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# User Manual

## - Fiber Laser Marking Machine II

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## Thanks

It is our honor to be one business partner of yours, our aim is to offer high-quality, easy-operation laser marking solution to each customer.

Wisely Laser Machines brings you new concepts of industrial fiber laser marking system - proudly designed and built right here in China.

Before using the machine, we kindly advise you to read the user manual carefully.



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## Chapter 1 Brief Introduction and Applications

### 1.1 Brief introduction of machine

Wisely fiber laser marking adopts world's most advanced technology, it is the third-generation laser marking system. It adopts fiber laser source to achieve marking function by ultra-high-speed scanning system. The fiber laser marking conversion is efficient, longer lifespan and energy-saving.

It can carve metal materials and some non-metallic materials, such as gold, silver, copper, brass, aluminum, stainless steel, silicon steel, carbon steel, chrome steel, cast iron, titanium, molybdenum, multi-coated metals, painted metals, ABS, carbon fiber, coated non-metallic material, PVC, PET, painted non-metallic materials and so on.

### 1.2 Typical application range

Application in promotional gifts, Apple Products, watches & jewelry, auto parts, mechanical engineering, medical technology, security & ID, Lighting & house electronics, kitchen ware, bathroom parts, glass frame, electronics&semiconductors, machine tools and mold making, precision bearings, food packaging and so on.

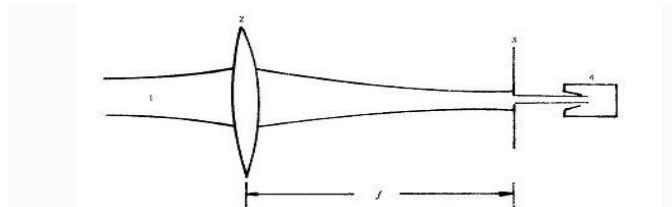
### 1.3 Fiber Laser Source Introduction

Raycus 20W Q-switched pulsed fiber lasers feature high peak power, high pulse energy and optional output beam size. They are widely used in marking, precision drilling and engraving on non-metal and high reflection metals, such as gold, silver, aluminum and stainless steel etc.. Compared with traditional lasers, Raycus' Q-switched fiber lasers have lower cost and more stable performance in these applications. The key components of the lasers are developed and manufactured in house to ensure the lasers' reliability and uniformity.

#### Specification:

|   |                |                                    |               |
|---|----------------|------------------------------------|---------------|
| <b>Mode</b>                               | YDFLP-20-M1+-S | <b>Pulse Width</b>                 | <130ns@20kHz  |
| <b>Nominal Output Power</b>               | 20W            | <b>Single Pulse Energy</b>         | 1.0mj@20kHz   |
| <b>Output Power Tenability</b>            | 10-100         | <b>Delivery Cable Length</b>       | 2m            |
| <b>Wavelength</b>                         | 1064nm         | <b>Power Supply</b>                | DC 24V        |
| <b>Repetition Frequency Range</b>         | 1-1000kHz      | <b>Max.Power Consumption</b>       | 200W          |
| <b>Output Power Stability</b>             | <3%            | <b>Dimensions</b>                  | 260×391×120mm |
| <b>Beam Quality (after beam expander)</b> | <1.5           | <b>Cooling</b>                     | Forced Air    |
| <b>Polarization State</b>                 | Random         | <b>Operating Temperature Range</b> | 0-40℃         |
| <b>NOHD</b>                               | 4500cm         | <b>Divergence Angle</b>            | 0.5mrad       |

**More information: The below image shows that the divergence angle of laser is around 0.5mrad.**

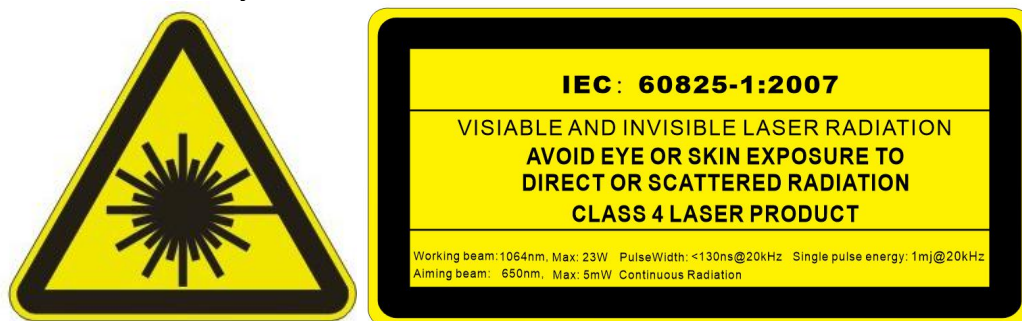


## Chapter 2 Safety Instruction

### 2.1 Safety Classification (laser /electricity)

#### 2.1.1 Only 4-level safety engineers are allowed to operate and maintain laser machine

Four-level laser will produce dangerous and invisible radiation while the laser machine is working, the radiation will be harmful to worker's eyes and skin. Radiation of Sub-shot and reflection is also harmful to people.



When the red radiation produces refraction to eyes, it will focus on the retina, eyes will be hurt easily. In a word, you should always wear protective glasses during the machine operation or maintenance.

#### 2.1.2 Avoid Laser Light Pointer (Class 3B)

The aiming beam is 650nm, and its max power is 5mw, we strongly advise the operator to avoid eye or skin exposure to direct or scattered radiation. After you find the focus length for marking subject, then you can power off the laser light pointer by pressing the button named “Red Light Pointer” or “Red Dot Pointer” on the machine!



### 2.2 Safety precautions

#### 2.2.1 Don't work alone

When the operator does service or maintenance for machine, it is better to have an assistant who is familiar with risk and high-voltage laser radiation knowledge besides him. Once an accident occurs, this person can help you turn off the laser equipment.

#### 2.2.2 Allow air circulation appropriately

Some materials during the laser processing will produce harmful fume, so the operator might as well install exhaust system / fume purifier.

### 2.3 Warning:

#### 2.3.1 Wear Protective Glasses / Goggle

Protective glass plays a protective role (for direct radiation, radiation reflected and scattered radiation). However, even if the operator wears the goggle, he can not look directly at the spot very often, intense laser radiation still can damage

the protection tool.

Before wearing the glass, please:

1. Check whether it is damaged or not.
2. Be sure you are wearing the right glass, because the protective glass for CO2 laser can't protect the laser radiation emitted from fiber laser (CO2 laser and fiber laser has different wave length).

### 2.3.2 Fire

Although the four-level laser output power is not high, the operator should pay more attention to the fire when the laser is working in high power and low speed.

### 2.3.3 Interlock Machine Door

Each machine has the interlock, the machine door must be closed during operation in case of the laser leak. Once you open the door of machine, the machine will stop working, and there will not be any laser output.

If you want to continue to run the machine, you have to close the door of machine, and click "Mark" in the software once again!



### 2.3.4 Laser Aperture

Once you see the below label on the machine, you must avoid eye or skin exposure to direct or scattered radiation, this label tell us where the laser output directly.



### 2.3.5 Training

Any distributor/dealer/agent/end-user who works with Wisely Laser must send his technician to our factory for machine training before the machine sales and operation. The training is of great importance for the laser safety.

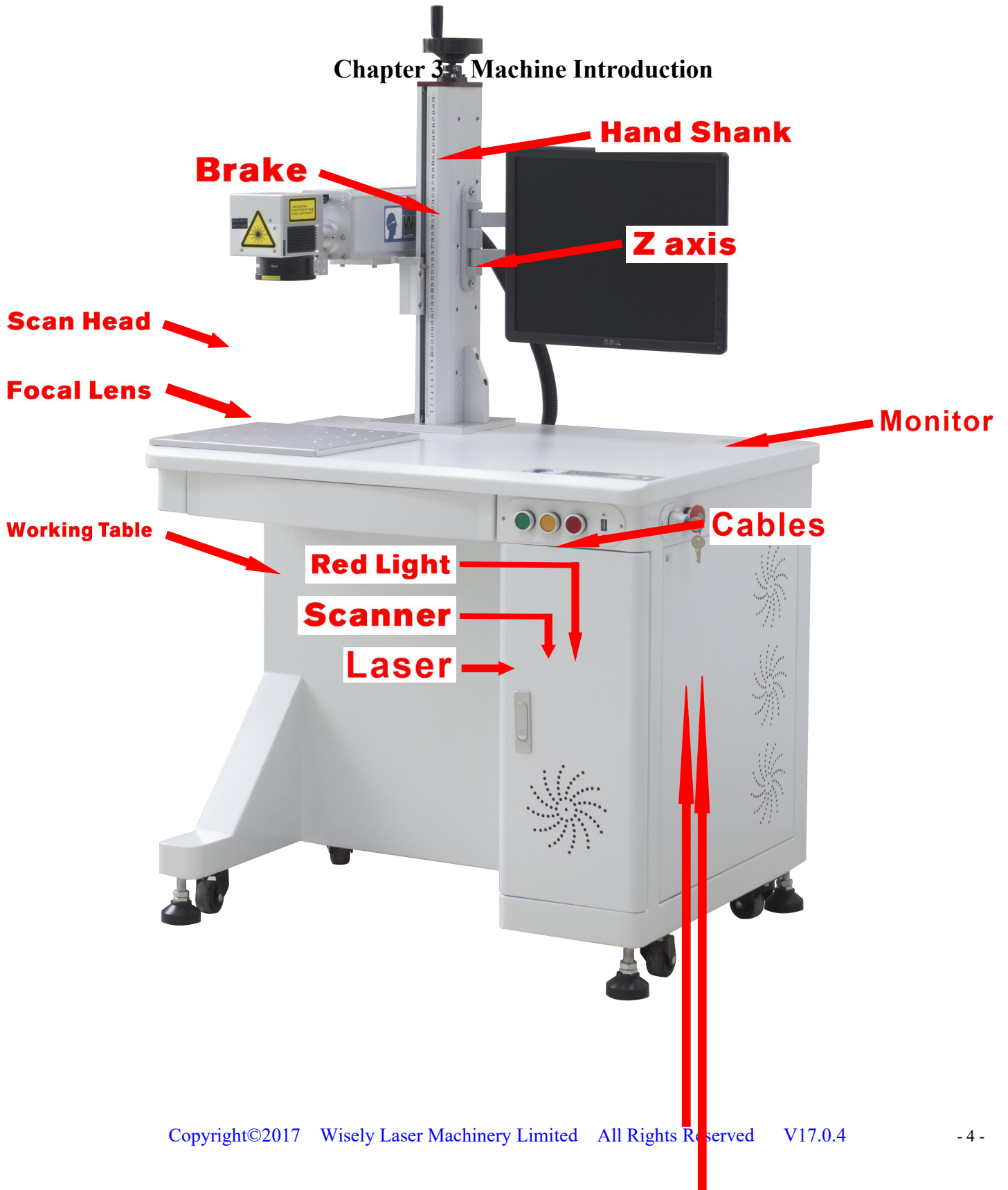
**Remarks:** Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.





**Do not make any change to laser marking system without written authorization from WISELY laser management approval.**

### Chapter 3 Machine Introduction



# Power Emergency

## Chapter 4 Machine Installation

### 4.1 Unpacking

- 1) Make sure the goods packaging is good in conditions..
- 2) Remove the packing material around the machine.
- 3) Check packing list carefully, report the shipper any unmatched project with PI/contract.

### 4.2 Space and environment

- 1) The system should be installed at the place without dust, strong electrical magnetic field, oil and smoke.
- 2) It is forbidden to expose the machine in the acid steam or other caustic gas.
- 3) To avoid vibrating and shocking, the floor should be flat and hard.
- 4) Earth Wiring is necessary, make sure the wall socket for earth wiring is available..

### 4.3 Air-cooling system

Fiber laser adopts air-cooling system, just keep the temperature between 0℃ and 40℃.

## Chapter 5 Software Installation

### 5.1 Find one laptop or PC for the portable machine







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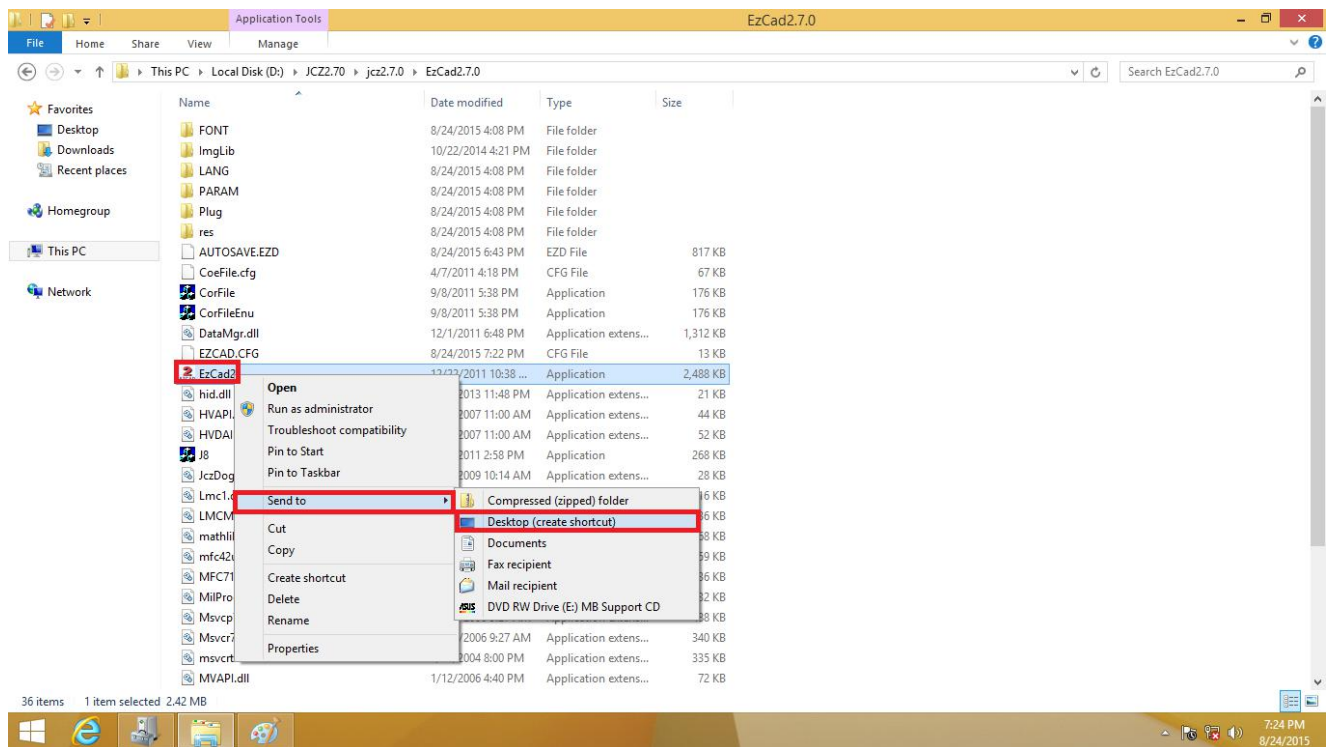
## 5.2 Find the CD Disk or USB in the tool box with machine



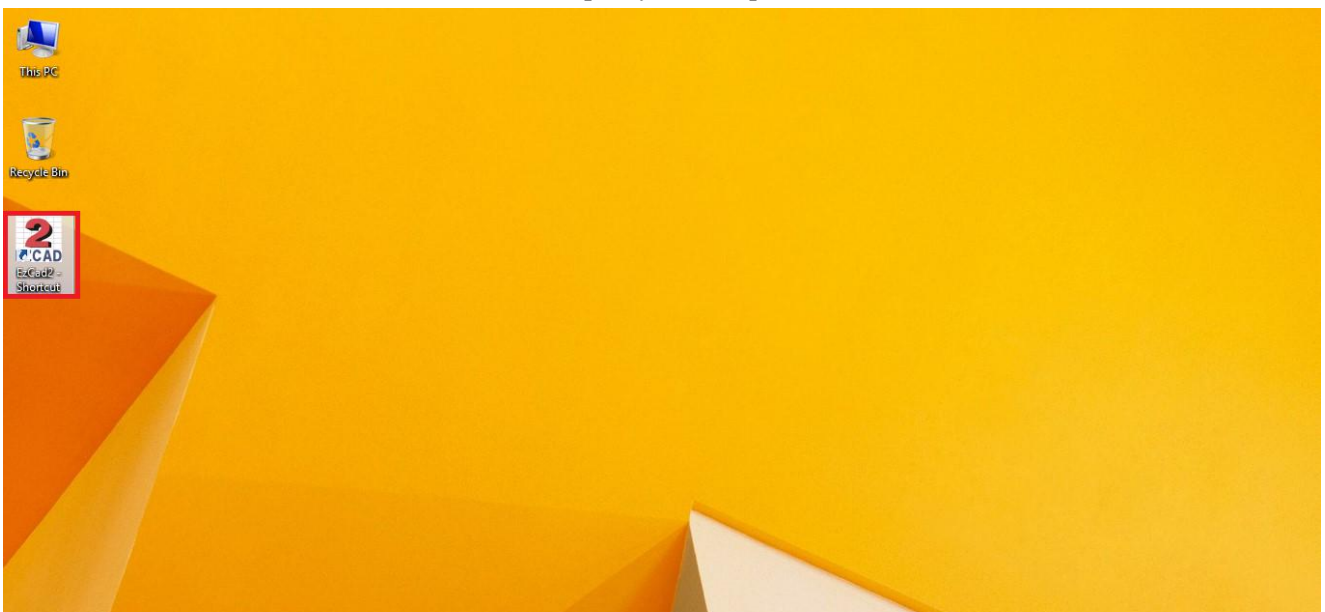
## 5.3 Copy the software to your laptop or PC

## 5.4 Do the software installation

**FIRST STEP:** Open the folder “jcz2.7.0” and “EzCad2.7.0”, find the icon “ EzCad2 ”, then send the shortcut to desktop of computer, as shown in the figure



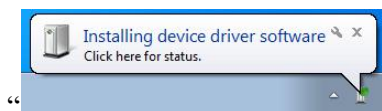
You can see the icon of “EzCad” is on the desktop of your computer



**SECOND STEP:** Find the electric power for the machine, the input should be AC220V/50HZ/1PH or 110V/60HZ/1PH (that depends on your local electric power supply), NO 380V!

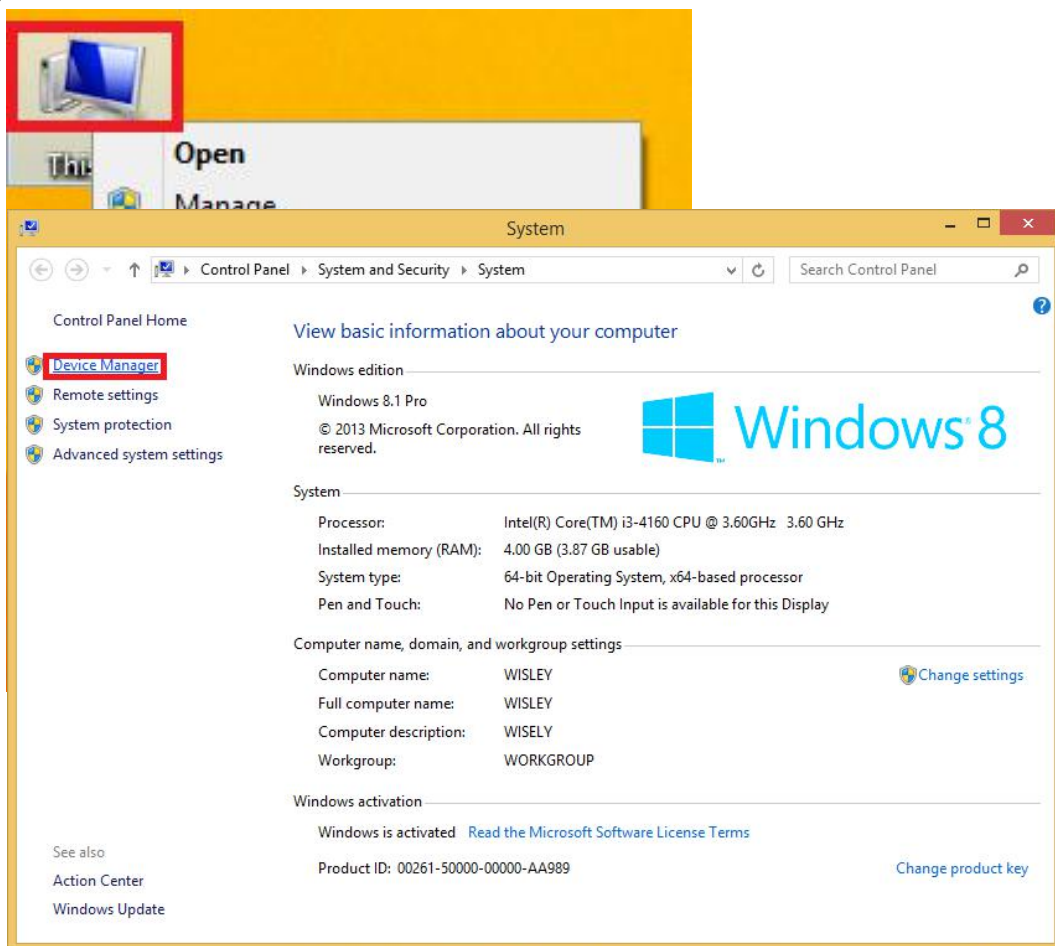
**THIRD STEP:** Power on the machine

**FORTH STEP:** Connect the machine with laptop or PC via USB cable, then the computer will show

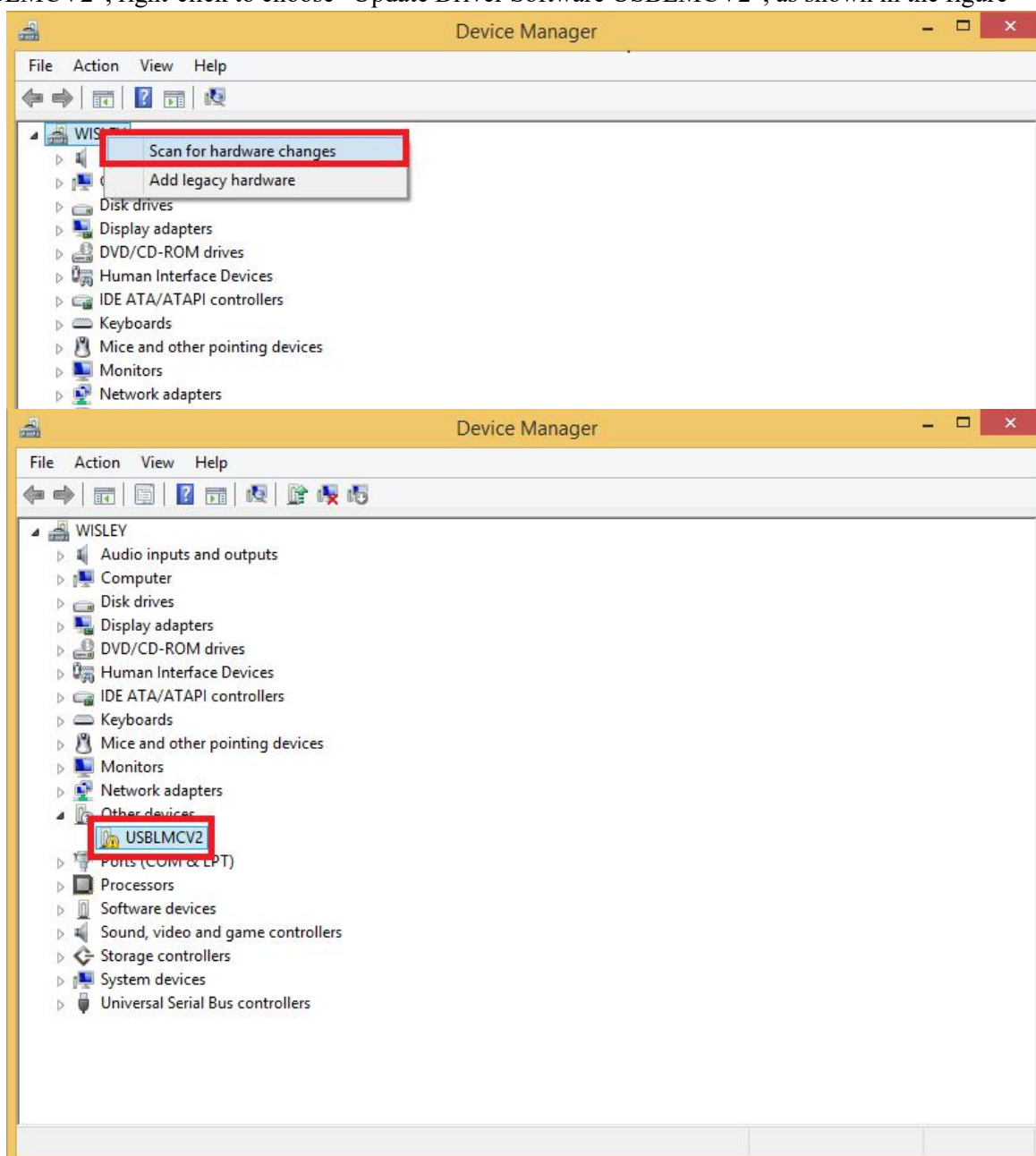


“”. Usually, you need to install the driver manually at the first time (If the driver can not be installed well automatically).

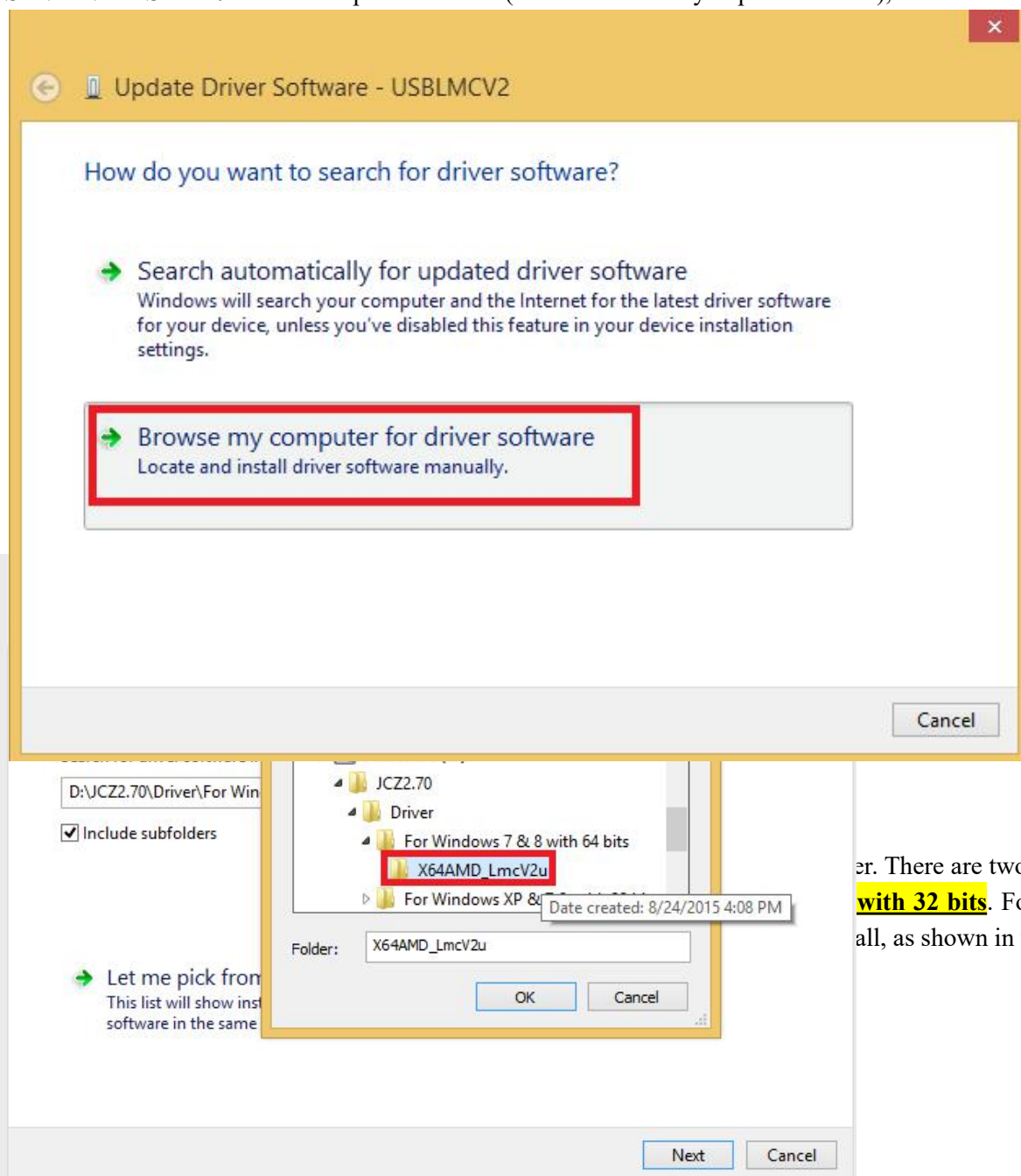
**FIFTH STEP:** Find “My Computer”, right-click to choose “Properties” and “Device Manager”, as shown in the figure



**SIXTH STEP:** Click “Device Manager”, then right-click to choose “Scan for hardware changes”, you will see “USBLMCV2”, right-click to choose “Update Driver Software USBLMCV2”, as shown in the figure



**SEVENTH STEP:** Choose the path of Driver (remember where you put the driver), as shown in the figure



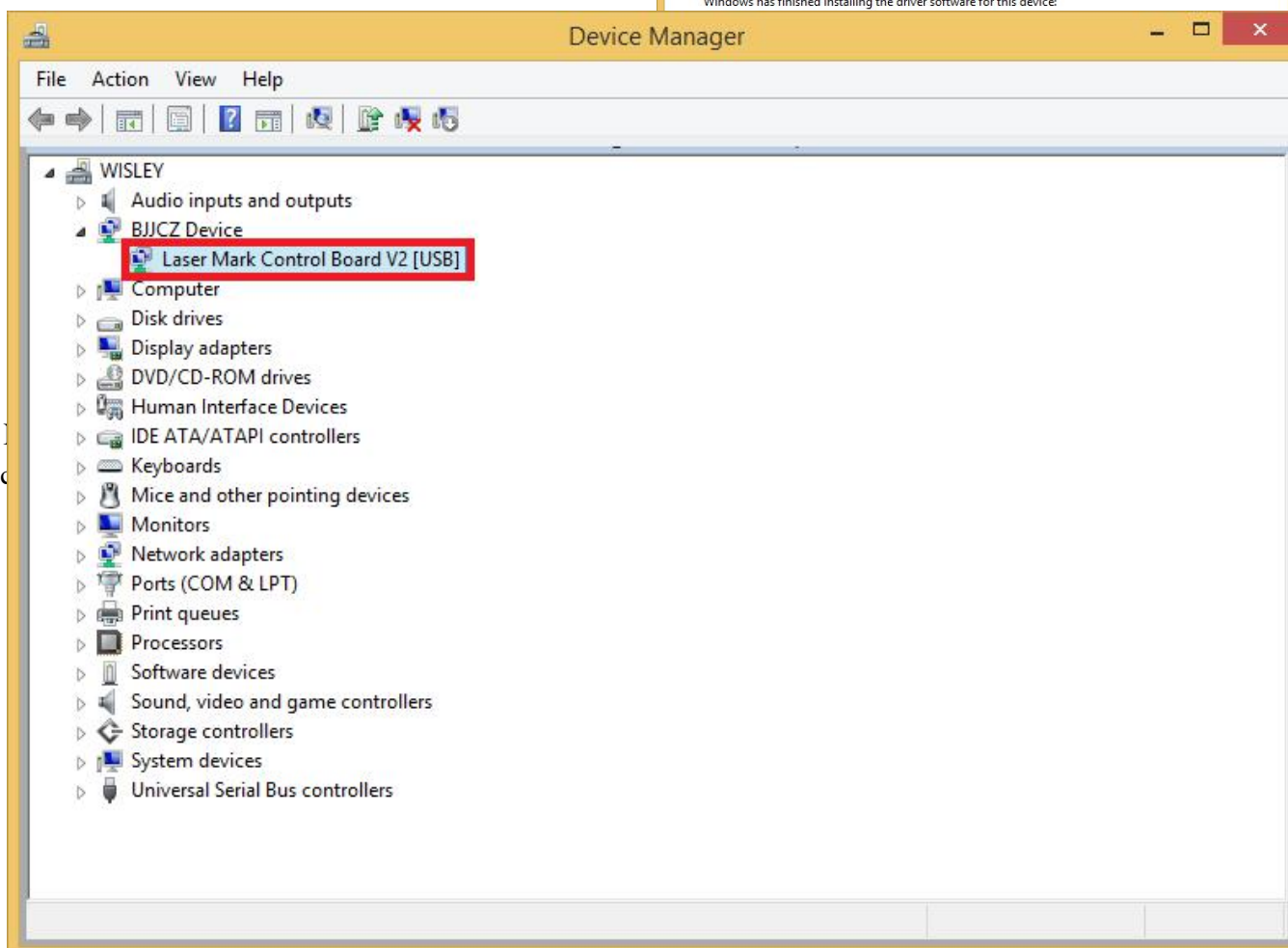
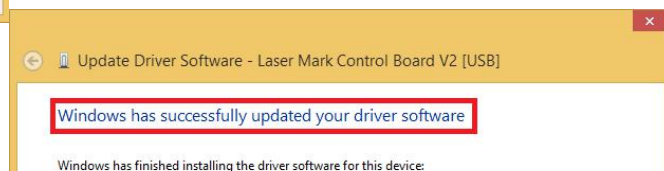
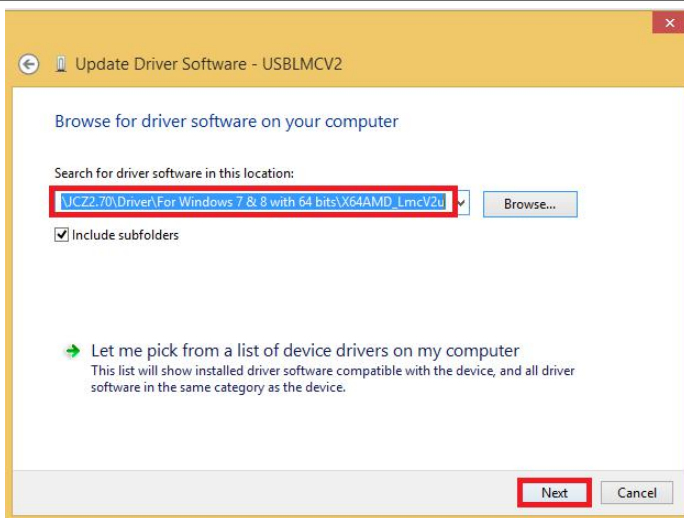
softw  
comp

er. There are two drivers for the **with 32 bits**. For example, our all, as shown in the figure



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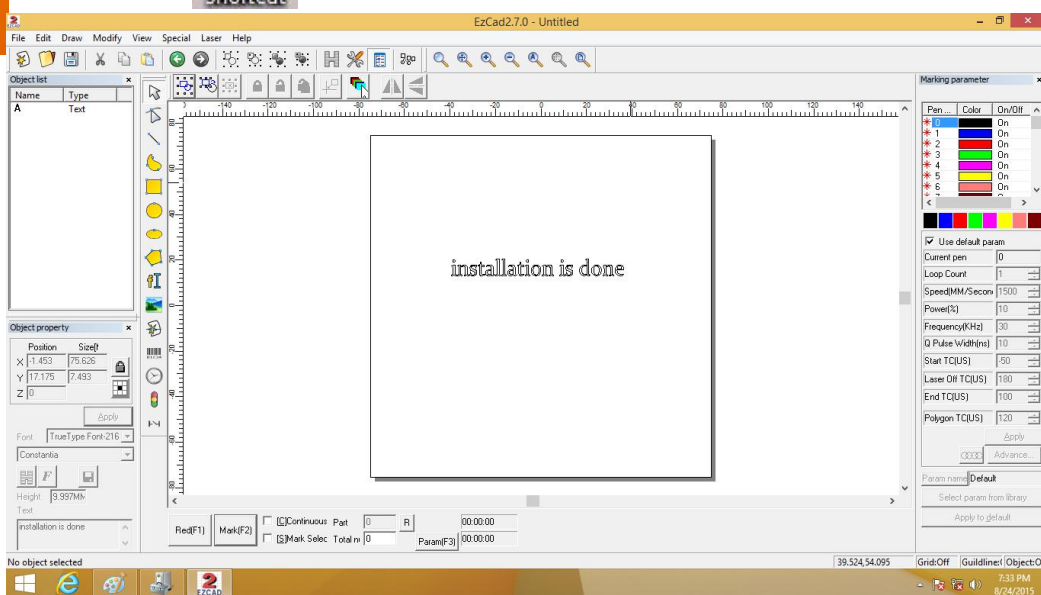
“Device





Laser Mark Control Board V2 [USB]" was installed successfully.

click the icon to run the software "EzCad", as shown in the figure

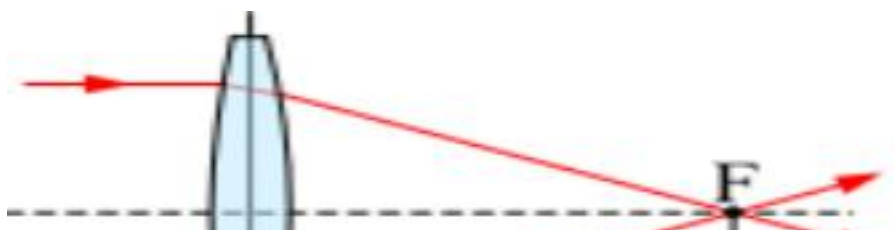


## Chapter 6 Find the correct Focal Length

**FIRST STEP:** To know what the focal length is

**Definition:** The focal length of an optical system is a measure of how strongly the system converges or diverges light. For an optical system in air, it is the distance over which initially collimated (parallel) rays are brought to a focus. A system with a shorter focal length has greater optical power than one with a long focal length; that is, it bends the rays more sharply, bringing them to a focus in a shorter distance.

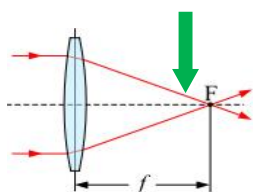
Check by visiting: [https://en.wikipedia.org/wiki/Focal\\_length](https://en.wikipedia.org/wiki/Focal_length)



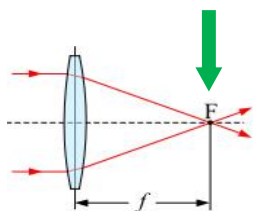


Briefly speaking, the further distance the marking object from the FL we choose, the weaker laser we get.

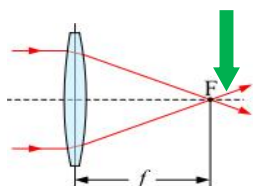
**SECOND STEP:** What difference on the marking object if we choose different focal length



Less than the correct FL



Correct FL



More than correct FL

After checking the above pictures, we will see: when we use the wrong FL for marking object, then we can not get the strongest laser power.

**THIRD STEP:** To know how to measure the focal length

- 1) Run the software

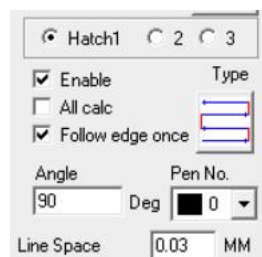
- 2) Draw a box - 100\*100mm size,



then click “Apply”



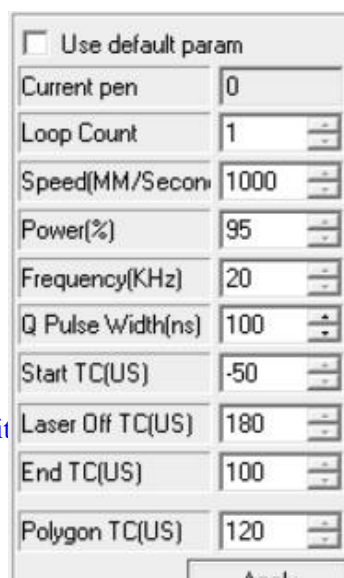
- 3) Set “Hatch” - Angle 90 - Line Space 0.03mm - Hatch 1



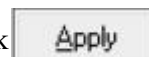
then click





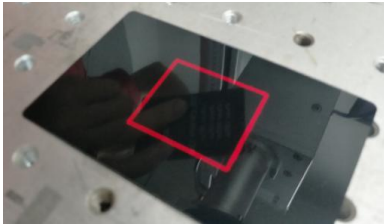
- 4) Set “Speed”, “Power”, “Frequency”, “Q Pulse Width”





then click

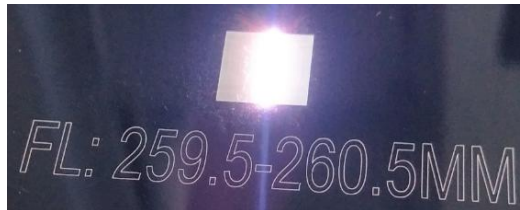


5) Press F1  on keyboard or click  to preview the position, then put the marking object to the correct position.



6) Select “Mark Selec” and “Continuous”, then Press F2  on keyboard or click  ☒ [C]Continuous ☒ [S]Mark Selec to mark.

7) Raise or fall the Z axis manually, try to find the strongest laser firing. When you found the strongest laser, then you find the Focal Length. We will give the value for the FL to clients after testing the machine.

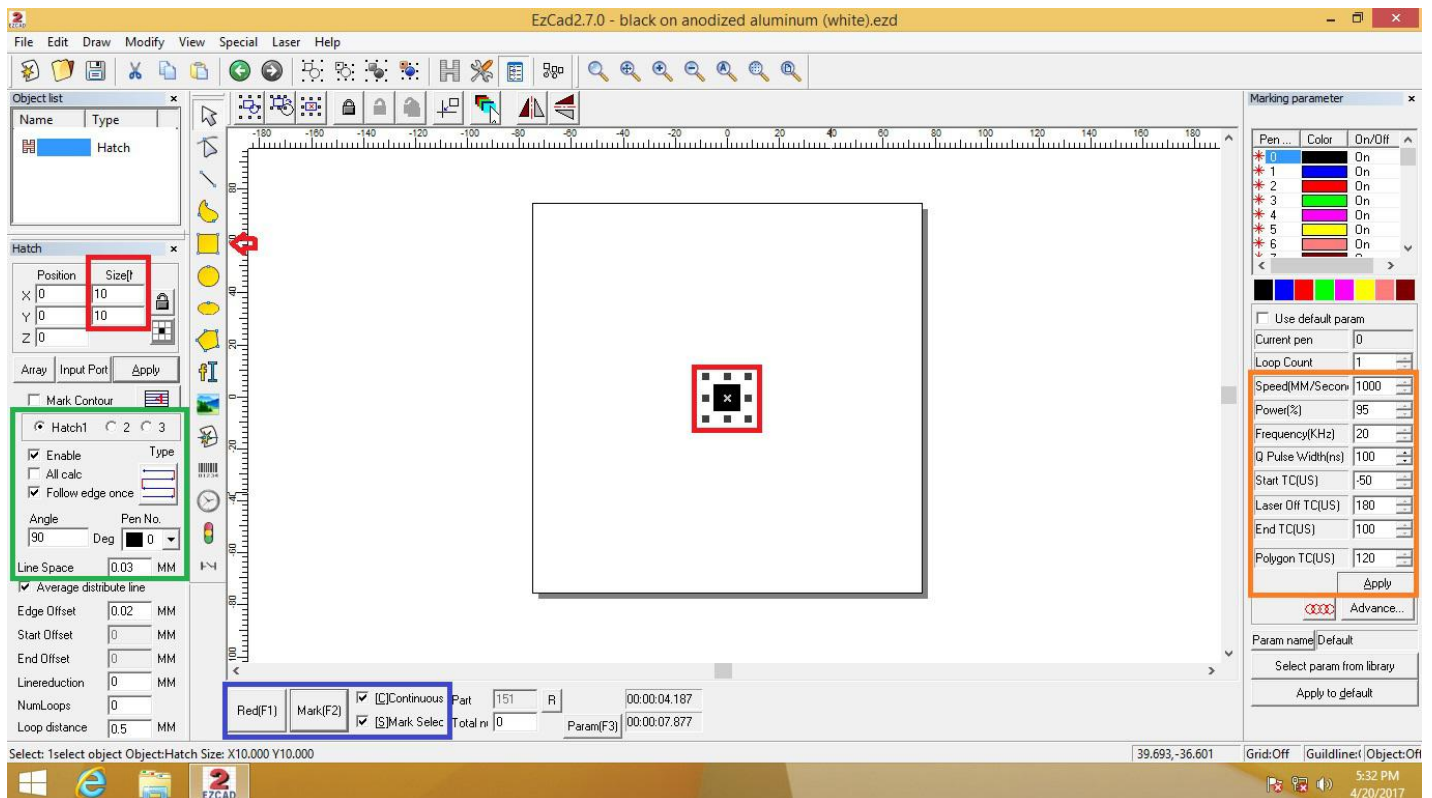


In order to help the operator get more experience, we have one picture for reference.



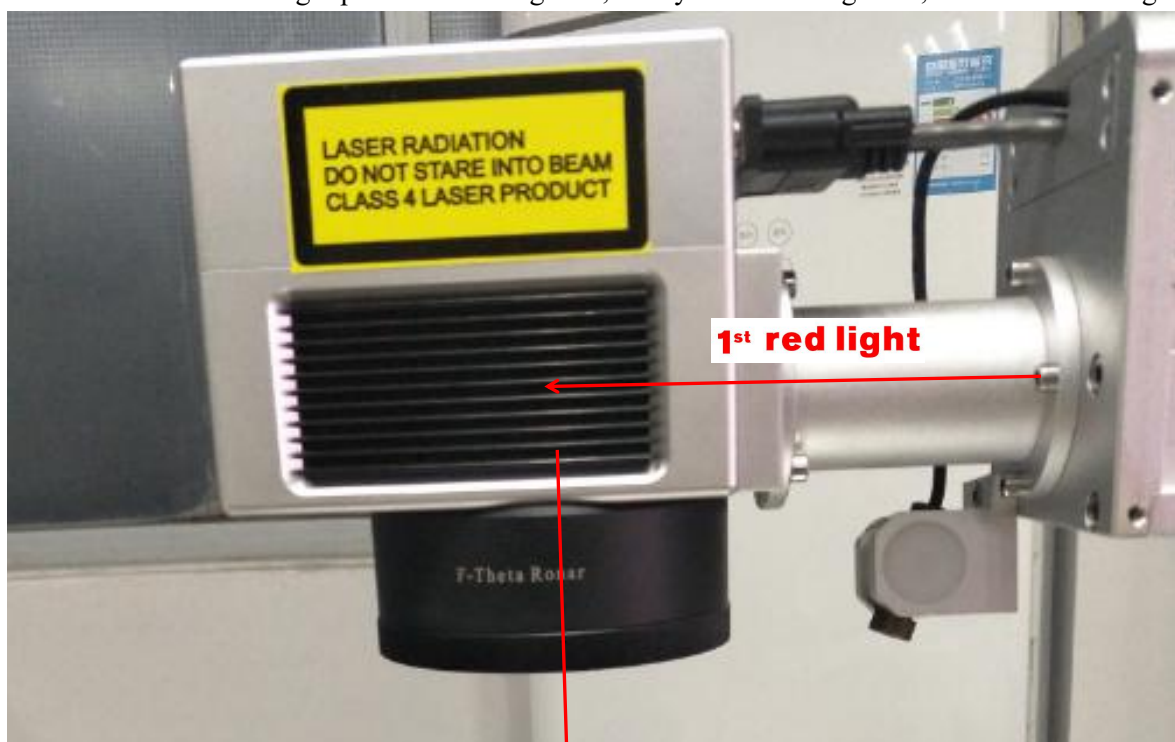
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## Another way to find the correct Focal Length

In order to find the right focal length on our machine easily, we add two red light pointers in our machine. One was installed inside the machine, and the other one is outside the machine. You can raise or fall the Z axis of the machine in order to let the two red light pointers meet together, then you find the right FL, as shown in the figure.

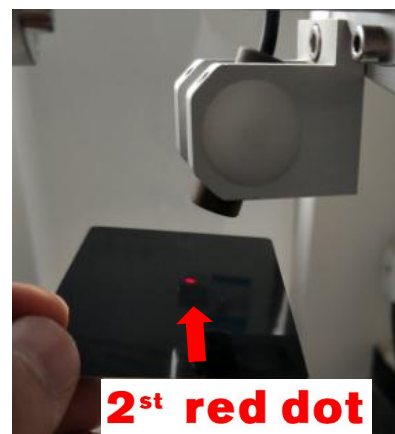




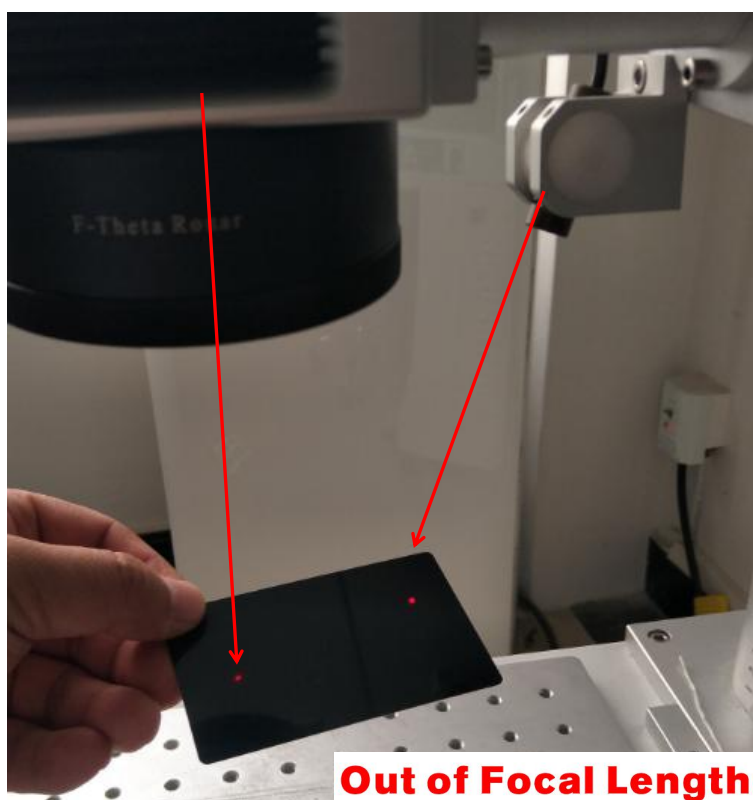


**1<sup>st</sup> red light**

**2<sup>st</sup> red light**



**Coincide Point**





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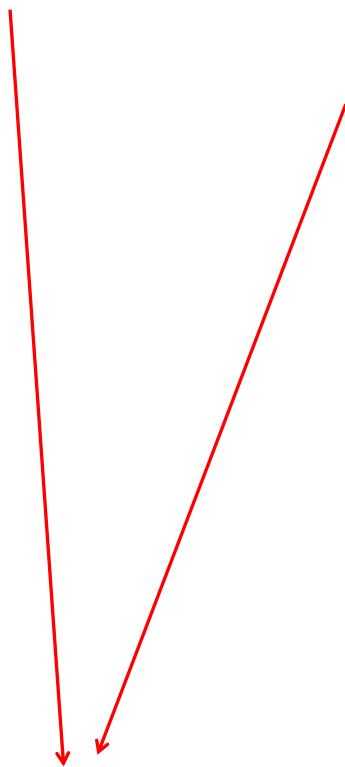
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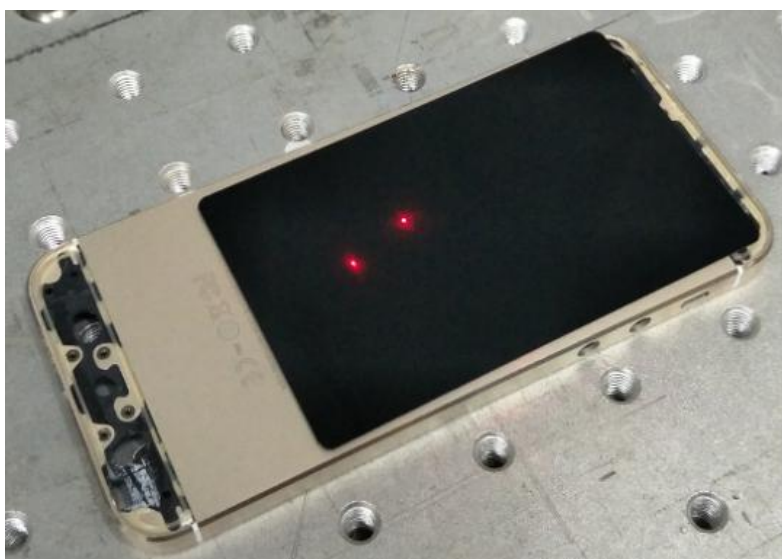
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## Out of Focal Length





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## Chapter 7 Basic Operation

### Turn ON

1. Connect the main power with black cable.
2. Turn on the switch on the back of machine.
3. Loose the button “Emergency” on the right side of machine.
4. Loose the button “Power” with the key.
5. Press the button named “Scanner” to turn on the power of scanner.
6. Press the button named “Red Light” to turn on the Red Dot Pointer.
7. Press the button named “Laser” to turn on the Red Dot Pointer.
8. Open the front door to run the industry computer.
9. Run software “EzCad”.
10. Load the material and put it in right position under the lens.
11. Adjust the right Focal Length by pulling the Z axis up and down.
12. Make or load a file which you want to mark in the software.

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13. Set the marking parameter for the marking jobs.
14. Prepare to mark.

**Turn OFF**

1. Save files (Or you do not need to save any files).
2. Close the software.
3. Shut down your PC.
4. Power off the laser source by key, scanner and red light pointer by pressing the buttons.
5. Pull down the switch on the back of machine.
6. Disconnect the main power.
7. Cover the lens with lens cover.

## Chapter 8 Regular Marking Effect Guide

In order to help new customers get the regular marking effect quickly, Wisely Laser will give you some parameter settings for reference.



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| Color<br>Parameter | Speed<br>(mm/s) | Power<br>(%) | Frequency<br>(KHz) | PulseWidth<br>(ns) | Hatch 1<br>Line<br>Space<br>(mm) | Hatch 1<br>Angle<br>(°) | Hatch 2<br>Line Space<br>(mm) | Hatch 2<br>Angle<br>(°) | Repeat | Remarks |
|--------------------|-----------------|--------------|--------------------|--------------------|----------------------------------|-------------------------|-------------------------------|-------------------------|--------|---------|
| Red                | 500             | 50           | 500                | 50                 | 0.003                            | 0                       | X                             | X                       | 1      |         |
| Green              | 1800            | 50           | 500                | 50                 | 0.005                            | 0                       | 0.005                         | 90                      | 4      |         |
|                    | 1500            | 40           | 500                | 8                  | 0.005                            | 0                       | 0.005                         | 90                      | 3      |         |
| Black              | 500             | 35           | 500                | 4                  | 0.005                            | 0                       | 0.005                         | 90                      | 1      |         |
|                    | 1500            | 40           | 500                | 8                  | 0.005                            | 0                       | 0.005                         | 90                      | 1      |         |
| Blue               | 500             | 35           | 500                | 4                  | 0.005                            | 0                       | 0.005                         | 90                      | 2      |         |
|                    | 1500            | 40           | 500                | 8                  | 0.005                            | 0                       | 0.005                         | 90                      | 3      |         |
| Purple             | 500             | 45           | 300/400            | 40                 | 0.005                            | 0                       | 0.005                         | 90                      | 1      |         |
|                    | 500             | 65           | 300                | 50                 | 0.005                            | 0                       | 0.005                         | 90                      | 1      |         |
| Golden/Yellow      | 500             | 40           | 400                | 50                 | 0.008                            | 0                       | 0.008                         | 90                      | 1      |         |
|                    | 1500            | 45           | 500                | 4                  | 0.002                            | 0                       | X                             | X                       | 1      |         |
|                    | 500             | 45           | 300                | 40                 | 0.005                            | 90                      | 0.005                         | 90                      | 1      |         |
| Black Green        | 1500            | 45           | 400                | 40                 | 0.005                            | 90                      | 0.005                         | 90                      | 3      |         |
| Light Green        | 500             | 38           | 400                | 50                 | 0.008                            | 0                       | 0.008                         | 90                      | 3      |         |

Machine: Type II + 20W + JPT + M1 + 150x150mm + 304# S.S

Remarks: The above parameter settings are just for your reference, the colors marked by your machine would be a little different, you may need fine adjustment.

## Chapter 9 Daily Maintenance

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After a few times, you should do some daily maintenance as follows:

- 1) Electrical control system works well - connection checking
- 2) Computer system works well - virus checking
- 3) Marking software works well - parameter settings checking
- 4) Elevating platform does not loose, screw does not loose and drop
- 5) Air cooling system for fiber laser source works well - cooling check
- 6) Do not squeeze fiber, be sure the protecting cover is good
- 7) Keep lens clean
- 8) Keep equipment clean

Actually, you can do the checking once per week, it is not necessary to do the checking every day.