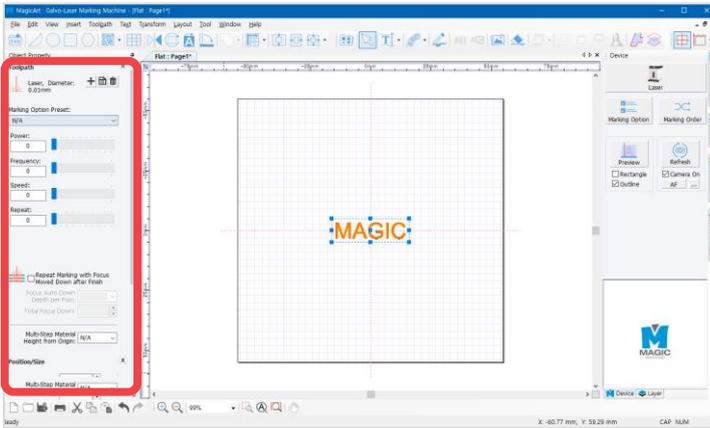
- 4) Set the laser focus, using the direction key (Z)   buttons.  
**(\* When using auto focus, Also set the laser focus.)**



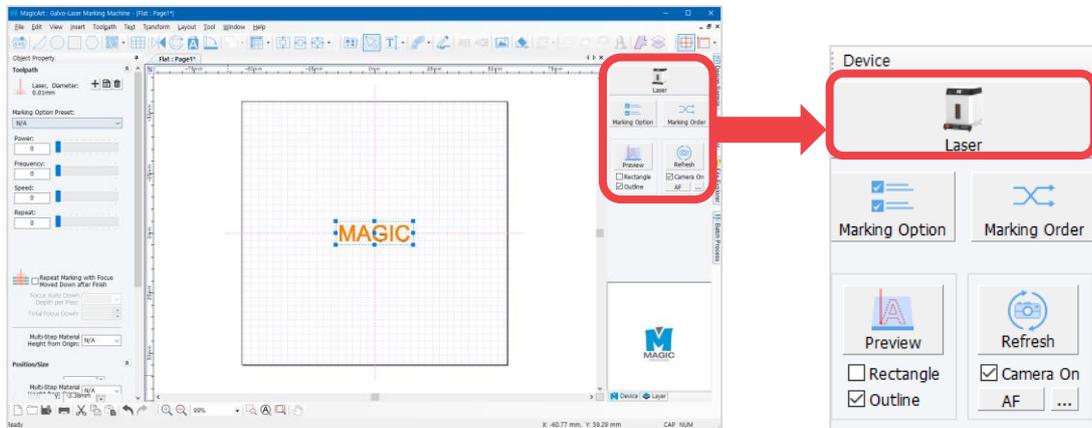
5) Prepare the design to mark, and then create the toolpath.



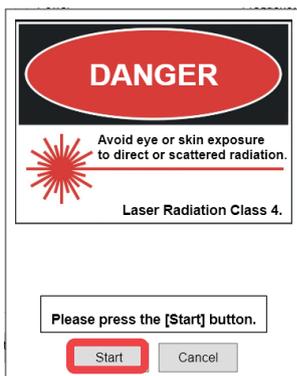
6) Set the laser marking option.



7) Then click the [LASER] button and send the marking data.



8) Click [Start] or press  for a long time (2 seconds or longer) to start marking.



## 6. External device

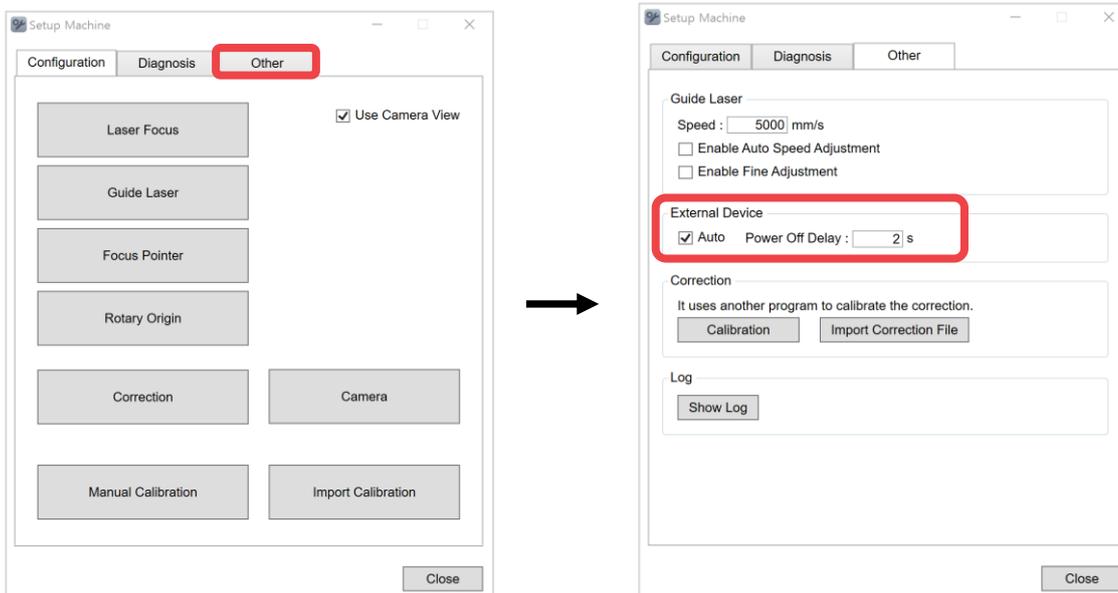
\* Blower power port : 110~220V/2A

\* Auxiliary Power Device must be used if the external blowers or dust collectors have more than 2 Ampere.

1. Connect the power to the back of the machine.



2. Click [OTHERS] in [Setup Machine].



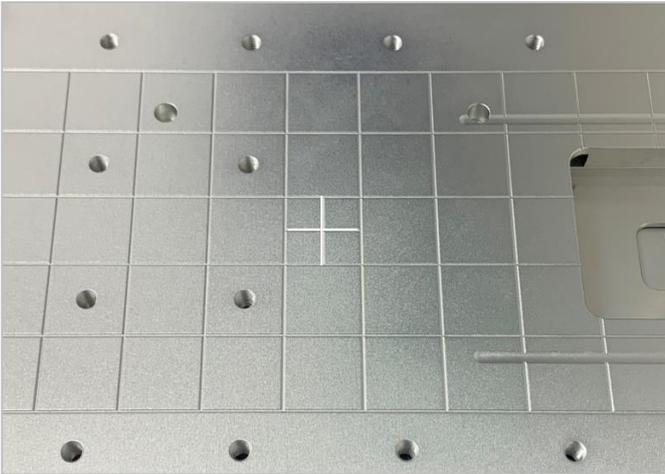
### External Device

Auto    Power Off Delay :  s

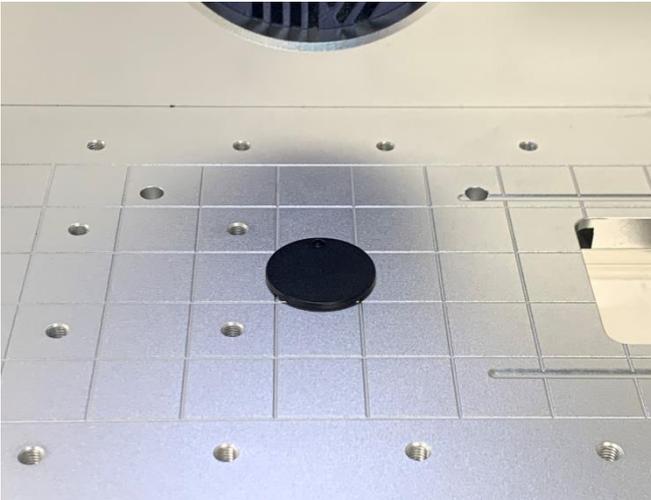
<b>Auto</b>	In case the [Auto] checkbox is clicked, the external device is automatically on/off during BB-L3 operation. If the [Auto] checkbox is not selected, the automatic control of external devices is disabled.
<b>Power Off Delay</b>	The external device power is automatically turned OFF after being delayed for the preset time in [Power Off Delay] before power off.

## 7. Clamp

A guideline can be checked at the work area.  
The work area of the product is 110x110(mm).



Put the material in the middle of the work area.  
The guideline of the work area is same as the work area of MagicArt.

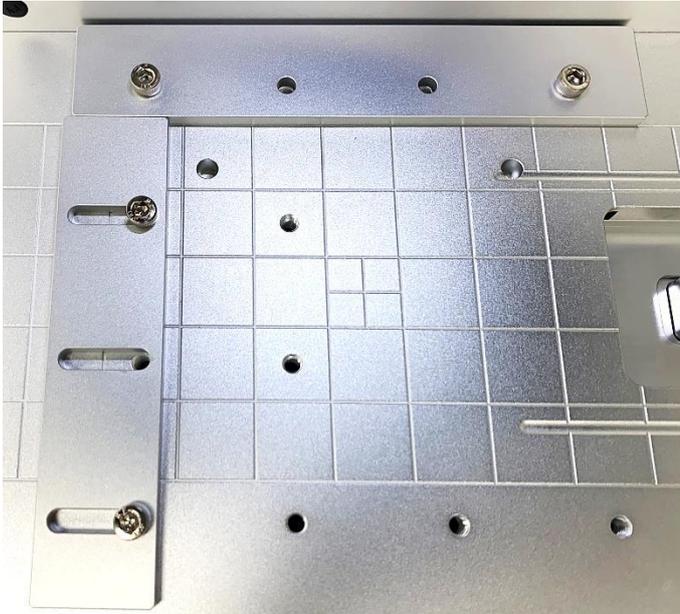


## (1) Clamp

It is able to fix clamp bolts into work area holes.

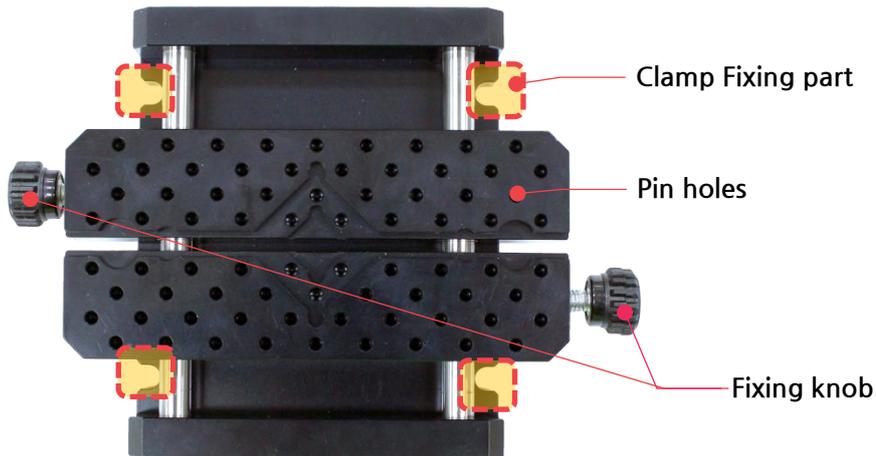
Put the clamp at a desired location and screw the clamp bolt.

Clamp Set	Clamp		1SET
	Clamp Bolt (M5-12mm)		4EA

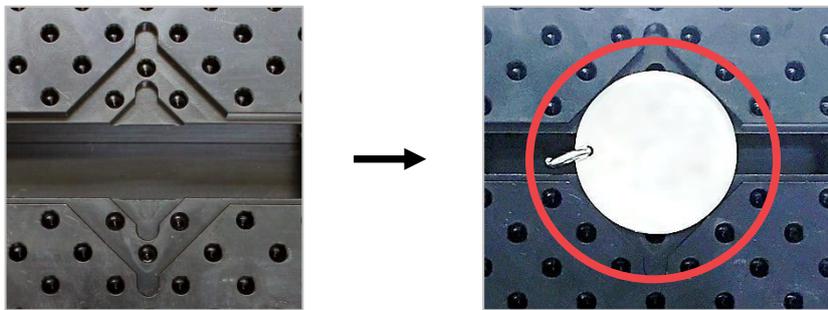


## (2) Medal clamp

※ Medal clamp is purchased separately.



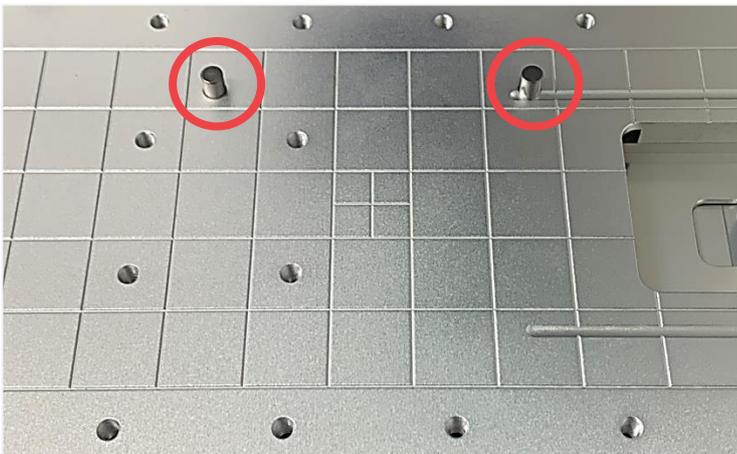
Since the holding part of the clamp is step type, set the clamp to the step to match the size and thickness of the material. If you move the clamp moving bar upwards; and then turn the fixing knob to the right, the clamp will be tightened.



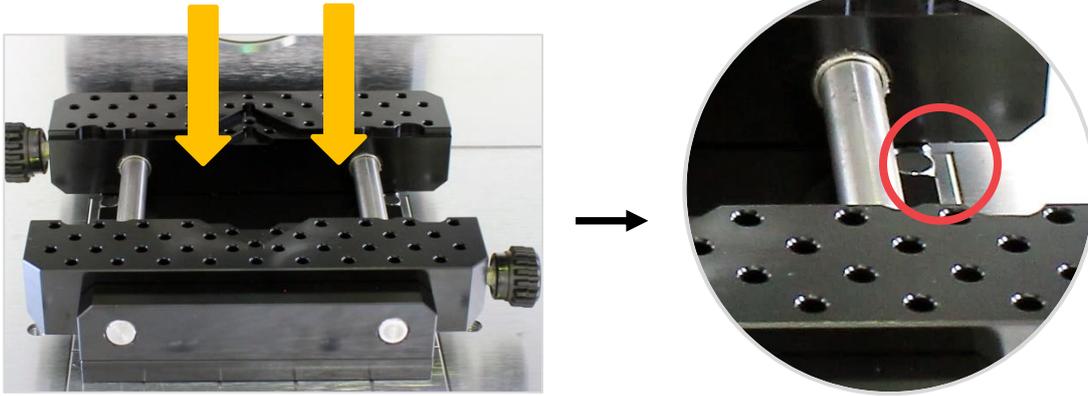
Caution

When holding the materials by turning the clamp fixing knob, a mark may be left on the materials.

1. Fix the product work area by matching the pins to the holes.

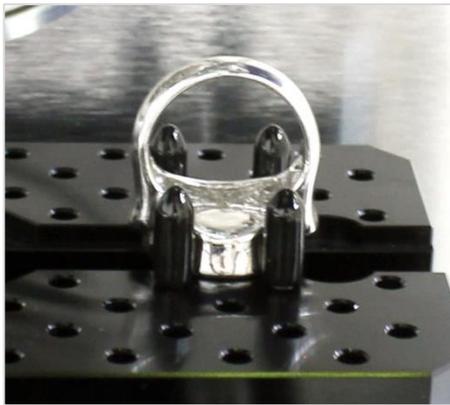


2. Connect the clamp pins to the clamp fixing unit.

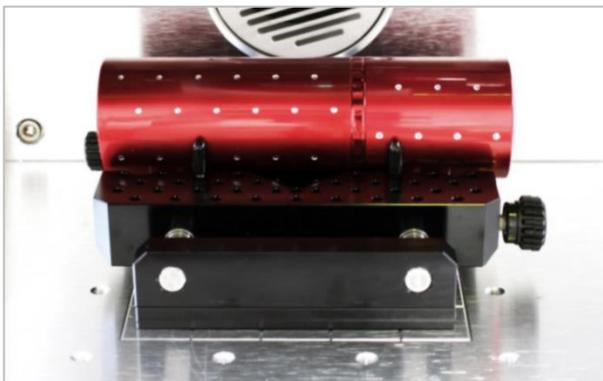


3. Fix the pin on the clamp.

Pin holes on the clamp ensures easier holding of irregular shaped material.

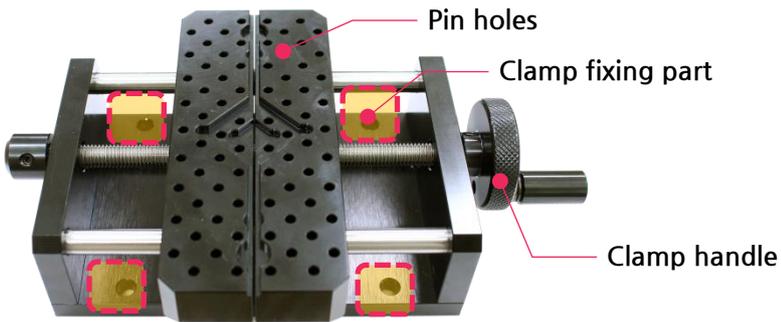


4. Fix it by turning the fixing knob.

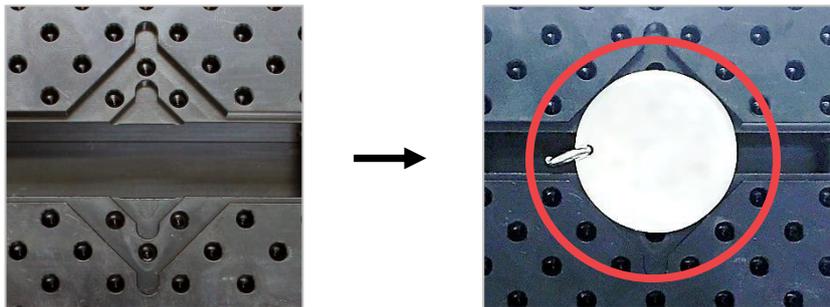


### (3) Medal clamp-center fixing type

※ Medal clamp is purchased separately.

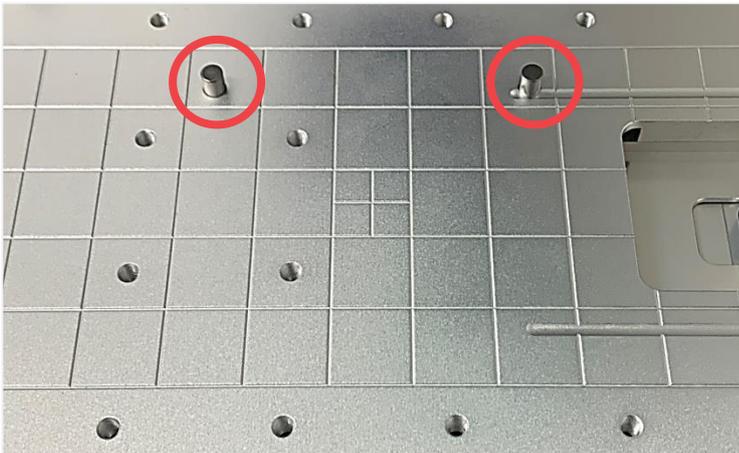


Since the holding part of clamp is step type, set the clamp to the step to match the size and thickness of the material. Place the material and turn the clamp handle to the right, and then the clamp will be tightened.

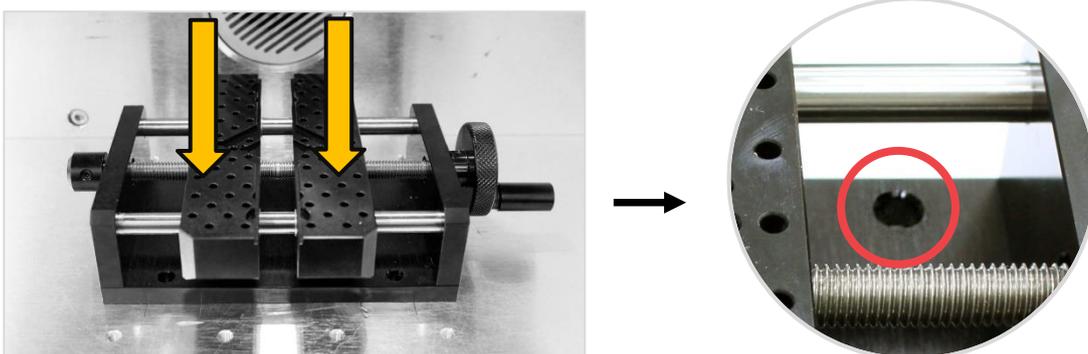


When holding the materials by turning the clamp handle, a mark may be left on the materials.

1. Fix the product work area by matching the pins to the holes.

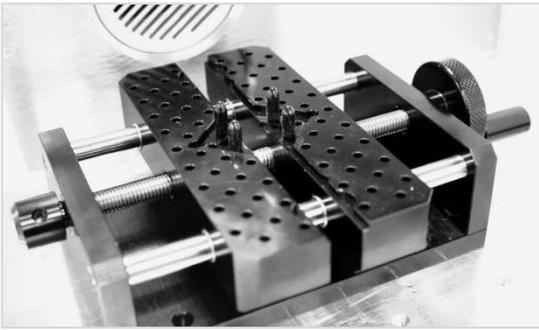


2. Connect the clamp pins to the clamp fixing unit.

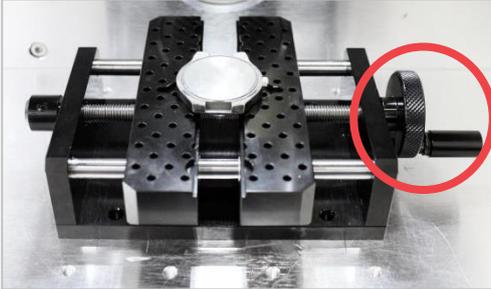


3. Fix the pin on the clamp.

Pin holes on the clamp ensures easier holding of irregular shaped material.

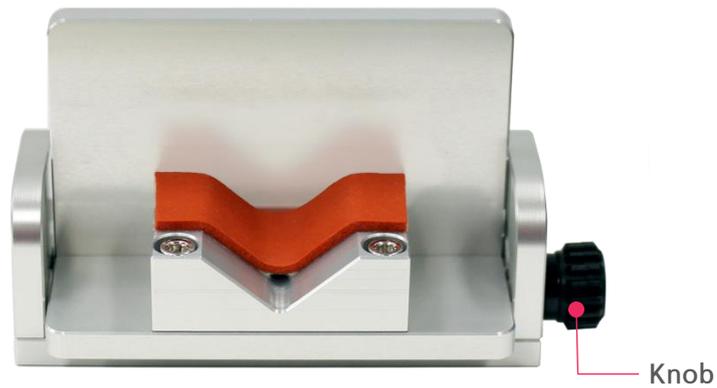


4. Fix it by turning the clamp handle.



#### (4) L Type clamp

※L type clamp is purchased separately.



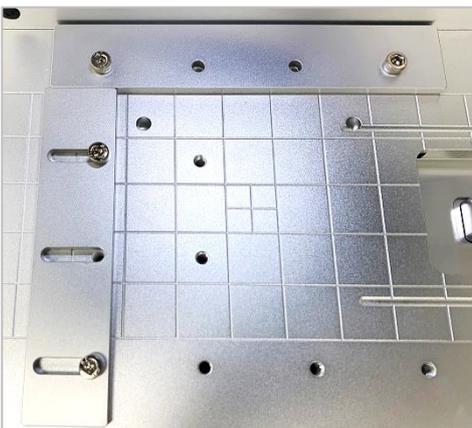
Caution

Put the material tightly on the fixing bracket.

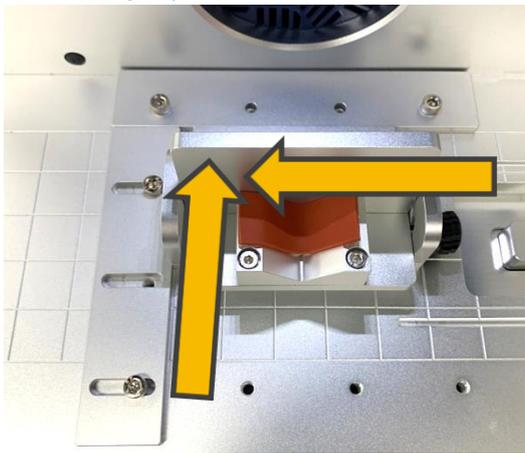
#### - Origin Point Setting

Set the L type clamp position to position the focus at the center of the L type clamp groove. The end position is the origin point of L type clamp. Once the origin point is set, it is easy to return L type clamp to its original position even after removal. If an X-axis flat clamp is removed, the origin point should be reset.

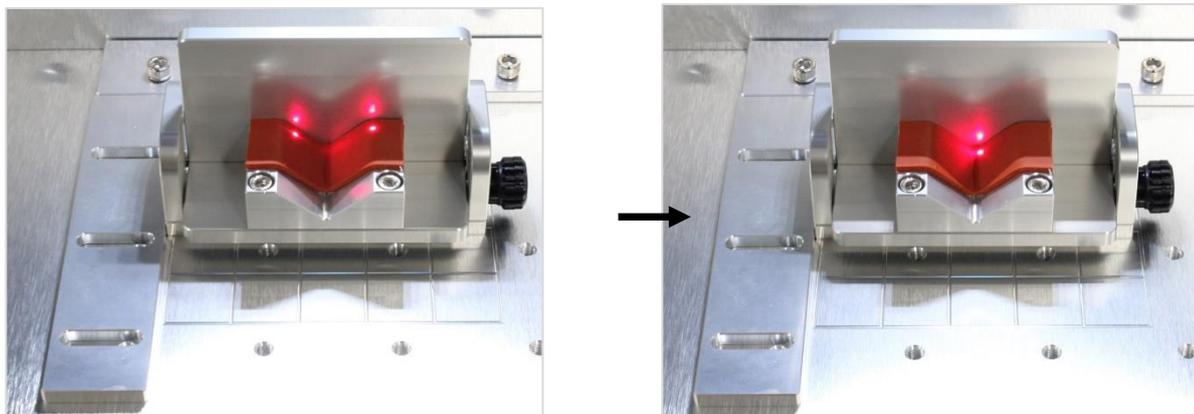
1. Fix the clamp to set the focus. Set the position of L type clamp and then fix the X-axis (vertical fixation) clamp.



2. Put it tightly on the work area with the clamp as a guide. Then, fix the position of L type clamp.



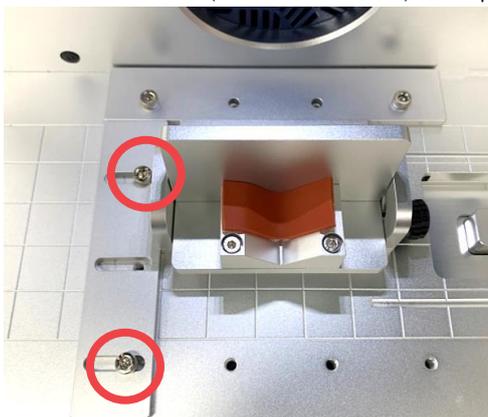
3. Set the focus, using the direction key (Z)   buttons.



4. Adjust the position of L type clamp to position the origin point of the focus in the middle of the L type clamp groove.

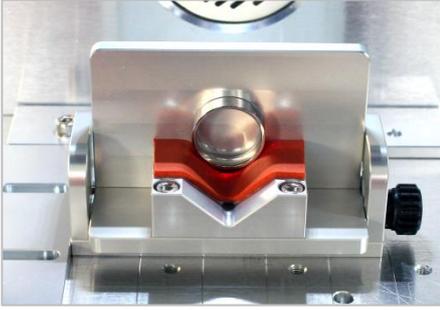


5. Fix the X-axis (vertical fixation) clamp.



## -Material Focus Setting

1. Put the material on the fixing bracket.



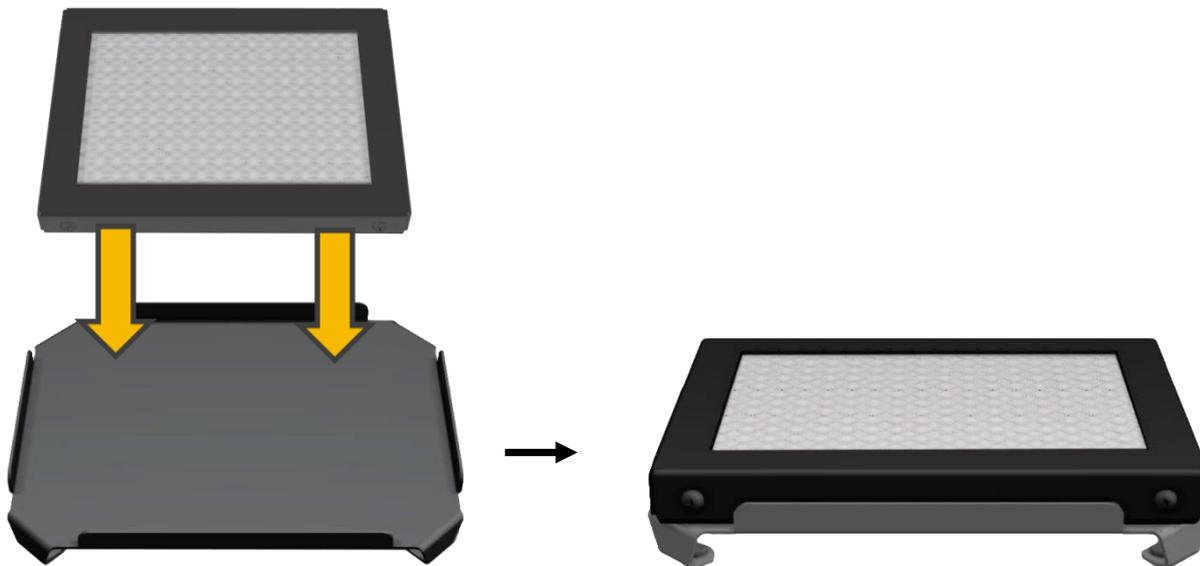
2. Set the focus, using the direction key (Z)   buttons.



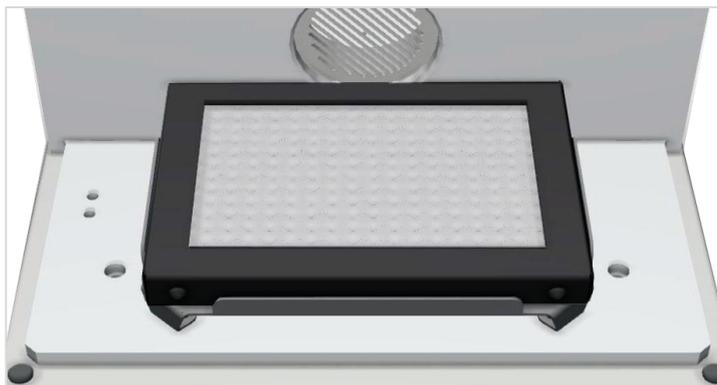
## (5) Honeycomb table

※ Honeycomb table is purchased separately.

1. Put the honeycomb table on the honeycomb table tray.

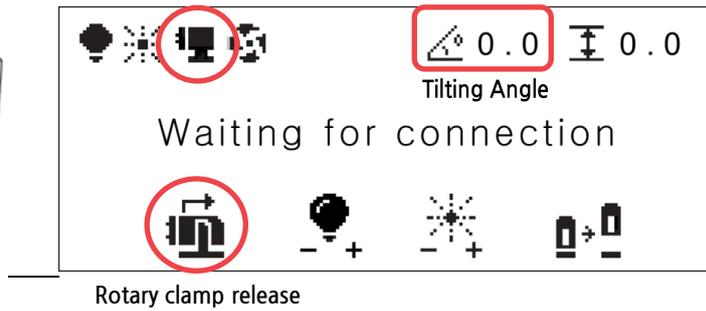


2. Set the position of honeycomb table on the machine.



## (6) Auto tilt rotary clamp

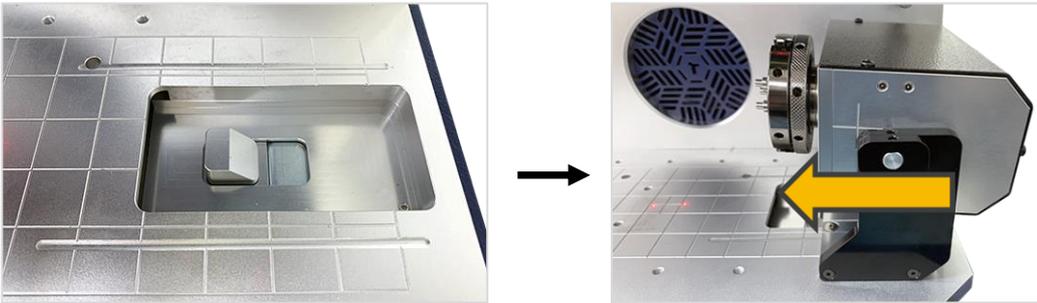
※ Auto tilt rotary clamp is purchased separately.



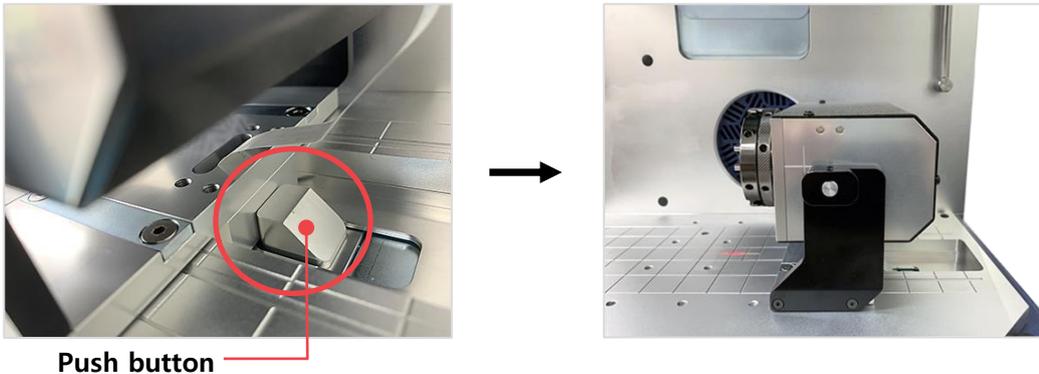
※ **When using the auto tilting rotary clamp, set the tilting origin to the 0 degree.**  
**(Refer to [Machine setting]-5.Rotary origin)**

[Connect]

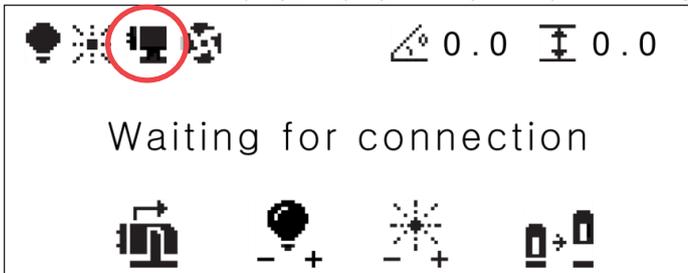
1. Place the rotary clamp on the docking station and slide it to the left.



2. When the **push button** is pushed to the left **until it comes up completely** with a mounting sound, the device automatically recognizes the clamp and performs the initial operation.



3. In the built-in display, displays rotary clamp mounting icon.

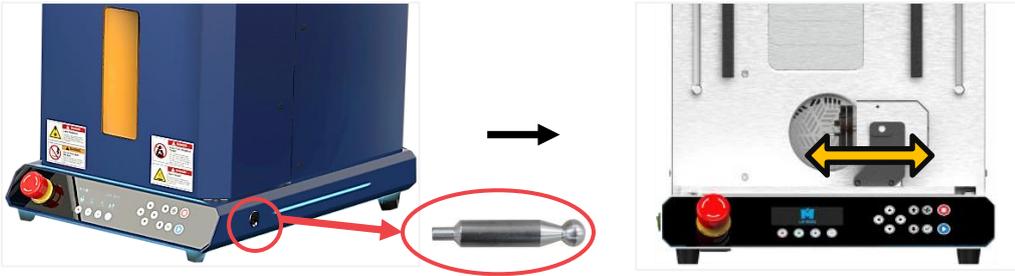


4. Connect the pin for preventing clamp falling.



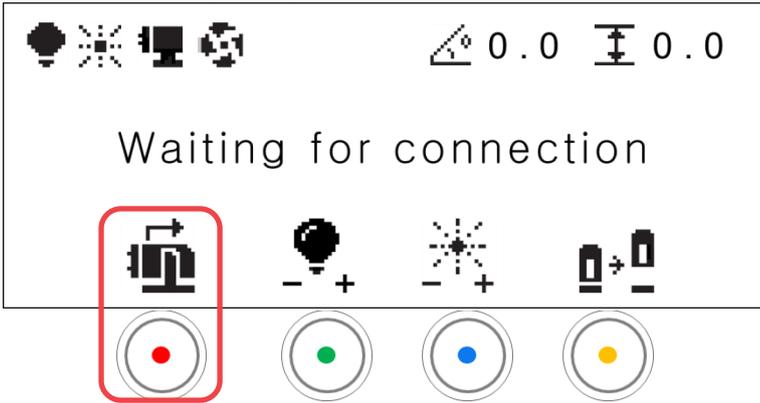
Anti-drop pin (6 $\phi$ ) (18mm)

5. Using the external device fine adjustment knob on the right side of the device, it is possible to move left and right slightly.

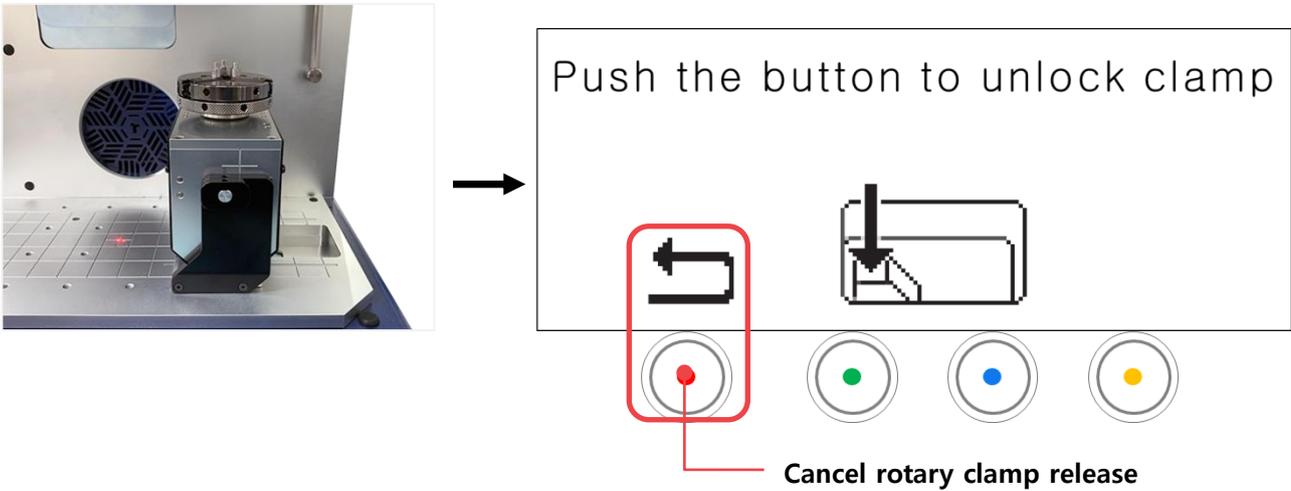


[Disconnect]

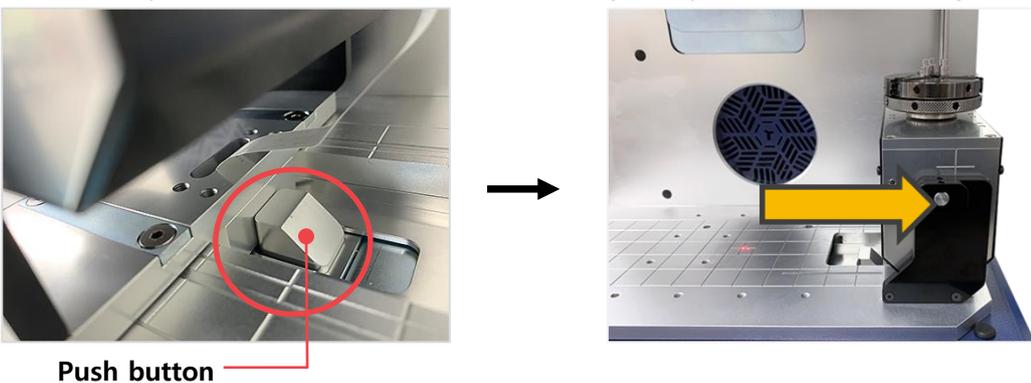
1. Press the rotary clamp release button.



2. The rotary clamp is tilted 90 degrees, and a guide message is displayed on the display.



3. Press the push button to release the fixed rotary clamp and slide it to the right to keep it..



### [Holding method for outer diameter engraving]

Put the ring into the chuck finger and fix it with the chuck handle.



### [Holding method for inner diameter engraving]

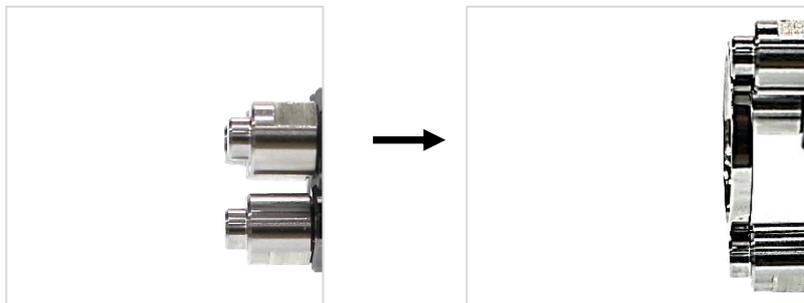
Insert the ring by widening the chuck finger of the rotary clamp. Then, fix it with the chuck handle.



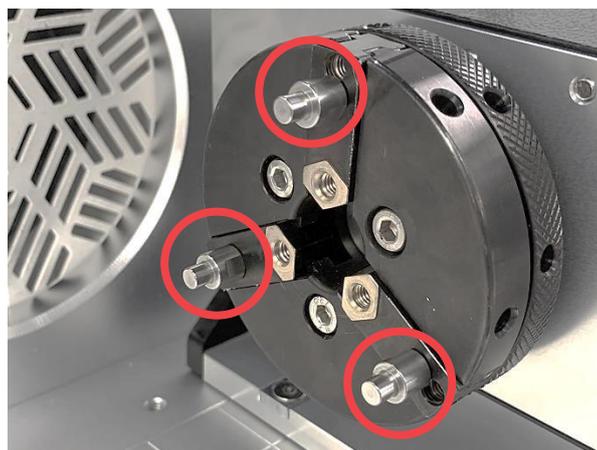
### [Holding method for thin ring inner diameter engraving]

When marking the thin rings, change to the 2mm chuck finger by using the chuck finger spanner provided along with the product to release.

Insert the ring by widening the chuck finger of rotary clamp. Then, fix it with the chuck handle.



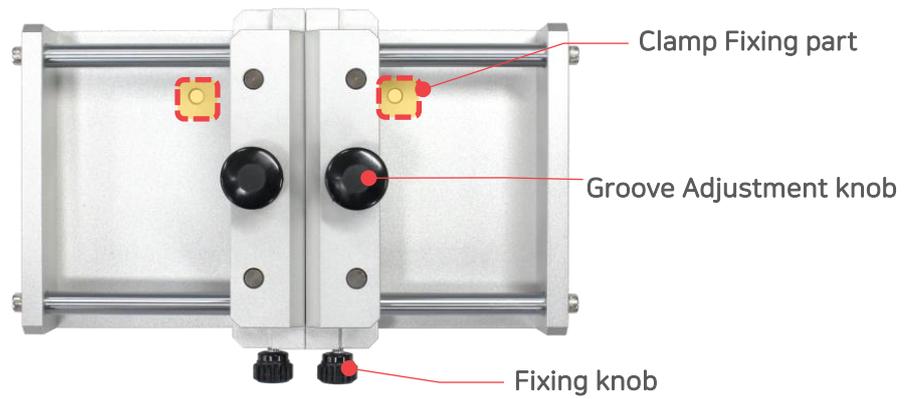
### [Bangle]



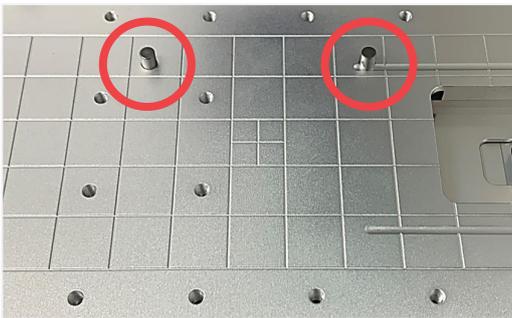
## (7) Anti-curling clamp

※ Anti-curling clamp is purchased separately.

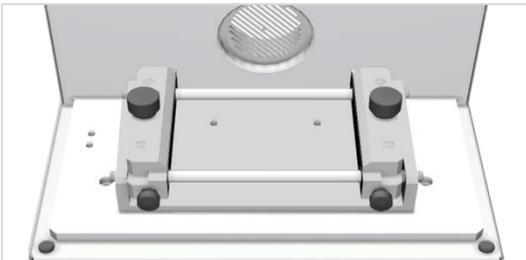
For holding a thin plate in place.



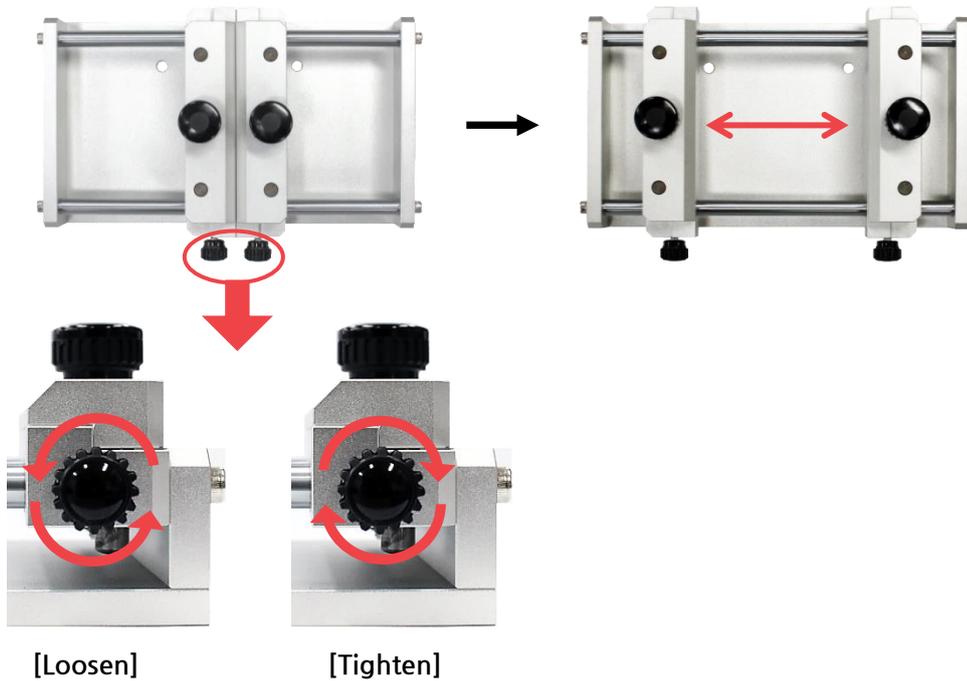
1. Fix the product work area by matching the pins to the holes.



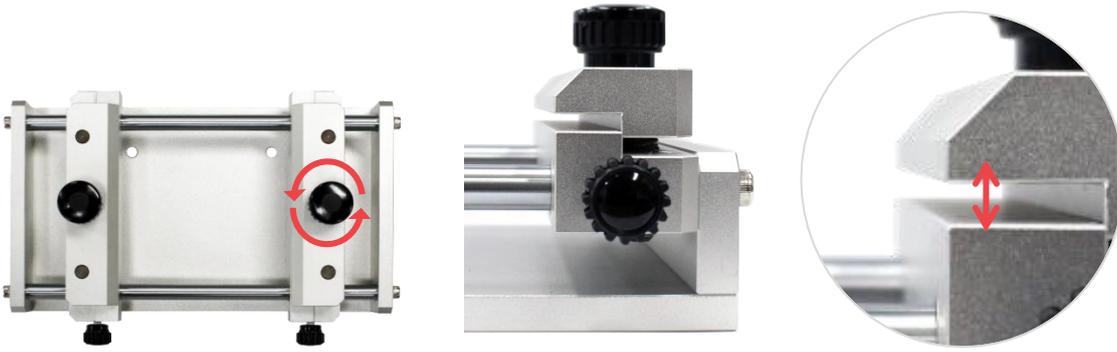
2. Set the position of anti-curling clamp on the machine.



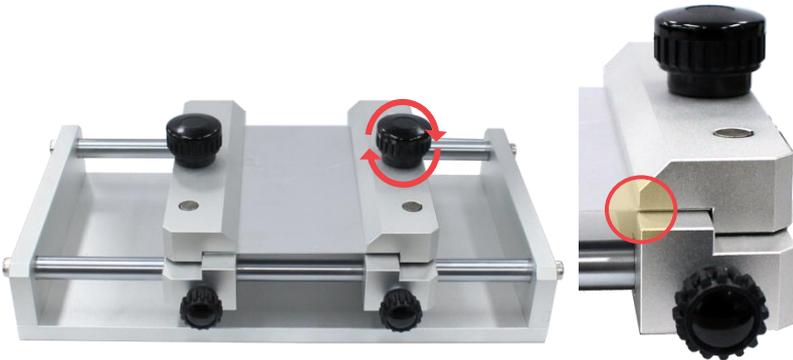
3. Turn the fixing knob to widen the gap of the clamp.



4. Turn the groove adjustment knob to widen the groove of the clamp.



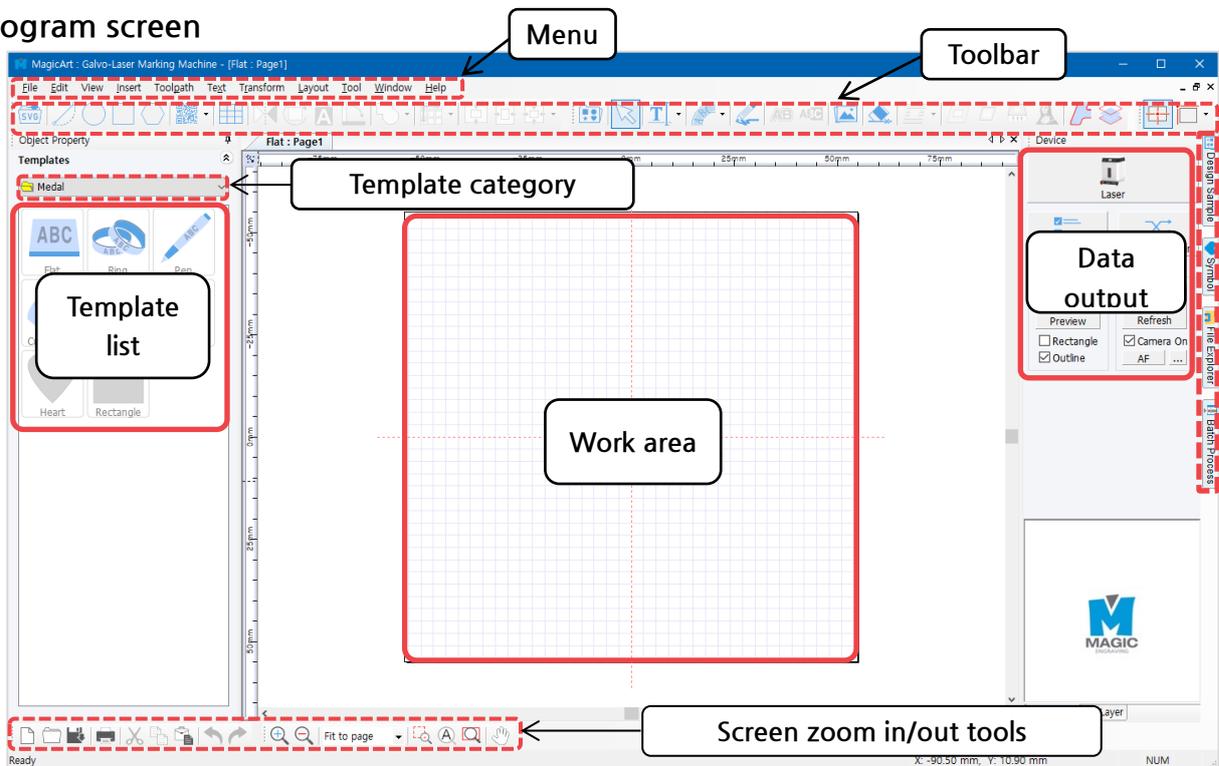
5. Fix a material to be engraved, and then turn the groove adjustment knob to narrow the groove of the clamp.



# Program Usage Description

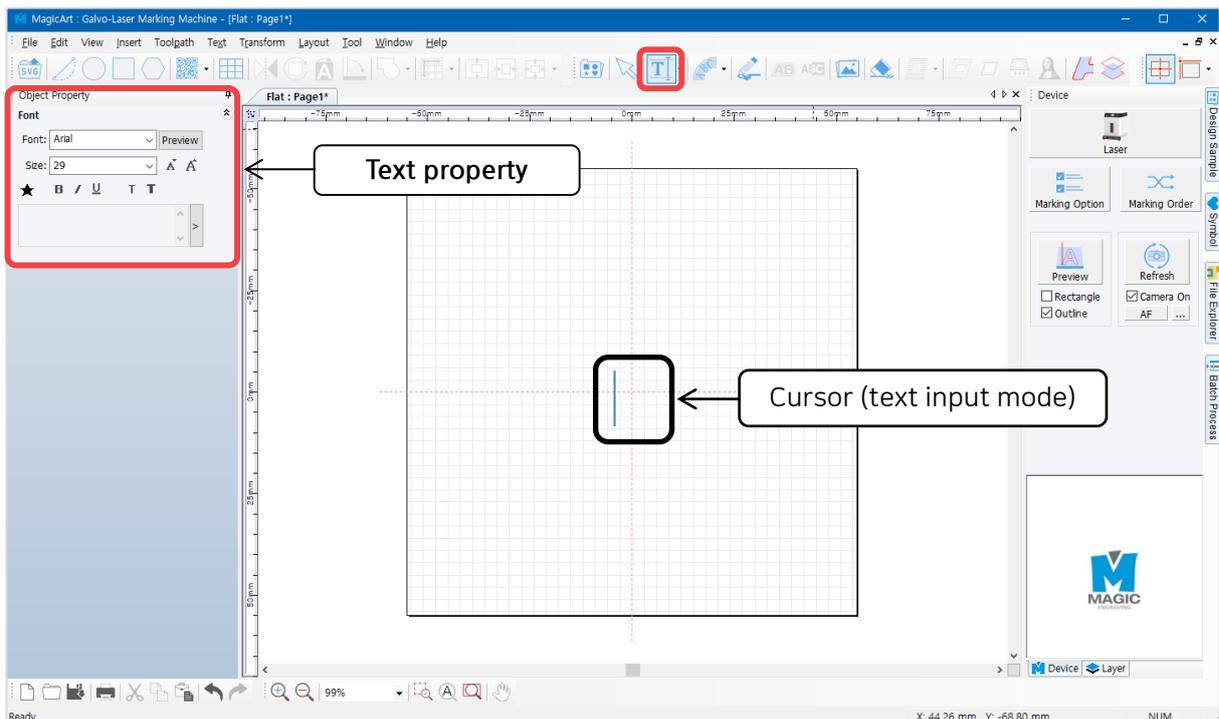
Run the program, then a window will appear as shown below. The program window is different in accordance with modes. The names of parts for each case are as follows.

## ◆ Program screen



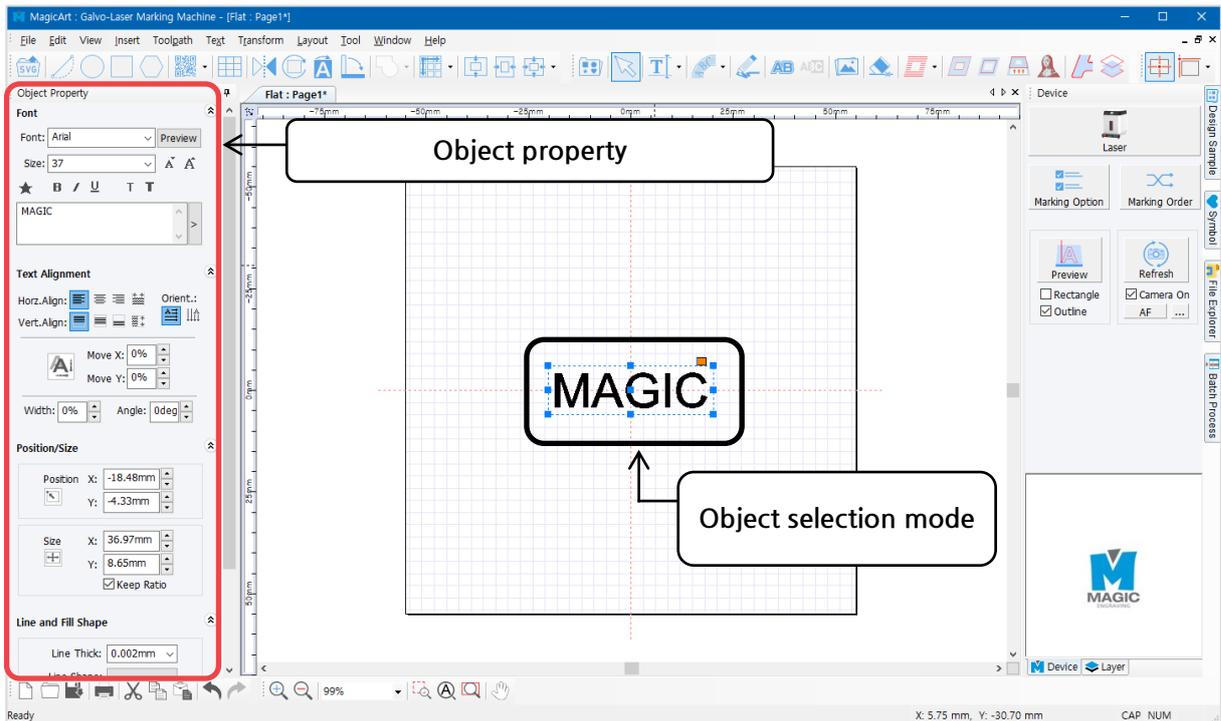
## ◆ Text input mode

Press  [Text Input] button and click the screen or double click on the selection mode to switch to text input mode.



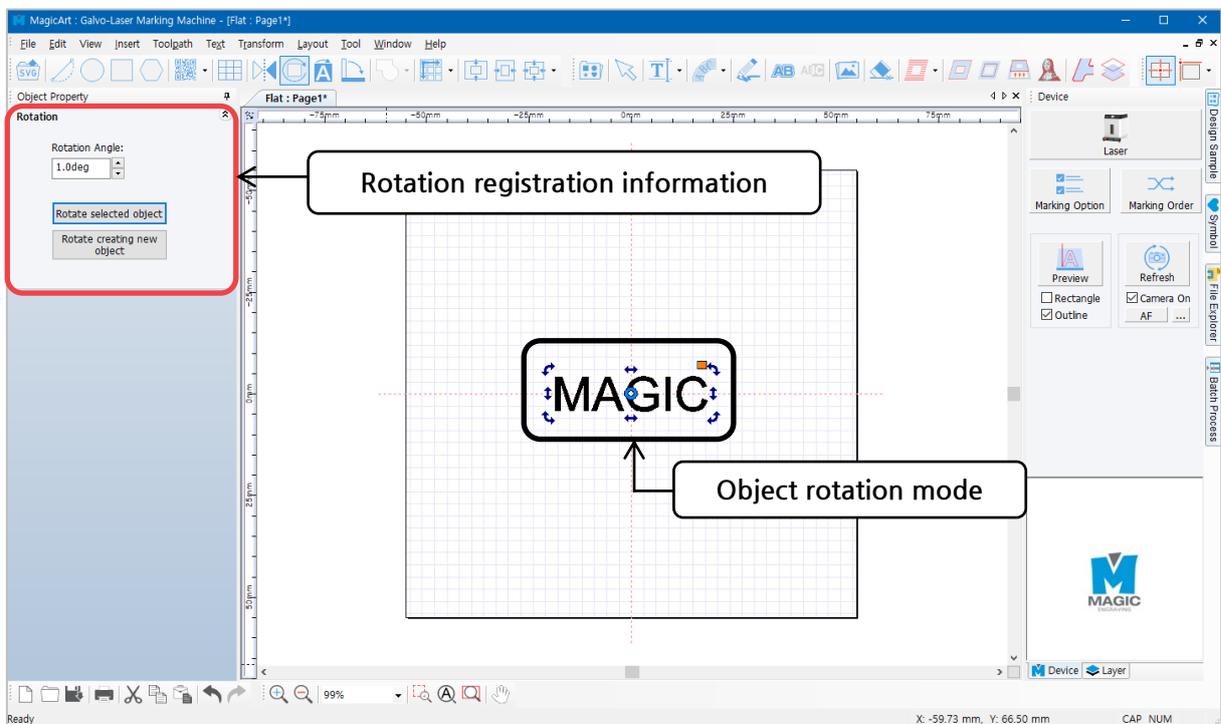
## ◆ Object selection mode

After entering the text, click [Selection] button with a mouse or right-click the work area. Then, the entered text object is selected and it switches over to selection mode. Double click the selection mode to switch it to text input mode.



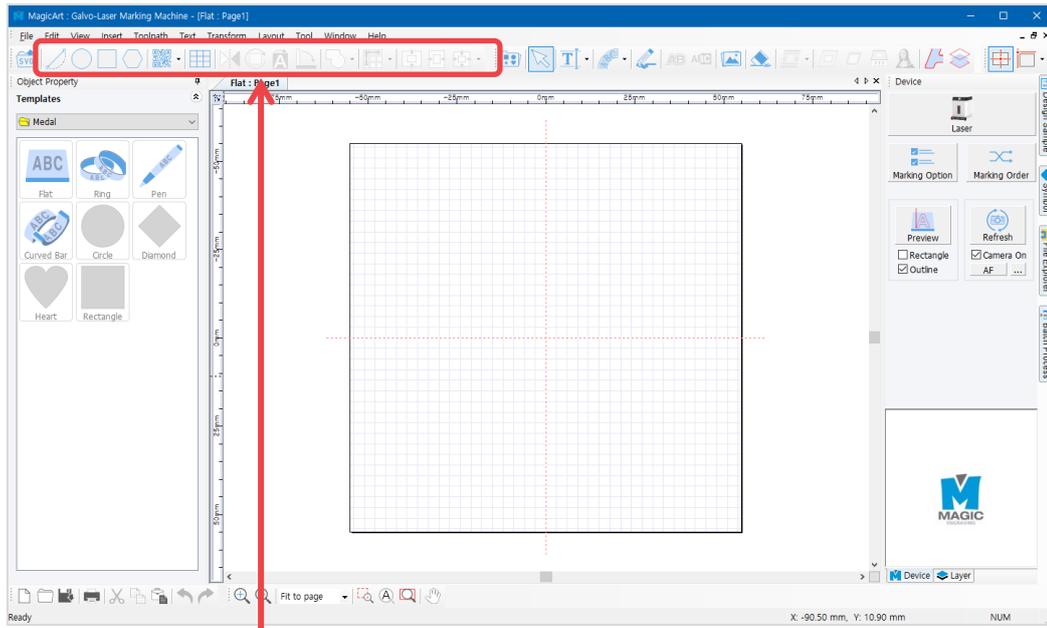
## ◆ Object rotation mode

If the selected object is clicked once more, the mode will switch over to object rotation mode.



# 1. Toolbar

## ◆ Alignment tools



### [Line/Curve]

	<p>Click a certain point and drag it to make a dot line appear. Designate the distance and click with the mouse and then right-click to create a straight line. Then, press “Ctrl” key on the keyboard and move the mouse to create a horizontal line or a vertical line.</p>
	<p>Click on a certain point and designate a distance. Drag while clicking and holding the mouse to make a curve appear. Right-click to create a curve.</p>



### [Circle/Oval/Pie]

	<p>Click and hold the work area with the mouse and drag it to designate the size of a circle. Then, press “Shift” key and drag it to create a perfect circle.</p>
	<p>Click <b>Arc</b> button on the circle object property window to convert into an arc. The starting/ending angle can be designated and those angles can be adjusted by dragging the starting/ending point of the arc with the mouse. Then, click <b>CW/CCW</b> button to create a reversed image.</p>
	<p>Click <b>Pie</b> button on the circle object property window to convert into a pie (a filled arc). The starting/ending angle can be designated and those angles can be adjusted by dragging the starting/ending point of the pie with the mouse. Then, click <b>CW/CCW</b> button to create a reversed image.</p>



### [Rectangle]

	Click and hold the work area with the mouse and drag it to designate the size of a rectangle. At this time, press “Shift” key and drag it to create a square.
	Determine the curvature of each edge on the rectangle object property window or drag the rectangular edge with the mouse to convert it into a rectangle with round corners.
	Click <input checked="" type="checkbox"/> <b>Independent Corner</b> button on the rectangle object property window and adjust the curvature of each corner individually.



### [Polygon]

	Click and hold the work area with the mouse and drag it to designate the size of a polygon. At this time, specify the number of vertex on the polygon object property window to change it.
--	---



### [Mirror]

	Reverse the left/right of the selected object.
--	--



### [Rotation]

	If the selected object is clicked once more with the mouse, it will switch over to the object rotation mode. Then, rotate the object by dragging it with the mouse or arrow keys on the keyboard.
--	---



### [Invert color]

	Invers the color of the selected object.
--	--

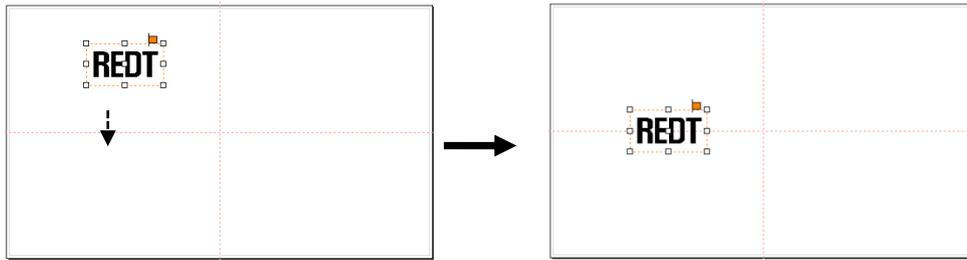


### [90°CW]

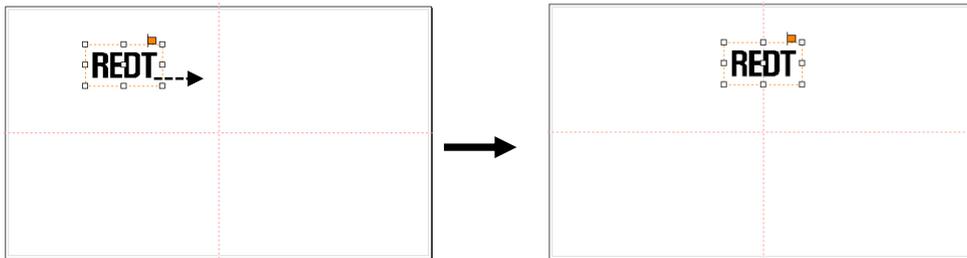
	Rotate the selected object by 90°.
--	------------------------------------



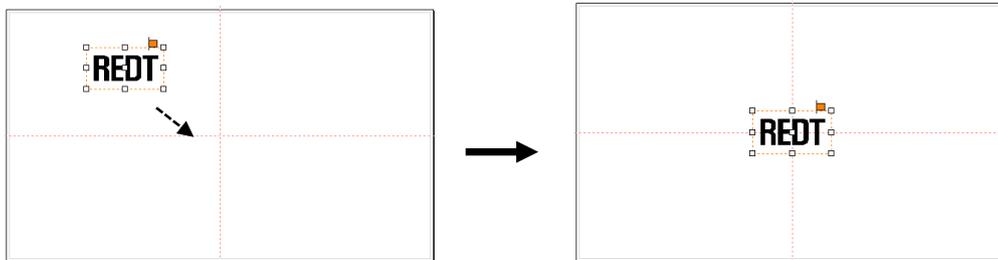
[Vertical center in page]



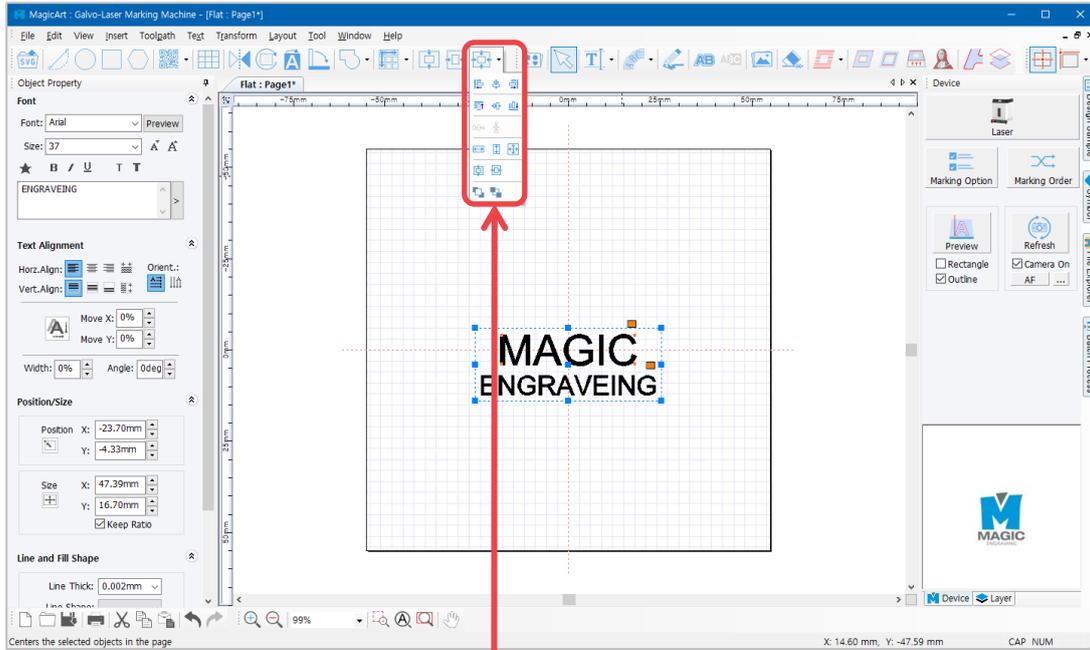
[Horizontal center in page]



[Center in page]

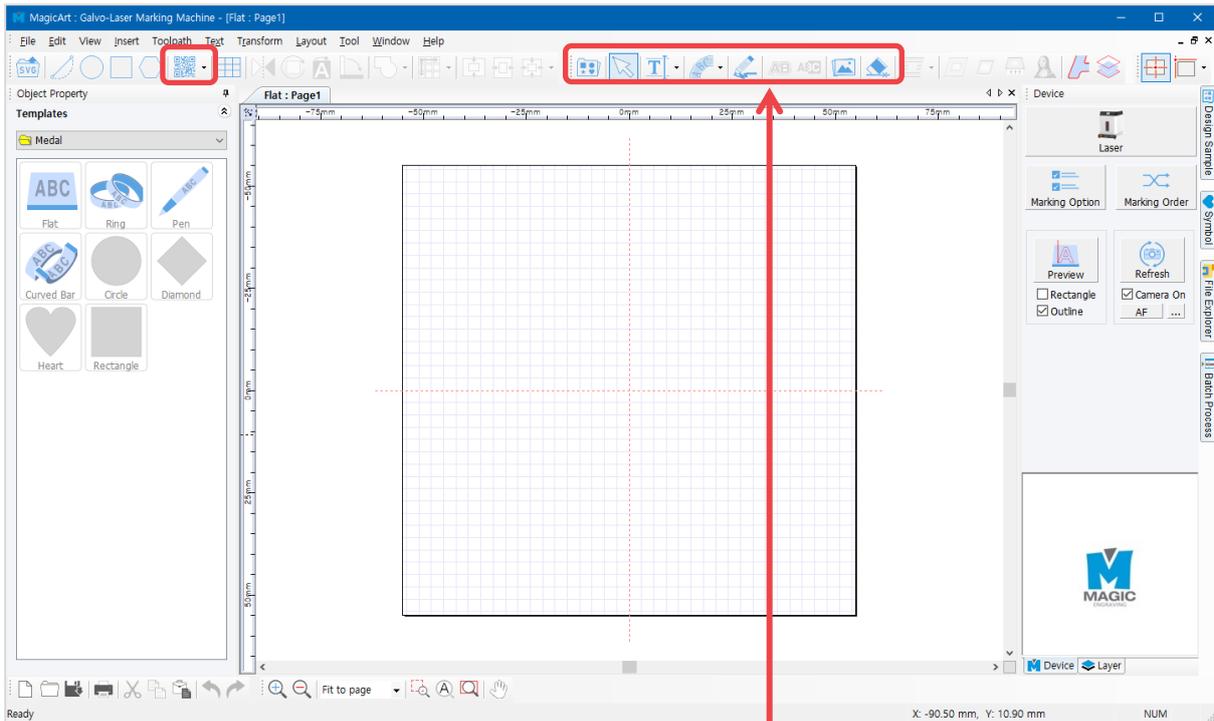


[Alignment option]



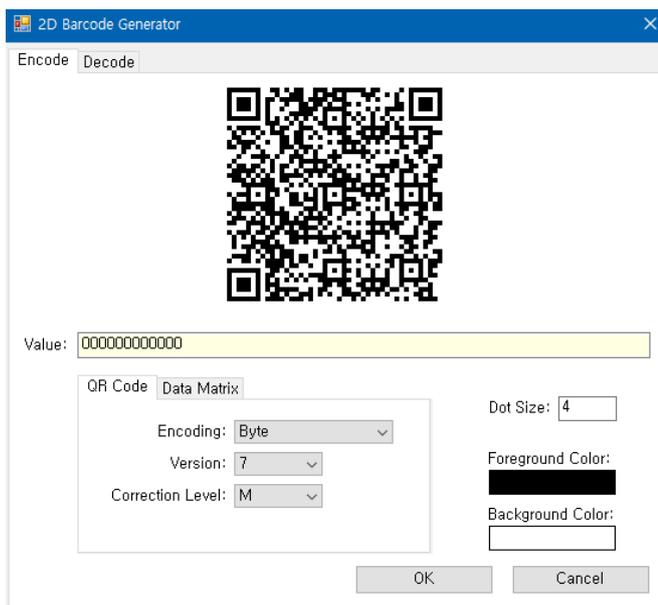
Alignment		Align to the left of base object
		Align to the center of base object
		Align to the right of base object
		Align to the top of base object
		Align to the center of base object
		Align to the bottom of base object
Adjust horizontal gap		Align horizontal gap between objects uniformly
Adjust vertical gap		Align vertical gap between objects uniformly
Same size		Make same width
		Make same height
		Make same size
Alignment		Vertical center in page
		Horizontal center in page
Order		Bring to front
		Send to back

## ◆ Object tools



[Barcode]

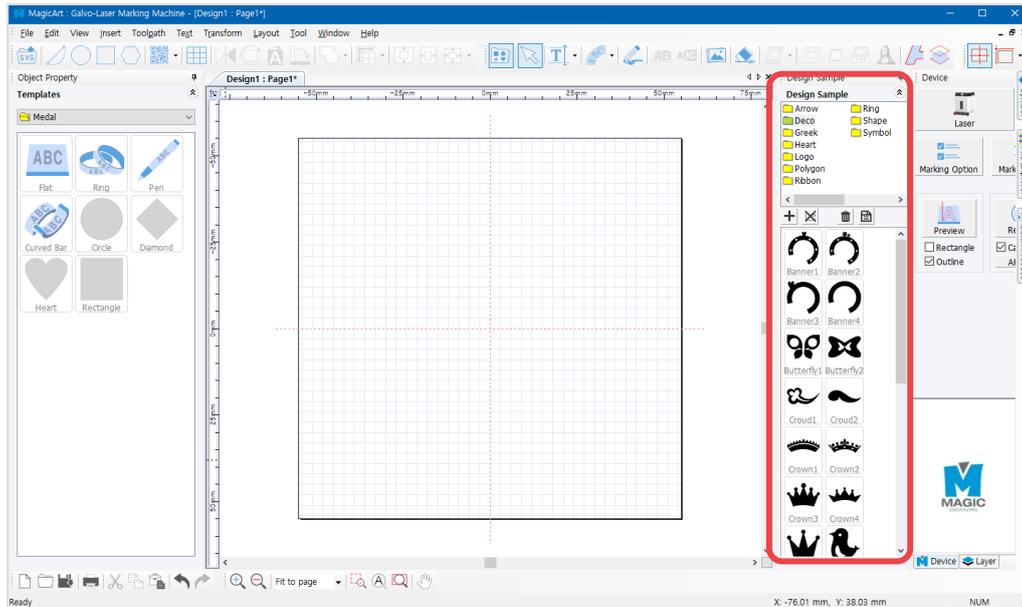
Create the barcode object.





### [Design sample]

Import design sample or save current object as design sample.



### What is a design sample?

It means design objects saved in the design sample library. The design sample is easily and quickly imported from the design sample library and freely edited.



### [Selection]

You can select the object created in the work area to adjust its size and location or to change the object's property. Only the selected objects are subject to change their options such as location, size, etc. In the text input mode, switch over to selection mode easily by right-clicking the work area.



[Object selected]



[No object selected]



### [Text input]

If  button is pressed and the work area is clicked with the mouse, characters can be entered. Double clicking in the selection mode is an easier way to switch over to the text input mode.



Cursor (Text input mode)



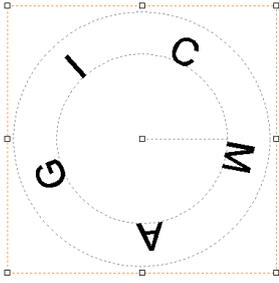
Press  button and drag a character to edit with the mouse for partial selection. Then, adjust its font and size.





### [Circular text]

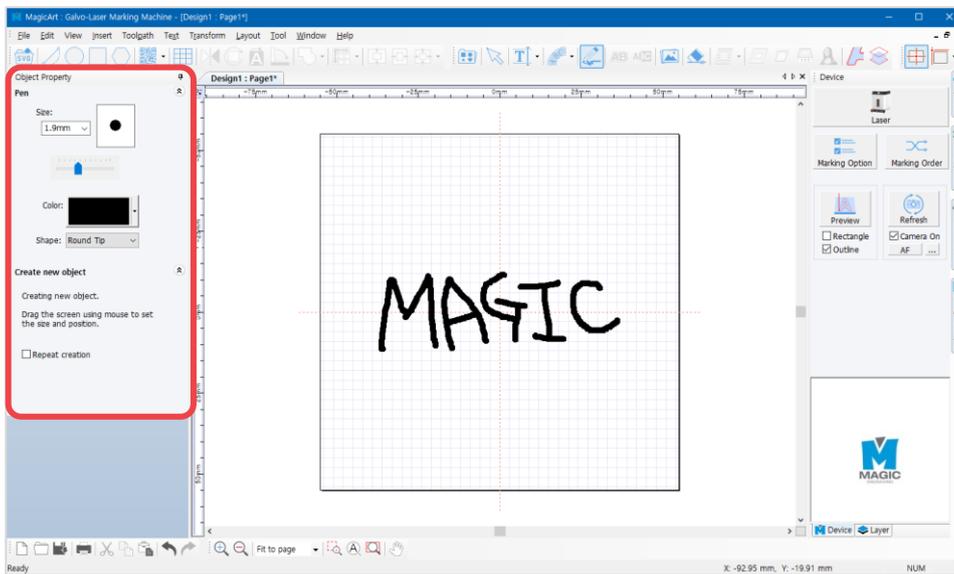
Create text objects along a circle.



### [Drawing pen]

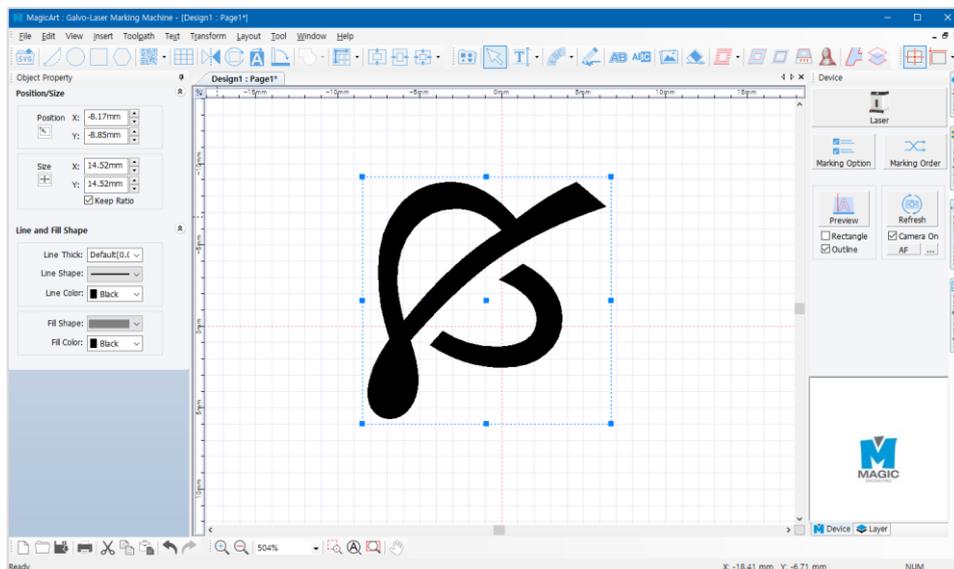
Drawing can be performed by dragging the mouse.

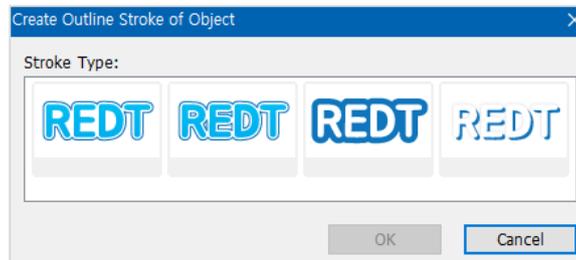
The thickness of the drawing line can be adjusted in the drawing object property window.



### [Outline stroke of object]

You can insert an outline in the selected object.

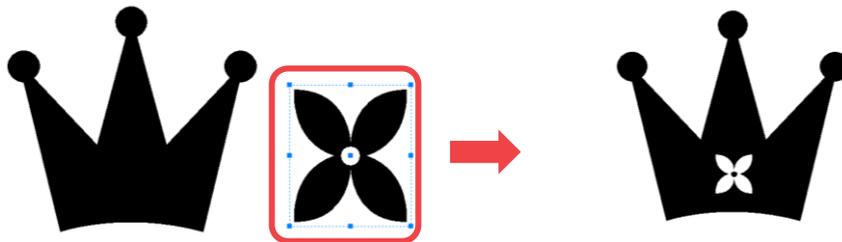




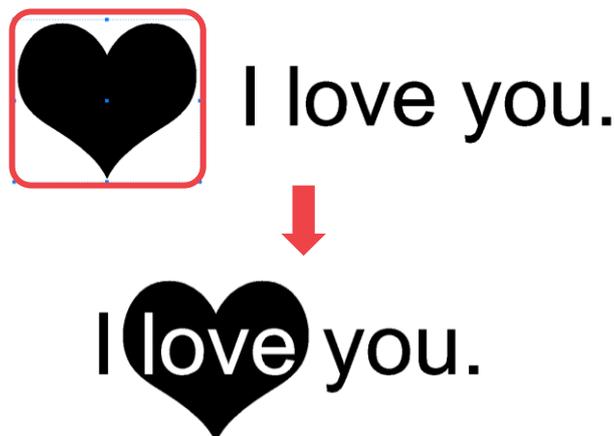
[Invert color of overlapped area]

When two or more objects are overlapped, the color in overlapped area can be inverted.

Move the target object over the first object after clicking **ABC** button, then overlapped area's color will be inverted.



When inverting text, drag the target object over the text after clicking **ABC** button.



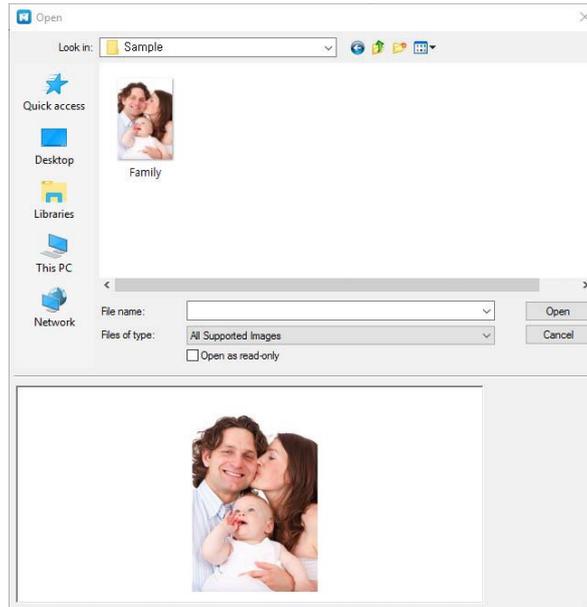
Notice

- [Automatically invert color in overlapped area] function is only applied to straight lines, curved lines, circle, rectangle, polygon, design sample and uploaded SVG file, not texts and images.
- [Automatically invert color in overlapped area] function inverts the color of underlaid object. If the color is not inverted, select [Layout menu → Order → Top Most] and place the underlaid object above the other object.



## [Image]

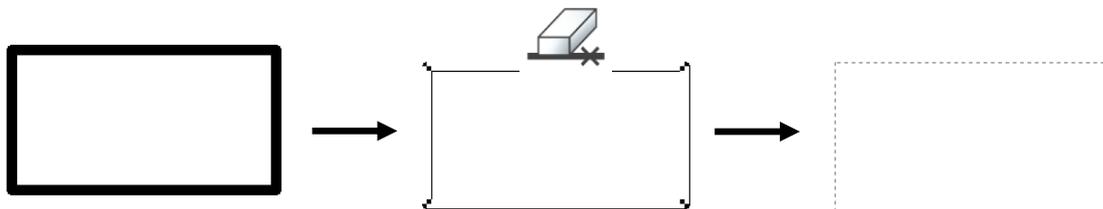
Import image (bmp, jpeg, gif, png ... etc.).



## [Line eraser]

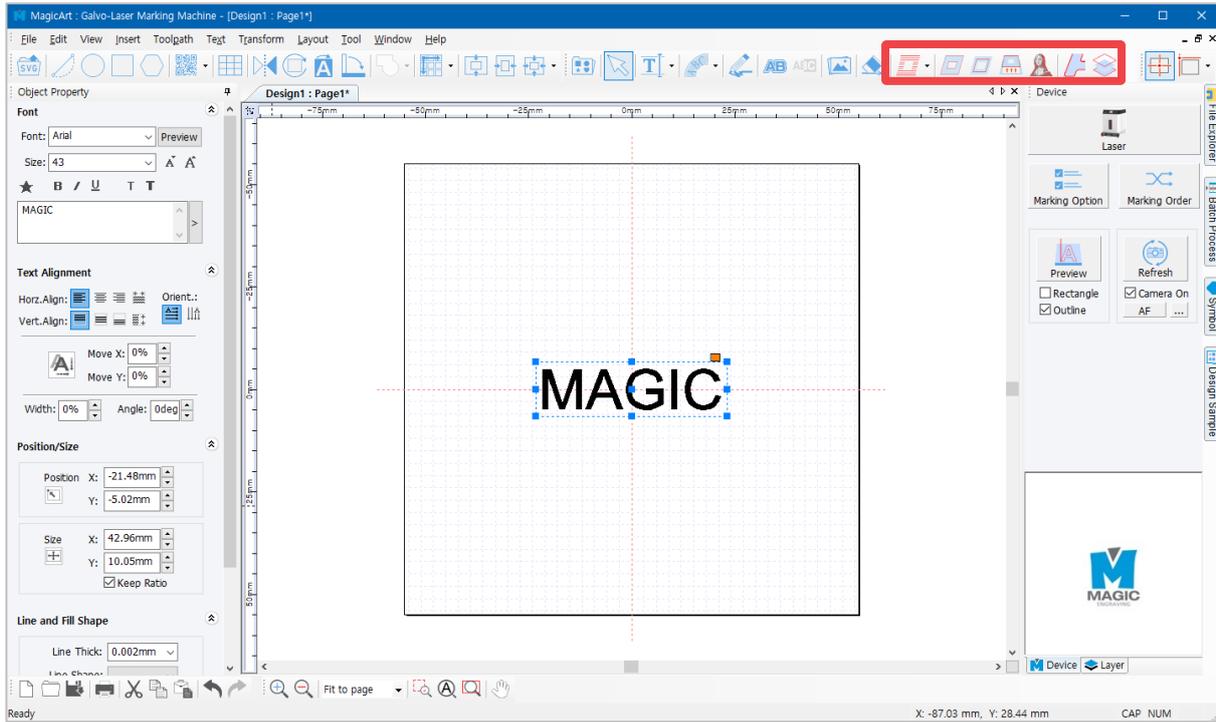
Erase the line of a created object.

Move the mouse over the line of an object, then click the line. The line will be erased (Some objects cannot be erased with the Line eraser tool).



## ◆ Toolpath

Please refer to [4. How to engrave for each toolpath] for details.



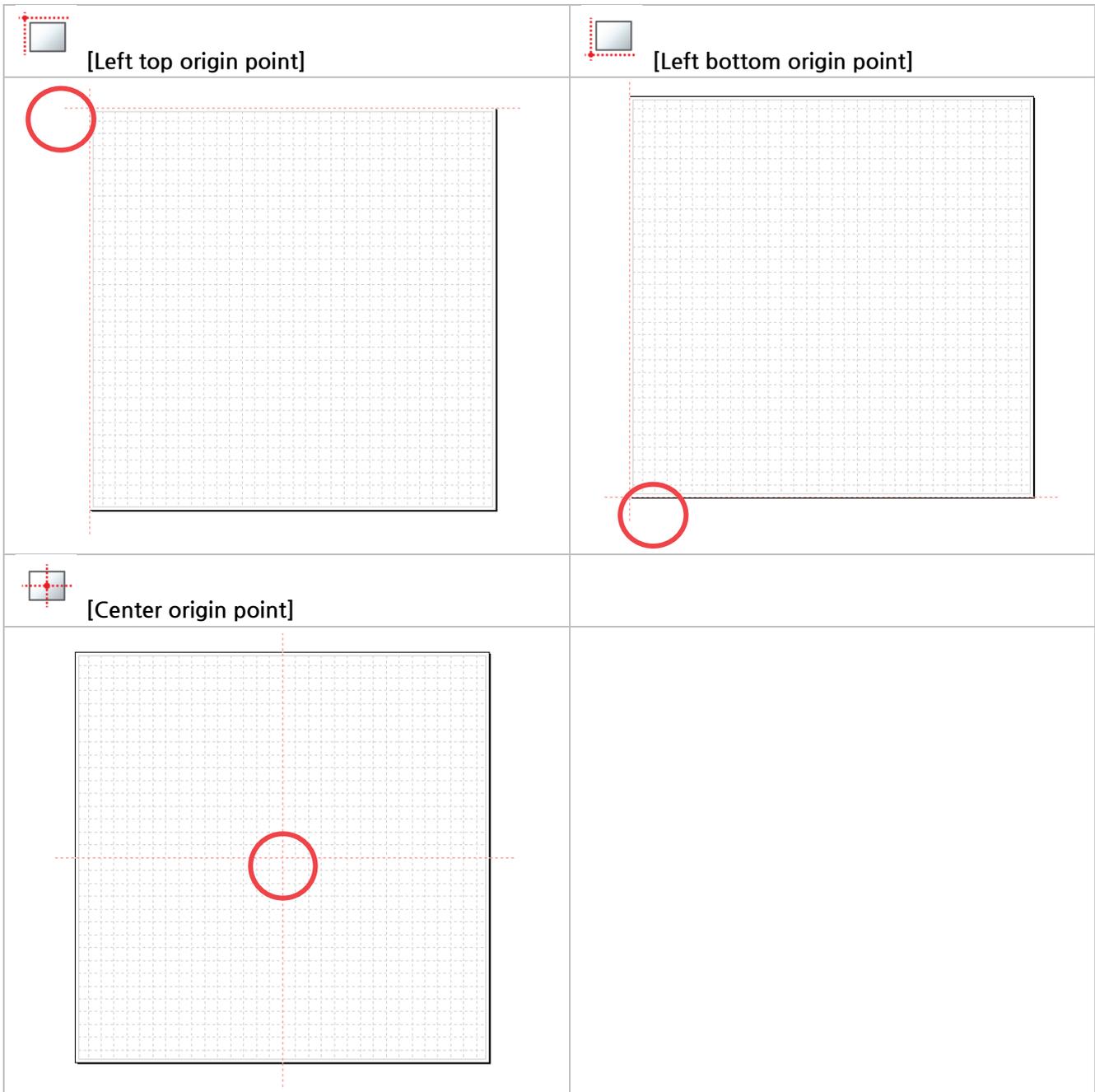
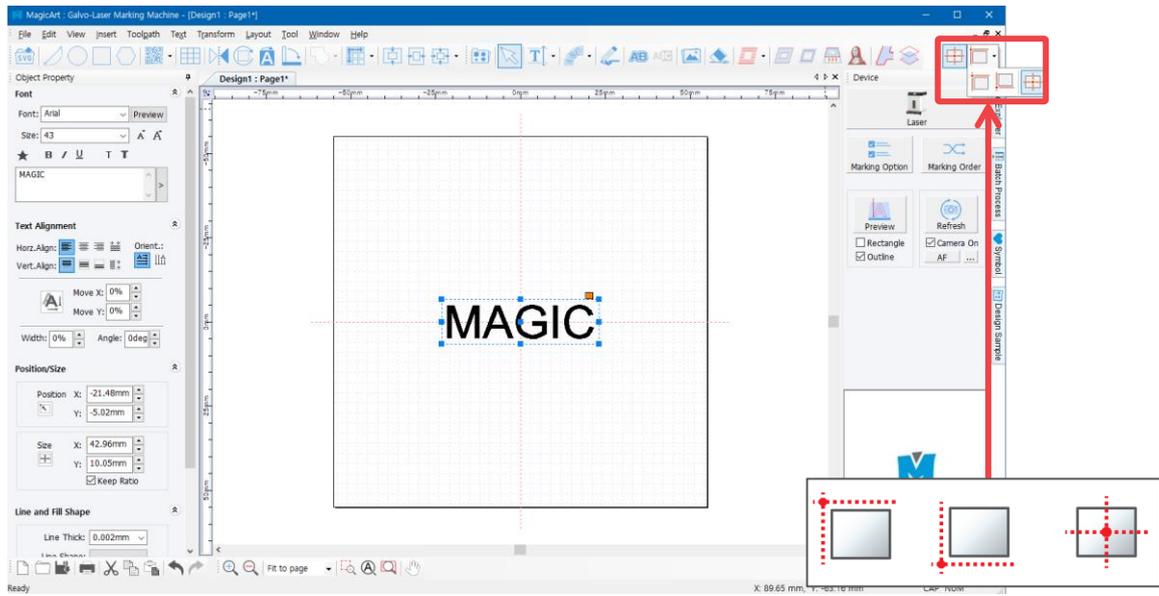
Note

### Toolpath?

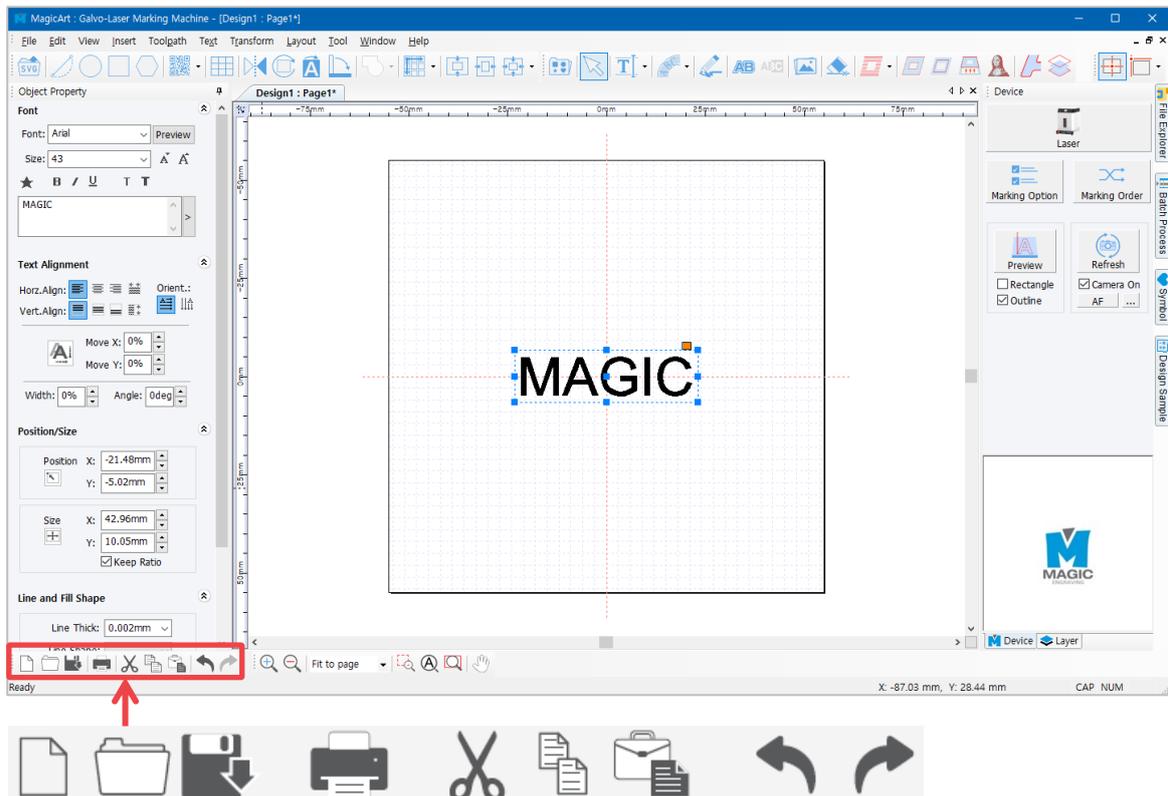
Toolpath is a pathway where tool passes by for marking.

Toolpath is usually displayed in red color and marking tool moves along the pathway as it engraves.

## ◆ Origin point setting tools

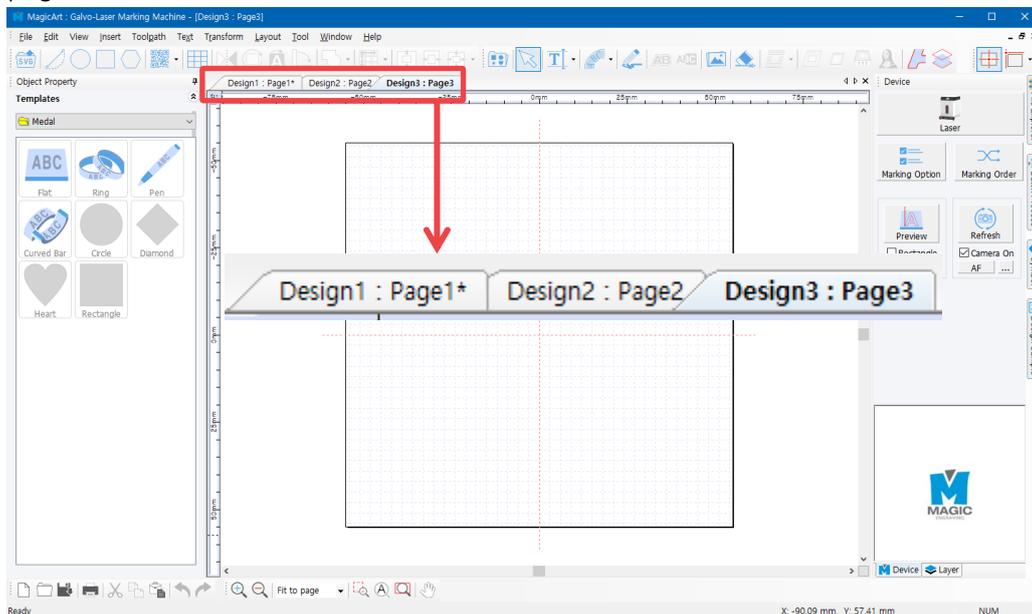


## ◆ Basic tools



### [New document]

Open a new page.



### [Open]

Open a file in "\*.dgn" file format.

Select a file on the "Open" window and click "Open" button.



### [Save document]

Save the design drawn on program as "\*.dgn" file format.

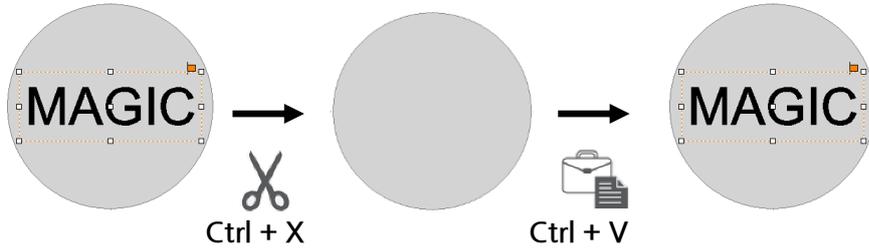
Choose the location (folder) in which the file will be saved and enter the file name before clicking "Save" button.



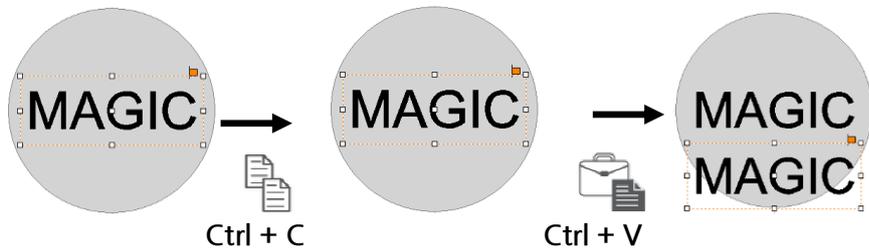
Print the design drawn on program.



Cut the selected object. If Ctrl+X is pressed on the keyboard, the same function will be executed.

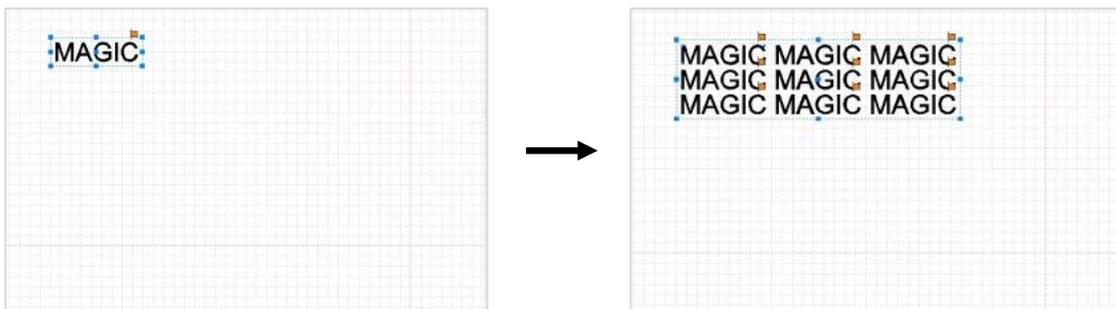
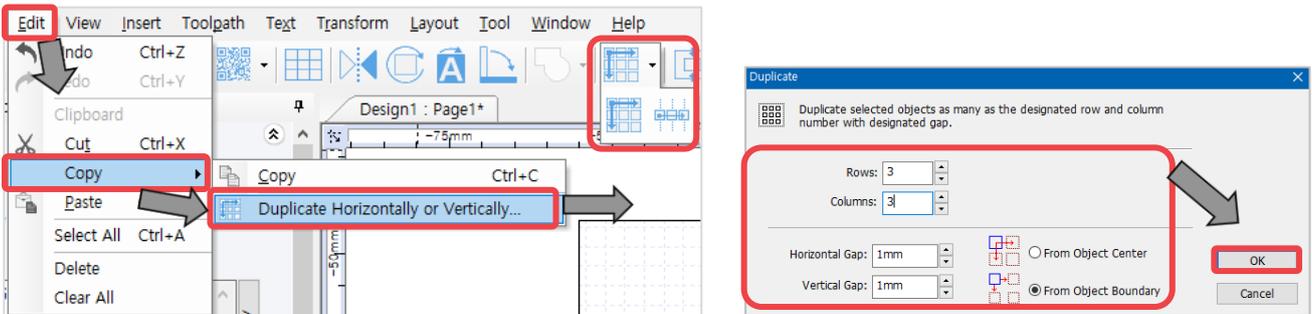


Copy the selected object. If Ctrl+C is pressed on the keyboard, the same function will be executed.



### [Duplicate Horizontally or Vertically...]

If more than one of the same objects is needed, multi-copy the object at regular intervals by clicking [Edit → Copy → Duplicate Horizontally or Vertically...] or pressing  icon in toolbar.



Paste the cut or copied object.

If [Ctrl+V] is pressed on the keyboard, the same function will be executed.



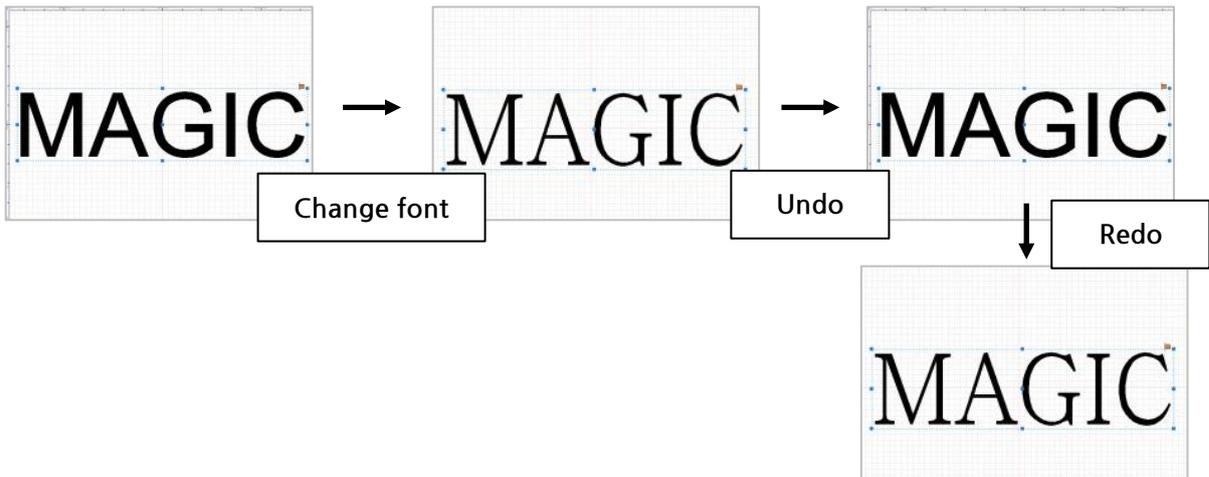
[Undo / Redo]

-Undo: Restore the work recently done to its previous state.

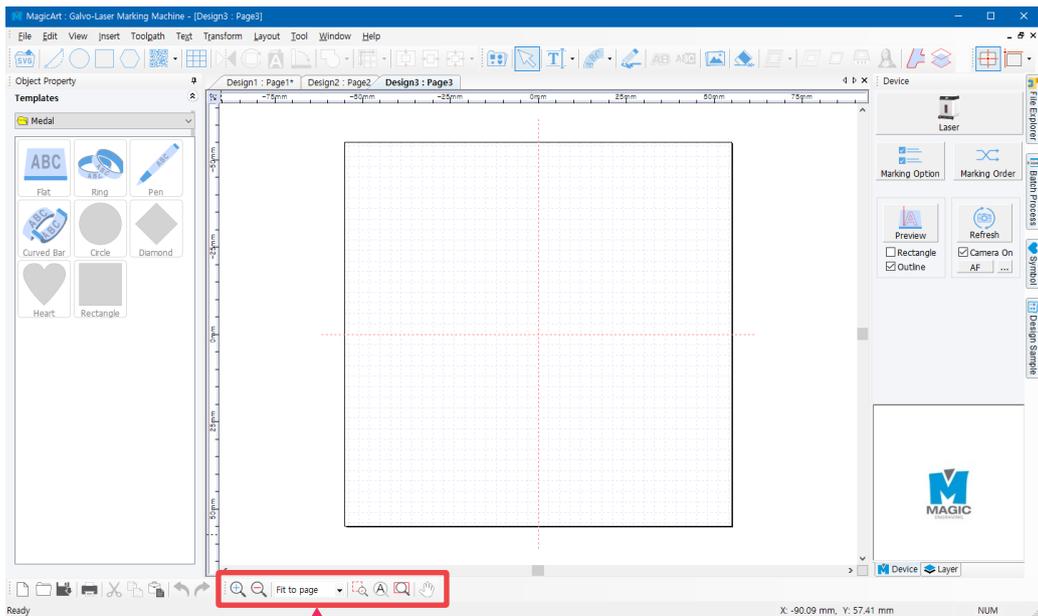
The number of undo steps can be adjusted with [Menu] → [Tool] → [Option] → [General].



-Redo: Re-execute the undone work.

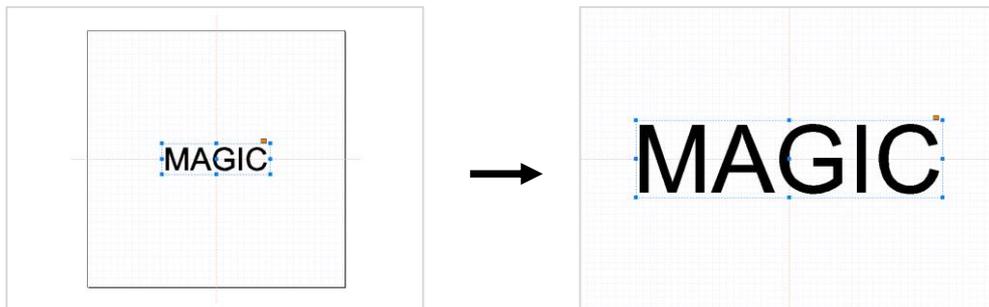


## ◆ Screen zoom in/out/move tools



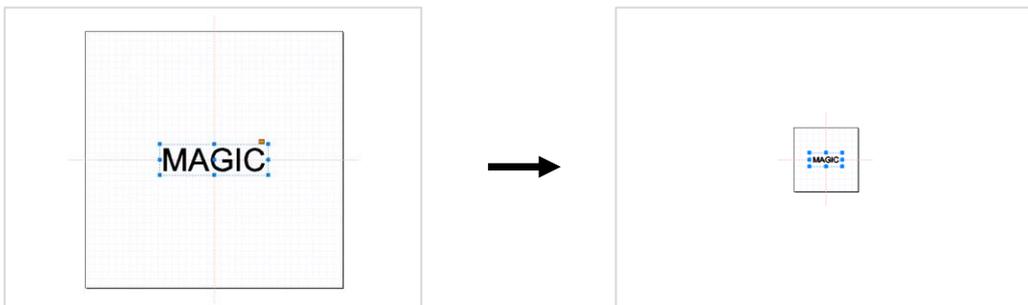
 [Zoom in]

The screen is zoomed in by one level.



 [Zoom out]

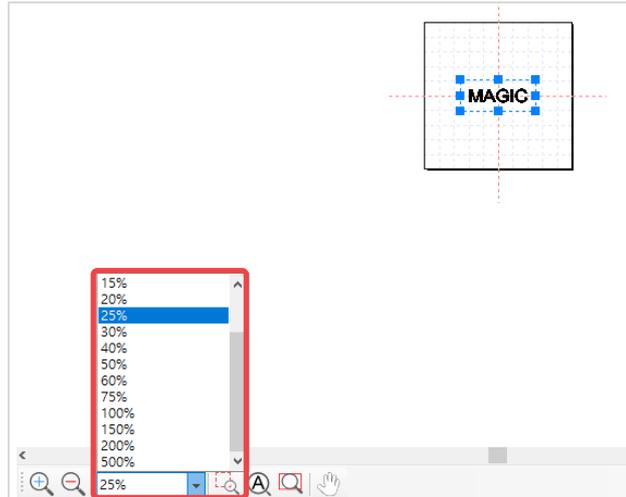
The screen is zoomed out by one level.



Fit to page ▾

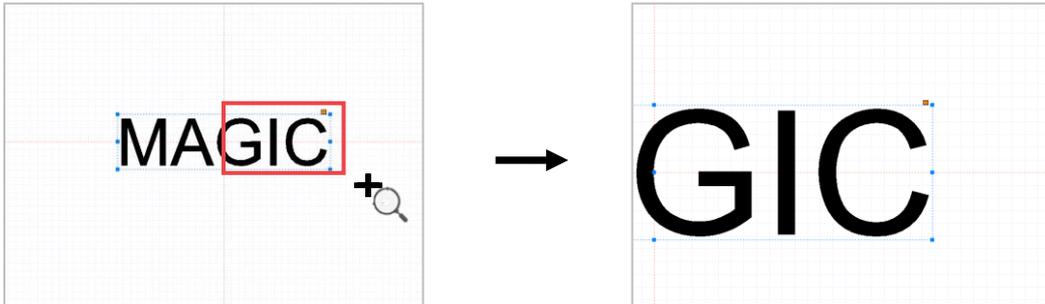
[Zoom in/out ratio]

If desired screen ratio is selected, the screen in the size of the selected ratio will be shown.



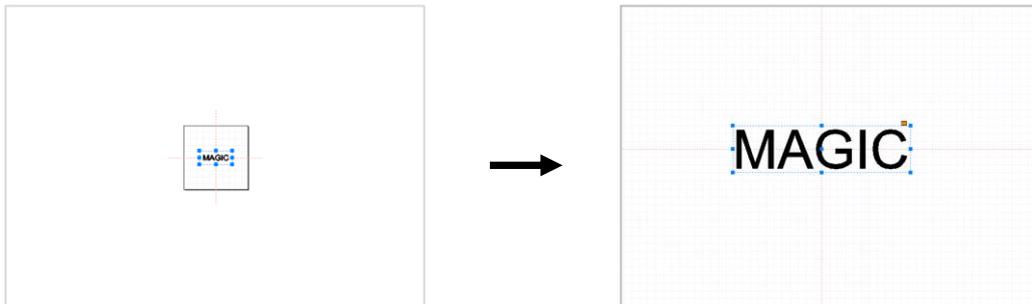
[Magnifier]

Drag a certain spot with the mouse to enlarge it.



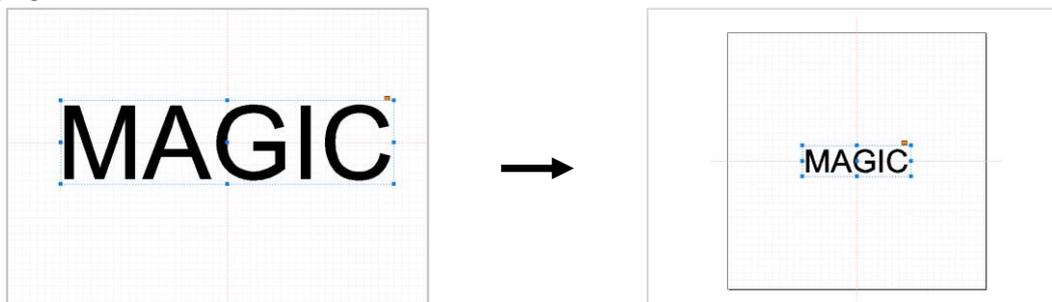
[Fit to object]

Enlarge the selected object to make it fill in the screen.



[Fit to page]

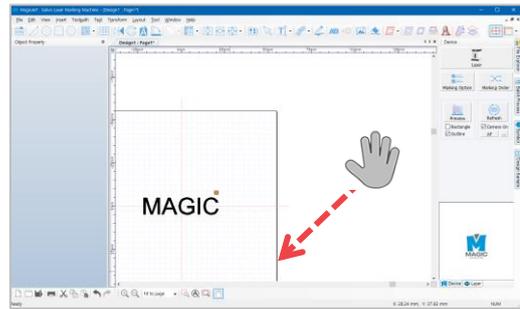
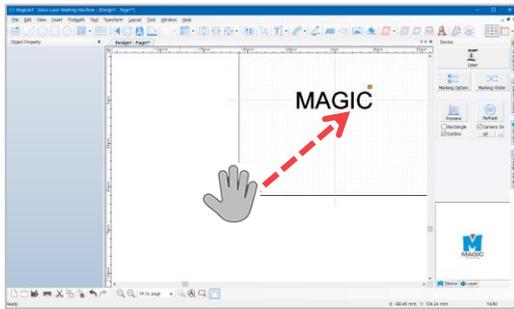
Adjust the page size to see the whole work area.





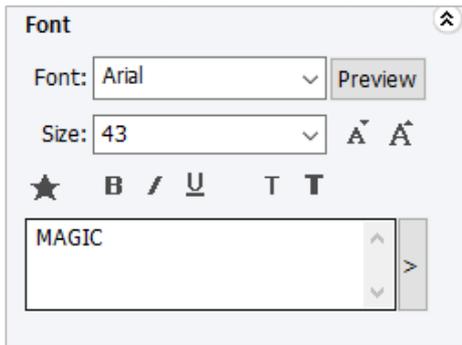
### [Panning]

Drag the screen with the mouse to move it.



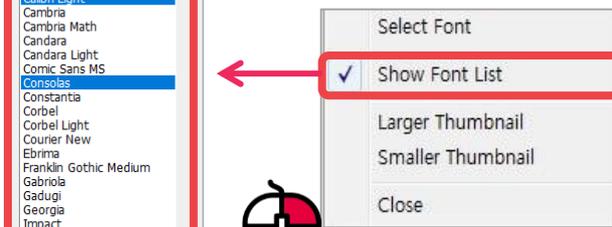
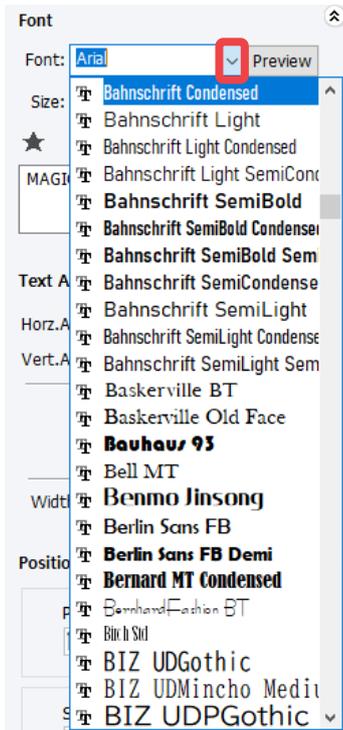
## 2. Text object property

If any text object is selected, the property of the text object will appear on the left of the screen.



[Font]

Designate font. Either click the font's arrow or click "Preview" button to designate font.

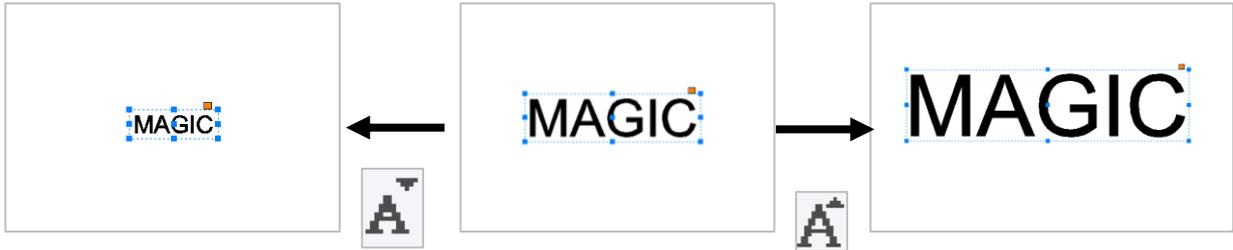


[Mouse right button click]

\*If you right click the font preview window, a menu appears. Click "Show Font List", then you can designate the fonts that will be used in preview.

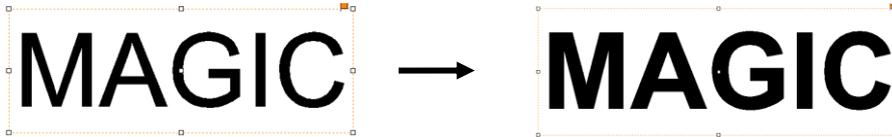
Size: 43    [Size]

Adjust the size of the selected text. Either press the arrow button of [Size] select the size of the font or press   [size] button to adjust the size by one level.



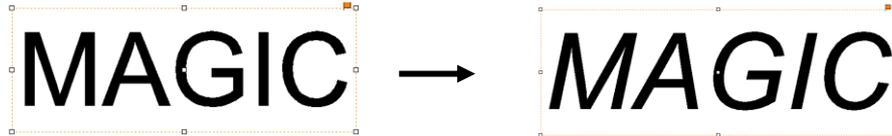
**B** [Bold]

Change text style to bold.



*/* [Italic]

Change the text style to italic.



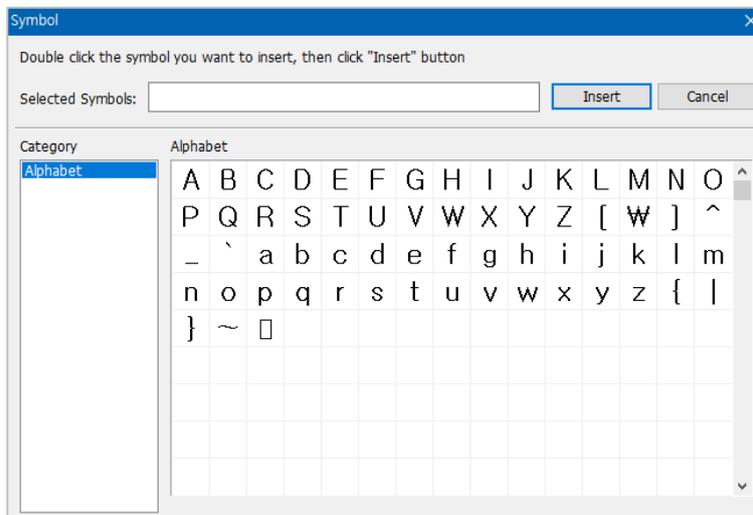
**T T** [Reduce or increase font weight by one level]

Adjust the weight of font.



★ [Symbol]

Insert symbols.



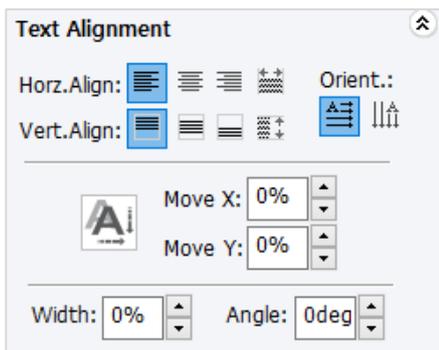
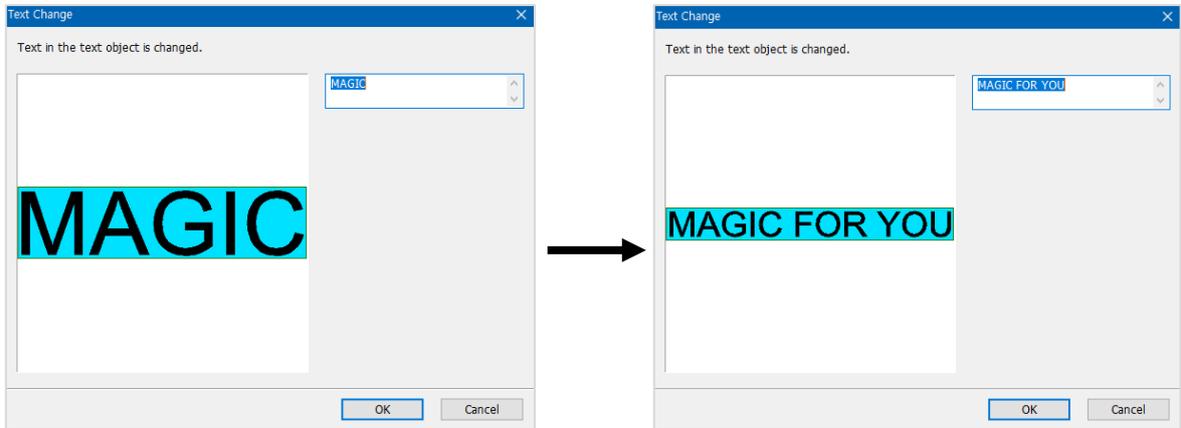


[Text change]

The entered text of the selected object can be displayed and changed. Edit the text on the text field or press

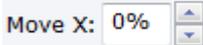


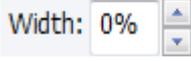
button to change the text more easily when several text objects are selected.



[Text Alignment]

 [Align to left]	Align characters to the left in the text box. 
 [Align to center]	Align characters to the horizontal center in the text box. 
 [Align to right]	Align characters to the right in the text box. 

 [Both]	<p>Align characters to the both direction evenly in the text box.</p> 
 [Align to top]	<p>Align characters to the top in the text box.</p> 
 [Align to center]	<p>Align characters to the vertical center in the text box.</p> 
 [Align to bottom]	<p>Align characters to the bottom in the text box.</p> 
 [Horizontal text ]	<p>Arrange characters horizontally.</p> 
 [Vertical text]	<p>Arrange characters vertically.</p> 
 Move X: 0%	<p>Move the selected character horizontally (left, right).</p> 
 Move Y: 0%	<p>Move the selected character vertically (up, down).</p> 

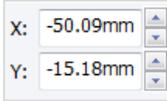
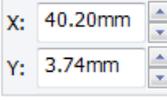
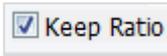
	<p>Adjust the width of the selected character.</p> 
	<p>Rotate the selected character.</p> 

**Position/Size** 

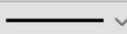
Position X:    
 Y:  

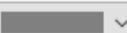
Size X:    
 Y:    
 Keep Ratio

[Position/Size]

	<p>Designates the location of the selected object</p>
	<p>Designates the size of the selected object</p>
	<p>When “Keep Ratio” is checked, width and height of the selected object is maintained at the same ratio.  When “Keep Ratio” is un-checked, width and height of the selected object can be adjusted separately.</p>

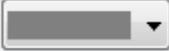
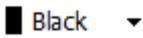
**Line and Fill Shape** 

Line Thick:    
Line Shape:    
Line Color:  Black 

Fill Shape:    
Fill Color:  Black 

[Line and Fill Shape]

<input type="text" value="0,002mm"/> 	<p>Line thickness of the selected object</p>
 	<p>Line type of the selected object</p>
 Black 	<p>Line color of the selected object</p>

	Color filled inside of the selected object
	Shape filled inside of the selected object

### 3. Rotation tool property

If the selected object is clicked once more, the mode will switch over to object rotation mode.



**Rotation**

Rotation Angle:  
 ▲▼

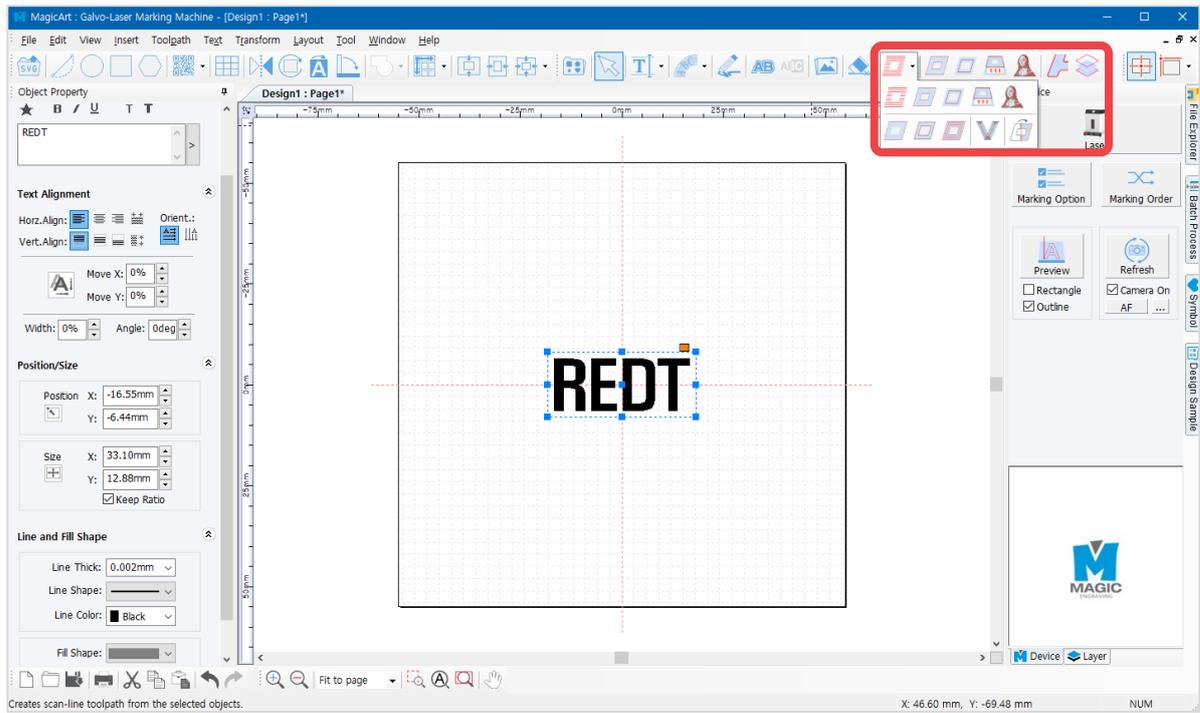
Rotate selected object

Rotate creating new object

[Rotation]

	Rotate the selected object by designated angle. Enter the desired angle of rotation, and then press arrow button. The object is rotated by the angle entered.
<span style="border: 1px solid blue; padding: 2px;">Rotate selected object</span>	Rotate the selected object at the same angle as entered.
<span style="border: 1px solid #ccc; padding: 2px; background-color: #f0f0f0;">Rotate creating new object</span>	Rotate and add a new object at the same angle as entered

## 4. How to engrave for each toolpath



Note

### Toolpath?

Toolpath is a pathway where tool passes by for marking.

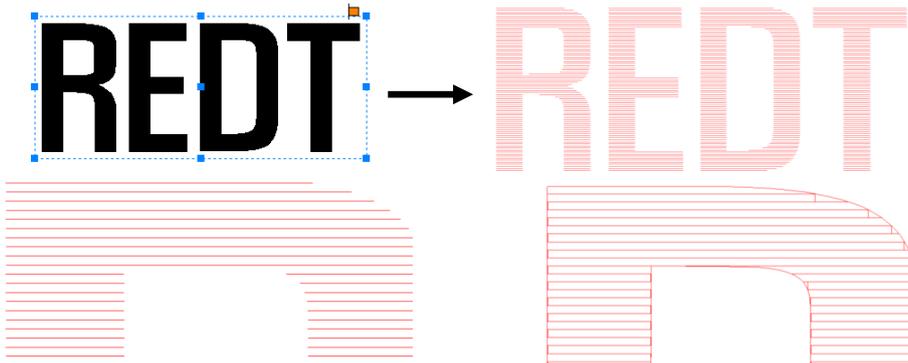
Toolpath is usually displayed in red color and marking tool moves along the pathway as it engraves.



### [Scan-line toolpath]

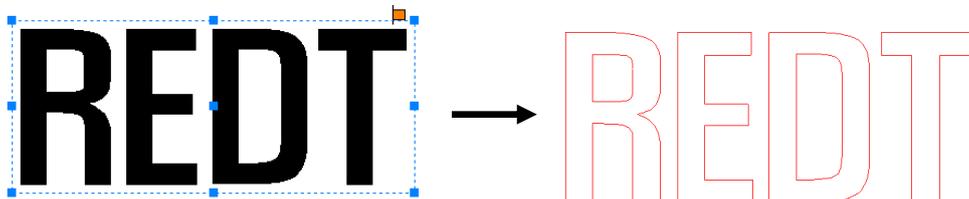
Creates toolpath that will engrave inside area of the target object's boundary.

“Scan line toolpath” might be similar to “Hatching toolpath”, but it is rather used for logos, patterns or objects with larger area.



### [Outline toolpath]

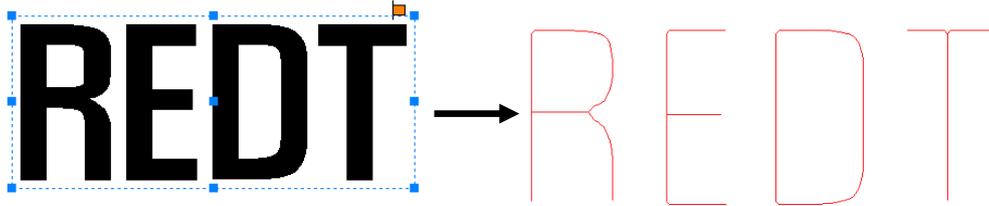
Creates a toolpath that will engrave the outline of the selected object.



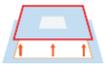


### [Single line toolpath]

Creates a toolpath that will engrave the center line of the selected object.



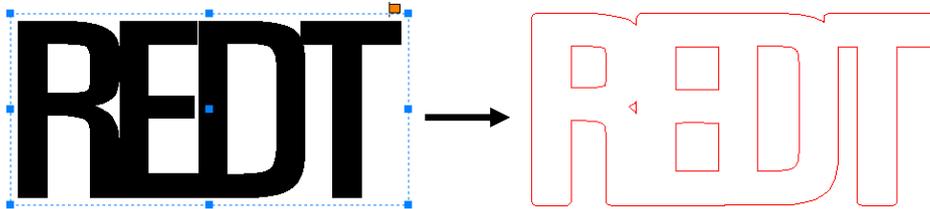
“Single line toolpath” process may cause the deviation of the center line. Thus, it is recommended to use thinner lined font to reduce the deviation.



### [Cut-out toolpath]

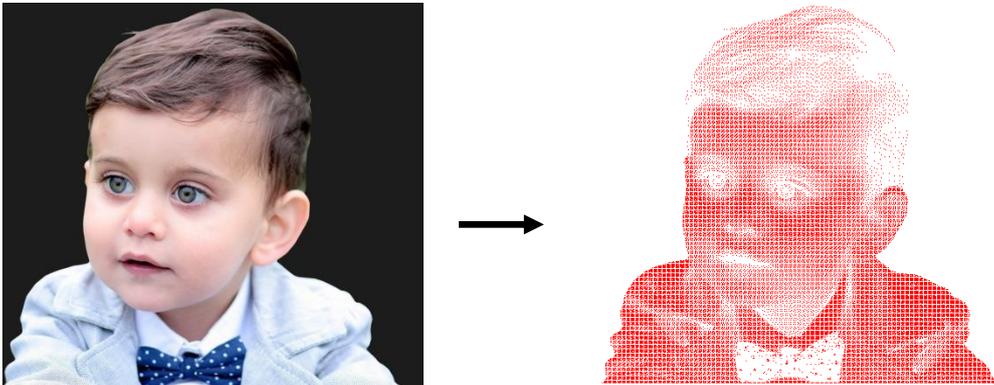
Creates a toolpath that will cut out the selected object.

The toolpath boundary will be wider than the boundary of the selected object depending on the thickness of the tool.



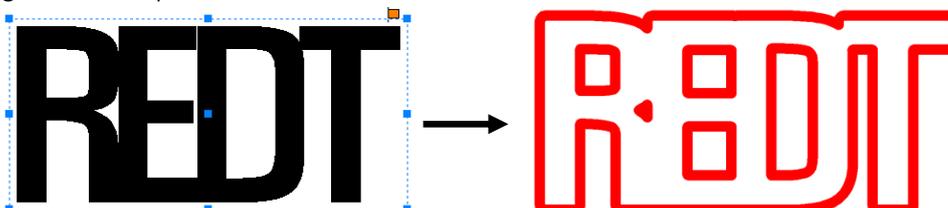
### [Photo impact engraving toolpath]

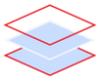
Creates a toolpath that will engrave an image with dots.



### [Simulate toolpath processing]

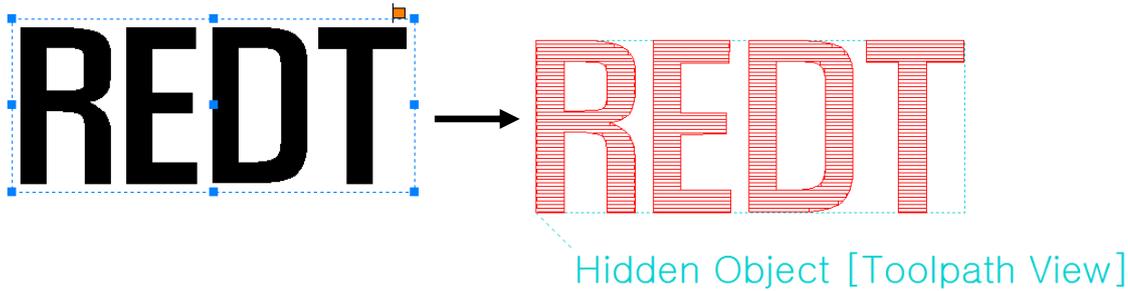
The predicted image of the toolpath result processed by the selected tool is shown. The following is an example.





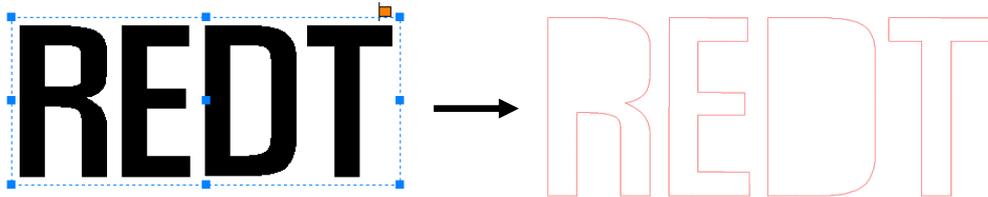
### [Show toolpath only]

Only toolpath is shown on the screen with temporarily hiding all of the other objects. If this button is pressed once again, all objects will be seen again.



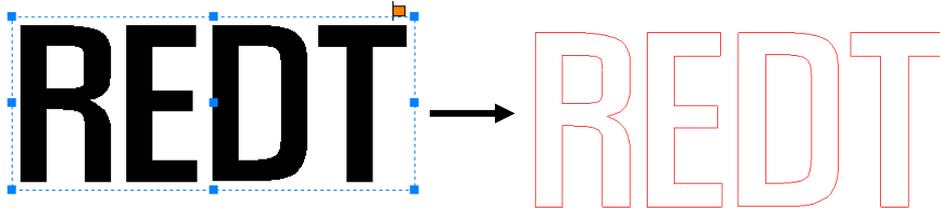
### [Boundary-line toolpath]

Creates a toolpath that will engrave the boundary of the selected object.



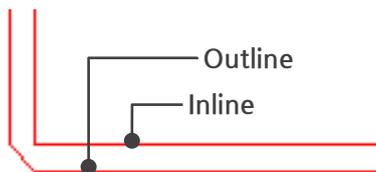
### [Inline toolpath]

Creates toolpath that will engrave inline of the selected object.



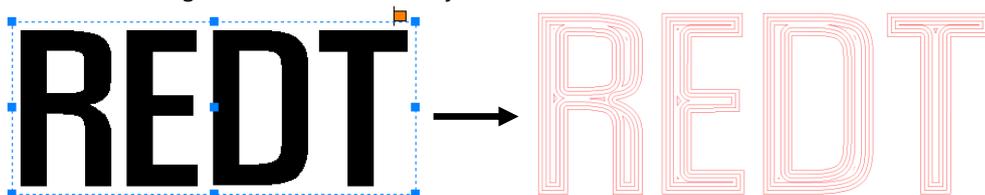
Notice

The toolpath is created on inner line that is placed within the boundary of the selected object.



### [Contour line toolpath]

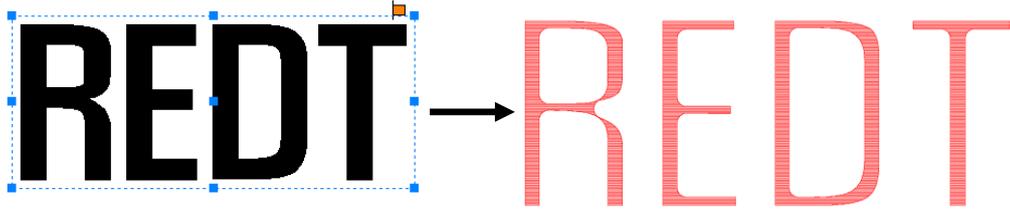
Creates a toolpath that will engrave the selected object with contour lines.



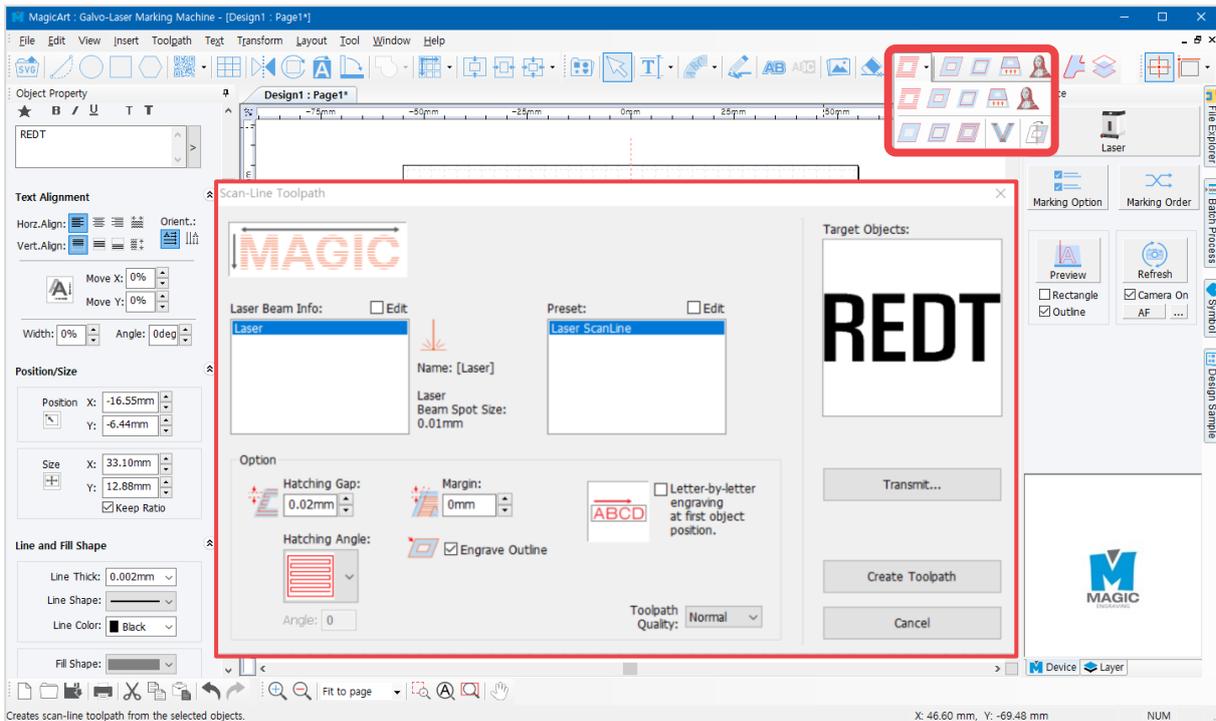


**[V-cut toolpath]**

Creates toolpath that will engrave V-cut groove.



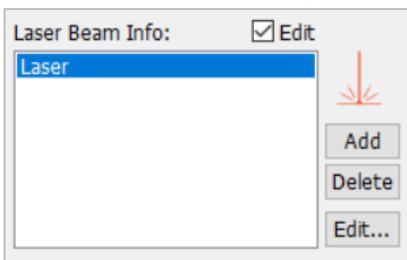
## 5. Create toolpath



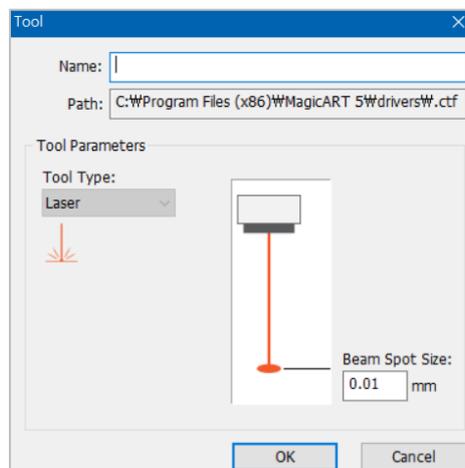
### (1) Toolpath setting

#### [Laser Beam Info: Add/Delete/Edit]

Select the laser beam. Each engraving option value can be changed by pressing Edit or Add button. If "Edit" button is checked, Add/Delete/Edit buttons will appear.



**Add** Designate the name of info to be added along with its type and other options like tip width, then click "OK" button. The new info will be added to the selection list.



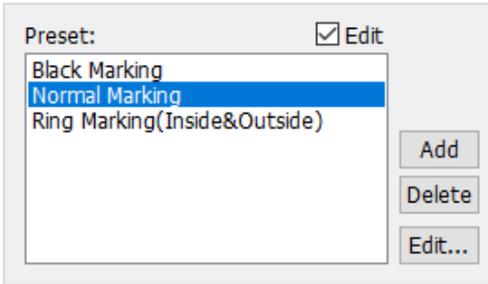
**Delete** Select info from the list and click "Delete" button to delete the selected tool from the list.

**Edit...** Select info for modifying and click "Edit" button. If "OK" button is clicked after option is modified, the modified value will be saved.

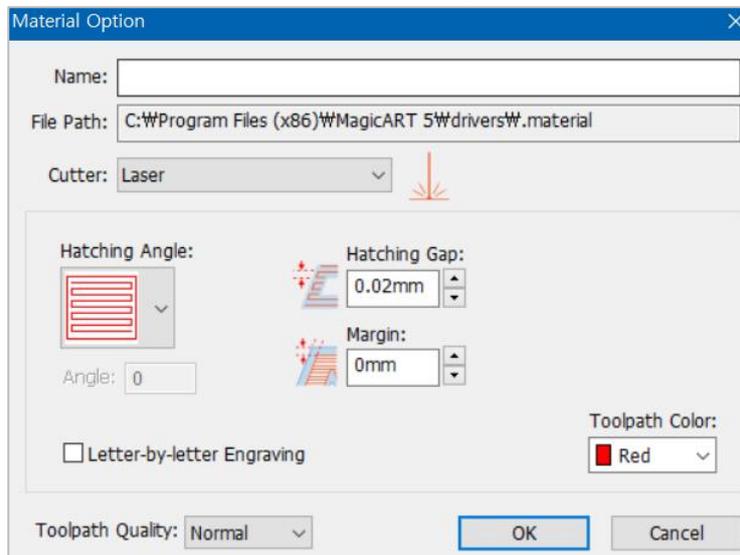
### [Preset: Add/Delete/Edit]

Hatching angle, gap and others are pre-set for each engraving option. Therefore, it is not necessary to designate hatching gap, angle and others every time and they will be automatically set with their pre-set values. Each engraving option value can be changed by pressing Edit or Add button.

If “Edit” button is checked, Add/Delete/Edit buttons will appear.



Enter a name to the preset option setting window and designate hatching gap, angle and etc before clicking “OK” button. The option will be added to the preset option selection list.

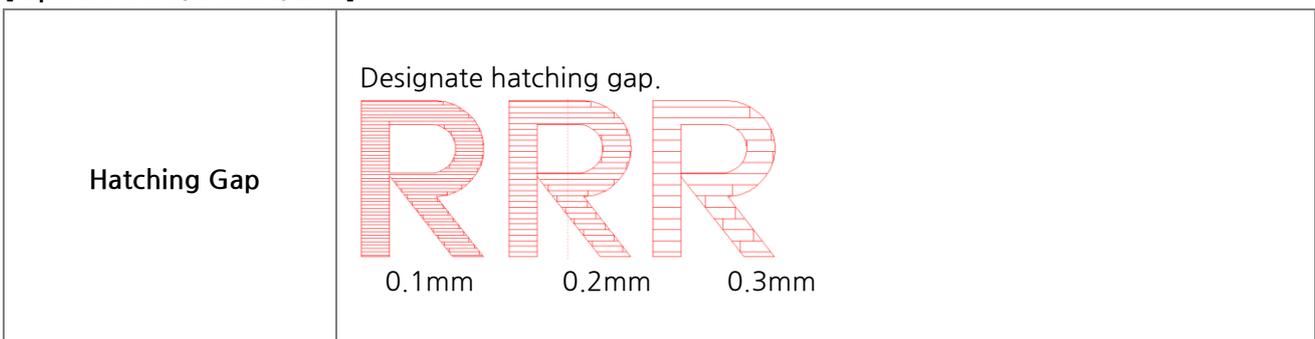


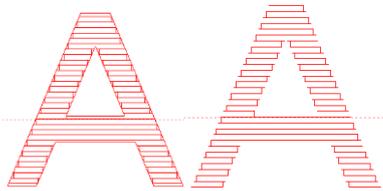
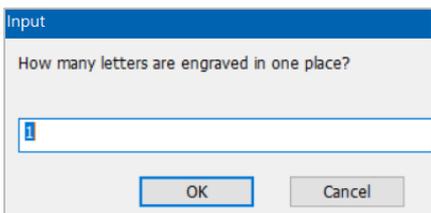
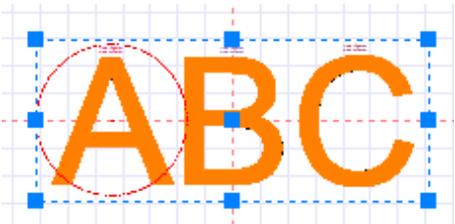
Select an option to be deleted and click “Delete” button to delete the option from the list.



Select an option to be modified and click “Edit” button. If “OK” button is clicked after option is modified, the modified setting value will be saved.

### [Option: Add/Delete/Edit]



<p><b>Margin</b></p>	<p>Designate a margin between object outline and toolpath.</p>  <p>0.1mm      0.2mm      0.3mm</p>
<p><b>Hatching angle</b></p>	<p>The followings are shown only on hatching Toolpath.</p>  <p>A Toolpath is created in the vertical direction</p> <p>A Toolpath is created in the left diagonal direction</p> <p>A Toolpath is created in the right diagonal direction</p> <p>A Toolpath is created in the horizontal direction</p> <p>A Toolpath is created in the cross hatched direction  <u>※ This toolpath is not recommended due to possible damage to materials with plated surface.</u></p>
<p><b>Engrave outline</b></p>	<p>If this option is un-checked, a toolpath for only the inside of the selected object is created.</p> 
<p><b>Letter-by-letter engraving at first object position</b></p>	<p>After marking only the specified letter, it waits and marks the entire letters by repeating the sequence in which the user manually adjusts the engraving position.</p> <p>(Example: When marking ABC, if the number of characters you would mark is one letter) After marking A, the user adjusts the engraving position → marking B → engraving position adjustment → marking C</p>  
<p><b>Toolpath quality</b></p>	<p>Select the toolpath quality.  The higher quality, the longer toolpath creation time.</p>

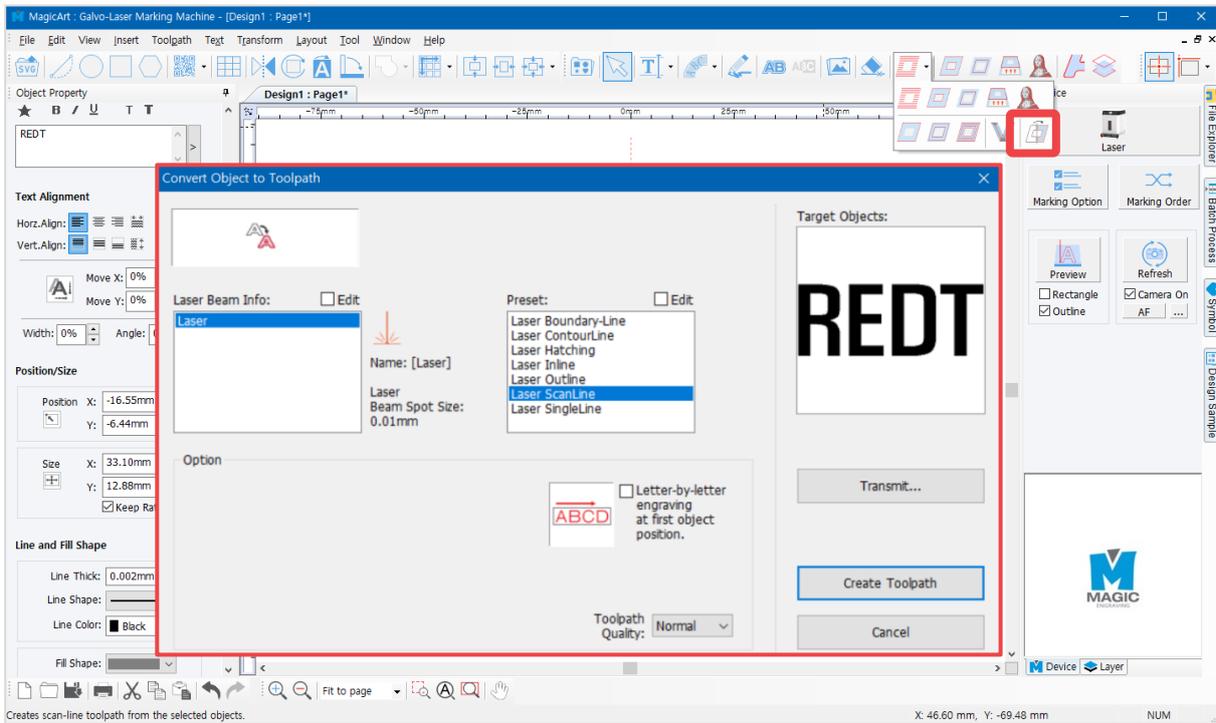
[Transmit]

Toolpath output window is displayed.

## (2) Convert object to toolpath

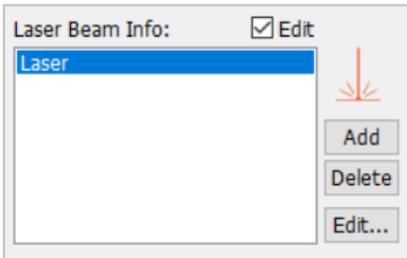


[Convert object to toolpath] is convert selected object to toolpath. It's not necessary to designate toolpath setting every time and they will be automatically set with their pre-set values. Each toolpath option value can be changed by pressing Edit or Add button.

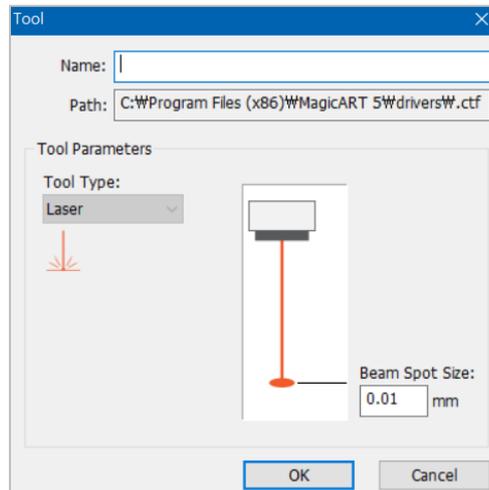


### [Laser Beam Info: Add/Delete/Edit]

If "Edit" button is checked, Add/Delete/Edit buttons will appear.



Designate the name of info to be added along with its type and other options like tip width, then click "OK" button. The new info will be added to the selection list.



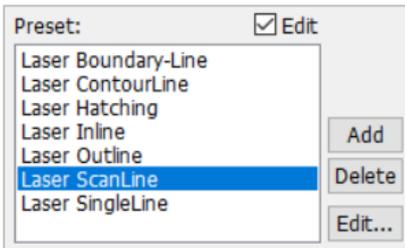
**Delete** Select info from the list and click “Delete” button to delete the selected tool from the list.

**Edit...** Select info for modifying and click “Edit” button. If “OK” button is clicked after option is modified, the modified value will be saved.

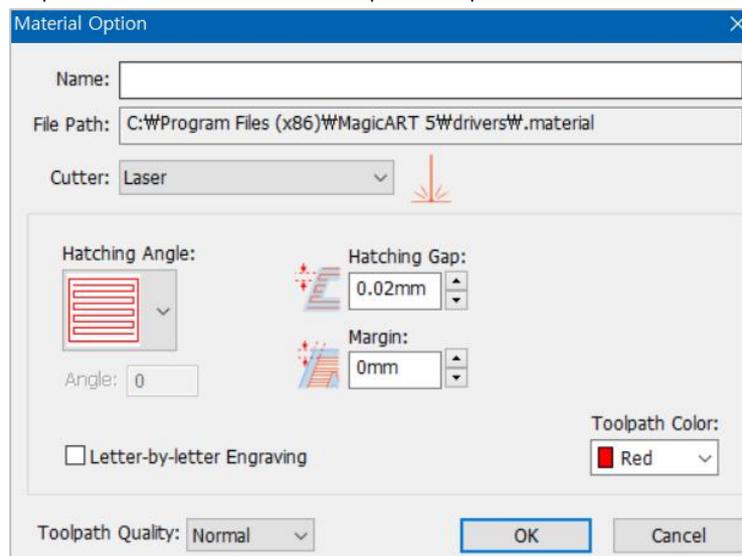
### [Preset: Add/Delete/Edit]

Toolpath setting pre-set for each toolpath. Therefore, it is not necessary to designate hatching gap, angle and others every time and they will be automatically set with their pre-set values. Each toolpath setting value can be changed by pressing Edit or Add button.

If “Edit” button is checked, Add/Delete/Edit buttons will appear.



**Add** Enter a name to the preset option setting window and designate hatching gap, angle and etc before clicking “OK” button. The option will be added to the preset option selection list.



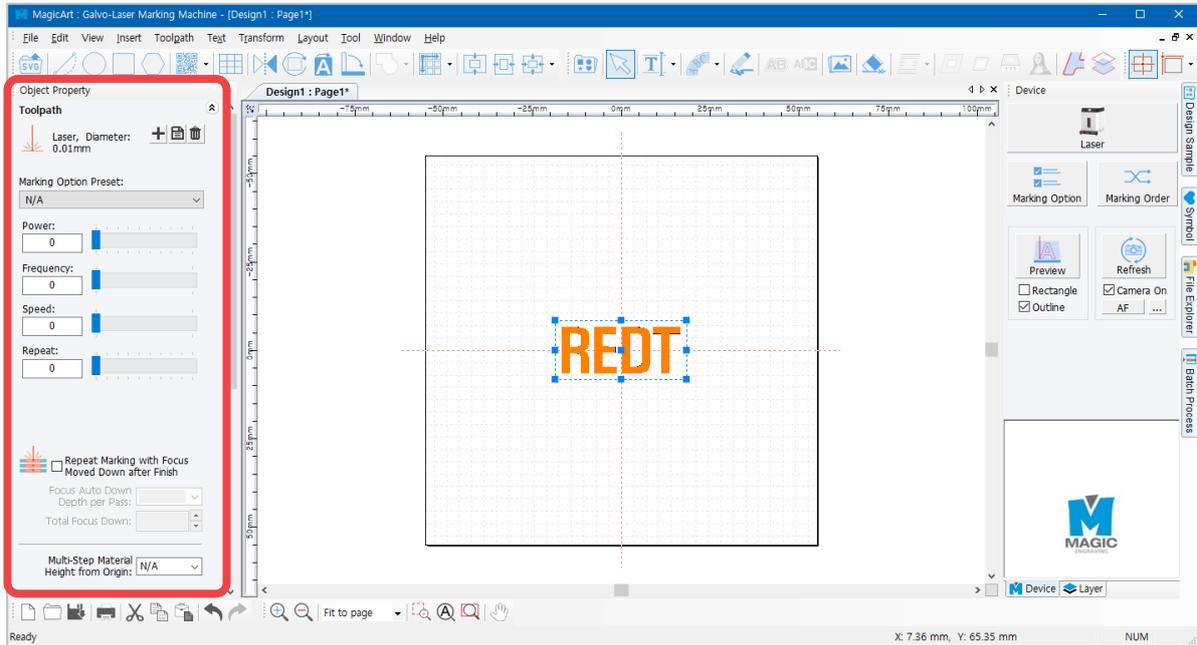
**Delete** Select an option to be deleted and click “Delete” button to delete the option from the list.

**Edit...** Select an option to be modified and click “Edit” button. If “OK” button is clicked after option is modified, the modified setting value will be saved.

## 6. Laser option

### (1) Quick setting

After creating the toolpath, the laser options settings are displayed on the left side of the program. You can set the laser options and immediately mark the selected design.

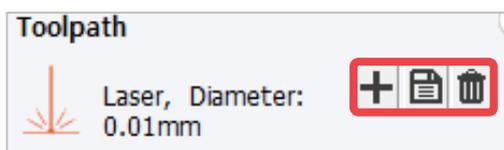


<b>Marking Option Preset</b>	Selects the marking option ※ See the details below.
<b>Power</b>	Adjusts the laser output
<b>Frequency</b>	Adjusts the laser frequency
<b>Speed</b>	Adjusts the marking speed
<b>Repeat</b>	Adjusts the marking repetition
<b>Repeat Marking with Focus Moved Down after Finish</b>	Adjusts marking depth upon selection of Deep Marking. <b>ex) 0.05mm per marking, 2 times</b> - Focus Auto Down Depth per Pass:0.05mm - Total Focus Down: 0.1mm
<b>Multi steps Material Height From Origin</b>	Batch engraving on materials with multilevel heights. Enter the heights from the focus surface to marking surface in the program, then the system adjusts focus according to the material heights automatically and performs engraving. <b>ex) Marking by moving up by 1mm</b>

### [Add/ Edit and Save/Delete]

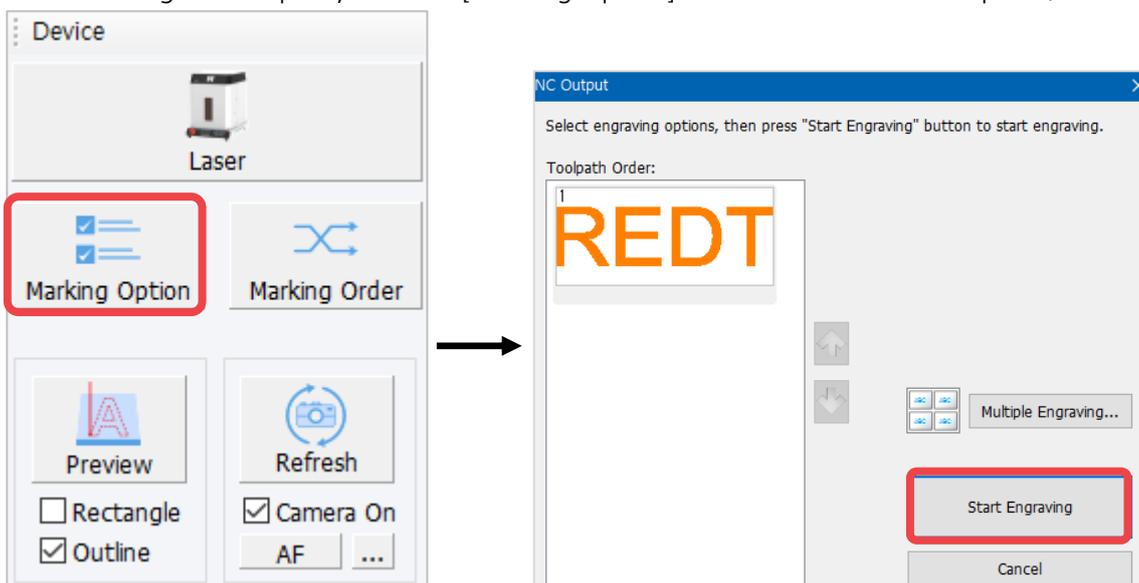
Laser options such as power and speed can be set in advance.

Press  [Edit and Save] and click the button at the bottom. Then, you can change options.

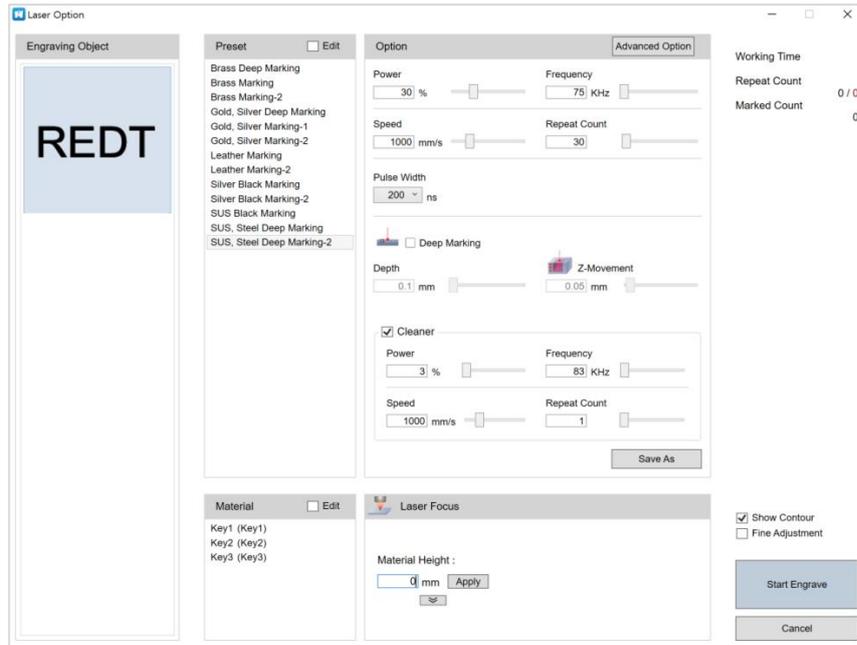


### (2) Marking option window

After creating the toolpath, click the [Marking Option] button to set the laser option.



A laser option window pops up. Adjust the laser option. Then, the marking data are sent to the machine.



		<b>Engraving object</b>	Checks the object to engrave
		<b>Preset</b>	Selects the marking option ※ See the details below.
<b>Option</b>			Changes the laser option ※ See the details below.
	<b>Advanced Option</b>		Changes the advanced option 
	<b>Power</b>		Adjusts the laser output
	<b>Frequency</b>		Adjusts the laser frequency
	<b>Speed</b>		Adjusts the speed
	<b>Repeat Count</b>		Adjusts the repetition
	<b>Deep Marking</b>	<b>Depth</b>	Adjusts marking depth upon selection of Deep Marking
		<b>Z-Movement</b>	The depth specified upon selection of Deep Marking is not marked at once. It is adjusted by Z-axis moving unit. <u><b>E.g.) Deep Marking-specified depth:</b></u> In the event of 1.2mm/0.3mm Z-axis moving unit, a depth of 1.2mm is marked (0.3mm per marking, 4 times).

	<b>Cleaner</b>	Perform the marking for cleaning.
<b>Material</b>		Selects the preset marking height ※ See the details below.
<b>Laser Focus</b>	<b>Material height</b>	Since the laser focus changes according to the height of the material, the height is adjusted accordingly. Or set the focus by entering the material height directly.

### [Preset]

Laser options such as marking type, power and speed can be set in advance.

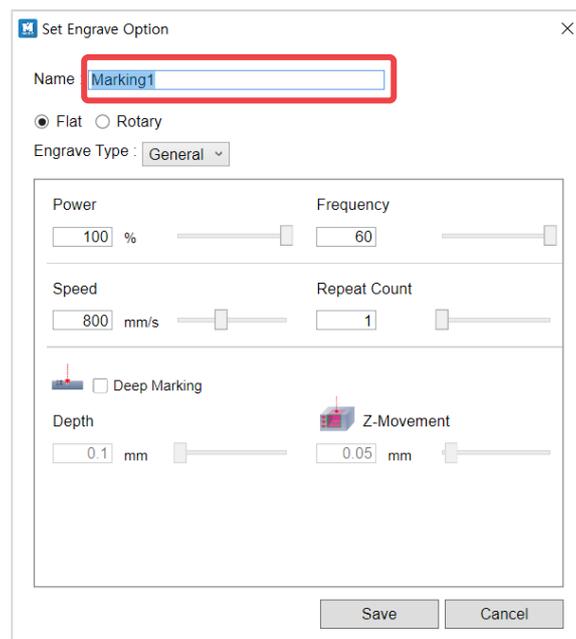
Press [EDIT] and click the button at the bottom. Then, you can change options.



### -Add

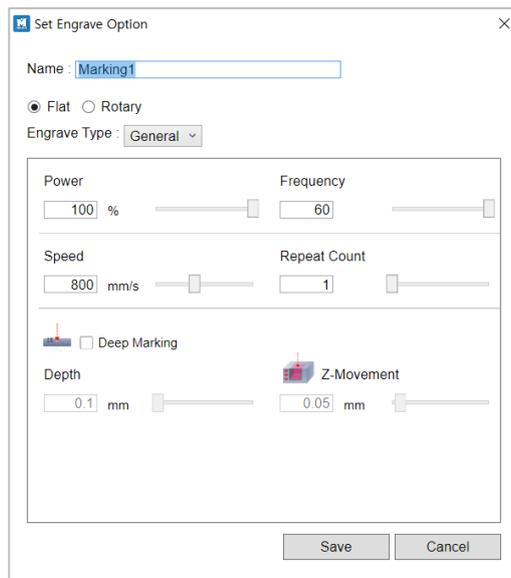
This menu is used to add a new marking option.

Set the options (name, engrave type, power, frequency, speed, etc.) and click [Save].



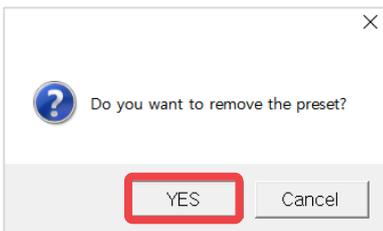
## -Edit

This menu is used to edit marking options.  
Edit the options and click [Save].



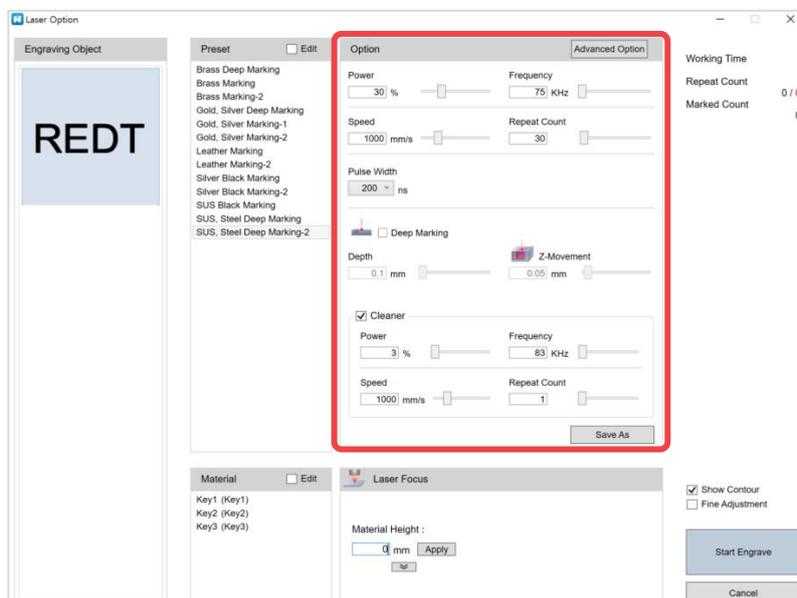
## -Delete

Deletes marking options



## [Options]

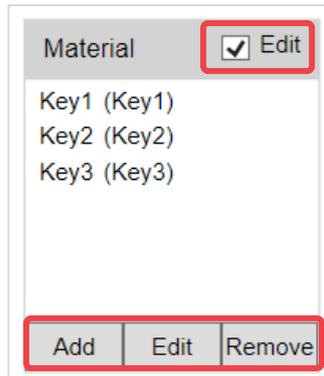
Marking types can be selected. Laser options change depending on an marking type. Adjust the value and click [Save as].



## [Material]

The height of laser focus can be set by material.

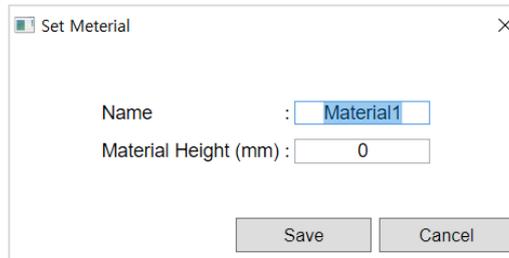
Press [Edit] and click the button at the bottom to change options.



### -Add

This menu is used to add new material setting.

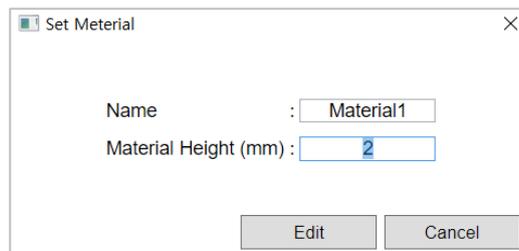
Set the name and material height and click [Save].



### -Edit

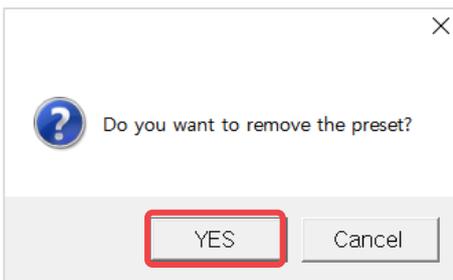
This menu is for editing material settings.

Change the option and click [Save].



### -Delete

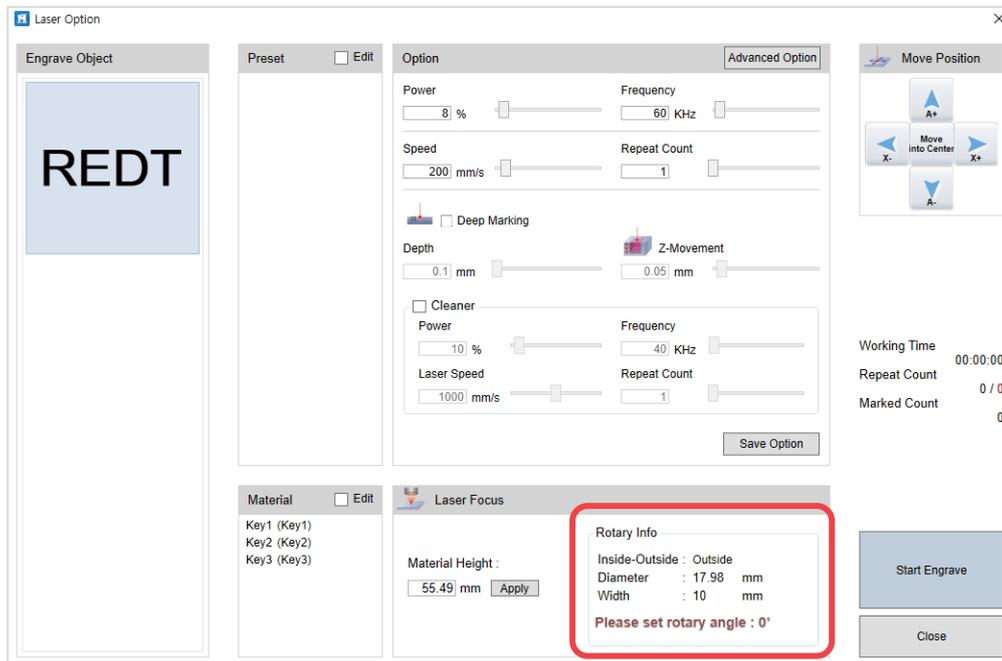
Deletes the material option



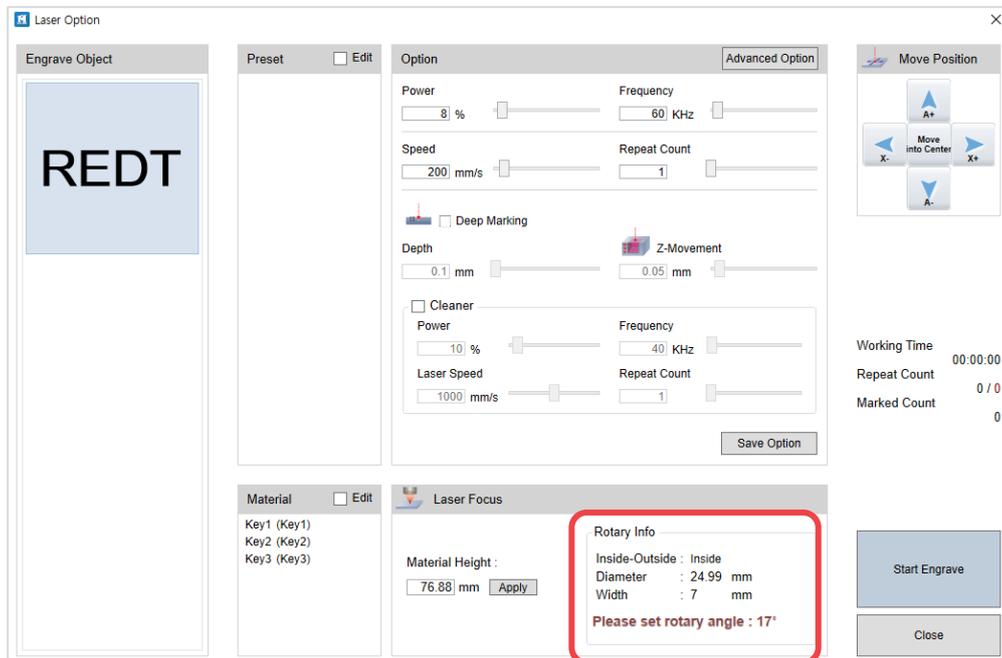
## [Rotary Engraving Option]

In case of rotary engraving, the diameter and width information which were entered at design by MagicArt is applied and shown as it is. Then, laser focus is automatically set, using the value.

In case of using auto tilt rotary clamp, Auto-calculates focuses height according to the tilted angle in case of inner/outer diameter.



In case of inner diameter, angle is calculated and notified.

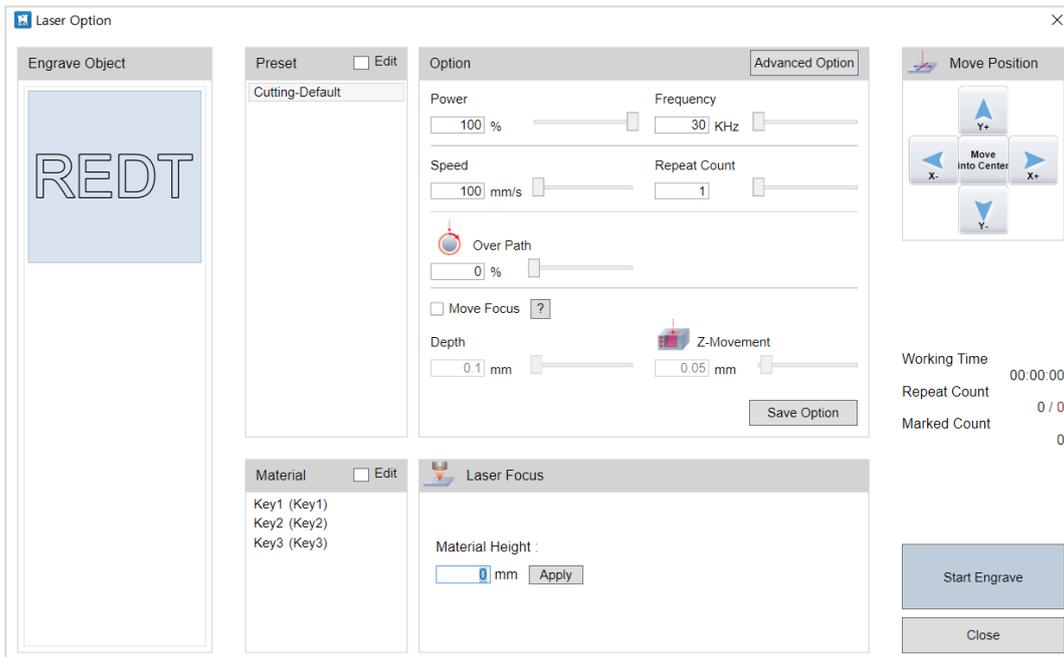


## [Laser Option by Toolpath]

There are differences in laser options by Toolpath.

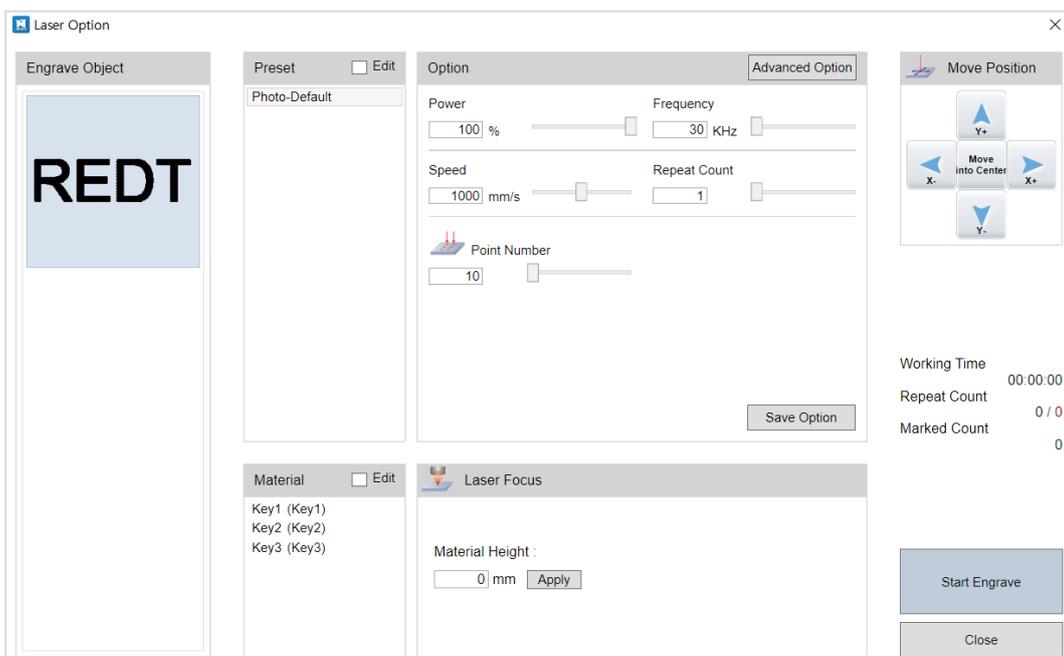
### -Cutting Toolpath

- Overpath: Improves cutting completeness by cutting from the starting point to the preset value with laser.
- Move Focus: Same as the focus depth setting. When cutting the engraving depth little by little, designate the depth.



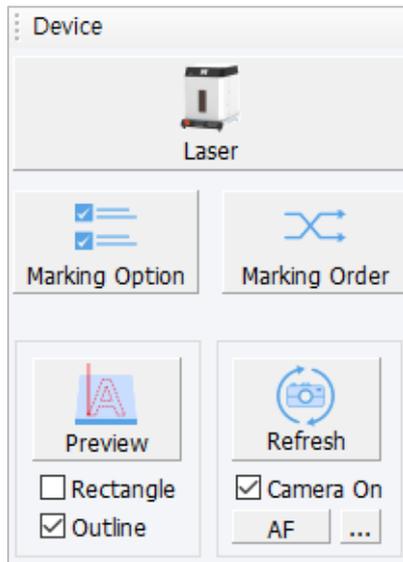
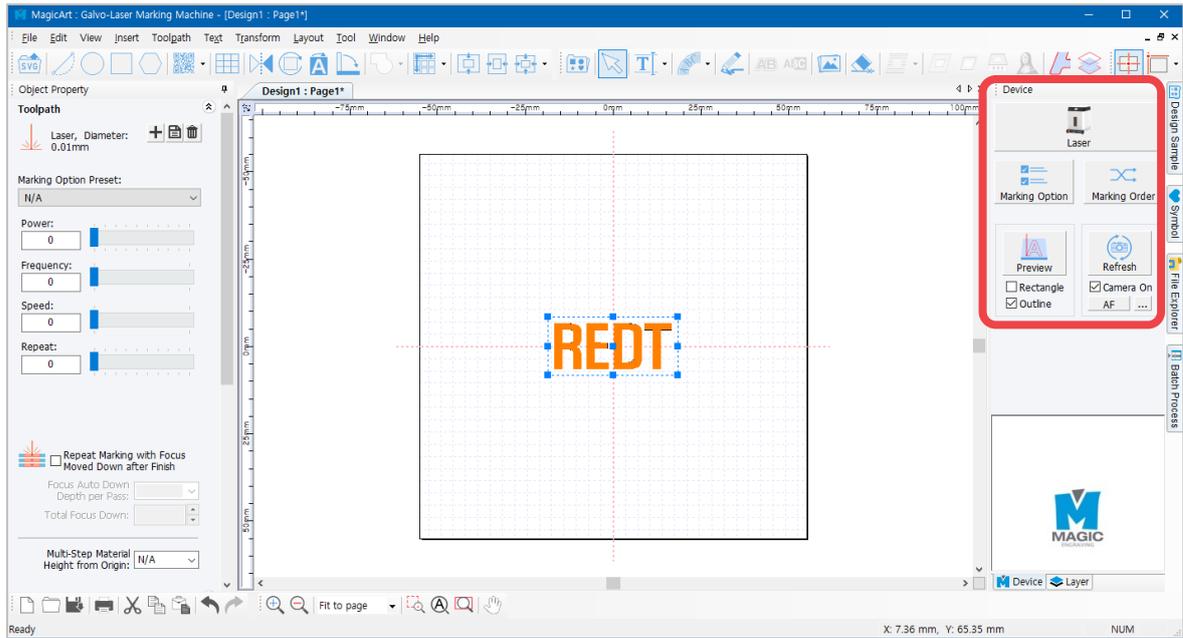
### -Image Engraving Toolpath

- Point Number: Since an image is engraved with tiny points, the level of image-engraving completeness can be adjusted by setting the number of points engraved at a time.



## 7. Data output

Select toolpath and click machine button on the top-right of the screen to transfer the selected toolpath to the machine.

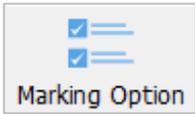


### (1) LASER

After create the toolpath, and set the laser marking option. And then click the [LASER] button and send the marking data.



## (2) Marking option



Click the [Marking Option] button to set the laser option.

(\* See 6. Laser option for details.)

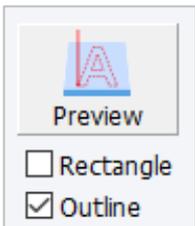
## (3) Marking order



When two or more toolpaths are selected for marking, they will be placed in order. The order can be adjusted by [Up], [Down] button on the right.



## (4) Preview



After selecting an object, you can preview the marking area by pressing the button.

\* This function is available after selecting an object.

\* You can change the position with the arrow keys in the preview state. **(However, this is not possible when the auto positioning function is activated.)**

The icon will change when you start the preview.



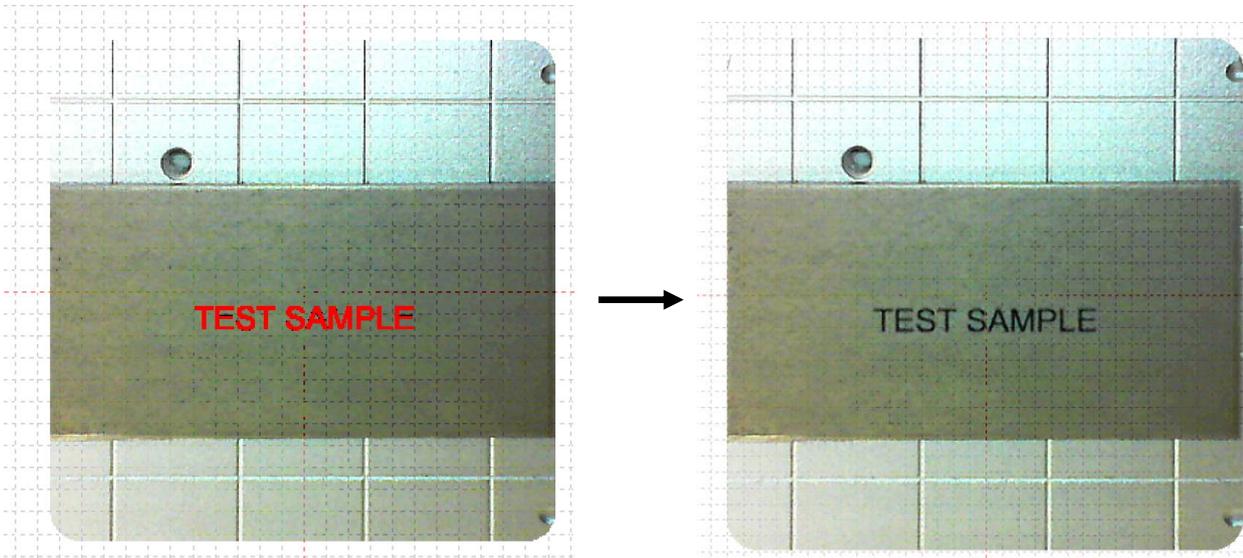
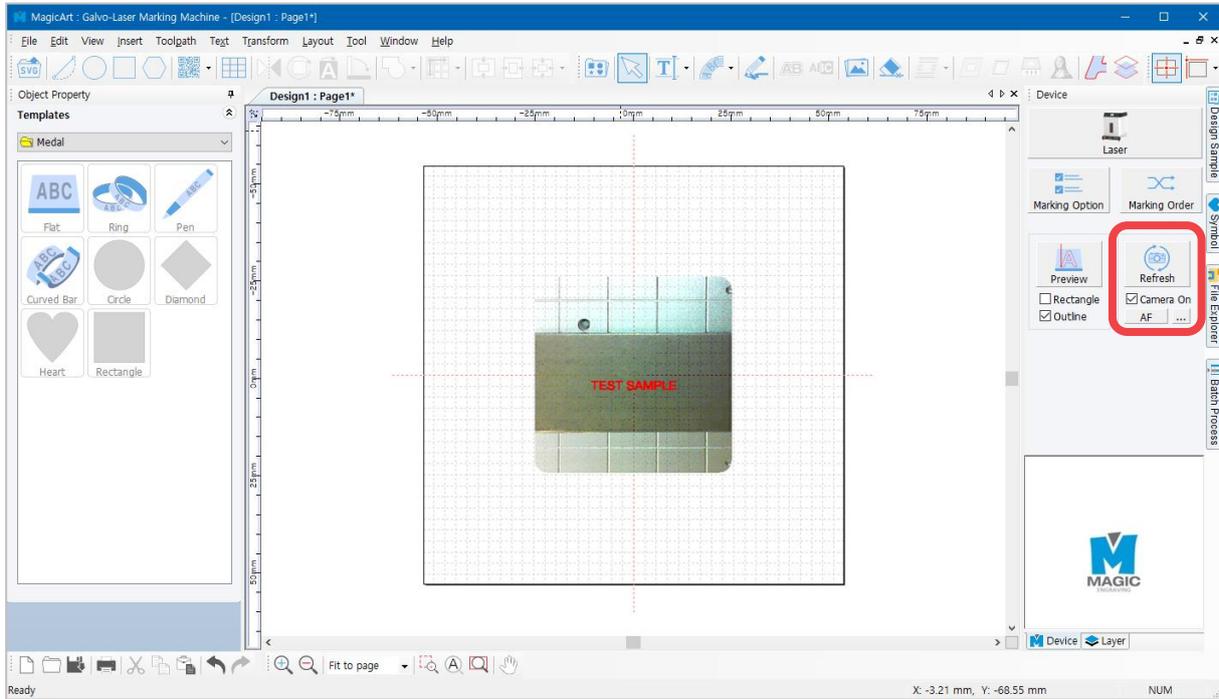
Rectangle	The marking area is indicated by a rectangle. <u>However, rotary marking is only available for Rectangle preview.</u>
Outline	The marking area is indicated by an object outline.

## (5) Camera

Activate the camera function.

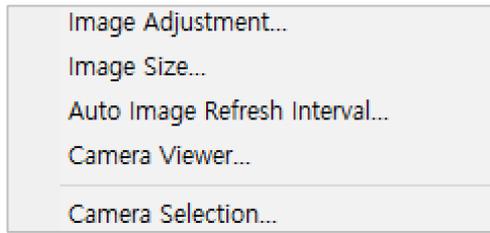
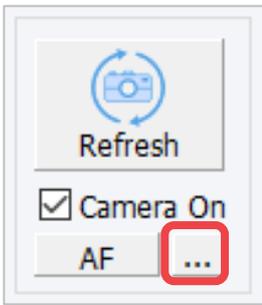
BB-L3 has a built-in camera filming laser marking areas. This camera takes the images of materials inside a laser marking area and sends the material images to the program along with their size and location data in order for users to design directly on the images of real engraving materials and set a marking size and location.

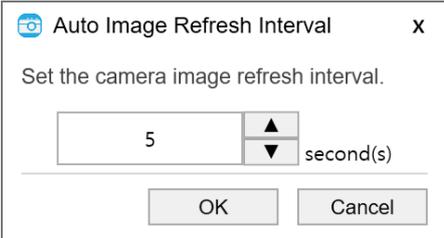
**\* BB-L3 Filming area: 80mm x 80mm**

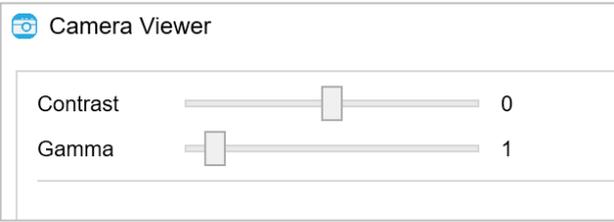
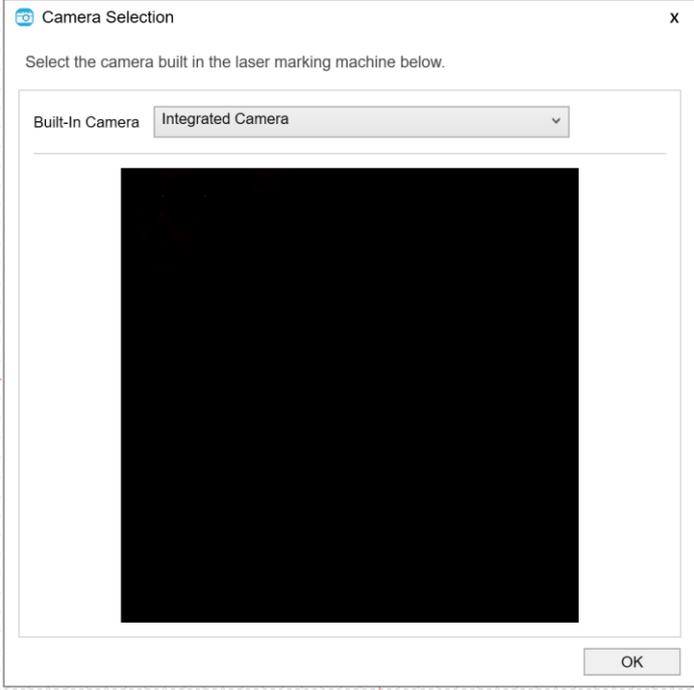


**The laser must be focused in order to use auto positioning properly.**

Since the camera calibration done at the laser focus criterion, if the focus does not fit, the lower the accuracy of the auto positioning.



Refresh	Renew the camera image displayed in the Magic Art Program.
Camera On	Activate/Inactivate the camera function. When [Camera on], auto positioning is also used.
AF	See 8. Auto Focus for details.
Image Adjustment	<p>Set the camera image options such as contrast, grayscale etc.</p> 
Image Size	<p>Set the size of the camera image displayed in the program. <b><u>*It cannot exceed the maximum area of the camera function supported by the machine.</u></b></p> 
Auto Image Refresh Interval	<p>You can set the auto image renewal interval displayed in the program. <b><u>- Setting range: min. 5 sec. ~ max. 30 sec.</u></b></p> 

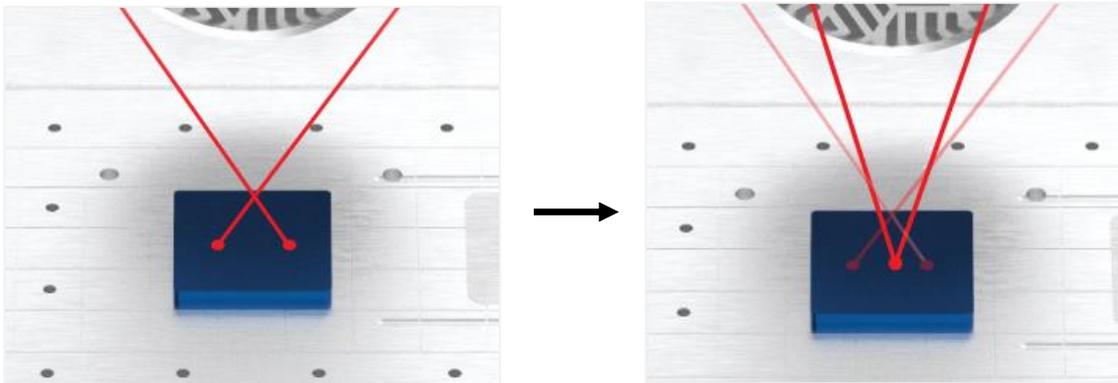
<p><b>Camera Viewer</b></p>	<p>View the camera image in a new window.</p>  <p>The screenshot shows a window titled "Camera Viewer" with a camera icon. It contains two sliders: "Contrast" with a value of 0 and "Gamma" with a value of 1.</p>
<p><b>Camera Selection</b></p>	<p>Select your camera device. If there are multiple camera devices connected to the PC, by default, the camera for laser is set automatically, but you can select the device manually.</p>  <p>The screenshot shows a dialog box titled "Camera Selection" with a close button (x). It contains the instruction "Select the camera built in the laser marking machine below." Below this is a dropdown menu labeled "Built-In Camera" with "Integrated Camera" selected. A large black rectangle represents the camera view. An "OK" button is at the bottom right.</p>

## 8. Auto focus

BB-L3 has a built-in auto focusing system that automatically focuses on a surface to mark through a material height-sensing camera.

\* Auto focus maximum measurement Height: 55mm

\* Precision: 0.5mm



\*Auto focus is auxiliary function. When using auto focus, also set the laser focus.

\*Auto focus is unavailable for rotary marking.

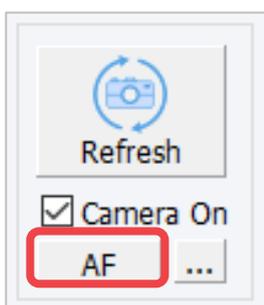


Depending upon material characteristics, the auto focusing may become unusable or less precise.

※Such conditions are summarized as follows:

- Materials scattering the focus laser rays (Ex: Bakelite, white acryl, etc.)
- Transparent materials penetrated by the focus laser rays (Ex: Transparent acryl, glass, etc.)
- Red-color materials, the same color with that of the focus laser rays (Ex: Red-color anodizing aluminum, etc.)
- Mirror-surface materials with high reflexivity such as chromium-plated materials, etc. (Ex: Chromium-plated pendants, etc.)
- Other materials on which the focus pointer is not clearly seen.

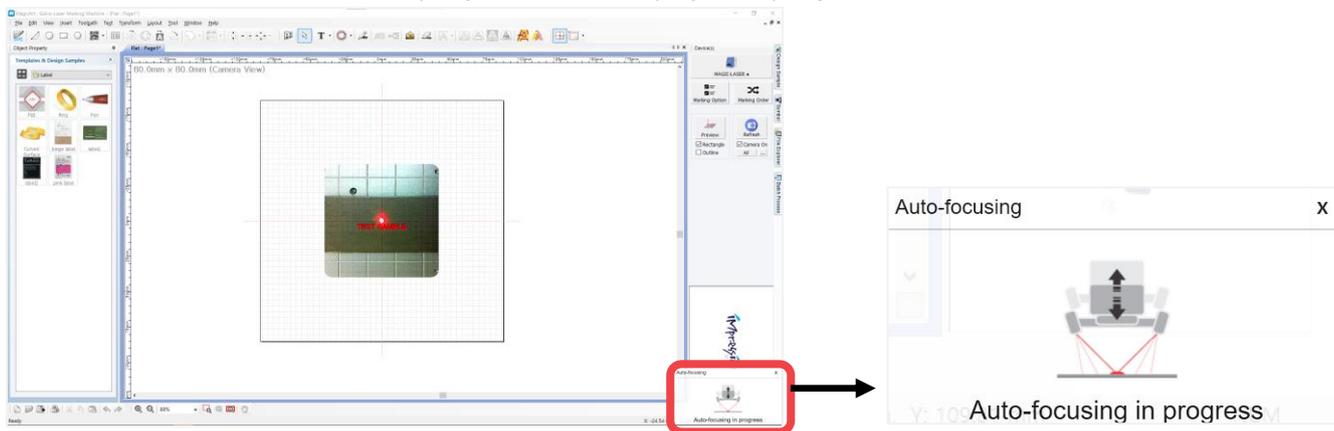
1. Click the [AF] button at the top right of the program.



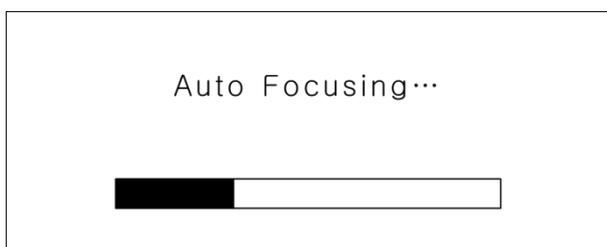
Or press the  button on BB-L3.



2. When autofocus is started, the program screen displays the progress of the function.



Also check the progress of the autofocus function on the display screen.



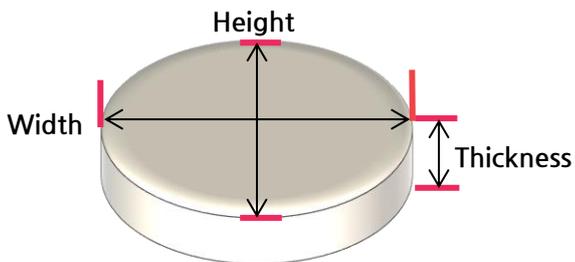
3. If you want to cancel the autofocus, press the  button on BB-L3.



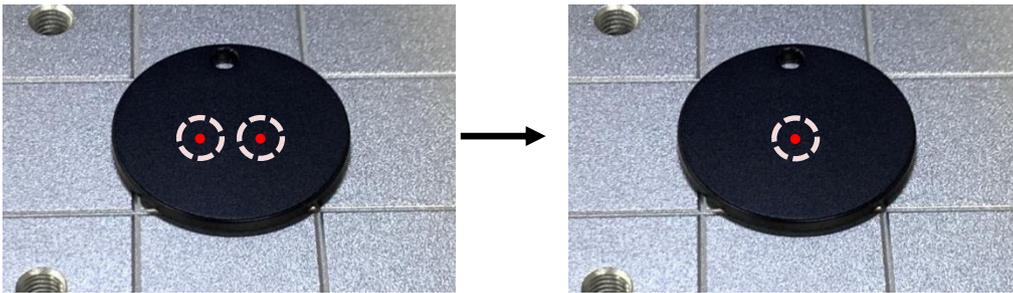
# Marking process



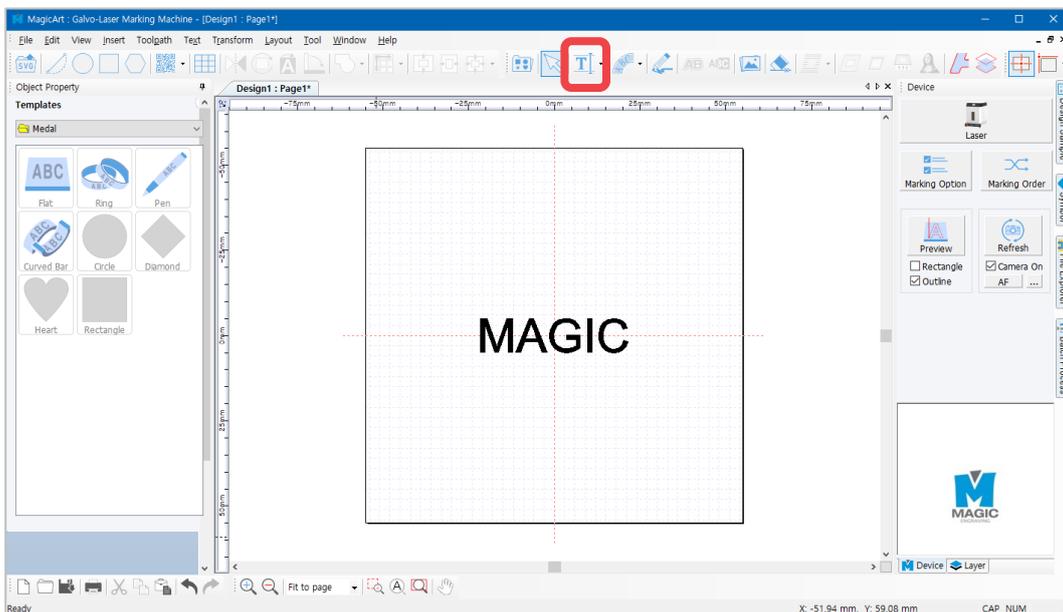
1. Measure the size and height of a material.



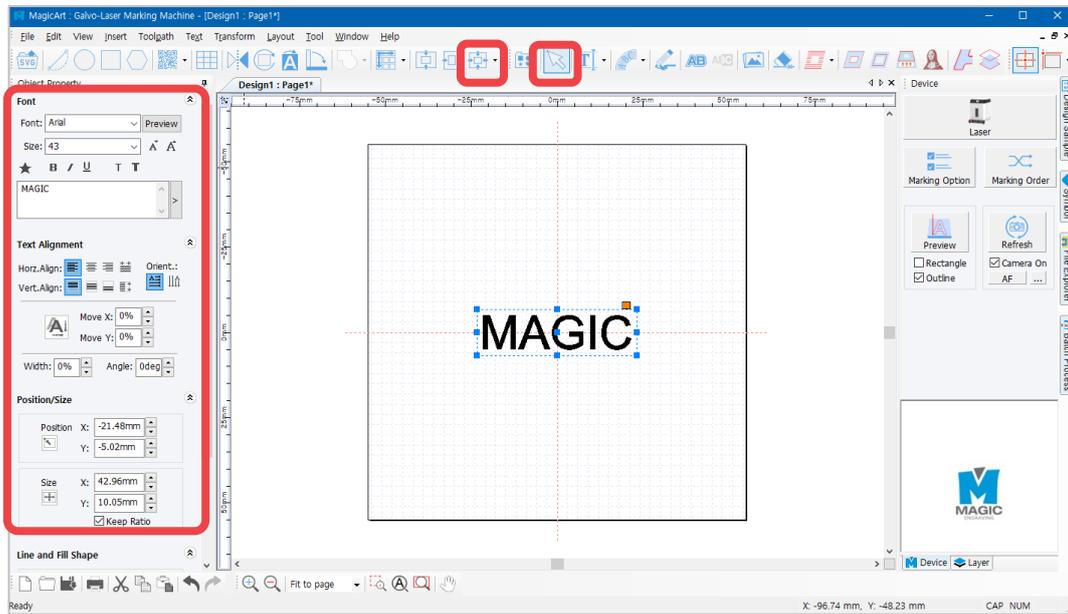
2. Place the material on the work area and set the laser focus, using the direction key (Z)   buttons.  
**(\* When using auto focus, Also set the laser focus.)**



3. Once a template appears, click [  ] (Enter/edit characters)]. Move the mouse pointer to a wanted position and click it. Then, enter the characters.

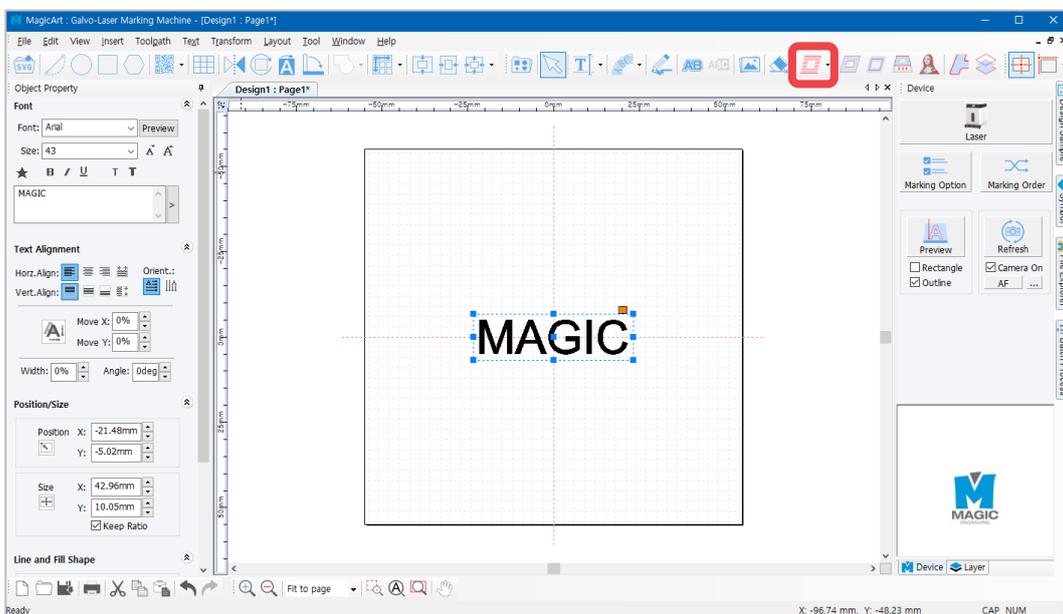


4. Once characters are entered, click [  (Select)] on the toolbar and open the Select Object mode. Then, select the entered character and edit its size, font and boldness. To put the object in the middle of the work area, click [  (alignment in the middle of a work area)].

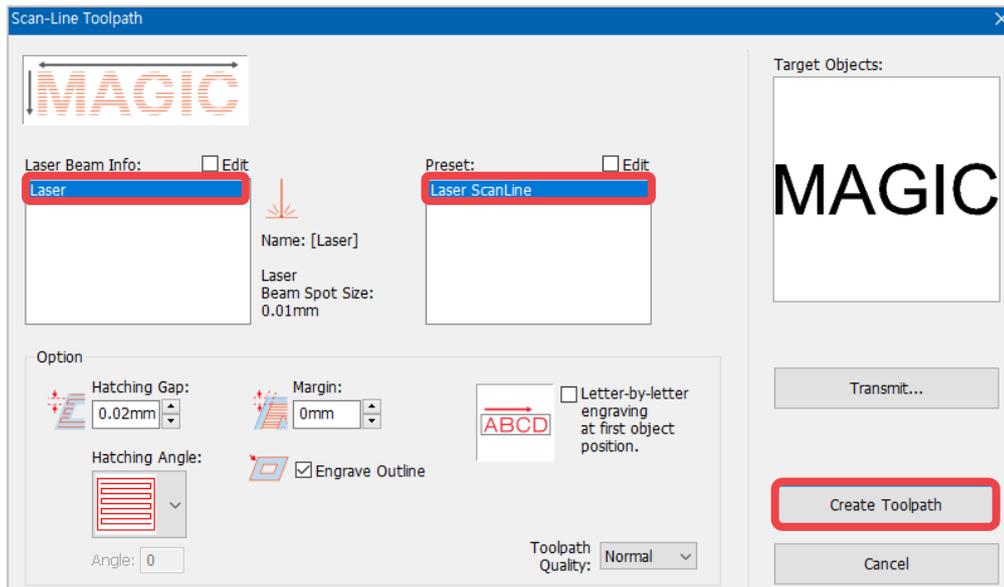


5. Once the design is completed, click [  (Scanned line Toolpath)]. A Toolpath refers to a path way of tools.

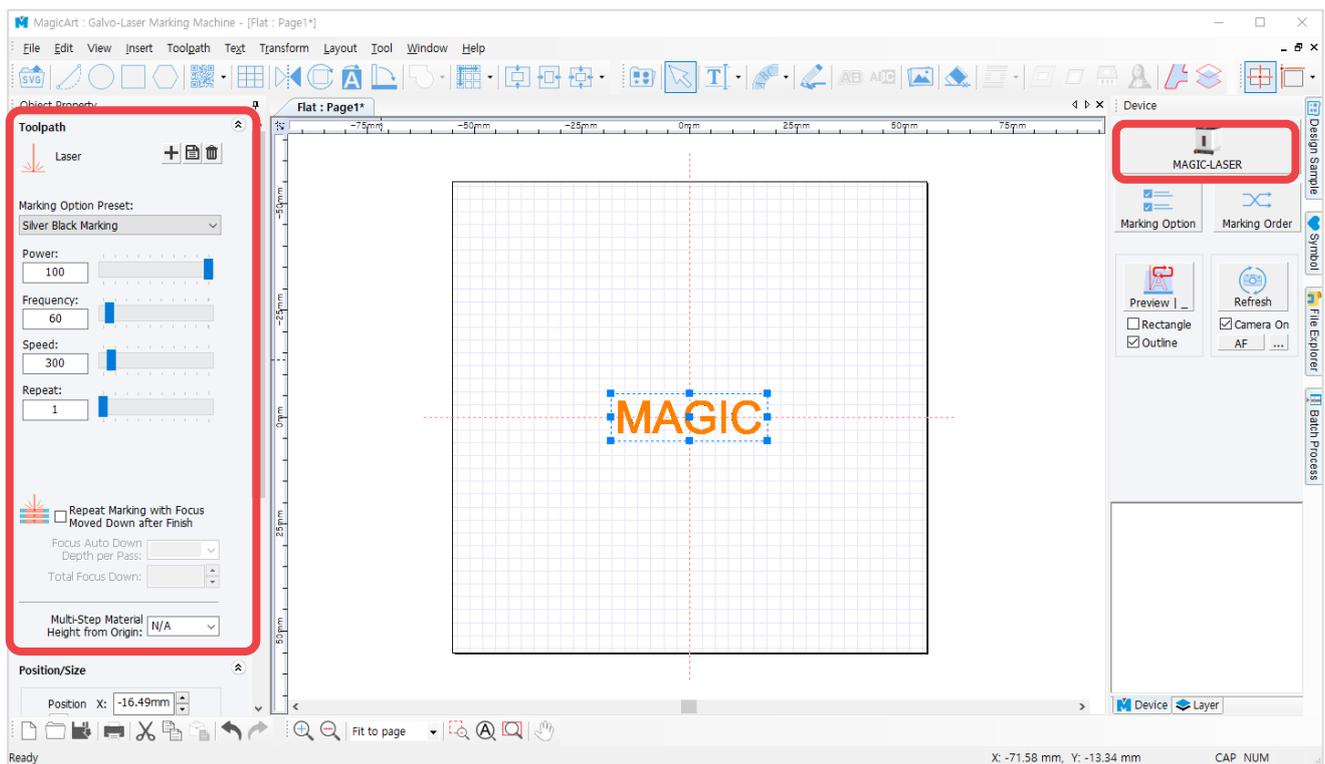
\* Click  on the right top without creating a Toolpath for immediate Marking.



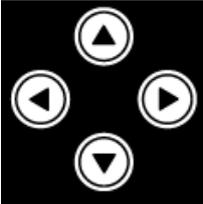
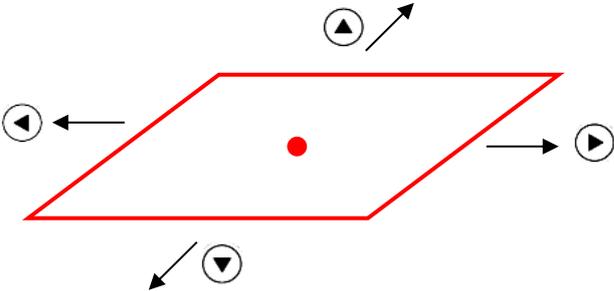
- Select an option on the Toolpath page. If necessary, set the hatching interval and click [Create Toolpath]. Then a Toolpath object is being created.



- After create the toolpath, set the laser marking option. Then click  on the right top.



8. Once a red laser pointer on the material is turned on, check and adjust the position of the pointer, using the direction keys. The area pointed by the red rectangular laser pointer refers to an actual marking zone. The round laser pointer in the middle represents the origin of the height of laser focus.

	<p>Whenever the direction key is pressed, the laser pointer moves up/down/left/right, showing a marking area. Check if the marking zone is matched with the area on the material to be actually engraved. If unmatched, adjust the position, using the direction keys.</p>
	<p>Once the direction key is pressed, the laser pointer moves up/down/left/right in the marking zone. In other words, if a laser pointer is situated on the left side, press [◀] to move the marking zone to the left.</p>
	

9. Once the marking position setting is done, click the program [Start] button or [▶] on the machine for a long time (2 seconds or longer). Then, the cover is automatically closed, and marking begins.
- **Repeat marking:** Press and hold the ▶ button to finish marking, then double-click the ▶ button to mark repeatedly when marking the same work.

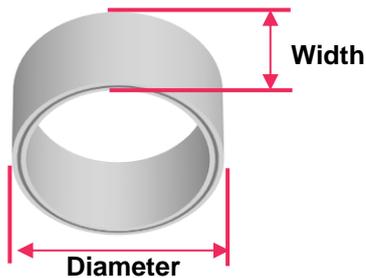


# Marking process of ring Inner/outer diameter

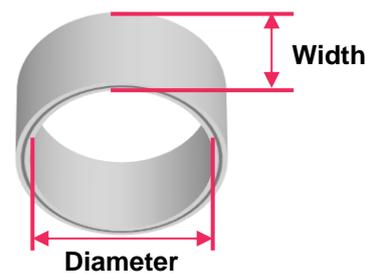


In case of inner diameter marking outside the limit of 20°, marking may not be possible.  
If outside the indicated angle and the marking position, marking may not be possible.

1. Measure the width and diameter of a ring to be engraved.



<Outer diameter marking - Ring outside size>



<Inner diameter marking - Ring inside size>

2. Place the material on the clamp and set the laser focus, using the direction key (Z)   buttons.

-L type clamp

※L type clamp is purchased separately.

After loosen the fixing knob, adjust the angle then fasten the fixing knob.



<Outer diameter>



<Inner diameter>

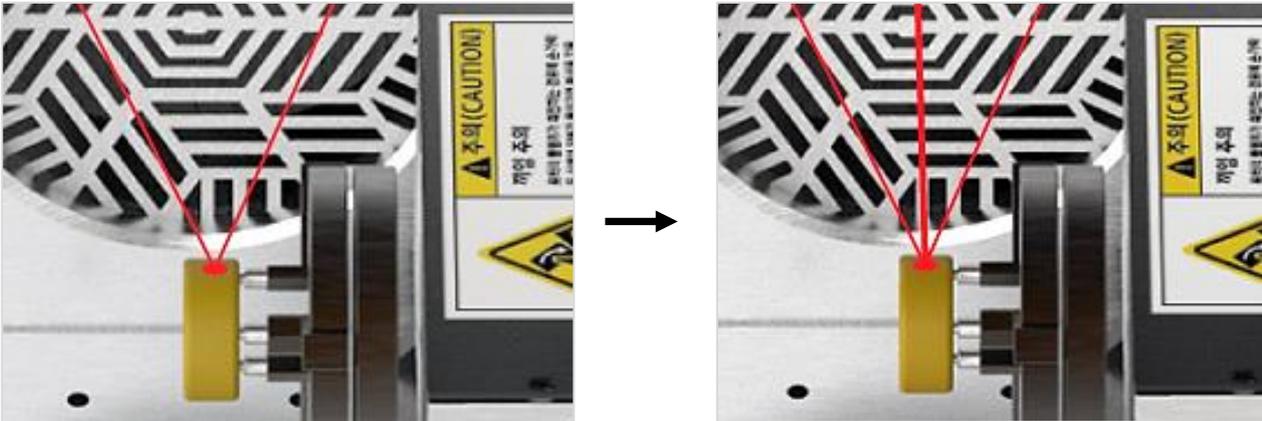
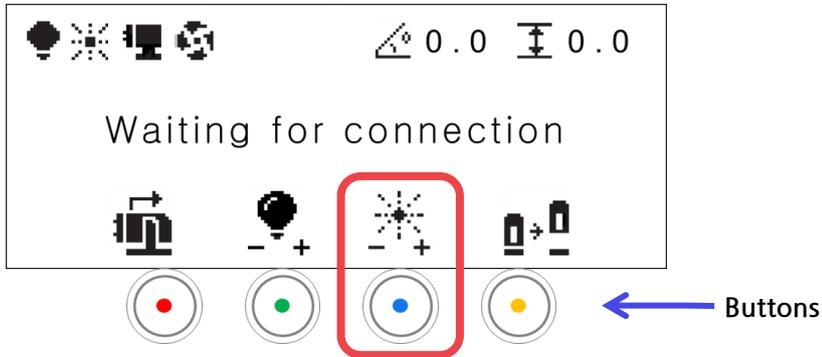
## -Rotary Clmap

※Rotary clamp is purchased separately.

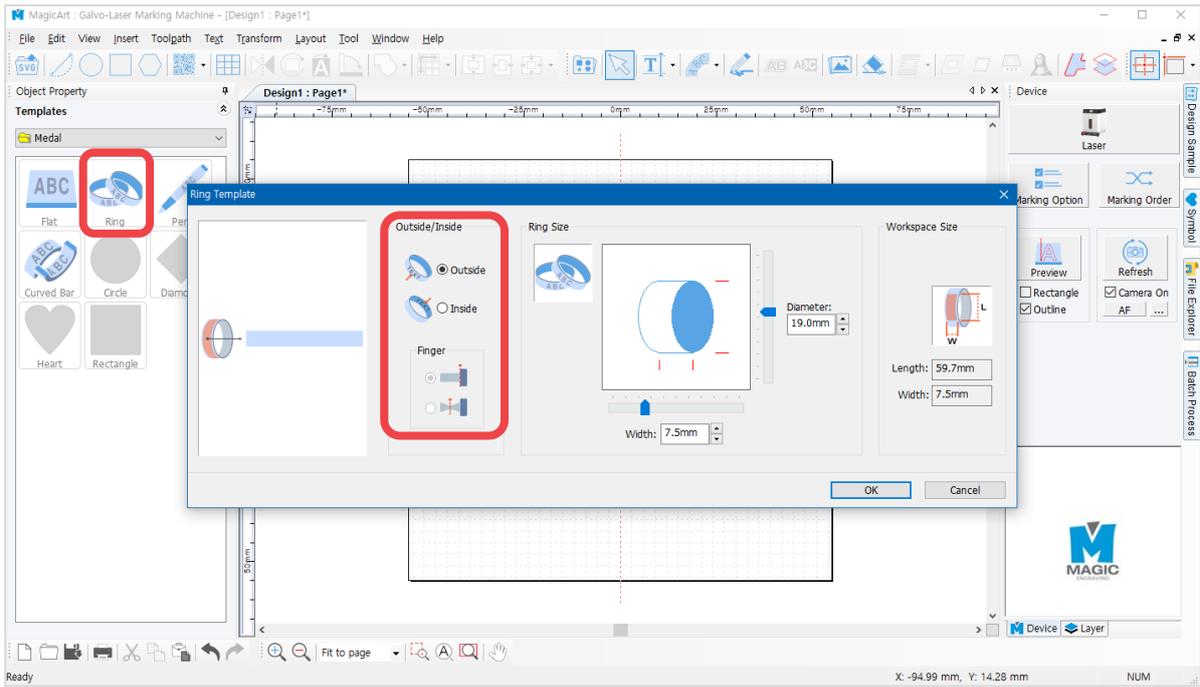
In case of using a rotary clamp, the clamp or material sometimes gets in the path of focus pointer ray to cover the pointer ray and disturb focusing.

BB-L3 provides the function to make the guide laser radiating vertically through the scan head available for focusing and focus by replacing the points with blocked paths.

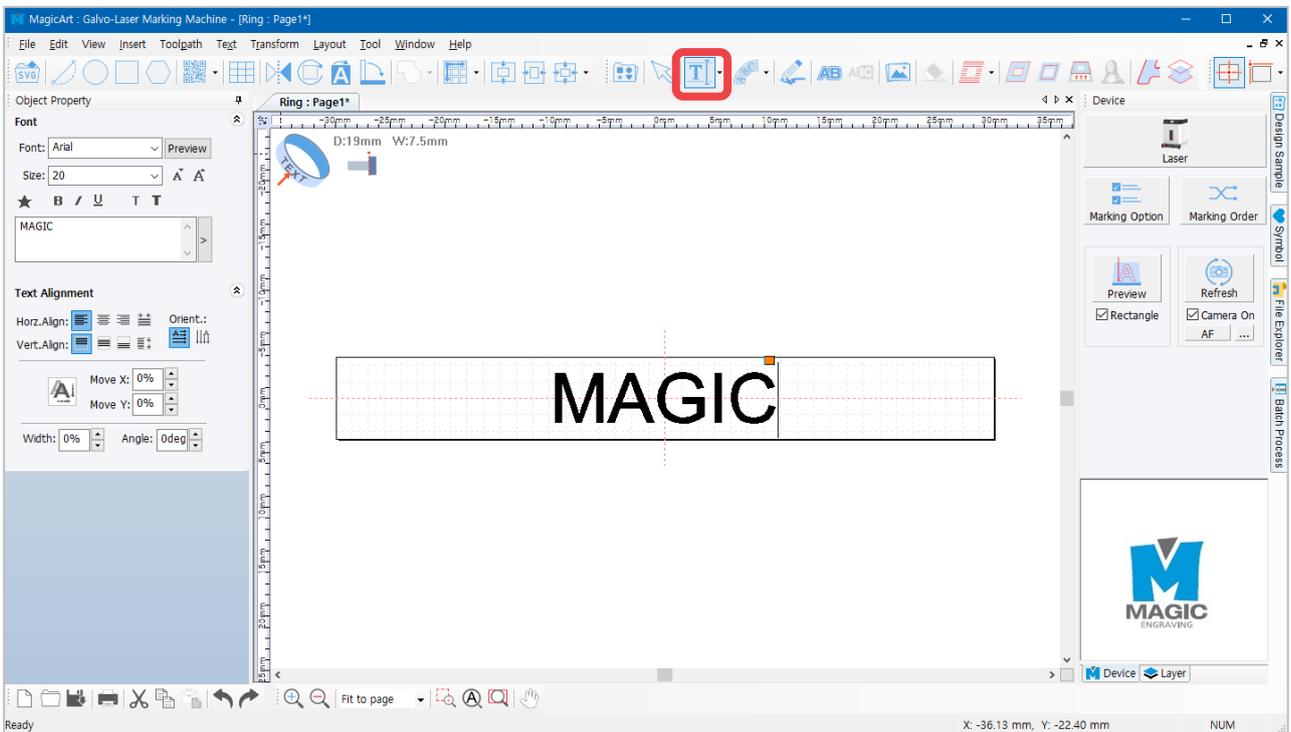
Press the focus-pointer brightness control button for at least 1 second to turn on the 3rd focus pointer.



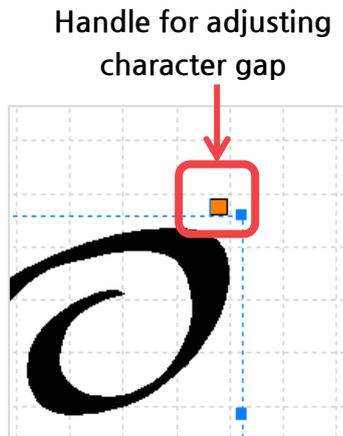
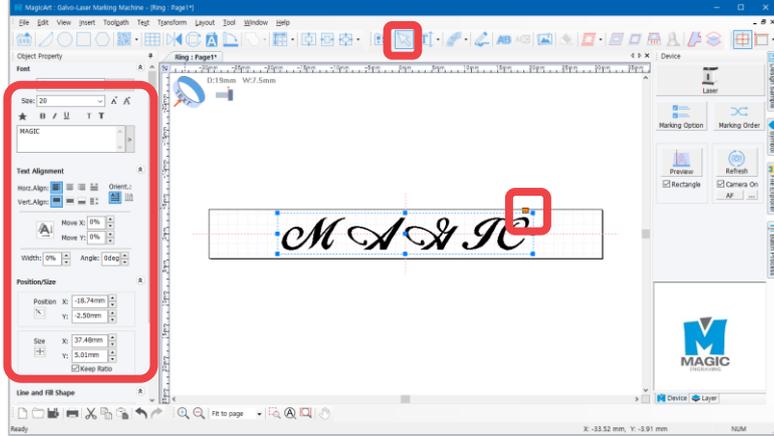
- Double click "Ring" template in the object property window. When [Insert Rotary Object Template] window appears, select the outside/inside, Then enter the measured width and diameter of the ring and click "OK."



- The template appears at the center of the screen. And select  [Text Input] on the toolbar, and click the work area using mouse and enter text to be engraved.

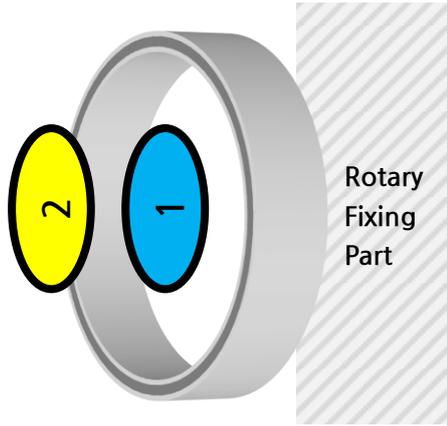
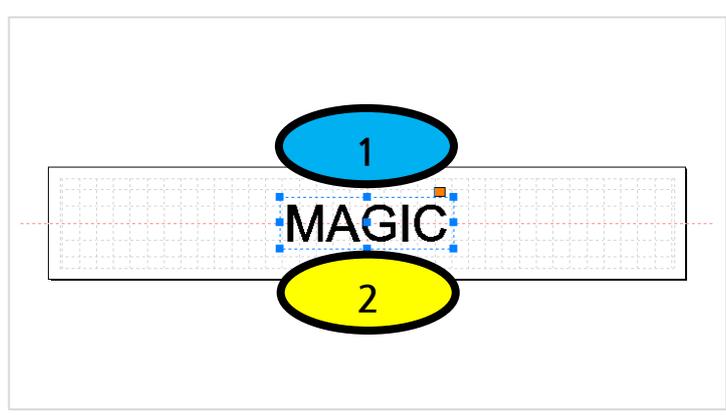


5. After entering text, press  [Selection] on the toolbar to enter the object selection mode. Select the text, and edit the size and font of the object. To place the object at the center of the work area, click  [Center in Page] button.

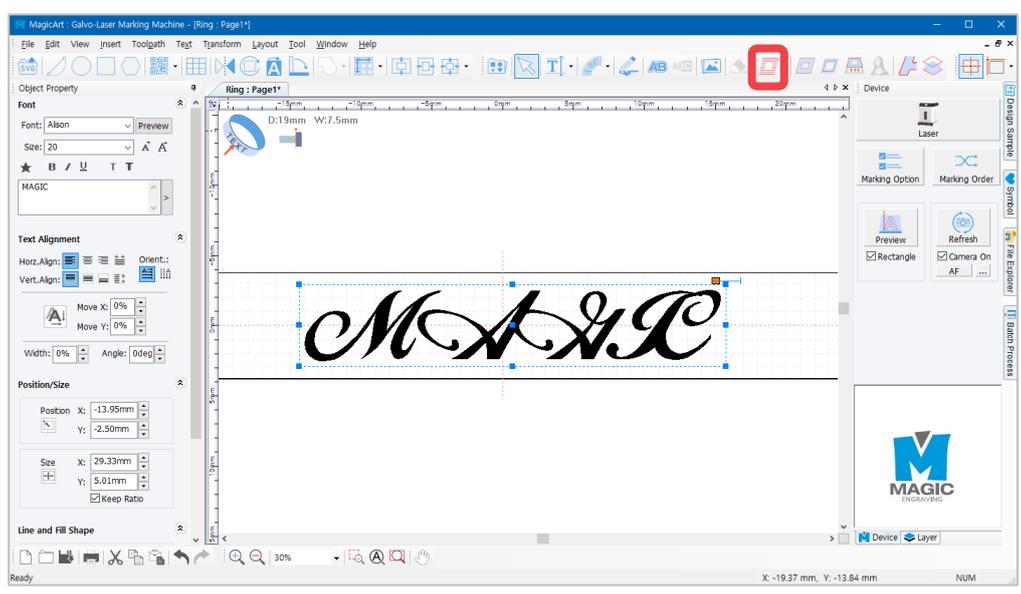


**Note** Handle for adjusting gaps between characters?  
A function adjusting gaps between characters by dragging characters to target positions.

[Object position]

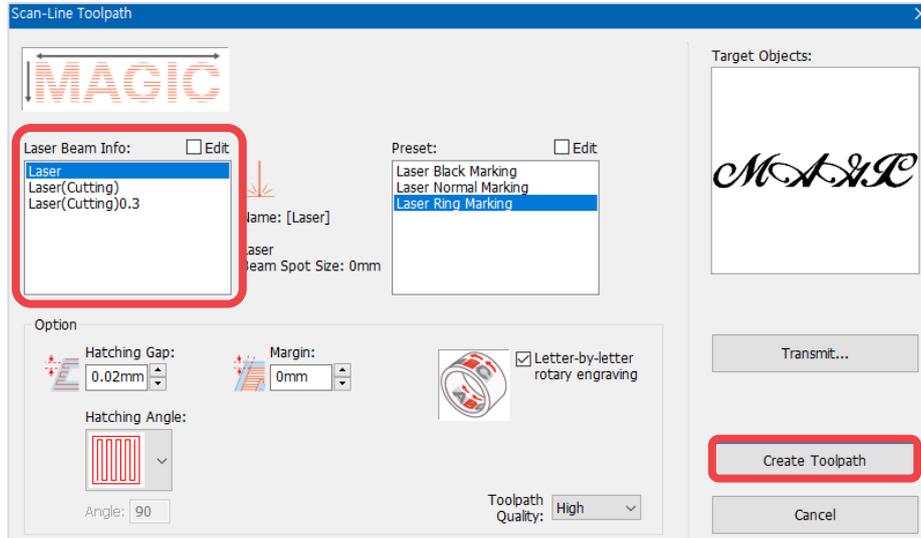


6. Once design is completed, click  [Scanned line Toolpath] button. A Toolpath refers to a path way of tools.

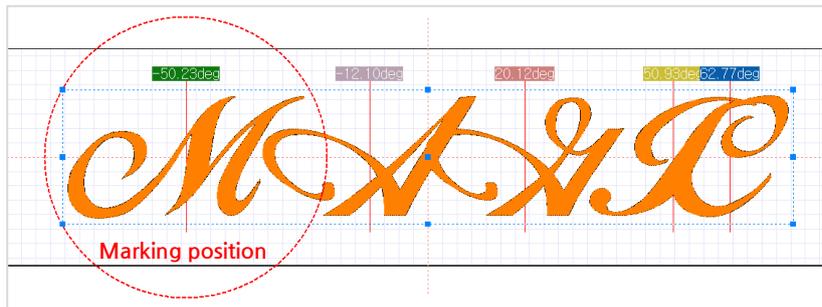


7. Once “Scanned line toolpath” window appears as shown in the picture below, select tool, toolpath gap and depth, and click “Create Toolpath” button.

-Letter-by-letter rotary engraving: Engrave the each text at fixed angle when rotary marking  
**(Text marking only)**



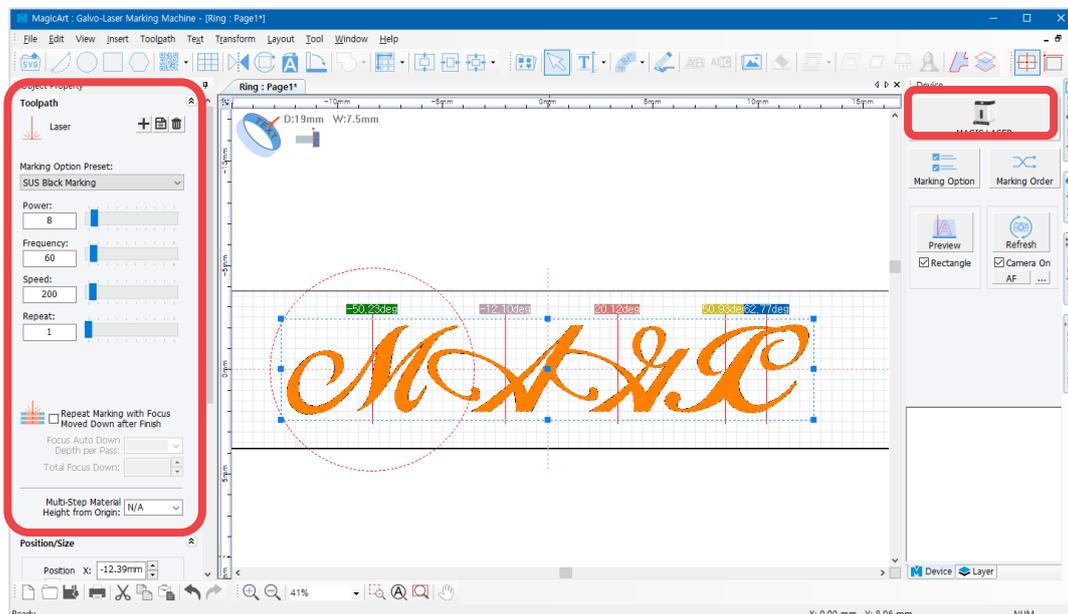
8. The “Toolpath” object is created as shown below and usually marked with red line on the screen. Scroll the mouse wheel to enlarge the toolpath object, and if it is not the desired toolpath, delete the toolpath and create it again by adjusting the toolpath option.



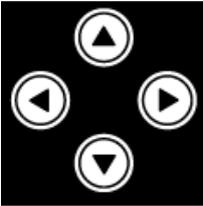
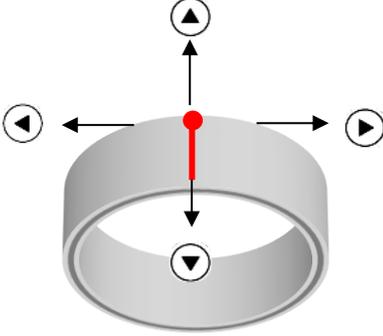
※ This functions is not supported image marking.

9. After selecting one or more created toolpaths, set the laser marking option.

Then click  button.

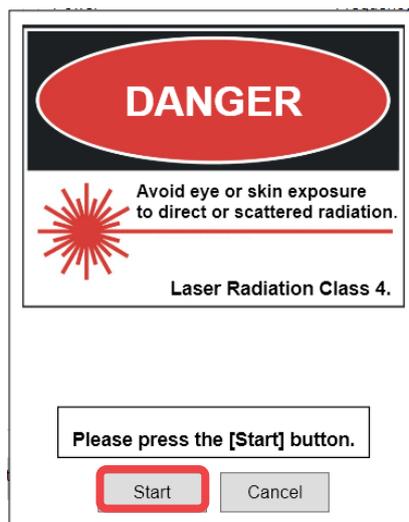


10. Once a red laser pointer on the material is turned on, check and adjust the position of the pointer, using the direction keys. The area pointed by the red rectangular laser pointer refers to an actual marking zone. The round laser pointer in the middle represents the origin of the height of laser focus.

	<p>Whenever the direction key is pressed, the laser pointer moves up/down/left/right, showing a marking area. Check if the marking zone is matched with the area on the material to be actually engraved. If unmatched, adjust the position, using the direction keys.</p>
	<p>Once the direction key is pressed, the laser pointer moves up/down/left/right in the marking zone. In other words, if a laser pointer is situated on the left side, press  to move the marking zone to the left.</p>
	

11. Once the marking position setting is done, click the program [Start button] or [  ] on the machine long (2 seconds or longer). Then, the cover is automatically closed, and marking begins.

- **Repeat marking:** Press and hold the  button to finish marking, then double-click the  button to mark repeatedly when marking the same work.



# Photo marking



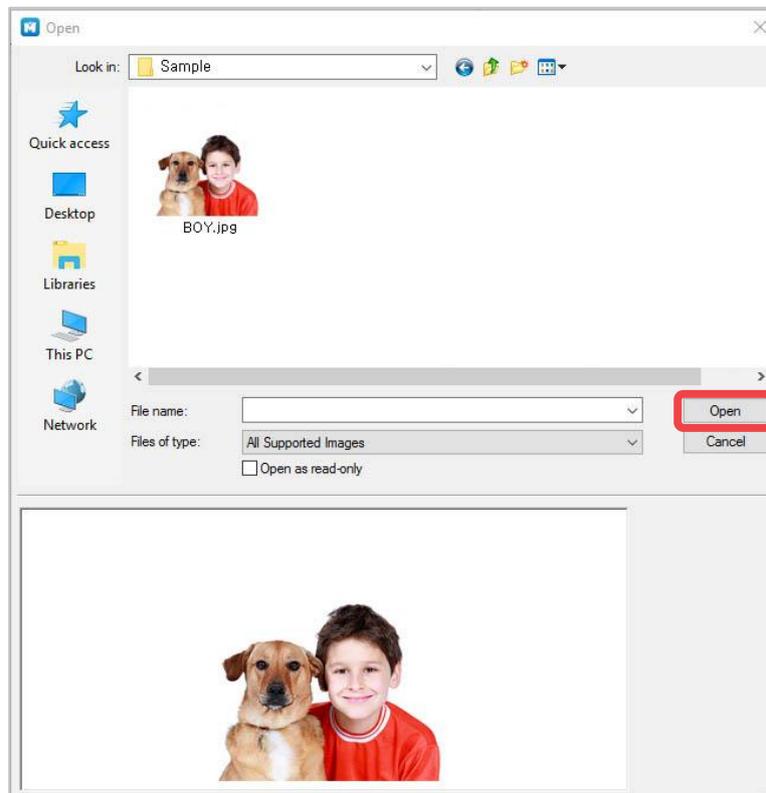
What is photo marking?

This is a marking method to display the shade of image with dots.

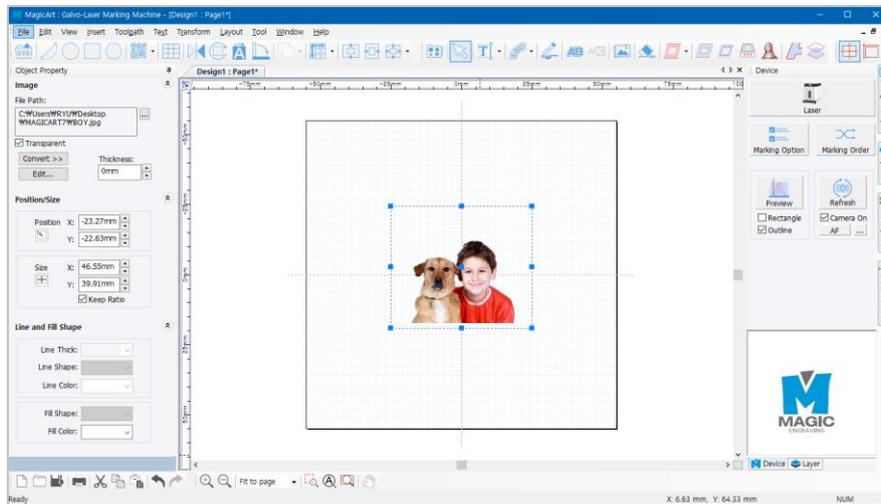
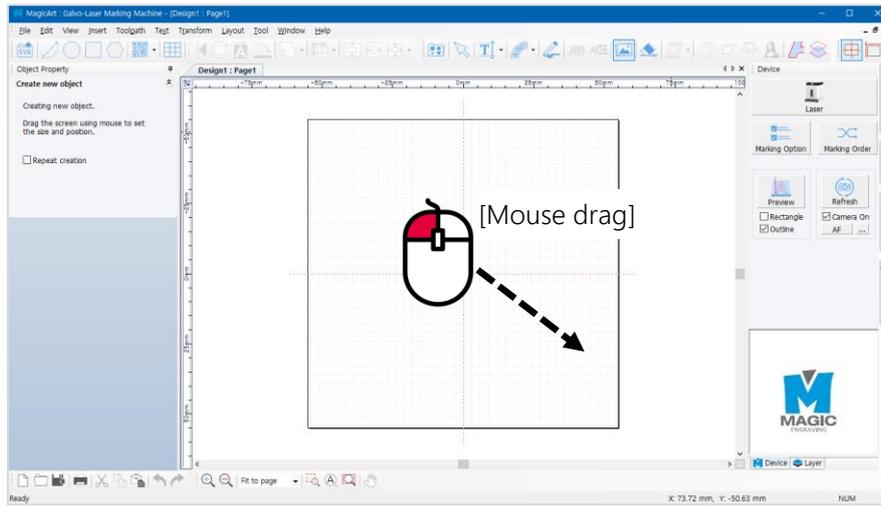
1. Place the material on the clamp and **set the laser focus**, using the direction key (Z)   buttons.



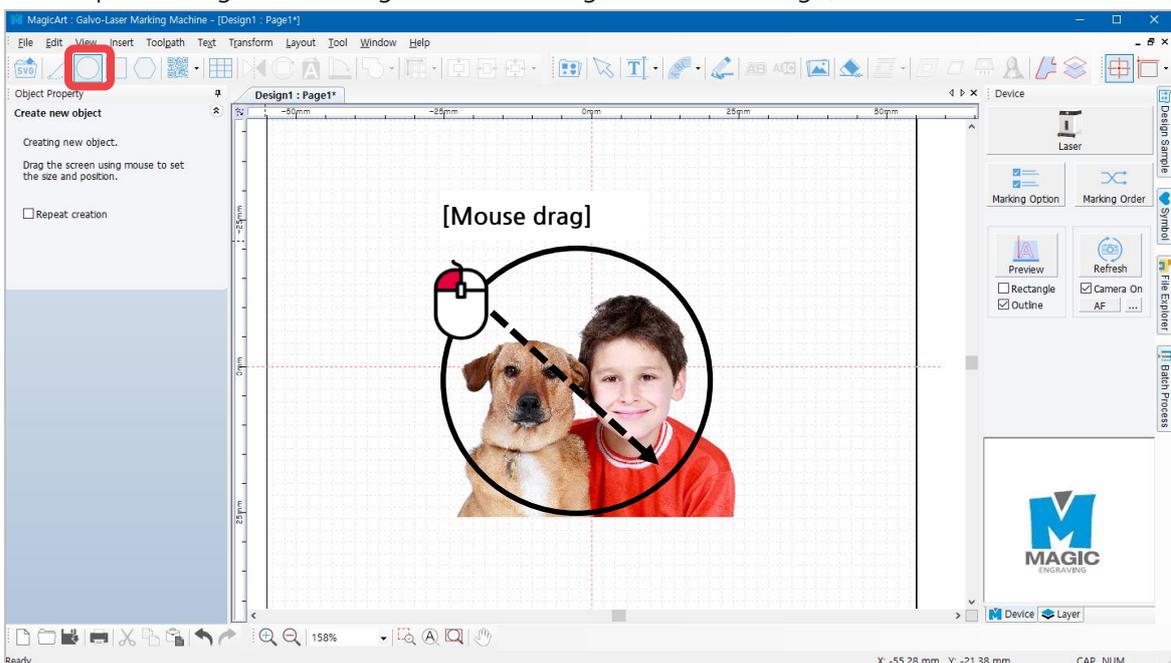
2. Click  [Image] to import an image for marking.



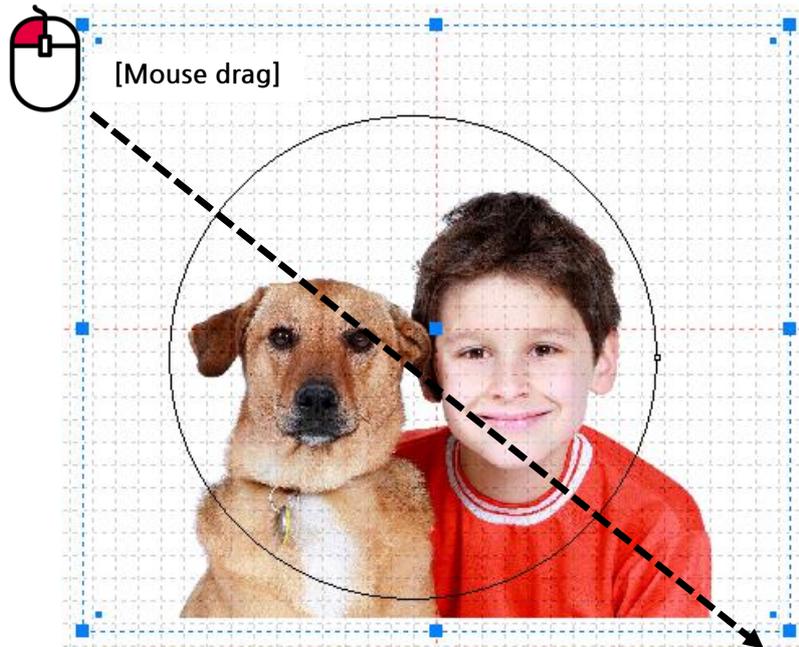
3. Adjust the size and location of the image.



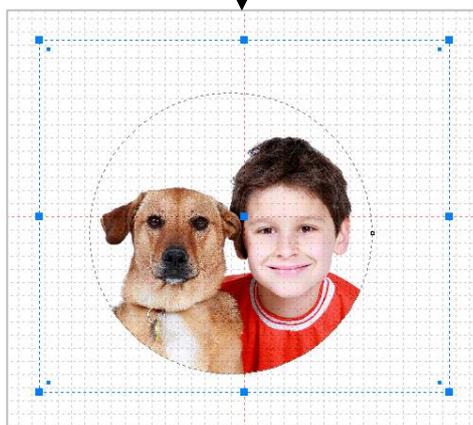
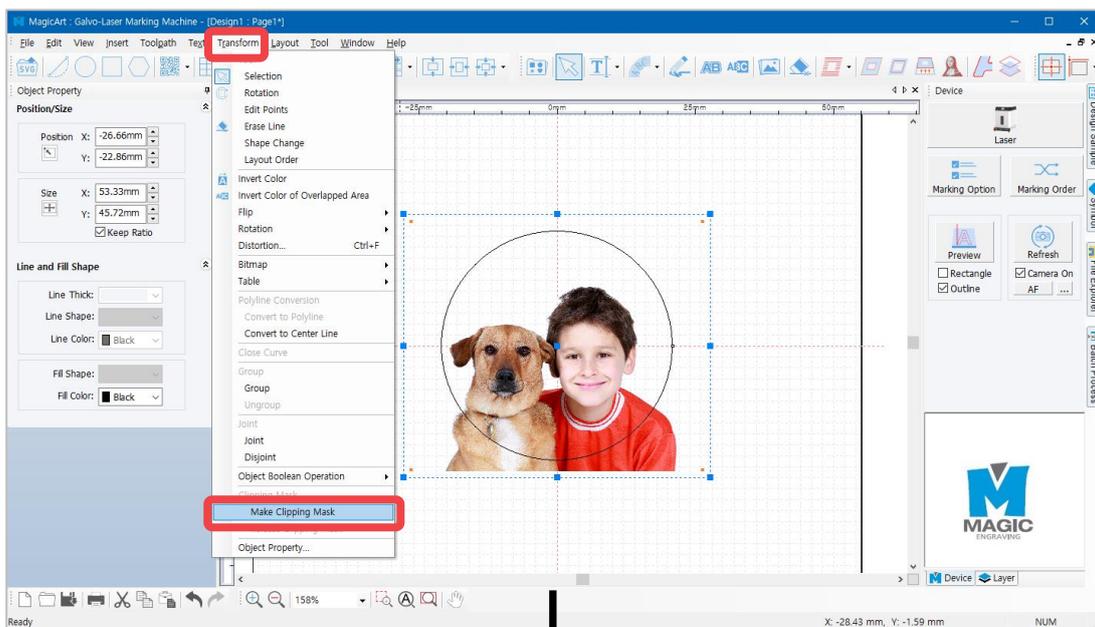
4. [Clipping Mask] function enables cutting out target area extracted from the image. Create a shape to designate the target area and drag it on to the image.



5. Drag a mouse to select the target area and the whole image. Or select [Menu] → [Edit] → [Select All].



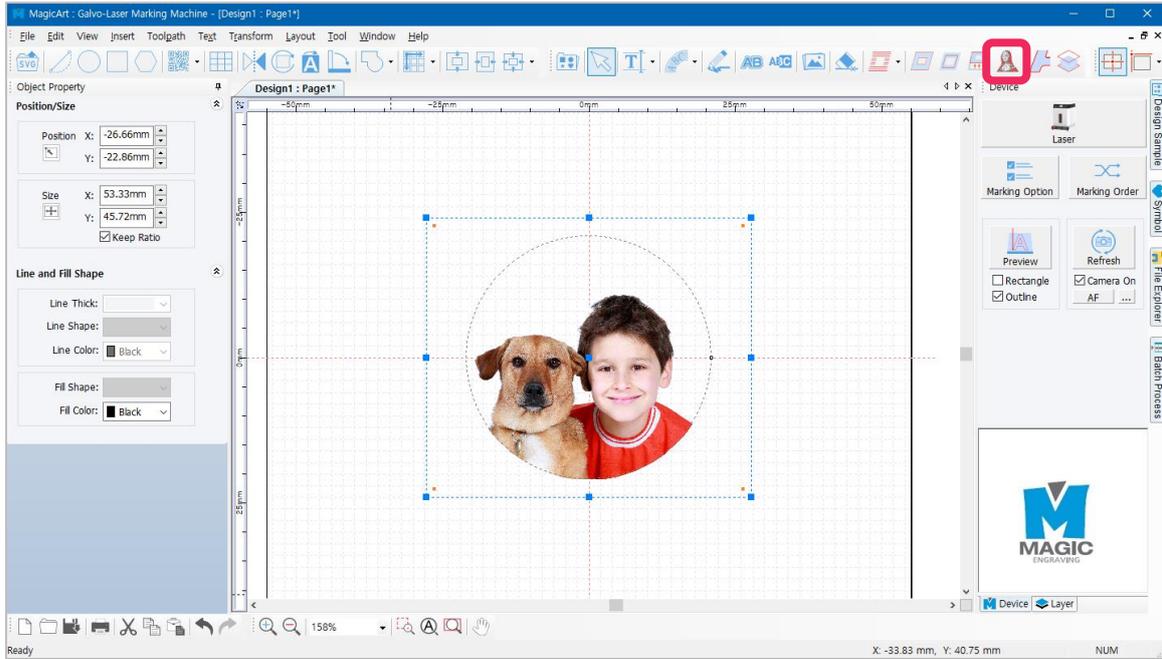
6. Select [Menu] → [Transform] → [Make Clipping Mask]. The target image remains except the external image.



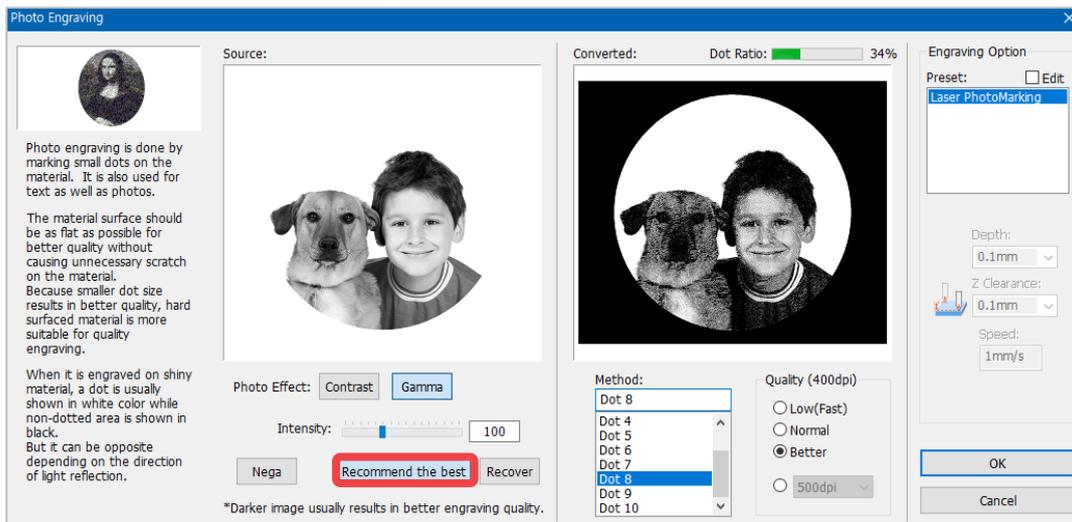
**Notice** The whole actual image is already saved in the file, not erased.



7. Click [Photo Impact Engraving Toolpath] button.



8. Adjust marking option in photo marking option window.



\* The black area cut by clipping mask is not being engraved.



Notice

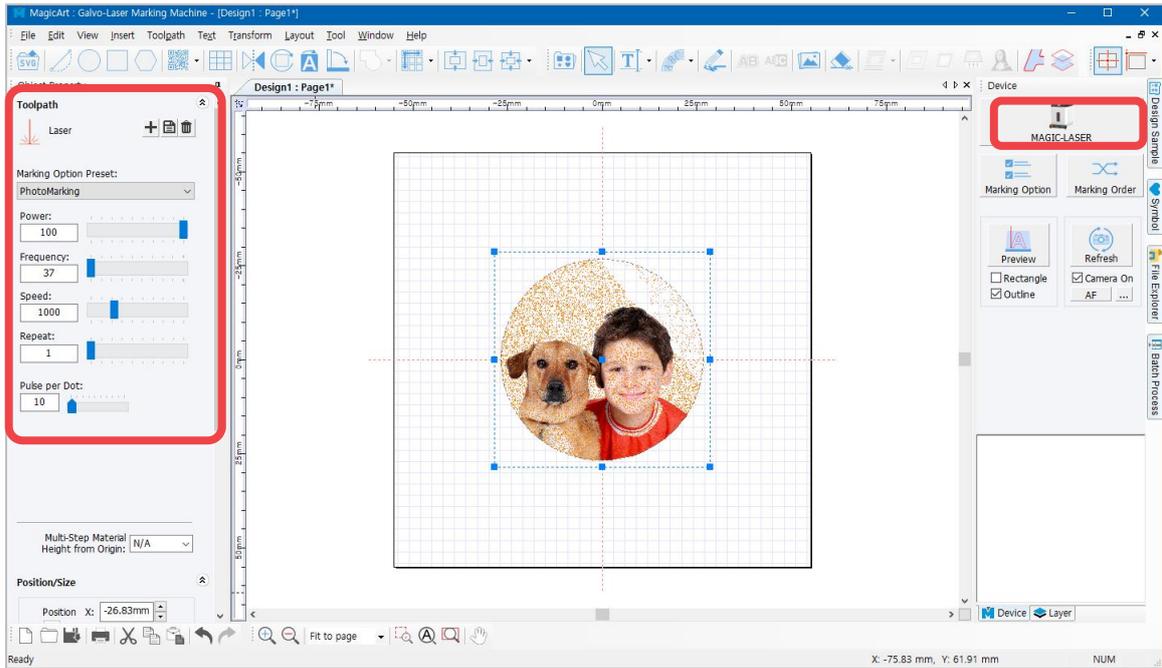
When marking a photo, the bright part (white area) of the image is expressed in dots. Since the darker image shows higher quality, adjust the brightness to be darker. Normally, dot ratio 10-20% shows the best marking quality for a portrait. The optimal image condition depends on the brightness of background of the image. Adjust the image monitoring the image preview and the dot ratio.

If 'image adjustment' is confusing, click "Recommend the best" button to automatically adjust the image.

9. Click “OK” button to create toolpath for photo marking.



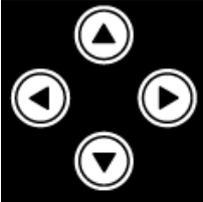
And set the laser marking option, then click button.



When marking a photo, the white area of the image appears as a dot. So the result of the toolpath is shown as a negative image.

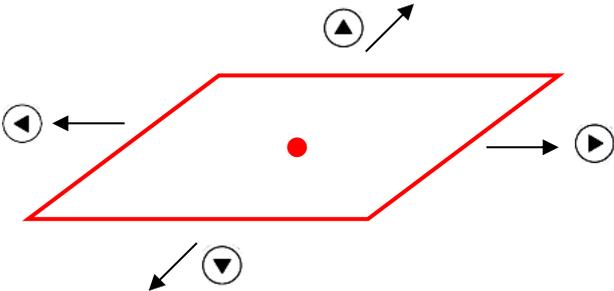
10. Once a red laser pointer on the material is turned on, check and adjust the position of the pointer, using the direction keys.

The area pointed by the red rectangular laser pointer refers to an actual marking zone. The round laser pointer in the middle represents the origin of the height of laser focus.

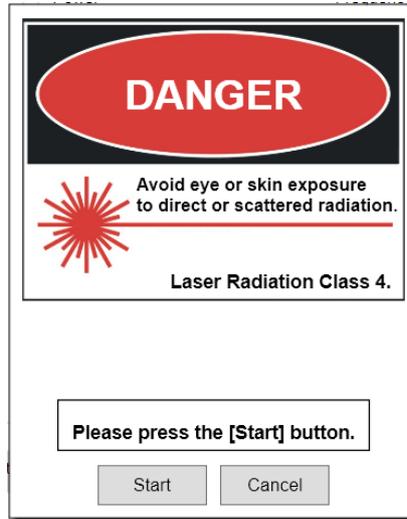


Whenever the direction key is pressed, the laser pointer moves up/down/left/right, showing a marking area. Check if the marking zone is matched with the area on the material to be actually engraved. If unmatched, adjust the position, using the direction keys.

Once the direction key is pressed, the laser pointer moves up/down/left/right in the marking zone. In other words, if a laser pointer is situated on the left side, press [←] to move the marking zone to the left.



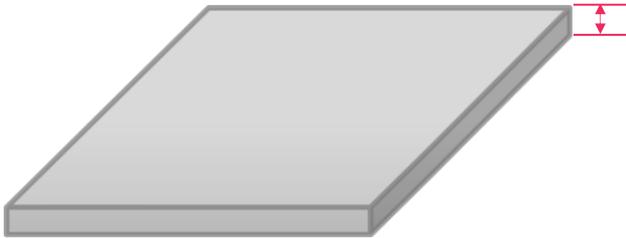
11. Once the marking position setting is done, click the program Start button or [  ] on the machine for a long time (2 seconds or longer). Then, the cover is automatically closed, and marking begins.
- **Repeat marking:** Press and hold the  button to finish marking, then double-click the  button to mark repeatedly when marking the same work.



# Cutting process

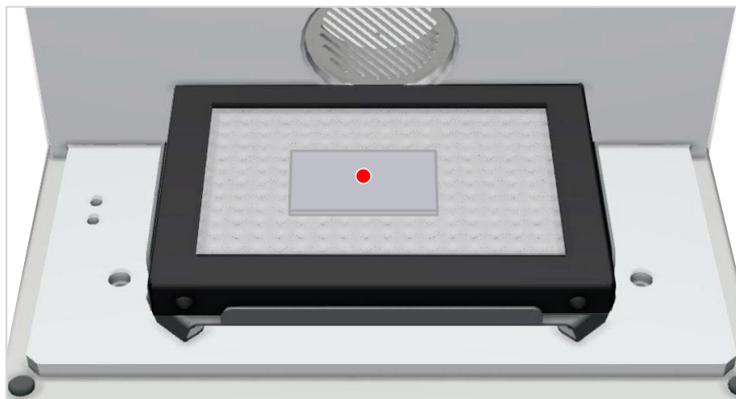
※Honeycomb table is purchased separately.

1. Measure the thickness of a material to be cut.

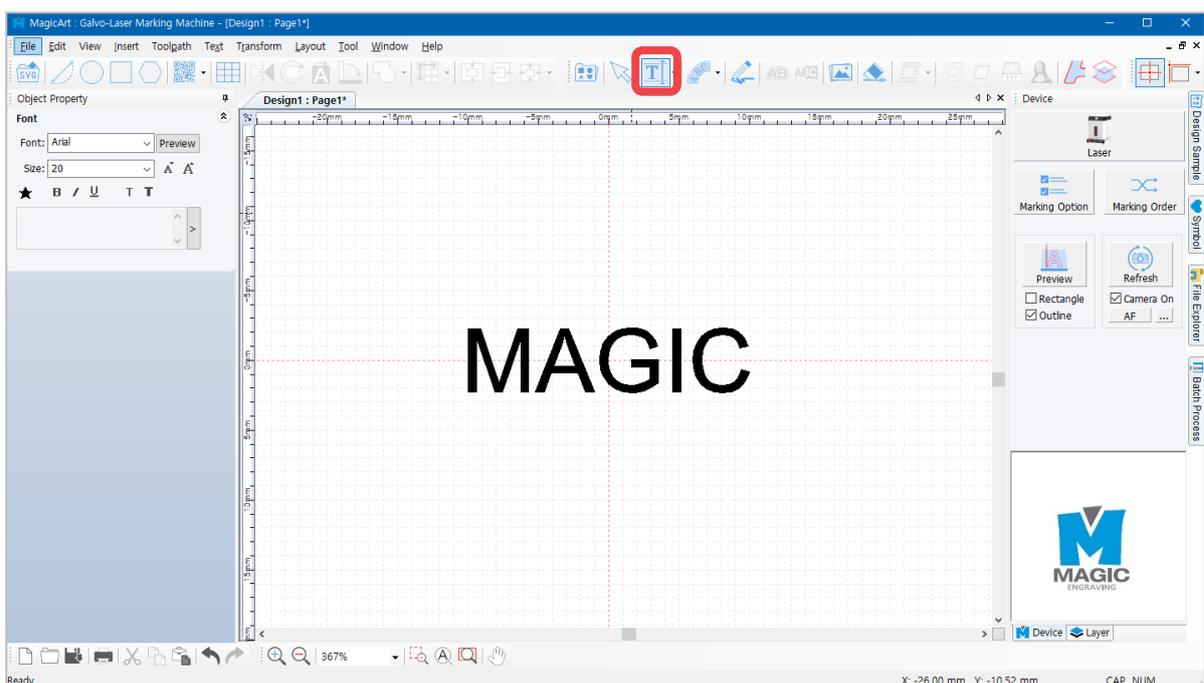


2. Place a material to be cut on the honeycomb table and place it on the work area.

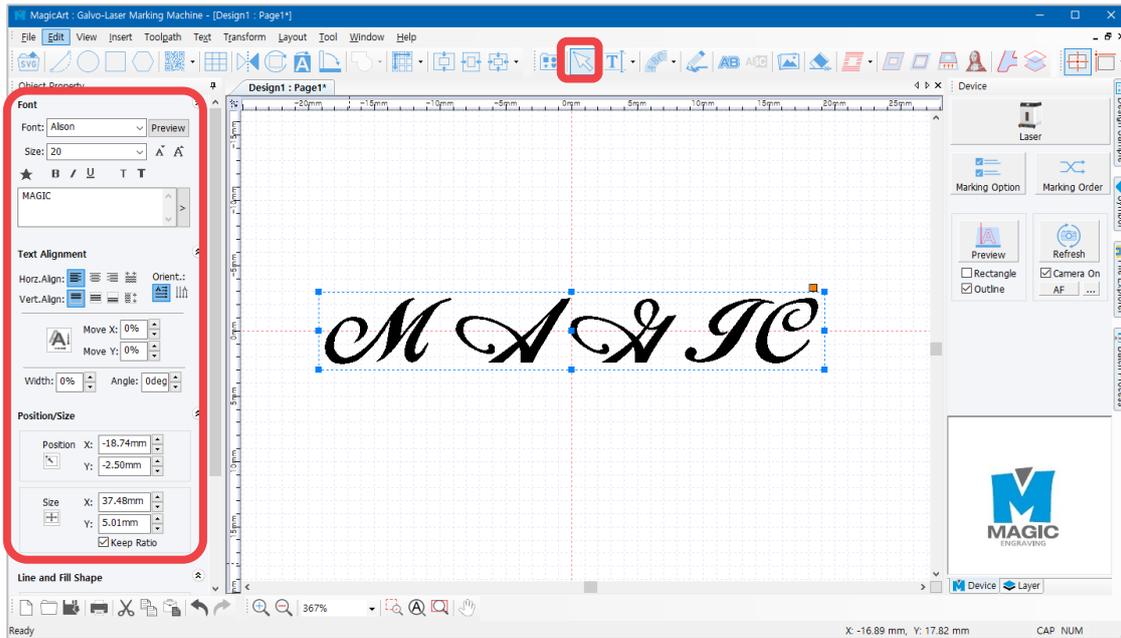
Then set the laser focus, using the direction key (Z)   buttons.



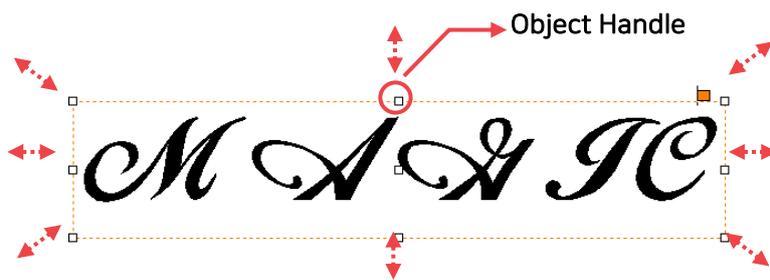
3. Press  [Text Input] on the toolbar to enter the text input mode, and click the work area you want and enter the text.



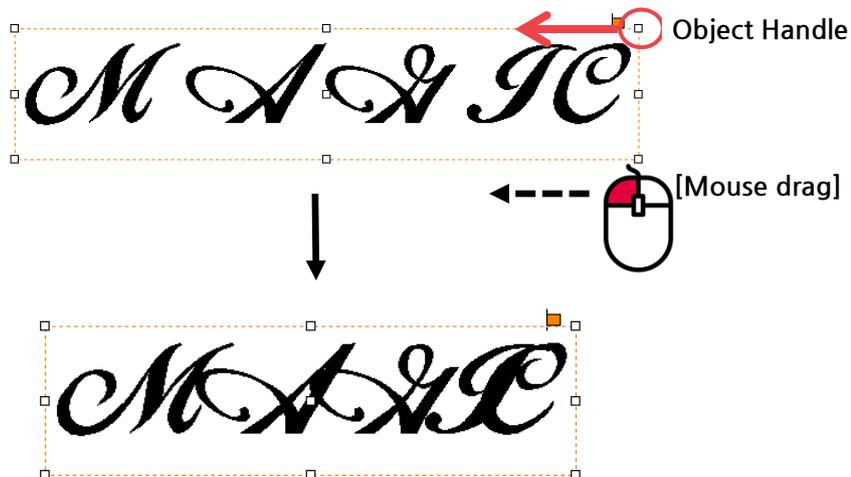
4. After entering text, press  [Selection] on the toolbar to select the text and designate the font.



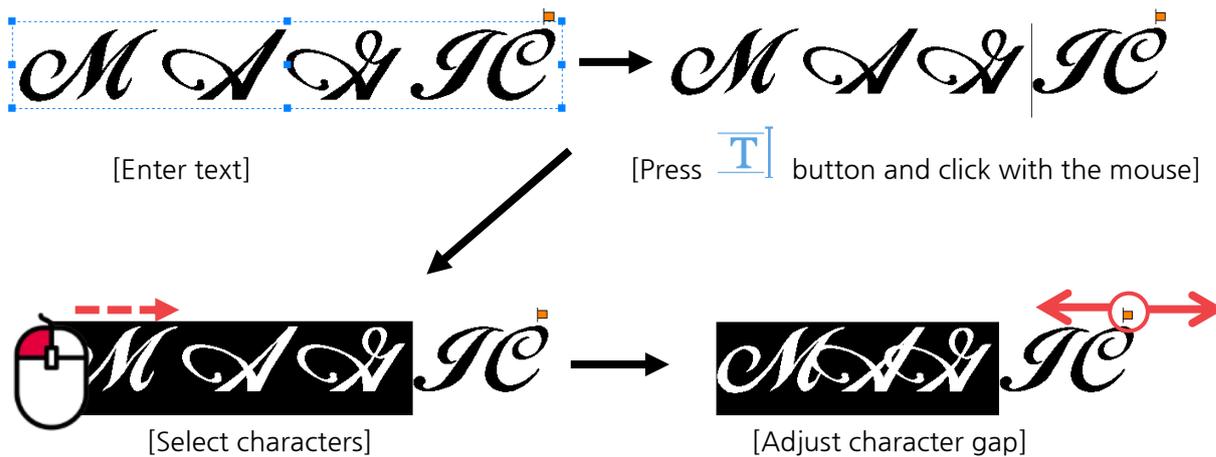
Adjust the text to the desired size. The size can be adjusted by using an object handle (a square in the picture below) as shown below, or from the object property window.



5. Drag the text gap adjustment handle (a square in the picture below) with the mouse to narrow or widen the gap between the characters.

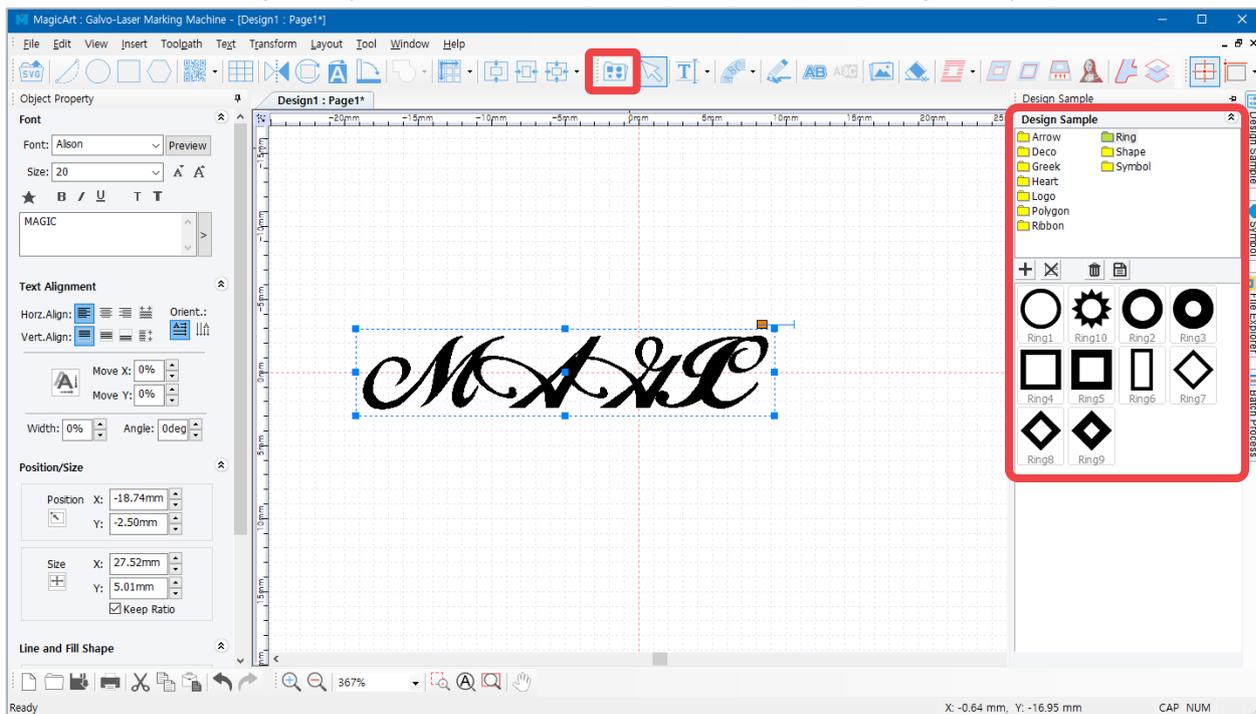


If the gap of some characters is partially adjusted, press  [Text Input] button and drag the mouse to select the characters you want. Drag a text gap adjustment handle with the mouse and adjust the gap.

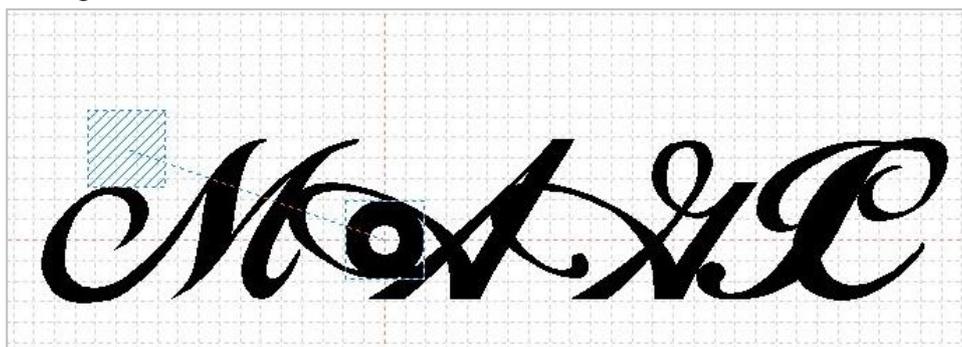


6. Insert a type of ring connected to the characters from the design sample section.

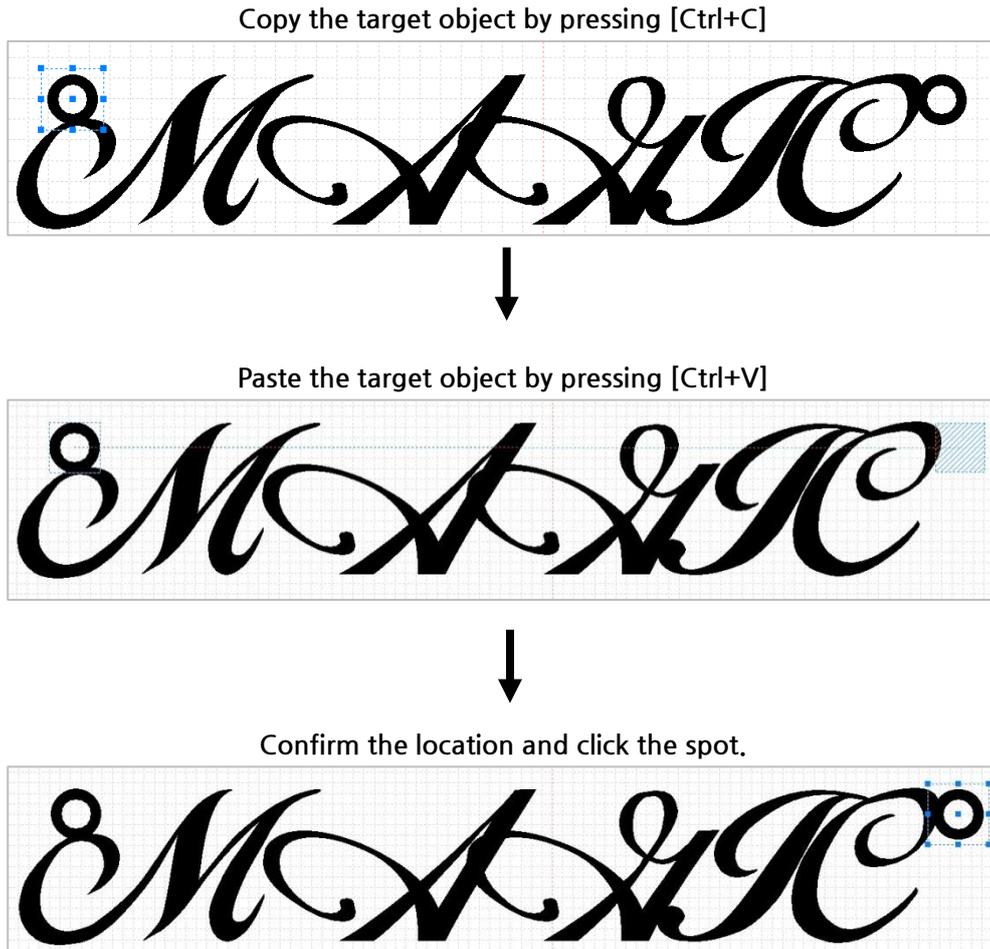
\*Design sample: Click  or [Menu] → [View] → [Design sample].



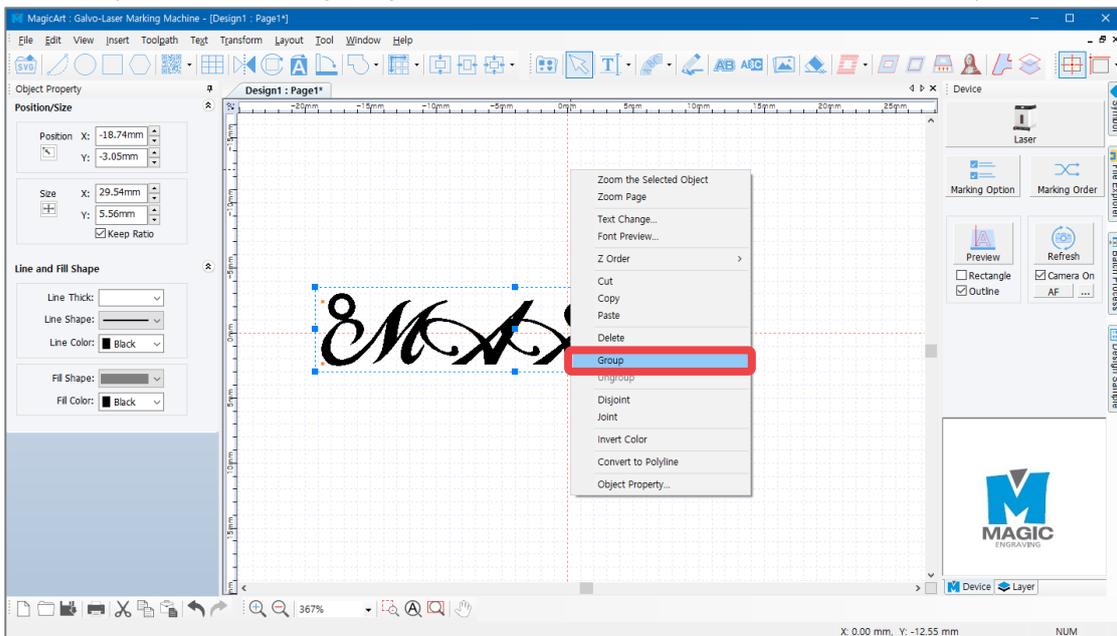
7. Select a type of ring and double click it to load in the work area.



8. [Copy] and [Paste] the ring type, then guideline for a location of the ring appears. Adjust the location and click the spot.

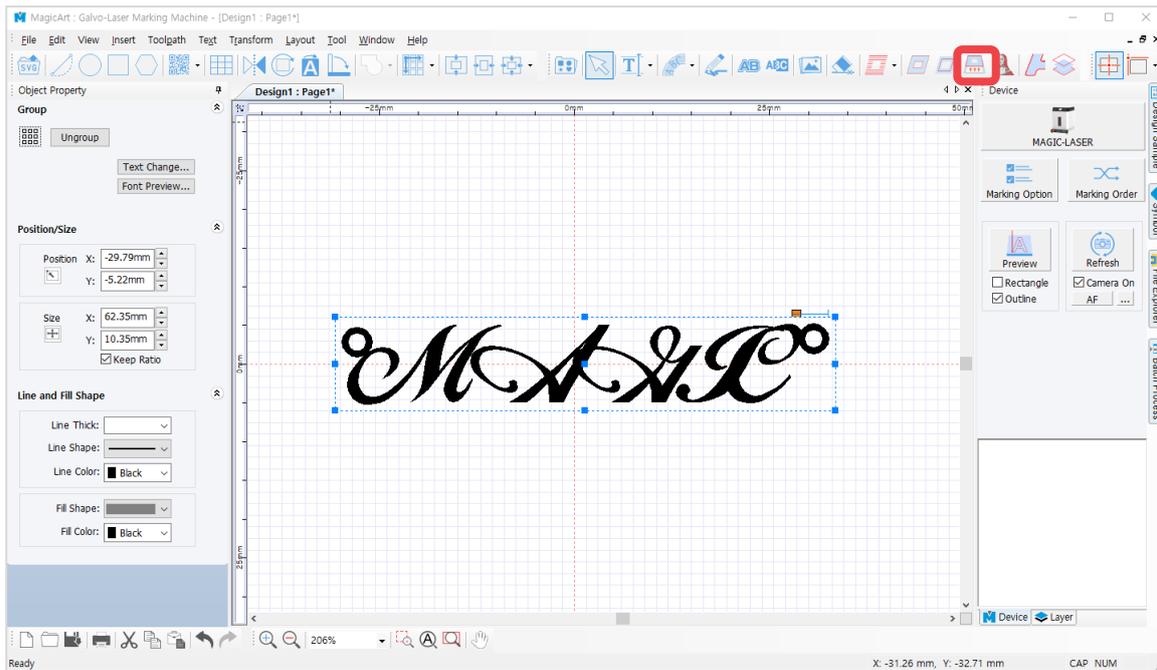


9. Select all the objects for the design, right-click on it to see the menu and select [Group].

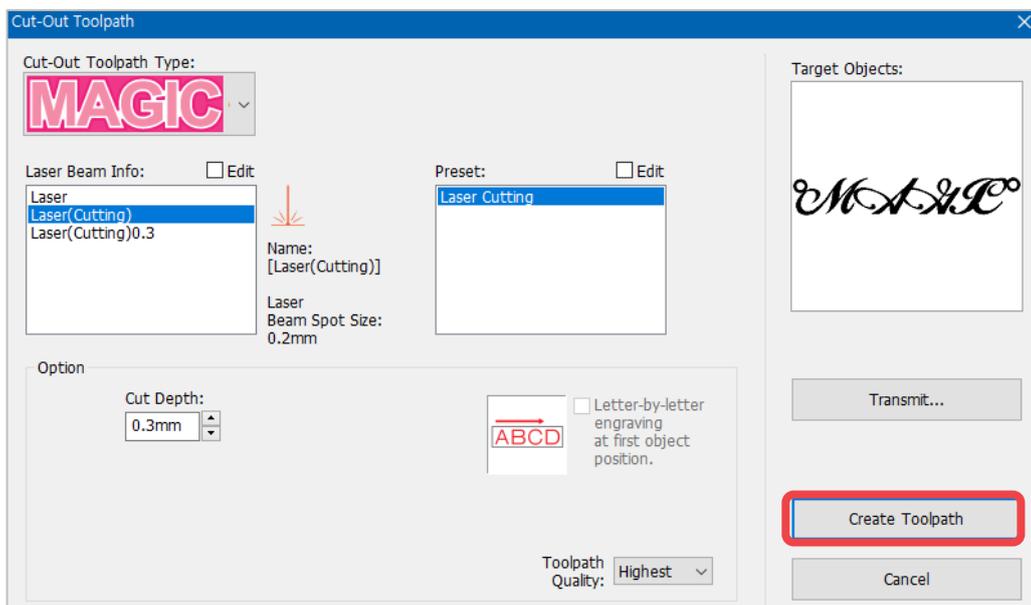


\* Selecting the whole objects: Drag the object with mouse or select [Menu] → [Edit] → [Select All].

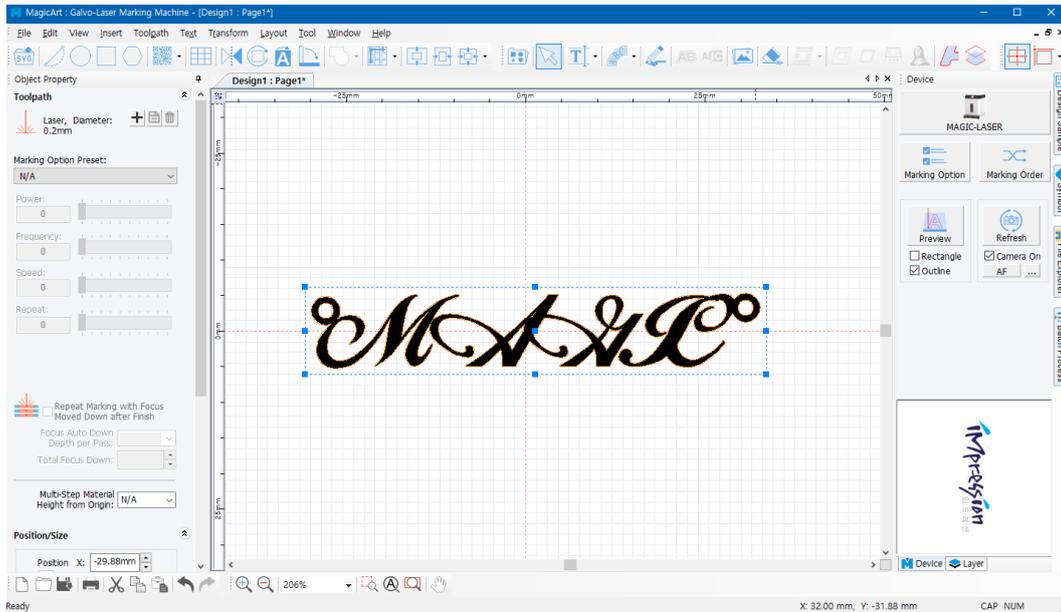
10. Once the design is completed, click  [Cut-Out Toolpath].



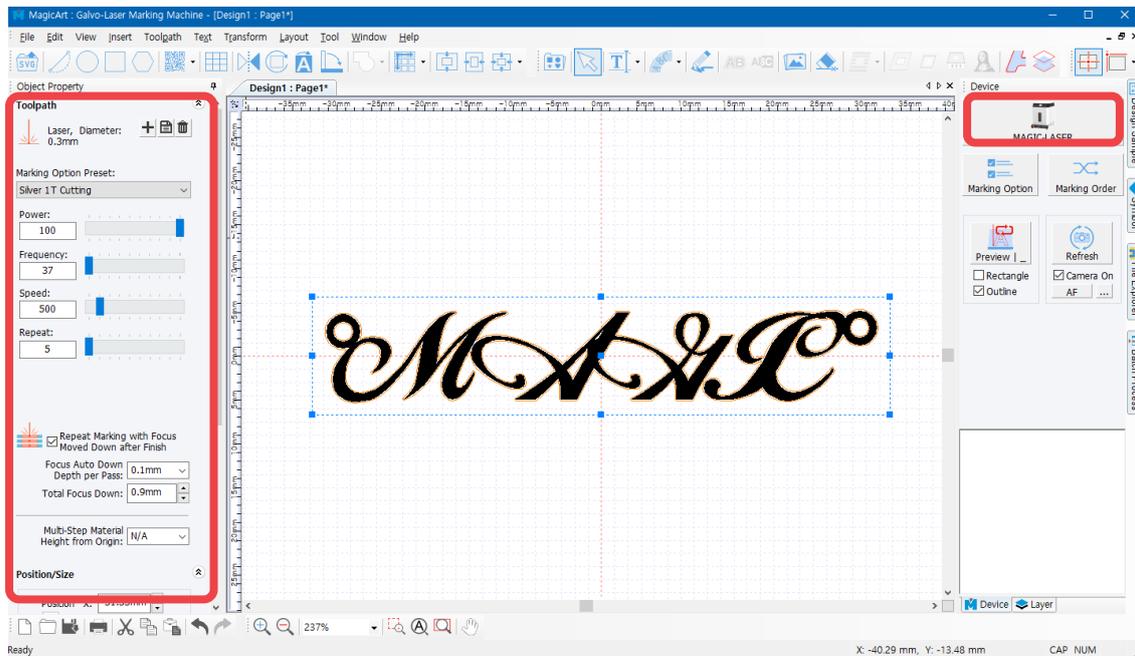
11. Once the “Cut-Out” window appears as seen in the figure below, select tool to be used for the cutting, enter the measured material thickness and the other options and click “Create Toolpath.”



12. "Toolpath" is created.

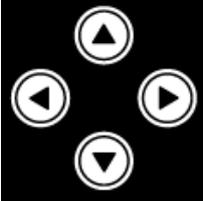
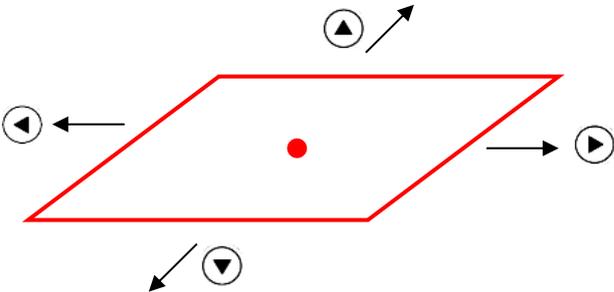


13. After create the toolpath, set the laser marking option. Then click  button.

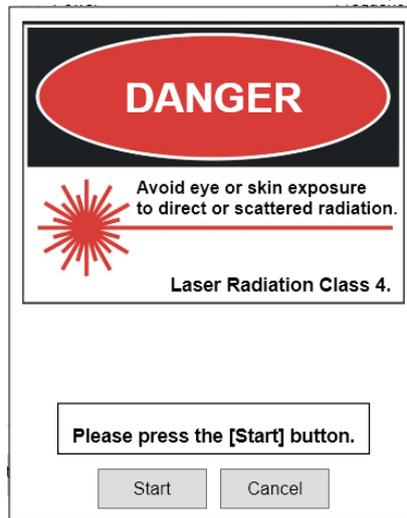


14. Once a laser on the material is turned on, check and adjust the position of the pointer, using the direction keys.

The area pointed by the red rectangular laser pointer refers to an actual marking zone. The round laser pointer in the middle represents the origin of the height of laser focus.

	<p>Whenever the direction key is pressed, the laser pointer moves up/down/left/right, showing a marking area. Check if the marking zone is matched with the area on the material to be actually engraved. If unmatched, adjust the position, using the direction keys.</p> <p>Once the direction key is pressed, the laser pointer moves up/down/left/right in the marking zone. In other words, if a laser pointer is situated on the left side, press [↶] to move the marking zone to the left.</p> 
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15. Once the marking position setting is done, click the program Start button or [▶] on the machine for a long time (2 seconds or longer). Then, the cover is automatically closed, and marking begins.



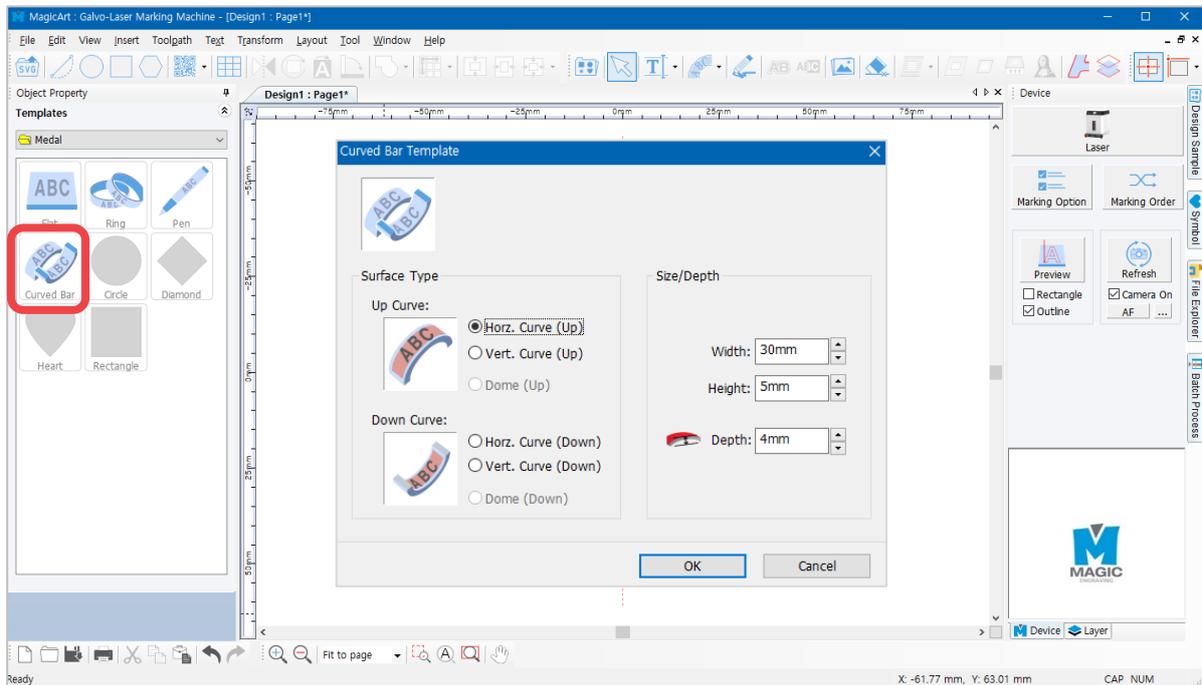
# Curved material marking

For marking on curved surface, select a curved template. Enter the height and length of the curved surface. Then, z-axis automatically moves along the surface and marks letters one by one.

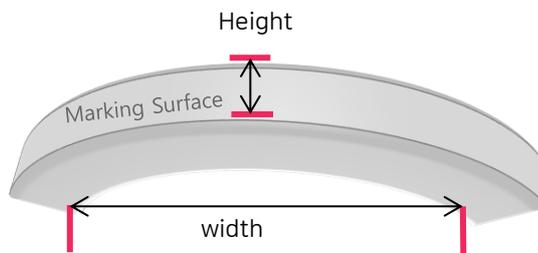


In terms of marking on curved surface, texts are only available.

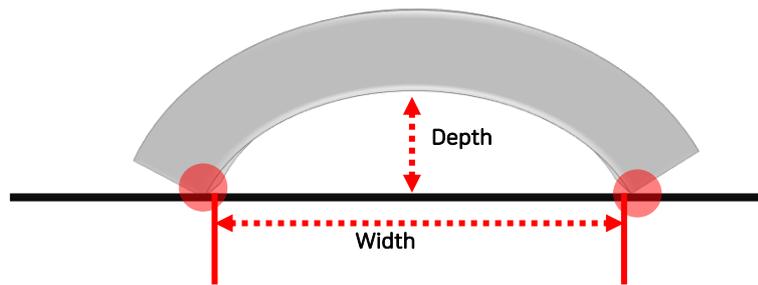
1. Select the [Curved] template.



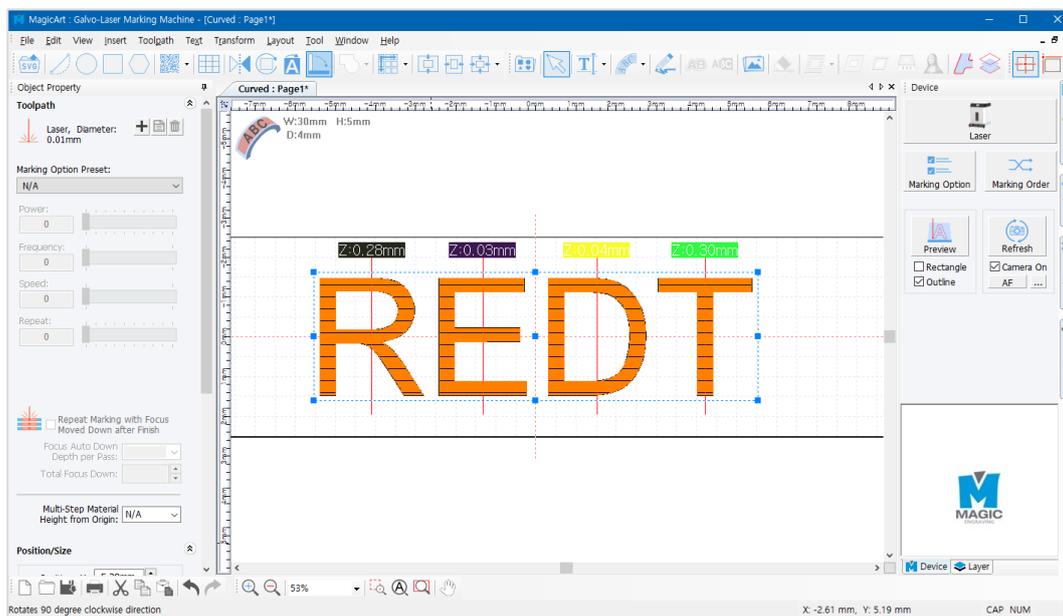
With the curvature information, Z-axis shift is calculated. Therefore, if an incorrect size is entered, Z-axis error can occur.



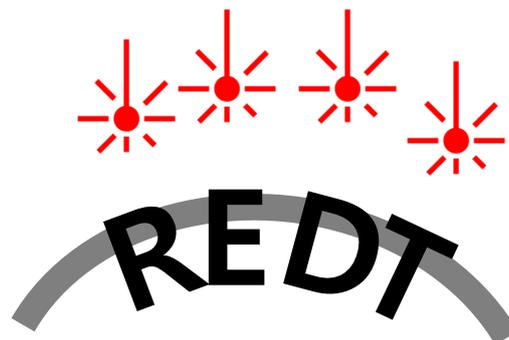
When entering curvature information, put the material on the floor as shown in the figure. Then, enter the distance between the two points which touch the floor.



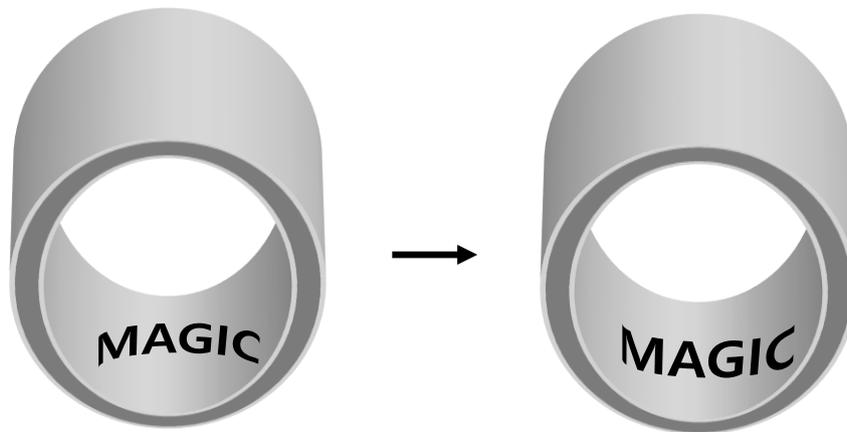
2. Enter texts and create a tool path. Then, Z-axis information appears on the screen as shown in the figure below:



3. Send data and start marking. Then, Z-axis automatically moves and marks according to angles.



# Shape distortion



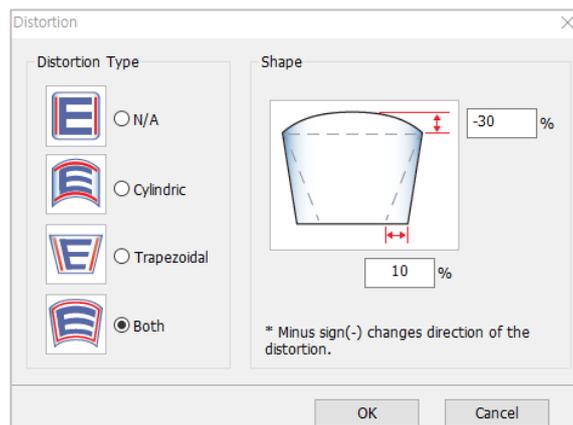
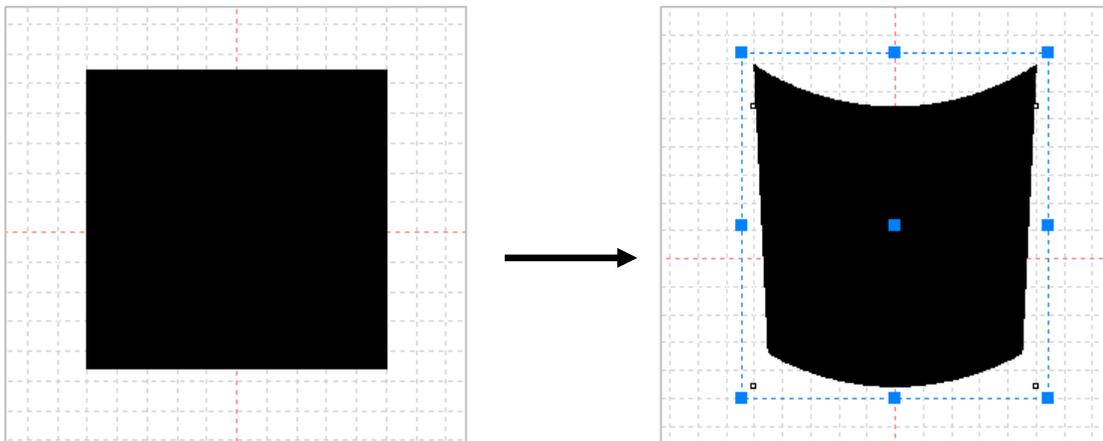
Due to curvature, text and shape can be distorted during laser marking. If marked under this mode, such distortion can be corrected.



- Check the guide laser on your own and enter the distortion value.
- This function is available for figures and texts only (NOT for pictures and circular texts).

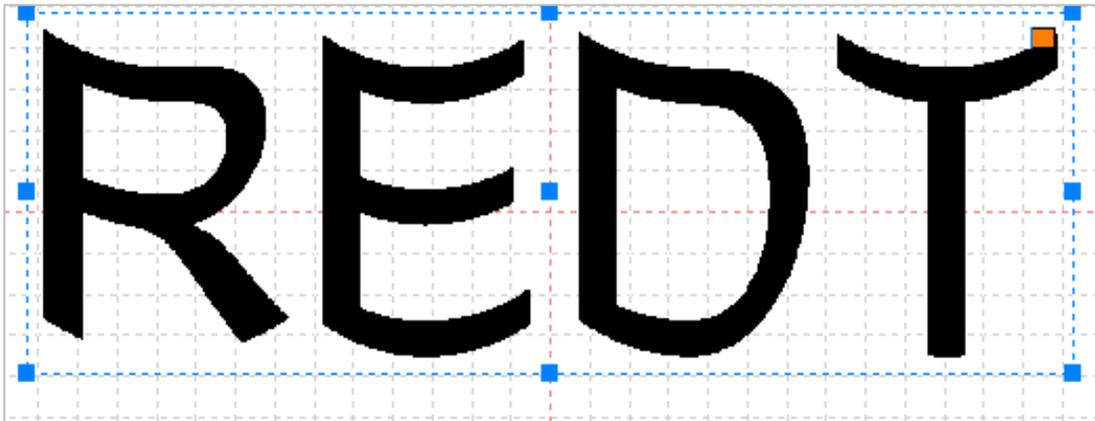
## [Figure Shape Distortion]

Able to distort the shapes of the figures provided by MAGIC ART  
Create figures and click [Menu] → [Transform] → [Distortion].



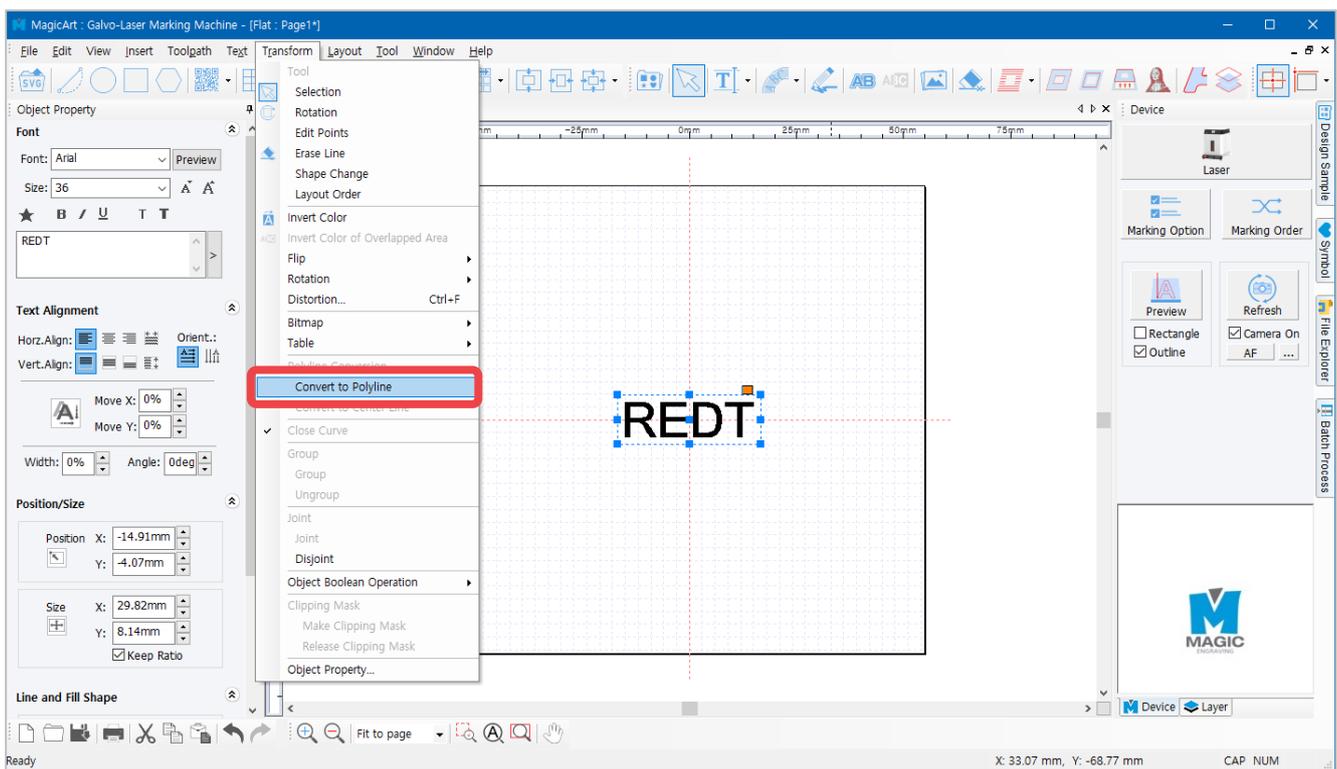
## [Text Shape Distortion]

If [Distort Shape] is clicked without converting an object into a curve, texts are distorted one by one.

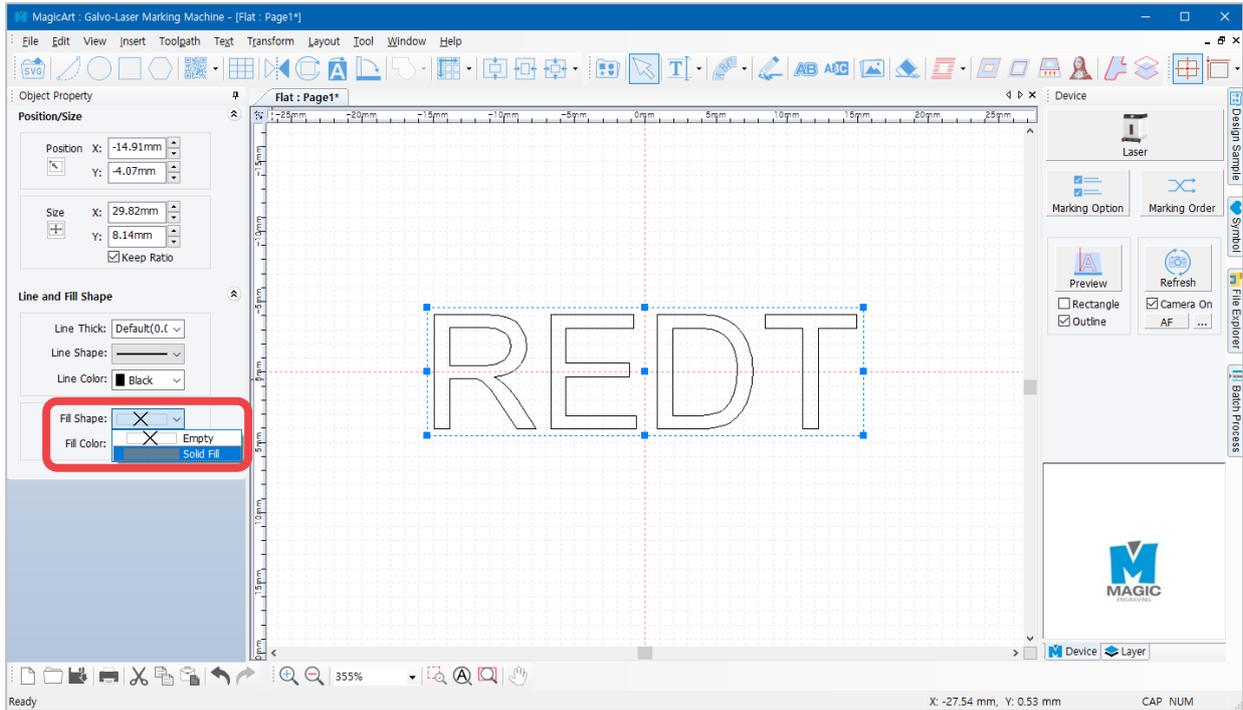


1. Enter texts and click [Menu] → [Transform] → [Convert to polyline].  
(Or select an object and right-click → [Convert to polyline])

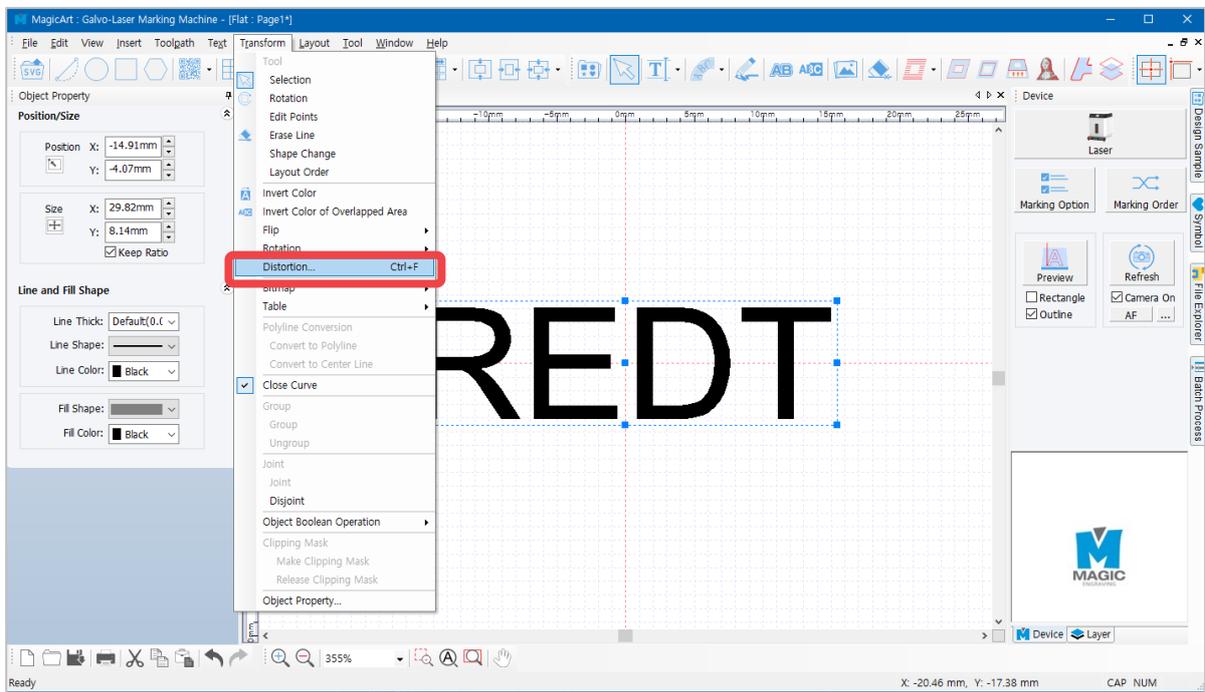
**\* Texts change to figures when converted into curves so that they cannot be edited.**



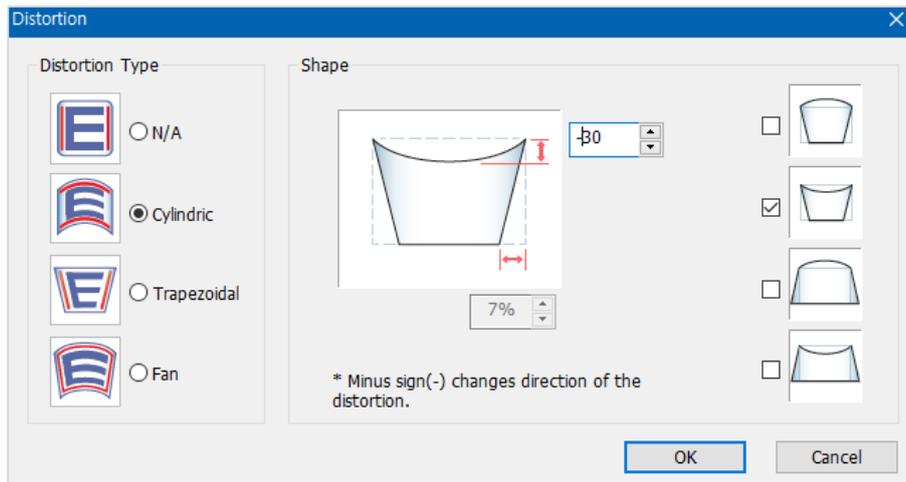
2. Once texts are converted into curves, change [Fill Shape] to [Infill] in the SHAPE on the left.



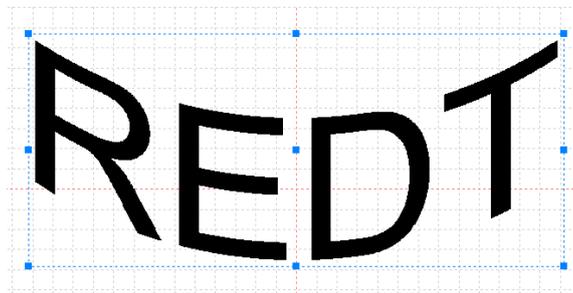
3. Click [Menu] → [Transform] → [Distortion].



4. Enter shape and values. If a negative value is entered, a direction of distortion changes.

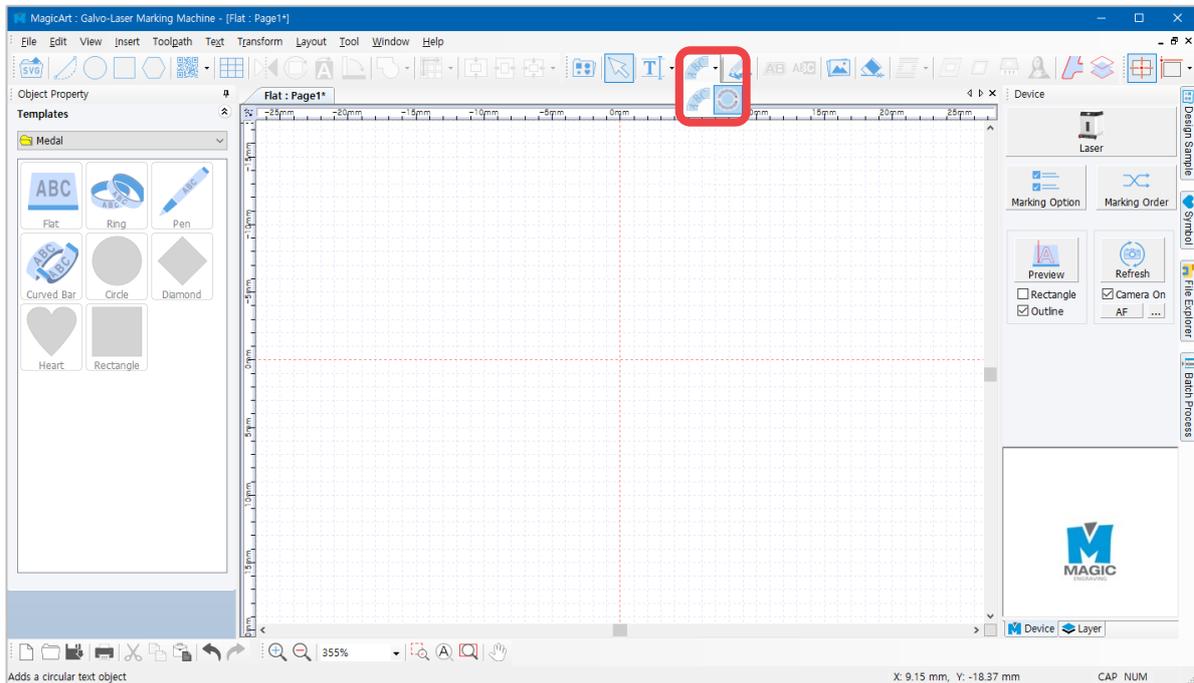


5. Enter shape and values. If a negative value is entered, a direction of distortion changes.



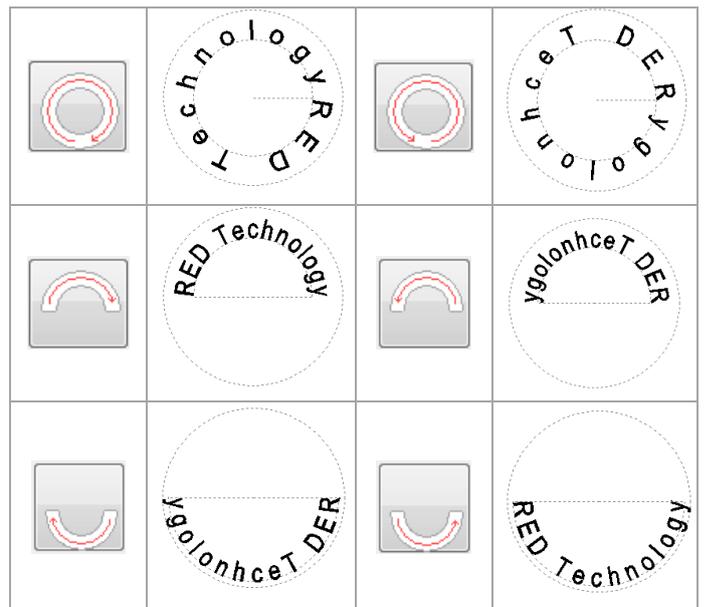
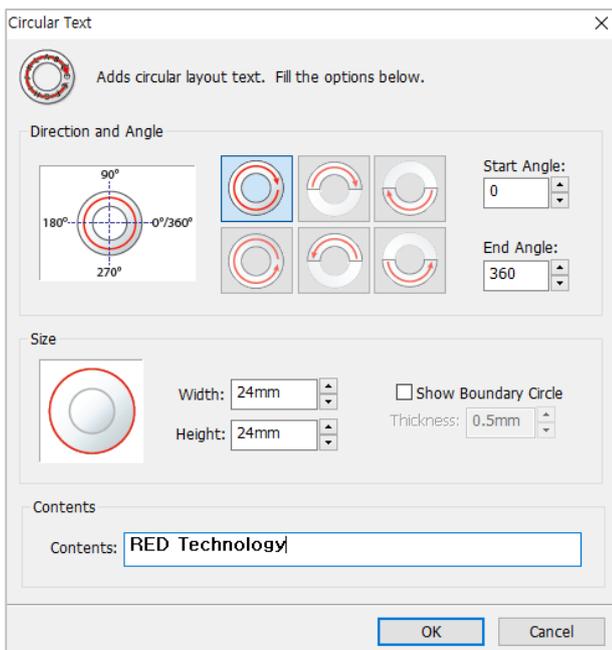
# Layout of text in a circle

Text can be laid out in a circle by using circular text object.



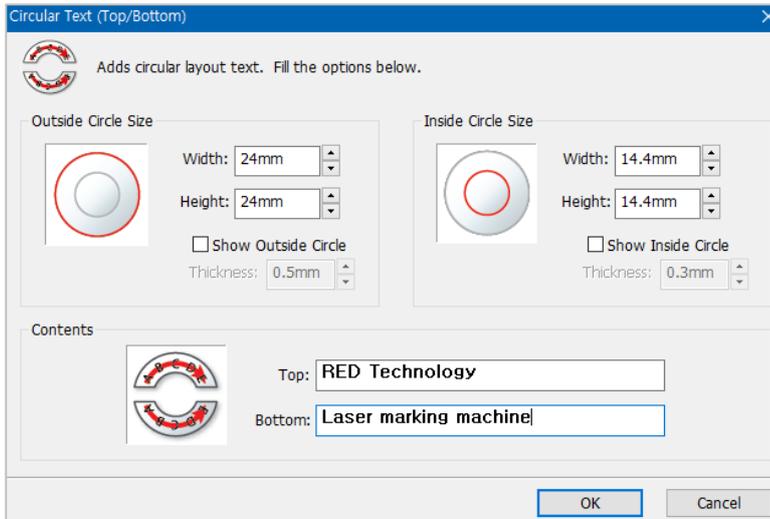
[Circular Text]

Click  button to display “Circular Text” window. Designate direction and angle, enter the size and text, then click “OK” button.



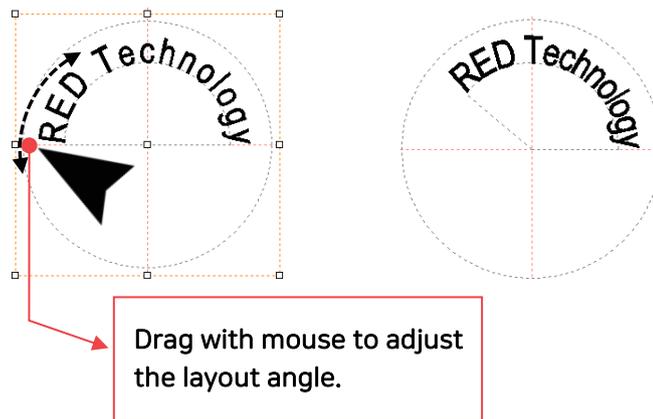


## [Circular Text- Top/Bottom]

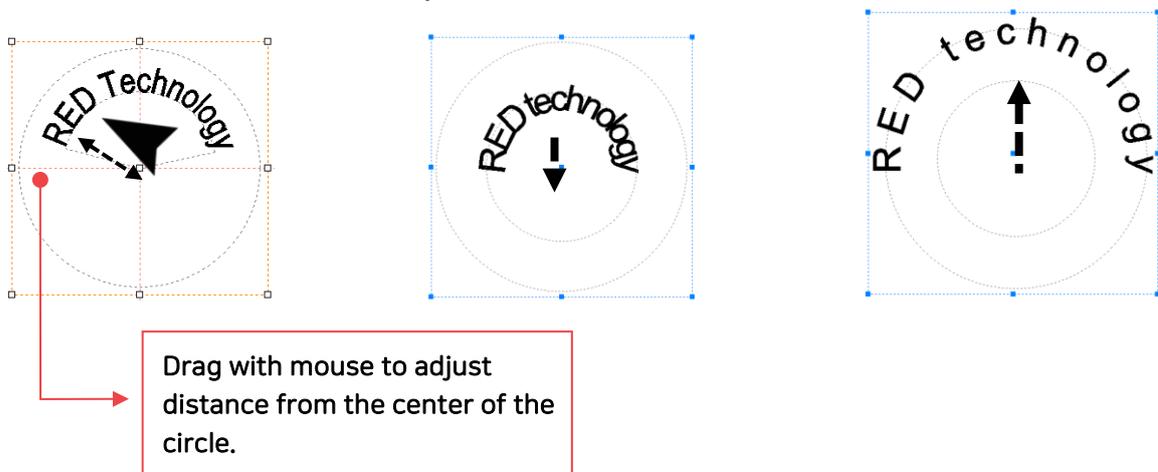


### [Adjusting layout angle]

Drag the first character [R] or last character [y] in the text to adjust the angle of the layout.

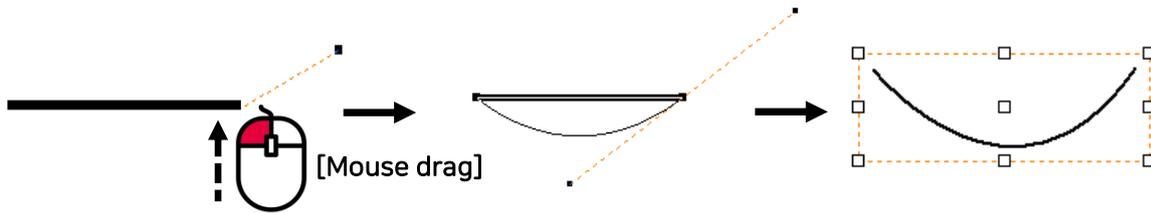


Drag other characters with the mouse to adjust the distance to the center of the circle.

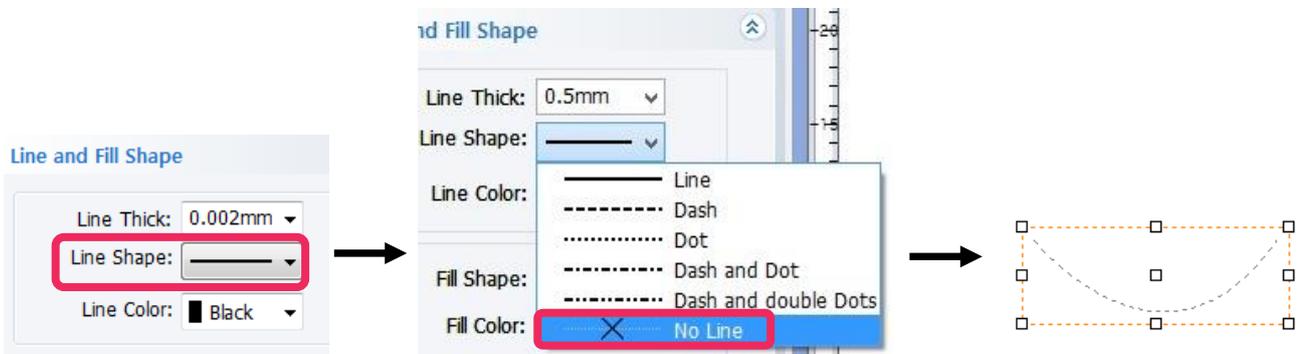


# Layout of text on a curve

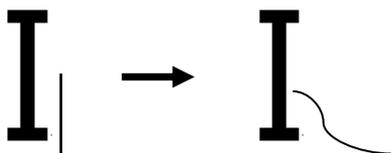
1. Click the  [Line/Curve] button.
2. Click on a certain point with the mouse and designate a distance. Drag the mouse to make a curve appear. Press the right button on the mouse to create the curve.



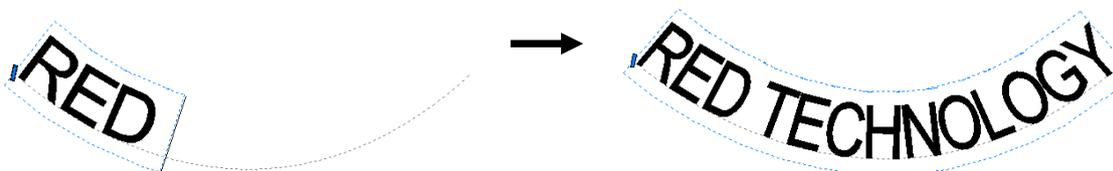
3. Select “No Line” on the “Line and Fill Shape” window on the object property window.



4. Click **T** [Text Input] button, and move the mouse cursor to the curve line. The cursor shape will change as shown below.



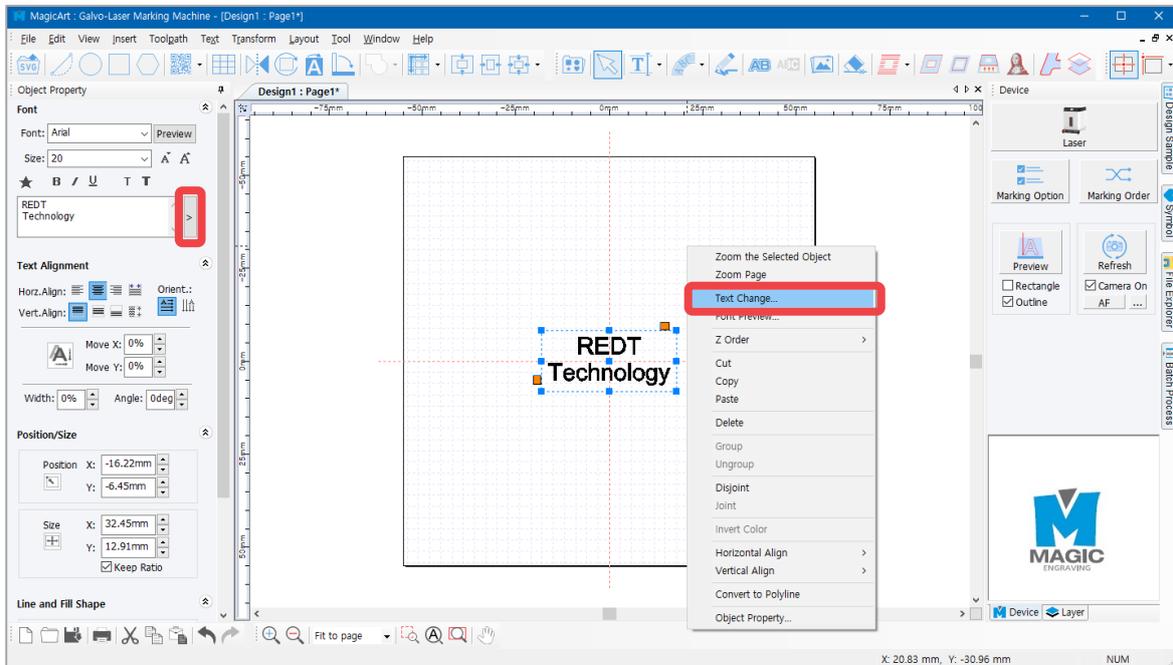
5. In the state in which the cursor shape is changed, click to enter the text input mode.



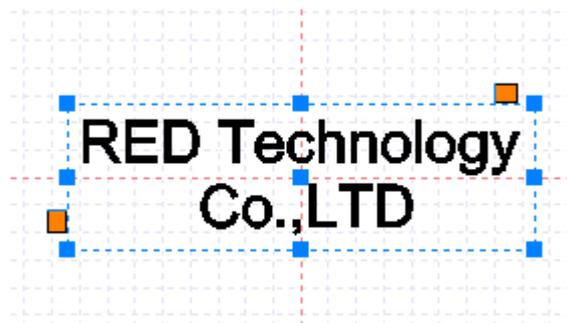
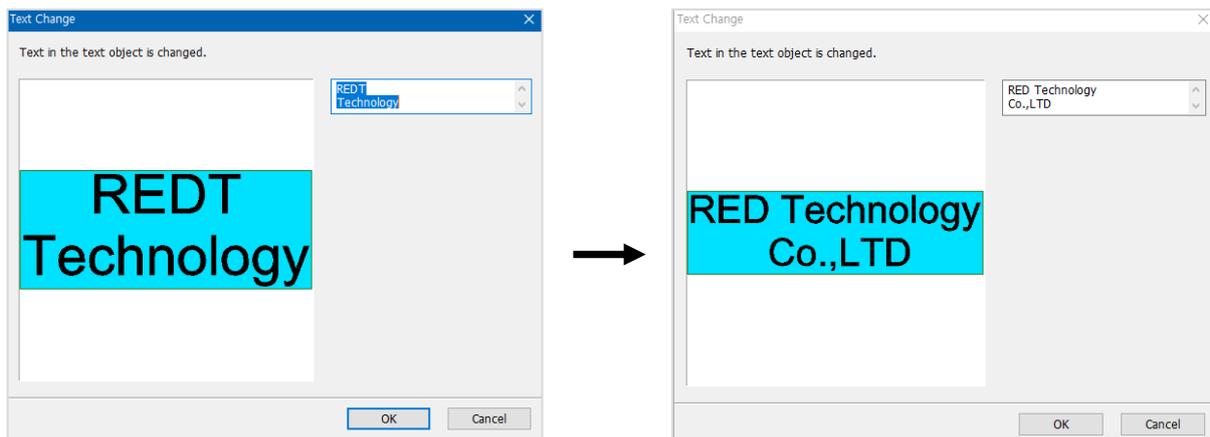
# Text change

The text contents in text objects can be easily changed by the [Text Change] feature.

Import a saved design sample, file, or select text objects designed on the screen. Click [Text change] button or right- click the mouse, and select [Text Change] on the menu. Or select [Menu] → [Text] → [Text change].



Change contents in the “Text Change” window, and click “OK” button. The changed texts will be shown on the screen.

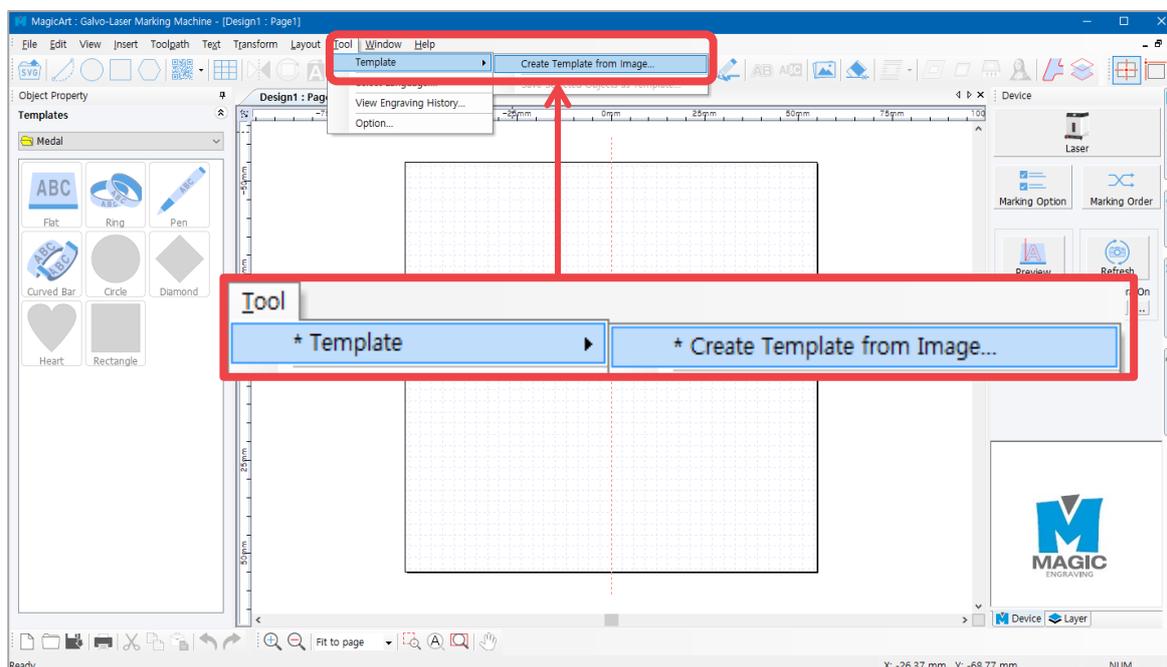


# Template creation

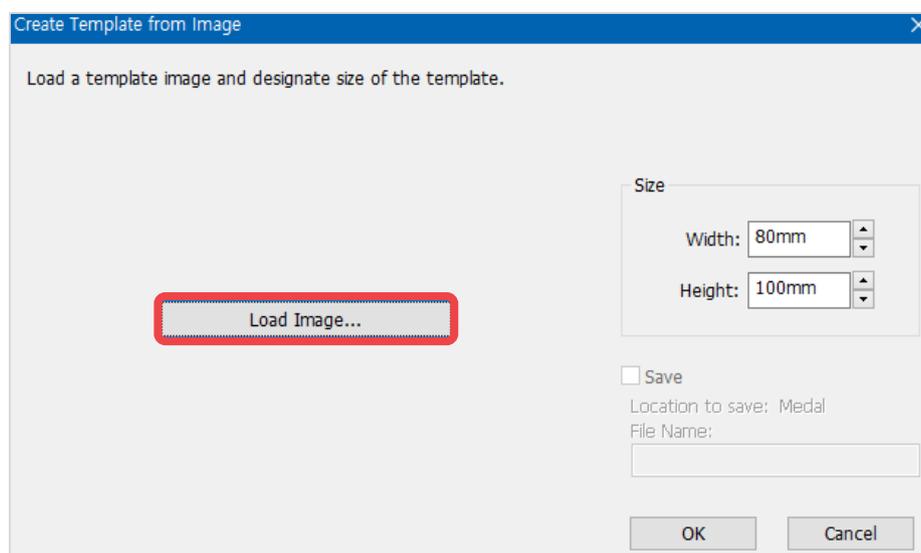
Template is an image corresponding to the materials to be engraved by 1:1 ratio. Load a template that is the most similar to the material to be engraved, and enter the text to be engraved. This allows you to create the location of marking and the size of text to be engraved more easily and conveniently. Circle, heart, square and diamond-shaped templates are initially provided by the program and users can freely add more templates. The shape of a template can be designed by graphic program (Illustrator, Photoshop, CorelDraw and etc.) and loaded by SVG file format. Also scanned image file such as jpeg, bmp, png, etc. can be applied as template.

## [Creating template #1]

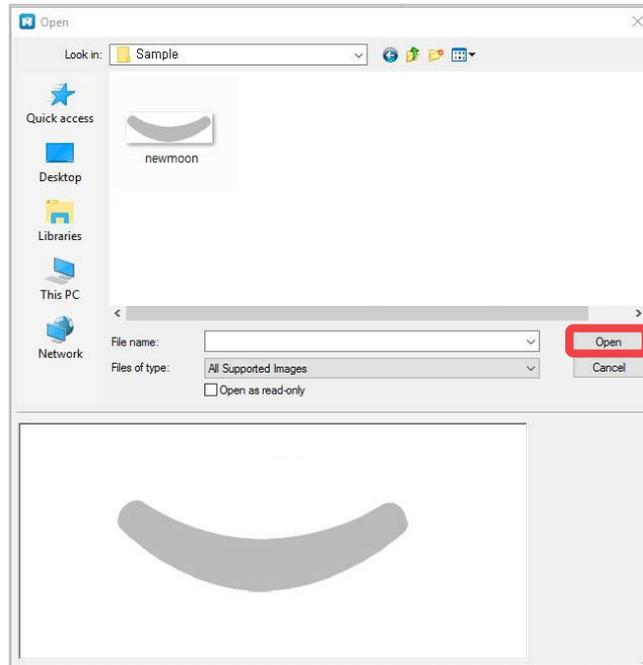
1. Select [Menu] → [Template] → [Create Template from Image].



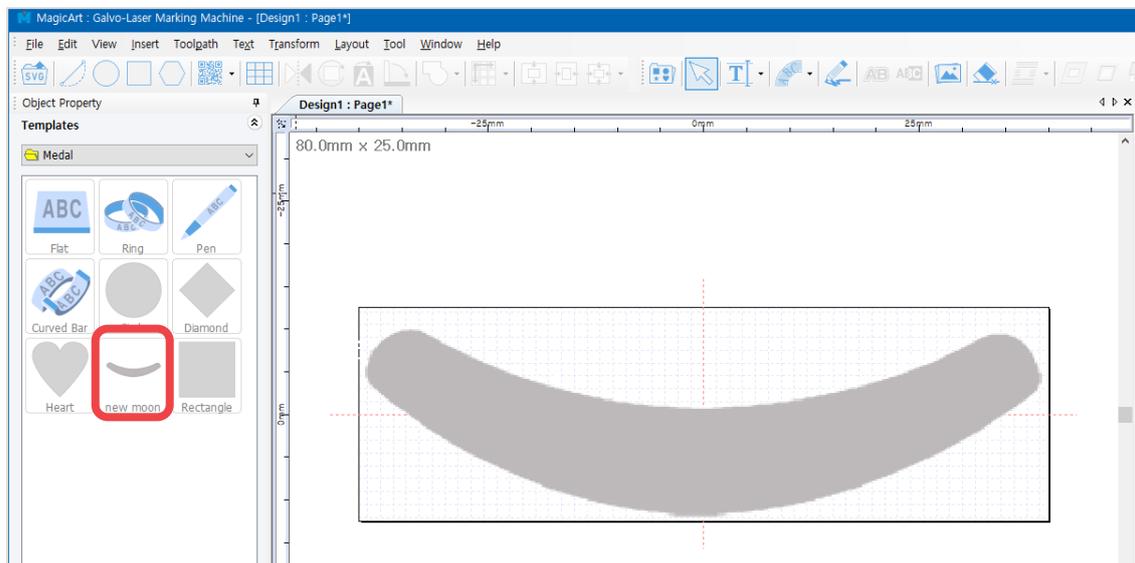
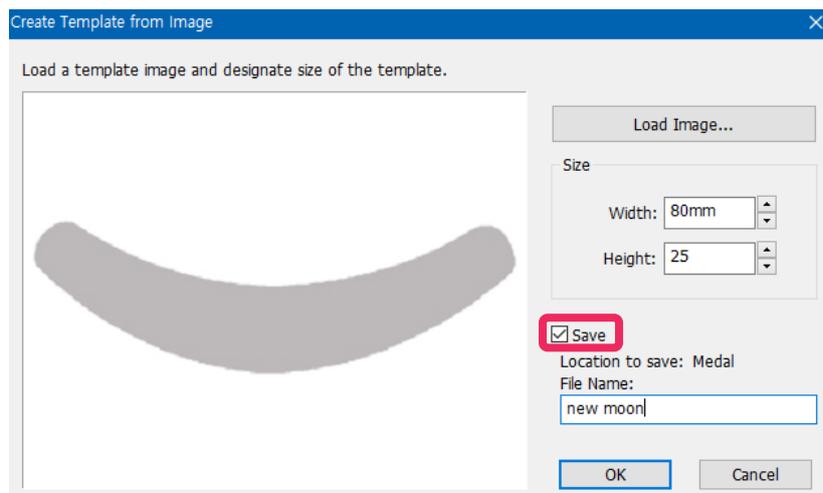
2. "Create Template from Image" window appears.



3. Select image files (jpeg, bmp, png and etc.) from the “Open” window, and click “Open” button.

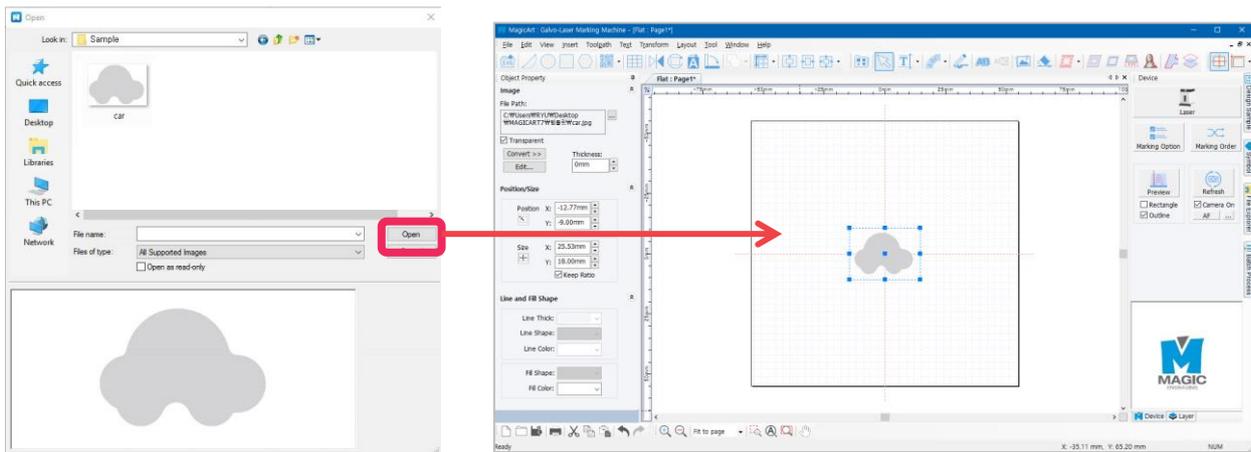


4. Input size of the template. Check “Save” to save the loaded image as a template for later use and enter a name for the template. Click “OK” button to load the image as a template. If “Save” is checked, and the template name is given, the loaded image will be saved as a template in the template library simultaneously.

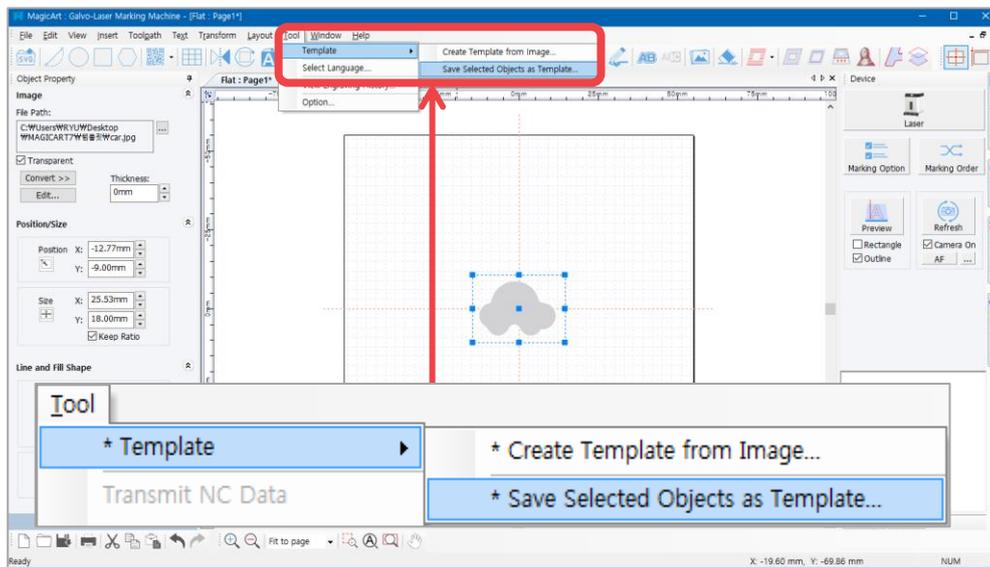


## [Creating template #2]

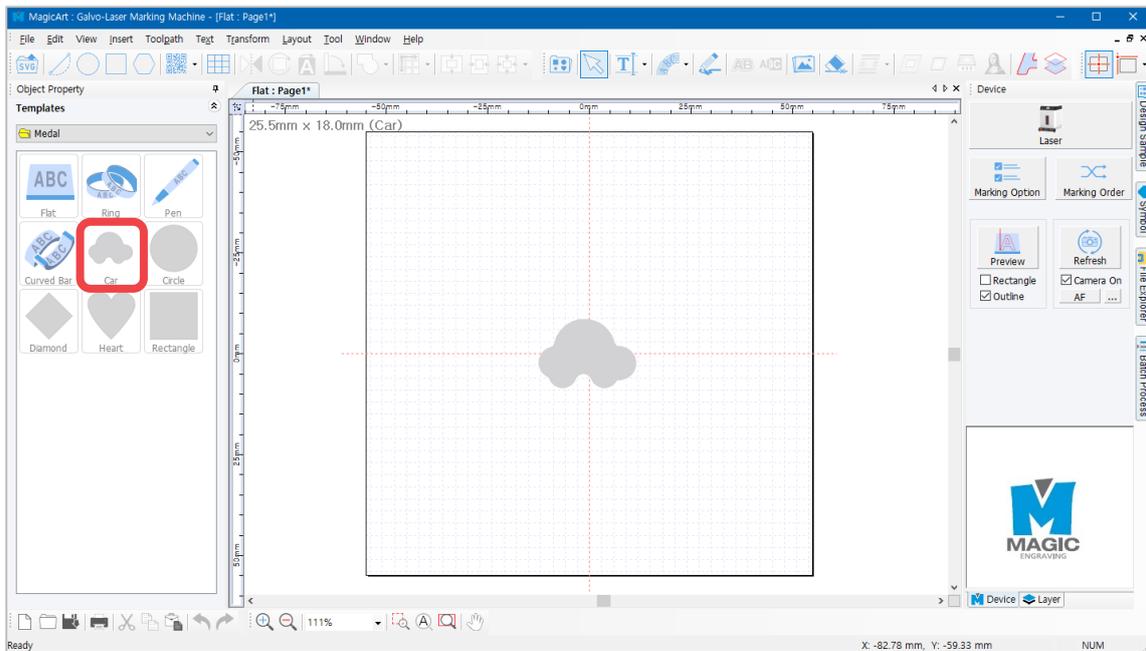
1. Press  [Image] button to open an image.



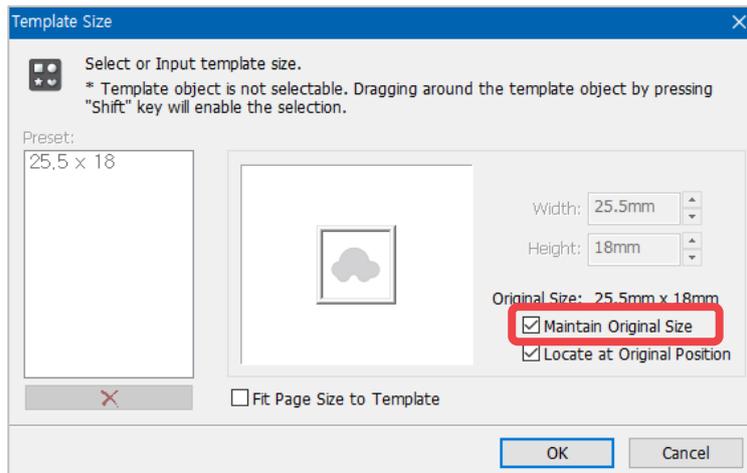
2. Select [Menu] → [Template] → [Save Selected Object as Template].  
Type a name of the new template in “Input” window.



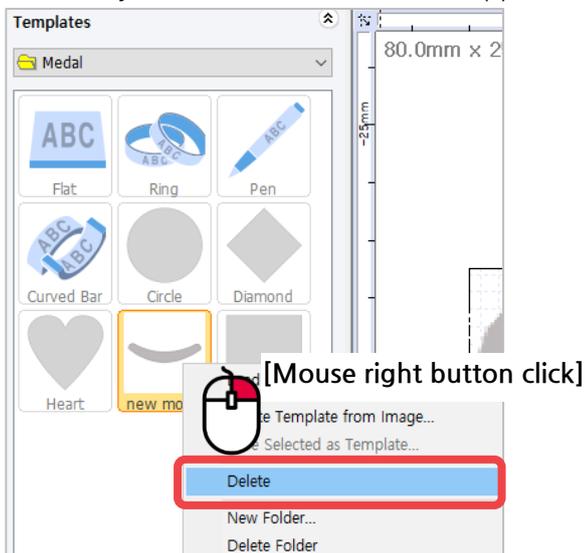
3. The saved template is added in the template library.



The template saved in the “Save Selected Object as Template” menu is saved as designated size to the screen. When loading the template, check “Maintain Original Size”, then the template will be loaded with the original size designated when the template was saved.



\* Right-click in the template category window for more template related features. The template can be deleted by “Delete” on the menu that appears by right-click in template list window.

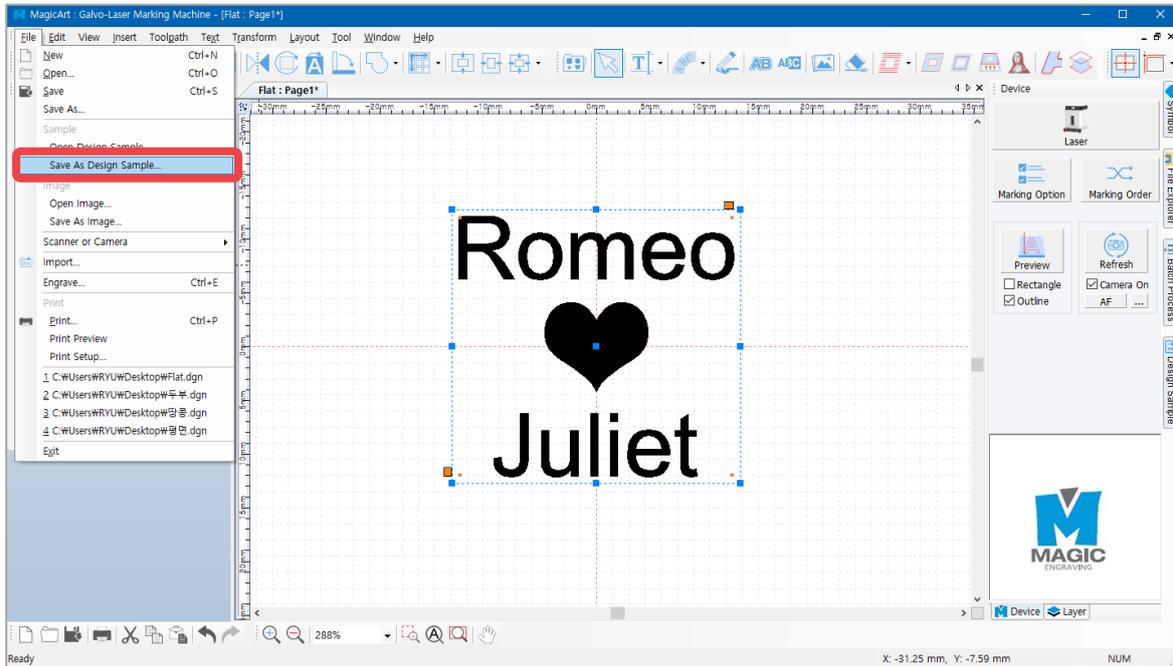


# Saving as design sample

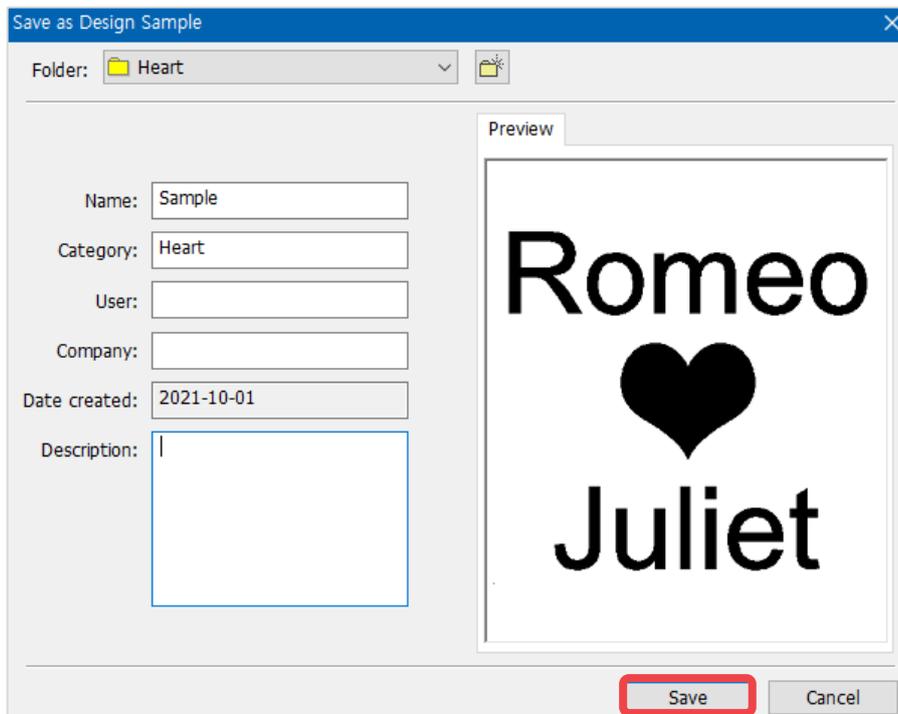
Edited contents can be saved as design sample for easier access to the design.

## [Saving as design sample #1]

1. Edit contents and select the objects.

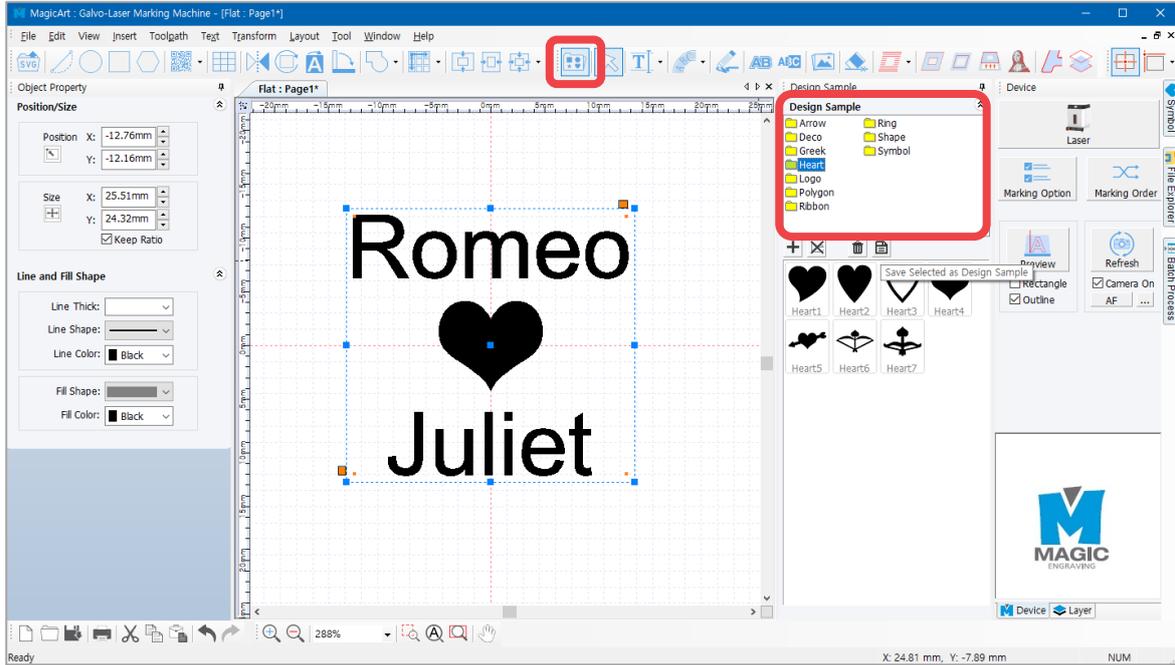


2. Click File [Menu] → [Save as Design Sample] and select a folder or create new folder. Enter the name and click “Save” button to save it.

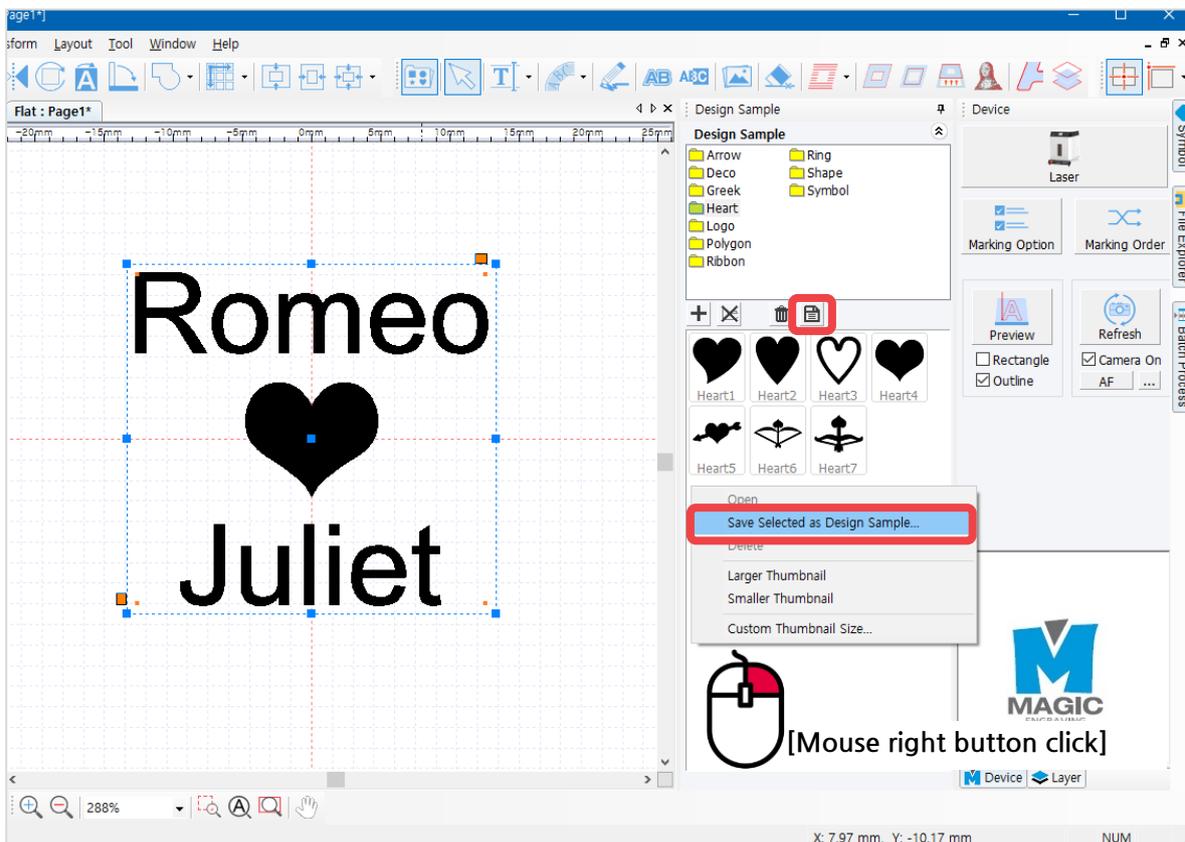


## [Saving as design sample #2]

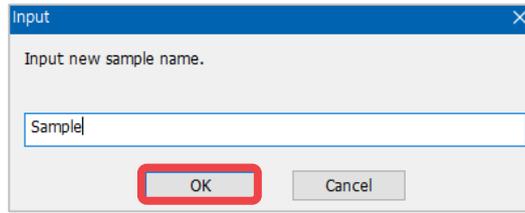
1. Select objects, and click  [Design Sample] button. And select a folder to save the objects from design sample library window.



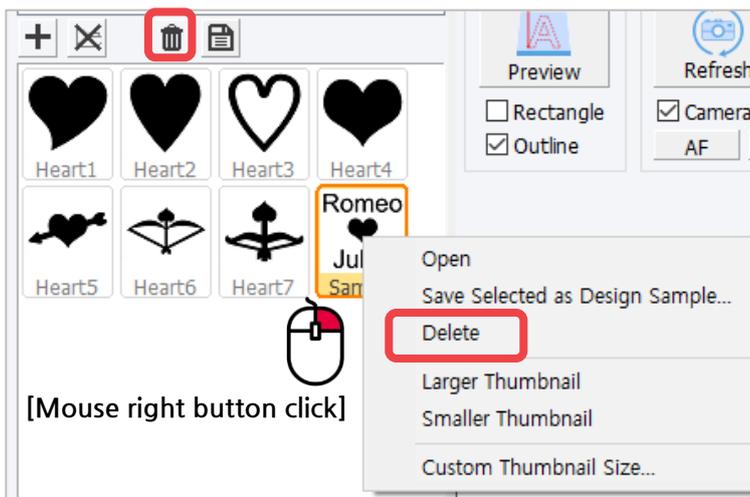
2. Click  [Save selected image as sample] or right-click the design sample image, and click "Save Selected as Design Sample" menu.



3. Enter the name to be saved, and click “OK” button to save it in the design sample library.



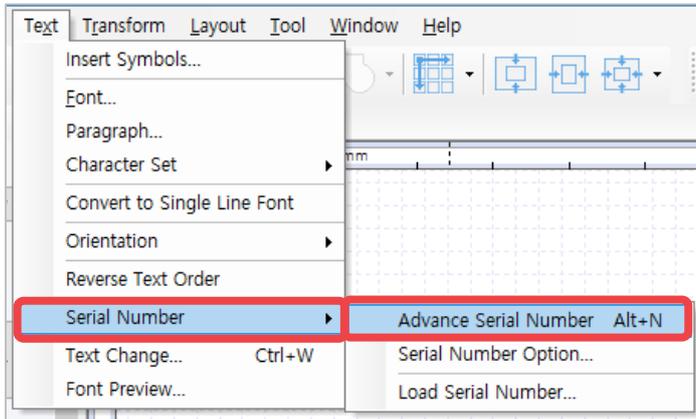
\* Right-click in the design sample window for more related features. The design sample can be deleted by click  or “Delete” on the menu that appears by right-click in design sample window.



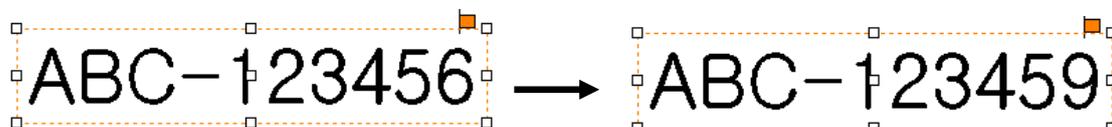
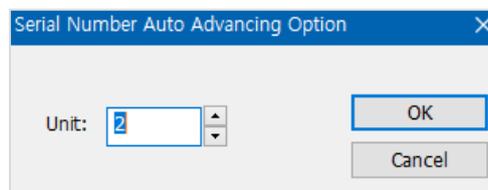
# Auto change of serial number

Use this function when changing numbers by certain unit.

1. Edit the font and size of text object with a number, and press “Alt+N” key on a keyboard, or select [Menu] → [Text] → [Serial Number] → [Advance Serial Number] to change the number automatically.

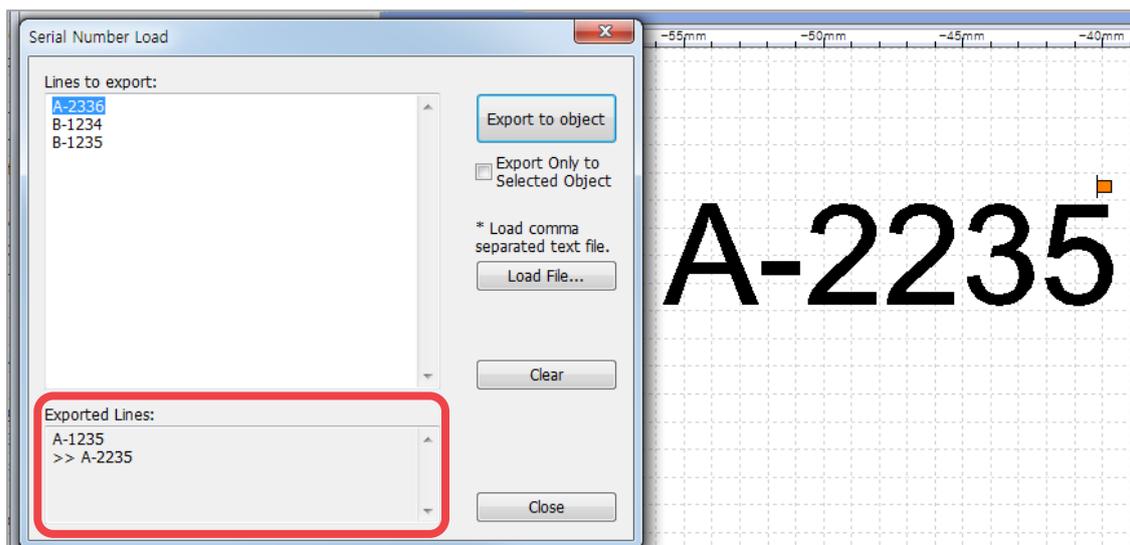
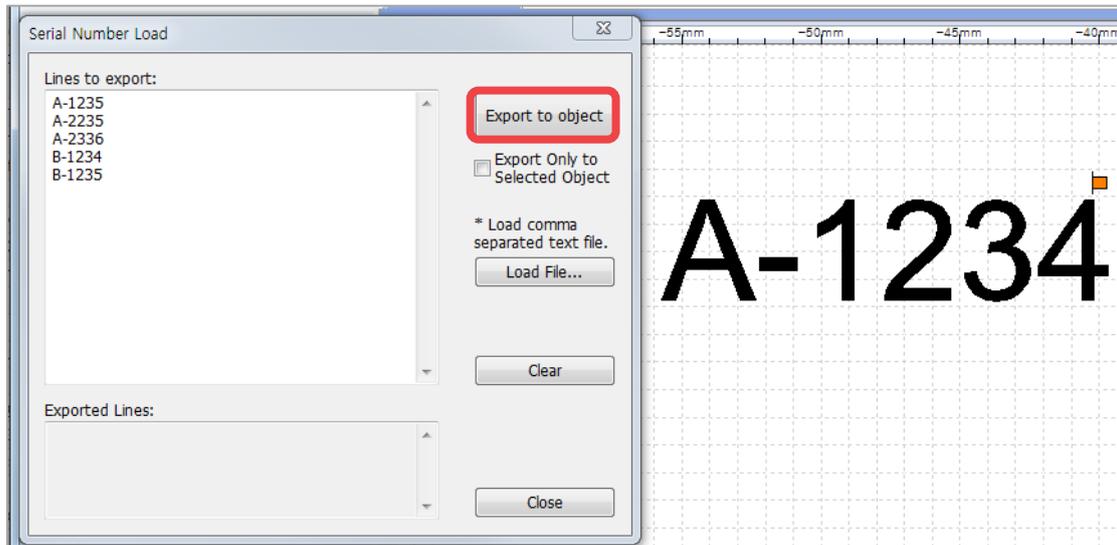


2. Select [Menu] → [Text] → [Serial Number] → [Serial Number Option] and enter a unit from the “Serial Number Auto Advancing Option” to change the serial number by the designated unit automatically.



3. If the serial number is not regular, then select [Menu] → [Text] → [Serial Number] → [Load Serial Number]. Enter serial number in the “Lines to export” field or click “Load File” button to load it from a file (.txt or .csv file format).

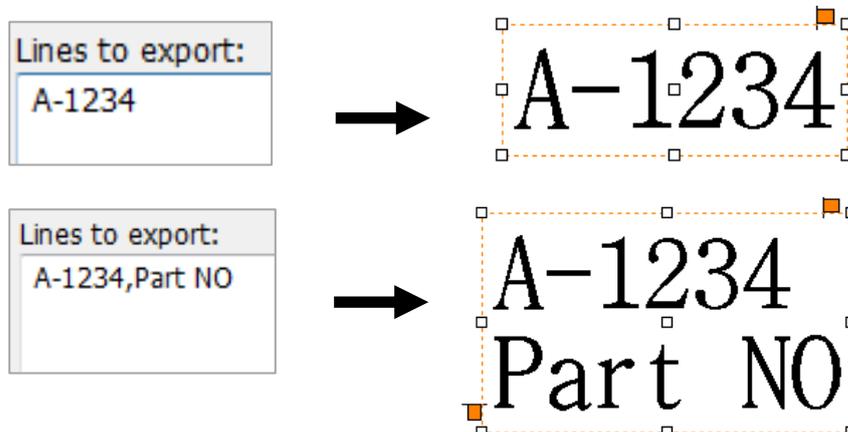
Once serial numbers are loaded, click “Export to object” button. The text on the selected text object is automatically changed, and the serial number is deleted from the list. The deleted numbers will be shown in the “Exported Lines”.



Notice

Serial numbers can be loaded from a file separated by a comma (.csv) or text file (.txt).

Each row of the file is recognized as one serial number, and the contents of each row separated by comma are shown in the next line.



# Loading and editing image

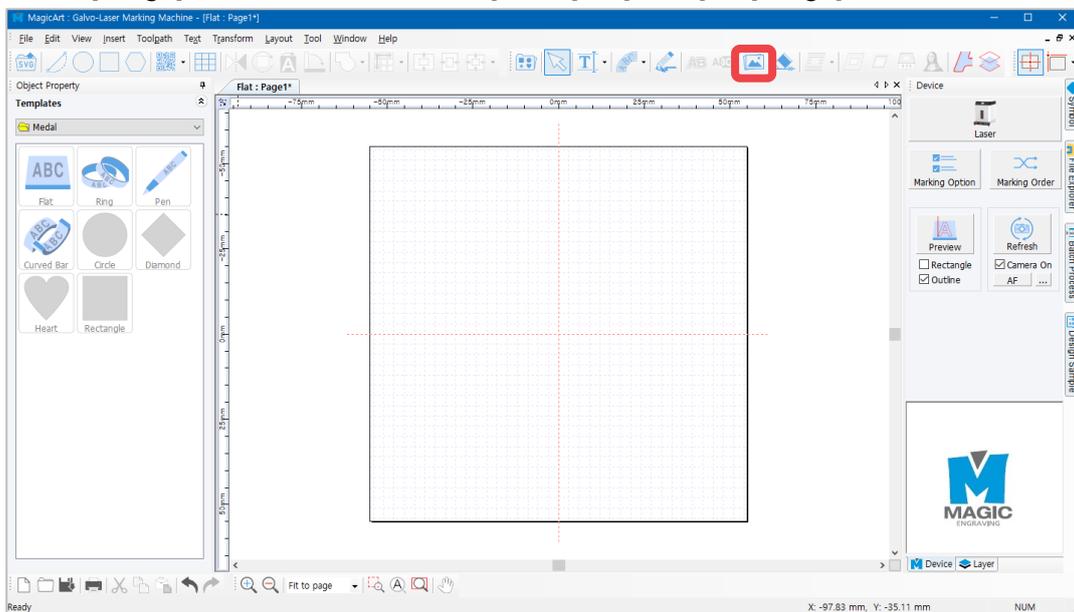
## 1. Loading an image

This program provides a function to load various types of image files. Supported image file types are as follows.

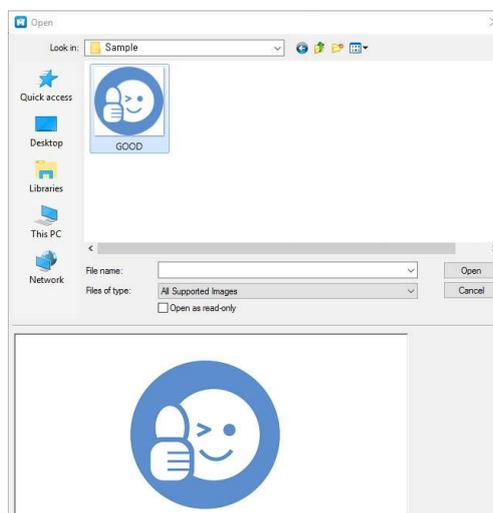
<b>BMP</b>	Windows or OS/2's bitmap graphic file
<b>GIF</b>	CompuServe graphic file
<b>JPG/JPEG</b>	JPEG bitmap graphic file
<b>PNG</b>	Portable Network Graphics bitmap graphic file
<b>PCX</b>	Z Soft PC paintbrush bitmap file
<b>TIF/TIFF</b>	Tagged Image File Format bitmap file
<b>WMF</b>	Windows meta file

Image file can be loaded by following method.

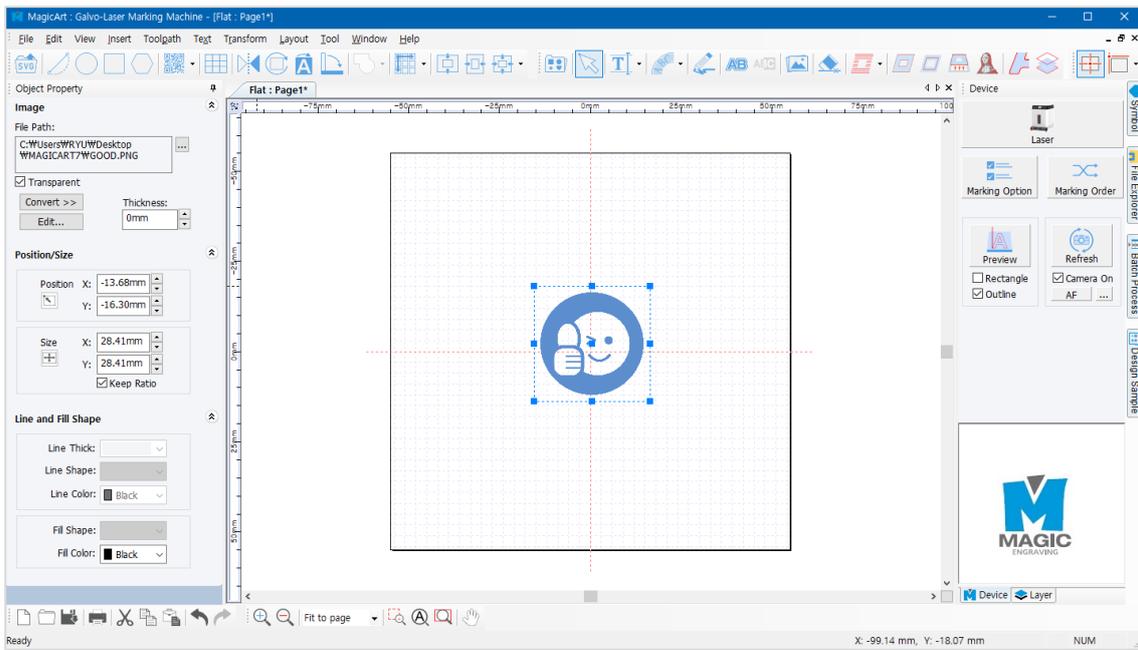
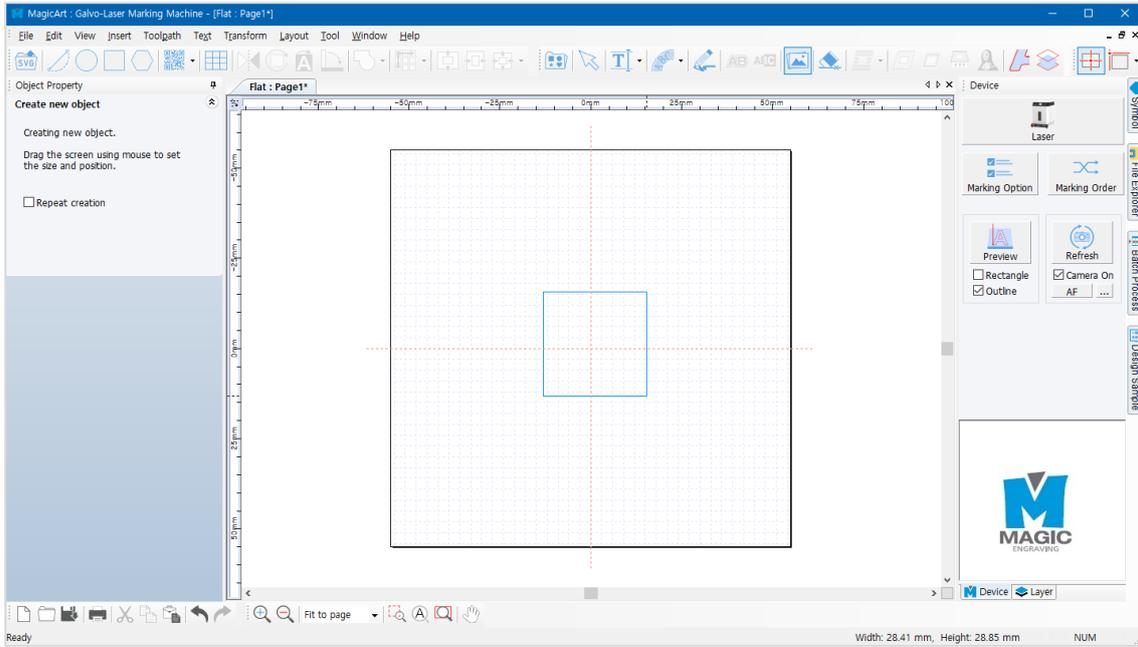
1. Select  [Image] on the toolbar or select [Menu] → [Insert] → [Image].



2. When “Open” window appears as the figure below, select the image to be loaded, and click “Open” button.



3. Drag the work area with the mouse to load the image by desired size.

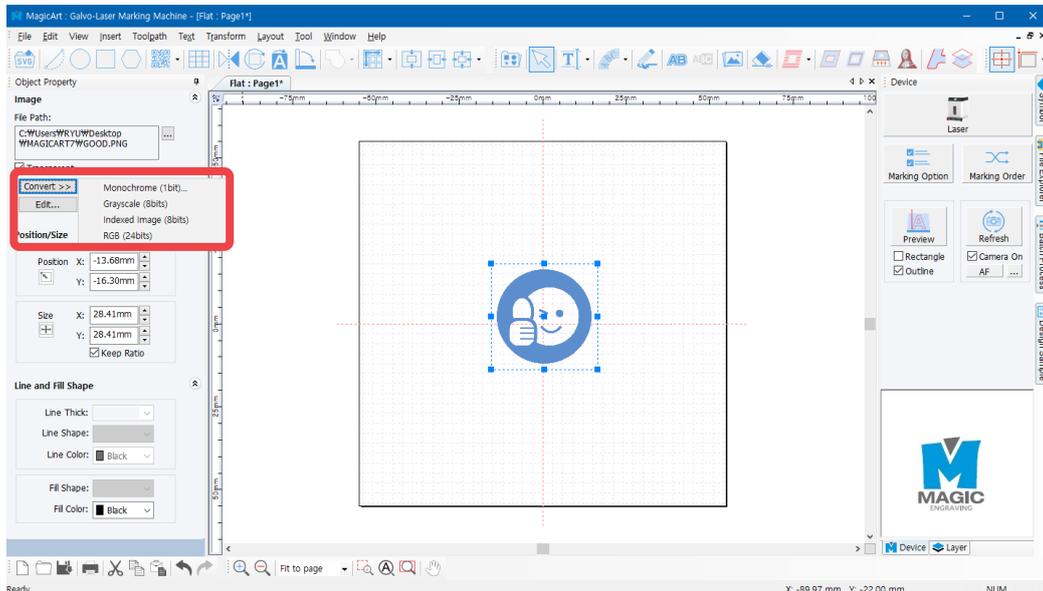


## 2. Converting and editing image

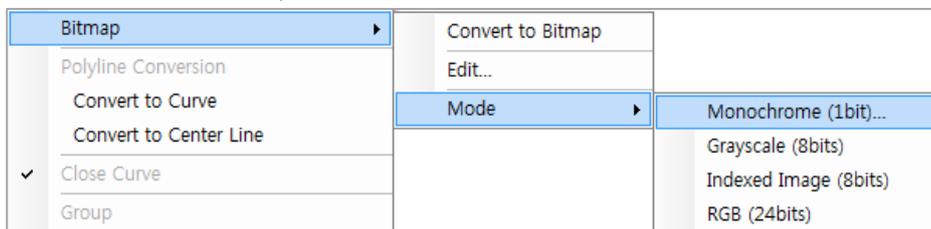
Only single color image can be engraved. Since multiple color images cannot be engraved by machine, it should be converted to a single color (1 bit) image.

### [Converting to single color image]

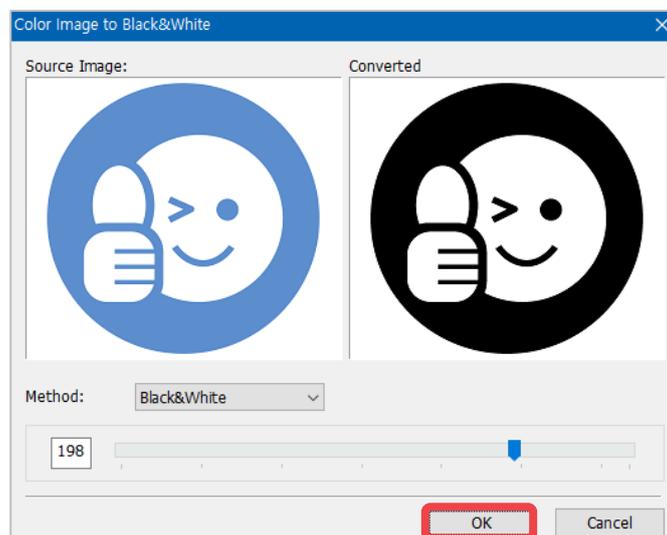
1. Select the image object you want to convert, and click “Convert” button in the image object window and select “Monochrome (1bit).”



Or select the Transform menu → Bitmap → Mode → Monochrome (1bit).



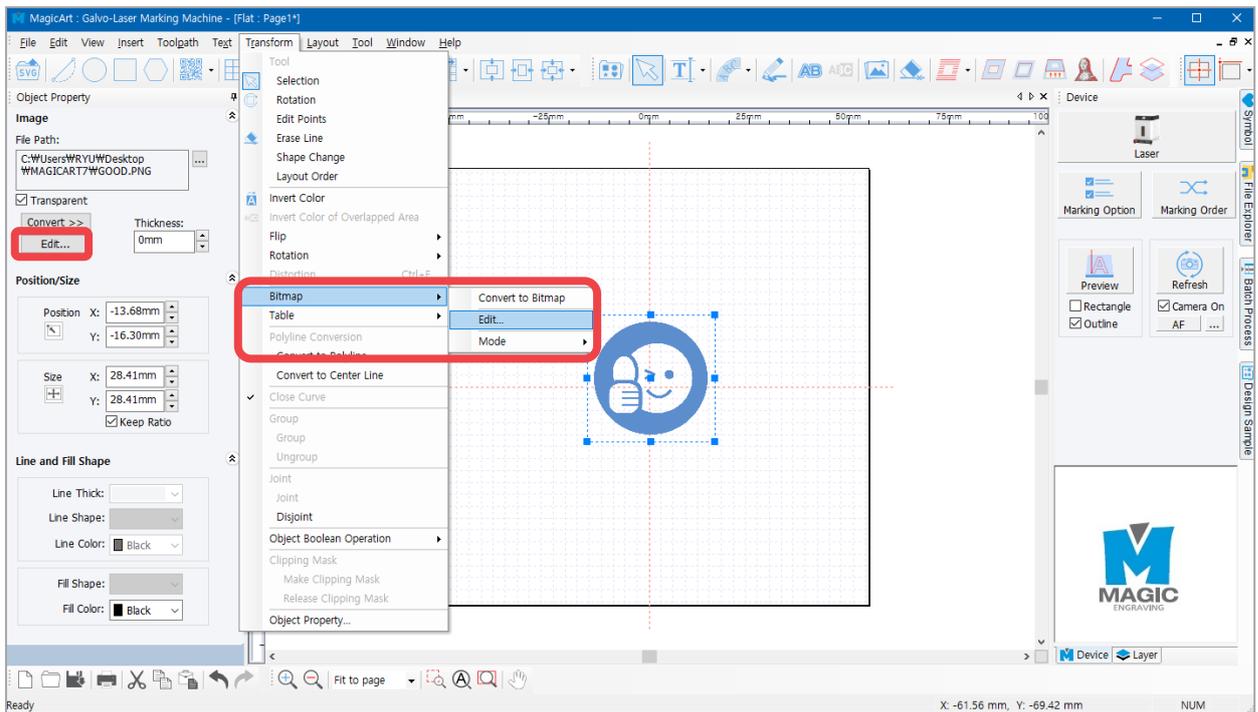
2. “Color Image to Black & White” window appears as shown below. Adjust the slider to change it to the most suitable single color, and click “OK” button.



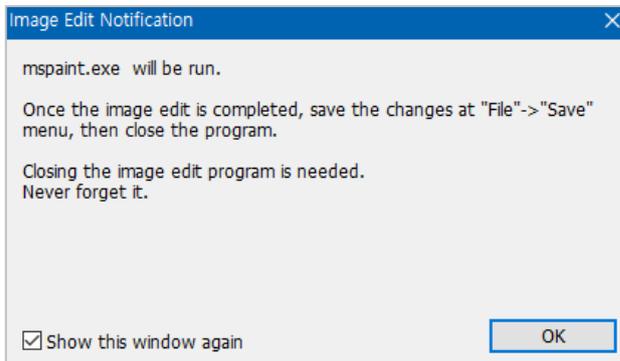
## [Editing image]

Loaded image can be edited by “Paint” program in Windows.

Select the image object to be edited, right-click it to select “Edit” or select [Menu] → [Transform] → [Bitmap] → [Edit].



Click [OK] to run Windows Paint program.



Then, Windows Paint program will show the image.

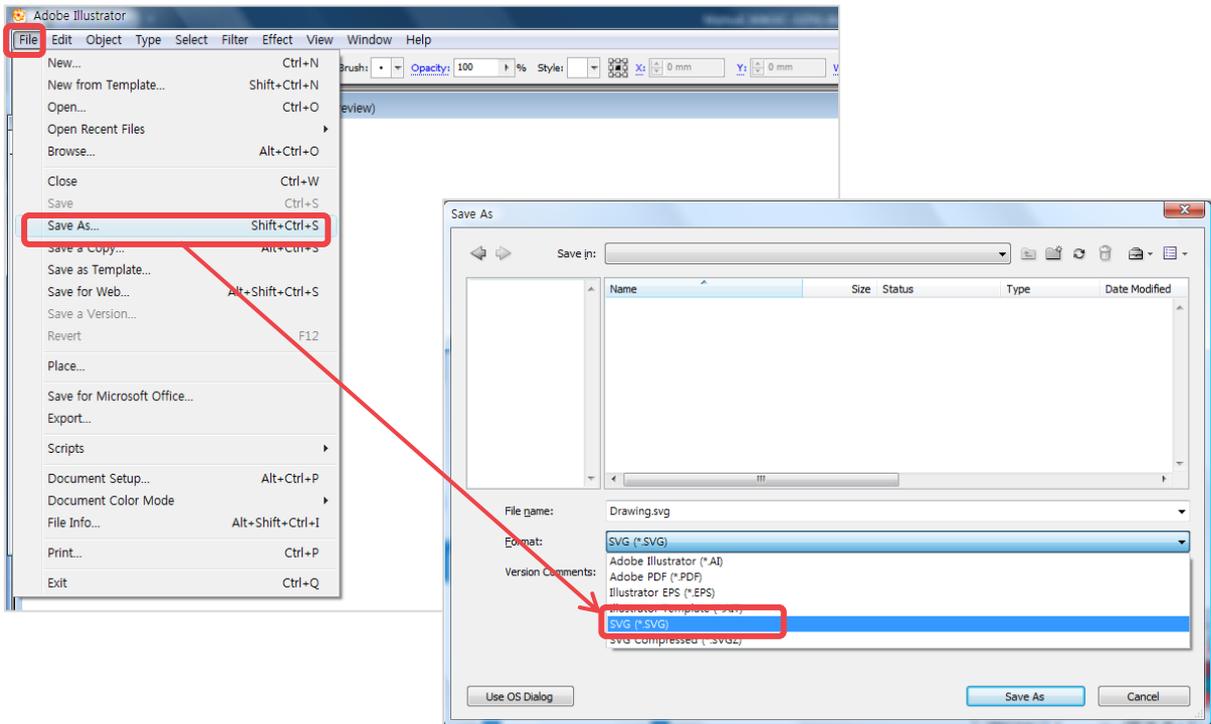
After editing the image, press “Save” from the File menu of Paint, and close the program to apply the edit.

# Import a file in SVG format

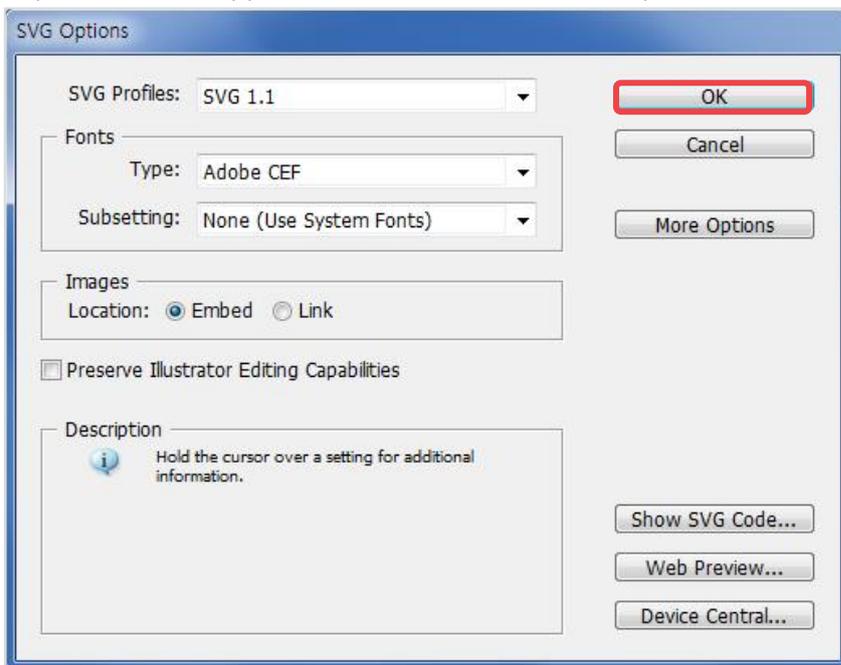
Loading vector graphic files such as SVG file is also supported.

The SVG file is created by various graphic programs such as Illustrator, CoreDraw etc.

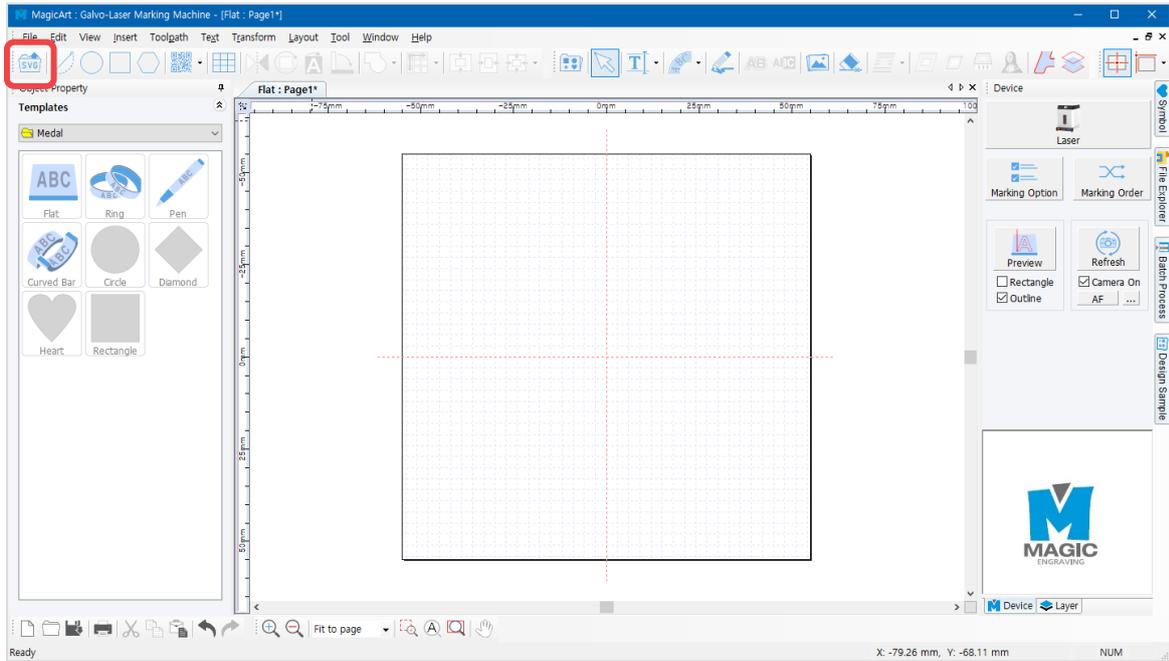
1. Select File menu → Save As from Illustrator program to save a file in SVG type.



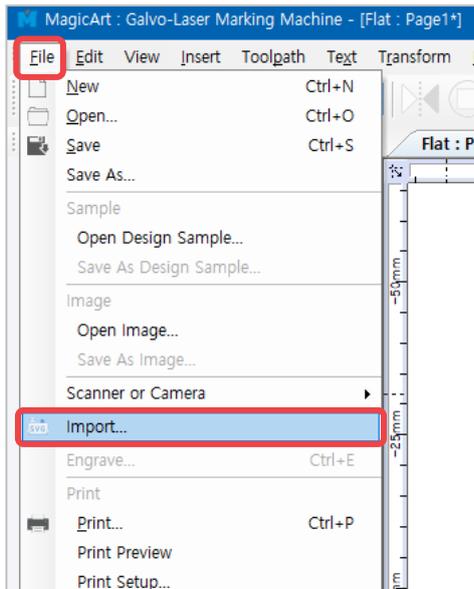
2. SVG option window appears. Press “OK” button to complete the save.



3. Click  button to load the SVG file.

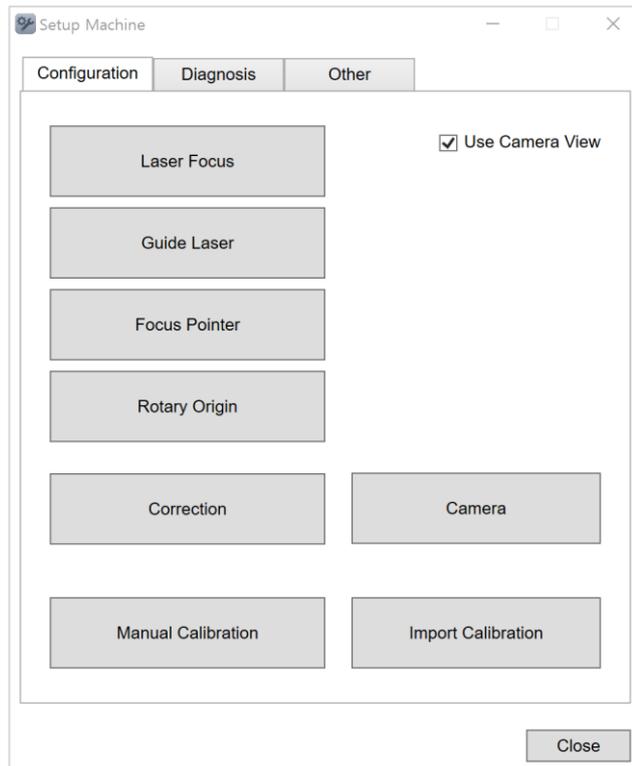


4. Or select [Menu] → [File] → [Import...] to import a file.



# Machine setting

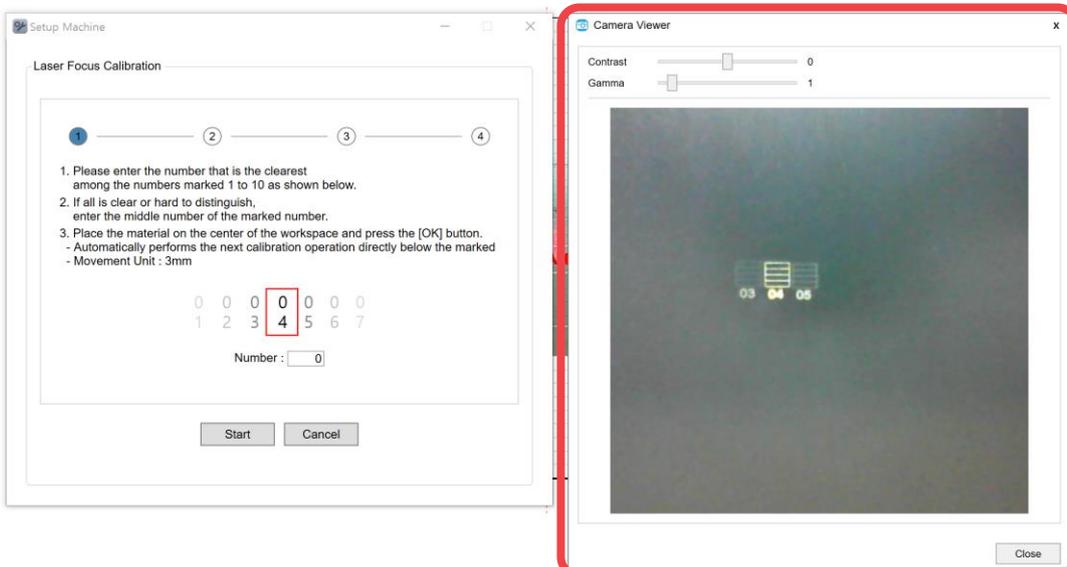
- ※ The machine is shipped out with default setting. Please contact the customer service center before changing the setting.
- ※ Set the machine in the following order: **Laser focus calibration - Guide laser calibration - Focus pointer - Correction - Rotary origin calibration (When using it) - Camera.**
- ※ A machine setting program is separately provided. Start the program first to set the marking machine.
- ※ Calibrate a proper material according to the marking machine. The warranty shall not cover any damage resulting from the use of an improper material.
- ※ **Choose a black anodized aluminum material.**



## 1. Use camera view

When the checkbox is selected, the camera view window appears.

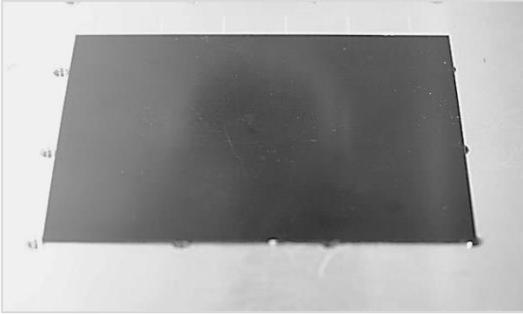
When calibrating each setting, it helps you to accurately check and calibrate using the camera view.



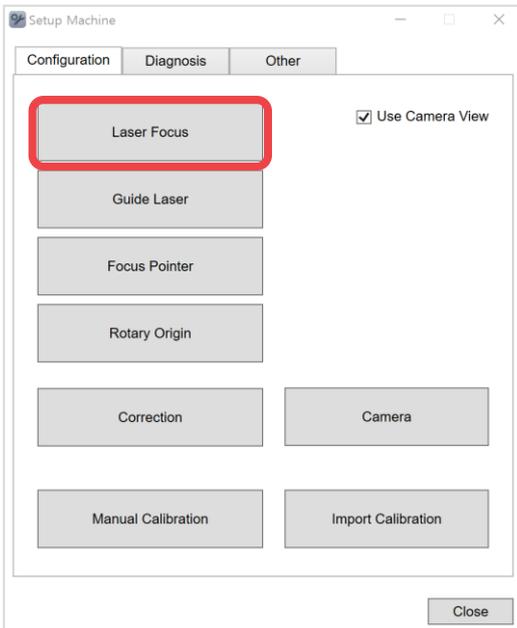
## 2. Laser focus calibration

Calibrate the laser focus according to the height of a material and improve marking accuracy. It is divided into 4 stages. In each stage, the head moves according to the distance specified in the previous stage, and the moving interval shortens.

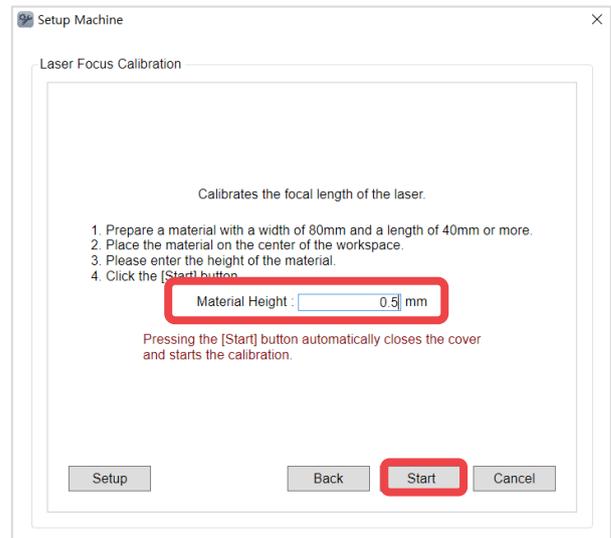
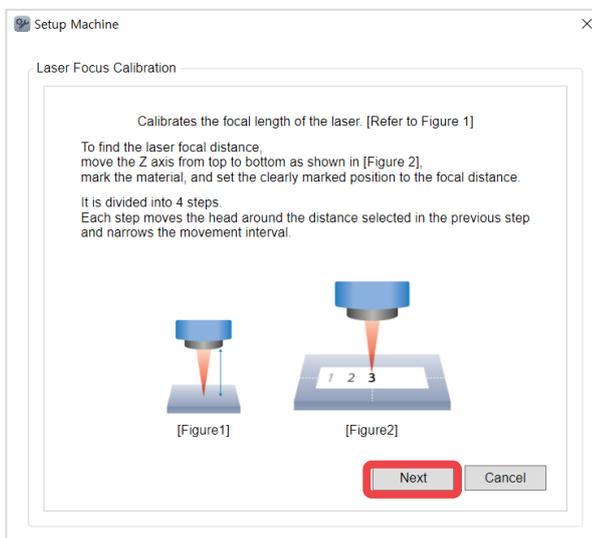
1. Place a material on the work area.



2. Click [Laser Focus] on the Machine Setting.



4. After checking the message, click [Next]. Then, the laser focus calibration procedure appears. Enter the height of a material.

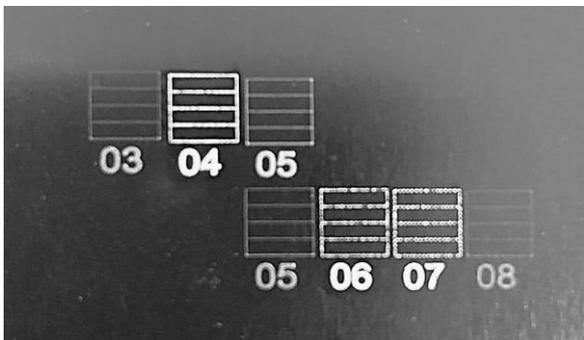


5. Check the warning message and click [Start].

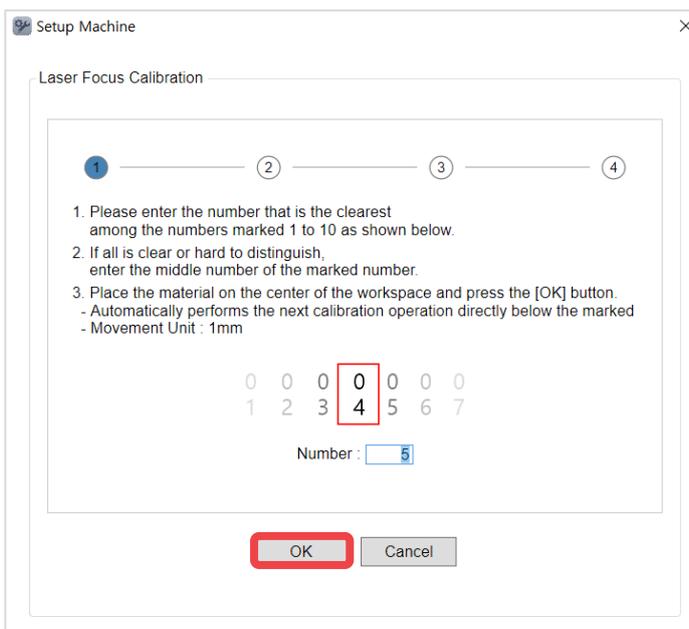


6. The numbers and circles are engraved on the fixed material.

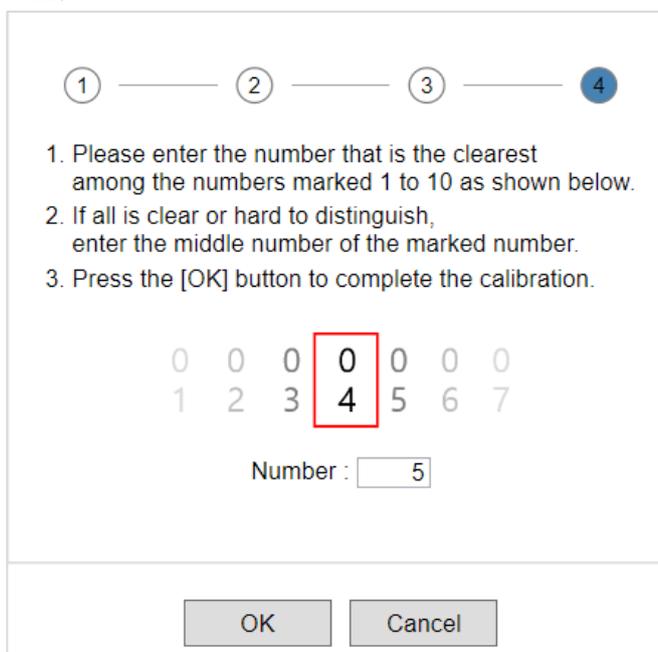
The numbers range from '01' to '10'. However, the numbers actually engraved can differ depending on the laser focus.



7. Enter the middle number among the engraved numbers on the Engrave Machine Setting page and click [OK]. **EX) In this example, '5' is positioned in the middle. Therefore, '5' is entered.**



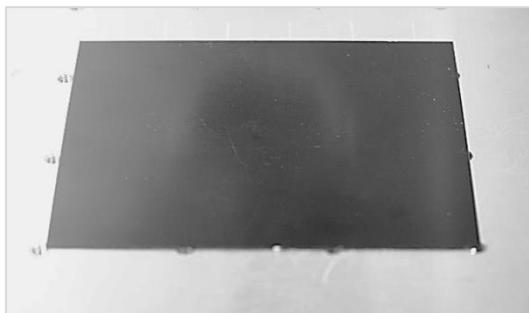
8. Repeat the processes (Clauses 5-6) 4 times and finish the calibration with the options optimized for laser focus.



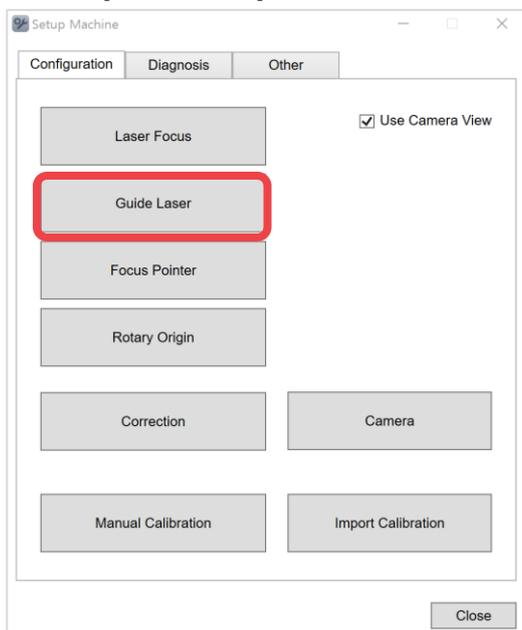
### 3. Guide laser calibration

Calibrates the size and position of a guide laser.

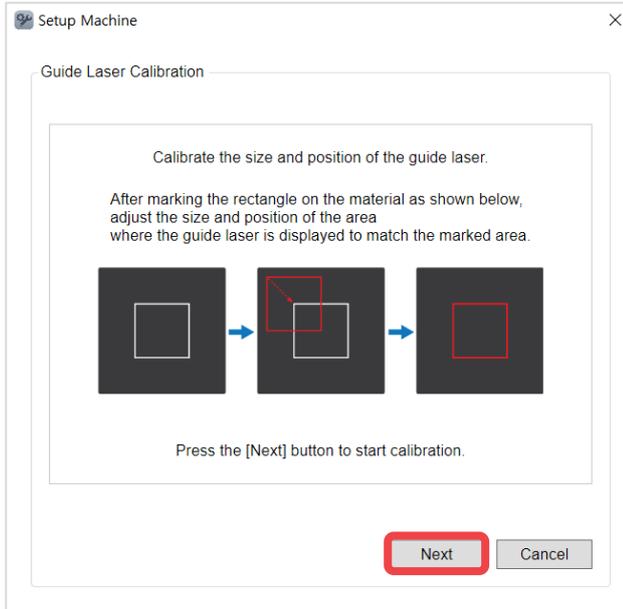
1. Place a material on the work area.



2. Click [Guide Laser] on the Machine Setting.

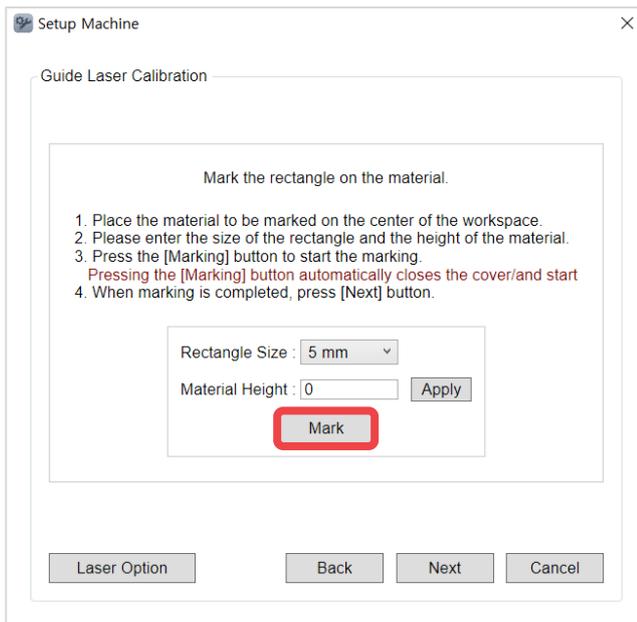


3. Check the message and click [Next].



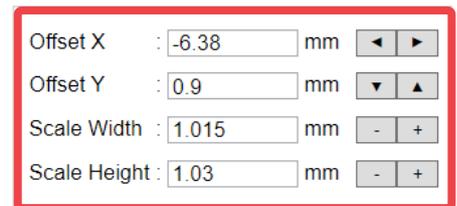
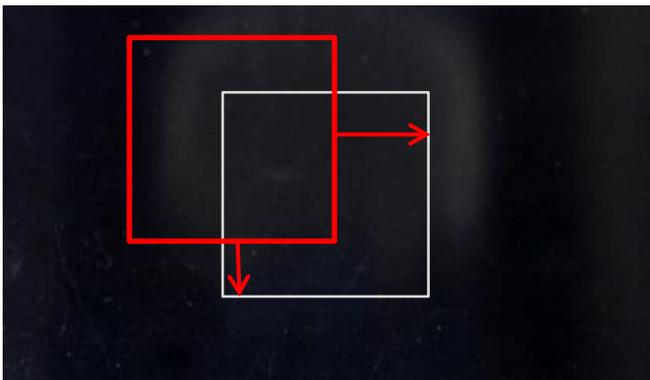
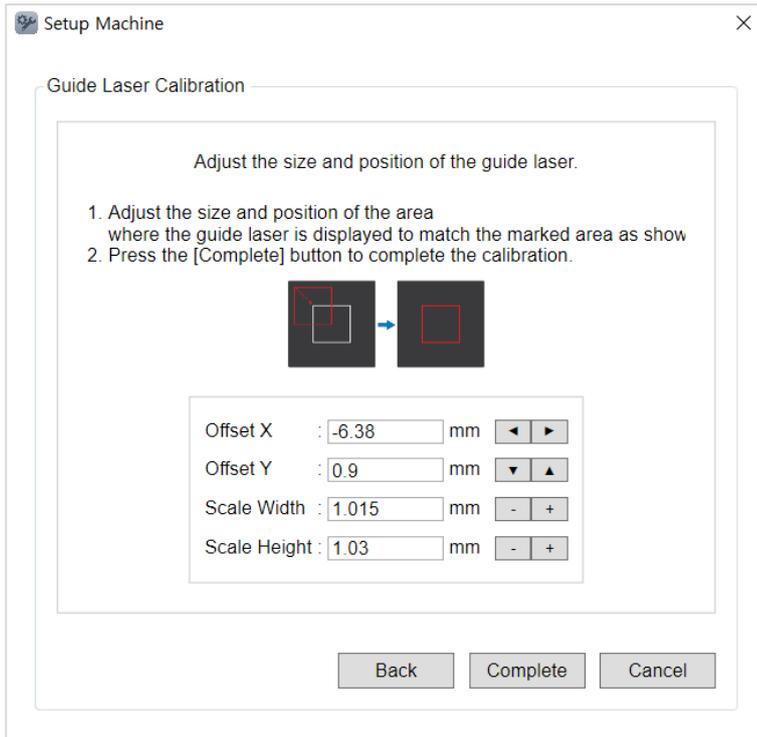
4. Set the size and height of a material (a rectangle to be marked) and click [Apply].

To mark the rectangle, click [Mark]. Then, the cover is automatically closed, and the rectangle is engraved on the material.

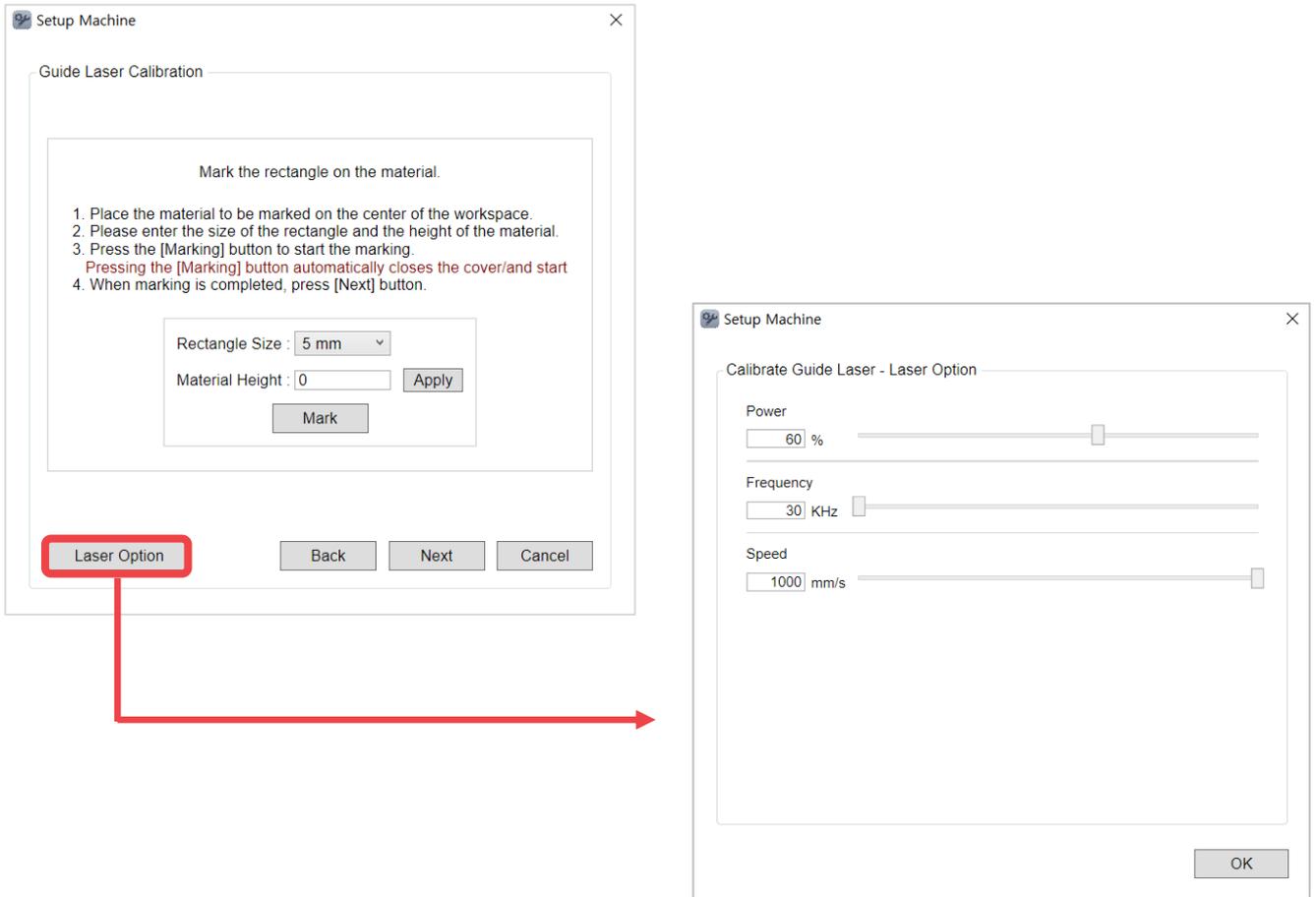


\*A 20mm rectangle is engraved on the 0.5mm-high material.\*

5. Once a guide laser appears after the end of marking, adjust the offset values, width and height according to the rectangle in '2. Parameter Setting' and click [Apply].

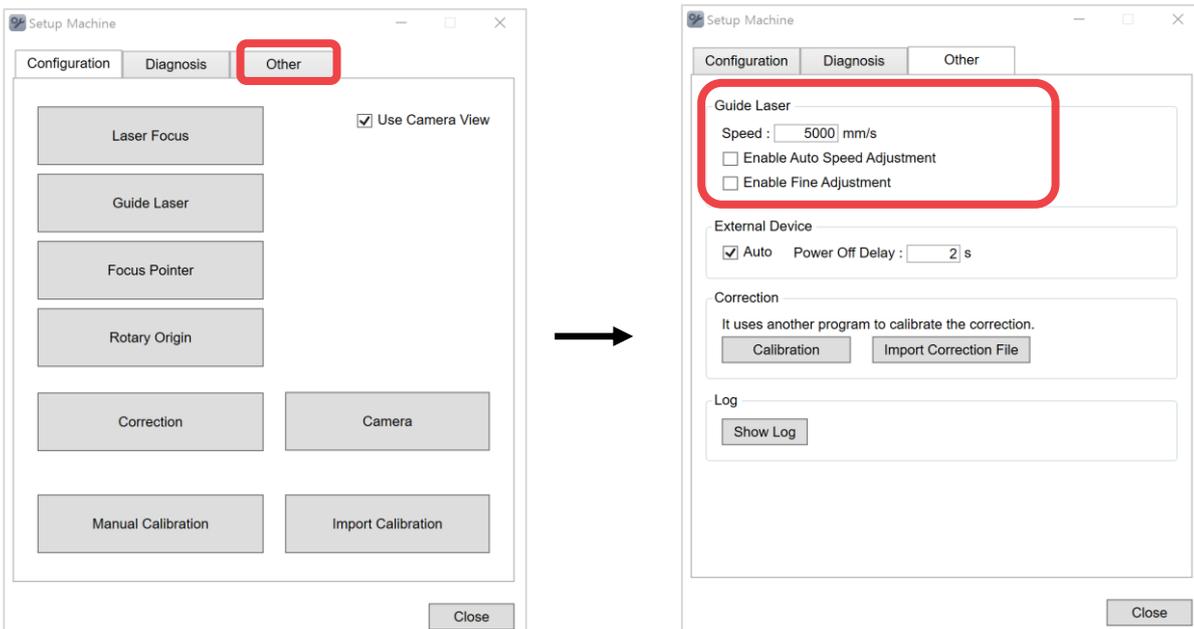


※ Select the laser option on the Guide Laser page and adjust laser options.



## [Advanced guide laser]

1. Click [Other] in [Setup Machine].

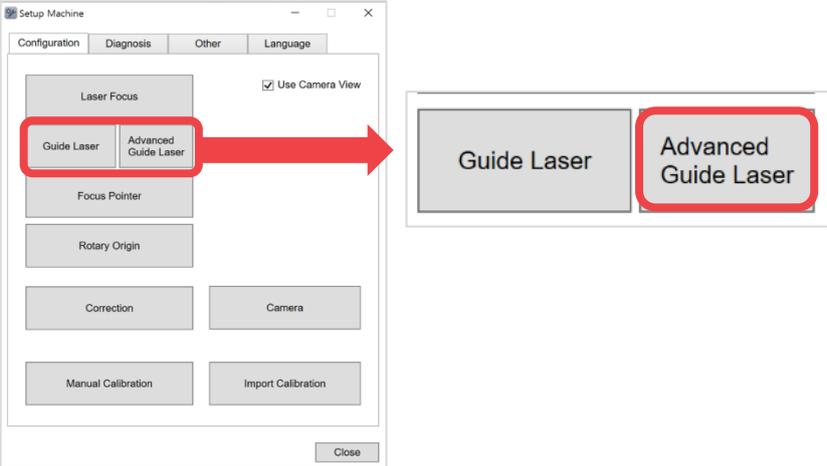


### Guide Laser

Speed :  mm/s

Enable Auto Speed Adjustment

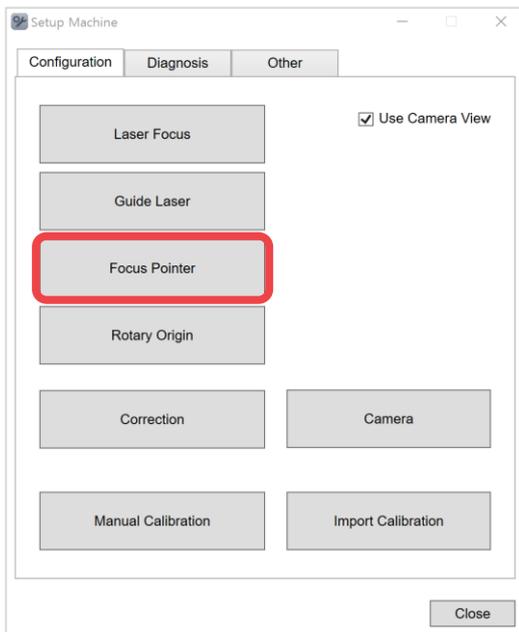
Enable Fine Adjustment

<p><b>Speed</b></p>	<p>Set the guide laser speed</p>
<p><b>Enable Auto Speed Adjustment</b></p>	<p>Automatically adjusts the guide laser speed according to the size of the object to be marked.</p>
<p><b>Enable Fine Adjustment</b></p>	<p>When checking the engraving area, it automatically moves to the guide laser focus position, enabling precise marking area position. A menu is added to the setup machine window when the function is activated.</p> <p><b><u>*Advanced guide laser calibration is required, and the method is the same as guide laser calibration.</u></b></p> 

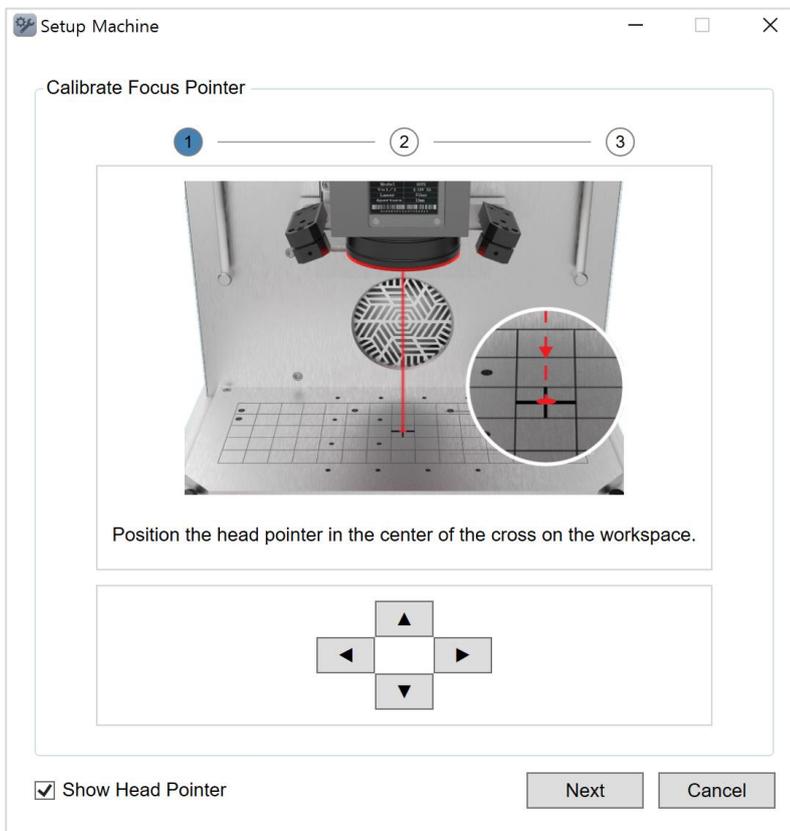
## 4. Focus pointer

Set the position of the head laser pointer and V laser pointers.

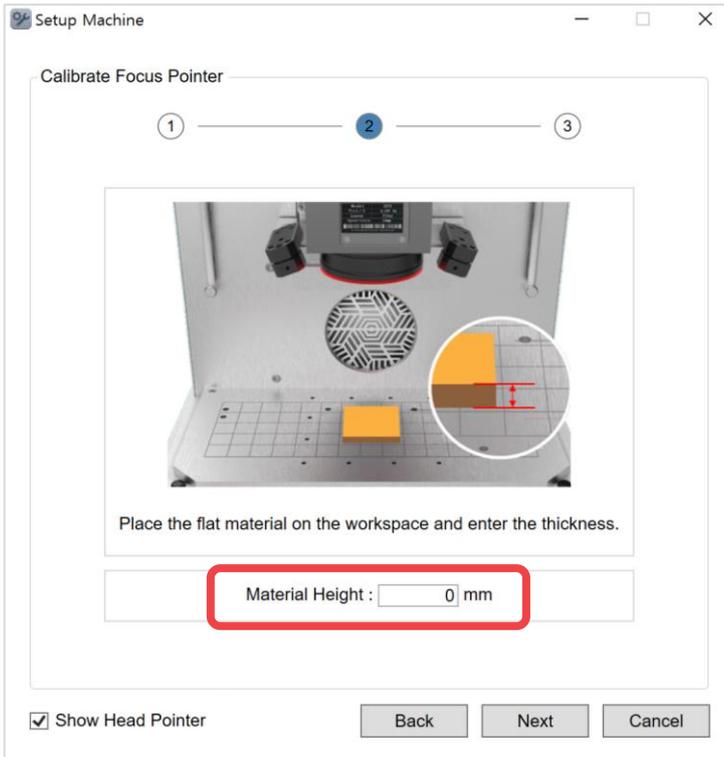
1. Select [Focus Pointer] in the Machine Settings.



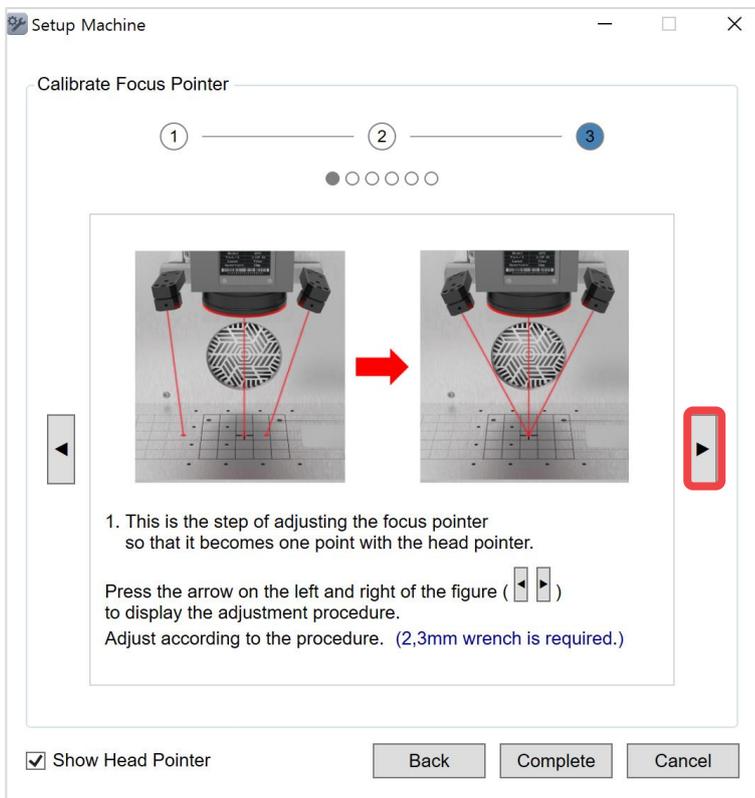
2. Adjust to position head pointer in the center of the cross on the workspace, using the arrow buttons. Then, click [Next].



3. Place the flat material on the workspace and enter the thickness. Then click [Next].

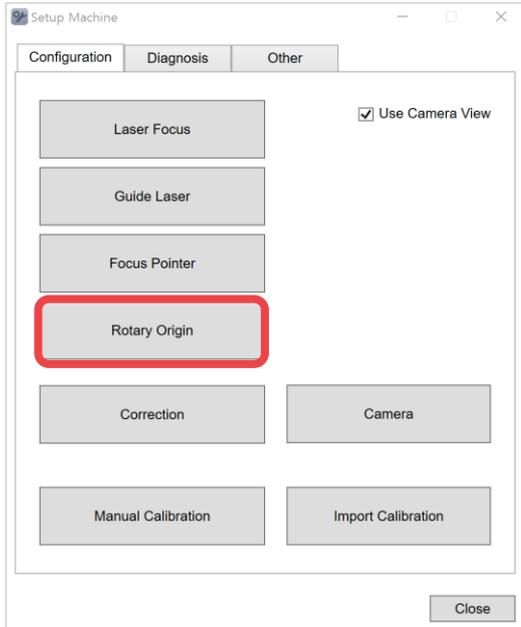


4. Press the ► button on the right and proceed sequentially. (A 2,3mm wrench is required.)  
**All steps are 4 steps**, and both pointers must proceed in the same way.

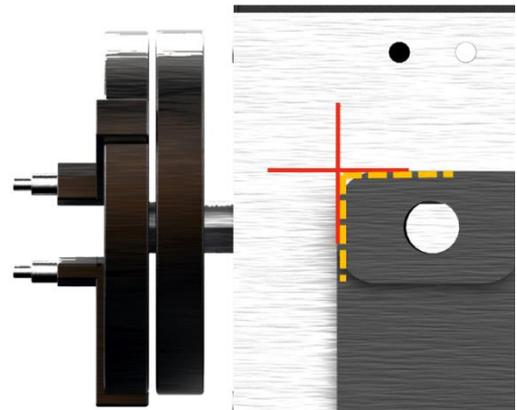


## 5. Rotary origin

1. Fix the rotary clamp to the work area.
2. Click [Rotary Origin] on the machine setting.



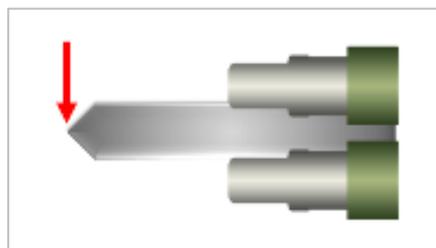
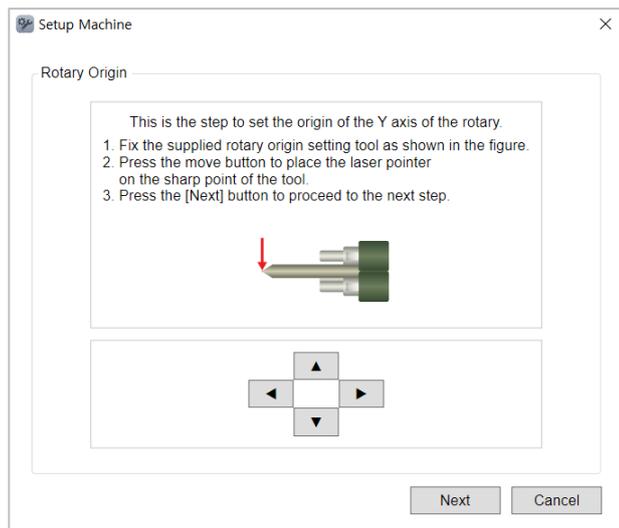
3. First, when using the auto tilting rotary clamp, set the tilting origin to the 0 degree.



Adjust the clamp angle in order to the cross mark on the clamp body lines up with the clamp support line.

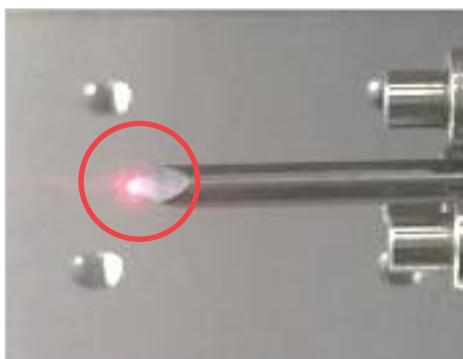
Each press of the   button adjusts the angle up/down by 0.1 degree. After adjusting the angle to the position of 0 degree, click the [Next] button.

4. Fix the tool with a sharp edge to the rotary as described below:



5. To position the laser pointer at the tip, adjust the machine with the direction keys. Then, click [Next]. Or,

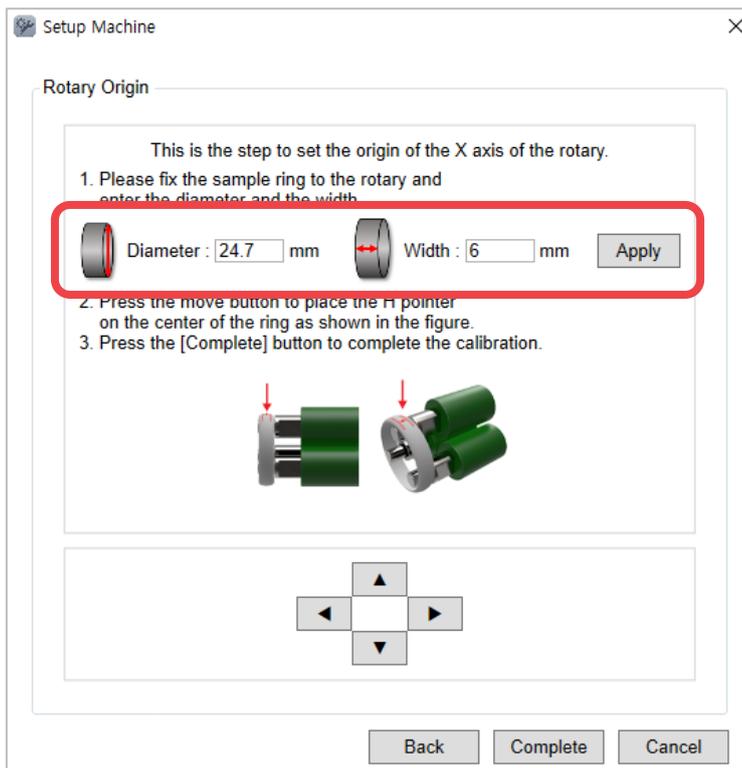
adjust the position, using the the   buttons and click  long (1 second or longer).



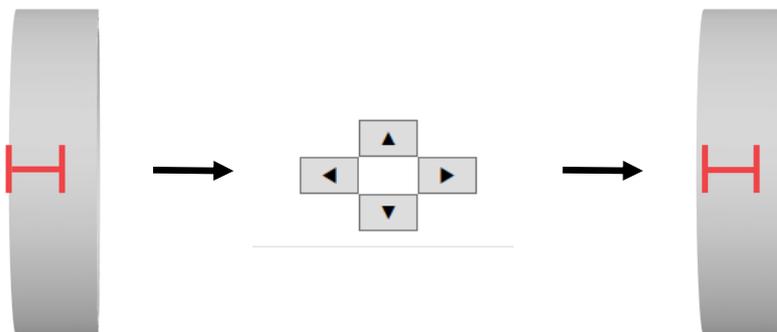
6. Remove the fixed tool, then Insert the ring into the chuck finger as shown below, and tighten the clamp to set it.



7. Move to the stage II. And insert the ring size on the program.

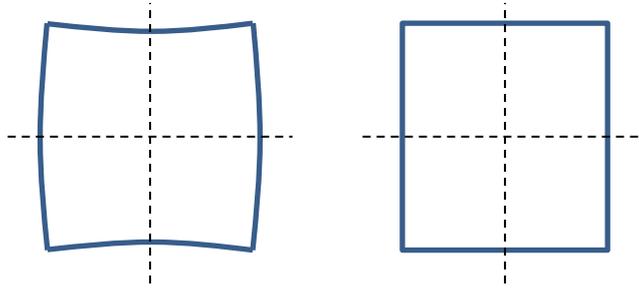


8. Move the [H pointer] to the center of the ring by using arrow buttons. Then, click [Complete].



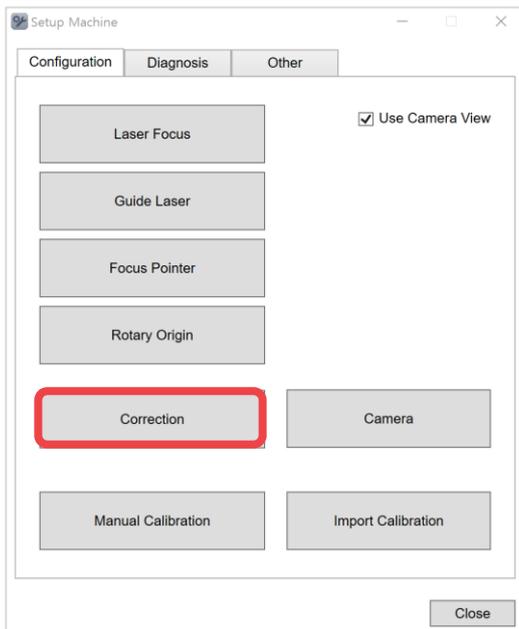
## 6. Correction

When the laser passes the scan head and comes all the way through the lens, the farther it moves away from the central point the greater distortion in shapes and sizes is introduced as shown in the figure below. The process of calibrating such a distortion, as shown in the figure on right, is known as correction.

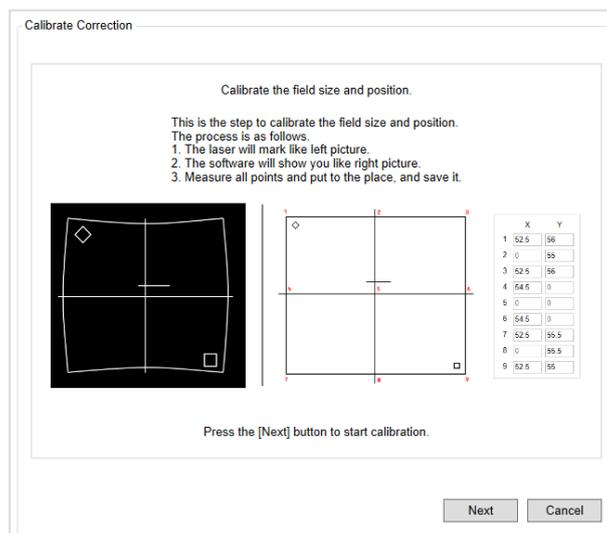


1. As the laser marks the area that measures the same or larger than the maximum size (110x110 mm), prepare the material that measures at least 120x120 mm in size.

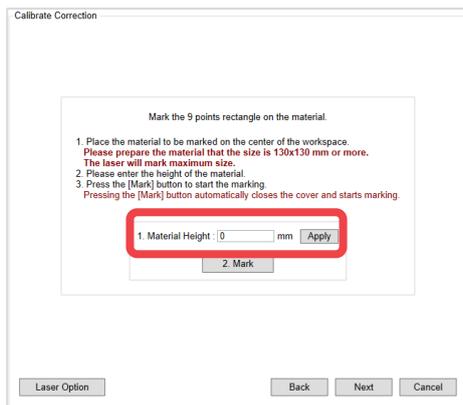
2. Click [Correction] on the Machine Setting.



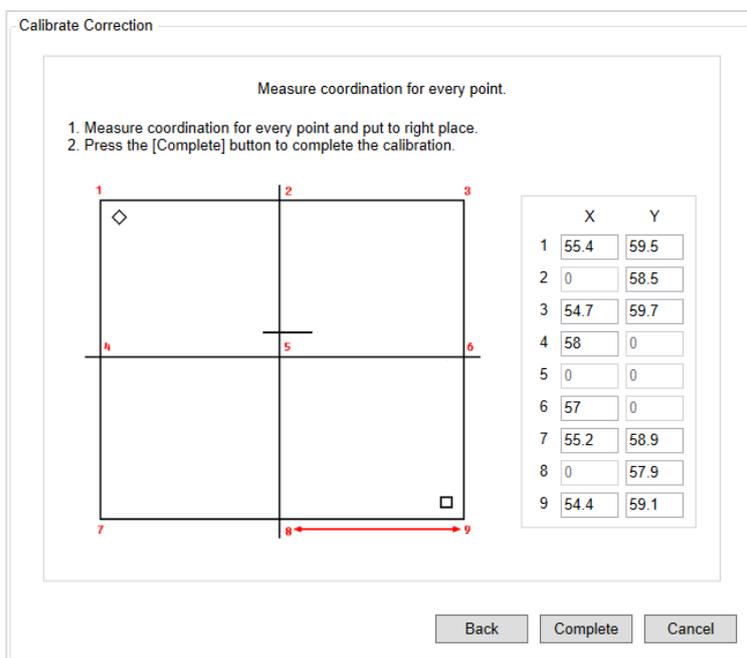
3. The following screen provides the brief explanation on the calibration process. Click the [Next] button to start calibration.



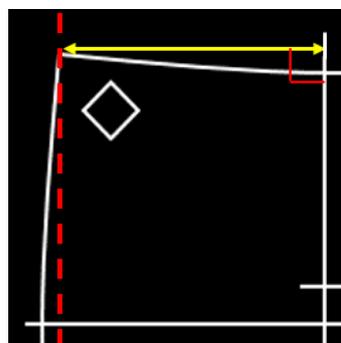
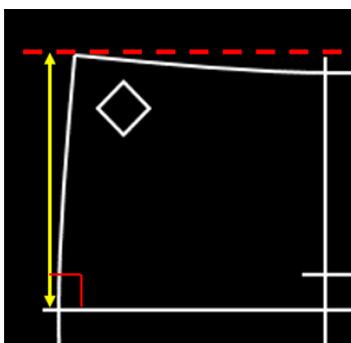
4. Enter the height of the material and click the [Apply] button. Then, click the [Mark] button to start marking



5. Enter the sizes and click “Complete” button to finish the calibration process.

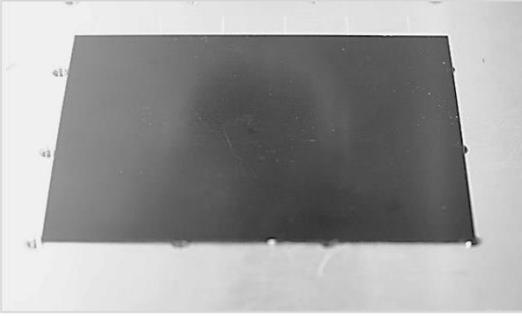


**Make sure that the size is measured from each corner as shown in the figures below.**

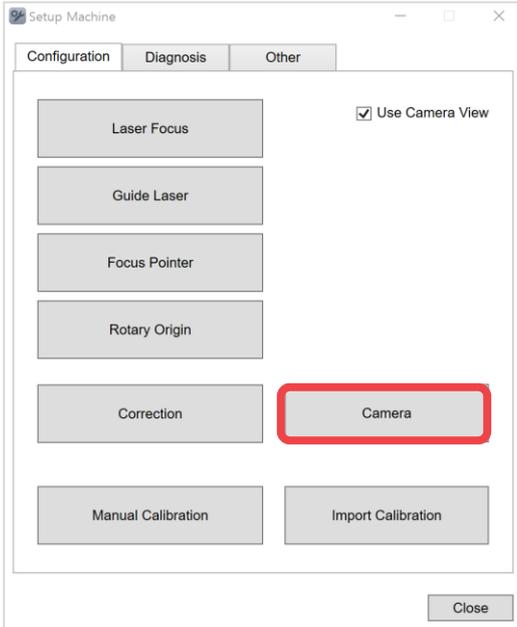


## 7. Camera

1. Place a material on the work area. (**\*Please using the black paper for camera setting.**)

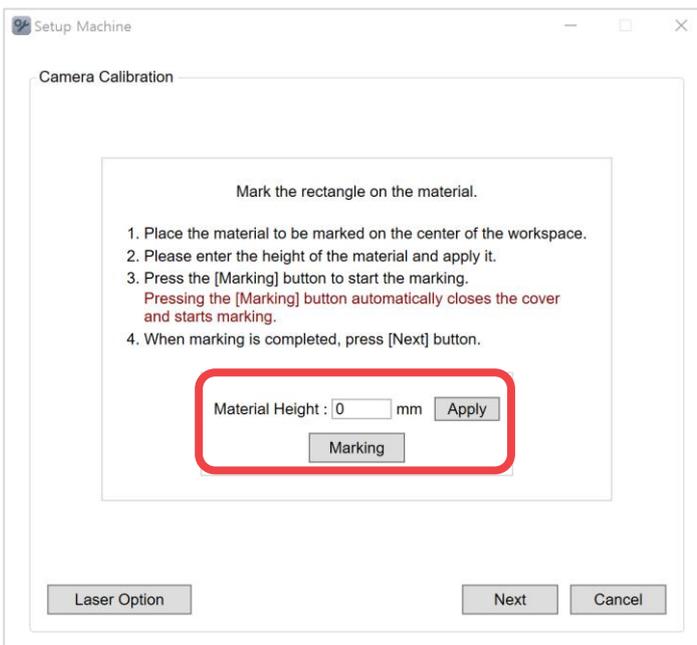


2. Click [Camera] on the Machine Setting.

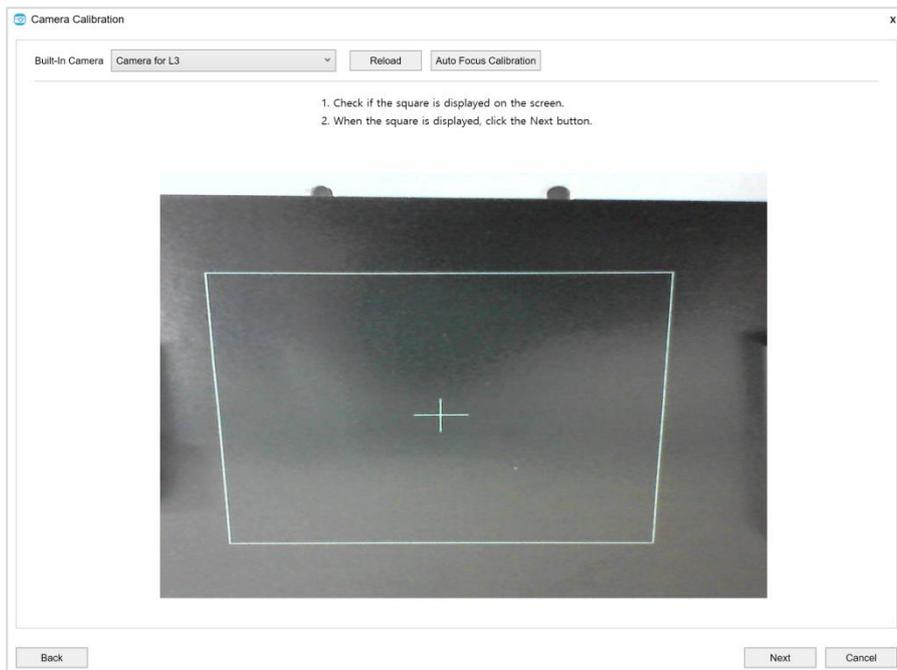


3. Set the height of a material (a rectangle to be marked) and click [Apply].

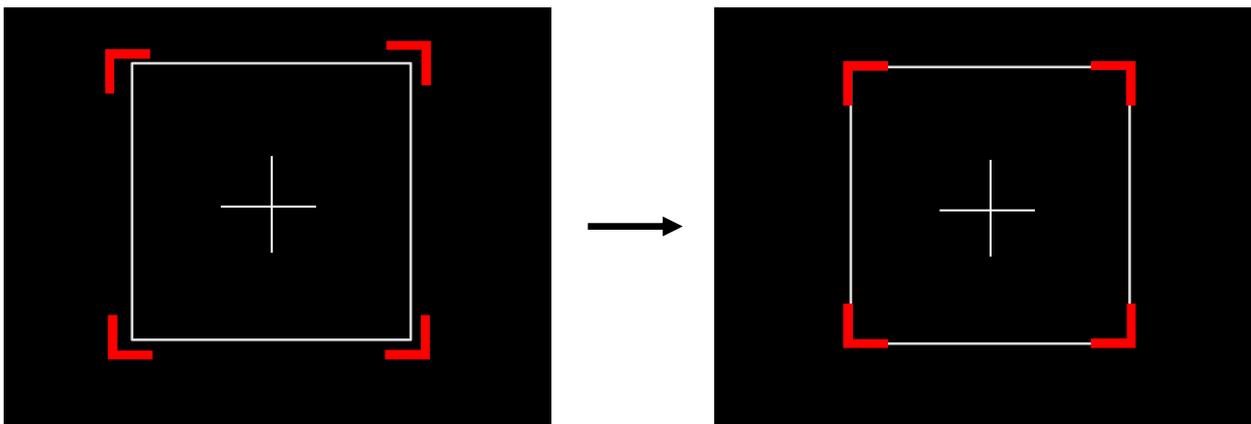
To mark the rectangle, click [Mark]. Then, the cover is automatically closed, and the 80\*80mm rectangle is engraved on the material.



4. Check the camera window, click [Next].

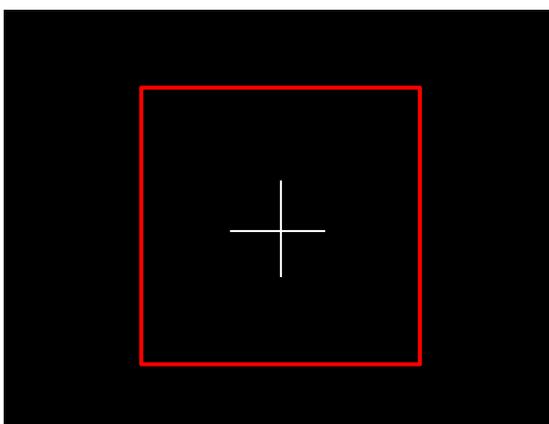


5. Align the four red borders with each corner of the marked rectangle. Move it with the mouse to determine the approximate position, and then press the arrow keys on the keyboard to make fine adjustment to set the position. Then click [Next].



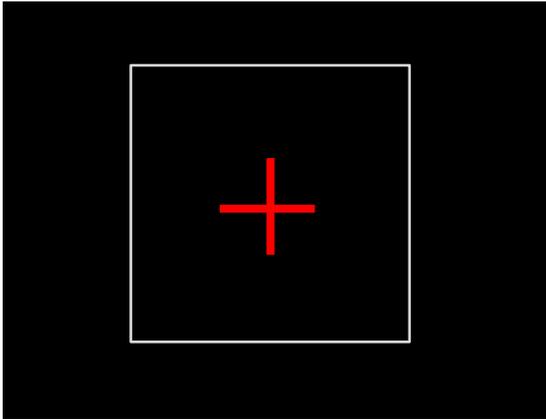
[Camera screen]

6. Check that the red borders of the camera screen match the marked border. If they do not match, go back to step 5 and readjust the position.



[Camera screen]

7. Check that the red [+] on the camera screen matches the marked [+]. If they do not match, use the keyboard arrow keys to fine adjustment the position. Then click [Next].

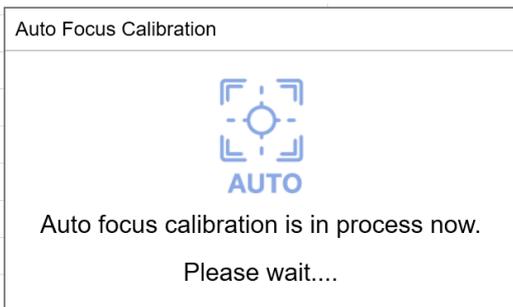


[Camera screen]

8. The camera automatically recognizes the focus pointer and performs calibration. Wait for the calibration to complete automatically.

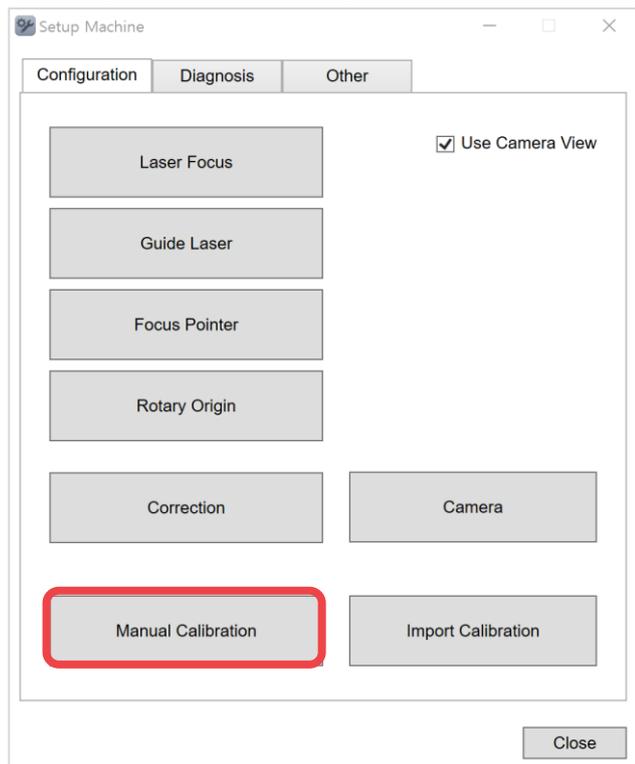
**\* Prohibit program and machine operation during automatic calibration.**

When the completion message appears, confirm and complete the calibration.

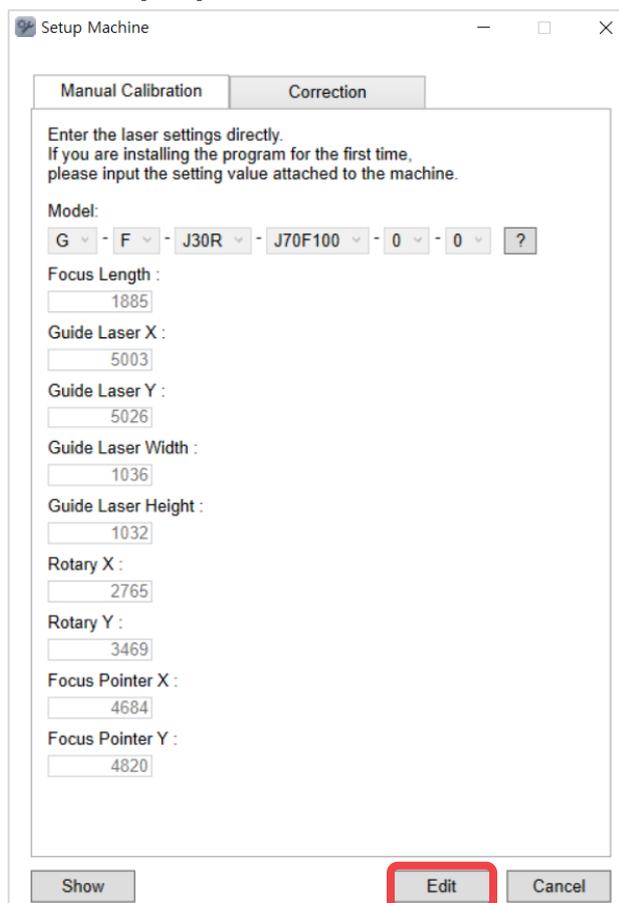


## 8. Manual calibration

1. Click [Manual calibration] on the machine setting.



2. Click the [Edit] button.



3. Enter the setting value, then click [Apply] button.

Manual Calibration    Correction

Enter the laser settings directly.  
If you are installing the program for the first time,  
please input the setting value attached to the machine.

Model:  
G ▾ - F ▾ - J30R ▾ - J70F100 ▾ - 0 ▾ - 0 ▾ - ?

Focus Length :  
1885

Guide Laser X :  
5003

Guide Laser Y :  
5026

Guide Laser Width :  
1036

Guide Laser Height :  
1032

Rotary X :  
2765

Rotary Y :  
3469

Focus Pointer X :  
4684

Focus Pointer Y :  
4820

Show    Apply    Cancel

Manual Calibration    Correction

Enter the laser settings directly.  
If you are installing the program for the first time,  
please input the setting value attached to the machine.

Model:  
G ▾ - F ▾ - J30R ▾ - J112F163 ▾ - 1 ▾ - 2 ▾ - ?

Focus Length :  
1885

Guide Laser X :  
5000

Guide Laser Y :  
5002

Guide Laser Width :  
1015

Guide Laser Height :  
1023

Rotary X :  
2985

Rotary Y :  
3720

Focus Pointer X :  
4610

Focus Pointer Y :  
4920

Show    Apply    Cancel

4. Select [Correction], the input the number.

Manual Calibration    Correction

Enter the laser settings directly.  
If you are installing the program for the first time,  
please input the setting value attached to the machine.

If you make a mistake writing, it may cause malfunction to the machine.  
Please be careful.

1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	29000	

Show    Edit    Cancel

Manual Calibration    Correction

Enter the laser settings directly.  
If you are installing the program for the first time,  
please input the setting value attached to the machine.

If you make a mistake writing, it may cause malfunction to the machine.  
Please be careful.

1	554	595
2	547	597
3	552	589
4	544	591
5	585	579
6	580	570
7	31191	

Show    Apply    Cancel

7. Click the [Yes] button, then the program will start.

×

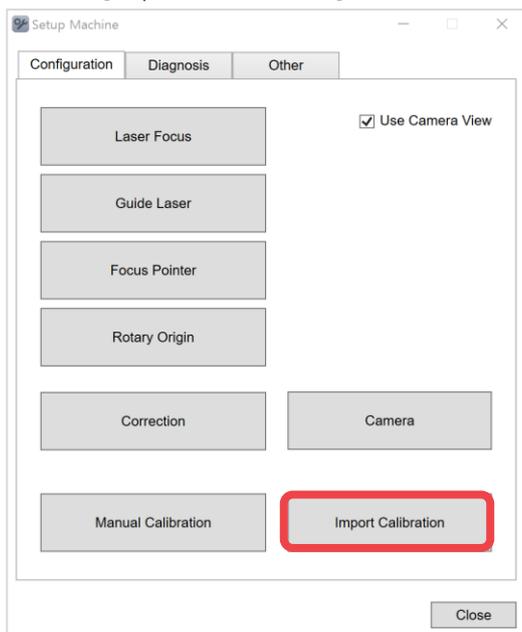
?

The program must be restarted to fully apply the settings.  
Do you want to restart?  
If not restarted, some settings may not be applied.

Yes    Cancel

## 9. Import calibration

1. Click [Import Calibration] on the Machine Setting.



2. When you enter the serial number, the correction value stored in the server is automatically called and set.

**\* This function requires a network connection.**

