

# USER MANUAL

MAKE SOMETHING WONDERFUL

# Foreword

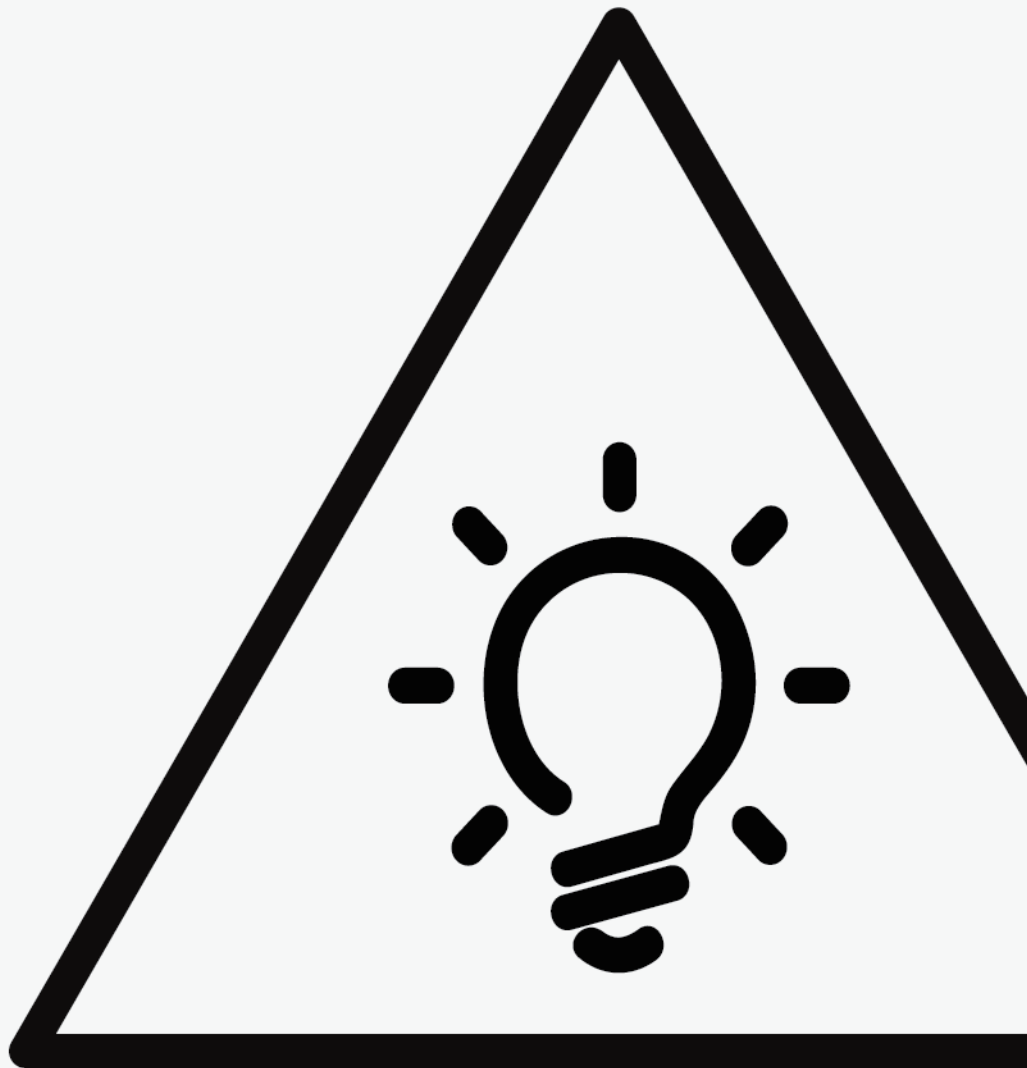
This manual instructs you to use the Snapmaker 2.0 A150, A250, and A350. The three models with different sizes share the same 3-in-1 function, so we will demonstrate their use with the A350 model. Before operation, ensure that you have read the entire manual. Should you encounter any technical problems, contact us at [support@snapmaker.com](mailto:support@snapmaker.com).

# Contents

<b>Foreword</b>	<b>1</b>
<b>Contents</b>	<b>2</b>
<b>Safety Guidelines</b>	<b>4</b>
Labels on Your Snapmaker	5
Safety Symbols	7
Safety Measures	8
Emergency Response	9
<b>Touchscreen</b>	<b>12</b>
User Interface	13
Firmware	14
<b>Snapmaker Luban</b>	<b>15</b>
How to Install	16
Version Requirements	16
<b>3D Printing</b>	<b>17</b>
01 Operating Environment	21
02 Filament Library	22
03 How to 3D Print	27
04 Waste Disposal	48
05 Maintenance	48
06 Troubleshooting	60
<b>Laser Engraving and Cutting</b>	<b>65</b>
01 Operating Environment	69
02 Material Library	70

03 How to Laser Engrave and Cut	78
04 Waste Disposal	120
05 Maintenance	121
06 Troubleshooting	130
<b>CNC Carving</b>	<b>135</b>
01 Operating Environment	139
02 Material Library	139
03 Tool Library	143
04 How to CNC Carve	147
05 Waste Disposal	163
06 Maintenance	164
07 Troubleshooting	173
<b>Resources</b>	<b>174</b>
<b>Compliance</b>	<b>175</b>
<b>Disclaimer</b>	<b>176</b>
<b>Copyright</b>	<b>176</b>

# Safety Guidelines



# Labels on Your Snapmaker

## On the 3D Printing Module



Warns you of the hot surface. Avoid direct contact with the nozzle and hot end during printing or immediately after printing.



## On the Laser Module

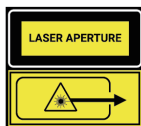


IEC 60825



FDA

Warns you of laser radiation. This is a class 4 laser product. Avoid eyes and skin exposure to direct or scattered radiation. Wear the Laser Safety Goggles or use other protective equipment such as the Enclosure during laser engraving and cutting.



IEC 60825



FDA

Warns you that laser radiation is emitted from this aperture. Never look into the aperture or put your body parts under the aperture when the laser engraving and cutting machine is powered on.



## On the CNC Module



Warns you of sharp objects. Take care to avoid injury when attaching or detaching the CNC bits.



## On the Heated Bed



Warns you of danger. Pay attention to any operations on the Heated Bed.



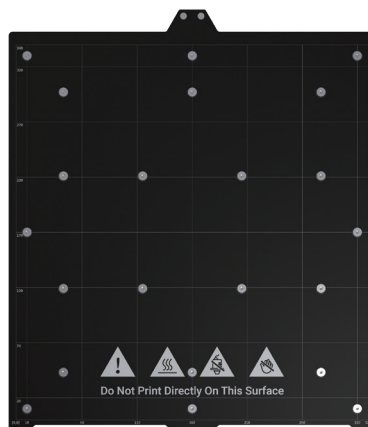
Warns you of the hot surface. Avoid direct contact with the Heated Bed during printing or immediately after printing. Wait several minutes before contact or use auxiliary tools like heat-insulated gloves.



Do not print directly on this surface; otherwise, you will damage the Heated Bed.



Do not touch the Heated Bed with bare hands during printing or immediately after printing.



There are no labels on the Heated Bed on Snapmaker 2.0 A150. Nevertheless, you should remain cautious in operation.

## On the Print Sheet

	Warns you of danger. Pay attention to any operations on the Print Sheet.
	Warns you of the hot surface. Avoid direct contact with the Print Sheet during printing or immediately after printing. Wait several minutes before contact or use auxiliary tools like heat-insulated gloves.
	Do not touch the Print Sheet with bare hands during printing or immediately after printing.

## Safety Symbols

Safety symbols in Quick Start Guides and User Manuals instruct you to avoid damage or hazards during assembly and use.

	<b>Warning</b>	Failure to follow this instruction might result in severe personal injury.
	<b>Caution</b>	Failure to follow this instruction might result in malfunction, damage to the machine or workpiece, or slight personal injury.
	<b>Tip</b>	Tells you practical advice.
	<b>Direction</b>	Ensure that the highlighted part is facing the right way.
		Do not tighten the screws yet.



# Safety Measures

## General Safety Information

Read the entire manual before use.

This machine should only be used by trained operators aged 18 and above.

This machine should be used exclusively for recreational purposes.

Do not leave the machine unattended while it is on.

Do not touch the moving parts while the machine is in operation.

Do not operate the machine while tired or under the influence of drugs, alcohol, or medication.

Do not let children use the machine without the supervision and assistance of an adult.

Always operate this machine indoors on a solid horizontal table or workbench.

Do not expose this machine to rain or wet conditions.

Always cut the power supply before maintenance or modifications.

In all EU member states, the operation of 5150-5250 MHz is restricted to indoor use only.



AT	BE	CY	CZ	DK	EE	FI
FR	DE	EL	HU	IE	IT	LV
LT	LU	MT	NL	PL	PT	SK
SI	ES	SE	UK	BG	RO	HR

## 3D Printing Safety

Do not touch the nozzle, hot end, Print Sheet, Heated Bed, and uncured filament when the 3D printer is heating or printing.

Turn off the 3D printer immediately if any of the following occurs:

- The 3D printer is on fire which persists after it is turned off.
- The 3D printer stops unexpectedly.
- Any damage is incurred to the interior components of the 3D printer.
- Any unusual light or sound comes from the 3D printer which has never occurred previously.

## Laser Safety

The small percentage of the population (0.01%) that have blue-yellow color blindness (tritanopia) may struggle to see the laser lights and may not realize that the laser engraving and cutting machine is turned on. Tritanopic users must therefore be particularly careful.

Operate the machine wearing the Laser Safety Goggles and other protective equipment such as a mask or using the Enclosure.

The Laser Module is a class 4 laser product. You should operate the Laser Module only if you have sufficient knowledge of the physical properties of laser radiation, Laser Hazard Classes and associated health implications, and safety measures.

Never expose yourself to the laser beam. Proper use and care of the Laser Module are essential to safe operation.

Keep children and bystanders away while operating this machine.

Operate the laser engraving and cutting machine in a well-ventilated place or with an air purifier.

Remove any reflective material from the work area underneath the Laser Module, as it can cause scattered radiation.

Turn off the machine immediately if any of the following occurs:

- Open flames appear.
- The machine stops unexpectedly.
- Any damage is incurred to the interior components of the laser engraving and cutting machine.
- Any unusual light or sound comes from the machine which has never occurred previously.

## CNC Safety

Always operate the machine wearing the CNC Safety Goggles.

Operate the CNC carver in a well-ventilated place and take safety precautions like wearing protective masks.

Do not touch the bit or collet immediately after use, as doing so can cause burn hazards.

Always have the material securely clamped. Do not hold the workpiece with your hands throughout carving.

Turn off the CNC carver immediately if any of the following occurs:

- The CNC carver is on fire which persists after it is turned off.
- The CNC carver stops unexpectedly.
- Any damage is incurred to the interior components of the CNC carver.
- Any unusual light or sound comes from the CNC carver which has never occurred previously.
- The bit or workpiece gets jammed or bogged down. Wait for all moving parts to stop and unplug the cable, and then free the jammed material.

# Emergency Response

## 3D Printing Emergencies

### Burns from Hot Surface

Touching the hot surface, including the hot nozzle, hot end, Heated Bed, Print Sheet, and uncured filament, will burn your skin. Should you be burnt:

- (1) Get yourself away from the heat source.
- (2) Immediately rinse your burnt area with cool running water.
- (3) Remove any clothing or jewelry near your burnt area.
- (4) Use painkillers if necessary.
- (5) Cover the burn with a clean, dry bandage.
- (6) Should you suffer from severe burn, seek medical help immediately.

### Inhalation of Fumes and Granules

Printing with certain filaments will emit fumes or produce granules, which may irritate your respiratory system.

Generally, we recommend you use safety addons and wear protective masks when printing.

Should respiratory irritation occur, immediately expose the victim to fresh air and seek medical help immediately.

## Laser Emergencies

### Eye Injury from Laser

Should your eyes be exposed to direct or scattered laser beams, take the following steps as an emergency response:

- (1) Grab a nearby thick and opaque object to block the laser beam to prevent further exposure to laser.
- (2) Shut down the laser engraving and cutting machine immediately.
- (3) If an eye injury is suspected, medical examination by a qualified specialist needs to be carried out as soon as possible.
- (4) If an eye injury is apparent, call the local hospital for emergency help.



If a medical emergency occurs in which the extent or nature of the injury precludes you from further actions, sit down on the floor and yell for help. Warn any respondent of laser danger and ask them to turn off the laser engraving and cutting machine before sending you to the hospital.

## Skin Injury from Laser

Lasers can harm the skin via photochemical or thermal burns, which can be treated as could any other burn. Take the following steps as an emergency response:

- (1) If it is a major burn, call for emergency medical care before you take the subsequent steps.
- (2) Remove any clothing or jewellery that's near the burnt area of skin, but do not move anything that's stuck to the skin.
- (3) Hold the burn under cool or lukewarm running water until the pain subsides. Use cool, wet compresses if running water isn't available.
- (4) After the burned area has been cooled, use painkillers such as paracetamol or ibuprofen to treat any pain.
- (5) Loosely bandage the burn. Use a sterile, non-adhesive bandage or clean cloth.

## Exposure to Gases or Fumes

The heating which occurs during laser cutting or engraving can cause charring, pyrolysis, and even combustion of the material being worked on and generate gases or fumes.

### • Airway Irritation

Gases and fumes may irritate the airways and potentially be extremely dangerous. Should airway irritation occur, take the following steps as an emergency response:

- (1) Expose the casualty to fresh air.
- (2) Call for medical help.
- (3) If the person is unresponsive, not breathing, or not breathing normally, perform CPR until the person begins breathing or emergency help arrives.

### • Eye Irritation

Being exposed to gases or fumes may cause the eyes to become red and watery, and induce a grainy feeling.

Should eye irritation occur, take the following steps as an emergency response:

- (1) Rinse the affected eyes with room temperature water for 10 to 20 minutes to relieve symptoms. Sterile water or sterile normal saline solution (0.9%) from sealed disposable containers can be used. Press the eyelids wide open and keep them apart while rinsing.
- (2) Transfer the casualty to the hospital as soon as possible for an eye examination and further treatment.

### • Asthma Attacks

Gases or fumes may trigger asthma in a person with asthma history. Should an asthma attack occur, take the following steps as an emergency response:

- (1) Sit the person upright.
- (2) Give 4 puffs of blue reliever puffer. Ensure you shake the puffer, put 1 puff into a spacer at a time, and get the person to take 4 breaths of each puff through the spacer. Remember: shake, 1 puff, 4 breaths.  
If you don't have a spacer, simply give the person 4 puffs of their reliever directly into their mouth. Repeat this until the person has taken 4 puffs.
- (3) Wait 4 minutes. If there is no improvement, give 4 more separate puffs as in Step (2).
- (4) Keep giving reliever. Give 4 puffs every 4 minutes until the ambulance arrives.

## Fire

Laser engraving and cutting can present a significant fire hazard due to the extremely high temperature caused by the laser beam. Should a fire occur, take the following steps as an emergency response:

- (1) If the fire is small in size (no larger than a small trash can), you can use an extinguisher to put it out. Remember to cut electrical power before dousing the flame.
- (2) If the fire is large, do not attempt to fight it yourself. Call for help immediately by pulling the nearest alarm.
- (3) Move quickly to the nearest accessible exit. Notify, and assist others to evacuate along the way. Do not use the elevators.
- (4) Contain the fire and the smoke by closing all doors leading into and surrounding the fire area. Do not lock them.
- (5) After a total and immediate evacuation, call medical attention for the casualty.

## **CNC Emergencies**

### **Injury from Sharp Objects**

Should you get injured from sharp objects, follow these first aid steps:

- (1) Stop the bleeding. Apply pressure to the wound with a clean cloth for a few minutes until the bleeding stops. If the bleeding won't stop or other tissues are severely injured, seek medical help immediately.
- (2) Remove any dirt and debris. Use sterilized tweezers to remove dirt and debris around the wound. If the debris penetrates deep into your skin, seek medical help immediately.
- (3) Clean. Gently rinse the wound, and wipe away the residual water using a clean cloth.
- (4) Disinfect. Apply an antiseptic cream on the wound to prevent infection. If the wound is infected, seek medical help immediately.
- (5) Band up. Use a bandage to protect the wound from further exposure to dirt and bacteria.

Note that any injuries to the vulnerable parts, like faces, eyes, and arteries, requires immediate medical treatment.

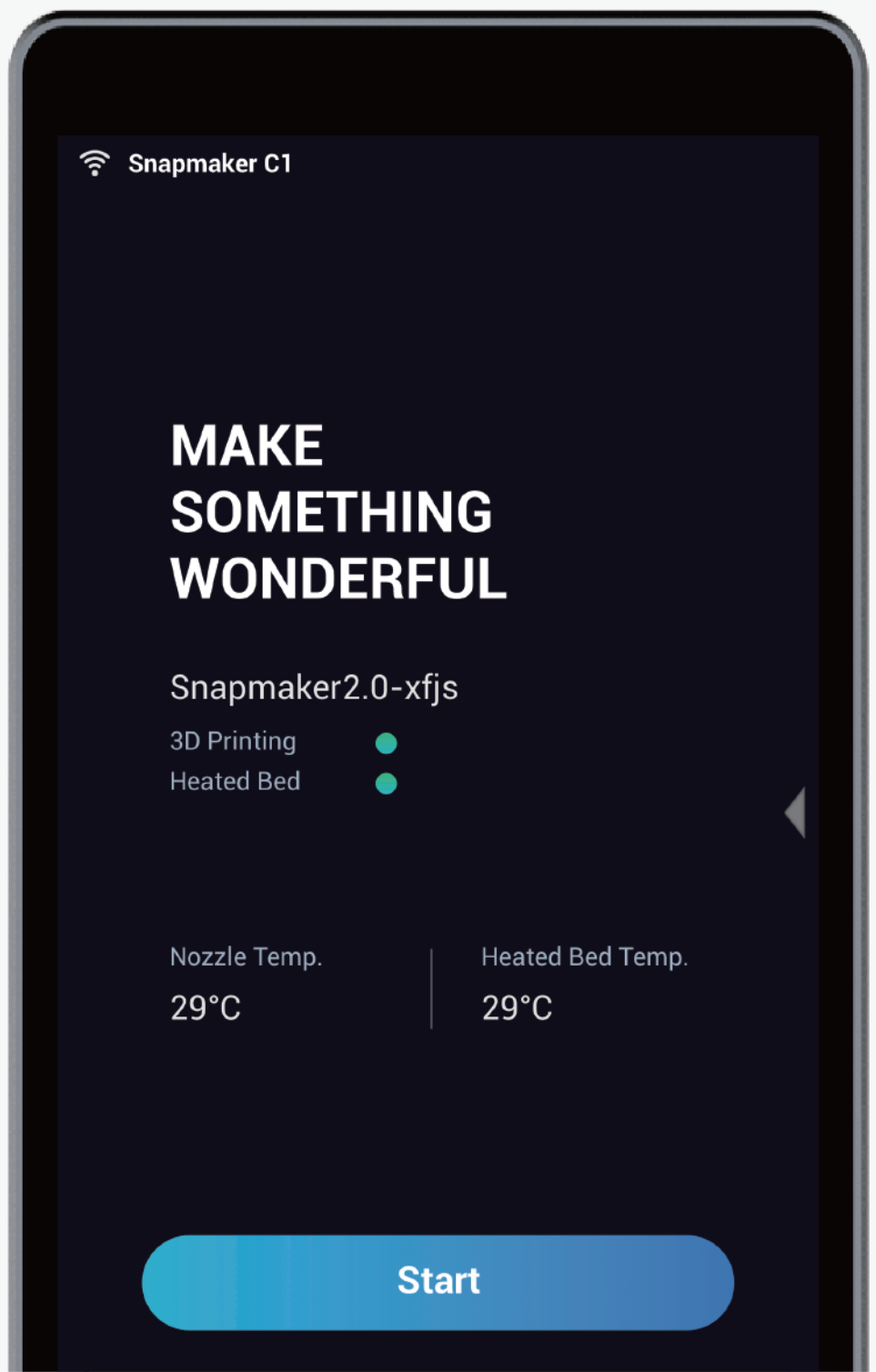
### **Inhalation of Dirt and Sawdust**

CNC carving will produce dust and sawdust, which may irritate your respiratory system. Generally, we recommend you use safety addons and wear protective masks when carving. Should respiratory irritation occur, immediately expose the victim to fresh air and seek medical help.

### **Inhalation of Scorched Smell**

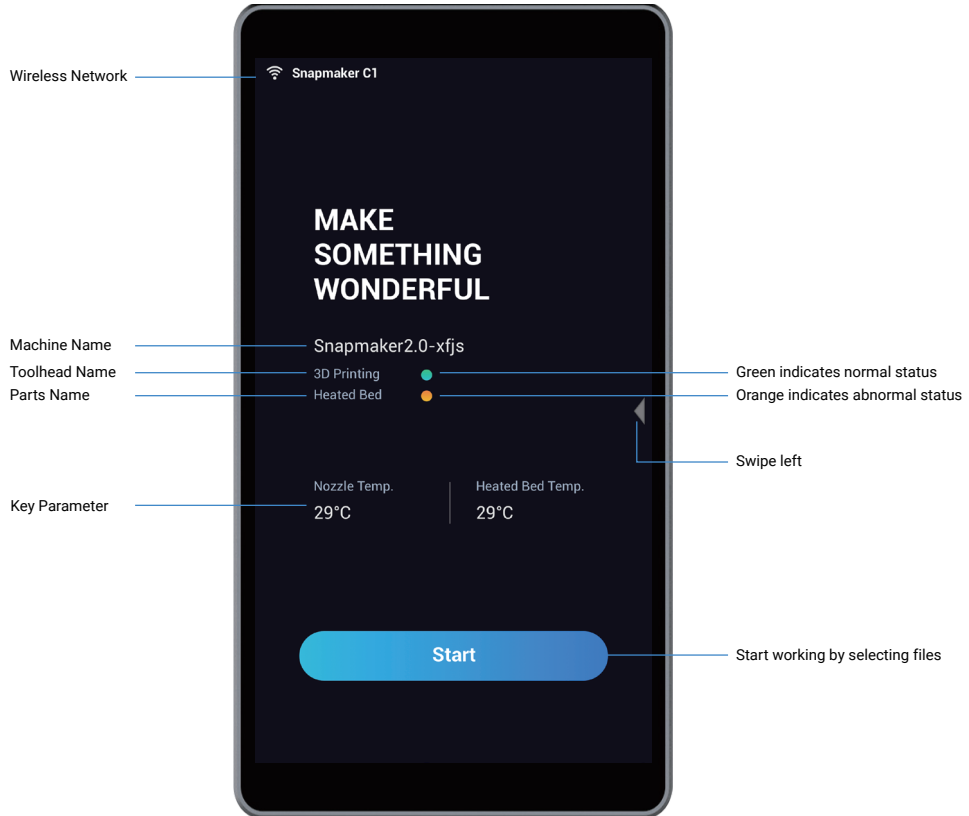
Sometimes, CNC carving may emit a scorched smell, which may irritate your respiratory system. Should respiratory irritation occur, immediately expose the victim to fresh air and seek medical help.

# Touchscreen

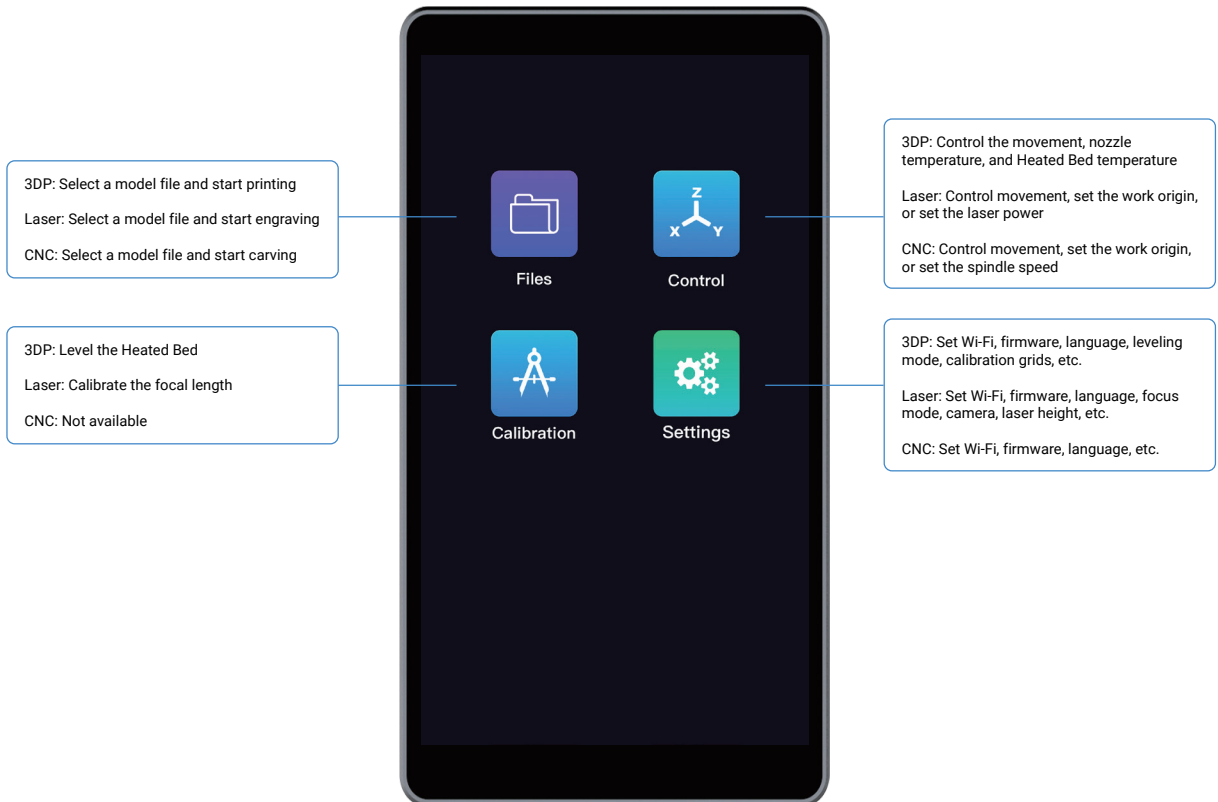


# User Interface

## Home Screen



## APP List Screen



# Firmware

## How to Update

Before use, update the Firmware to the latest version. For Touchscreen with the firmware of V1.9.0 or later, you can update via Wi-Fi or USB flash drive. For firmware previous to V1.9.0, update only via USB flash drive.



: Turn on the machine > Connect your machine to a Wi-Fi network > Swipe left on the Touchscreen > Tap **Settings** > **Firmware Update** > **Check for Updates** > **Update Now** > **Complete**.



: Download our firmware from [snapmaker.com/product/snapmaker-2/downloads](https://snapmaker.com/product/snapmaker-2/downloads) > Insert the USB flash drive into the Controller > Turn on the machine > Swipe left on the Touchscreen > Tap **Files** > **USB** > Tap the firmware file to update.



Should you need to update the Touchscreen firmware, Controller firmware, or the firmware of other modules and addons separately, download them from our [website](#) or [forum](#) to your USB flash drive, and update via Touchscreen.

## Version Requirements

Should you use the 3D printer together with addons like the Enclosure, Rotary Module, Emergency Stop Button, or Air Purifier, update the firmware to the required version:

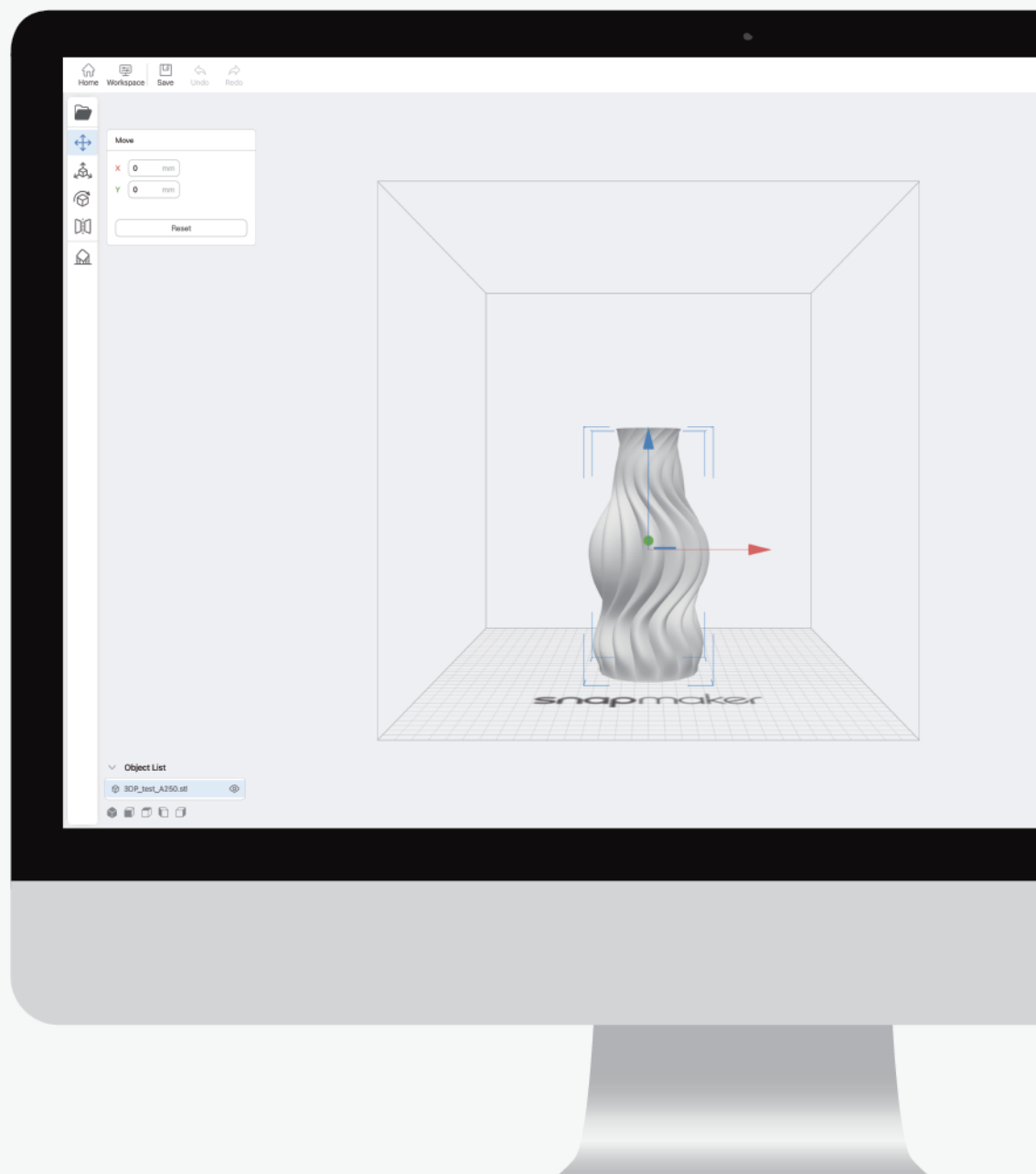
- Enclosure: V1.10.0 or later
- Rotary Module: V1.12.0 or later
- Emergency Stop Button: V1.12.0 or later
- Air Purifier: V1.13.1 or later

To check the firmware version, tap **Settings** > **About Machine**.



Before using the Emergency Stop Button, you should update the firmware to version 1.12.0 or later as required.

# Snapmaker Luban





# How to Install

Our free slicing Software Snapmaker Luban (Luban hereafter) supports three operating systems.

- Windows
- macOS
- Linux

Download Luban from [luban.xyz](https://luban.xyz) or [Forum](#). Double-click and install Luban.

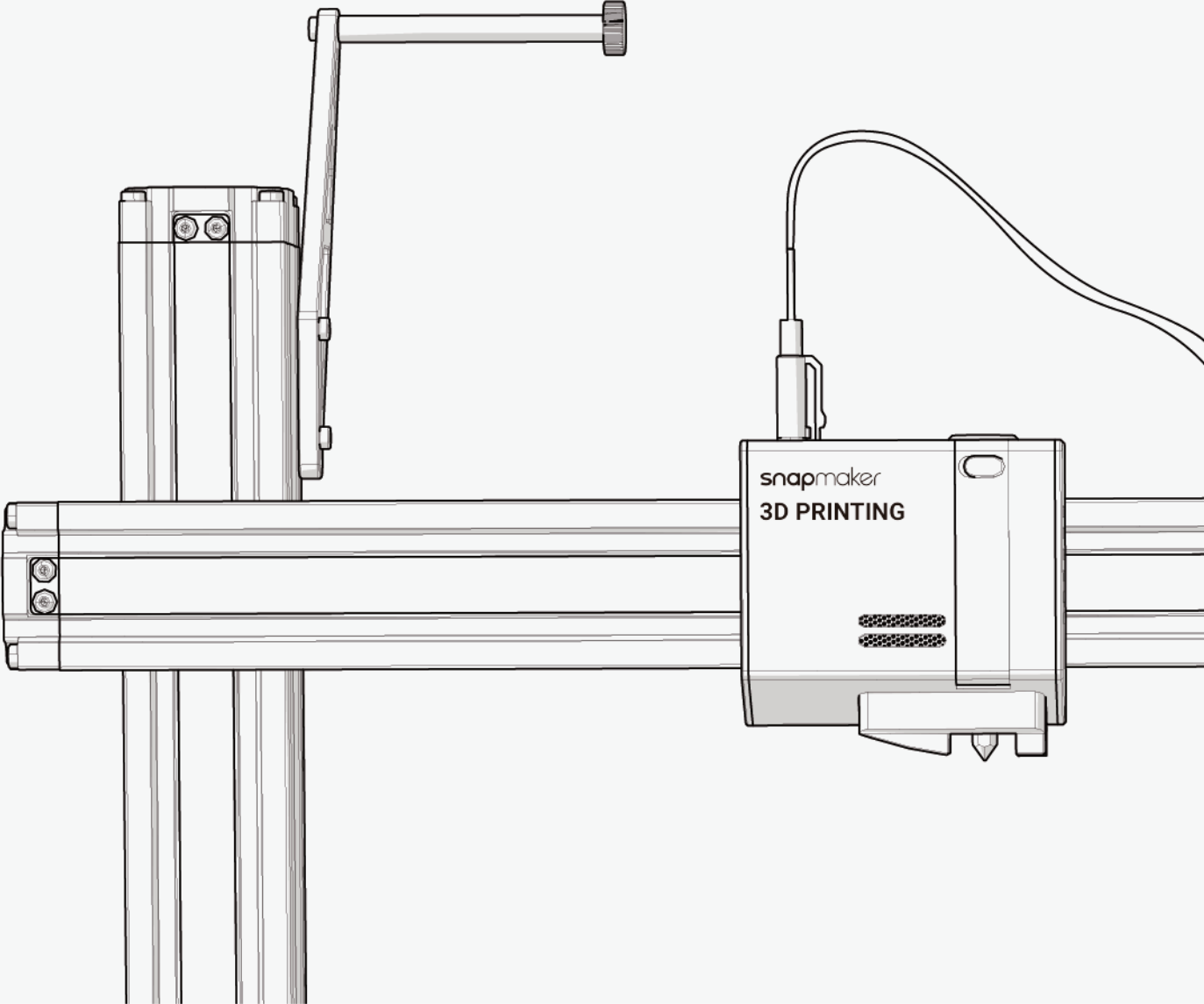


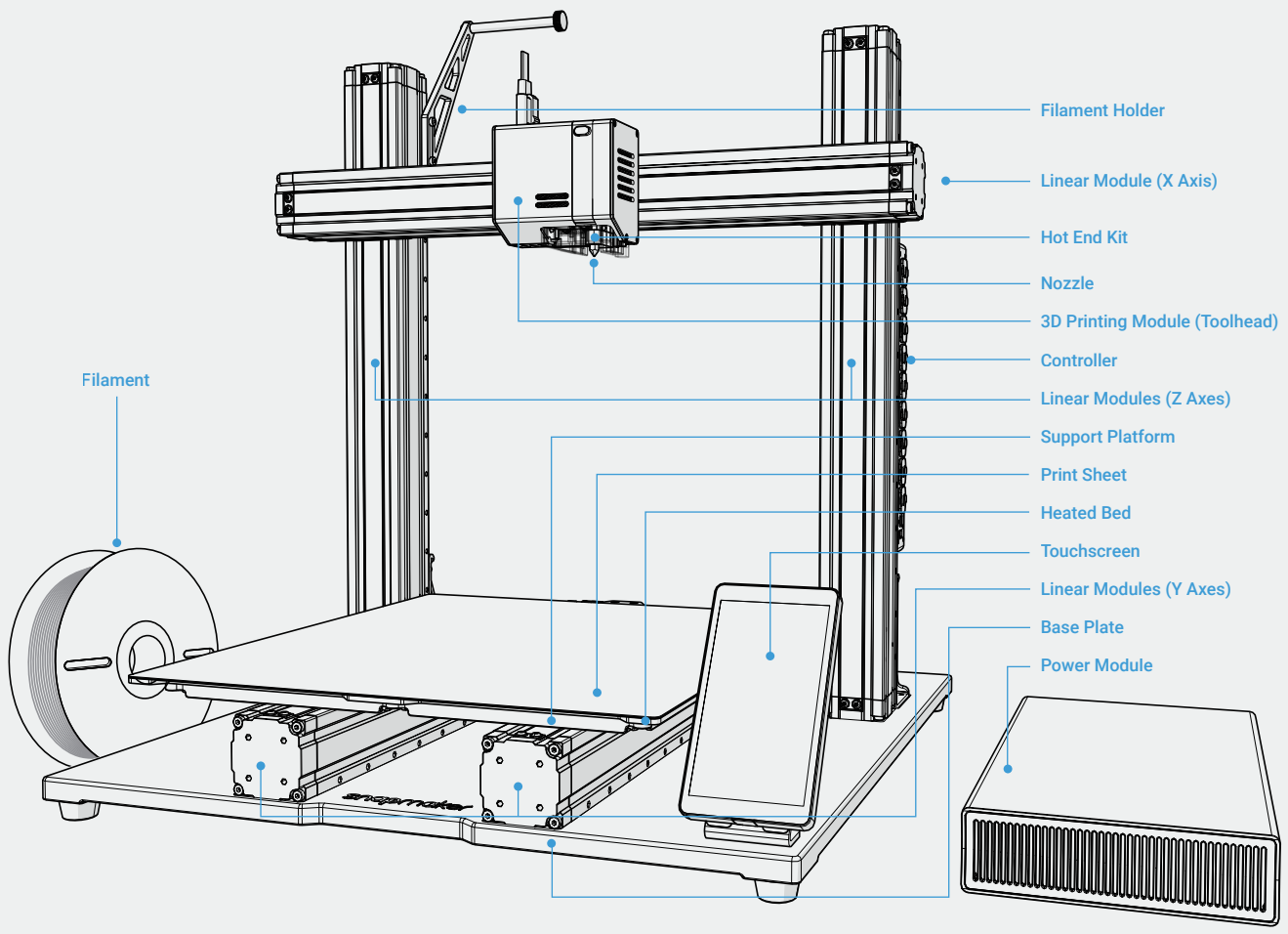
## Version Requirements

Should you use the 3D printer together with addons like Enclosure, Rotary Module, or Emergency Stop Button, update Luban to the required version or later:

- Enclosure: V3.5.0 or later
- Rotary Module: V3.14.0 or later
- Emergency Stop Button: V3.14.0 or later
- Air Purifier: V1.13.1 or later

# 3D Printing





<b>01 Operating Environment</b>	<b>21</b>
1.1 Temperature and Humidity	21
1.2 Workbench	21
<b>02 Filament Library</b>	<b>22</b>
2.1 Filament Overview	22
2.2 PLA	23
2.3 ABS	24
2.4 TPU	25
2.5 PETG	25
<b>03 How to 3D Print</b>	<b>27</b>
3.1 3D Printing Workflow	27
3.2 Level the Heated Bed	27
3.3 Load the Filament	33
3.4 Prepare the G-code File	37
3.5 Transfer the File and Start Printing	38
3.6 Remove Prints	42
3.7 Filament Runout Recovery	46
3.8 Power Loss Recovery	47
<b>04 Waste Disposal</b>	<b>48</b>
4.1 Packaging	48
4.2 Wasted Filaments	48
4.3 Electronics	48
<b>05 Maintenance</b>	<b>48</b>
5.1 Maintenance Schedule	48
5.2 Before You Print	49

5.3 Every Month	57
5.4 Every Three Months	59
<b>06 Troubleshooting</b>	<b>60</b>
6.1 First Layer Does Not Stick	60
6.2 Warping	62
6.3 Toolhead Hits the Heated Bed	62
6.4 Filament Does Not Come Out	64
6.5 Blobs on Nozzle	64

# 01 Operating Environment

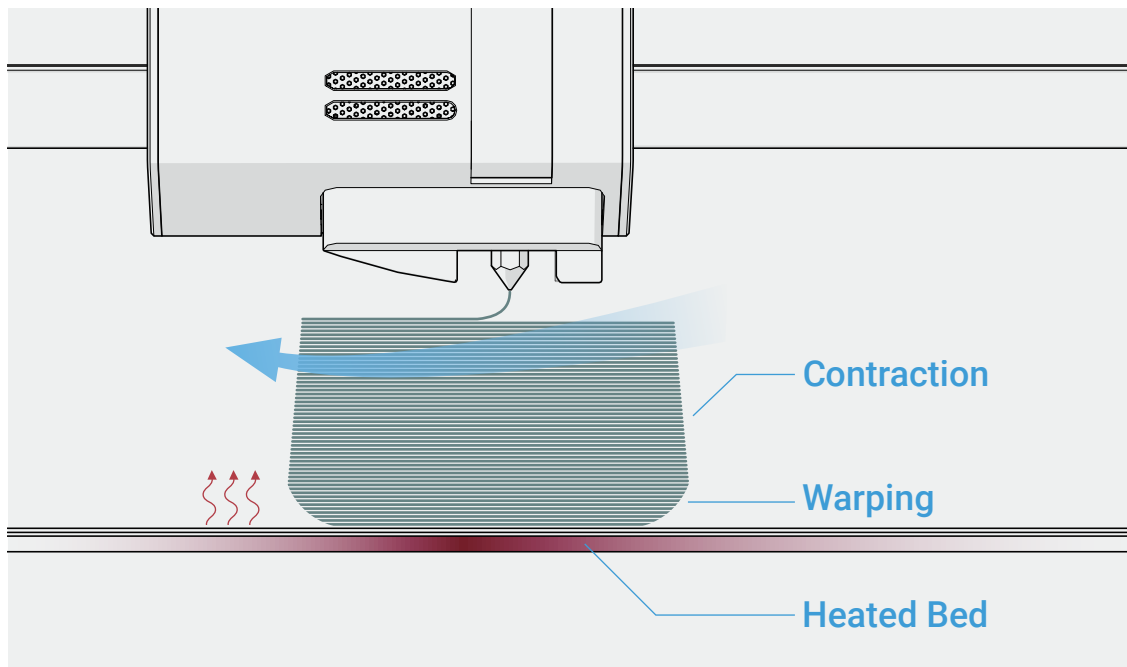
## 1.1 Temperature and Humidity

### 1.1.1 Recommended Temperature

The Fused Deposition Modeling (FDM) technology is highly susceptible to temperature. To ensure a perfect print result, put the 3D printer at a recommended ambient temperature.

The recommended operating temperature for your 3D printer is between 0°C to 40°C (32°F to 104°F). If the ambient temperature is too high, though beneficial to print results in some cases, it will damage the 3D printer components. Use fans or air conditioners to lower the ambient temperature if necessary.

If the ambient temperature is too low, it will take longer to heat up before you print. Another adverse impact is that the print will easily warp. Affected by cool air, the top layers of the extruded filament contract; whereas the bottom layers kept heating up by the Heated Bed will expand and thus warp. Use enclosures or air conditioners to raise the ambient temperature if necessary.



### 1.1.2 Recommended Humidity

Extreme humidity is harmful to the 3D printer. The recommended relative humidity for your 3D printer is between 30% to 70%. In extremely damp conditions, the 3D printer will be damaged due to dampened components. In extremely dry conditions, the 3D printer under static interference may execute wrong operations. Use dehumidifiers or humidifiers to keep the relative humidity at a recommended range if necessary.

## 1.2 Workbench

Put the 3D printer on a sound and level workbench.

Put the workbench in a well-ventilated place when printing with ABS, as it emits toxic fumes.

Put the workbench near ventilation openings should you use the 3D printer with an enclosure or air purifier.

Keep the workbench clean and dry.

# 02 Filament Library

## 2.1 Filament Overview

Your 3D printer support filaments including PLA, ABS, TPU, PETG, more being tested.

Filament	Properties	Application	See
PLA	Easy to print, environmentally friendly, degradable, food safe, high tensile strength, low shrinkage, variety in color	Medical devices, food handling, packaging, automotive components	<a href="#">2.2</a>
ABS	Stiff, heat-resistant, impact-resistant, strain-resistant, abrasion-resistant, good weldability, high shrinkage	Home appliances, building and construction, fittings, housings, pipes, automotive components, electronics	<a href="#">2.3</a>
TPU	Transparent, elastic, abrasion-resistant, oil-resistant, grease-resistant, high shear strength, high shrinkage	Automotive components, sporting equipment, medical devices, outer cases, seals, gaskets, tubes, hoses	<a href="#">2.4</a>
PETG	Easy to print, tough, transparent, heat-resistant, water-resistant, chemical-resistant, recyclable, high tensile strength, low shrinkage	Food and drink containers, medical and pharmaceutical devices, retail stands and displays, machine guards	<a href="#">2.5</a>

The data sheets provided in this manual are intended for reference and comparison purposes only. Actual performance varies with printing conditions. Each user is responsible for judging the fitness for application in specific conditions. The data is subject to change without notice.

### How to Store Filaments

Most filaments absorb moisture from the air, especially PLA and PETG. The damp filament is likely to block the nozzle or ruin your prints. If the printing interval is long, store the filament in a vacuum-sealed bag with a desiccant, labeled with the unwrapped date. The exposed filament is supposed to use up within one month, and the vacuum-sealed filament can be stored for about 24 months.

Store the filament at the temperature of around 25°C (77°F).

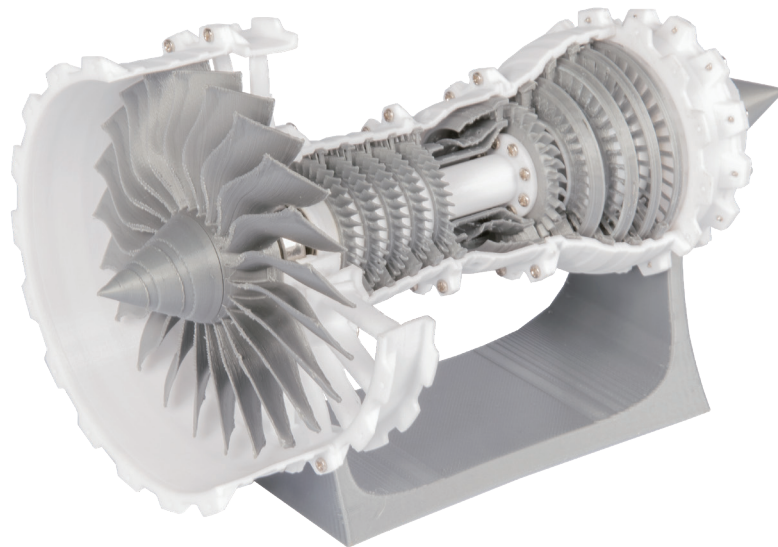
Store the filament at the relative humidity of 40%.

Avoid direct exposure to sunlight.



## 2.2 PLA

Filament Properties	
Physical Properties	
Diameter	1.75 mm
Density	1.2 g/cm <sup>3</sup>
Thermal Properties	
Melt Flow Index	3.5 g/10 min
Heat Deflection Temperature	53°C (127.4°F)
Mechanical Properties	
Flexural Strength	90 MPa (13 ksi)
Flexural Modulus	1,915 MPa (277.7 ksi)
Impact Strength	5.4 KJ/m <sup>2</sup>
Elongation at Break	11.8%
Printing Parameters	
Printing Temperature	190°C–230°C (374°F–446°F)
Heated Bed Temperature	45°C–60°C (113°F–140°F)
Printing Speed	40 mm/s–100 mm/s

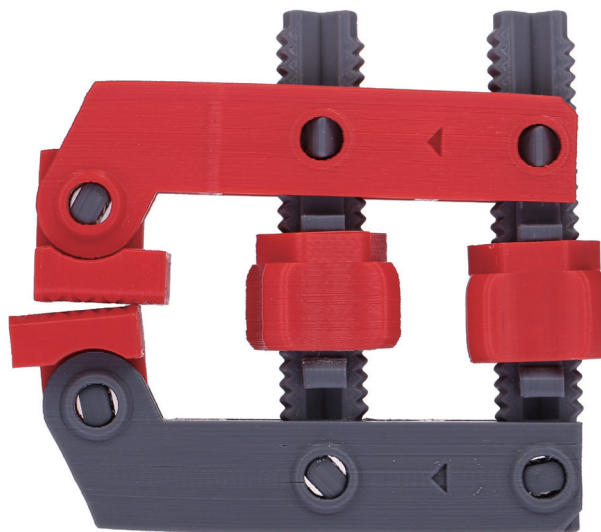


PLA will easily absorb moisture from the air and thus get damp. Store it in a dry place.



## 2.3 ABS

Filament Properties	
Physical Properties	
Diameter	1.75 mm
Density	1.06 g/cm <sup>3</sup>
Thermal Properties	
Heat Deflection Temperature	73°C (163.4°F)
Mechanical Properties	
Flexural Strength	68 Mpa (9.9 ksi)
Flexural Modulus	1,203 Mpa (174.5 ksi)
Tensile Strength	40 MPa (5.8 ksi)
Impact Strength	42 KJ/m <sup>2</sup>
Elongation at Break	30%
Printing Parameters	
Printing Temperature	230°C–240°C (446°F–464°F)
Heated Bed Temperature	95°C–110°C (203°F–230°F)
Printing Speed	40 mm/s–100 mm/s



ABS emits pungent odors and toxic particles when printed. Use this type of filaments in a well-ventilated place and wear protective masks.

## 2.4 TPU

Filament Properties	
Physical Properties	
Diameter	1.75 mm
Density	1.21 g/cm <sup>3</sup>
Thermal Properties	
Melt Flow Index	1.2 g/10 min
Mechanical Properties	
Tensile Strength	35 MPa (5.1 ksi)
Elongation at Break	800%
Printing Parameters	
Printing Temperature	230°C–250°C (446°F–482°F)
Heated Bed Temperature	45°C–60°C (113°F–140°F)
Printing Speed	10 mm/s–50 mm/s



## 2.5 PETG

Filament Properties	
Physical Properties	
Diameter	1.75 mm

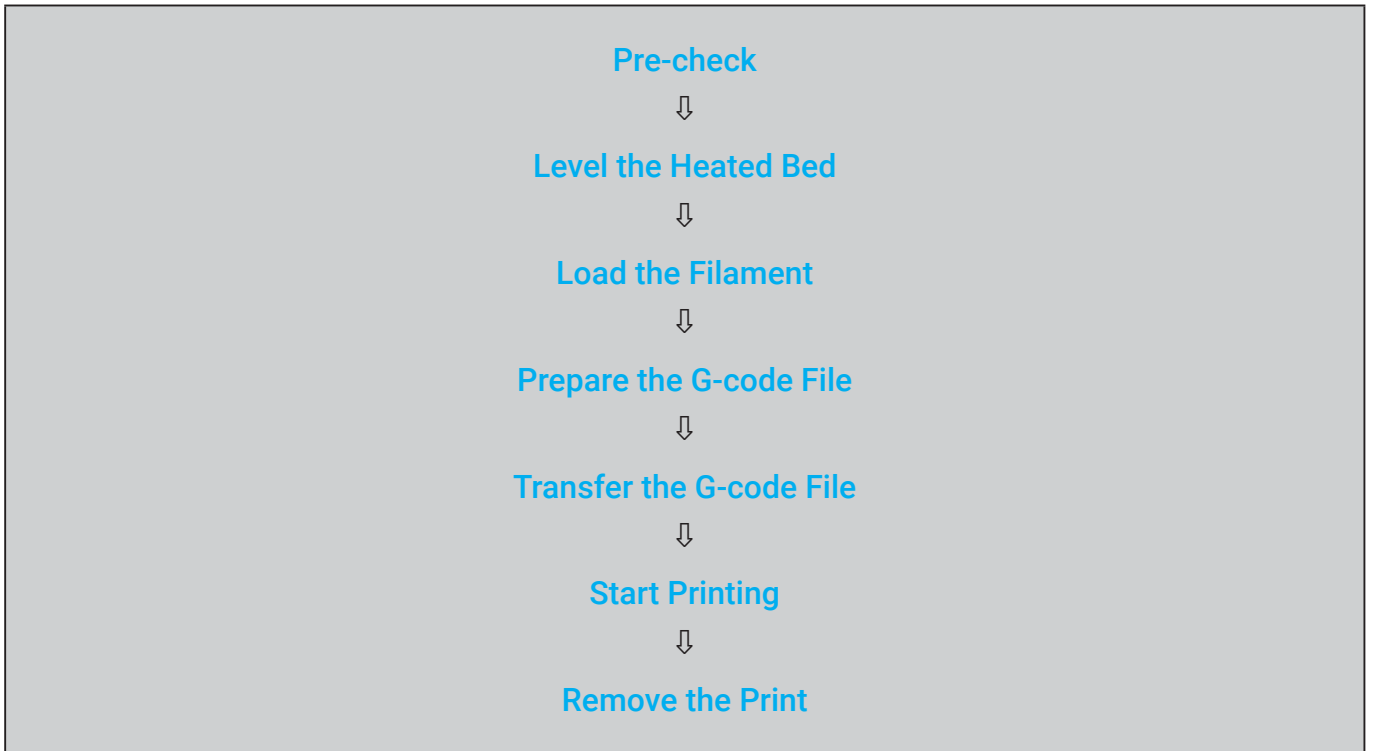
Density	1.38 g/cm <sup>3</sup>
<b>Thermal Properties</b>	
Melt Flow Index	20 g/10 min
Heat Deflection Temperature	64°C (147.2°F)
<b>Mechanical Properties</b>	
Flexural Strength	68 Mpa (9.9 ksi)
Flexural Modulus	1,800 Mpa (261.1 ksi)
Tensile Strength	49 MPa (7.1 ksi)
Impact Strength	7.6 KJ/m <sup>2</sup>
Elongation at Break	225%
<b>Printing Parameters</b>	
Printing Temperature	230°C–250°C (446°F–482°F)
Heated Bed Temperature	60°C–80°C (140°F–176°F)
Printing Speed	40 mm/s–100 mm/s



Store PETG in a cool, dry place. Avoid long exposure to air.

# 03 How to 3D Print

## 3.1 3D Printing Workflow



Before printing, you should thoroughly check the 3D printer and filament (see [5.2 Before You Print](#) ).

## 3.2 Level the Heated Bed

### Leveling Mode

There are four leveling modes to calibrate the Heated Bed—Auto Leveling, Manual Leveling, Heated Auto Leveling, and Heated Manual Leveling. Normally, Auto Leveling or Manual Leveling is your go-to choice. If the first layer cannot stick to the Heated Bed, try Heated Auto Leveling or Heated Manual Leveling to improve the first layer adhesion.

To switch the mode on the Touchscreen, tap **Settings > 3D Printing > Auto Leveling or Heated Leveling**.



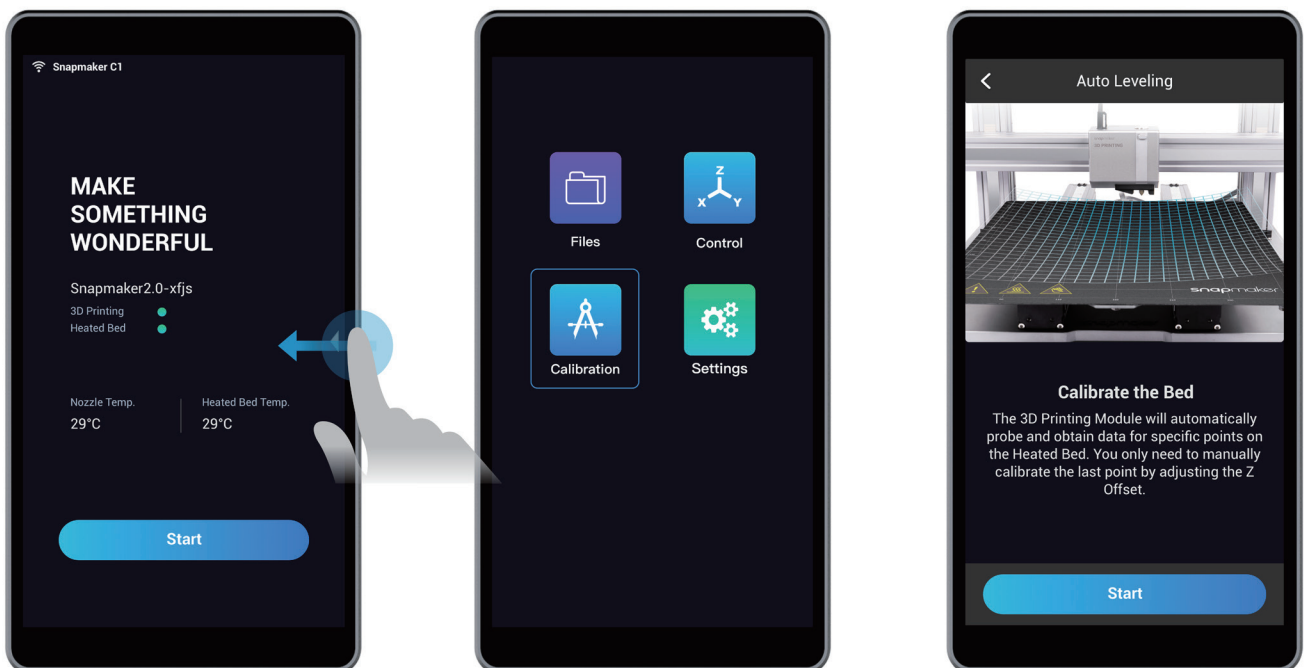
Do not touch the Heated Bed with bare hands while using the Heated Leveling mode.

## Auto Leveling

- (1) Turn on the 3D printer.



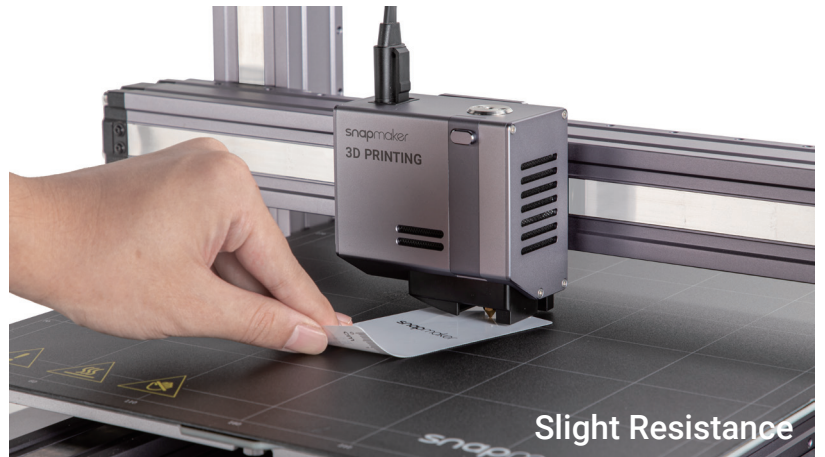
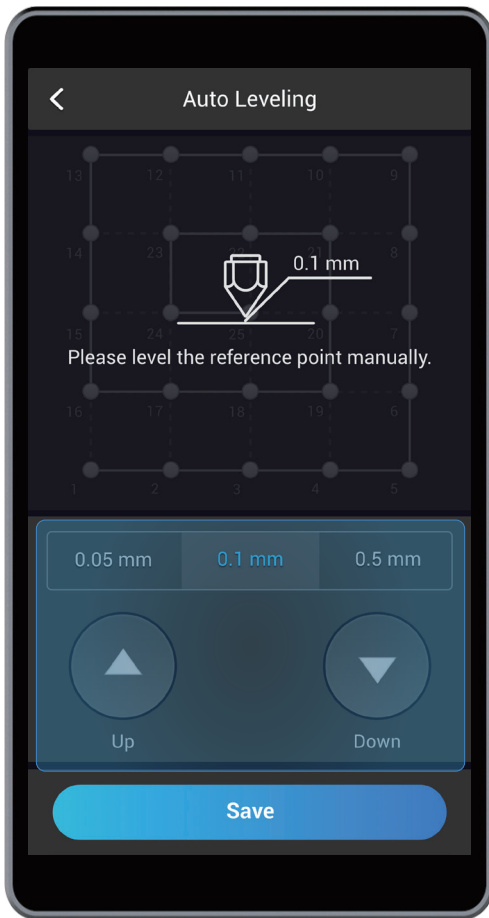
- (2) Read instructions. On the Touchscreen, swipe left to tap **Calibration**. Read on-screen instructions on how to level the bed and tap **Start** to run Auto Leveling.



- (3) Start calibrating. The 3D Printing Module has a built-in distance sensor measuring the distance between the nozzle and Print Sheet at specific points. If the Print Sheet is not flat, the 3D Printing Module will automatically adjust its movement to keep the nozzle and Print Sheet at an optimum distance during printing. All you need to do is to manually calibrate the last point:
  - a. Place the Calibration Card or a piece of paper between the nozzle and Print Sheet.



- b. Fine-tune the last point. Select the offset per travel (0.05 mm, 0.1 mm, or 0.5 mm). Keep adjusting the height of the nozzle tapping **Up** and **Down**, until you feel slight resistance when you pull out the Calibration Card and it should be wrinkled when you push it forward. Tap **Save** to save the calibration settings.

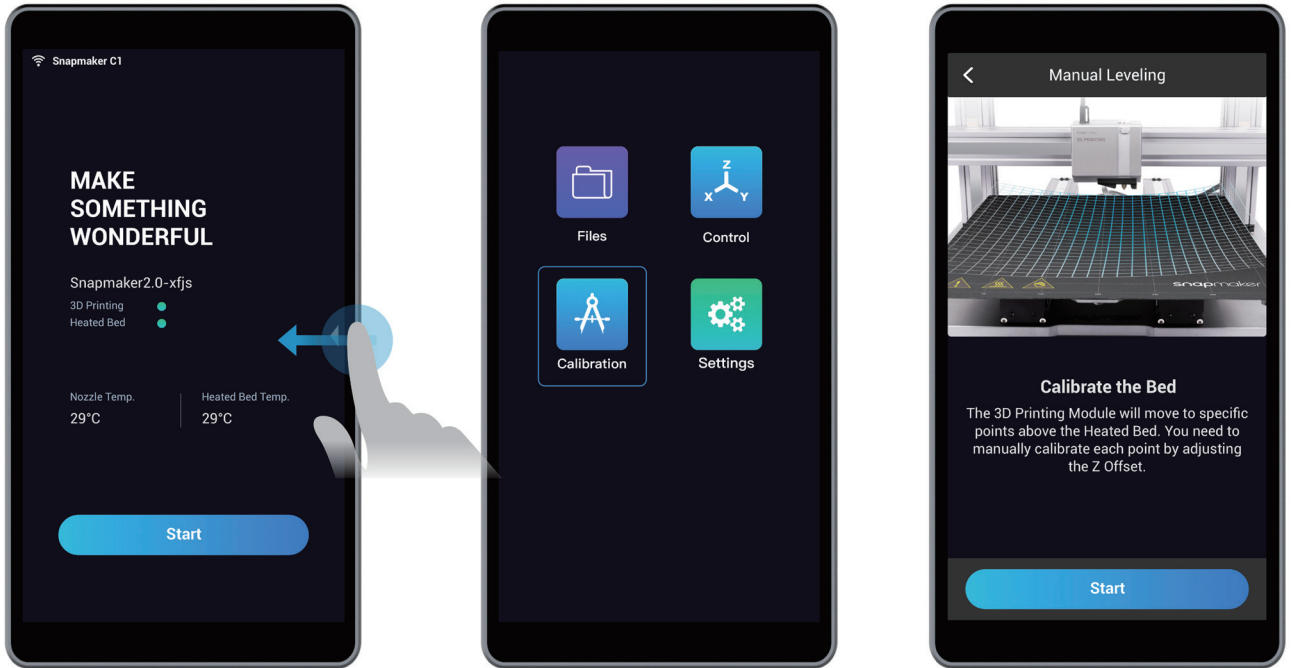


## Manual Leveling

- (1) Turn on the 3D printer.



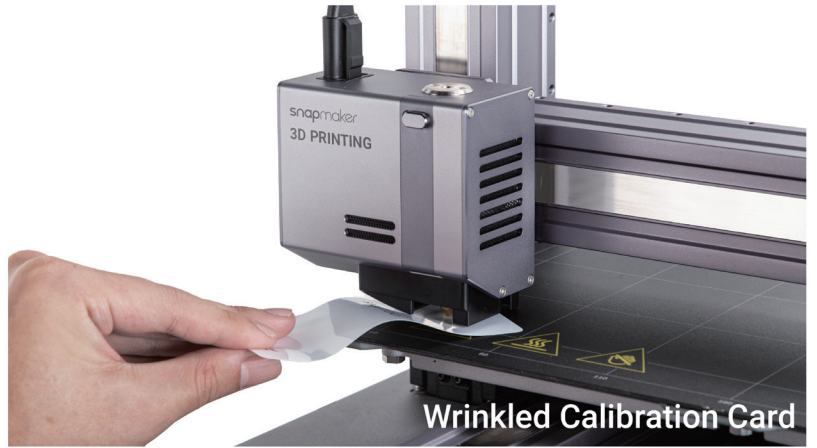
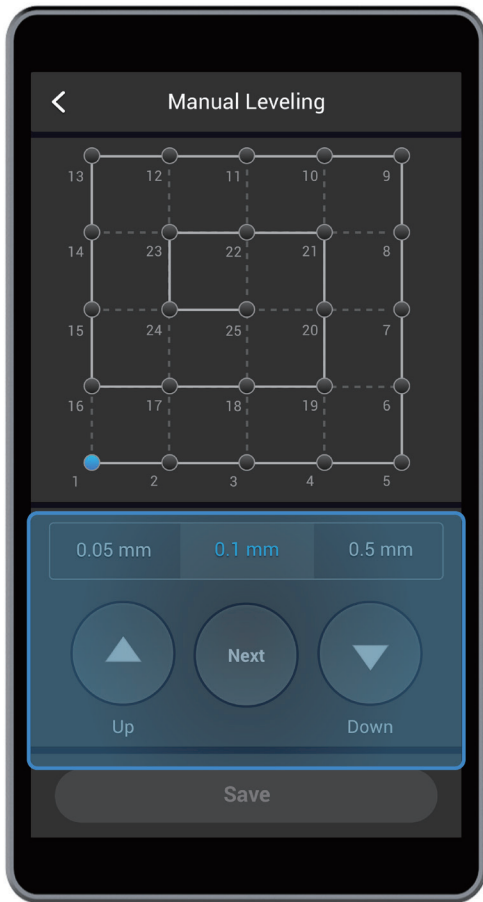
- (2) Read instructions. On the Touchscreen, swipe left to tap **Calibration**. Read on-screen instructions on how to level the bed and tap **Start** to run Manual Leveling.



(3) Calibrate the first point. Place the Calibration Card or a piece of paper between the nozzle and Print Sheet.



(4) Fine-tune the first point. Select the offset per travel (0.05 mm, 0.1 mm, or 0.5 mm). Keep adjusting the height of the nozzle tapping **Up** and **Down**, until you feel slight resistance when you pull out the Calibration Card and it should be wrinkled when you push it forward. Tap **Next** to calibrate the next point.



(5) Calibrate the rest of the points. One by one, repeat the previous two steps till the last point. Tap **Save** to save the calibration settings.



### Calibration Grid

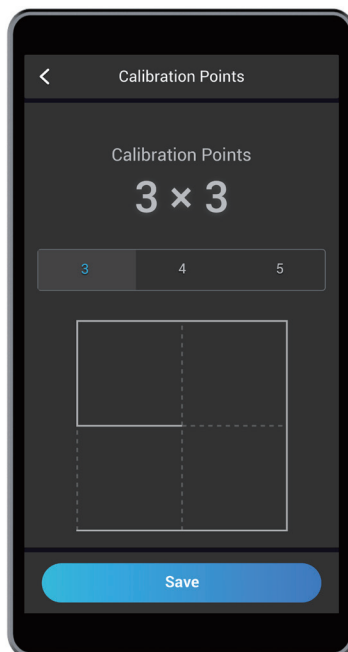
Your 3D printer has three types of calibration grids, made up respectively of 9, 16, or 25 points. At each point, the distance sensor probes the height of the Heated Bed, and then the 3D printer records the data. During printing, the 3D printer will automatically adjust its movement, based on the measured data, to keep the nozzle and Print Sheet at an optimum distance. The more points your 3D printer probes, the more precise data your 3D printer gets, and the more likely the first layer is to adhere to the Heated Bed.



To switch the calibration grids, tap **Settings** > **3D Printing** > **Calibration Grid** on the Touchscreen.

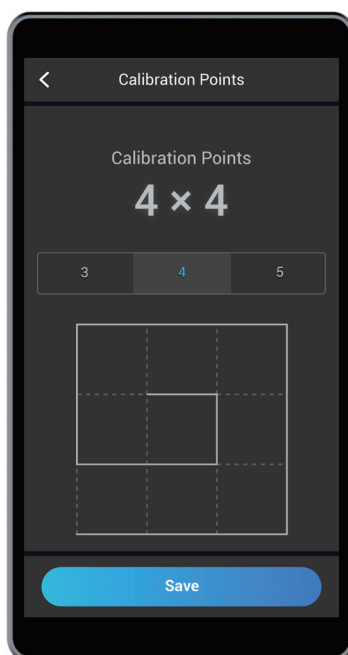
### 9-Point Grid

This grid is  $2 \times 2$ , with 9 points. To apply it, tap **3** and **Save**.



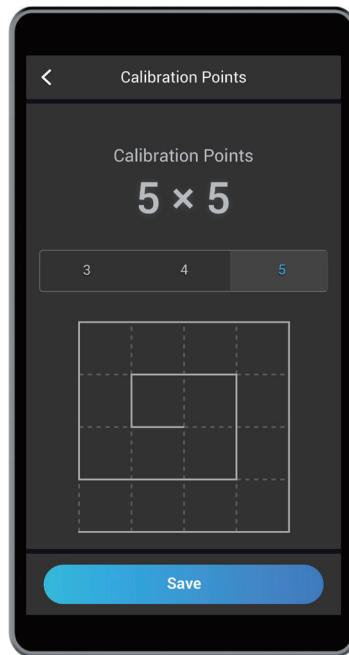
### 16-Point Grid

This grid is  $3 \times 3$ , with 16 points. To apply it, tap **4** and **Save**.



## 25-Point Grid

This grid is 4 × 4, with 25 points. To apply it, tap **5** and **Save**.

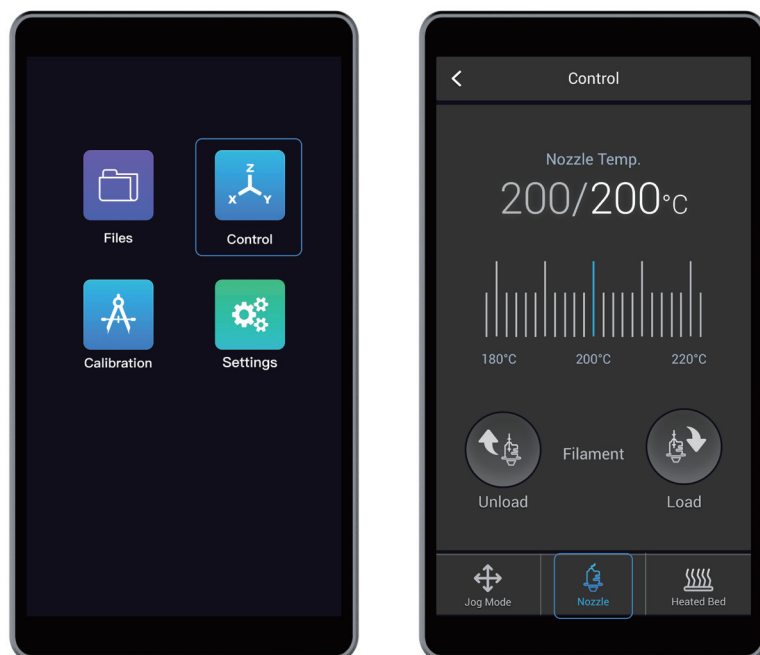


### 3.3 Load the Filament

Your 3D printer supports two filament loading modes—Auto Loading and Manual Loading, as is the case with filament unloading. To automatically load the filament, heat up the nozzle and tap **Load** on the Touchscreen. To manually load the filament, heat the nozzle and extrude the filament by hand.

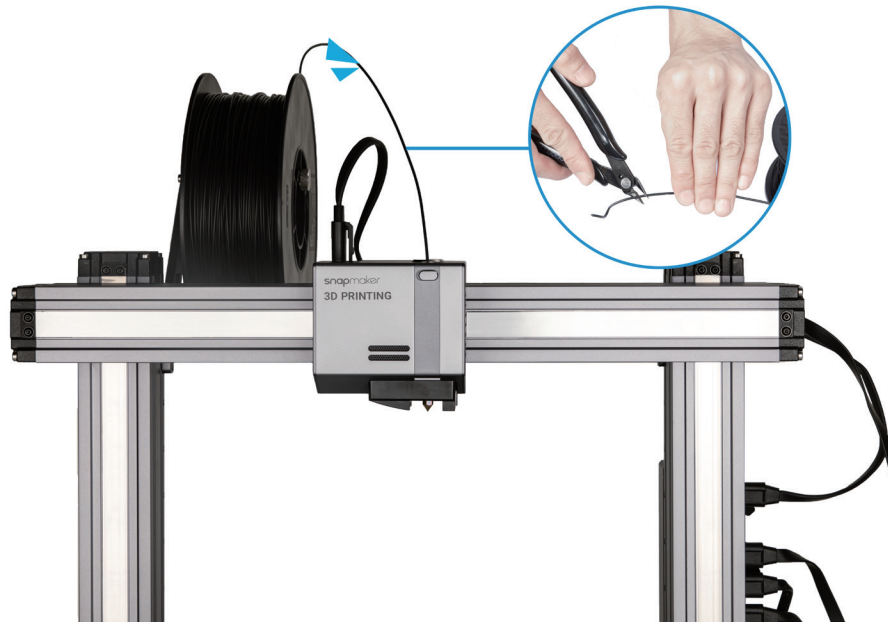
#### Automatically Load the Filament

- (1) Heat the nozzle. On the APP List Screen, tap **Control** > **Nozzle**. Slide the scale bar left or right to set the target Nozzle Temp. so that the heated block can melt the filament.



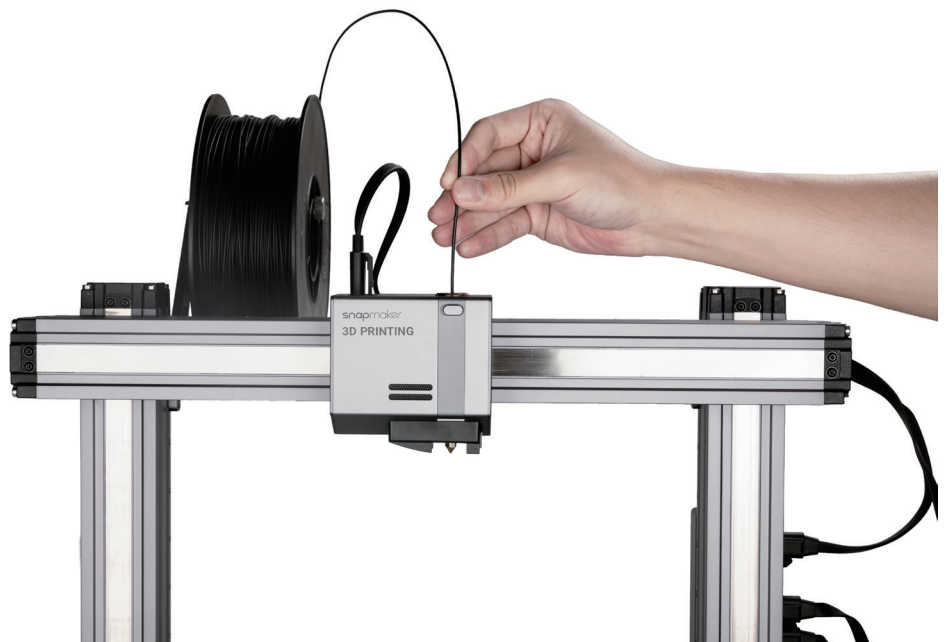
By default, the nozzle will be heated to 200°C (392°F). The **Load** or **Unload** button is available only when the nozzle is heated to around the preset temperature which should be 175°C (347°F) or higher.

- (2) Insert the filament. During heating, hang the filament onto the Filament Holder. Cut the bent end of the filament using the diagonal pliers, and insert it into the 3D Printing Module.

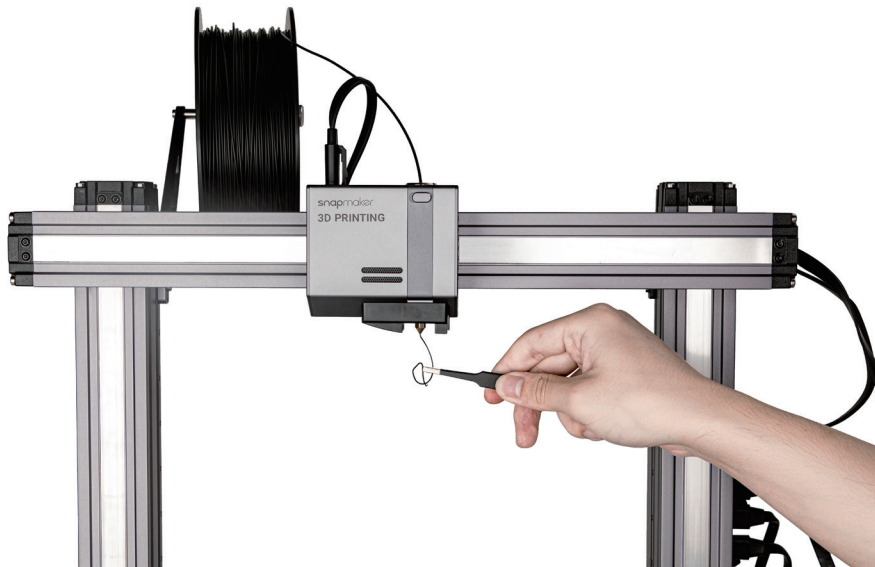


Should the 3D Printing Module have filament inserted, heat the nozzle up to 200°C (392°F) and then tap **Unload** to pull out the old filament before inserting a new one.

- (3) Load the filament. After the nozzle reaches the target temperature, tap **Load** and gently thread the filament until you feel the gear driving the filament in.



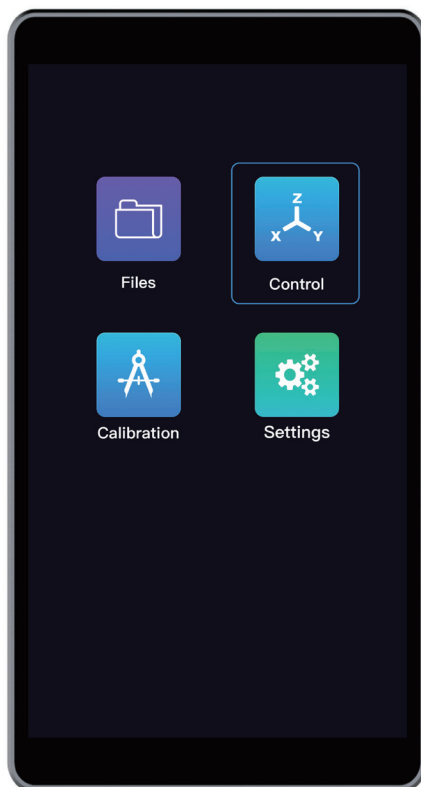
(4) Clean the nozzle using the tweezers.



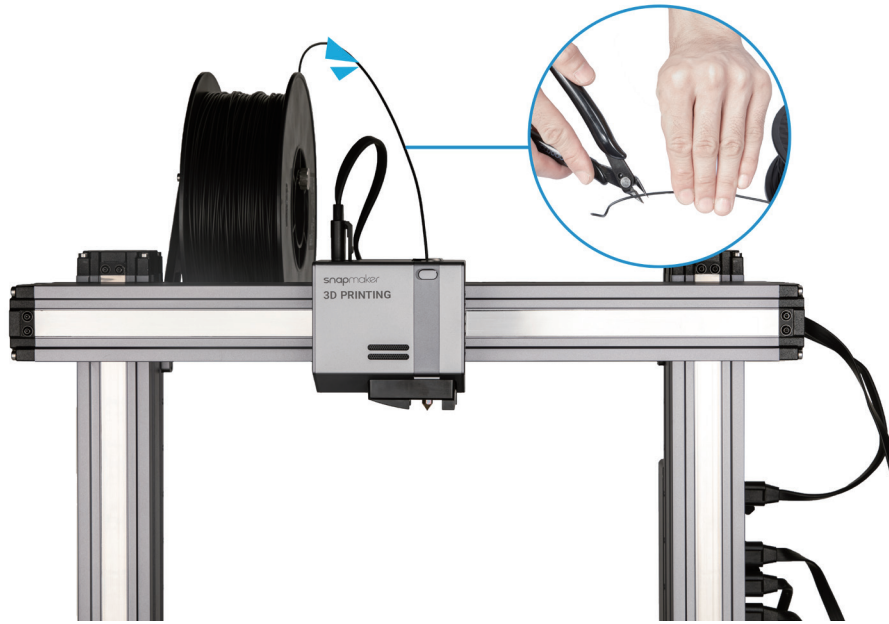
Do not touch the hot nozzle with bare hands.

### Manually Load the Filament

(1) Heat the nozzle. On the APP List Screen, tap **Control** > **Nozzle**. Slide the scale bar left or right to set the target Nozzle Temp. so that the heated block can melt the filament.

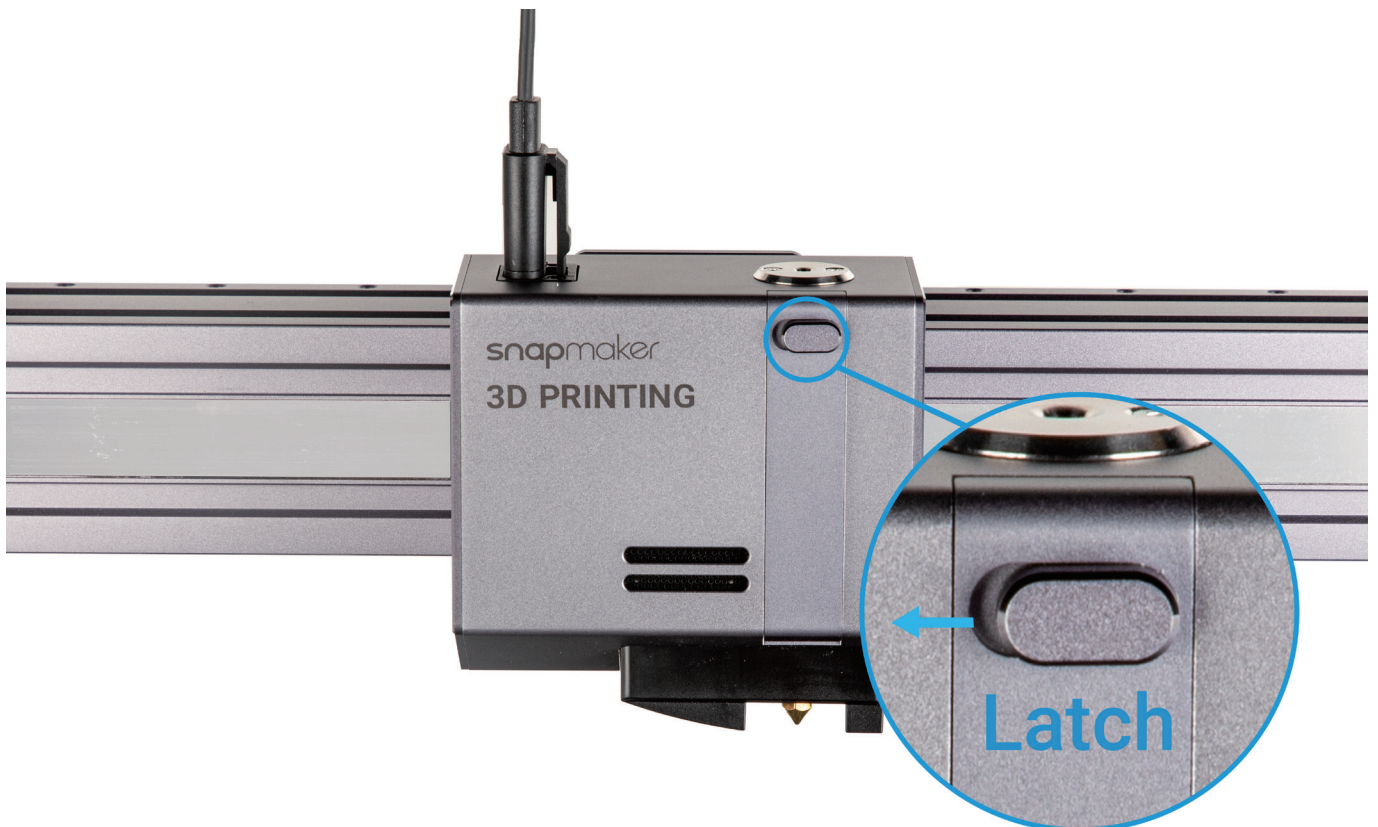


- (2) Insert the filament. During heating, hang the filament to the Filament Holder. Cut the bent end of the filament using the diagonal pliers, and insert it into the 3D Printing Module.



Should the 3D Printing Module have filament inserted, heat the nozzle up to 200°C (392°F) and then tap **Unload** to pull out the old filament before inserting a new one.

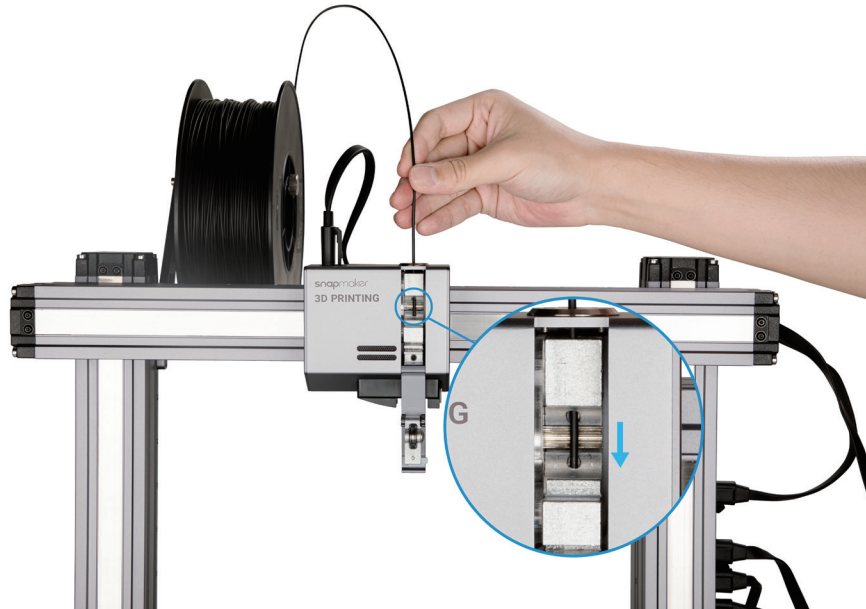
- (3) Open the 3D Printing Module. Press the slide knob inward and then push it left to open the 3D Printing Module.



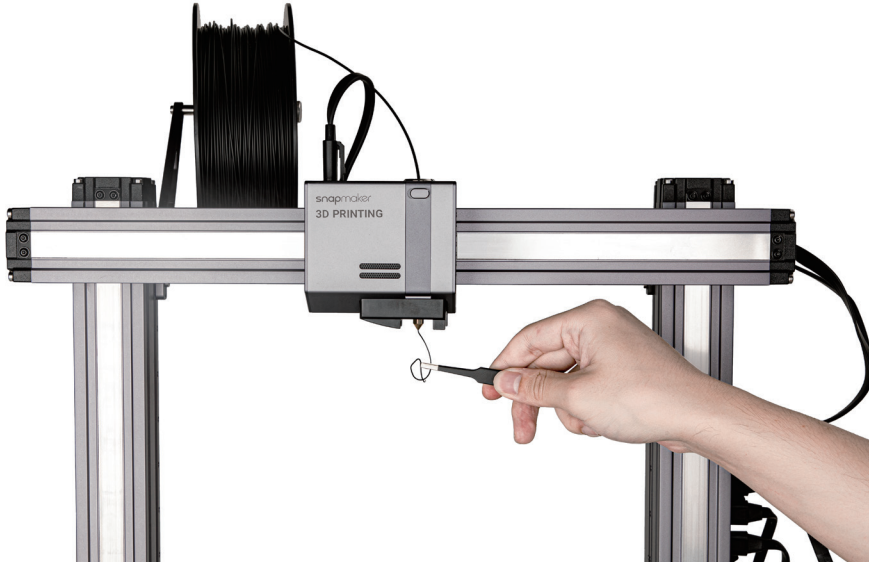


Do not touch the hot nozzle with bare hands while operating the slide knob.

- (4) Manually extrude the filament. After the nozzle reaches the target temperature, squeeze the filament down the feed hole until the uncured filament is extruded from the nozzle. Press the slide knob inward and then push it right to close the 3D Printing Module.



- (5) Clean the nozzle using the tweezers.



### 3.4 Prepare the G-code File

#### Prepare the Model File

Before generating the G-code file on Luban, you should prepare a model file. Here are a few options for preparing the model file:

- Use provided models in the Case Library of Luban.
- Design 3D models using the 3D modeling software, like SketchUp and Fusion 360.
- Download free and high-quality 3D models online, like [thingiverse.com](https://www.thingiverse.com) and [myminifactory.com](https://www.myminifactory.com).

- 3D scan models of various physical objects using a 3D scanner.
- As a reminder, Luban supports these design file formats for 3D printing: .stl, .obj, more formats to be added.


### Generate the G-code File

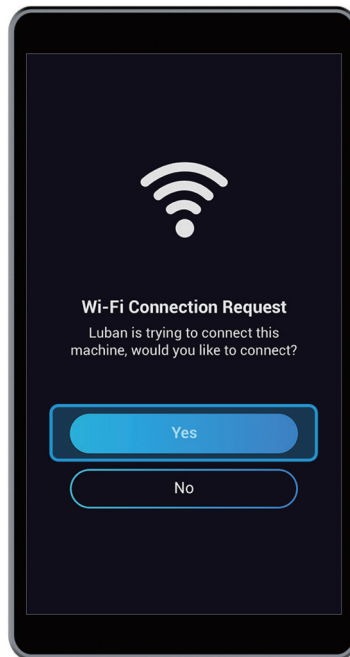
Open Luban and follow the [Snapmaker 2.0 Quick Start Guide](#) to generate the G-code file.

## 3.5 Transfer the File and Start Printing

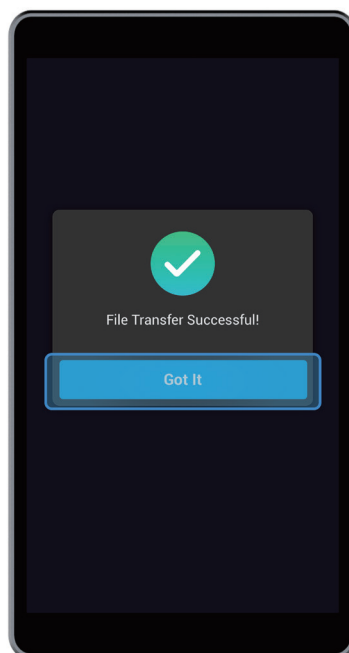
You can transfer the G-code file to Touchscreen or keep it on Luban for printing.

### Start Printing on the Touchscreen via Wi-Fi

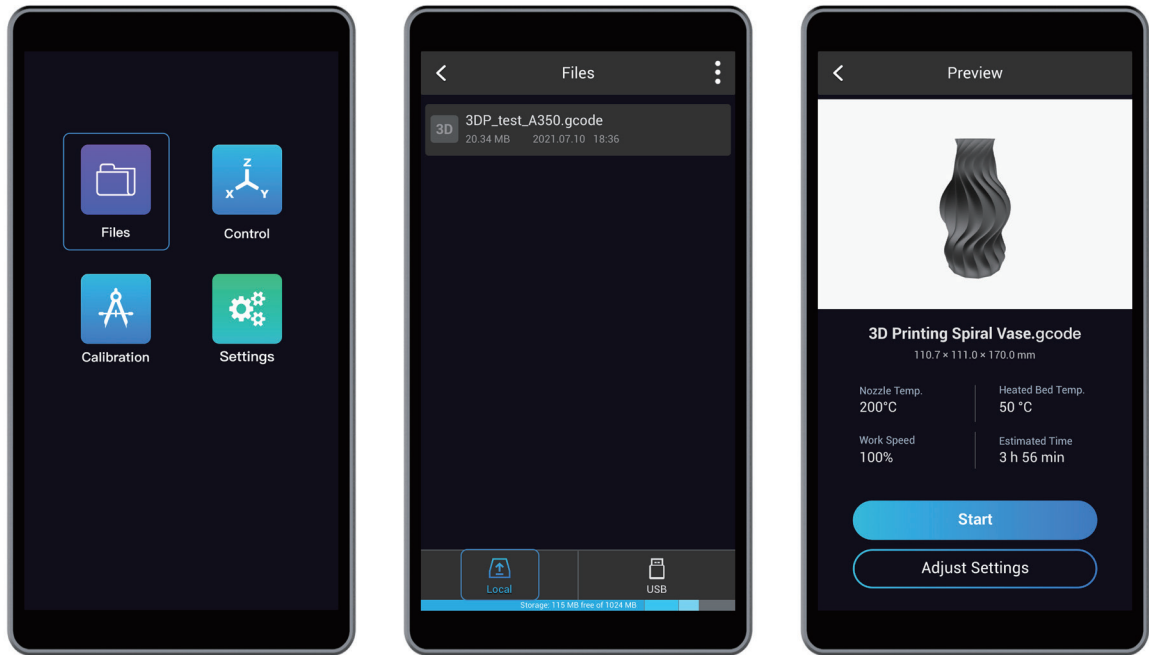
- (1) On Luban, click **Workspace**. In the Connection panel, click **Connect Wi-Fi** > **Refresh**  > Select your 3D printer in the drop-down list > **Connect** Luban to your 3D printer.
- (2) On the Touchscreen, tap **Yes** to grant Wi-Fi connection.



- (3) In Workspace, click **Send to Device via Wi-Fi**.
- (4) On the Touchscreen, tap **Got It** to receive the G-code file.



- (5) On the Touchscreen, find the G-code file by tapping **Files** > **Local**. Preview the file, check the printing settings, and tap **Start** to start printing.



Should the first layer fail to stick to the Print Sheet, **Stop** printing and see [6.1 First Layer Does Not Stick](#).

During printing, you can readjust settings by swiping left on the printing screen.

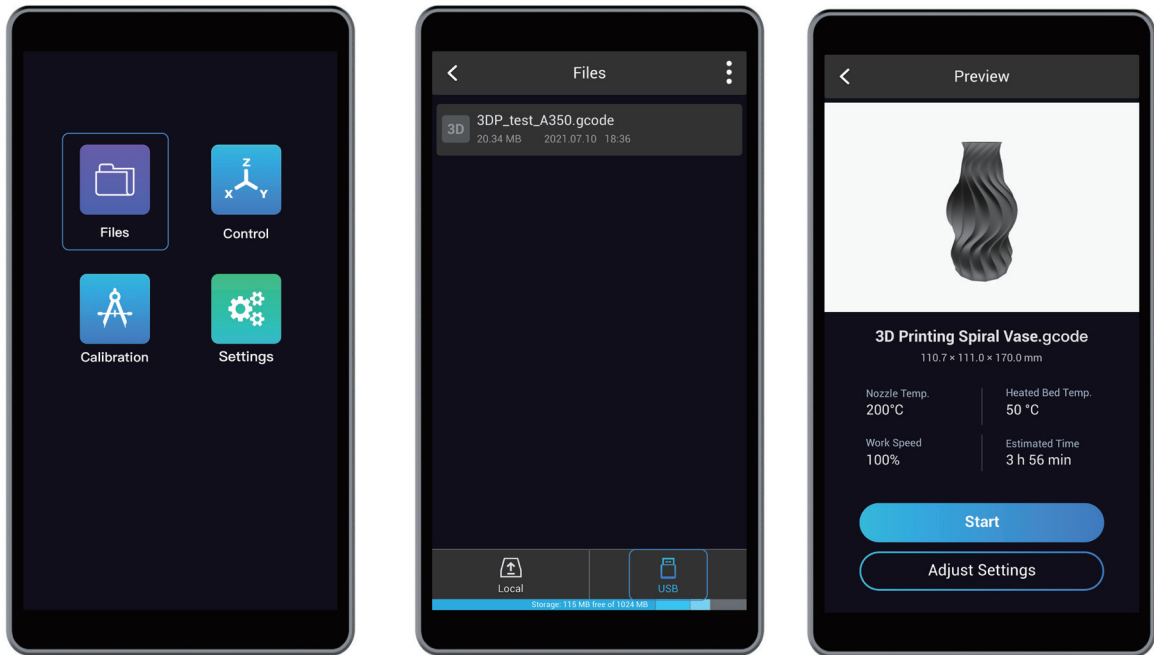
### Start Printing on the Touchscreen via USB Flash Drive


- (1) In the 3D Printing G-code Generator, click **Export G-code to File** (in .gcode format) and save it to the USB flash drive.
- (2) Insert the USB flash drive into the Controller of the 3D printer.



- (3) On the Touchscreen, find the G-code file by tapping **Files** > **USB**. Preview the file, check the printing settings, and tap **Start** to start printing.






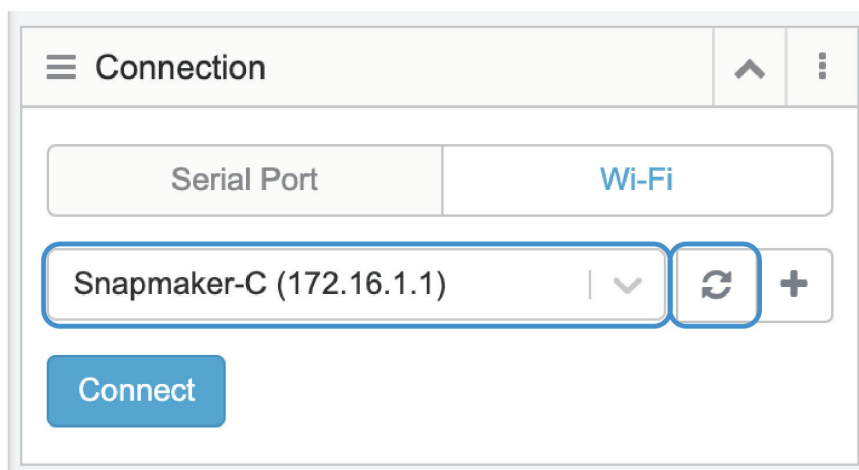


Should the first layer fail to stick to the Print Sheet, **Stop** printing and see [6.1 First Layer Does Not Stick](#).

During printing, you can readjust settings by swiping left on the printing screen.

### Start Printing on Luban via Workspace

- (1) In the 3D Printing G-code Generator, load the generated G-code file to Workspace by clicking **Load G-code to Workspace**.
- (2) In the Workspace, go to the Connection panel. Click **Wi-Fi > Refresh**  > Select your 3D printer in the drop-down list > **Connect** Luban to your 3D printer.



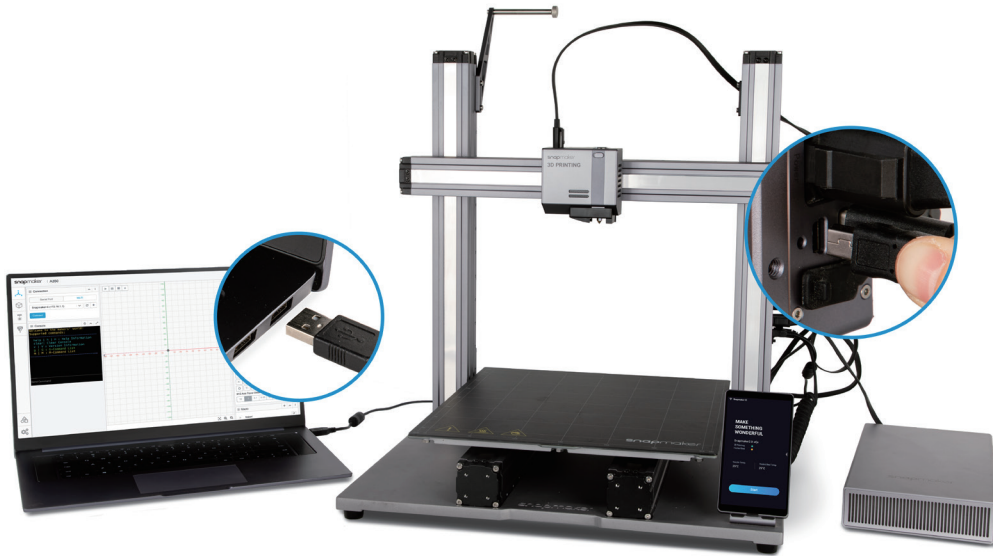
- (3) After connection, click the **Run** button  in Workspace to start printing.




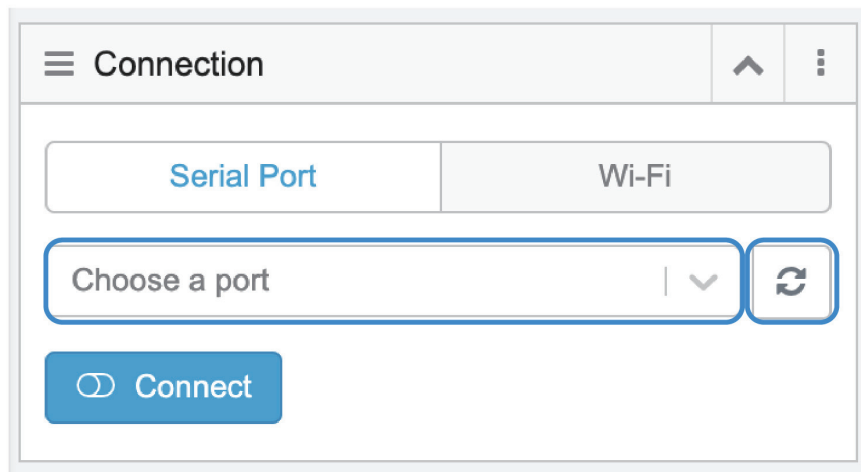
Should Wi-Fi be disconnected during printing, the Touchscreen will prompt you to keep or stop printing. To keep printing, ignore the prompt; to stop printing, tap **Confirm**.

## Start Printing on Luban via USB Cable


- (1) In the 3D Printing G-code Generator, load the generated G-code file to Workspace by clicking **Load G-code to Workspace**.
- (2) Insert one end of the USB cable into the computer, and the other end into the Controller of the 3D printer.



- (3) On Luban, click **Workspace**. In the Connection panel, click **Serial Port** > **Refresh**  > Select the port of your 3D printer in the drop-down list > **Connect** Luban to your 3D printer.



If you can't find the port, unplug the USB cable and try again. For initial use, you need to download and install the driver from [snapmaker.com/product/snapmaker-2/downloads](https://snapmaker.com/product/snapmaker-2/downloads).

- (4) After connection, Luban will prompt you to select your machine model and toolhead. Select and click **Choose** to save the settings.
- (5) Now you can start printing by clicking the **Run** button .

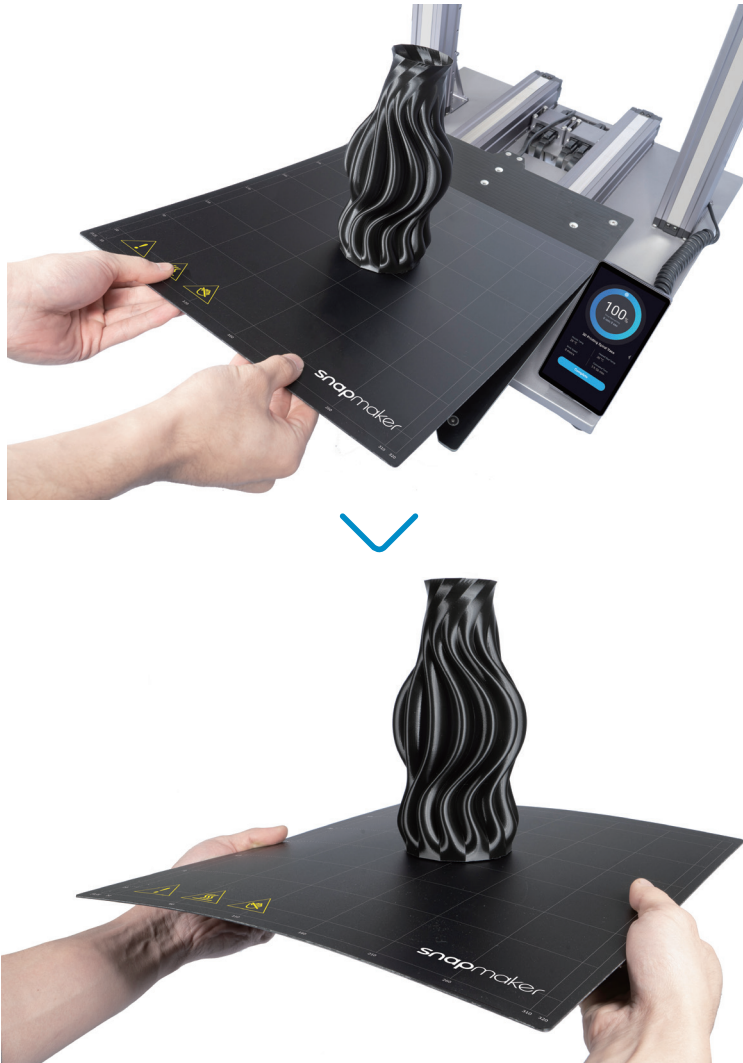


Keep the cable connected until the printing job is completed. Otherwise, the job will be stopped.

### 3.6 Remove Prints

#### Bend the Print Sheet

- (1) Wait several minutes until the nozzle and Heated Bed cool down to the ambient temperature as indicated by the Touchscreen. Remove the Print Sheet from the Heated Bed, and slightly bend the Print Sheet to detach the print edge from the Print Sheet.



Do not overbend the Print Sheet; otherwise, it may compromise the first layer adhesion.

- (2) Place the Print Sheet on a stable and flat workbench. Gently scrape the print using its sharp edge.



## Tape the Print Sheet

To remove the print with ease, you can tape the Print Sheet before printing.

- (1) Clean the Print Sheet surface with alcohol.



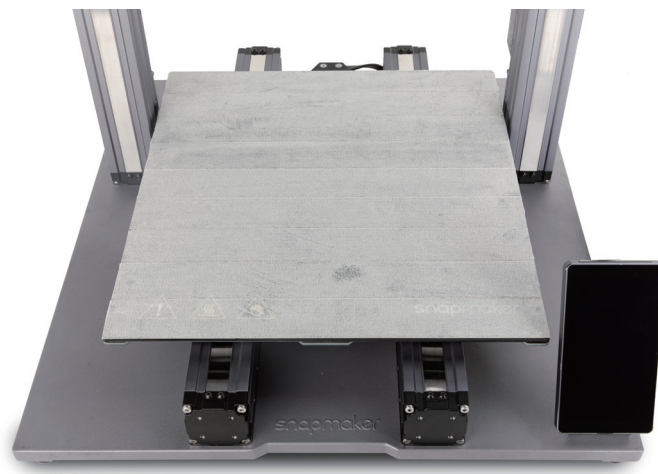
- (2) Tape the Print Sheet using adhesive tapes ( $\geq 1$  mm) that are resistant to high temperature. Apply pressure to the tapes to smooth out air bubbles underneath using the flat blade.



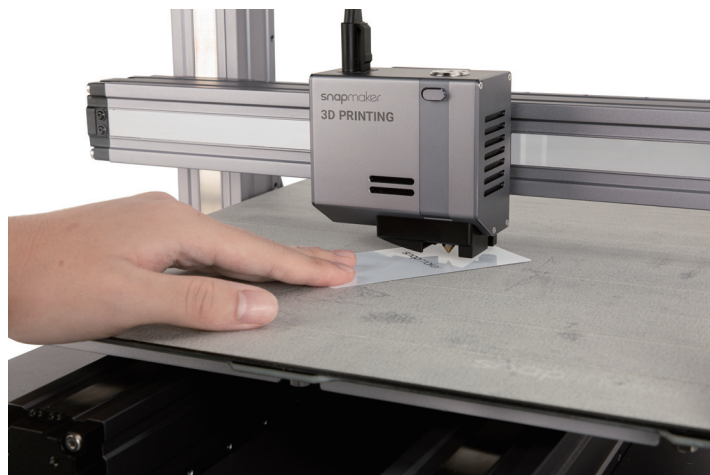
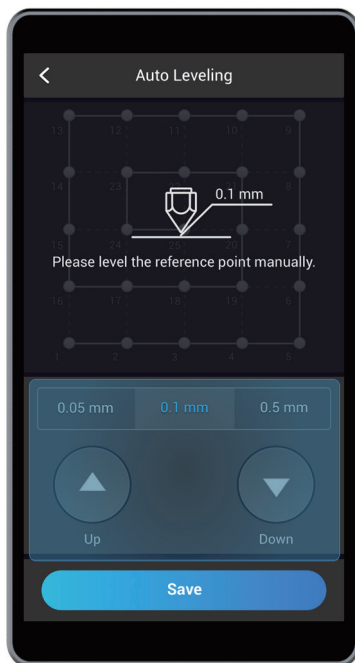
(3) Trim the tape to fit the Print Sheet edge.



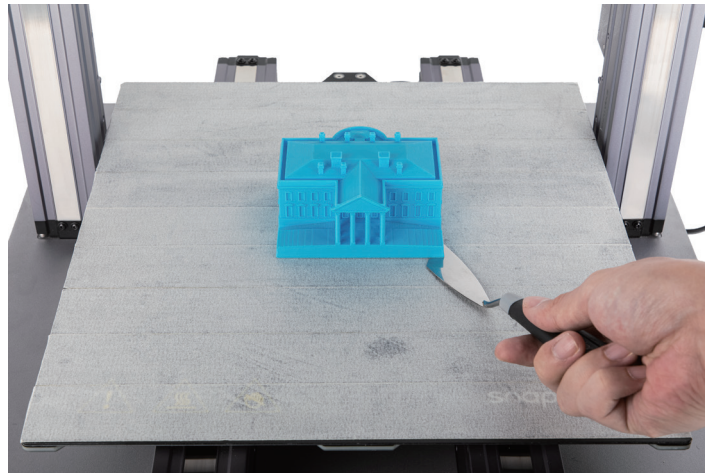
(4) Tape the entire Print Sheet. Ensure that the two sides of all tapes fit tightly, without any gaps.



(5) Since the printing will be performed on the tape, you should recalibrate the Heated Bed before printing.



- (6) After the printing job completes, wait for the Heated Bed to cool down. Gently scrape your print from the tape using the palette knife. Adhesive tapes on the Print Sheet can be used for next printing job.



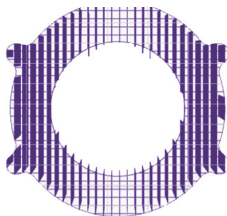
### Remove Support Structures

Some 3D prints work well without support structures, whereas some do need them. Should you add support structures in your G-code files, the following tips may be helpful.

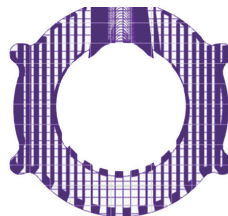
### Set Proper Support Structures

Luban has three types of support structures—Line, Zig Zag, and Grid. Generating support structures can prevent the overhung model parts from collapsing during printing. Setting a proper support pattern and its pertaining parameters will ease the removal of the support structures.

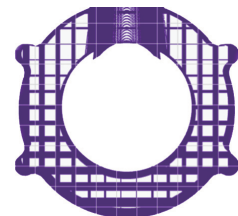
Generally, Line is the easiest pattern to remove, and Grid the most difficult. Line is often used for prints with few overhangs, requiring only slight support. Grid is suitable for prints with more overhangs which, if without any support from the base, will collapse the moment the uncured filament is extruded.



Line



Zig Zag



Grid

### Use Tools

As a general rule, you should always remove support structures slowly and cautiously.

#### Diagonal Pliers

Provided by Snapmaker. Diagonal pliers with wide jaws are typically used for cutting off outer parts, but less ideal for parts embedded deep inside the model.



### Needle Nose Pliers

Not provided. Needle nose pliers with long and narrow noses are typically used for grabbing away parts quickly, but less suitable for parts that need precise control.



### Precision Knives

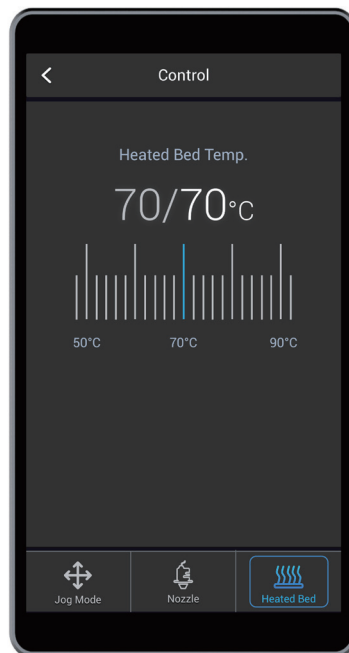
Not provided. Precision Knives are typically used for cutting off delicate parts which requires precision control.



## Remove Residual Filaments

### Heat the Bed Before Scraping

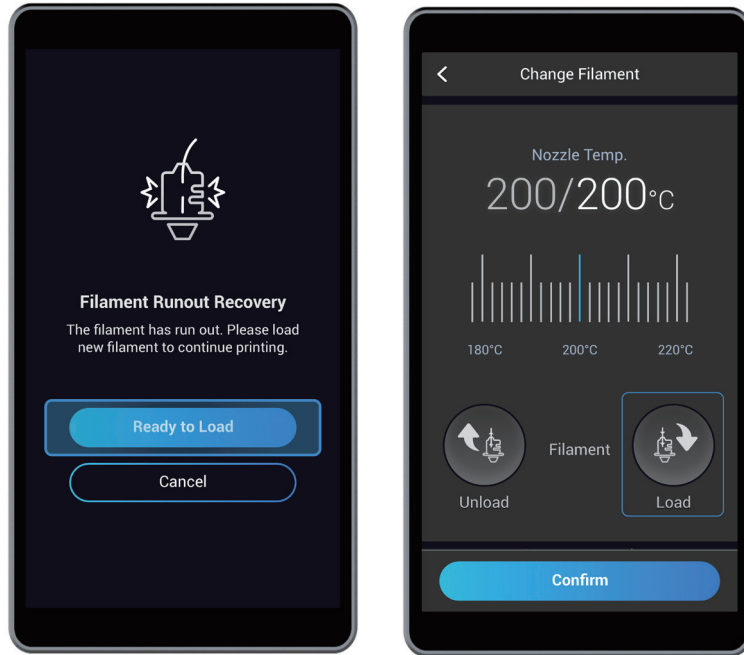
To ease the removal of cured filaments, heat the Heated Bed up to 70°C (158°F). Wait for the Heated Bed to cure the filament, and then scrape the residual filament using the sharp edge of the palette knife.



Do not touch the Heated Bed with bare hands.

## 3.7 Filament Runout Recovery

During printing, if the filament runs out, the 3D printer will pause printing and prompt you to replace the filament. In this case, tap **Ready to Load** and **Load** to change a filament (see [3.3 Load the Filament](#)). After the filament is reloaded, tap **Continue** to resume printing.



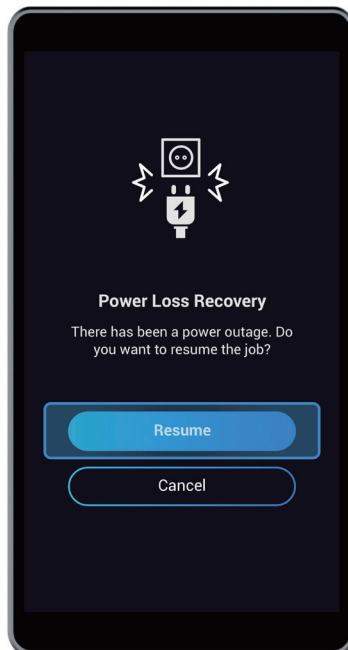
### 3.8 Power Loss Recovery

If the Power Module is turned off, to resume the printing job:

- (1) Turn on the power switch.
- (2) After the 3D printer is restarted, tap **Resume** on the Touchscreen.

If the AC Power Cable is unplugged, to resume the printing job:

- (1) Turn off the power switch.
- (2) Plug in the AC Power Cable.
- (3) Turn on the power switch.
- (4) After the 3D printer is restarted, tap **Resume** on the Touchscreen.





## 04 Waste Disposal

Waste disposal laws and regulations vary with countries and regions. When you dispose of any waste, you should observe the local laws, regulations, rules, or requirements on waste disposal.

### 4.1 Packaging

The shipping packaging is made of corrugated fiberboard, withstanding great pressure and providing effective protection for your 3D printer. The packaging can be recycled or reused to store 3D prints or create DIY projects. Inside the packaging is Expanded Polystyrene (EPS) foam, protecting your 3D printer from collision during shipping. Littering non-degradable EPS foam is detrimental to the environment, so throw the EPS foam into the designated trash bin.

### 4.2 Wasted Filaments

Do not litter non-degradable filaments or failed prints in nature. Throw them into the designated trash bin. As a reminder, wasted filaments or failed prints can be turned into something wonderful, as long as you give full play to your imagination!

### 4.3 Electronics

Electronics can be discarded, donated, or recycled. Should the e-waste be no longer wanted or near the end of its useful life, you can throw it into the designated trash bin, or take it to a trusted charity or recycler.

## 05 Maintenance

### 5.1 Maintenance Schedule

This maintenance schedule is for reference only. Should you use the 3D printer more frequently, adjust your schedule according to your use frequency. Before maintenance, check [Snapmaker's Limited Warranty](#) void your warranty by self-servicing your 3D printer.



Cut the power supply before maintenance.

### Before You Print

Task	See
Check the Cables	<a href="#">5.2.1</a>
Check the Support Platform	<a href="#">5.2.2</a>
Check the Heated Bed	<a href="#">5.2.3</a>
Check the Nozzle	<a href="#">5.2.4</a>
Check the Filament	<a href="#">5.2.5</a>

## Every Month

Task	See
Clean the Linear Modules	5.3.1
Clean the Gear in the 3D Printing Module	5.3.2
Clean the Side Covers	5.3.3

## Every Three Months

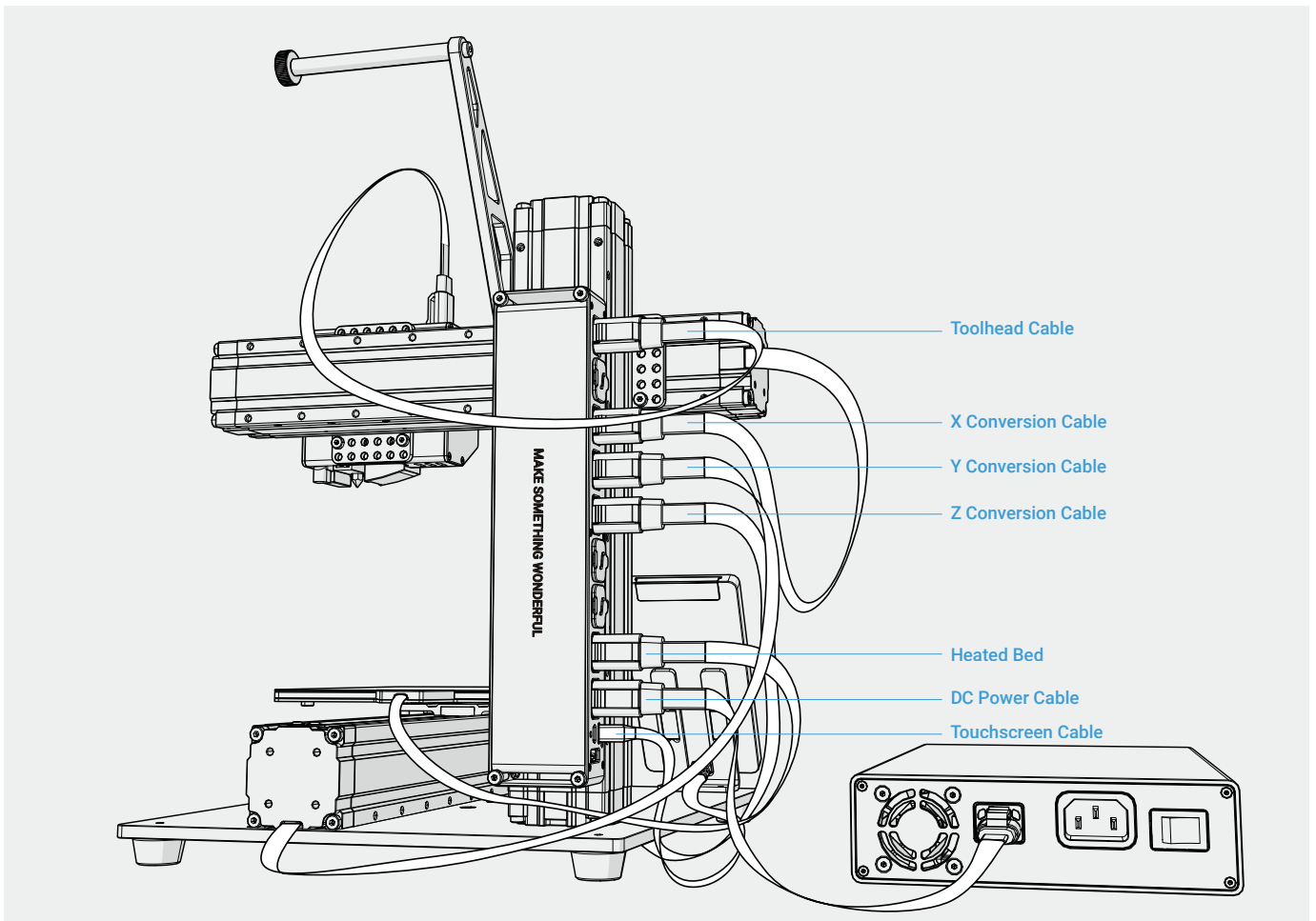
Task	See
Update the Firmware and Software	5.4

## 5.2 Before You Print

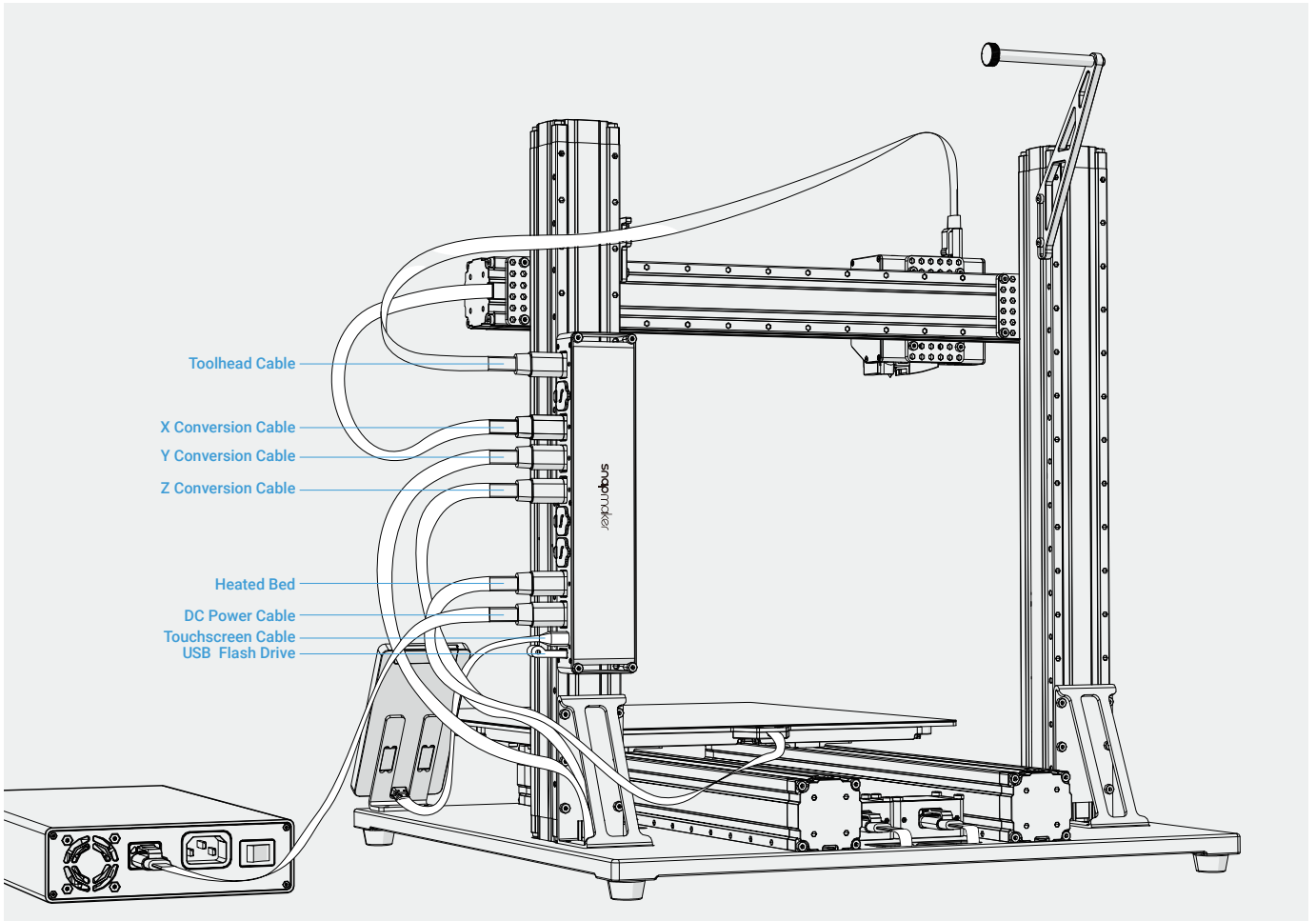
### 5.2.1 Check the Cables

Check if every cable is plugged into the right socket in the right direction.

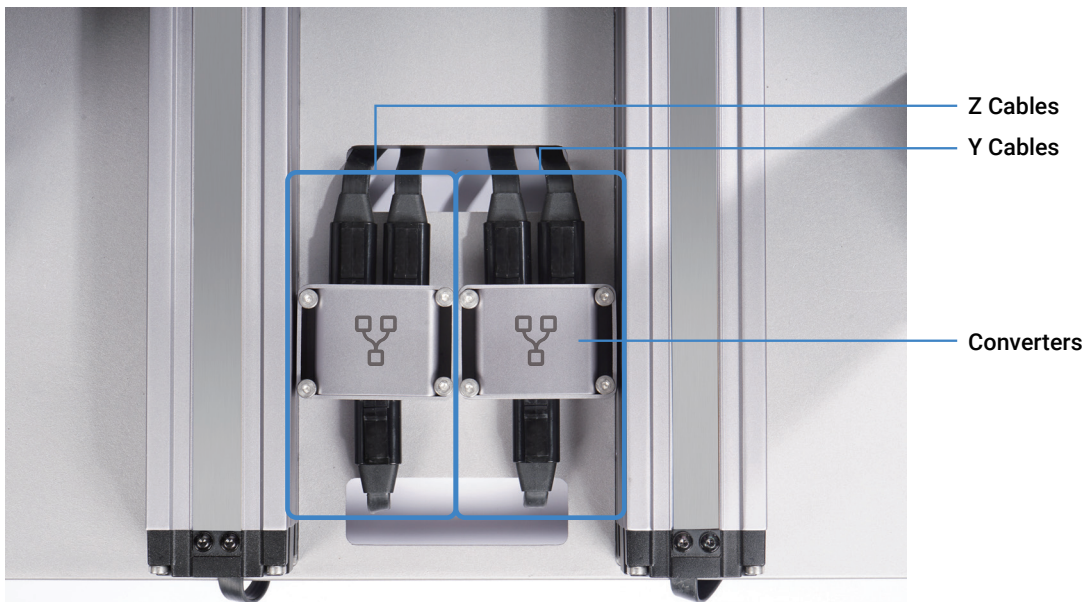
#### Into the Controller (A150)



## Into the Controller (A250 & A350)

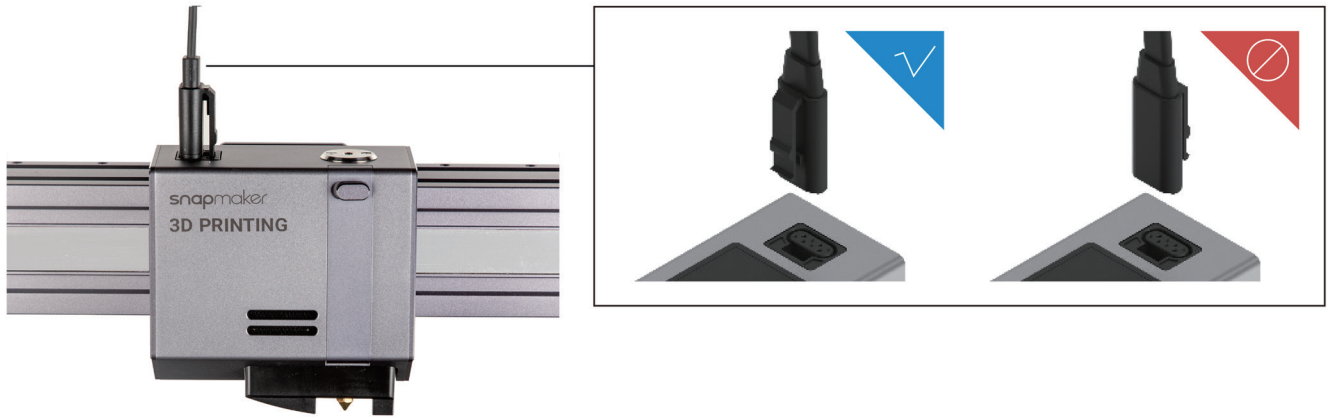


## Into the Converters



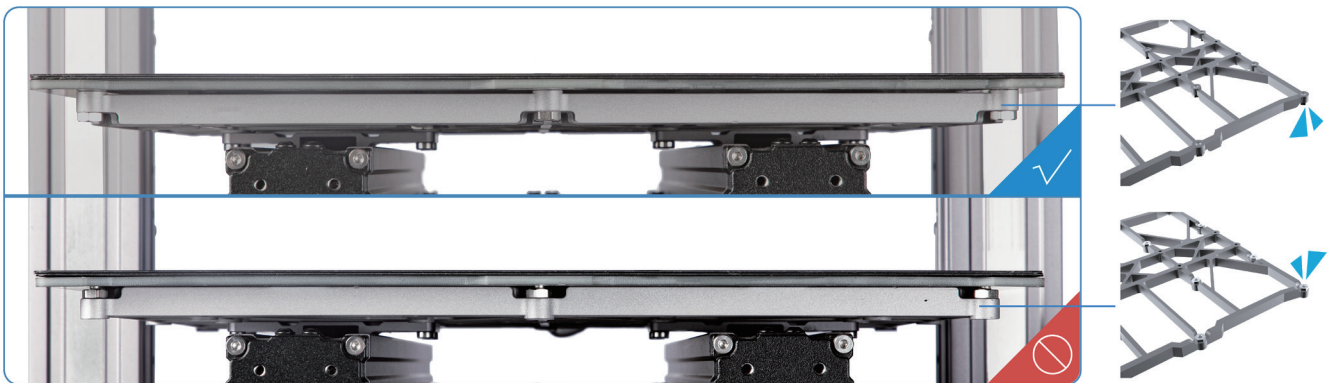
Snapmaker 2.0 A150 has no Converters.

## On the 3D Printing Module

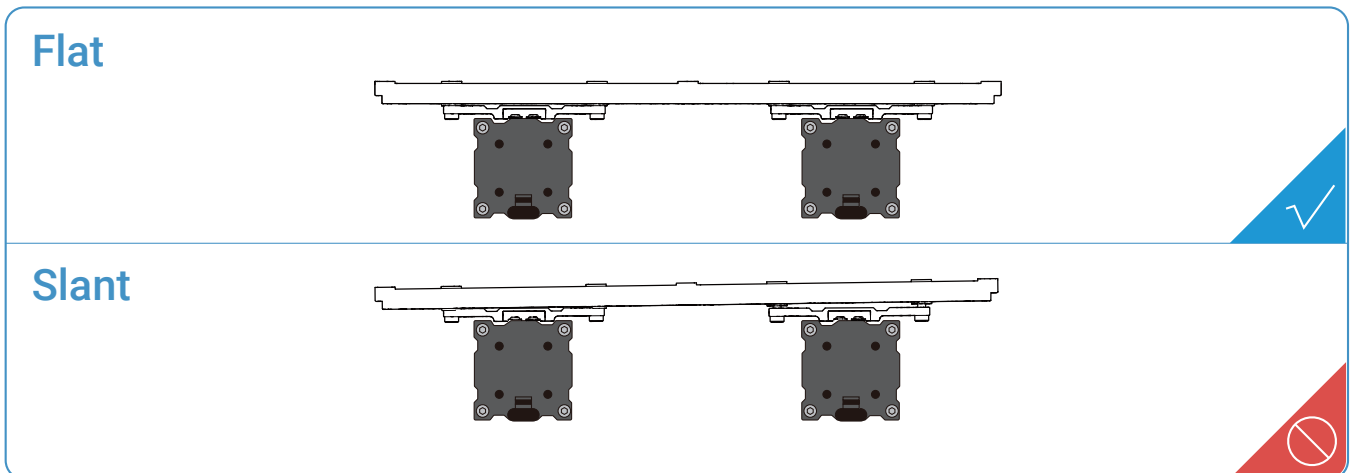


### 5.2.2 Check the Support Platform

Check if the Support Platform is assembled in the correct direction. The front without screws should face up, and the rear with some screws faces down. If you install the platform upside down, it will be higher than the one when it is correctly installed, and this is likely to cause the 3D Printing Module to bump into the Print Sheet.

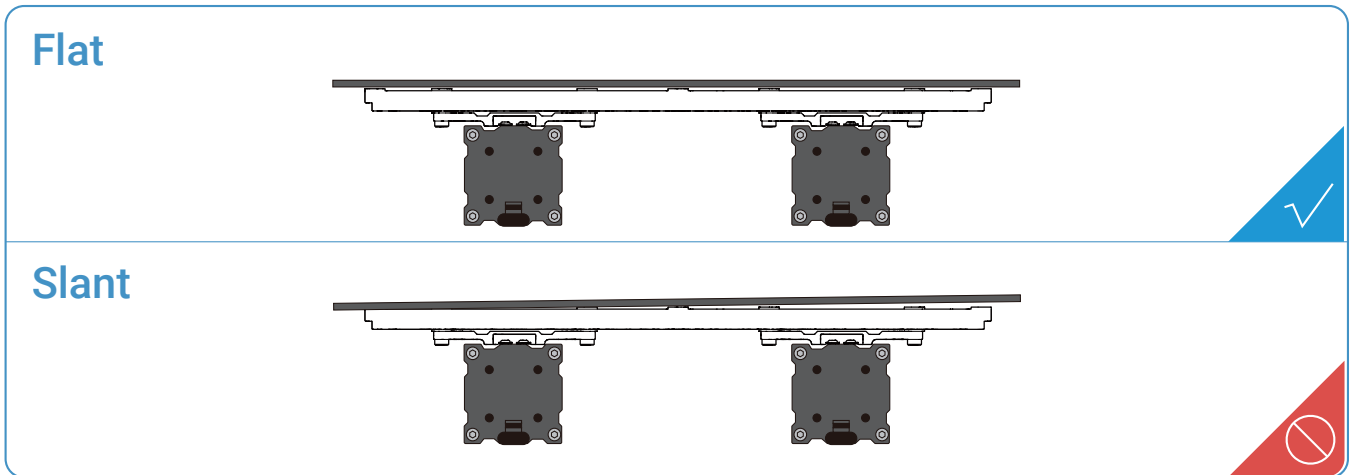


Check if the Support Platform is flat and stable, fully tightened with screws. If not, loosen all screws and reassemble the Platform.

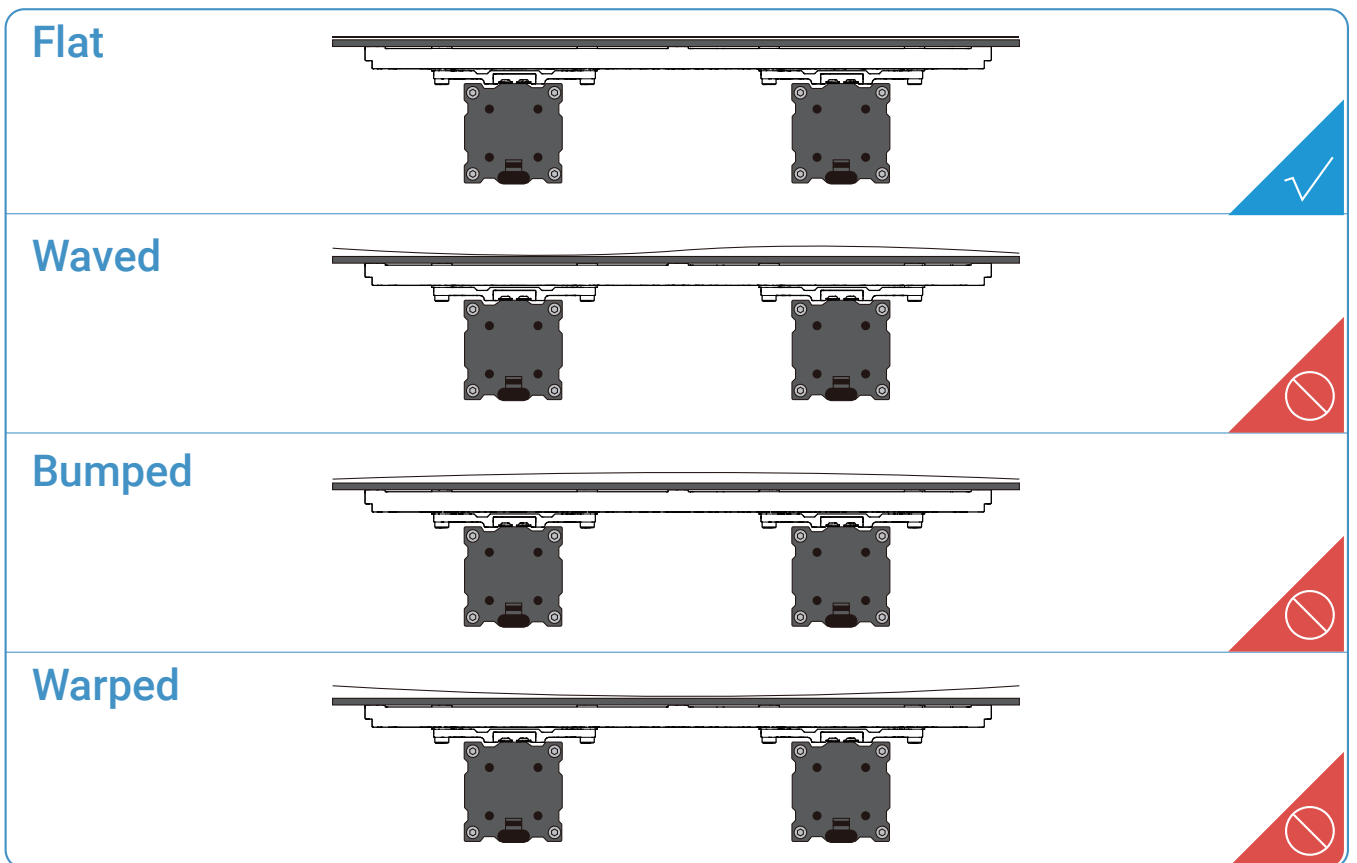


### 5.2.3 Check the Heated Bed

Check if the Heated Bed is flat and stable, fully tightened with screws. If not, reassemble the Heated Bed.



Check if the Print Sheet is correctly placed on the Heated Bed as illustrated. If not, reassemble the Print Sheet.



### 5.2.4 Check the Nozzle

There are many reasons why the nozzle is blocked and thus compromise the print quality. To prevent the nozzle from malfunction and blockage, check the nozzle before every printing job. If the nozzle bore or tip is blocked, follow these steps to clean the nozzle:

#### Clean the Nozzle Bore

- a. Turn on the machine. Heat the nozzle up to 200°C (392°F) by tapping **Control > Nozzle**.



- b. Clean the bore. After the nozzle reaches the target temperature, insert a needle, with its diameter smaller than 0.4 mm, into the nozzle bore from the bottom.



Do not use pliers, scissors, or drill bits to clean the nozzle as they may damage the nozzle.

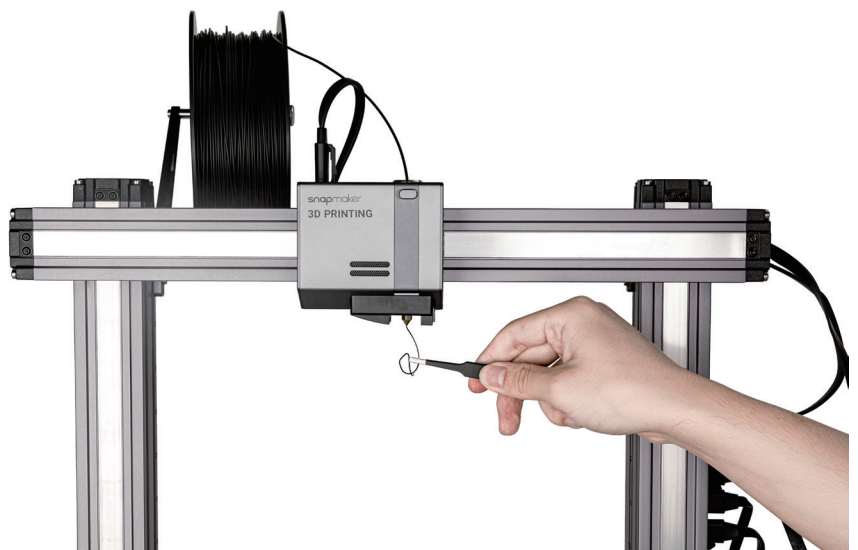


Do not touch the hot nozzle with bare hands.

- c. Stir the softened filament out using the needle until you have cleared the blockage.



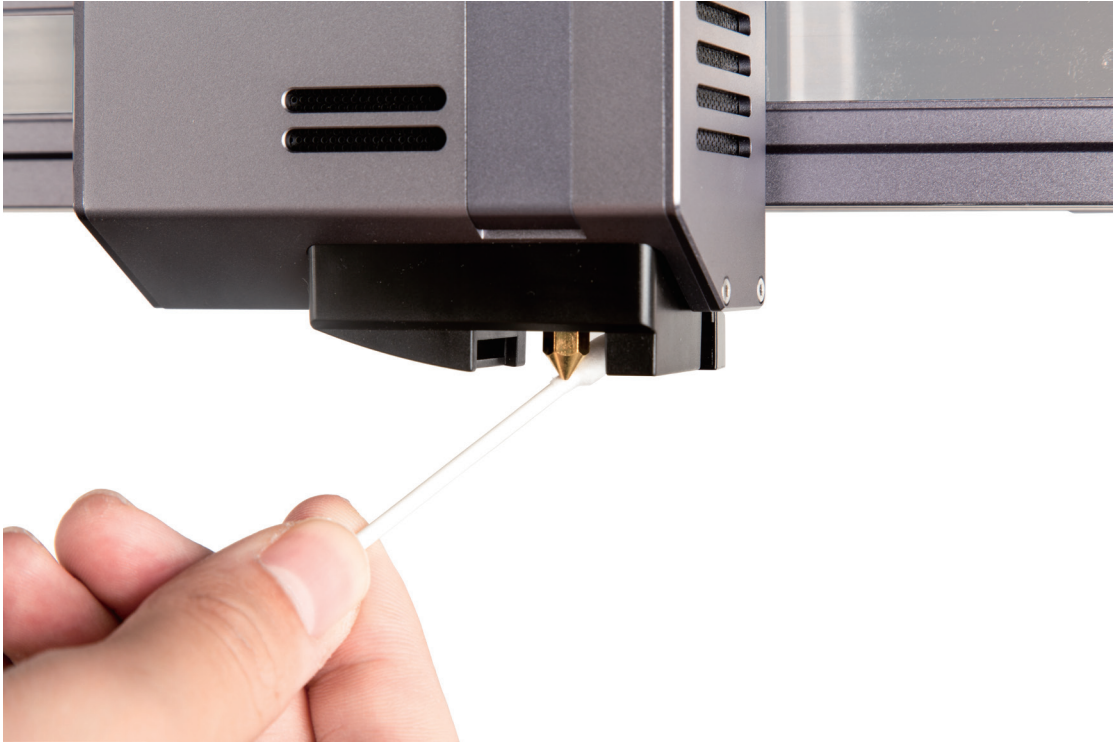
- d. Check if the nozzle is clean. Tap **Load** and insert the filament to see if it can get through the nozzle. If not, repeat the previous two steps to clear the blockage. If the filament comes out smoothly, you have unclogged the blocked nozzle. Remove the extruded filament using the tweezers.



If the blockage remains in the nozzle, you may need to [replace the hot end](#).

## Clean the Nozzle Tip

Clean the nozzle tip and its surrounding area with a swab.



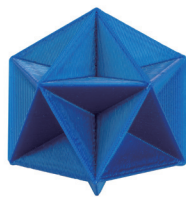
### 5.2.5 Check the Filament

Before you print, check if the filament is damp. Here are some tips to identify, store, and dry the filament.

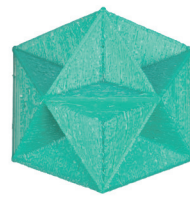
#### How to Identify Damp Filaments

These are a few common signs of damp filaments:

- Easily break if bent or pulled
- Popping sounds while being extruded
- Poor strength and first layer adhesion
- Bubbles on the print surface



Normal



Damp

#### How to Store Filaments

See [2.1 Filament Overview](#).

#### How to Dry Filaments

Use a filament dryer. Put your damp filament into the filament dryer, select the proper settings, and leave the dryer to do its job. After the dryer finishes, recheck if the filament adequately dried.





Use an oven. Put your damp filament into the oven, set an appropriate temperature, and leave it dry for hours. After the oven finishes, recheck if the filament is adequately dried. Note that drying temperature and drying time vary with filament types, brands, and quantities. Before drying, check the optimal drying temperature and drying time for your damp filament.



If the filament is still damp, you can buy new filaments from [Snapmaker's online store](#).

## 5.3 Every Month

### 5.3.1 Clean the Linear Modules

Keeping all Linear Modules freed of dust and other foreign matters can reduce friction and noise while the 3D printer is moving. To do so, gently wipe the Linear Module surface using a dry cotton cloth.

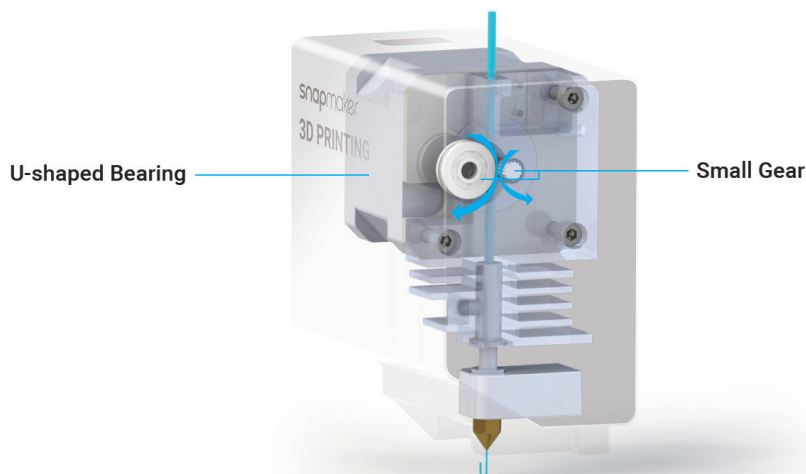


While cleaning, do not press the steel strip.

Do not dismantle the Linear Modules yourself, as doing so will void your [Snapmaker's Limited Warranty](#).

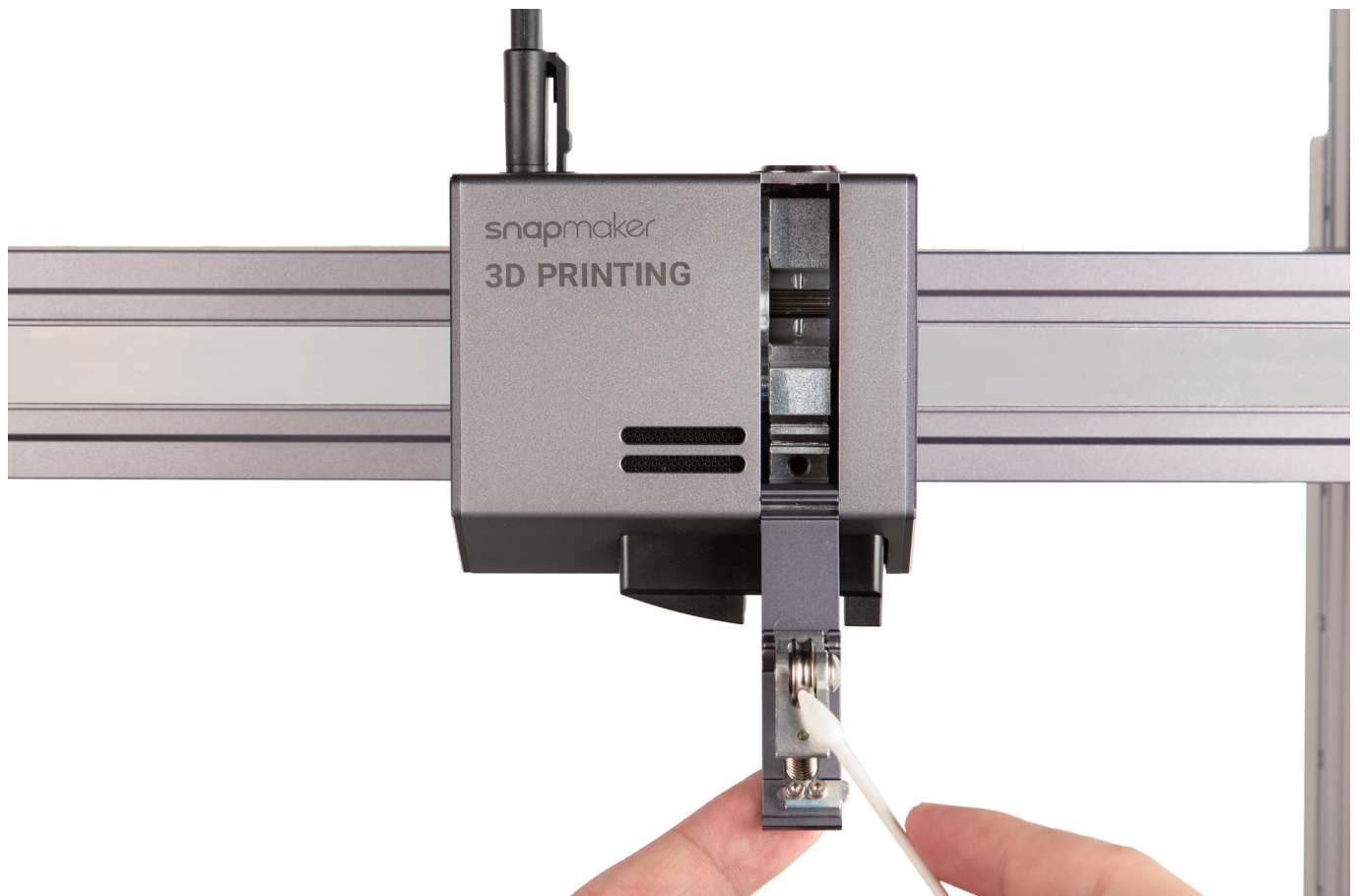
### 5.3.2 Clean the Gear in the 3D Printing Module

While driving the filament into the extruder, the gear encounters strong friction, which more or less produces scraps. As scraps accumulate, the friction reduces between the filament and the gear or U-shaped bearing bracket. Consequently, reduced friction compromises the extruding efficiency, and eventually causes slip during extrusion. Another adverse effect is that the accumulated scraps will fall into the nozzle and block it. In this case, you need to clean the nozzle or even replace it.

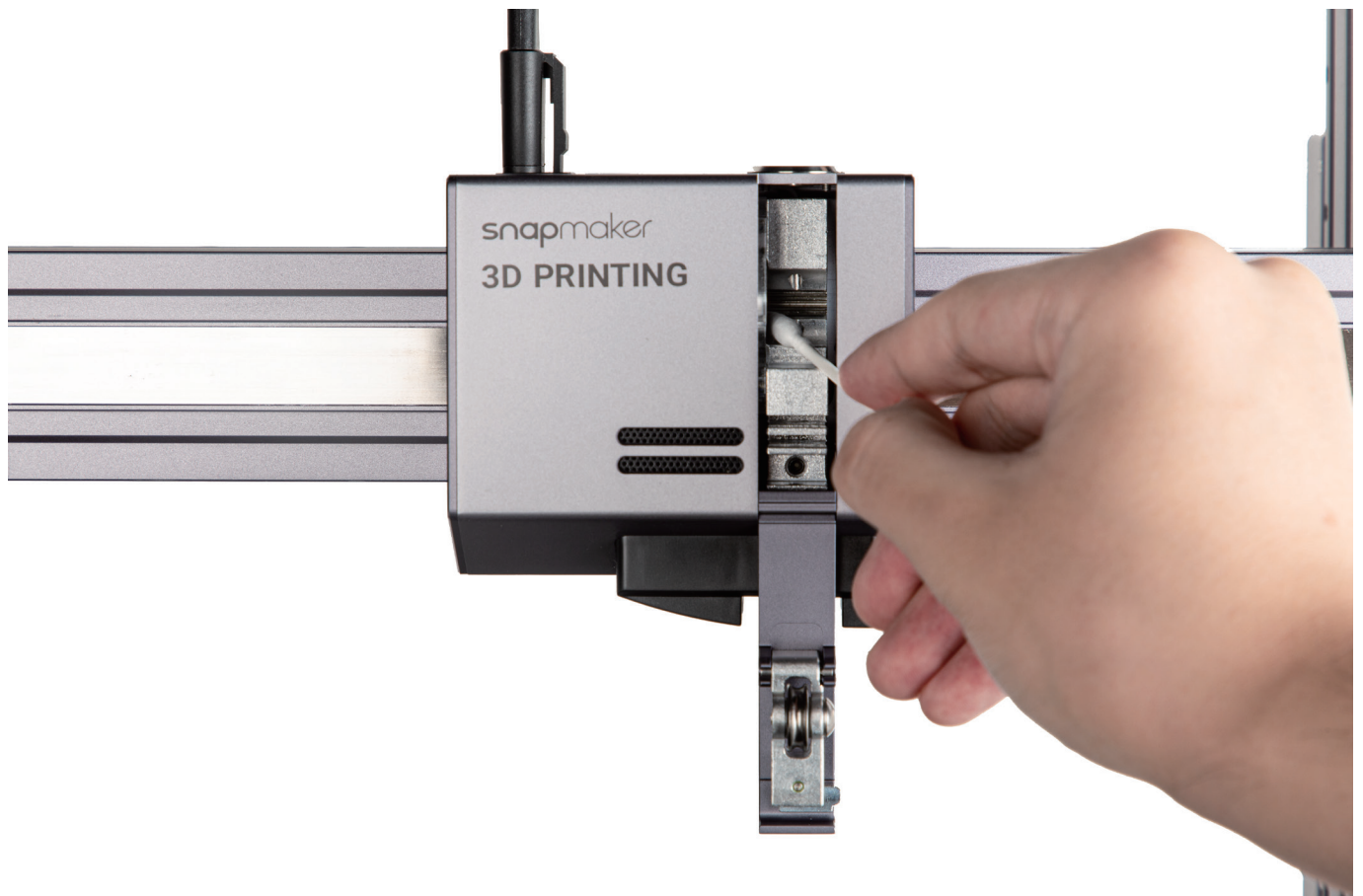


To avoid the trouble, follow these steps to clean the U-shaped bearing bracket and gear:

- a. Clean the U-shaped bearing bracket. Open the 3D Printing Module, and clear the accumulated scraps on the U-shaped bearing bracket using a swab or vacuum.

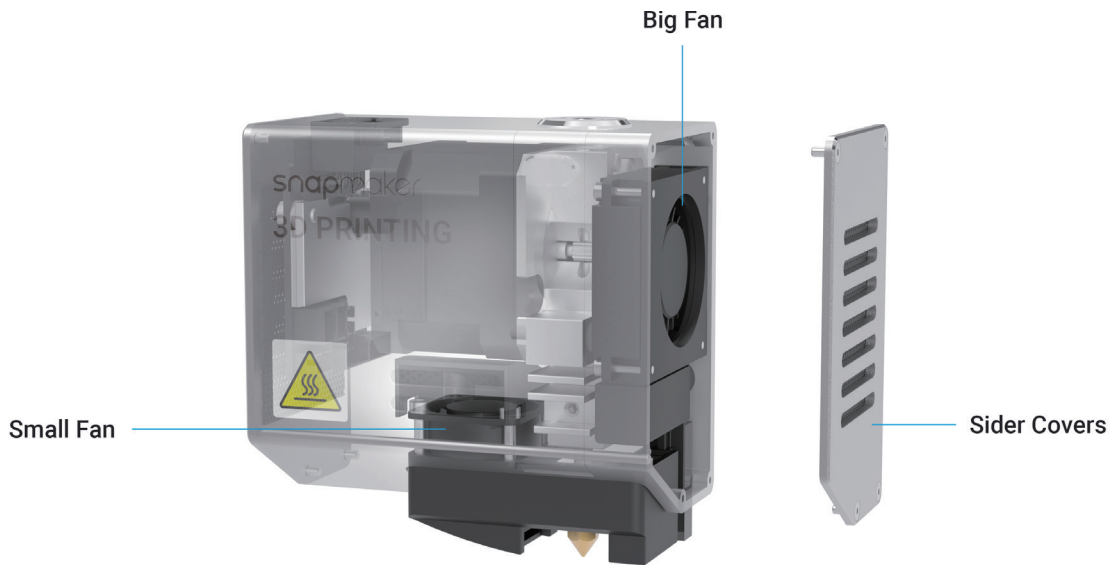


- b. Clean the gear. Clear the accumulated scraps on the gear and its surrounding area using a swab. Close the 3D Printing Module.

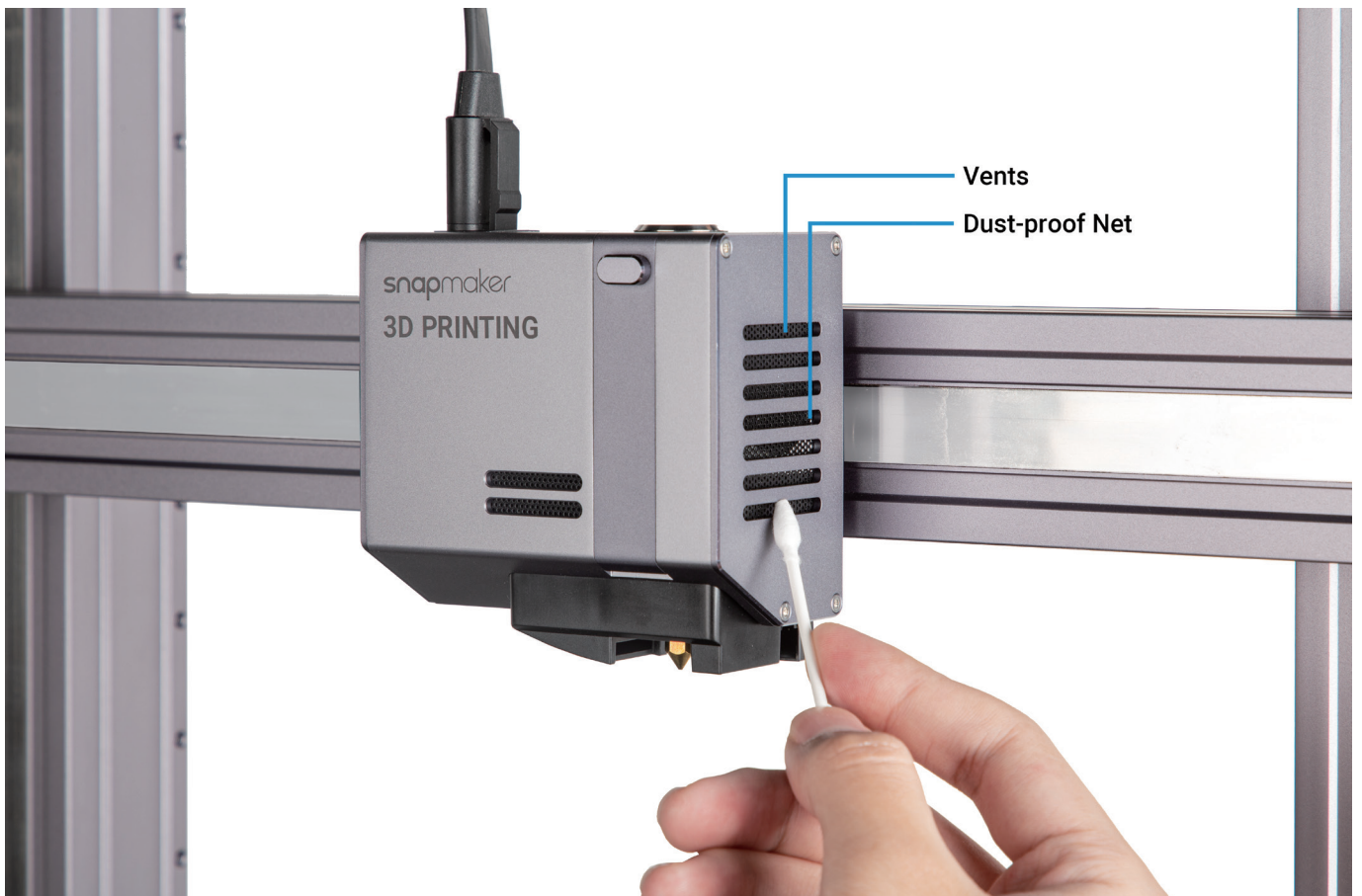


### 5.3.3 Clean the Side Covers

The 3D Printing Module has two side covers, each with vents and a dust-proof net for heat dissipation. If the side covers are clogged by foreign matters, it will affect the airflow inside the 3D Printing Module. Consequently, the internal components will be overheated, and the 3D Printing Module will malfunction.



To avoid this, you should check the vents and dust-proof nets monthly. Use a swab or vacuum to clean the foreign matters.



### 5.4 Every Three Months

To keep your 3D printer and Luban up to date, update your firmware and software every three months. For how to update, see [Firmware](#) and [Software](#).

# 06 Troubleshooting

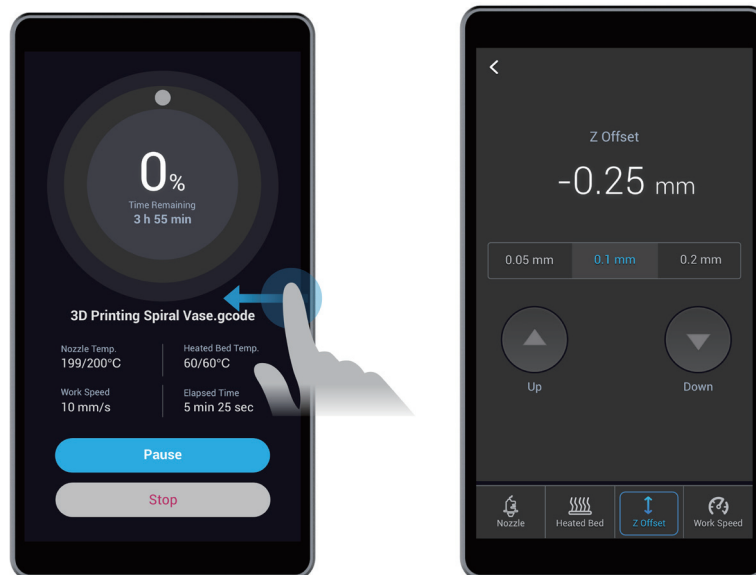
## 6.1 First Layer Does Not Stick

### Possible Causes

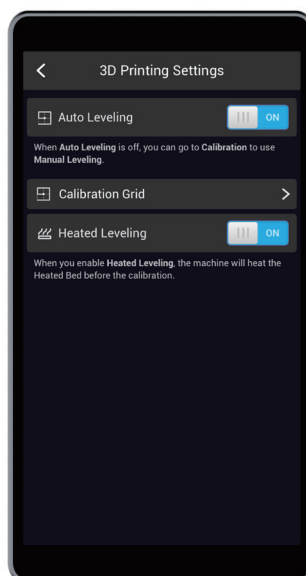
- (1) The calibration is done improperly.
- (2) The printing parameters are improper.
- (3) The Print Sheet is dirty and thus uneven.
- (4) The nozzle bore or tip is dirty.
- (5) The filament is damp.
- (6) The ambient temperature is too low.

### Solutions

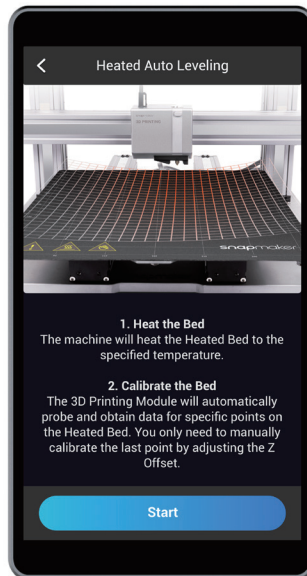
- (1) [Recalibrate the Heated Bed](#). If the problem persists, start a new printing job. Right before the filament comes out, swipe left on the Touchscreen and tap **Z Offset** at the bottom. Tap **Up** or **Down** to adjust the nozzle height.



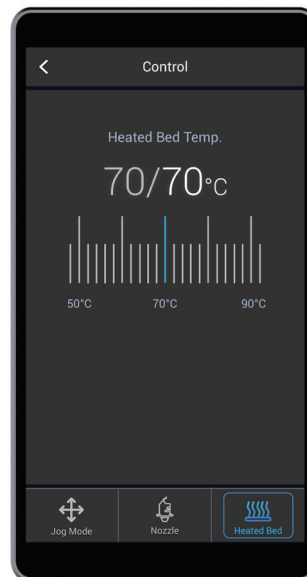
- (2) Recalibrate the Heated Bed using the Heated Leveling mode.
  - a. In the APP List Screen, tap **Settings > 3D Printing > Auto Leveling > Heated Leveling** to toggle on the Heated Auto Leveling mode.



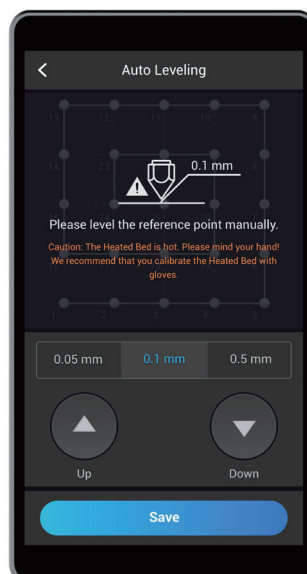
- b. Return to the APP List Screen, and tap **Calibration** > **Start** to run Heated Auto Leveling.



- c. Slide the scale bar to the recommended temperature as indicated by the Touchscreen. After the Heated Bed reaches the target temperature, tap **Calibrate**.



- d. Wear heat-resistant gloves before touching the Heated Bed.  
 e. Manually calibrate the last point using the Calibration Card as in [3.2 Level the Heated Bed](#). After the calibration is completed, tap **Save**.





Caution the hot Heated Bed. Always wear heat-resistant gloves while using the Heated Auto Leveling or Heated Manual Leveling mode.

- (3) Reset the printing parameters on Luban:
  - a. Set the Heated Bed Adhesion Type as Brim. Brim can effectively improve the first layer adhesion. Also, you can increase the line count to improve adhesion.
  - b. Lower the Initial Layer Print Speed.
  - c. Increase the Initial Layer Height.
  - d. Increase the Initial Layer Line Width.
  - e. Set a proper Heated Bed temperature as required by each filament.
  - f. Set a proper orientation and angle for the model to maximize its contact area with the Print Sheet.
- (4) Clean the Print Sheet to keep it free of dust, cured filaments, tapes, or other foreign matters.
- (5) [Clean the nozzle bore](#) to keep it free of blockage and foreign matters.
- (6) [Dry the damp filament](#) or buy new filaments.
- (7) Raise the ambient temperature using an air conditioner, enclosure, or heater.
- (8) If poor adhesion persists, coat the Heated Bed with masking tapes or solid glues before printing.

## 6.2 Warping

### Possible Causes

- (1) The first layer does not stick to the Print Sheet.
- (2) The filament you use has high shrinkage, and is prone to warping during printing.
- (3) The ambient temperature is too low.

### Solutions

- (1) See [6.1 First Layer Does Not Stick](#).
- (2) Should you use ABS, here is a video tutorial to walk you through [how to 3D print with ABS filament](#). Alternatively, you can change a filament with low shrinkage like PLA and PETG.
- (3) Raise the ambient temperature around the 3D printer using an air conditioner, enclosure, or heater.

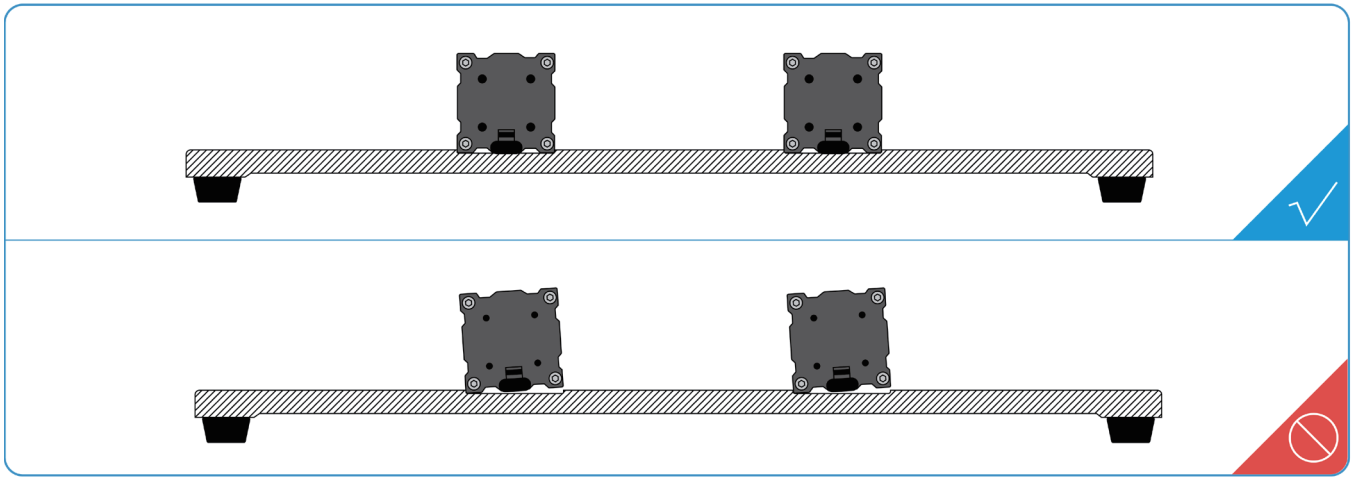
## 6.3 Toolhead Hits the Heated Bed

### Possible Causes

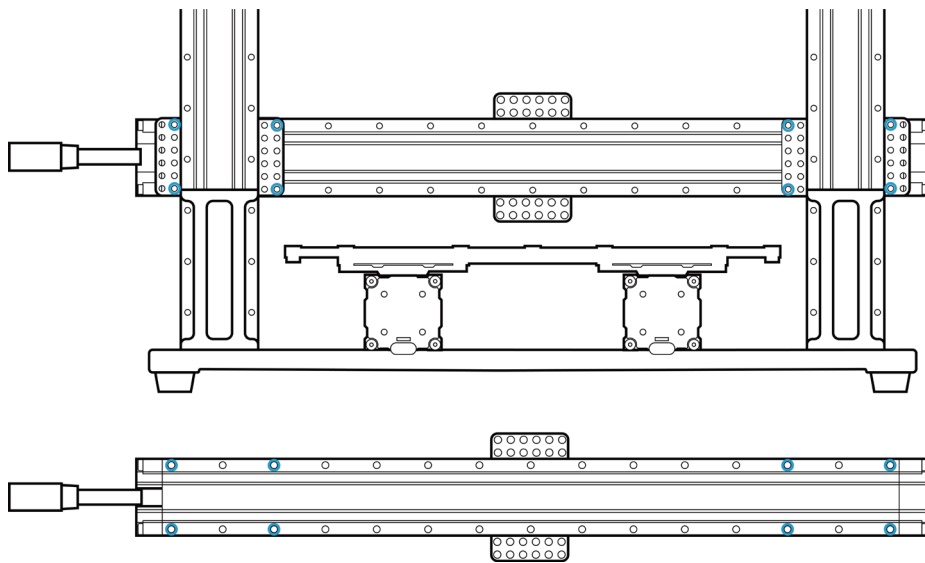
- (1) The Y axes are assembled incorrectly.
- (2) The X axes are assembled incorrectly.
- (3) The 3D Printing Module is assembled incorrectly.
- (4) The Support Platform is assembled upside down.
- (5) The probe sensor wiring is worn out.
- (6) The probe sensor is malfunctioning.

### Solutions

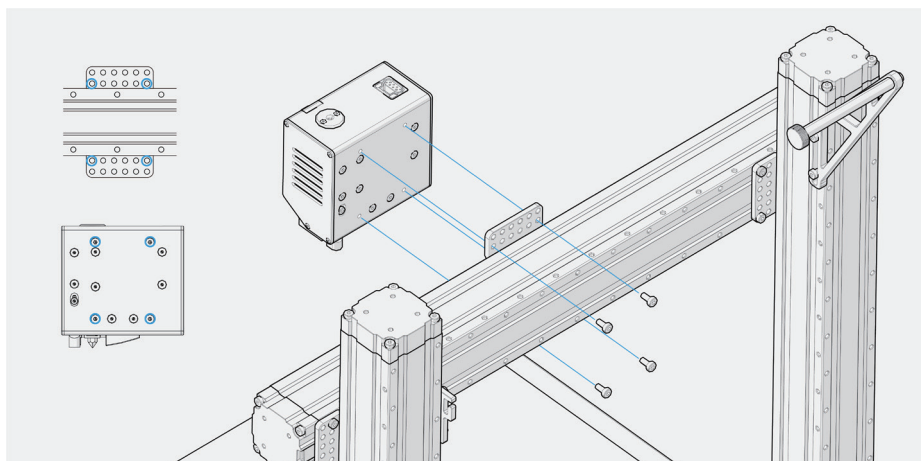
- (1) Check if the Y axes are perfectly mounted onto the grooves of the Base Plate. If not, place the Y axes right into the grooves.



(2) Check if the screws for fixing the X axis with Z-axis sliders are installed into the correct holes.



(3) Check if the screws for attaching the 3D Printing Module are installed into the correct holes.



(4) Check if the Support Platform is correctly installed (see [5.2.2 Check the Support Platform](#)). If not, reassemble the Support Platform.

(5) If the problem persists, contact us at [support@snapmaker.com](mailto:support@snapmaker.com).



## 6.4 Filament Does Not Come Out

### Possible Causes

- (1) The nozzle is blocked.
- (2) The filament has poor quality ranging from impurities to inconsistent diameters.
- (3) The filament is not supported by the 3D printer.
- (4) The gear is malfunctioning.
- (5) The hot end is malfunctioning.

### Solutions

- (1) If the nozzle is blocked, see [5.2.4 Check the Nozzle](#).
- (2) Replace it with a quality filament.
- (3) Your 3D printer supports PLA, ABS, PETG, TPU, Wooded PLA, etc. Check if the filament is supported by Snapmaker 2.0 3D printers. If not, replace it with a supported filament.
- (4) Open the 3D Printing Module to check if the gear can rotate. If it rotates normally, [replace the hot end](#); if not, contact us at [support@snapmaker.com](mailto:support@snapmaker.com).



- (5) [Replace the hot end](#) as in step 4. If the problem persists, contact us at [support@snapmaker.com](mailto:support@snapmaker.com).

## 6.5 Blobs on Nozzle

### Possible Causes

- (1) The first layer fails to stick to the Print Sheet.
- (2) The filament has poor quality ranging from impurities to inconsistent diameters.

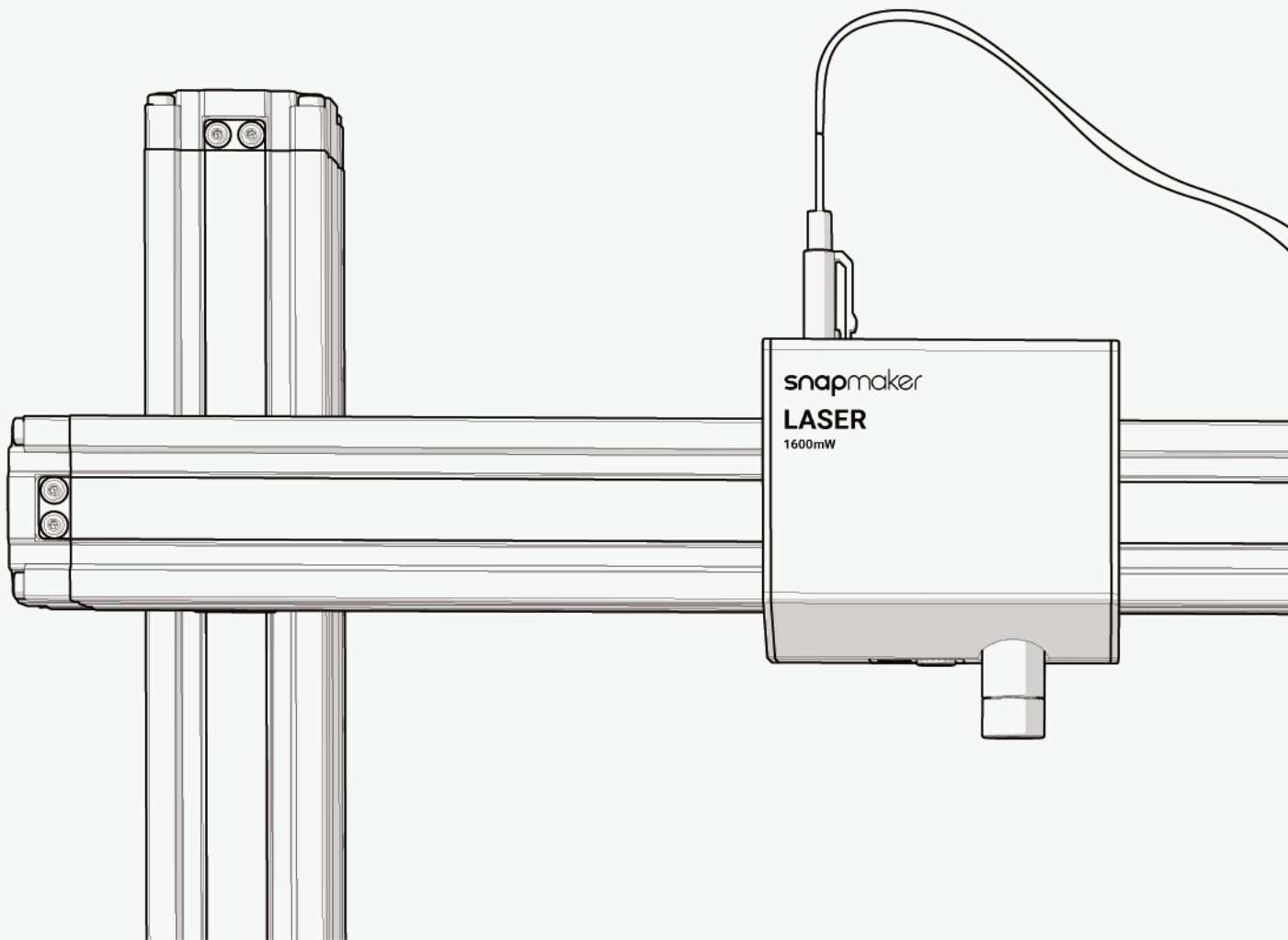
### Solutions

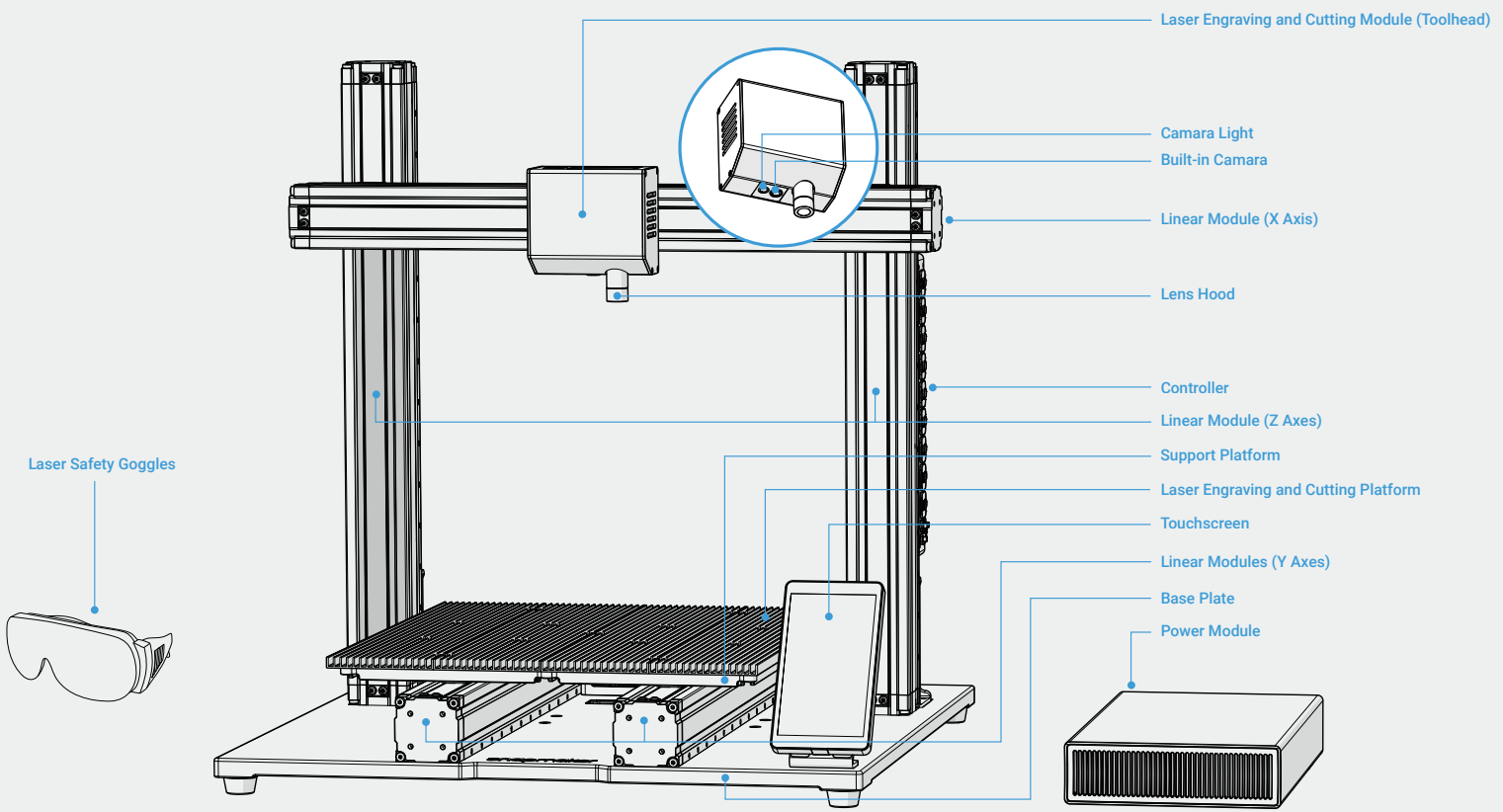
To begin with, heat the nozzle up to 230°C (446°F), and [replace the hot end](#) with a spare one provided in the box.

- (1) See [6.1 First Layer Does Not Stick](#).
- (2) Replace it with a quality filament. If the problem persists, contact us at [support@snapmaker.com](mailto:support@snapmaker.com).

snapmaker | A150 | A250 | A350

# Laser Engraving & Cutting





<b>01 Operating Environment</b>	<b>69</b>
1.1 Work Area	69
1.2 Workbench	69
<b>02 Material Library</b>	<b>70</b>
2.1 Material Overview	70
2.2 Wood	71
2.3 Basswood (1.5 mm)	71
2.4 MDF	72
2.5 Vegetable-tanned Leather (1.5 mm)	73
2.6 Cotton Fabric (0.6 mm)	74
2.7 A4 White Paper (0.1 mm)	75
2.8 White Cardstock (0.28 mm)	76
2.9 Corrugated Fiberboard (3 mm)	77
2.10 Non-transparent Acrylic (2.6 mm)	78
<b>03 How to Laser Engrave and Cut</b>	<b>78</b>
3.1 Laser Engraving and Cutting Workflows	78
3.2 Measure the Focal Length	80
3.3 Calibrate the Camera	92
3.4 Prepare the Material	96
3.5 Connect the Machine to Luban	99
3.6 Prepare the G-code File	101
3.7 Four Modes to Process the File	103
3.8 Transfer the G-code File	104
3.9 Start Engraving and Cutting	107
3.10 Auto Mode and Manual Mode for Laser Engraving and Cutting	112

3.11 Power Loss Recovery	116
3.12 Other Operations	117
<b>04 Waste Disposal</b>	<b>120</b>
4.1 Package	120
4.2 Waste Gas Treatment	120
4.3 Wasted Material	120
4.4 Electronics	120
<b>05 Maintenance</b>	<b>121</b>
5.1 Maintenance Schedule	121
5.2 Before You Engrave and Cut	121
5.3 Every Month	128
5.4 Every Three Months	129
<b>06 Troubleshooting</b>	<b>130</b>
6.1 Auto Focus Fails	130
6.2 Camera Capture Does not Work	131
6.3 Laser Is Discontinuous or Weak	132
6.4 Laser Will not Burn Material When Enclosure Is Used	133

# 01 Operating Environment

## 1.1 Work Area

### 1.1.1 Ventilation

Always use the laser engraving and cutting machine in a well-ventilated area. The machine uses a laser beam to rapidly heat, melt and partially or completely vaporize the material, creating gases and particulate matter. These byproducts of laser operation may irritate the eyes and respiratory system. Never use the laser engraving and cutting machine in an enclosed area that doesn't have good ventilation. Otherwise, serious personal injury may occur. We recommend that you use ventilation devices such as fans to exhaust the gases and fumes produced to the outdoors. You can also use an air purifier to freshen the air. If you do not have ventilation or filtration equipment, ensure that your workplace is well-ventilated. Open doors and windows to allow air to flow.

### 1.1.2 Fire Safety

Never operate the laser engraving and cutting machine near flammable or explosive substances. The machine uses a high-intensity beam of light that can result in a large amount of heat. Flammable or explosive substances exposed to direct or reflected laser beams pose a fire hazard. Besides, the materials being engraved or cut may be ignited and burst into open flame. This open flame is very dangerous and has the potential to destroy not only the machine but the building in which it is housed.

Install a smoke detector in your workplace. Always keep a properly maintained and inspected fire extinguisher on hand. Typically, Carbon Dioxide (CO<sub>2</sub>) chemical fire extinguishers should be used. Always have a first-aid kit designed for the initial treatment of burns and smoke inhalation nearby. Ensure that this kit is put in an area that is outside risk areas.

### 1.1.3 Humidity and Temperature

The ambient humidity should be kept between 30%–70%. Do not use the laser engraving and cutting machine in wet surroundings. Water entering the machine may increase the risk of an electric shock. Ensure your workspace is dry and not subject to potential wet conditions.

The ambient temperature should be kept between 0°C–40°C (32°F–104°F). If the temperature is higher than 40°C, the heat generated by the laser engraving and cutting machine cannot be properly dissipated, and thus may cause damage to the machine. If the temperature is lower than 0°C, some electronic components cannot work properly.

### 1.1.4 Clean and Bright Space

Keep the work area clear and well lit. Cluttered or dark areas invite accidents. Clean around the machine and keep the area free of clutter and combustible materials. Provide at least 8 inches of unobstructed spacing around the laser engraving and cutting machine to allow ventilation. Stacking materials (especially organic materials such as paper) can lead to an increased risk of flame propagation or workpiece ignition.

## 1.2 Workbench

Put the laser engraving and cutting machine on a sound and level workbench.

Put the laser engraving and cutting machine in a well-ventilated place during laser engraving and cutting.

Put the workbench near ventilation openings should you use the laser engraving and cutting machine with an enclosure or purifier.

Keep the workbench clean and dry.

# 02 Material Library

## 2.1 Material Overview

Snapmaker 2.0 laser engraving and cutting machine supports materials including wood, basswood, MDF, vegetable-tanned leather, cotton fabric, A4 white paper, white cardstock, corrugated fiberboard, non-transparent acrylic, and more are being tested.

Material	Engraving	Cutting	Features	Application
Wood	✓	✗	Easily machinable, bio-degradable	Furniture, flooring, decorative accessories
Basswood	✓	✓	Odorless, soft, light, easy to work with	Musical instruments (such as electric guitar bodies), veneer, plywood, wood pulp and fiber products
MDF	✓	✗	Strong, stiff, resilient to moisture, affordable	Furniture, flooring, decorative accessories
Vegetable-tanned Leather	✓	✓	Versatile, tough, durable	Purses, wallets, cases, belts, labels, decorative accessories
Cotton Fabric	✓	✓	Soft, absorbent, breathable, durable, good color retention	Shirts, dresses, jeans, skirts blouses, underwear, socks, sheets, blankets, bags, towels, napkins
A4 White Paper	✗	✓	Thin, light, smooth, bright white, contrasting	Copying, printing, writing, drawing
White Cardstock	✓	✓	Thick, smooth, heavyweight, stiff	Flyers, brochures, coupons, invitations, reports, menus, arts and crafts, certificates
Corrugated Fiberboard	✓	✓	Anisotropic, lightweight, durable, easy to use	Packing, storing, shipping, retail display
Non-transparent Acrylic	✗	✓	Tough, stiff, impact resistant, heat insulative, UV resistant, easy to thermoform	Indoor and outdoor signs, POP displays and exhibits, shelves, retail fixtures

## 2.2 Wood

Work Parameters	
Engraving in Line Mode	
Density	5 dot/mm
Work Speed	500 mm/min
Power	100%
Engraving in Dot Mode	
Density	5 dot/mm
Work Speed	2500 mm/min
Dwell Time	5 ms/dot
Power	60%

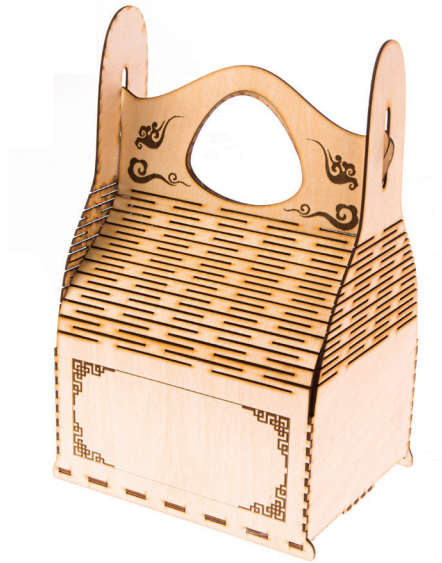


## 2.3 Basswood (1.5 mm)

Work Parameters	
Engraving in Line Mode	
Density	5 dot/mm
Work Speed	500 mm/min
Power	80%
Engraving in Dot Mode	
Density	5 dot/mm
Work Speed	2500 mm/min
Dwell Time	5 ms/dot

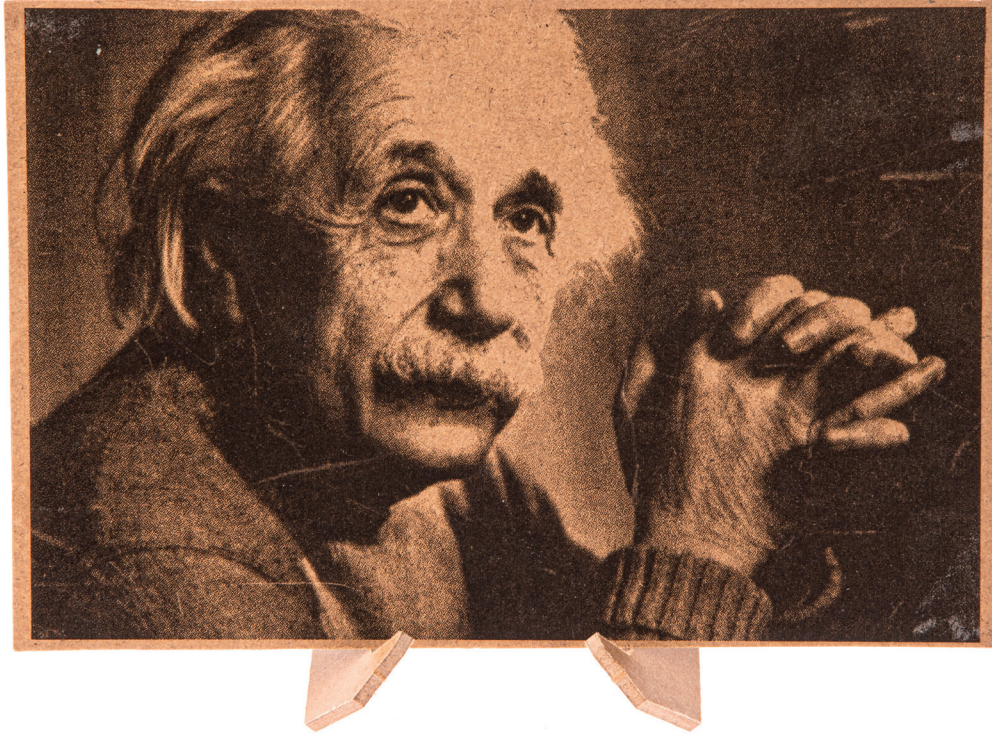


Power	30%
Cutting	
Work Speed	180 mm/min
Passes	2
Pass Depth	0.6 mm
Power	100%



## 2.4 MDF

Work Parameters	
Engraving in Line Mode	
Density	5 dot/mm
Work Speed	800 mm/min
Power	70%
Engraving in Dot Mode	
Density	5 dot/mm
Work Speed	2500 mm/min
Dwell Time	5 ms/dot
Power	20%



## 2.5 Vegetable-tanned Leather (1.5 mm)

Work Parameters	
Engraving in Line Mode	
Density	5 dot/mm
Work Speed	800 mm/min
Power	80%
Engraving in Dot Mode	
Density	5 dot/mm
Work Speed	2500 mm/min
Dwell Time	5 ms/dot
Power	30%
Cutting	
Work Speed	50 mm/min
Passes	3
Pass Depth	0.6 mm
Power	100%



## 2.6 Cotton Fabric (0.6 mm)

Work Parameters	
Engraving in Line Mode	
Density	5 dot/mm
Work Speed	500 mm/min
Power	90%
Engraving in Dot Mode	
Density	5 dot/mm
Work Speed	2500 mm/min
Dwell Time	5 ms/dot
Power	60%
Cutting	
Work Speed	200 mm/min
Passes	3
Pass Depth	0.6 mm
Power	100%



### 2.7 A4 White Paper (0.1 mm)

Work Parameters	
Cutting	
Work Speed	1100 mm/min
Passes	2
Pass Depth	0.6 mm
Power	100%



## 2.8 White Cardstock (0.28 mm)

Work Parameters	
Engraving in Line Mode	
Density	5 dot/mm
Work Speed	800 mm/min
Power	90%
Engraving in Dot Mode	
Density	5 dot/mm
Work Speed	2500 mm/min
Dwell Time	5 ms/dot
Power	30%
Cutting	
Work Speed	800 mm/min
Passes	2
Pass Depth	0.6 mm
Power	100%



## 2.9 Corrugated Fiberboard (3 mm)

Work Parameters	
Engraving in Line Mode	
Density	5 dot/mm
Work Speed	500 mm/min
Power	80%
Engraving in Dot Mode	
Density	5 dot/mm
Work Speed	2500 mm/min
Dwell Time	5 ms/dot
Power	30%
Cutting	
Work Speed	380 mm/min
Passes	4
Pass Depth	0.6 mm
Power	100%



## 2.10 Non-transparent Acrylic (2.6 mm)

Work Parameters	
Cutting	
Work Speed	40 mm/min
Passes	4
Pass Depth	0.6 mm
Power	100%

s n a p m a k e r

## 03 How to Laser Engrave and Cut

### 3.1 Laser Engraving and Cutting Workflows

Snapmaker provides you with the following two methods to help you position the laser working area:

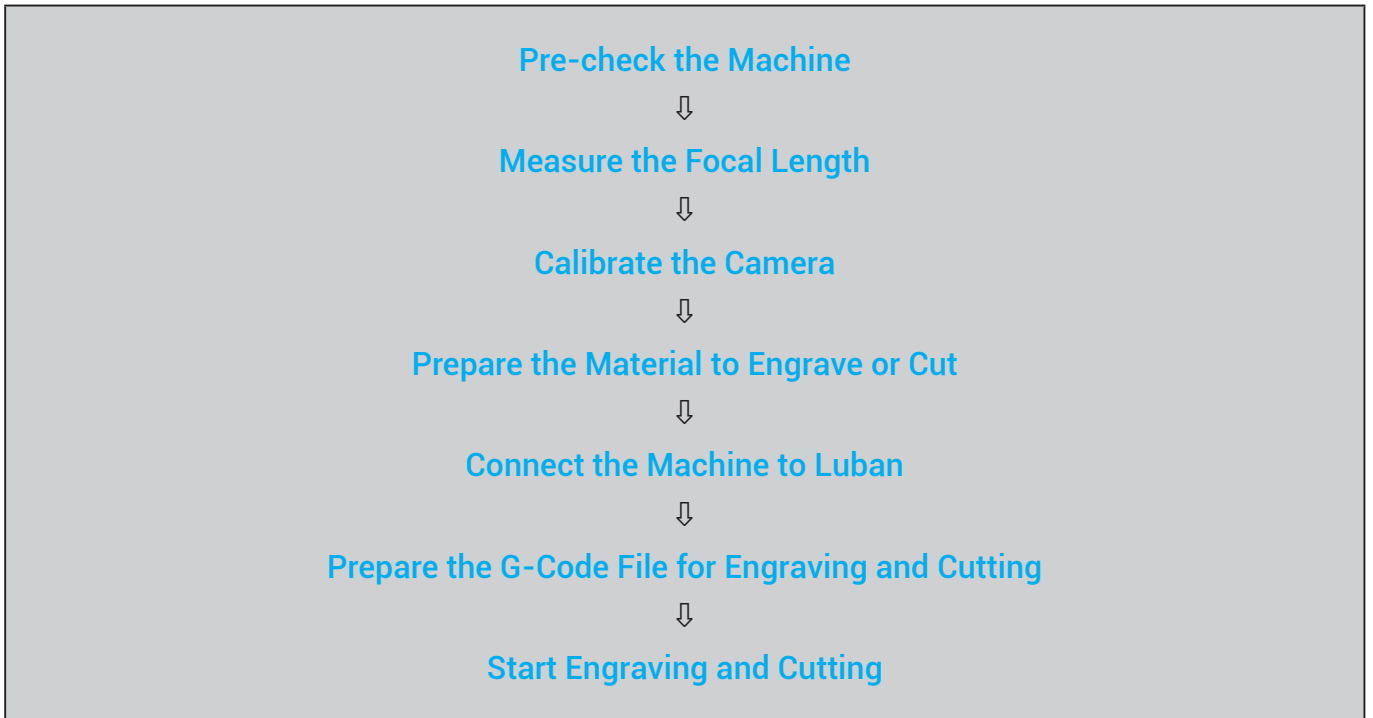
- Use Camera Capture
- Set Work Origin

If you use the method of camera capture, you must connect your machine to Luban, and use Luban for the subsequent operations. If you set the work origin, you can start laser engraving and cutting by using Luban or the Touchscreen. Depending on the positioning methods and operating consoles you choose, the workflows can be different. This section provides the three workflows you can follow to start laser engraving and cutting.

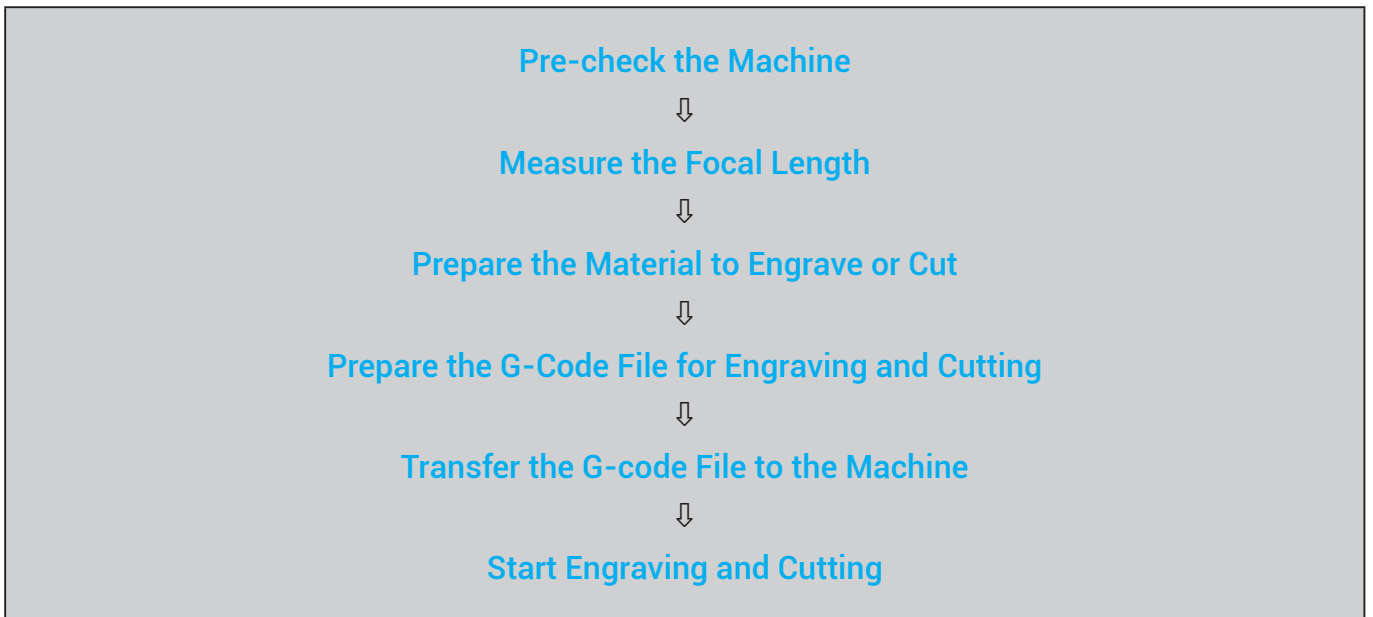


The engraving and cutting effects depend on the material you choose and the parameters you configure, regardless of which workflow you opt for.

## Use Camera Capture to Start Laser Engraving and Cutting in Luban

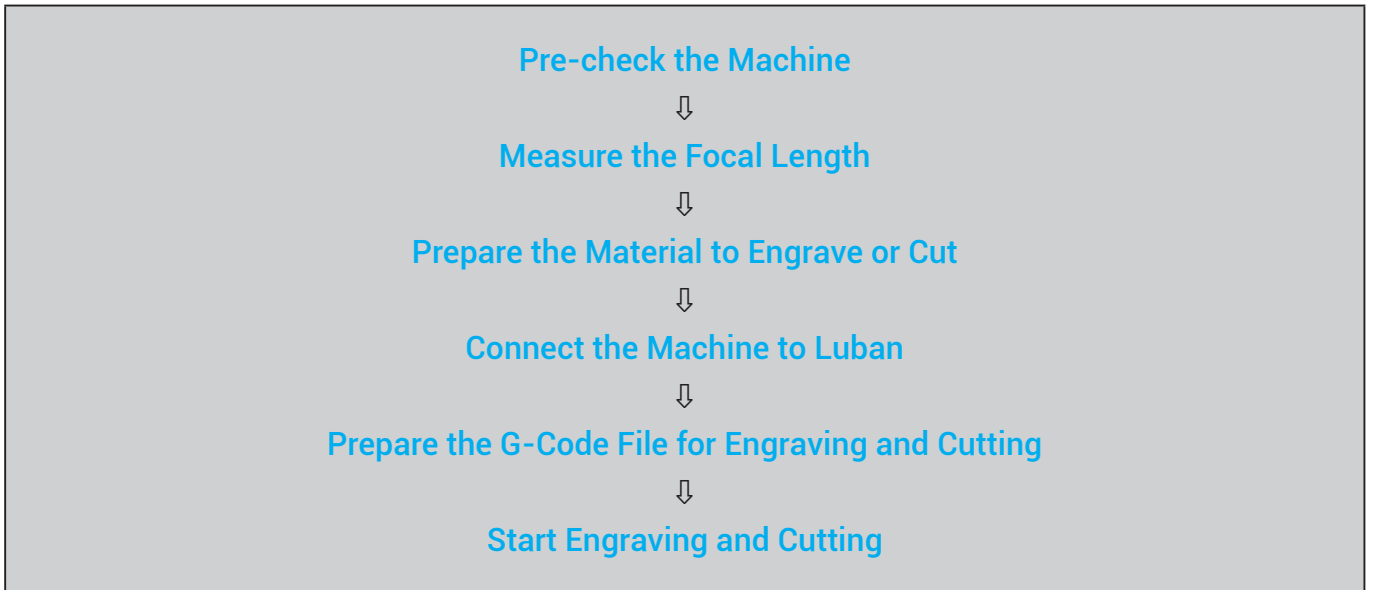


## Set Work Origin to Start Laser Engraving and Cutting on the Touchscreen





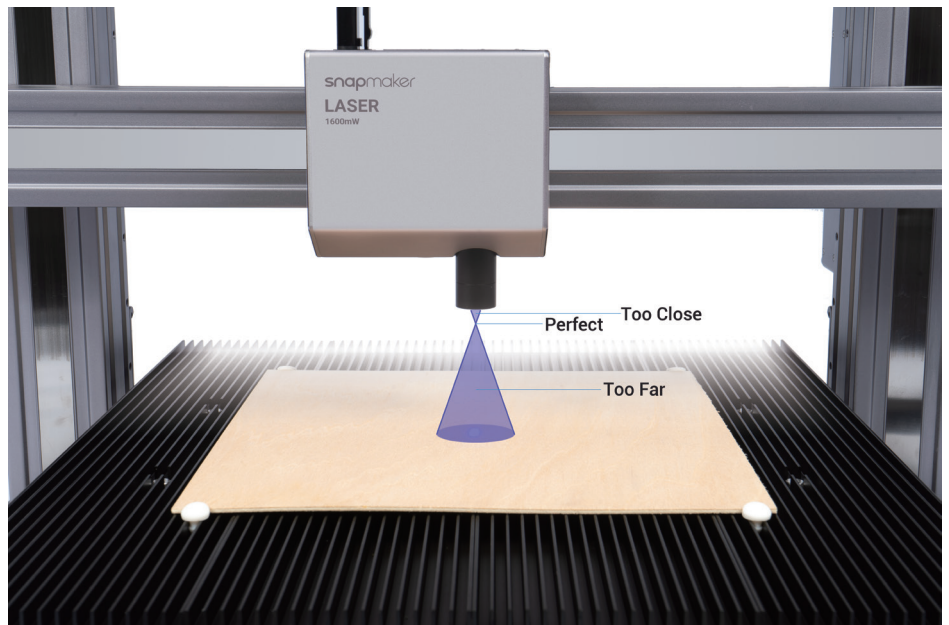
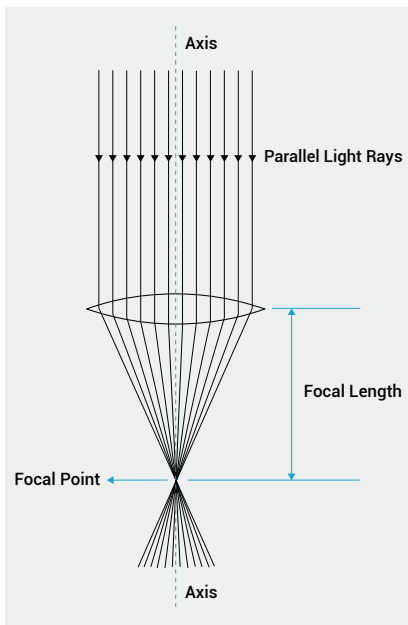
## Set Work Origin to Start Laser Engraving and Cutting in Luban



### 3.2 Measure the Focal Length

#### How It Works: Measure the Focal Length

Focal length is the distance from the center of the lens to the focal point of the lens. By setting an accurate focal length value, you will be able to position the focal point right on the surface of the material, which ensures the best focusing result.

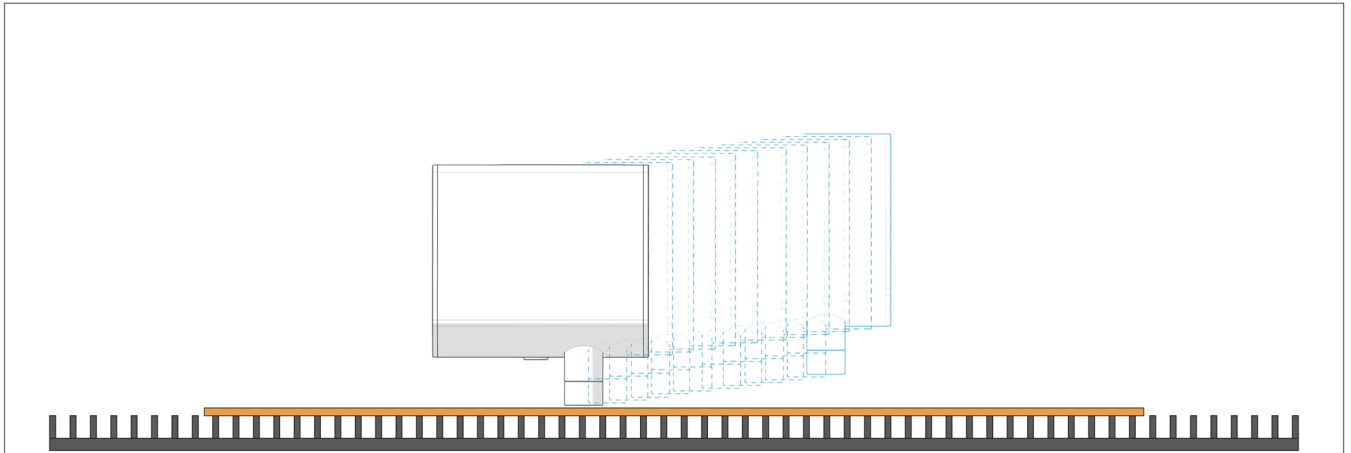


Snapmaker designs both the Auto Focus and Manual Focus modes to help you measure the focal length. The measurement of focal length mainly involves the following procedures.

#### (1) Engrave a few lines at different heights.

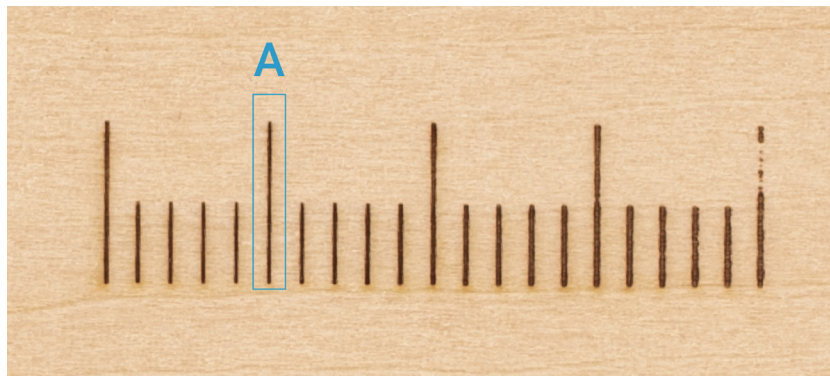
Each laser engraving and cutting machine comes with a default focal length value, which is not always accurate. During auto focusing, the machine adjusts the height of the Laser Module based on the default focal length to engrave a series of lines on the material.

The manual focusing procedure does not necessarily use the default value for focal length. Instead, you can manually set a reference point. Then, the machine adjusts the height of the Laser Module based on the reference point to engrave a series of lines on the material.



**(2) Identify the best engraved line.**

At the optimal height, the laser is best focused and can engrave the thinnest line on the material surface, which is called the best engraved line. The lines engraved before or after the best engraved line should be thicker than it, as illustrated by the following figure.



(Line A is the best engraved line. Lines engraved before or after it are thicker.)

However, sometimes the engraving result does not contain the best engraved line. For example, Line B is the thinnest line in the following picture, but it is not the best engraved line. This is because the Laser Module did not reach the optimal height during the focusing procedure. In this case, the focusing procedure will fail. For more information about how to deal with failed focusing, see [Laser Engraving and Cutting – 6.1 Auto Focus Fails](#).



### (3) Calculate and record the focal length.

After the best engraved line is identified, automatically or manually, the machine will register the corresponding laser height and calculate the focal length, which will be saved for subsequent use.

As long as you do not reassemble the Laser Module and the machine works normally, the recorded focal length can be used for the next engraving and cutting job. For the next engraving and cutting job in Auto Mode (see [3.9 Start Engraving and Cutting](#)), you only need to set the material thickness, and then the machine will automatically adjust itself to ensure that the focal point always falls on the material surface.



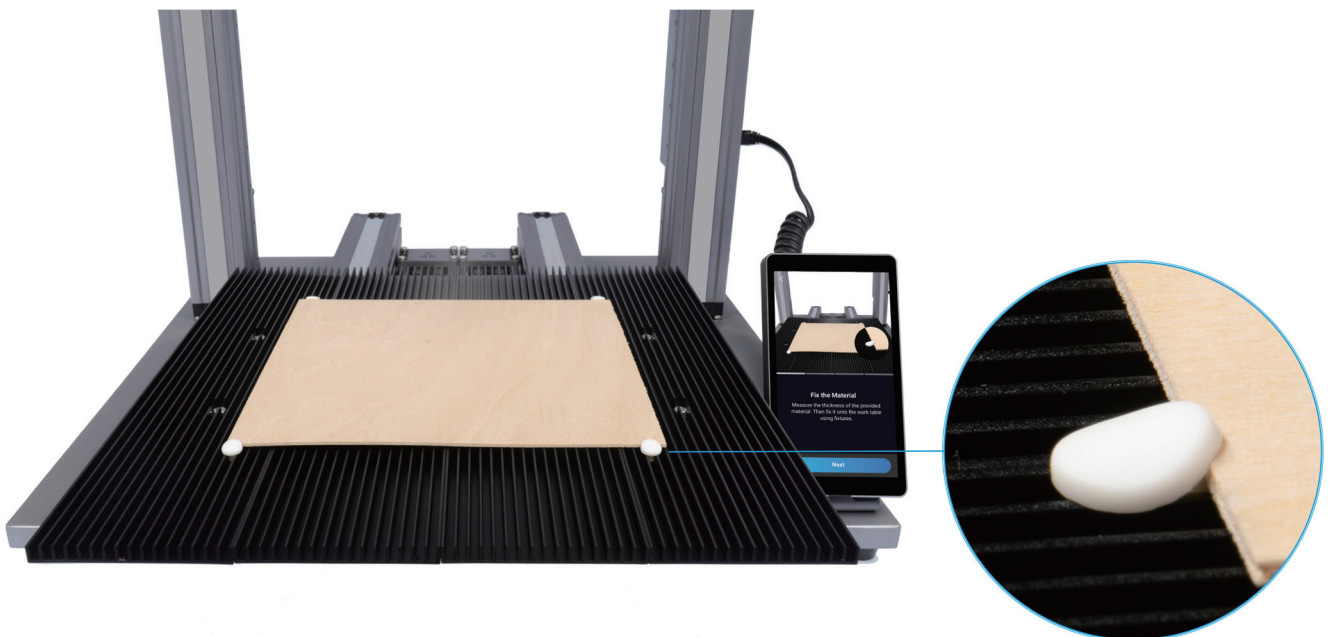
To switch the focusing mode, tap **Settings > Laser > Auto Focus** on the Touchscreen.

## Automatically Measure the Focal Length

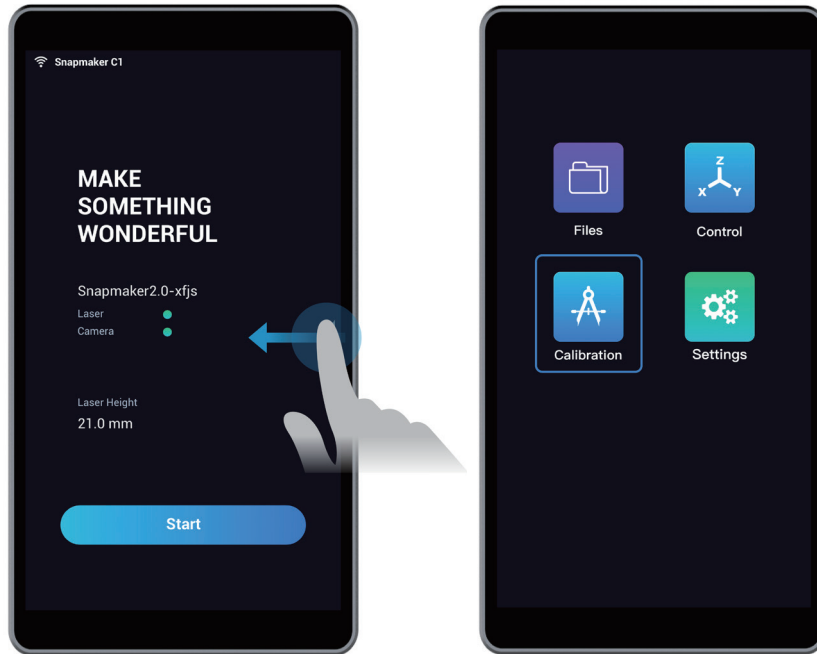
### Preparation:

- Laser Material × 1
- Silicone Plugs × 4
- Laser Safety Goggles × 1

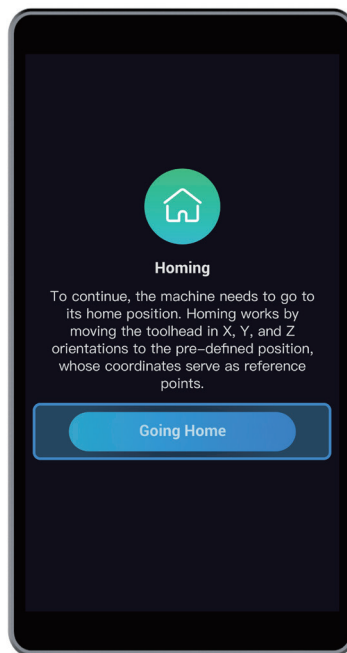
(1) Place the provided material on the Laser Engraving and Cutting Platform. Secure it with the silicone plugs.



(2) On the Touchscreen, swipe left to tap **Calibration**.

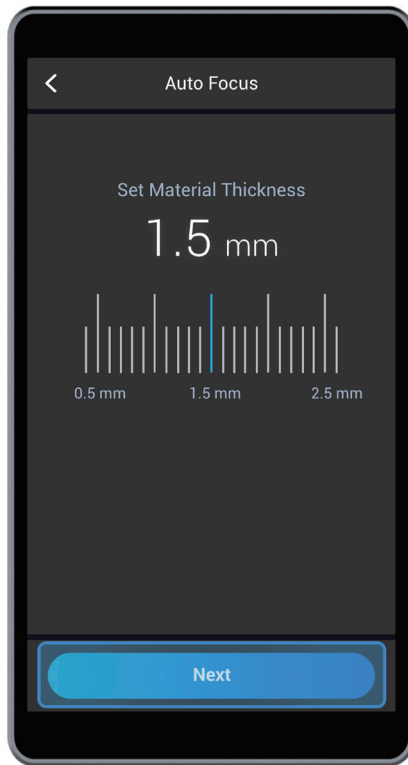


(3) Read the homing instruction on the Touchscreen. Tap **Going Home**, and the Laser Module will automatically jog to the starting position of X, Y, and Z axes.



If you have completed homing previously, the machine will skip this step.

- (4) Slide the scale to set the thickness of the material (1.5 mm) and tap **Next**.



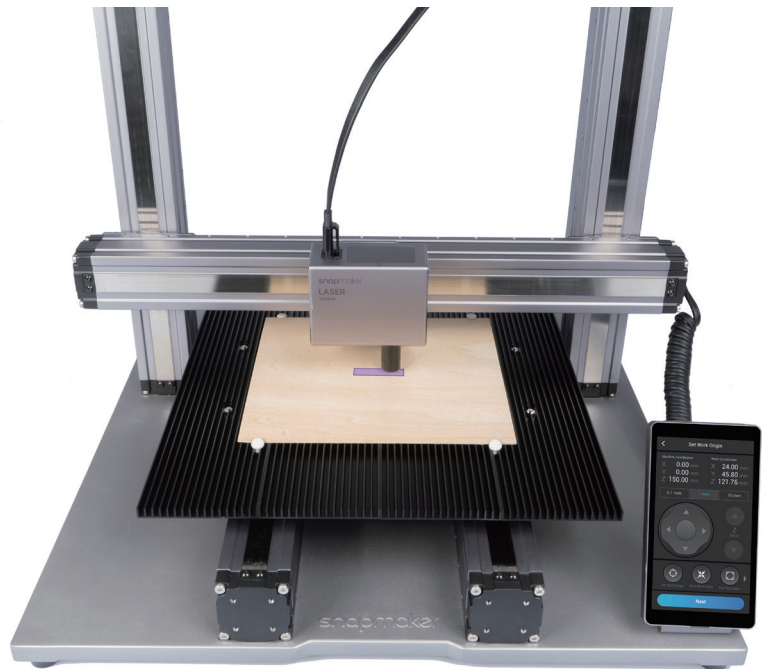
- (5) Put the Calibration Card provided or a piece of A4 paper in between the Laser Module and the material. Tap **X-**, **X+**, **Y-**, **Y+** to move the Laser Module above the Calibration Card. Keep adjusting the **Z Offset** until you feel slight resistance when you pull out the Calibration Card, and it should be wrinkled when you push it forward. Then, pull out the Calibration Card and tap **Next**.



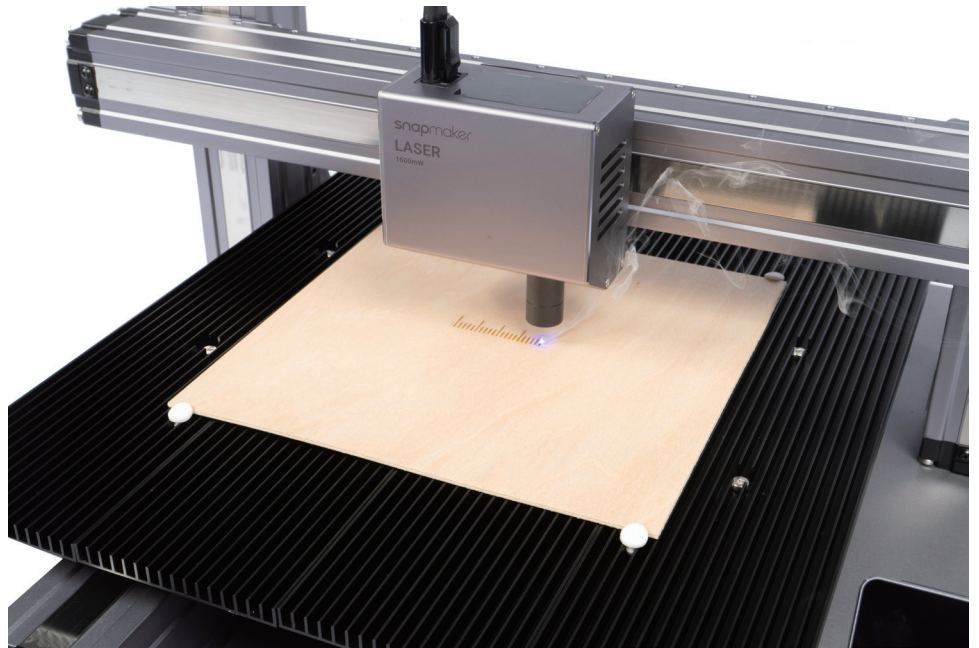
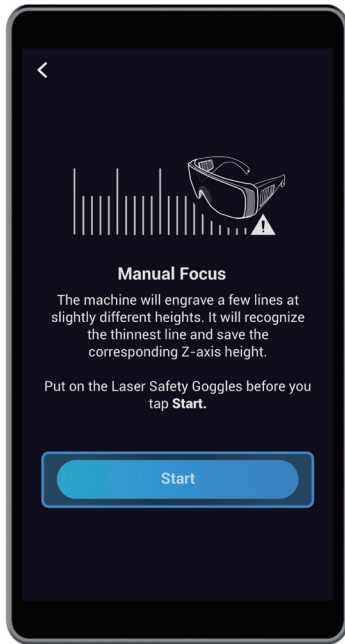
(6) Put on the Laser Safety Goggles and tap **Next**.



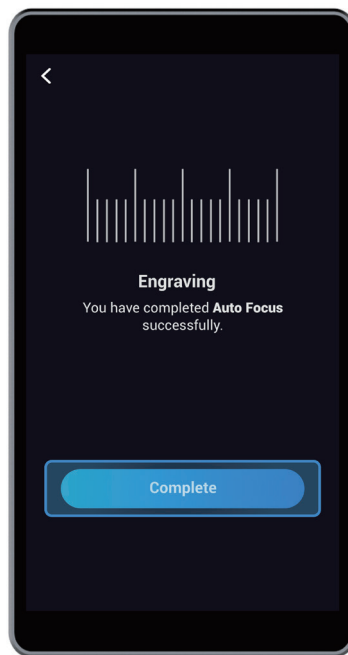
(7) Tap **Set Work Origin**, and then tap **Run Boundary**. As the Laser Module moves, the laser dot will be traveling along the path of a small rectangle on the material surface, which represents the area to be engraved. Ensure this work area on the material is blank. If not, tap **X-**, **X+**, **Y-**, or **Y+** to reset the work origin and run boundary again. After setting the work area, tap **Next**.



(8) Read the Auto Focus instruction on the Touchscreen. Tap **Start**, and the machine will keep adjusting the height of the Laser Module to engrave a series of lines on the material. Then, the built-in camera will identify the best engraved line.



(9) After Auto Focus is completed, tap **Complete** to go back to the APP List Screen.



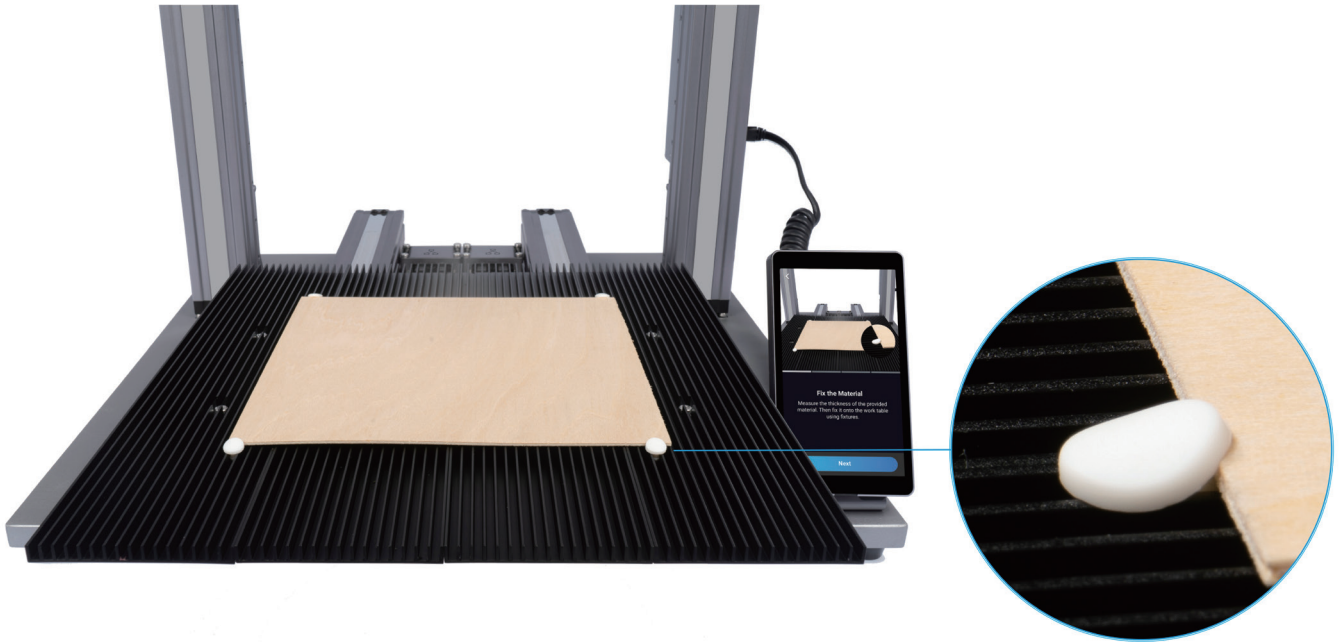
If the screen displays **Failed**, tap **Failed** and slide the scale to choose the line corresponding to the thinnest engraved line manually. Then you may need to redo Auto Focus. For more information about the possible causes and solutions to failed auto focus, see [Laser Engraving and Cutting - 6.1 Auto Focus Fails](#).

## Manually Measure the Focal Length

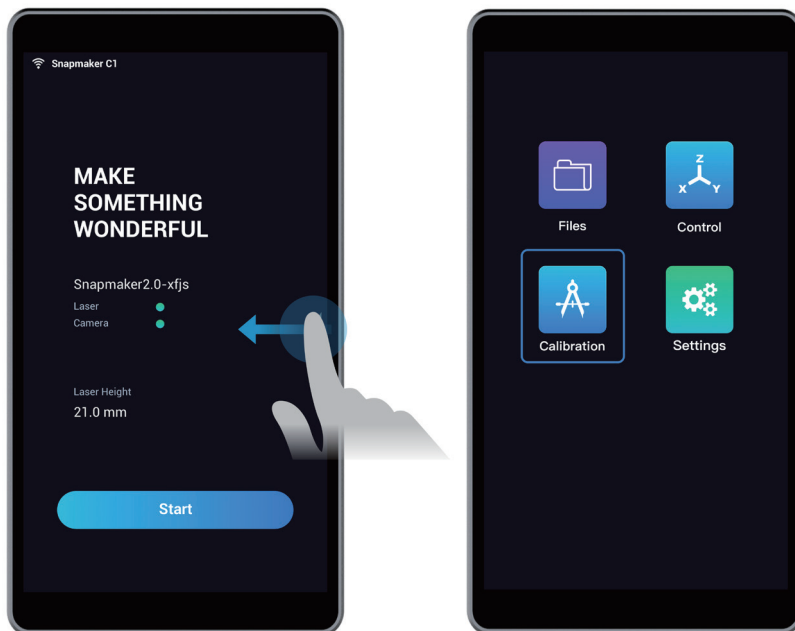
### Preparation:

- Laser Material × 1
- Silicone Plugs × 4
- Laser Safety Goggles × 1

(1) Place the provided material on the Laser Engraving and Cutting Platform. Secure it with the silicone plugs.

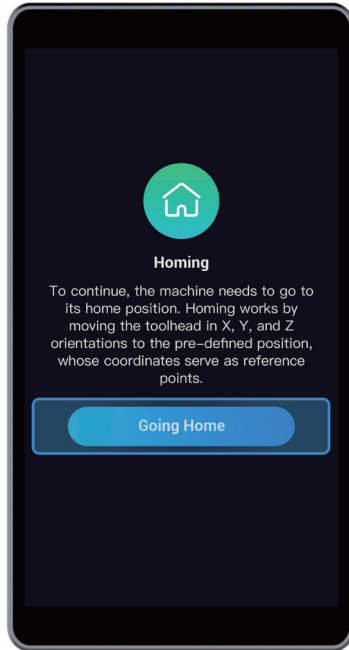


(2) On the Touchscreen, swipe left to tap **Calibration**.



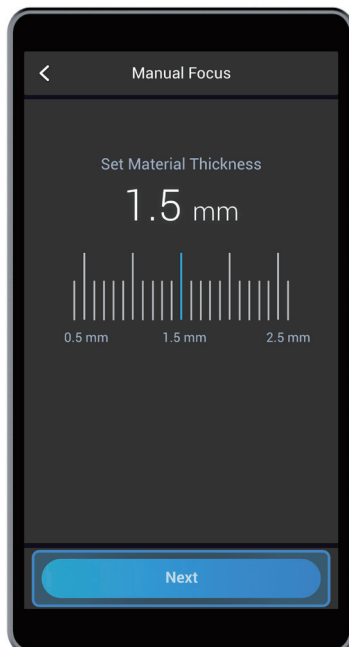


- (3) Read the homing instruction on the Touchscreen. Tap **Going Home**, and the Laser Module will automatically jog to the starting position of X, Y, and Z axes.



If you have completed homing previously, the machine will skip this step.

- (4) Slide the scale to set the thickness of the material (1.5 mm) and tap **Next**.



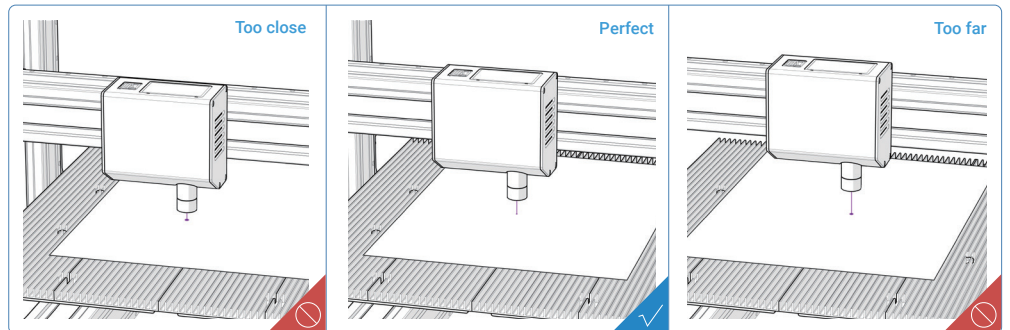
- (5) Put the Calibration Card provided or a piece of A4 paper in between the Laser Module and the material. Tap **X-**, **X+**, **Y-**, **Y+** to move the Laser Module above the Calibration Card. Keep adjusting the **Z Offset** until you feel slight resistance when you pull out the Calibration Card, and it should be wrinkled when you push it forward. Then, pull out the Calibration Card and tap **Next**.



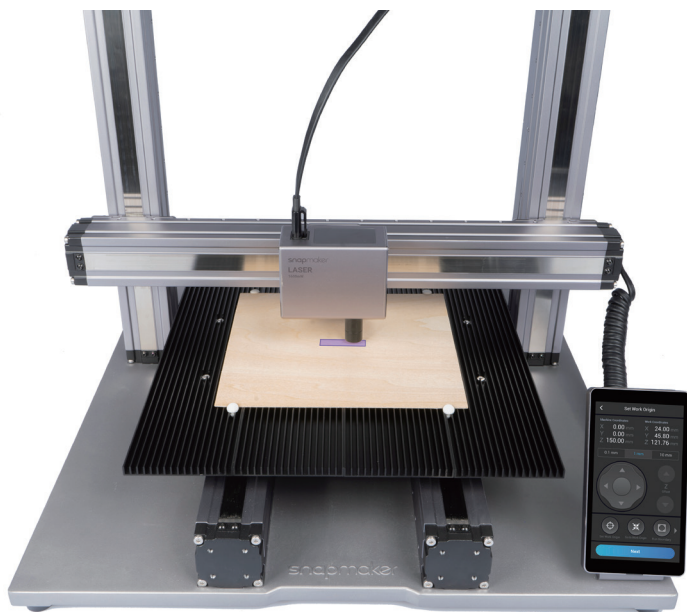
- (6) Put on the Laser Safety Goggles and tap **Next**.



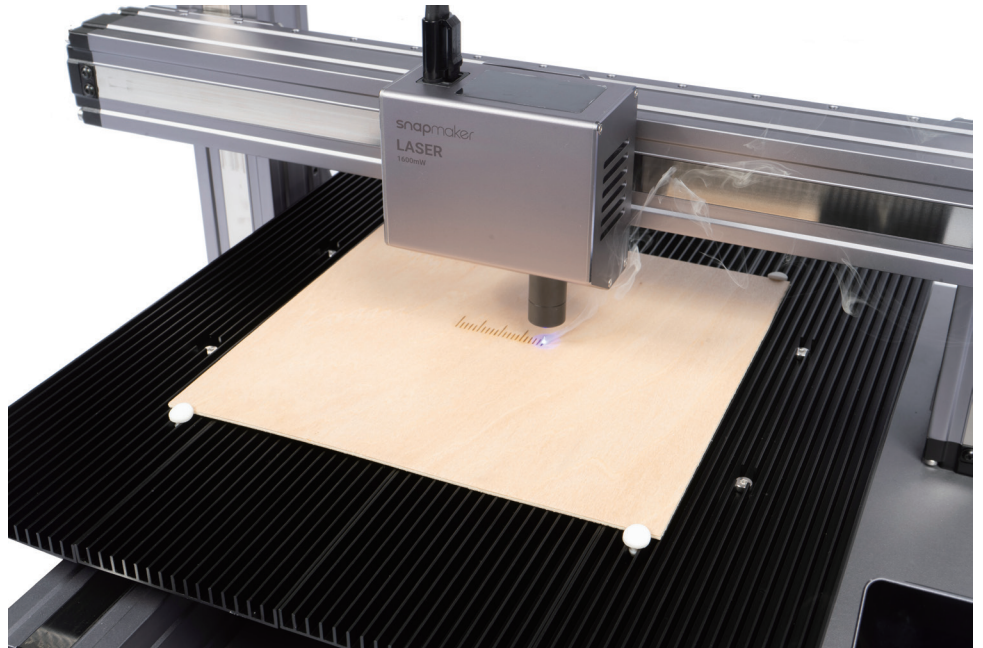
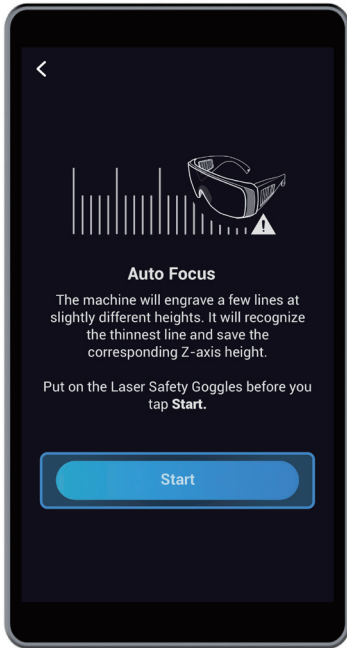
- (7) Set Reference Points. Tap **X-**, **X+**, **Y-**, **Y+**, **Z-**, or **Z+** to move the Laser Module. After the laser beam is focused into the smallest spot possible, tap **Next**.



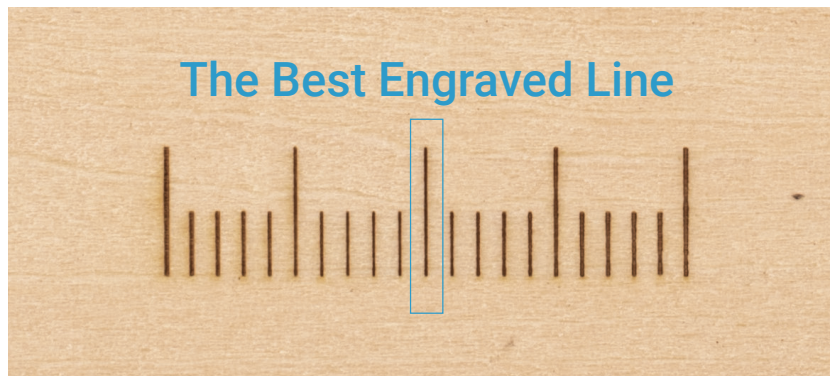
- (8) Tap **Set Work Origin**, and then tap **Run Boundary**. As the Laser Module moves, the laser dot will be travelling along the path of a small rectangle on the material surface, which represents the area to be engraved. Check if this work area is a blank surface on the material. If not, tap **X-**, **X+**, **Y-**, or **Y+** to reset the work origin and run boundary again. After setting the work area, tap **Next**.



- (9) Read the Manual Focus instruction on the Touchscreen. Tap **Start**, and the machine will keep adjusting the height of the Laser Module to engrave a series of lines on the material.

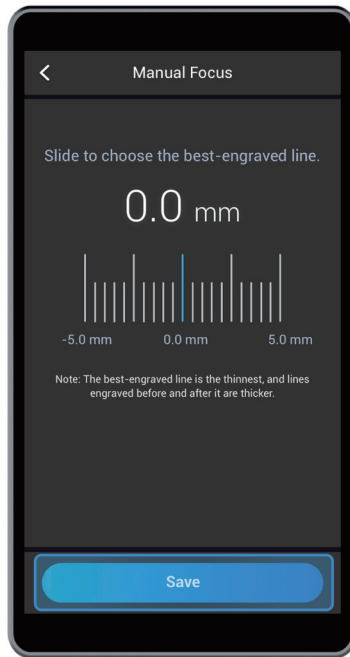


(10) After the engraving process is completed, check the engraving result and find the best engraved line.



For more information about how to identify the best engraved line, see [Laser Engraving and Cutting - 3.2 How It Works: Measure the Focal Length](#). If the best engraved line does not exist, see [Laser Engraving and Cutting - 6.1 Auto Focus Fails](#).

(11) On the Touchscreen, slide the scale to choose the line corresponding to the best engraved line, and tap **Save** to save the focal length and exit the manual focus procedure.



### 3.3 Calibrate the Camera

You can use the built-in camera to capture images of the work area, and then put the images together as the background of your editing area in Luban. This way, you can easily position the pattern you want to engrave or cut on the material.

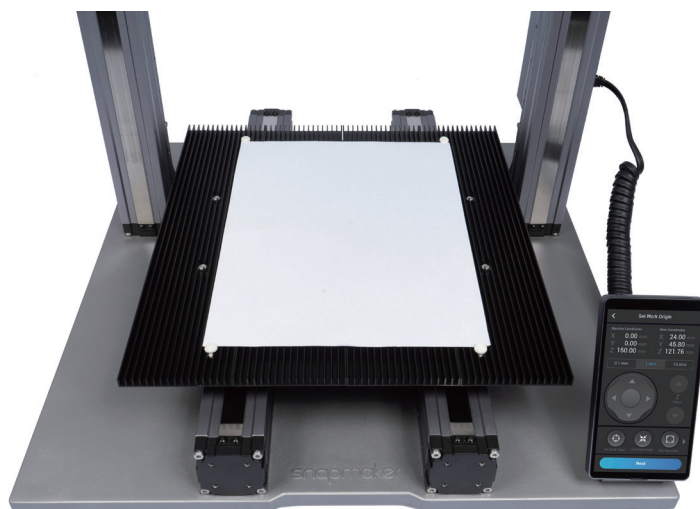
To use the camera capture feature for engraving and cutting, you must first calibrate the camera. This section describes how to use automatic calibration to calibrate the camera and how to manually adjust the calibration result to obtain the best camera capture images.

#### Automatically Calibrate the Camera

##### Preparation:

- Blank white paper (no less than 150 mm × 150 mm) × 1
- Silicone Plugs × 4
- Laser Safety Goggles × 1

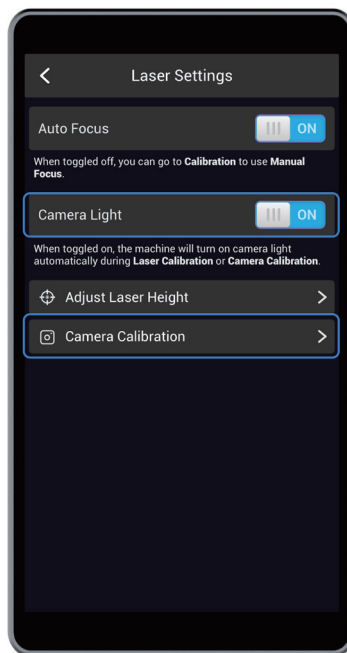
- (1) Place the blank white paper on the center of the Laser Engraving and Cutting Platform. Secure it with the silicone plugs.



(2) On the Touchscreen, swipe left and tap **Settings** > **Laser** to enter Laser Settings.



(3) On the **Laser Settings** screen, tap **Camera Calibration**.

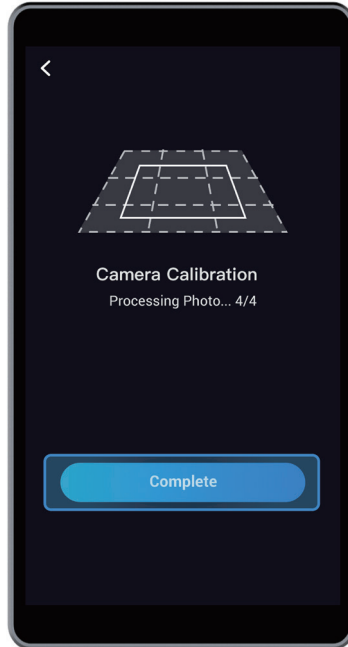


Ensure that **Camera Light** is toggled on. This way, the machine will turn on the camera light automatically during Auto Focus and Camera Calibration. Camera light provides a brighter working environment for the camera and ensures better calibration results.

(4) Read the camera calibration instruction on the Touchscreen. Put on the Laser Safety Goggles and tap **Start**. The machine will cut a square on the paper to calibrate the camera.



(5) Wait about 1 minute for the machine to process the photo. When the processing progress is 4/4, tap **Complete**.




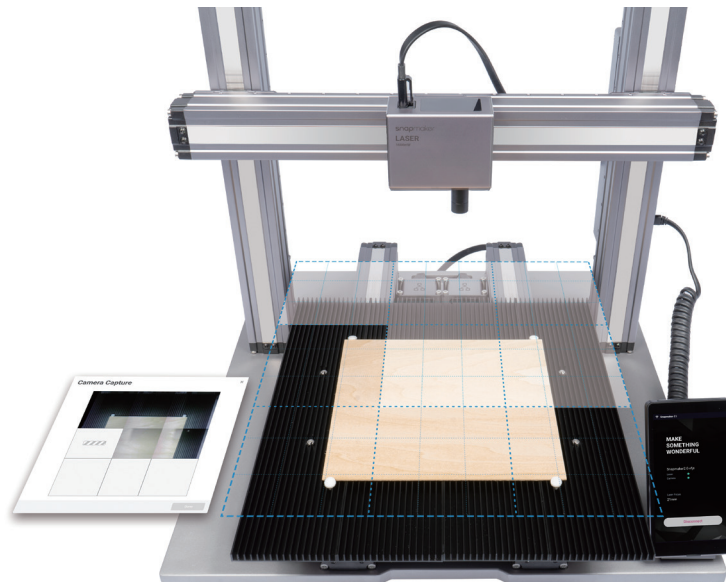
## Manually Adjust the Calibration Result

### Prerequisites:

Automatic camera calibration is completed.

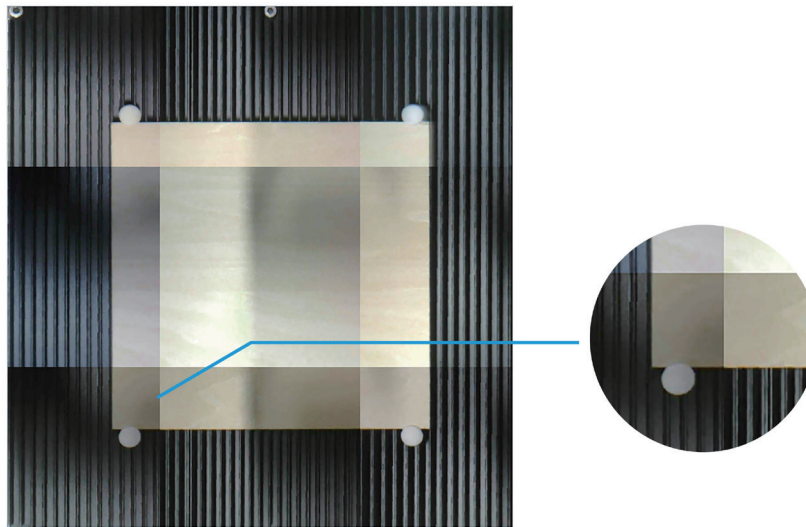
The machine is connected to Luban (see [3.5 Connect the Machine to Luban](#)).

- (1) In Luban, enter the edit and process space for laser. Then, click **Camera Capture**  to add background.
- (2) On the **Camera Capture** dialog box, click **Start**. Wait about 1 minute for the machine to take photos and stitch them into a panorama of the platform.

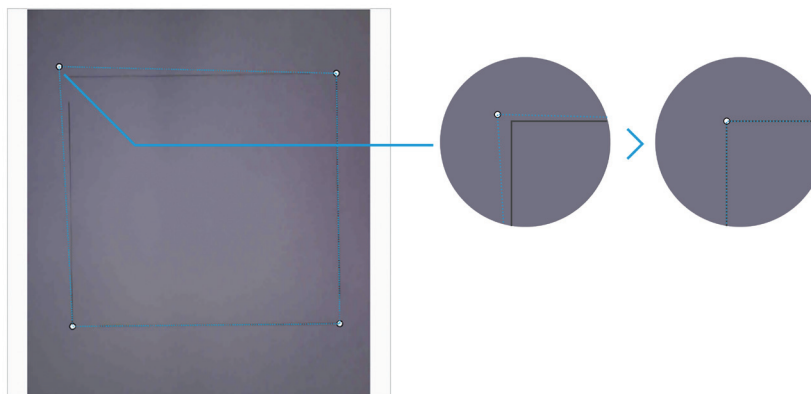


(3) Examine the captured image.

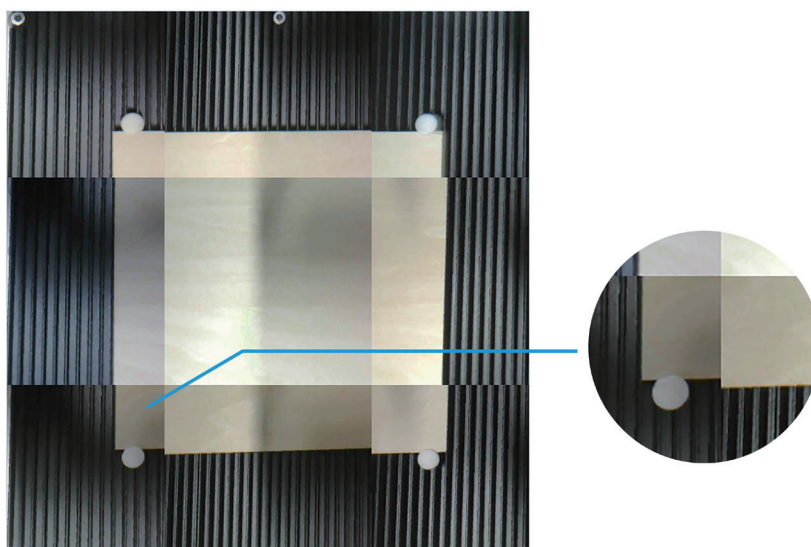
- If the edges of the captured image are aligned, click **Confirm** and skip the following steps.
- If the edges of the captured image are not aligned, click **Calibration** and continue the following steps.



(4) The image of the paper with an engraved square and a quadrilateral are displayed on the Calibration dialog box. Zoom in on the image and drag the lines of the quadrilateral until they perfectly match the square.



(5) Click **Apply** to see the finished image. You can repeat Step (5) and Step (6) if the edges of the captured image are still not aligned.



(6) After you finish calibration, click **Confirm** and the finished image will be loaded into the canvas in the coordinate system.



### 3.4 Prepare the Material

#### Choose the Material

Choosing an appropriate material is key to your personal safety and can render a better laser engraving and cutting effect. Pay attention to the following points so as to choose the proper material to engrave or cut:

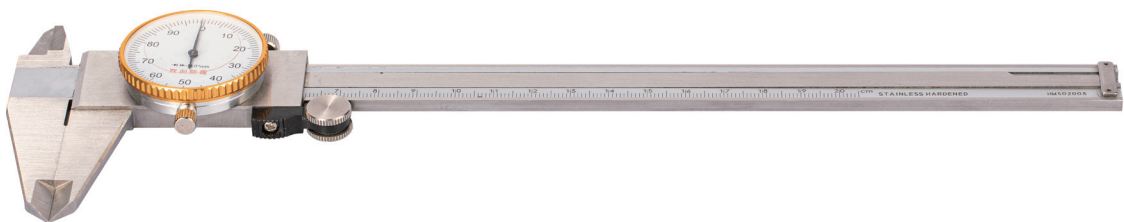
- Choose a material that is listed in the Material Library. Materials listed in Material Library are tested by Snapmaker, and are safe for your use. If you want to use materials that are not included, ensure that you are familiar with the material properties and that the material can be used for engraving and cutting. If you want to engrave or cut a material whose properties you are unsure of, you can contact us at [support@snapmaker.com](mailto:support@snapmaker.com).
- Choose a material that has a proper size. Ensure that the material you choose does not exceed the size of the Laser Engraving and Cutting Platform.
- Choose a material that has an even engraving and cutting area. If the engraving and cutting area is not flat, the laser beam will be out of focus.



#### Measure the Thickness of the Material

If you use the Auto Mode for engraving and cutting (see [3.9 Start Engraving and Cutting](#)), you must know the thickness of material to be engraved or cut. With an accurate thickness, the laser can best focus on the material surface and produce the best engraving and cutting result.

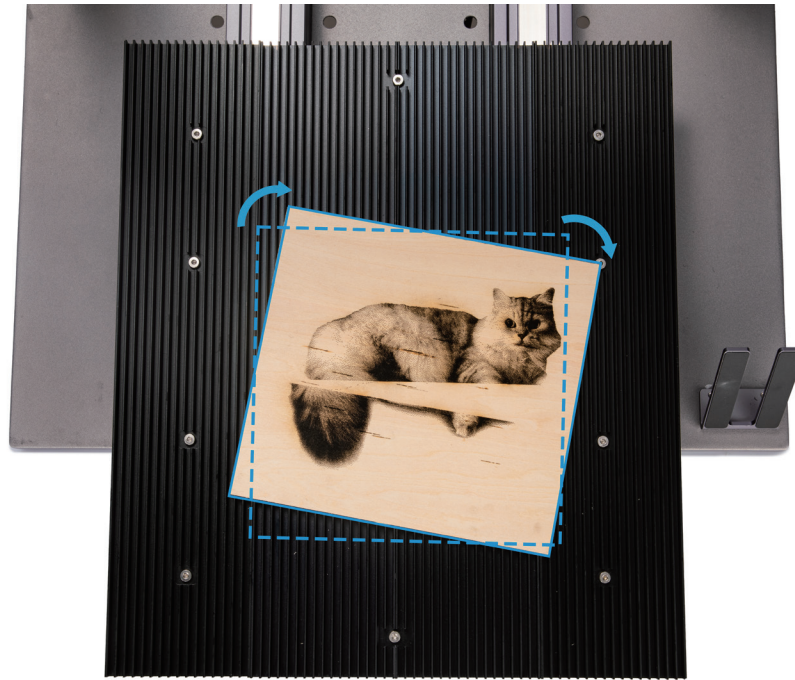
The thickness of the provided laser material is 1.5 mm. If you use other materials for engraving and cutting, we recommend that you use a vernier caliper to measure their thickness.



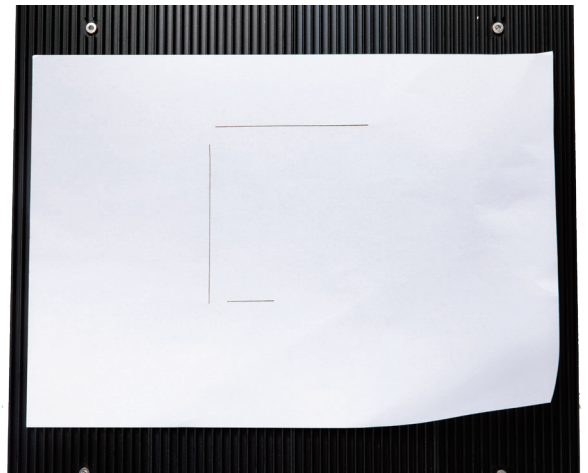
#### Fasten the Material

You must fasten the material before engraving and cutting for the following two purposes:

- To prevent position changing.  
The laser engraving and cutting machine works on designated paths. If the position of the material changes, the engraving and cutting effect will be compromised.

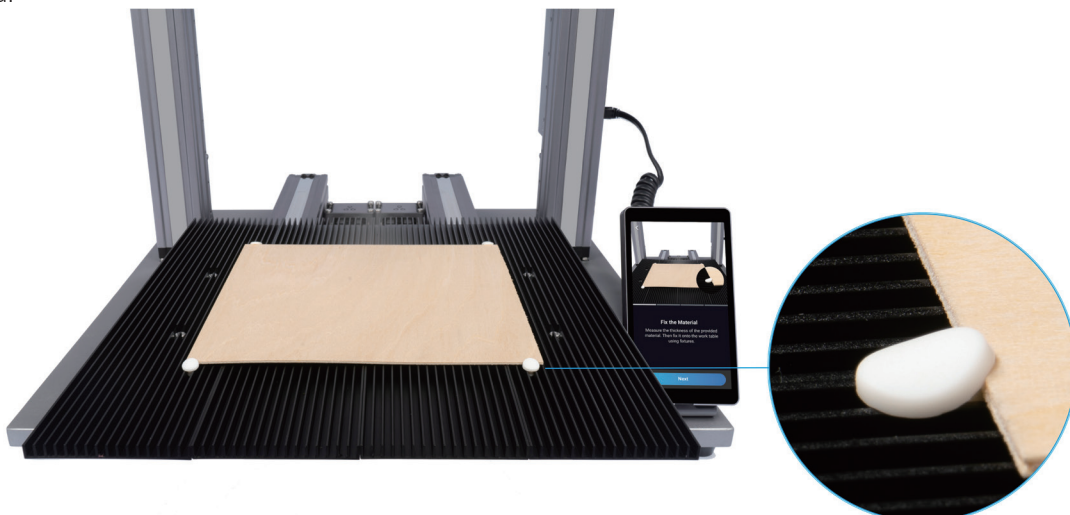


- To ensure consistent focusing.  
The laser engraving and cutting machine works with a fixed focal length. If the material surface is not flat, the engraving and cutting effect will be compromised.

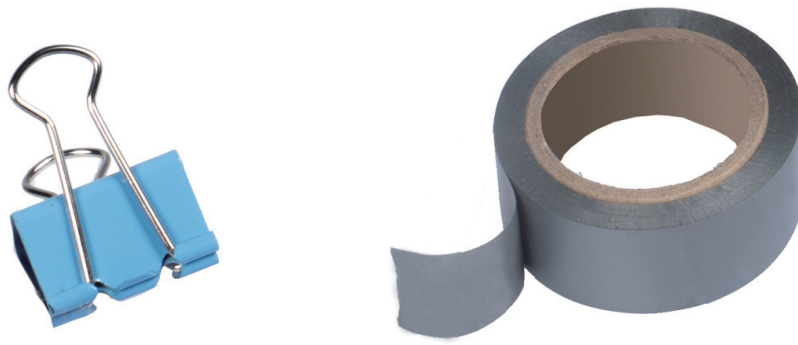


You can fasten the material with the provided silicon plugs or other tools.

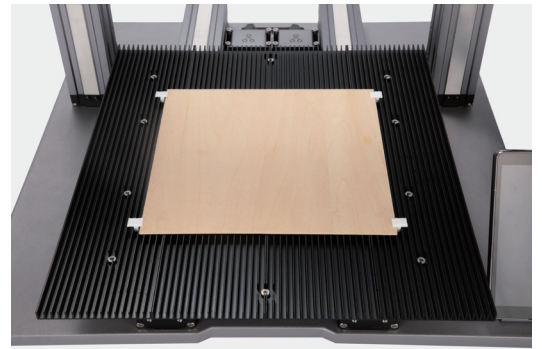
- Use Provided Silicone Plugs  
Place the material on the Laser Engraving and Cutting Platform. Fasten it with at least four silicone plugs as illustrated.



- Use Office Products  
Office products such as tapes and binder clips can be useful.

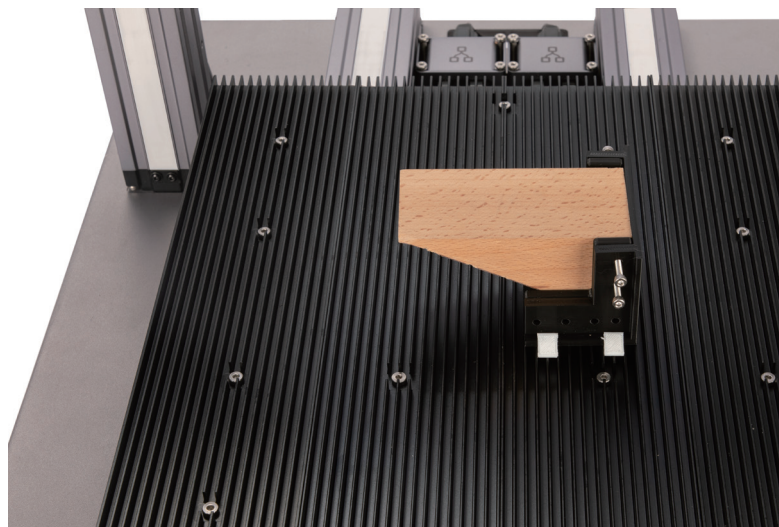


- Use DIY Fasteners  
Make good use of the 3D printer to DIY your own fasteners. The following picture shows a 3D printed widget specially designed to secure laser engraving and cutting materials.

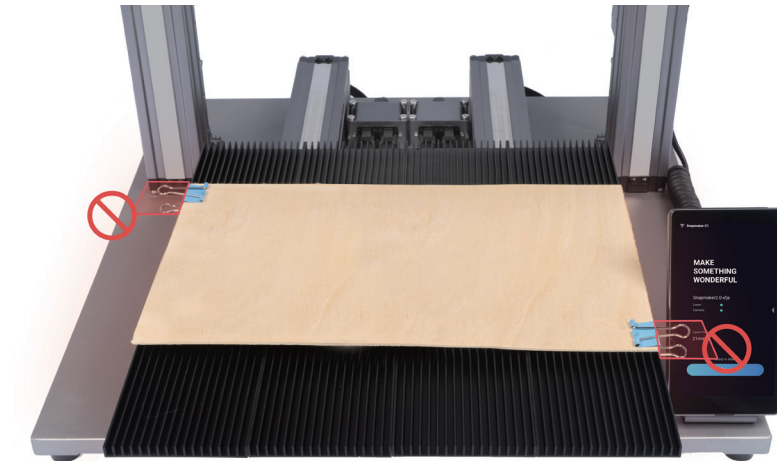


Pay attention to the following points when you fasten the material so as to protect your safety and ensure machining success:

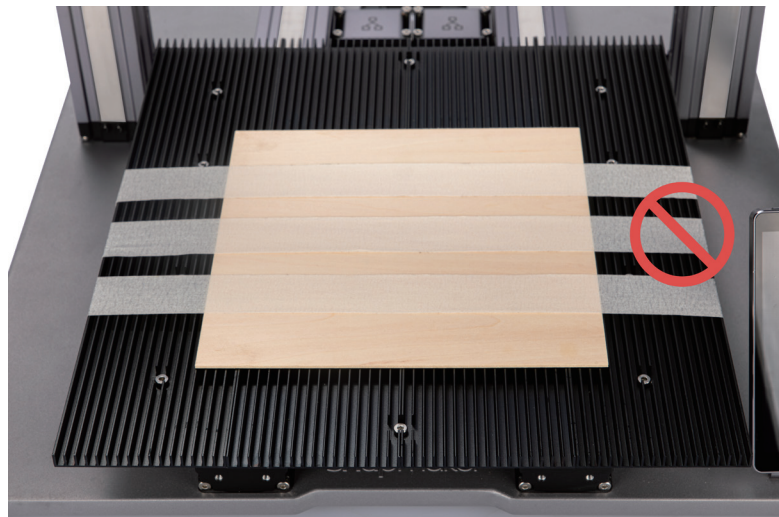
- Ensure that the area to engrave or cut remains level.  
Be creative, especially when engraving or cutting an irregular-shaped material. The following picture shows you an example of how to secure a triangular piece of wood.



- Ensure that the fastening tools will not collide with any portions of the machine.




- Ensure that the fastening tools remain out of the engraving and cutting paths.

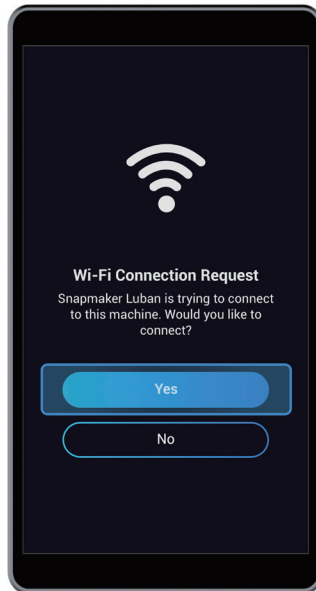


### 3.5 Connect the Machine to Luban

Luban is a free slicing software designed by Snapmaker. You can use Luban to edit and process the files for engraving and cutting. You can also connect your machine to Luban via Wi-Fi or USB cable and operate the machine using Luban. This section describes how to connect the machine to Luban.

#### Connect via Wi-Fi

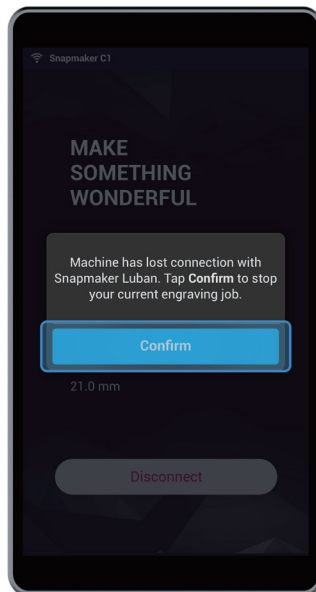
- (1) Connect the machine and your computer to the same Wi-Fi network.
- (2) In Luban, click **Workspace**. On the **Connection** panel, click **Wi-Fi** > **Refresh**  > Select your machine from the drop-down list > **Connect**.
- (3) Tap **Yes** on the Touchscreen of the machine.



After the machine is connected to Luban via Wi-Fi, you cannot operate it on the Touchscreen. You can find actions such as **Set Work Origin** and **Laser Speed** adjustment in Luban.



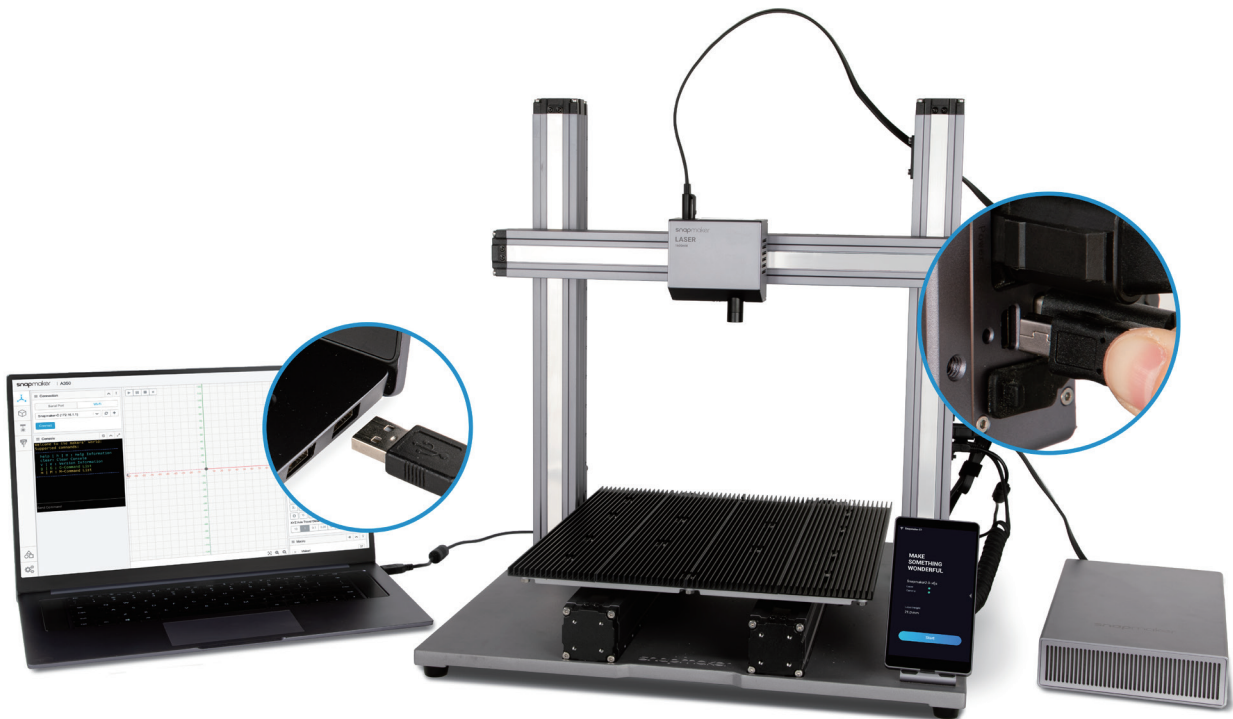
If the machine is disconnected from Luban, ongoing engraving and cutting jobs will not stop on the machine. You must tap **Confirm** on the Touchscreen to stop machine operations.




If the machine becomes disconnected with Luban when the **Laser Power** is turned on, the laser will not automatically turn off. You must go to **Control > Laser Power > Laser Status** to manually turn it off.

## Connect via USB Cable

- (1) Insert one end of the provided USB cable into the computer, and the other end into the Controller of the laser engraving and cutting machine.



- (2) In Luban, click **Workspace**. On the **Connection** panel, click **Serial Port** > **Refresh**  > Select your machine from the drop-down list > **Connect**.



If you can't find the port, unplug the USB cable and try again. You may need to download and install the driver from <https://snapmaker.com/product/snapmaker-2/downloads>.



Keep the cable connected until the laser engraving and cutting job completes.




If the machine becomes disconnected with Luban when the **Laser Power** is already turned on, the laser will not automatically turn off. You must go to **Control** > **Laser Power** > **Laser Status** to manually turn it off.

## 3.6 Prepare the G-code File

G-code is the most widely used computer numerical control (CNC) programming language. It is used mainly in computer-aided manufacturing to control automated machine tools.

G-code instructions are provided to a machine controller that tells the motors where to move, how fast to move, and what paths to follow.

A G-code file contains a series of G-code instructions. To operate the machine for engraving and cutting, you must first prepare a G-code file. This section describes how to prepare a G-code file.

- (1) Open Luban on your computer.
- (2) Connect Luban with your machine. Then, use **Camera Capture** to take photos of the work area and generate a background for your image.  
(Skip this step if you use work origin to determine the position of your engraving and cutting image.)
- (3) Load cases or add images, text, or patterns to the canvas for editing.
  - You can choose a case from the case library of Luban and load it to the canvas.
  - You can also click  and choose an image from your computer. The add files icon is on the left of the canvas.



Luban supports the following image formats: .svg, .png, .jpg, .jpeg, .bmp, .dxf, and more formats are to be added.



- You can also add text, rectangles, ellipses or other patterns. The tool bar is on the left of the canvas. When adding text, you can type in any characters and set the font and the font size.



- (4) Adjust the positions, sizes, and rotation angles of the images, patterns or text.
- (5) Click to choose an image, and select and configure a **Processing Mode** (see [3.7 Four Modes to Process the File](#)) for the image. Repeat this step to configure processing modes for the other images. When multiple images overlap, you can right click on the images to **Bring to Front** and **Send to Back** to select the image you want.



You can configure the same or different processing modes for different images.

- (6) Switch **Edit** to **Process**. Click to choose an image, a pattern, or text, and click **Create Toolpath**. Configure parameters about the toolpaths of the laser engraving and cutting machine. Repeat this step to create and configure toolpaths for the other images, patterns, or text. Then, you can **Prioritize**  or **Deprioritize**  each toolpath to determine the engraving and cutting sequence.



You can configure the same or different toolpaths for different images, patterns, or text. You can also configure multiple toolpaths for one image, pattern, or text. If a toolpath for engraving overlaps with a toolpath for cutting, we recommend that you prioritize the toolpath for engraving to avoid undermining engraving quality in case the materials become less stable after being cut.



If you do not create a toolpath for an image, a pattern, or text, then they will not be engraved or cut.

(7) Preview the toolpaths and generate a G-code file. The G-code file can be loaded to Workspace or exported to your computer.

### 3.7 Four Modes to Process the File

Snapmaker provides you with four modes to process the image, all of which can be used in laser engraving. But you can use only the **Vector** mode for laser cutting.

#### B & W

It will render the engraved material black and white without any grey.



#### Greyscale

It will render the engraved material in different shades of grey depending on the original color of the image.





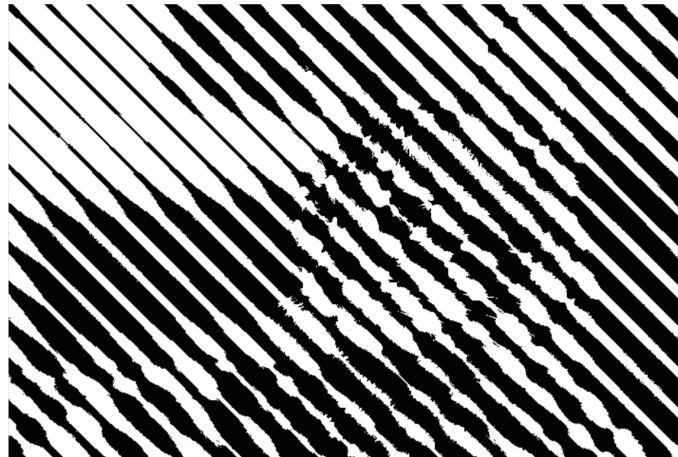
## Vector

It can be used for engraving vector images. The engraved results will be in black and white without any grey. The Vector mode can also be used for laser cutting. For laser cutting, you can adjust **Work Speed**, **Multi-pass** and **Power** based on the materials you use.



## Halftone

It creates a gradient-like effect on your material.

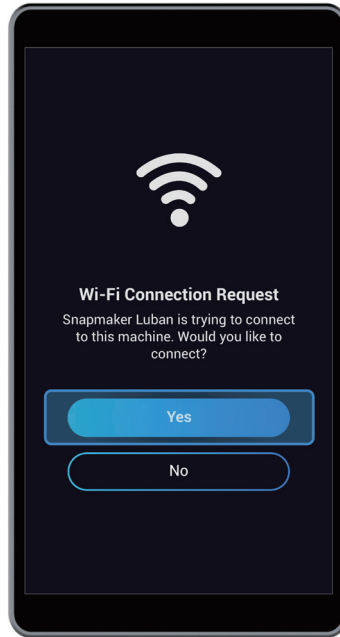


## 3.8 Transfer the G-code File

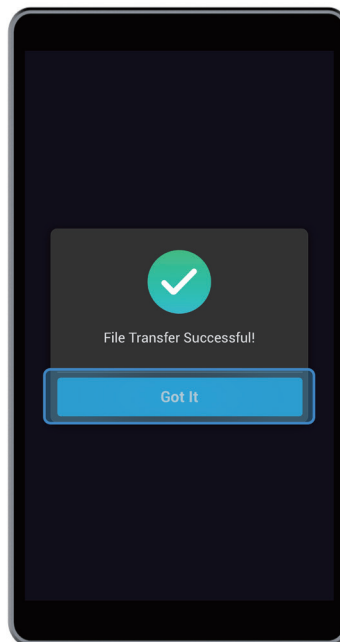
If you want to operate laser engraving and cutting on the Touchscreen, you must transfer the G-code file to the machine. This section describes how to transfer the G-code file to the machine for laser engraving and cutting.

### Transfer via Wi-Fi

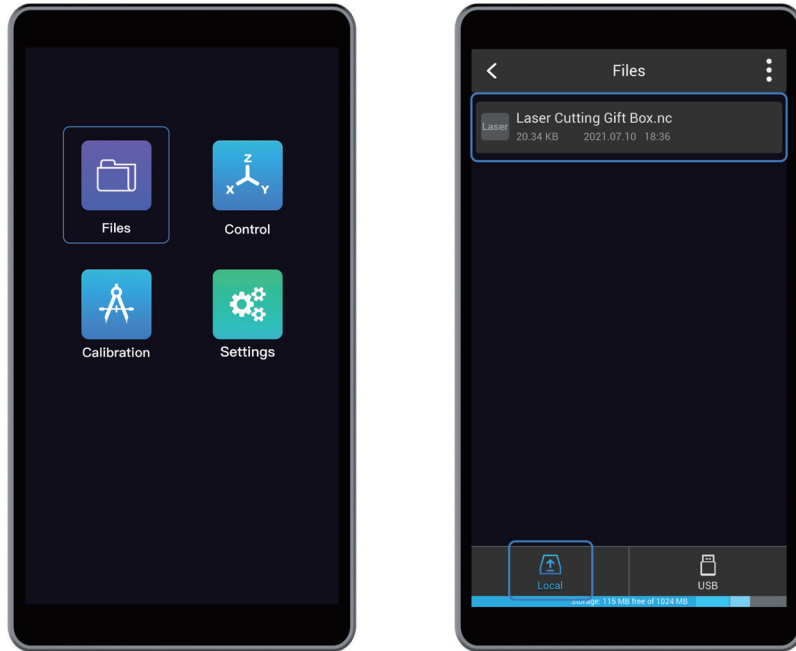
- (1) Connect the machine to Luban (see [3.5 Connect the Machine to Luban](#)).



- (2) In the edit and process space for laser in Luban, click **Load G-code to Workspace**. In the workspace of Luban, click **Send to Device via Wi-Fi**.
- (3) On the Touchscreen, tap **Got It** to receive the G-code file.

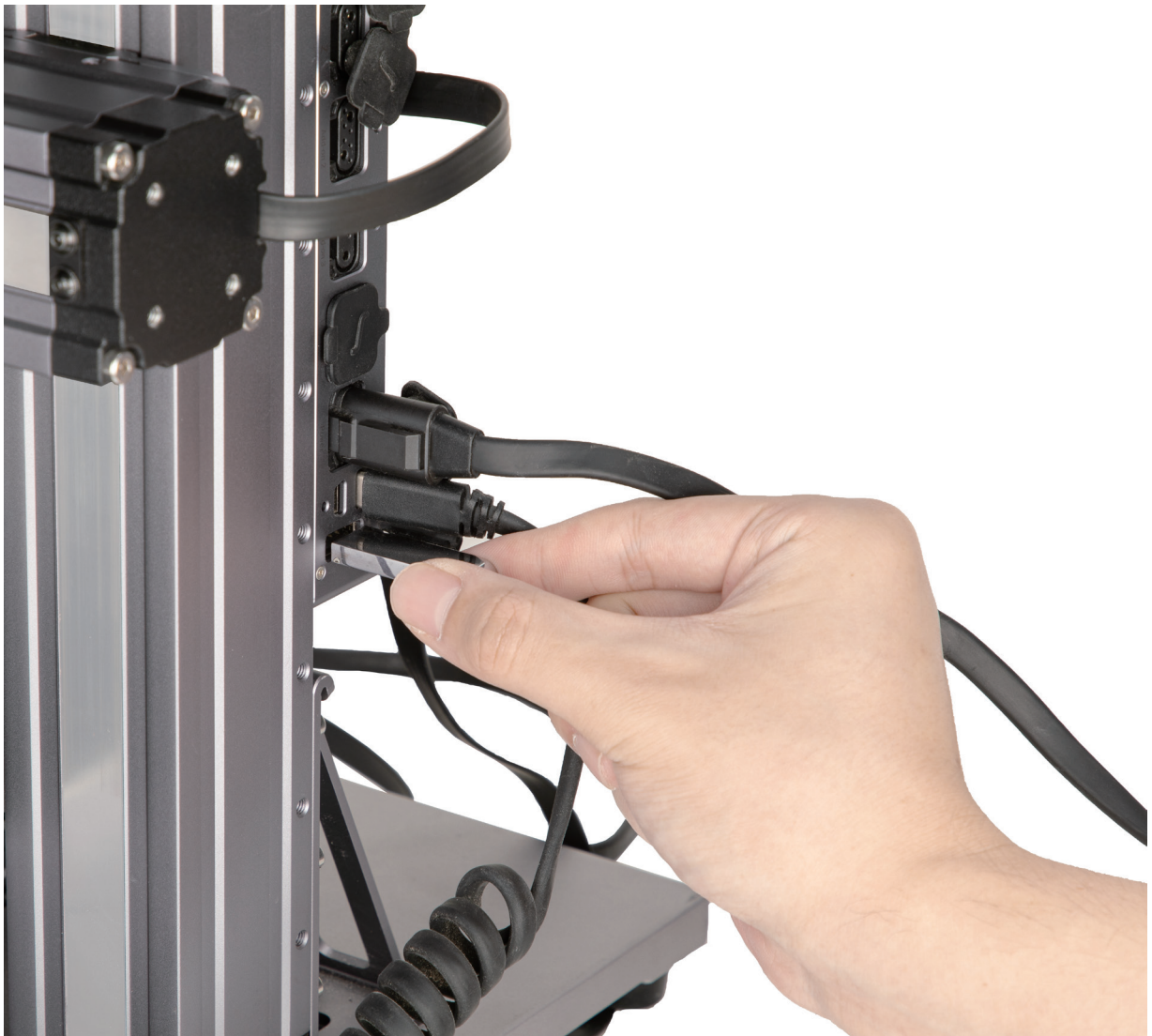


- (4) On the Touchscreen, find the G-code file by tapping **Files > Local**.

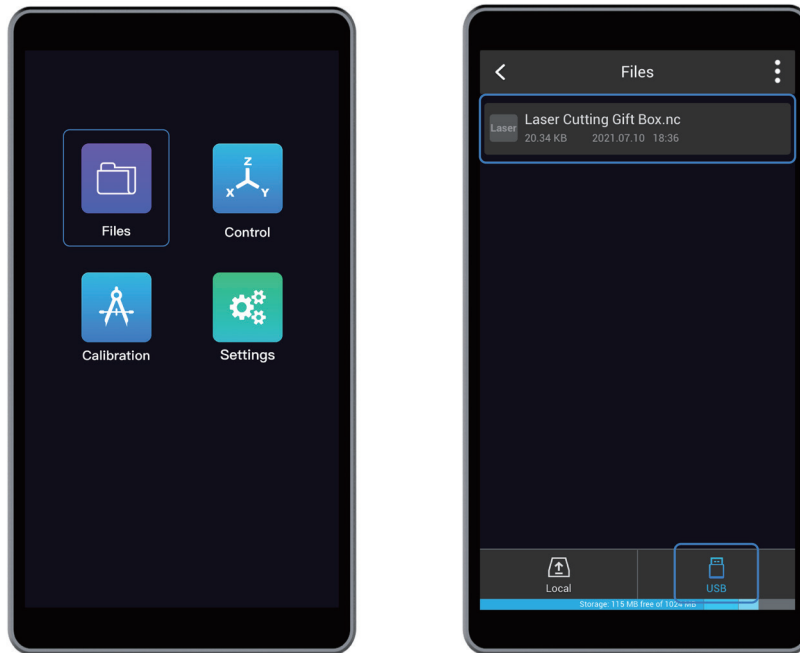


### Transfer via USB Flash Drive

- (1) In the edit and process space for laser in Luban, click **Export G-code to File** (in .nc format) and save the exported file to the USB flash drive.
- (2) Insert the USB flash drive into the Controller of the laser engraving and cutting machine.



(3) On the Touchscreen, find the G-code file by tapping **Files > USB**.



### 3.9 Start Engraving and Cutting

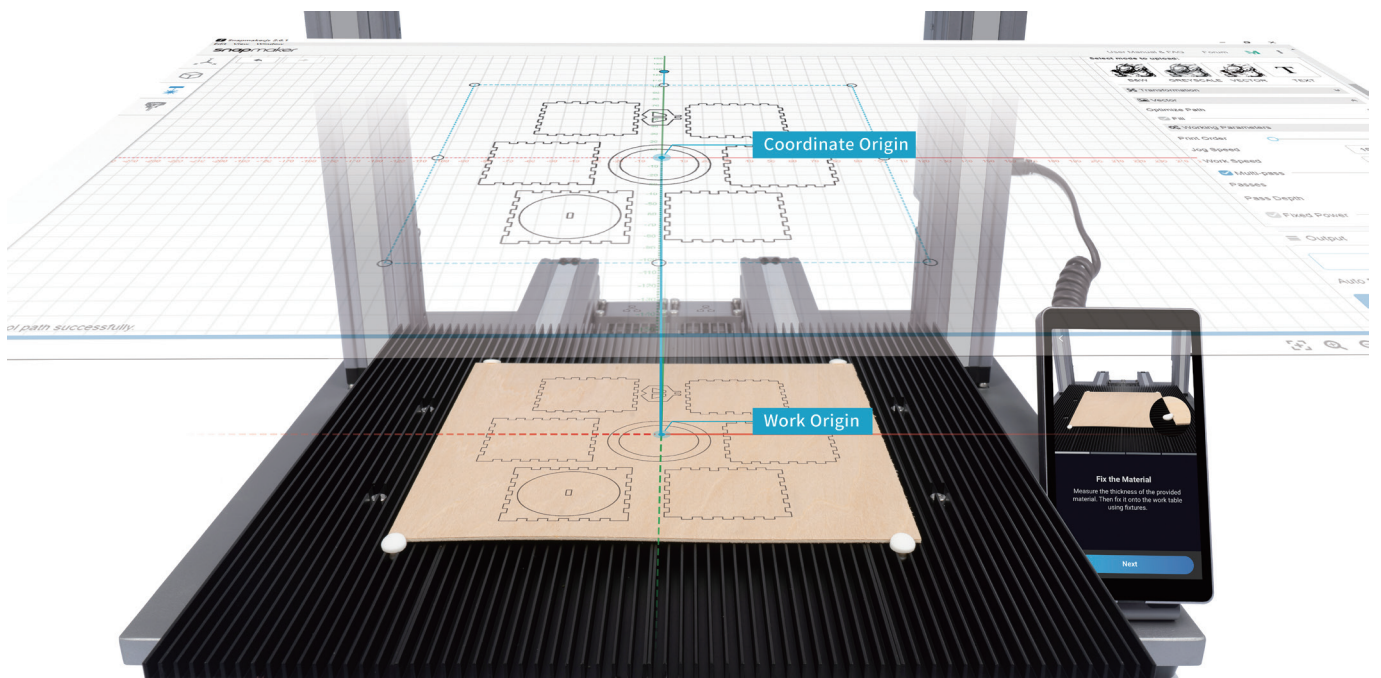
After the machine, material, and G-code file are ready, you can start engraving and cutting. The operating console can be Luban or the Touchscreen. **Set Work Origin** is a crucial step to start engraving and cutting. This section explains work origin and describes how to start engraving and cutting in Luban or on the Touchscreen.

#### How It Works: Work Origin

The work origin corresponds to the (0, 0) coordinate origin in Luban. By setting the work origin and running boundary, you can find out where the engraving and cutting will take place.

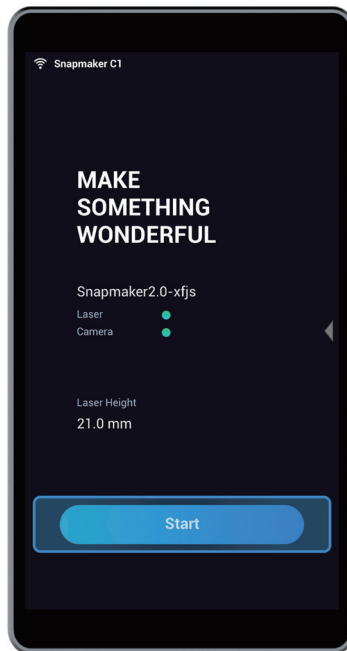


If you use the camera capture feature to determine the engraving and cutting position, you do not need to set the work origin.

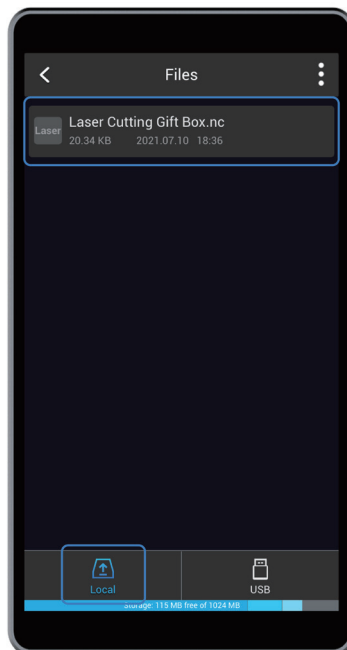


## Start Engraving and Cutting on the Touchscreen

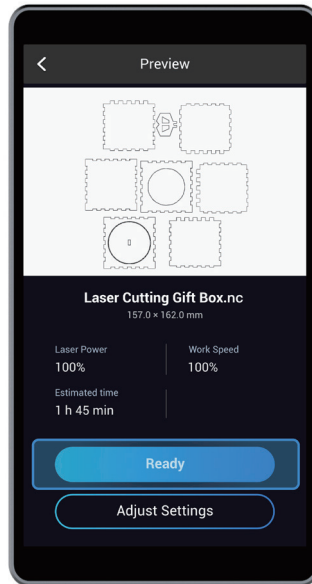
- (1) On the Touchscreen, tap **Start**.



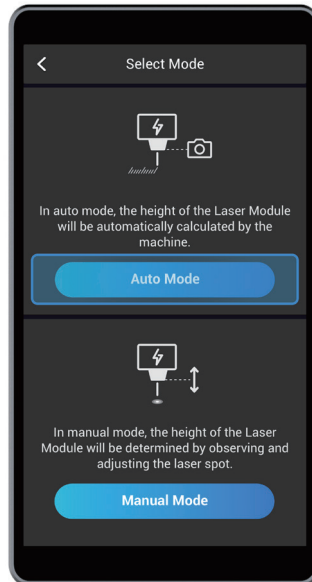
- (2) Choose the G-code file you prepare from **Local** or **USB**.



- (3) On the **Preview** screen, you can preview the image for engraving and cutting. **Laser Power**, **Work Speed**, and **Estimated Time** are also displayed on the screen. You can tap **Adjust Settings** to modify **Laser Power** and **Work Speed**. Check if the image is right and the laser power and the work speed are proper, and then tap **Ready**.

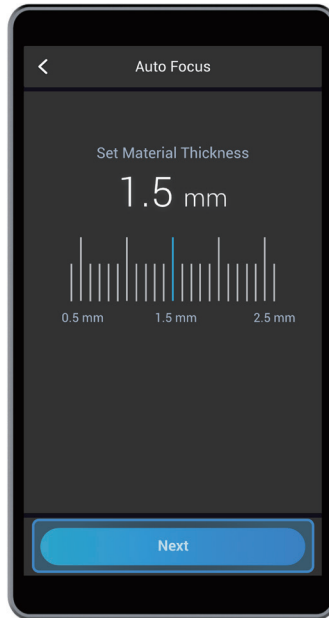



(4) In the **Select Mode** screen, tap **Auto Mode**.



You can also opt for **Manual Mode**. However, we recommend auto mode as it is easier to follow. To know more about the differences between the two modes as well as how to navigate the manual mode, see [3.10 Auto Mode and Manual Mode for Laser Engraving and Cutting](#).

(5) **Set Material Thickness**. Set the thickness of the material you want to engrave or cut, and then tap **Next**.



 Set an accurate material thickness. Otherwise, the Lens Hood may collide with the material.

(6) Put on the Laser Safety Goggles and tap **Next**.



(7) Tap **X-**, **X+**, **Y-**, or **Y+** to move the laser dot to where the work origin will be, and then tap **Set Work Origin**. Next, tap **Run Boundary** to check if the work origin is proper. If not, reset the work origin and run boundary again. After you set a proper work origin, tap **Start**.

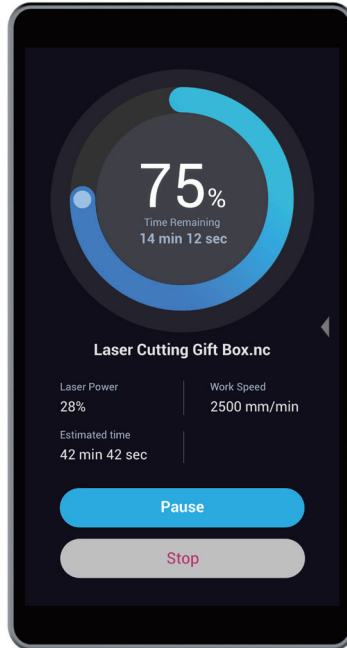
For more information about work origin, see [3.9 How It Works: Work Origin](#).



(8) Laser engraving and cutting starts.



You can swipe left to modify **Laser Power** and **Work Speed**.



### Start Engraving and Cutting in Luban

- (1) Connect your machine to Luban.
- (2) Load G-code to **Workspace**.
  - If you generate G-code in Luban, click Load G-code to Workspace to load the generated G-code to Workspace.
  - If you want to use a G-code file stored in your computer, click Open G-code. Select a G-code file (NC file) from your computer and click Open.
- (3) Select **Auto Mode**.



You can also opt for **Manual Mode**. However, we recommend auto mode as it is easier to follow. To know more about the differences between the two modes as well as how to navigate the manual mode, see [3.10 Auto Mode and Manual Mode for Laser Engraving and Cutting](#).

- (4) **Set Material Thickness**. Enter the thickness (in millimeters) of the material you want to engrave or cut.



Set an accurate material thickness. Otherwise, the Lens Hood may collide with the material.

- (5) Put on the Laser Safety Goggles and turn on **Laser Power**.
- (6) Click **X-**, **X+**, **Y-**, or **Y+** to move the laser dot to where the work origin will be, and then click **Set Work Origin**.




Next, click **Run Boundary** to check if the work origin is proper. If not, reset the work origin and run boundary again. Repeat this step until you set a proper work origin.

For more information about work origin, see [3.9 How It Works: Work Origin](#).

(If you use the camera capture method to determine the position of the image, skip this step to continue the following operations.)

(7) You can also modify **Laser Power** and **Work Speed** in Luban.

(8) On the top-left corner of the **Workspace**, click the **Run**  button to start engraving and cutting.

## 3.10 Auto Mode and Manual Mode for Laser Engraving and Cutting

### Differences between Auto Mode and Manual Mode

In auto mode, the machine automatically adjusts the height of the Laser Module based on the measured focal length and the input material thickness, so as to ensure the best focusing result. In manual mode, you must manually adjust the height of the Laser Module to make the laser beam best focus on the material surface. Therefore, manual mode differs from auto mode in the following aspects:

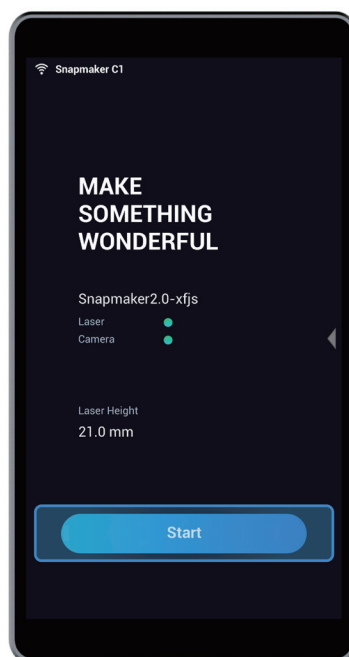
- Manual mode does not involve the Auto Focus or Manual Focus procedure to measure the focal length.
- Materials with unknown thickness can be engraved and cut.
- The height of the Laser Module can be adjusted. The height of the Laser Module is not automatically calculated by the machine. Thus, if you find the engraving and cutting effect unsatisfying, you can stop the job and choose Manual Mode again to modify the height of the Laser Module.

### How to use Manual Mode

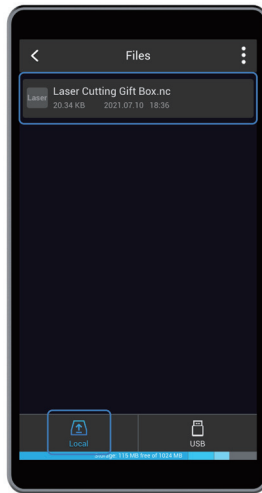
When using manual mode, you do not need to measure the focal length or measure the thickness of the material. After the machine, material, and G-code file are ready, you can use Manual Mode to start engraving and cutting. The operating console can be Luban or the Touchscreen.

- Use Manual Mode on the Touchscreen

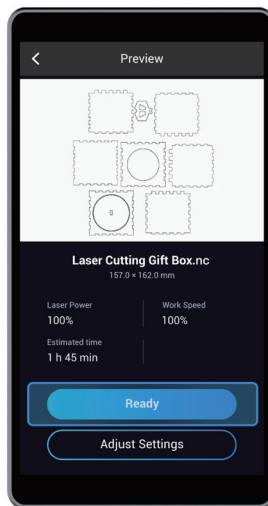
(1) On the Touchscreen, tap **Start**.



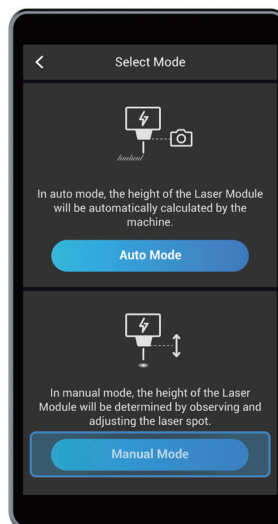
(2) Choose the G-code file you have prepared from **Local** or **USB**.



(3) On the **Preview** screen, you can preview the image for engraving and cutting. **Laser Power**, **Work Speed**, and **Estimated Time** are also displayed on the screen. You can tap **Adjust Settings** to modify **Laser Power** and **Work Speed**. Check if the image is right and the laser power and the work speed are proper, and then tap **Ready**.



(4) On the **Select Mode** screen, select **Manual Mode**.



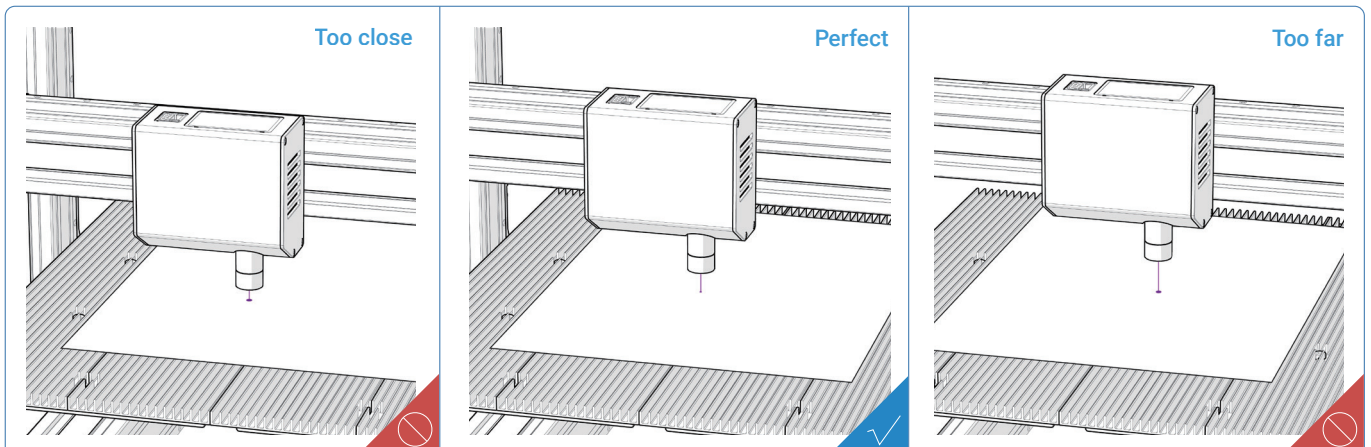
(5) Put on Laser Safety Goggles and tap **Next**.



(6) Tap **X-**, **X+**, **Y-**, or **Y+** to move the laser dot above the material. Then, tap **Z-** or **Z+** to adjust the height of the Laser Module until the laser beam is focused down to the smallest spot.



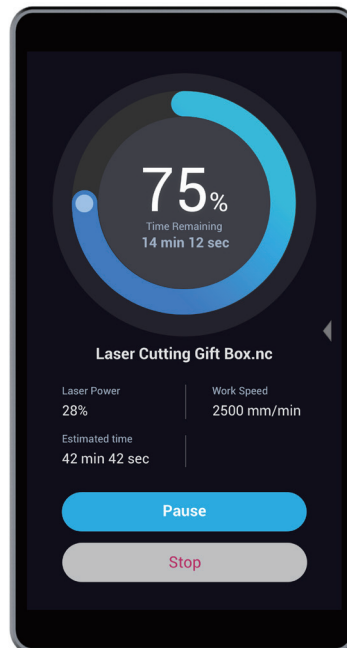
The smallest laser spot means the best focusing result. To reach the best focusing result, first lower the Laser Module until the Lens Hood has slightly touched the surface of the material. Then, gradually move the Laser Module up. The laser spot will first become smaller before becoming larger. Find the smallest laser spot in this process by tapping **Z-** or **Z+**.



- (7) Tap **X-**, **X+**, **Y-**, or **Y+** to move the laser dot to where the work origin will be, and then tap **Set Work Origin**. Next, tap **Run Boundary** to check if the work origin is proper. If not, reset the Work Origin and run boundary again. After you set a proper work origin, tap **Start**.



- (8) Laser engraving and cutting starts.



- Use Manual Mode in Luban
  - (1) Connect your machine to Luban.
  - (2) Load G-code to **Workspace**.
    - If you generate G-code in Luban, click Load G-code to Workspace to load the generated G-code to Workspace.
    - If you want to use a G-code file stored in your computer, click Open G-code. Select a G-code file (NC file) from your computer and click Open.
  - (3) Unselect **Auto Mode**.

- (4) Put on the Laser Safety Goggles. Adjust the **Laser Power** to a small value and turn on **Laser Power**.
- (5) Click **X-**, **X+**, **Y-**, or **Y+** to move the laser dot above the material. Then, click **Z-** or **Z+** to adjust the height of the Laser Module until the laser beam is focused down to the smallest spot.



The smallest laser spot means the best focusing result. To reach the best focusing result, first lower the Laser Module until the Lens Hood has slightly touched the surface of the material. Then, gradually move the Laser Module up. The laser spot will first become smaller before becoming larger. Find the smallest laser spot in this process by tapping **Z-** or **Z+**.

- (6) Click **X-**, **X+**, **Y-**, or **Y+** to move the laser dot to where the work origin will be, and then click **Set Work Origin**. Next, click **Run Boundary** to check if the work origin is proper. If not, reset the work origin and run boundary again. Repeat this step until you set a proper work origin.



If you use the camera capture method to determine the position of the image, skip this step to continue the following operations.

- (7) You can also modify **Laser Power** and **Work Speed** in Luban.
- (8) On the top-left corner of the **Workspace**, click the **Run** button to start engraving and cutting.

### 3.11 Power Loss Recovery

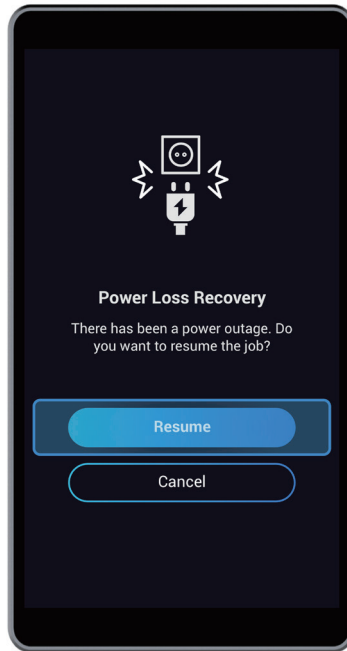
This feature enables you to restart a laser engraving and cutting job from where you left. If the Power Module is turned off or the AC power cable is unplugged during laser engraving and cutting, you need to first restore power and then restart the machine. To resume your job, read the Power-Loss Recovery instruction on the Touchscreen and tap **Resume**.



Power Loss Recovery applies to only laser engraving and cutting jobs that are started on the Touchscreen.



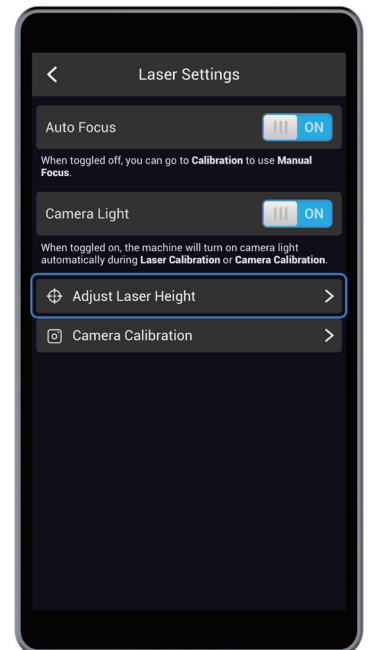
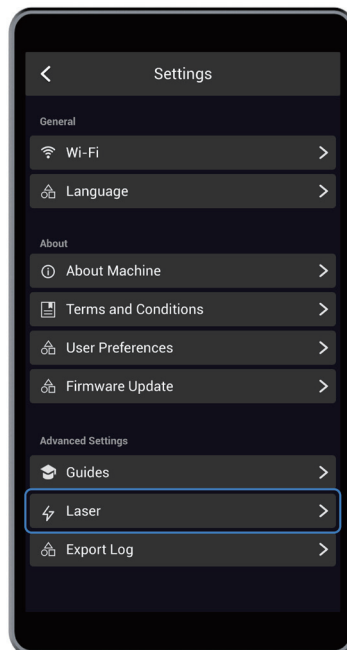
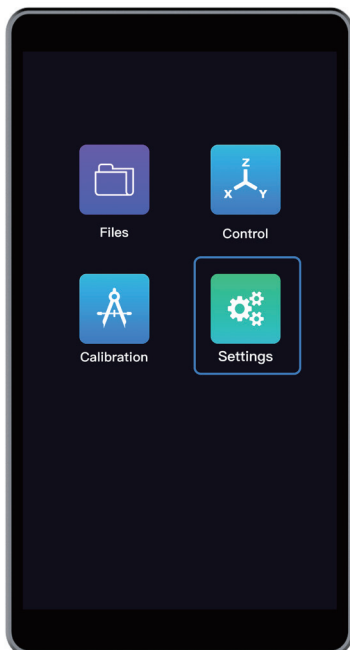
If the power loss is caused by the disconnection of the power cable, you must turn off the Power Module before you plug in the power cable.



### 3.12 Other Operations

- Adjust Laser Height

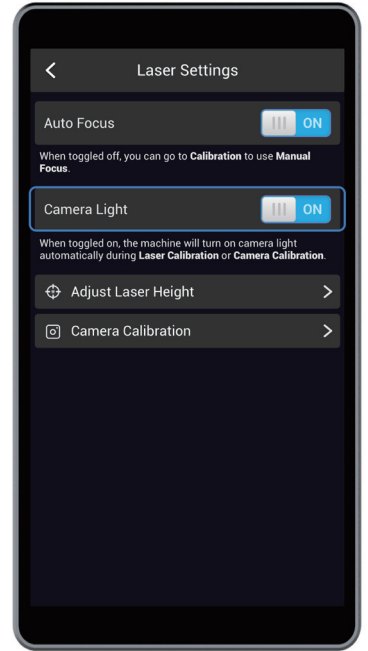
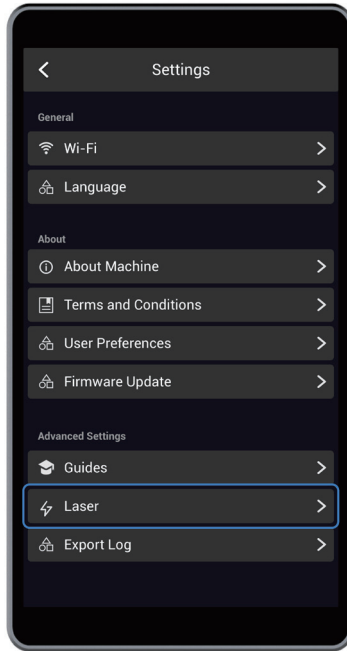
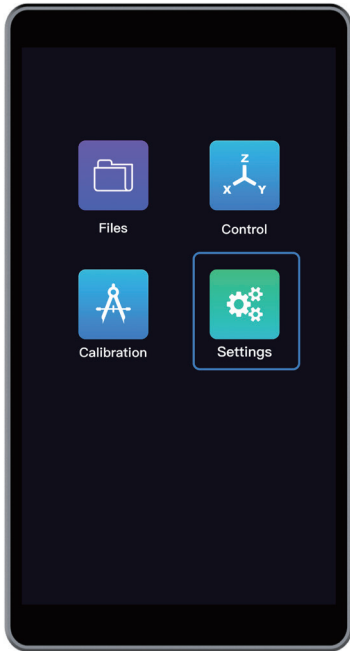
If you want to change the laser height, tap **Settings > Laser > Adjust Laser Height**.



- Camera Light

When calibrating the camera or using **Auto Focus** to measure the focal length, you can turn on **Camera Light** for illumination.

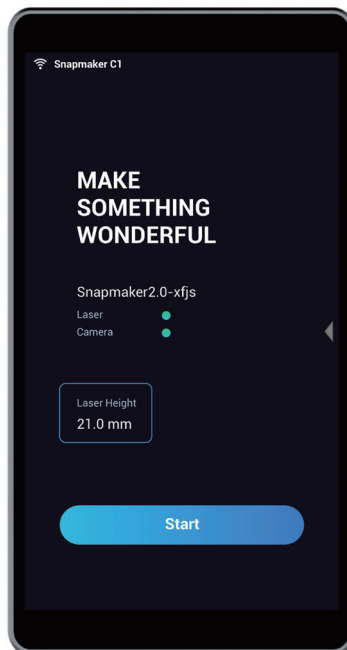
**Camera Light** is enabled by default. You can disable it by going to **Settings** in the APP List Screen, tap **Laser**, and turn off **Camera Light** under **Laser Settings**.



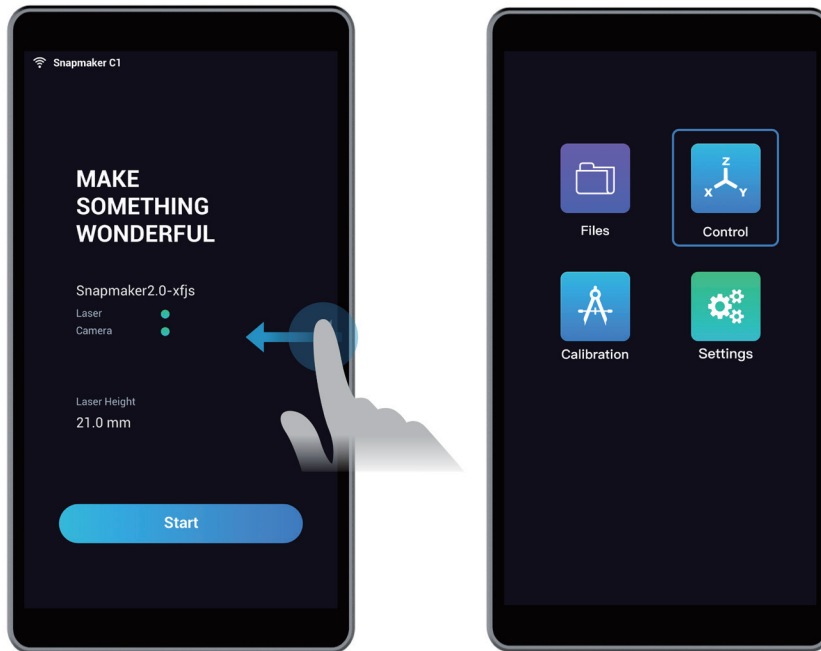
- Adjust Lens Hood

During the laser engraving and cutting process, if you feel that the lens hood is too far from the surface of the material to produce the best light-blocking effect, you can follow the steps below to adjust the settings for the lens hood:

- (1) Read the current value of the **Laser Height** displayed on the Home Screen of the Touchscreen. Here we use 21.0 mm as an example.



(2) Swipe left and select **Control**.

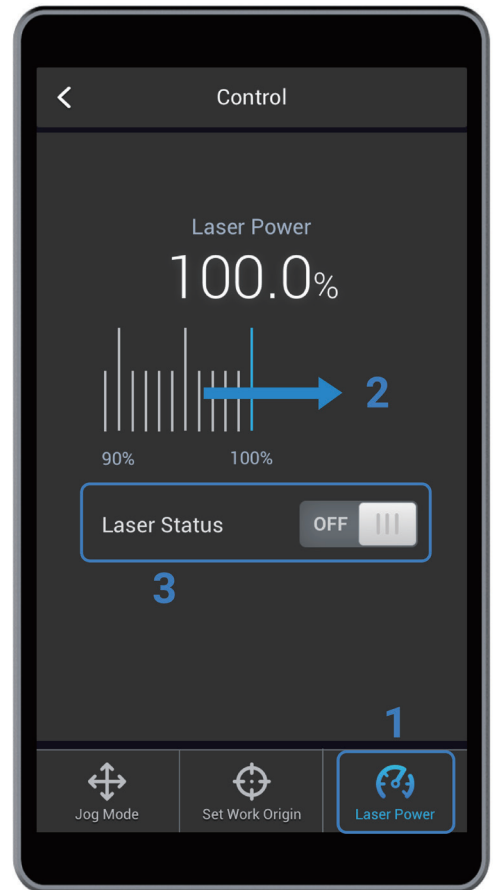


(3) Use a blank piece of paper, and use **X-**, **X+**, **Y-**, **Y+**, **Z-**, or **Z+** to move the Laser Module to the top of the paper. The machine coordinate of the Z Axis should match the value of the laser height, which is 21.0 mm.



(4) Turn the lens hood until it is 1 mm away from the paper. If you want to check the light-blocking effect, please do so after you put on your Laser Safety Goggles and tap **Laser Power**. Set a relatively small value (e.g. 1%) for **Laser Power** and turn on the laser.





## 04 Waste Disposal

Waste disposal laws and regulations vary with countries and regions. When you dispose of any waste, observe the local laws, regulations, rules, or requirements on handling waste.

### 4.1 Package

The shipping package is made of corrugated fiberboard, standing great pressure and providing effective protection for your laser engraving and cutting machine. The package can be recycled or reused to store finished works or create DIY projects. Inside the package is Expanded Polystyrene (EPS) foam, protecting your laser engraving and cutting machine from collision during shipping. Littering non-degradable EPS foam is detrimental to the environment, so toss the EPS foam into the designated trash bin.

### 4.2 Waste Gas Treatment

The gases and fumes produced during laser engraving and cutting should be treated and then exhausted to the outdoors in accordance with the local laws of gas exhaustion. An air purifier will be a good option for waste gas treatment.

### 4.3 Wasted Material

Do not litter non-degradable materials or engraving and cutting failures in nature. Toss them into designated trash bins.

### 4.4 Electronics

Electronics can be discarded, donated, or recycled. Should the e-waste be no longer wanted or nearing the end of its useful life, you can choose to toss it into the designated trash bin, or take it to a trusted charity or recycler.

# 05 Maintenance

## 5.1 Maintenance Schedule

This maintenance schedule is for reference only. Should you use the laser engraving and cutting machine more frequently, adjust your schedule according to your usage frequency. Before maintenance, [check Snapmaker's Limited Warranty](#) so as not to void your warranty.



Turn off the power supply before maintenance.

### Before You Engrave and Cut

Task	See
Check the Cables	<a href="#">5.2.1</a>
Check the Support Platform	<a href="#">5.2.2</a>
Check the Laser Engraving and Cutting Platform	<a href="#">5.2.3</a>
Check the Built-in Fan	<a href="#">5.2.4</a>
Check the Camera and the Camera Light	<a href="#">5.2.5</a>

### Every Month

Task	See
Clean the Linear Modules	<a href="#">5.3.1</a>
Clean the Side Covers	<a href="#">5.3.2</a>
Clean the Exhaust System	<a href="#">5.3.3</a>

### Every Three Months

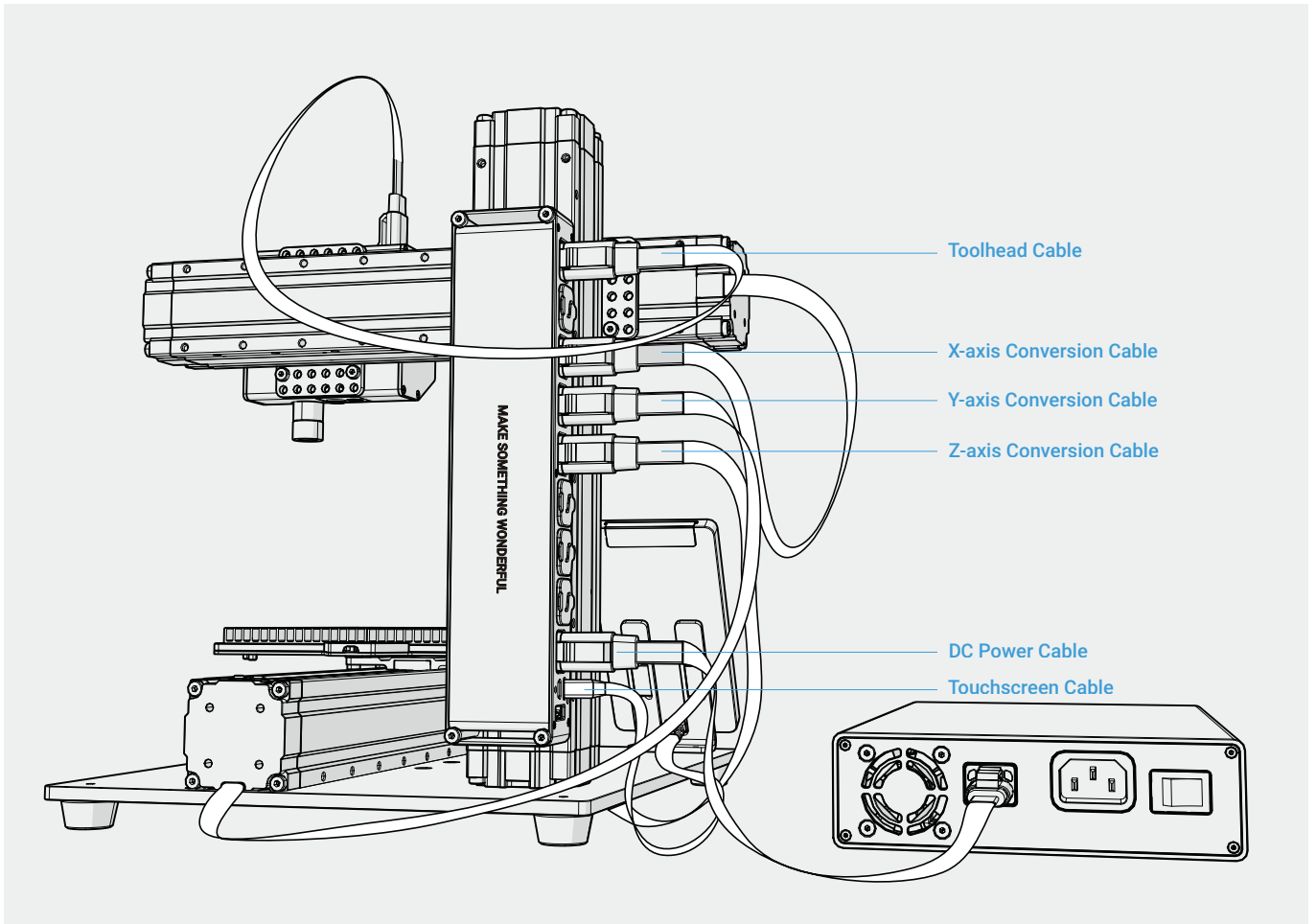
Task	See
Update the Firmware and Software	<a href="#">5.4</a>

## 5.2 Before You Engrave and Cut

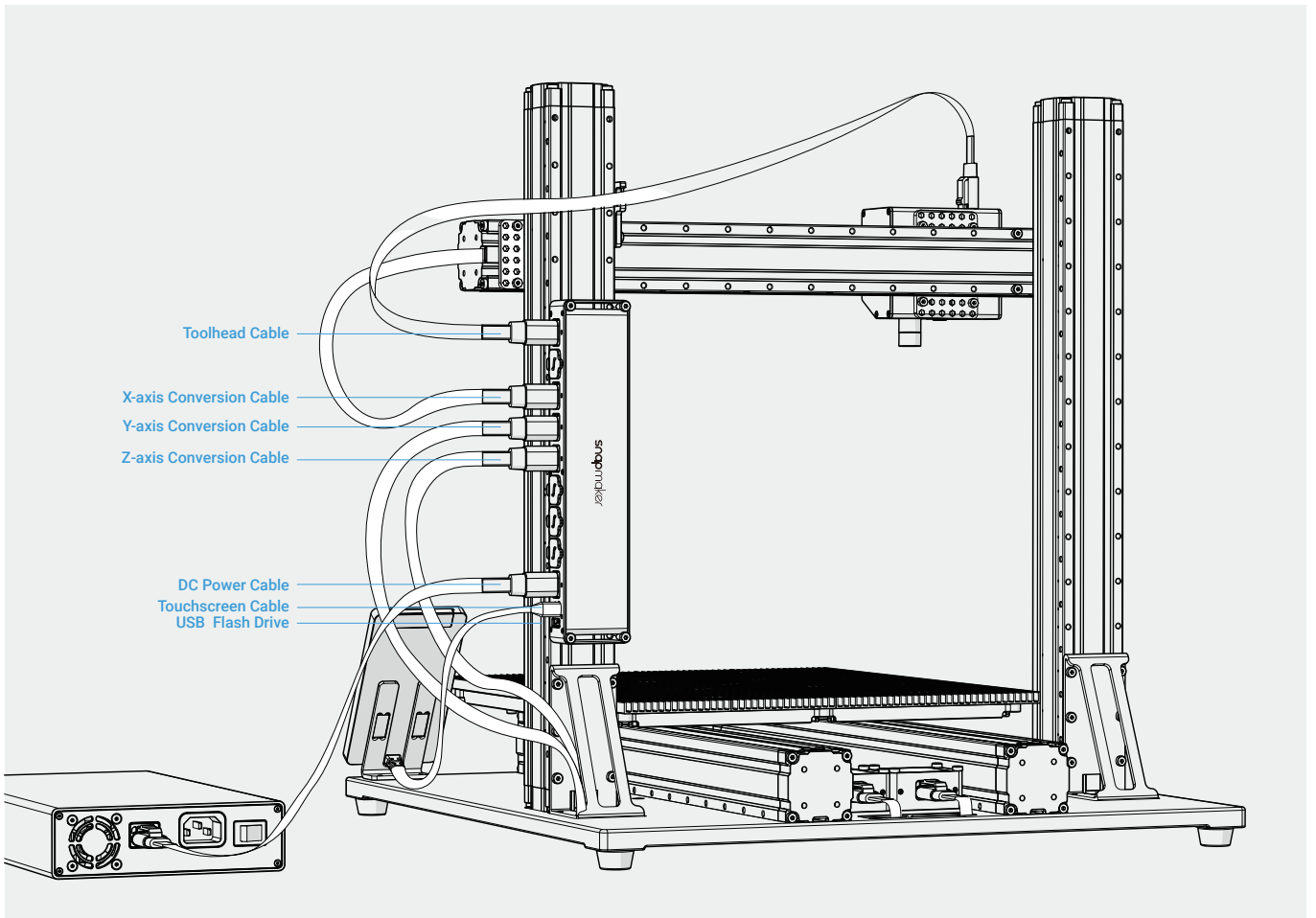
### 5.2.1 Check the Cables

Check if every cable is plugged into the right socket, in the right direction.

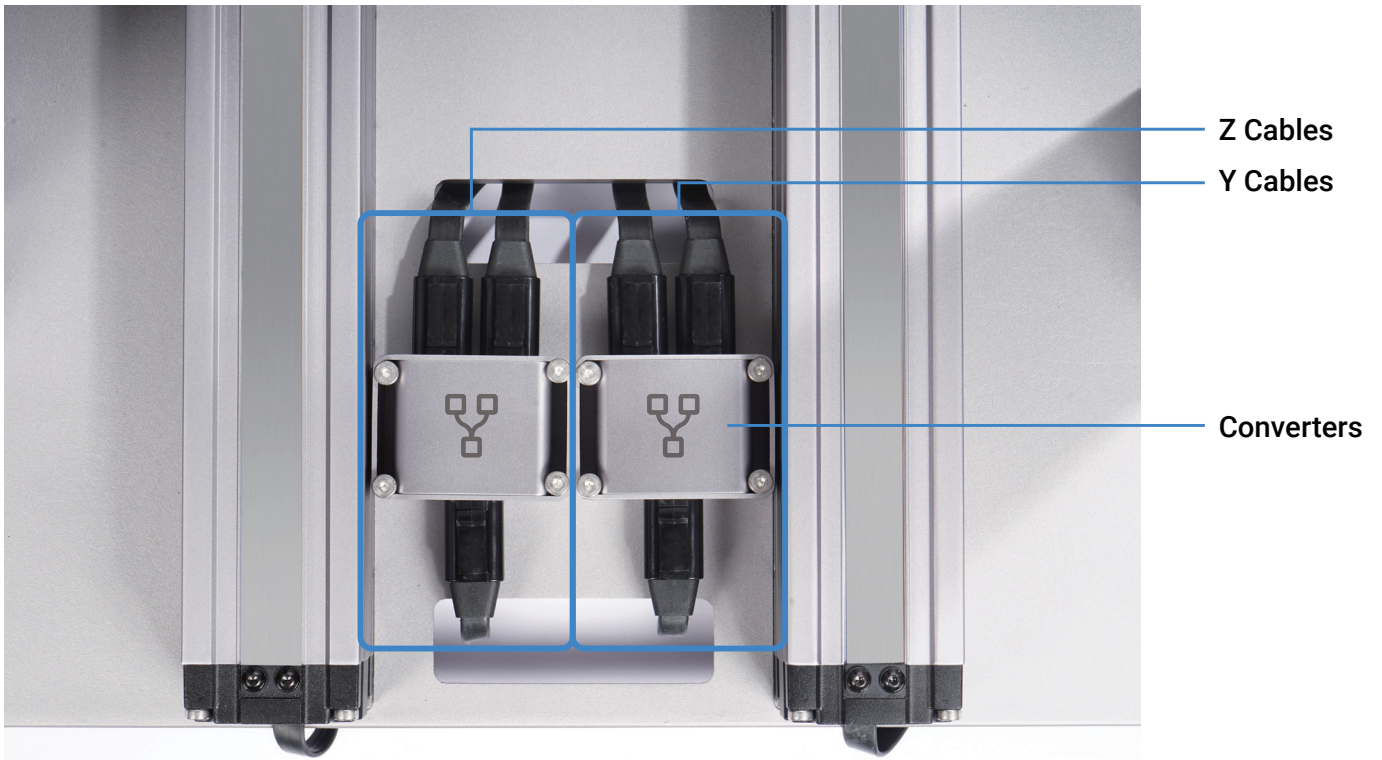
- Into the Controller (A150)



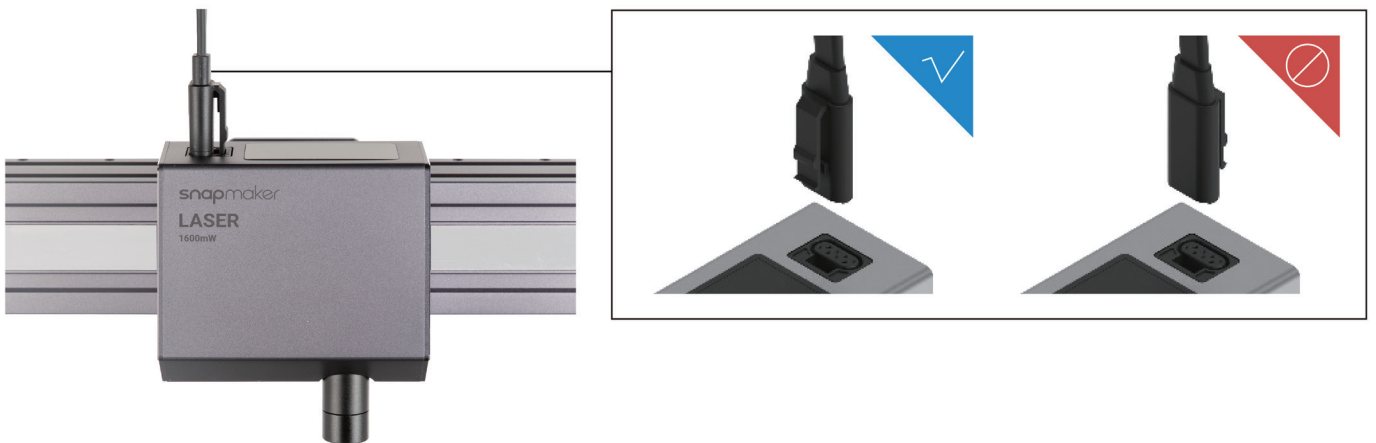
- Into the Controller (A250 & A350)



- Into the Converters

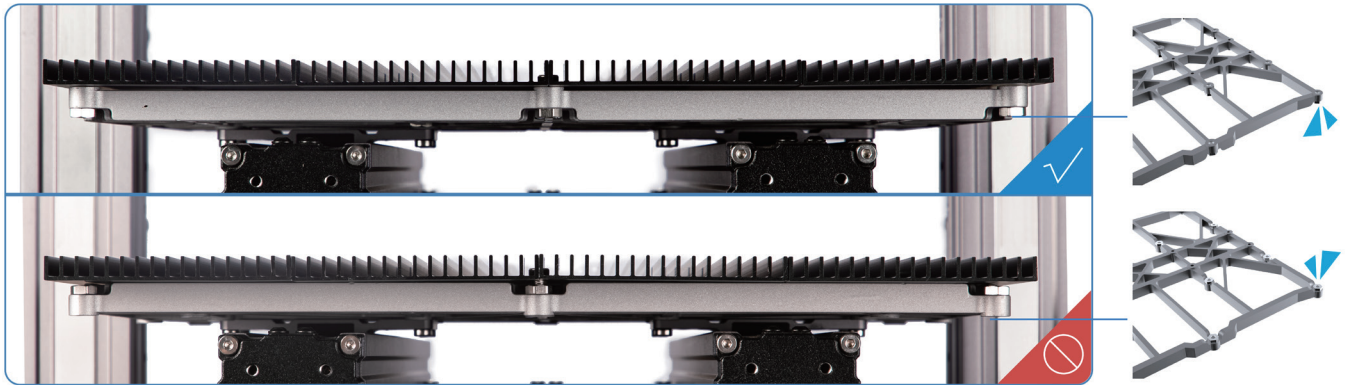


- On the Laser Module

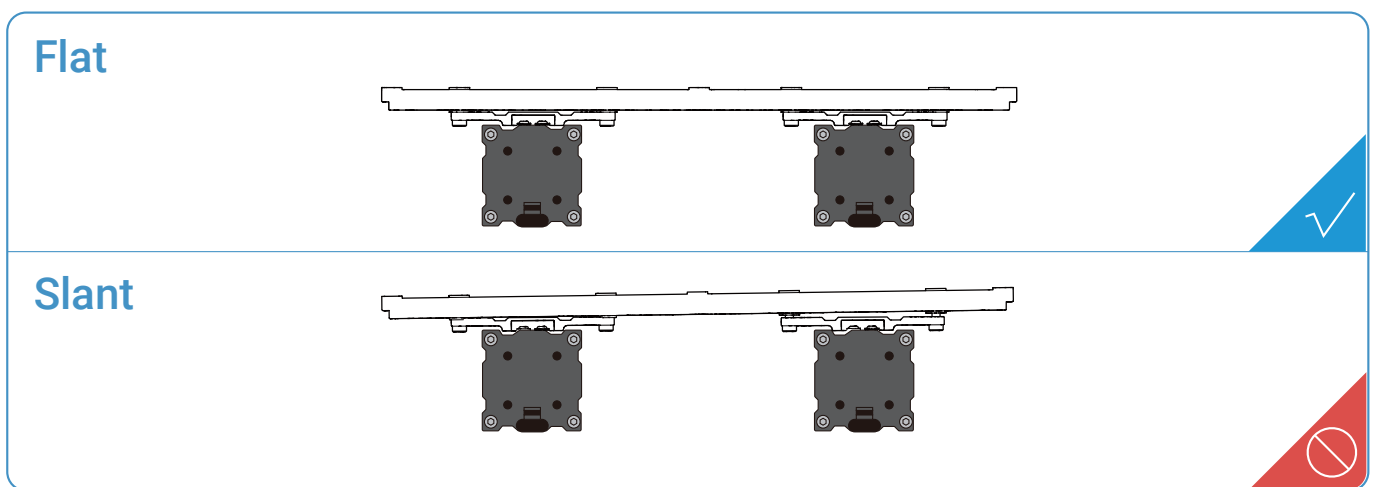


### 5.2.2 Check the Support Platform

Check if the Support Platform is assembled in the correct direction. The front without screws should face up, and the rear with some screws faces down. The reversely installed platform will be higher than the correctly installed one.



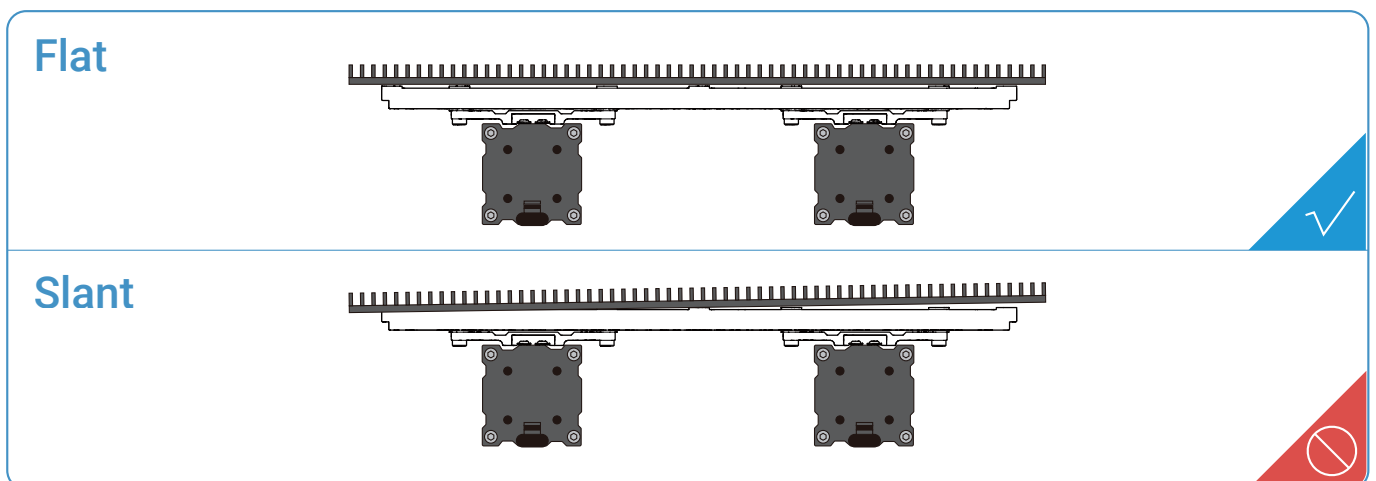
Check if the Support Platform is flat and stable, fully tightened with screws. If not, loosen all screws and reassemble the platform.



### 5.2.3 Check the Laser Engraving and Cutting Platform

#### Check the Laser Engraving and Cutting Platform

Check if the Laser Engraving and Cutting Platform is flat and stable, and fully tightened with screws. If not, reassemble the Laser Engraving and Cutting Platform.



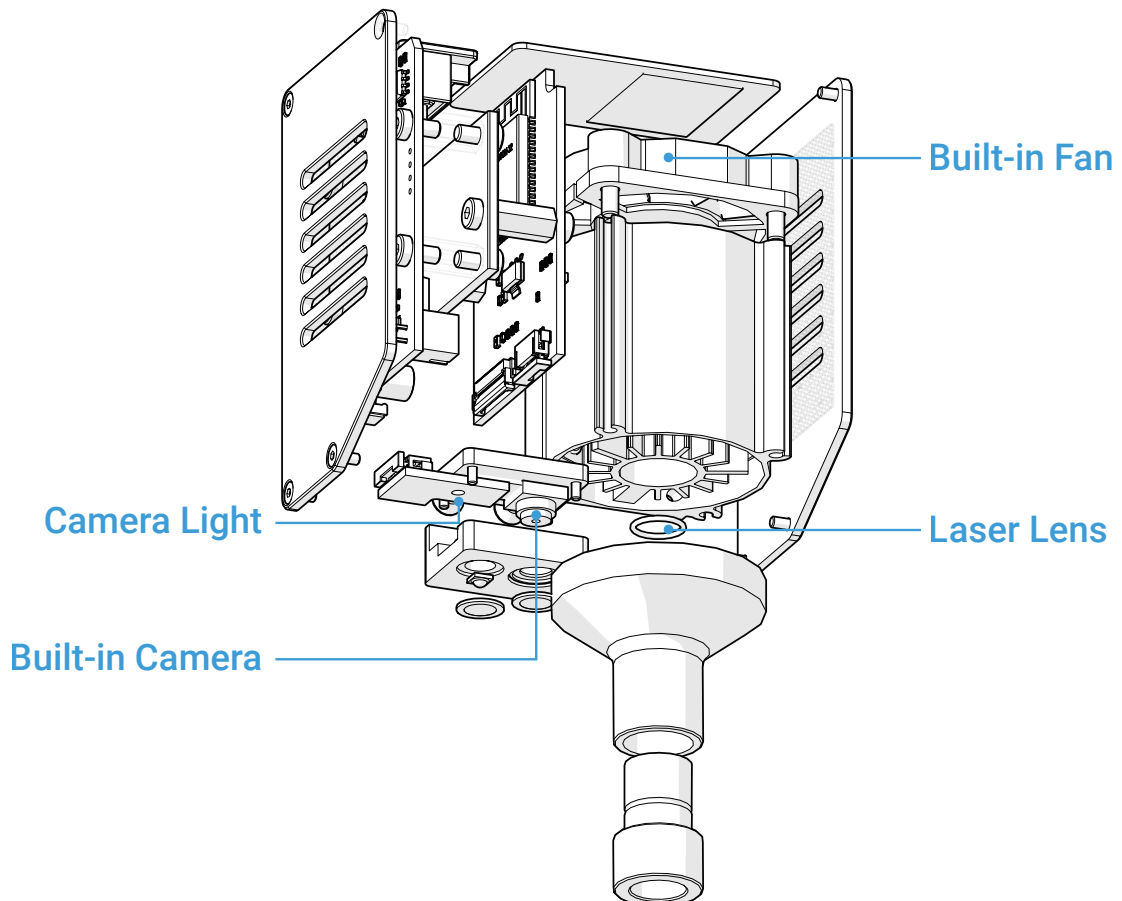
### Clean the Laser Engraving and Cutting Platform

Dust and debris accumulated on the Laser Engraving and Cutting Platform not only make it difficult to fasten materials on the platform, but also pose a fire hazard.

To avoid this, you should check if the Laser Engraving and Cutting Platform is clean. If not, use a stiff brush or vacuum to clean it. You can also take down the platform for cleaning and install it back to place after.



#### 5.2.4 Check the Built-in Fan



The Laser Module uses a built-in fan to dissipate heat as well as prevent dust accumulation on the laser lens. If the built-in fan does not work normally, the laser inside the Laser Module may become overheated and prone to damage. To avoid this, take the following steps to check the built-in fan each time before you use the laser engraving and cutting machine:

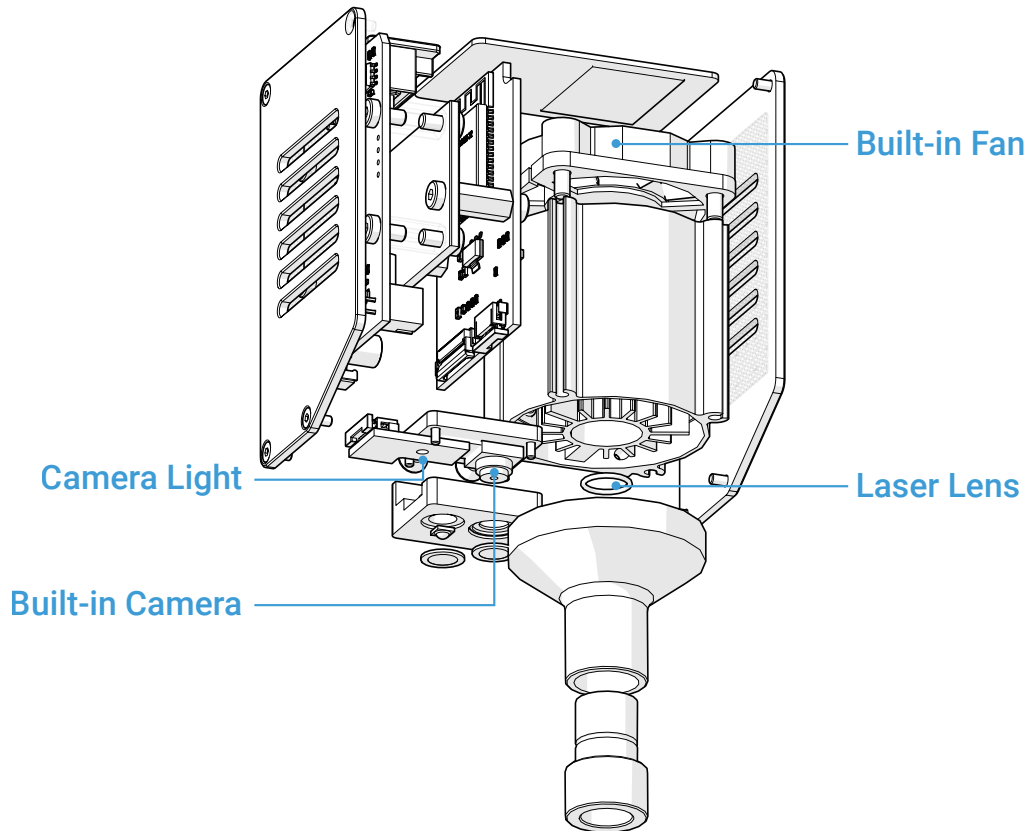
- (1) Put on the Laser Safety Goggles.
- (2) On the Touchscreen, swipe left to select **Control**.
- (3) Tap **Laser Power**. Adjust the laser power to the lowest value, and turn on the laser.
- (4) Put the end of a strip of paper or a soft feather under the lens hood, as shown in the pictures. Be careful not to expose your body parts directly under the laser beam.



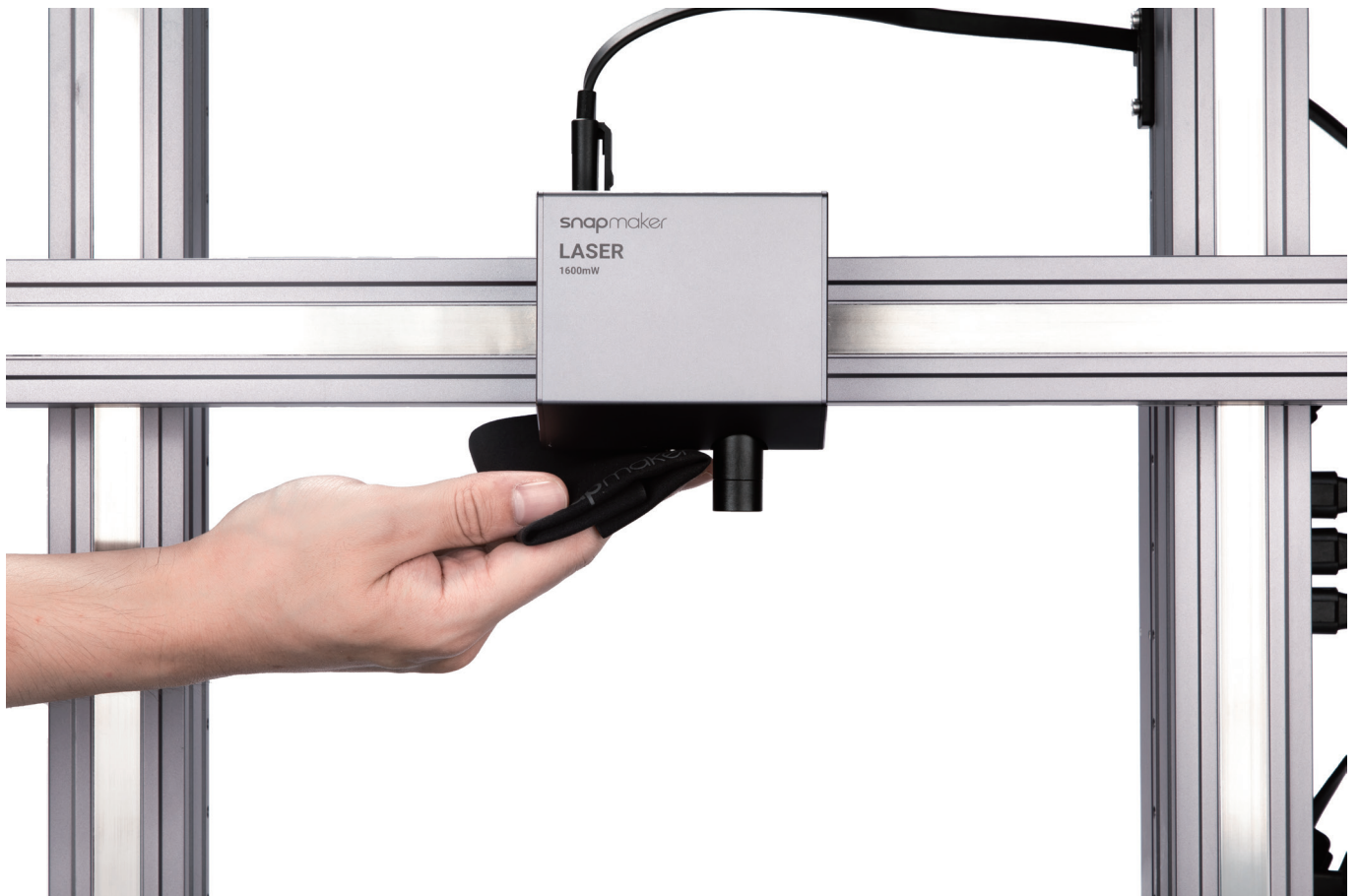
- (5) If the paper or feather is moving with the flow that comes out of the lens hood, it indicates that the built-in fan is working. If the paper or feather is sucked into the lens hood or air flow cannot be detected at the mouth of the lens hood, the built-in fan may be stuck or broken. Maintenance or replacement by professional personnel is required.



### 5.2.5 Check the Camera and the Camera Light



Check if the camera captures a clear image. A blurry image may be caused by dust accumulation on the camera lens or weak light. If the image is not clear, clean the camera lens and the camera light with a piece of soft cloth. Also, due to the qualities of polycarbonate which is used to synthesize the lens, you should use PH neutral detergent or water to clean the lens and avoid scraping it.





If the light is still weak, the camera light may be broken. Maintenance or replacement by professional personnel is required. If the light is bright, but the camera capture image is still blurry, the camera may be broken. Maintenance or replacement by professional personnel is required.

## 5.3 Every Month

### 5.3.1 Clean the Linear Modules

Keeping all Linear Modules free of dust and foreign matters helps reduce friction and noise while the Laser Module is moving. To do so, gently wipe the Linear Module surface using a piece of dry cotton cloth.

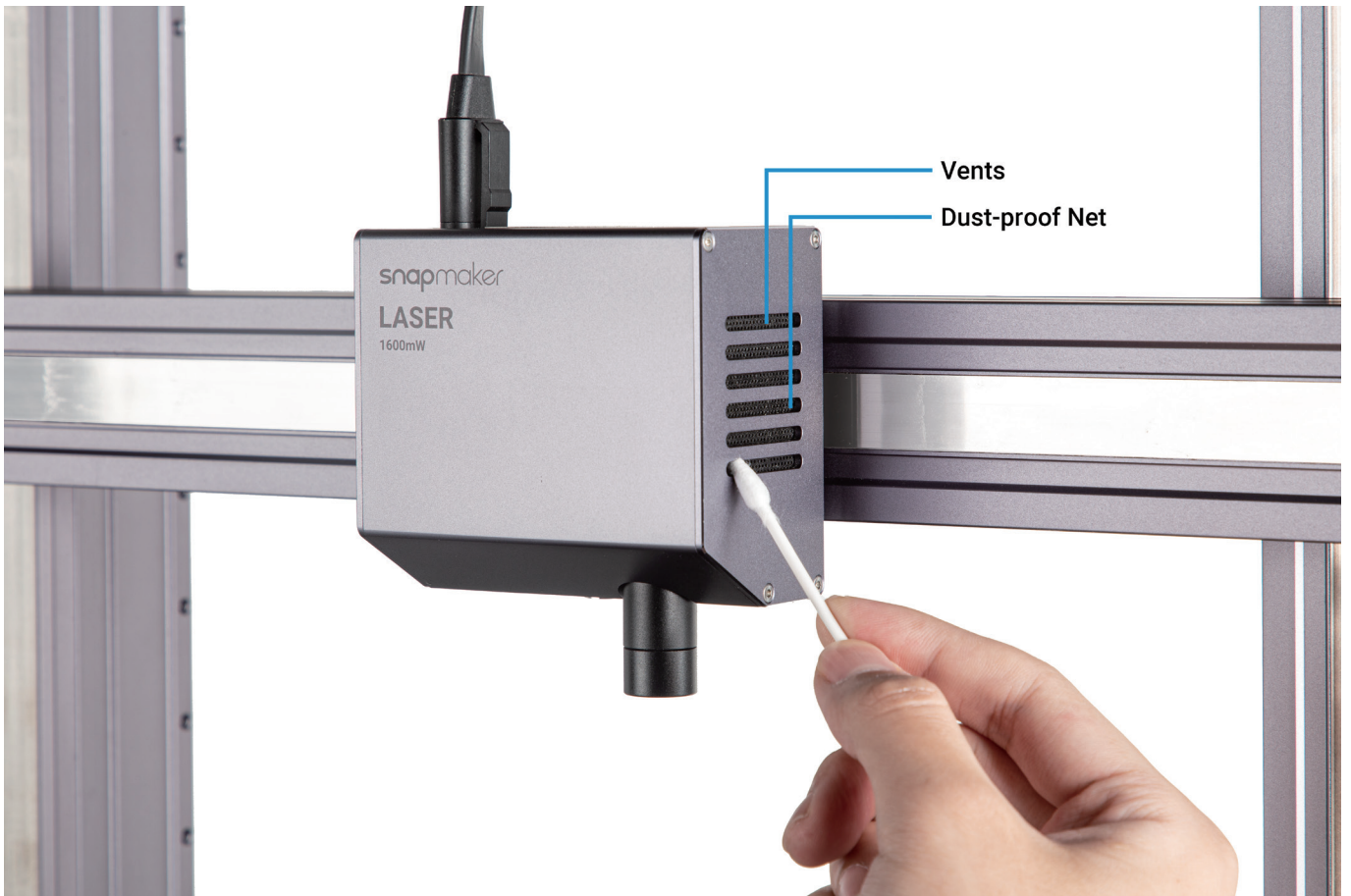


While cleaning, do not press the steel strip. Do not dismantle the Linear Modules yourself, as doing it will void your [Snapmaker's Limited Warranty](#).

### 5.3.2 Clean the Side Covers

The Laser Module has two side covers, each with a vent and dust-proof net for heat dissipation for the fan inside the Module. If blocked by dust, the nets will prevent the vent from functioning. Failure to cooling down the internal components will cause the Module to malfunction.

To avoid this, you should check the vents and dust-proof nets monthly. Use a brush, swab, or vacuum to clean the dust on the vents and nets.



### 5.3.3 Check the Exhaust System

If you use an exhaust system, always inspect the exhaust fan and duct work for obstructions and ensure proper air flow before each use. Unobstructed and properly maintained exhaust fan and duct work will reduce the risk of fire and extract caustic fumes and smoke. Check the following parts before each use:

- Fans  
Dust and debris can easily accumulate on the exhaust fans and make the fans stuck. Clean the fans each month to ensure that they work properly.
- Filters  
If you use an air purifier, follow its user manual. Replace the filter when its life is running low. The inside of the filter may be filled with poisonous chemicals, so do not try to take apart and wash it.

## 5.4 Every Three Months

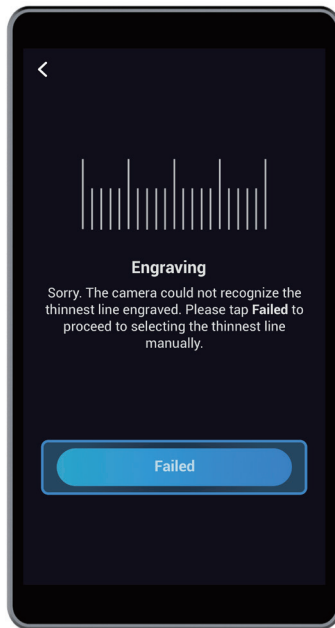
To keep your laser engraving and cutting machine and Luban up to date, update your firmware and software every three months.

For how to update, See [Firmware](#) and [Software](#).

# 06 Troubleshooting

## 6.1 Auto Focus Fails

If Auto Focus doesn't go well, the Touchscreen will display **Failed**.

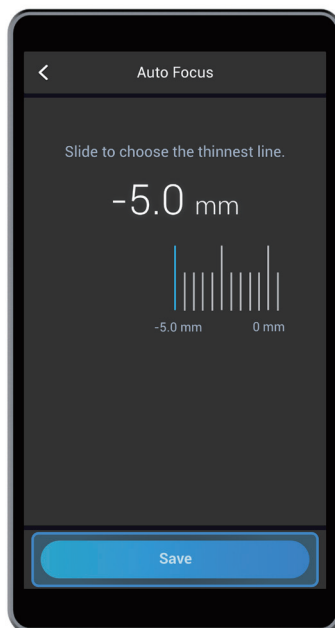


### Possible Causes

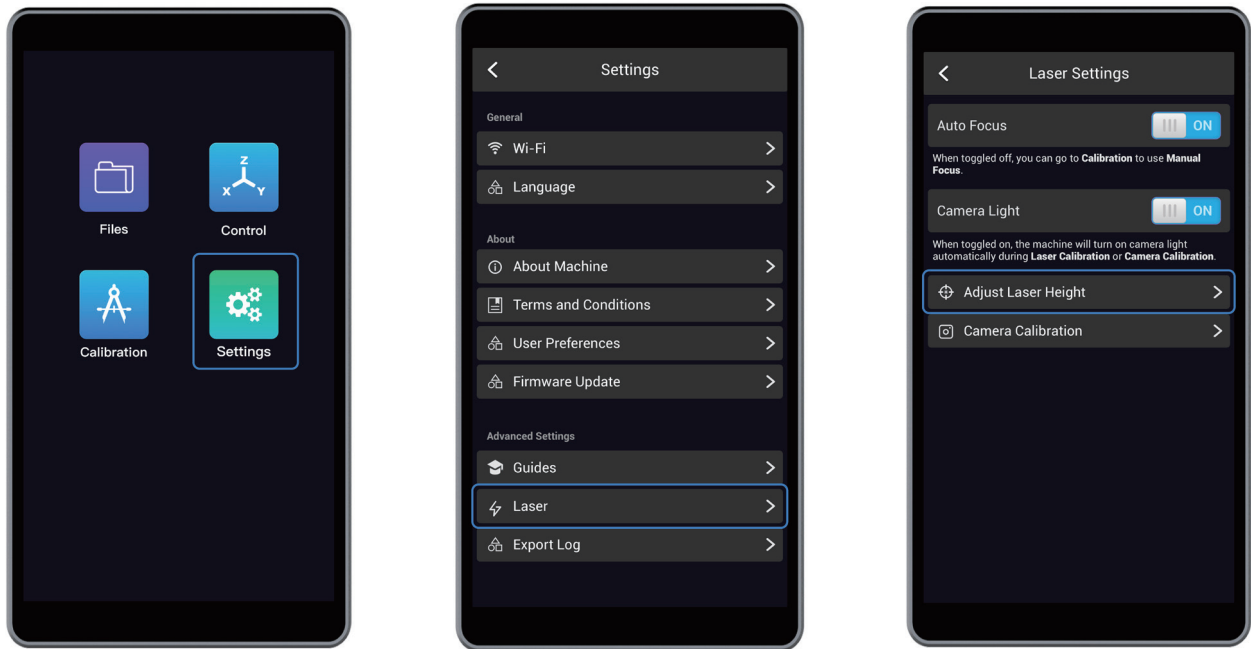
- The Laser Module is too high.

### Solutions

- Redo Auto Focus. Tap Failed, slide the scale left to select the leftmost line, and tap Save. After the screen goes back to the APP List Screen, tap Calibration to redo auto focus. If the problem persists, repeat the steps until Auto Focus succeeds.

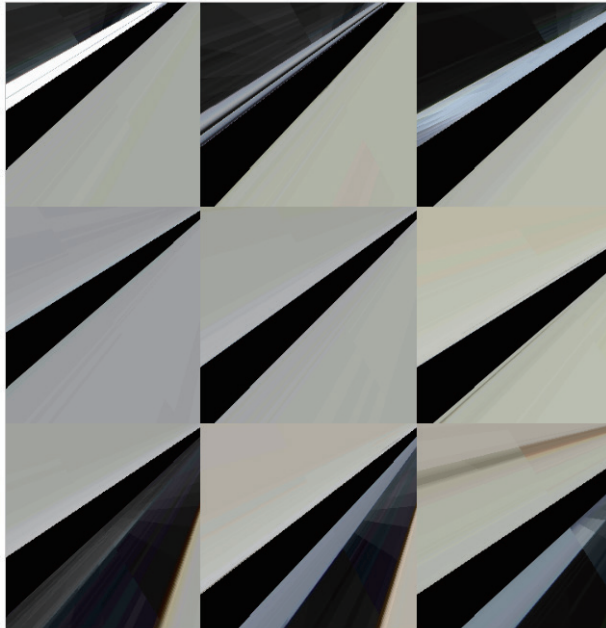


- Change the Laser Height manually. On the Touchscreen, tap Failed > Settings > Laser > Adjust Laser Height. Set the Laser Height to 23.0 mm and then redo auto focus. If the Touchscreen keeps showing Failed, and several lines fail to be burnt out, lower the laser height (to 21.5 mm or 19 mm, for example), and try again.



## 6.2 Camera Capture Does not Work

If the image is not fully processed, it indicates that camera capture is not working properly.



### Possible Causes

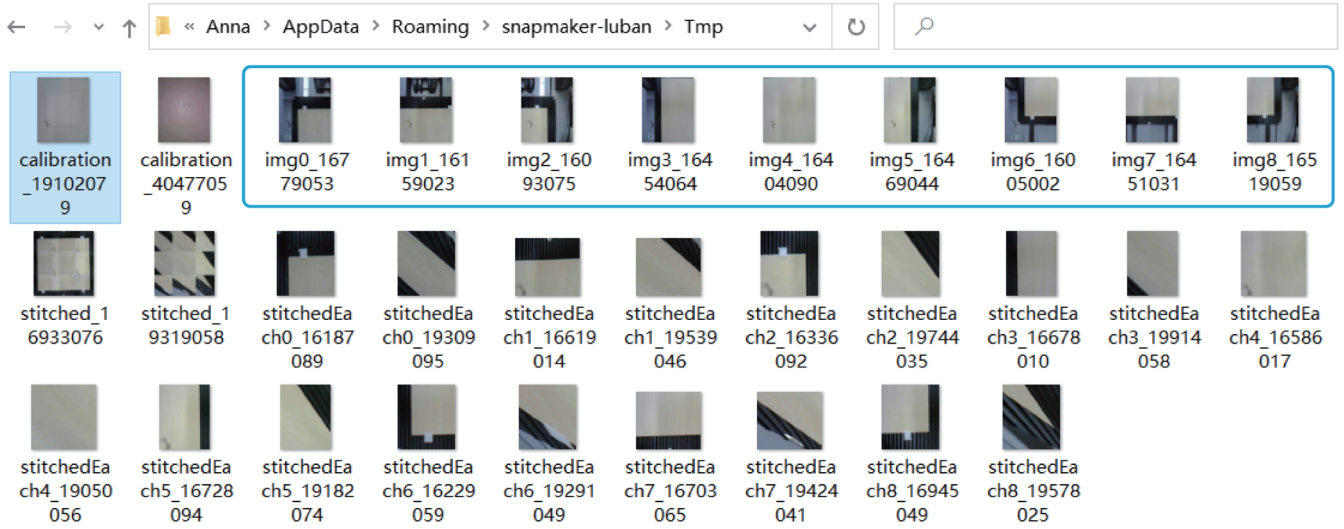
- Your Snapmaker Luban is running the old version.
- You are not using camera capture correctly.

### Solutions

- Download the latest version of Snapmaker Luban from <https://snapmaker.com/product/snapmaker-2/downloads>.
- To manually adjust the calibration result, see [3.3 Calibrate the Camera: Manually Adjust the Calibration Result](#).
- If the camera capture feature still doesn't work, please find the images generated by the camera through the following path. Export them to your USB drive, and send them to [support@snapmaker.com](mailto:support@snapmaker.com) for further investigation.
  - Windows OS: C:\Users\admin\AppData\Roaming\snapmaker-luban\Tmp
  - macOS: /Users/admin/Library/Application\ Support/snapmaker-luban/Tmp



Replace **admin** with your username.



### 6.3 Laser Is Discontinuous or Weak

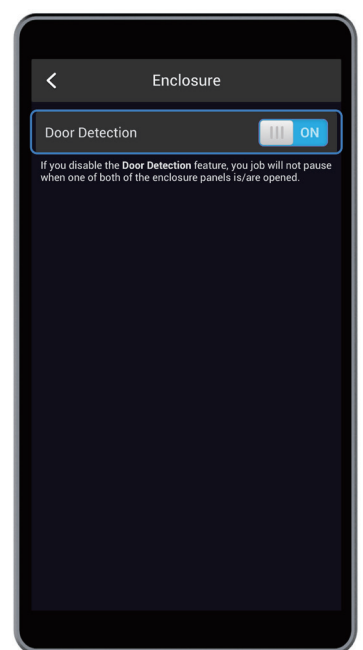
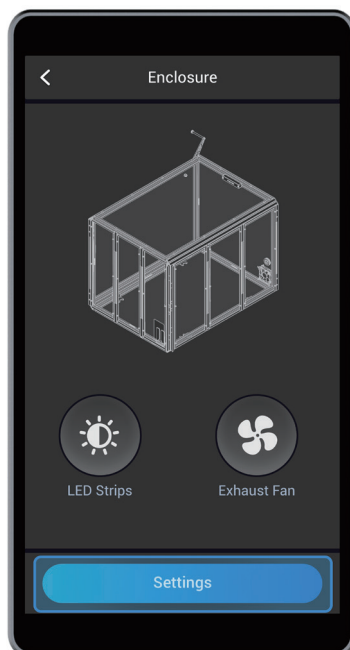
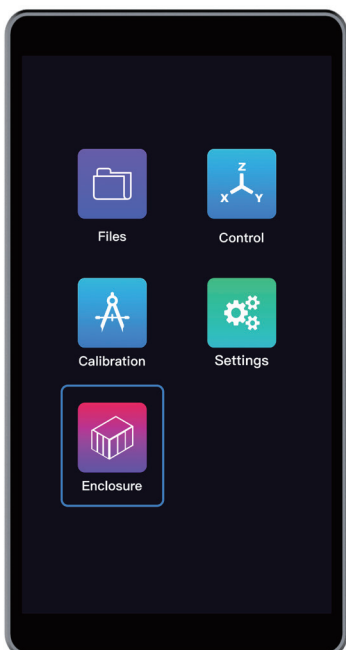
The Laser Module emits weak light and does not engrave at its full power, and therefore the module can't finish Auto Focus.

#### Possible Causes

- The Enclosure's door is open during Auto Focus.
- The Laser Module is too high during Auto Focus.
- The Laser Module is broken.

#### Solutions

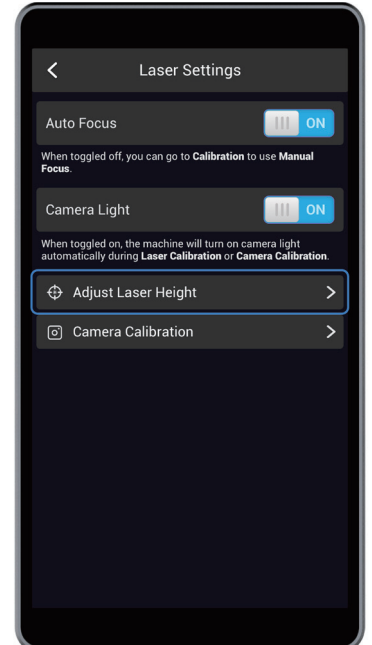
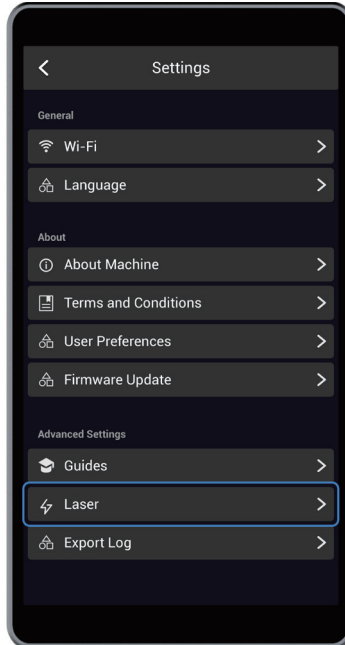
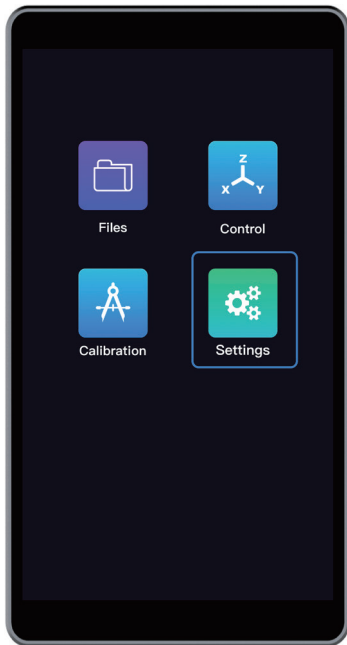
- Either close the Enclosure's doors or go to Enclosure > Settings to disable the Door Detection feature.





Wear the Laser Safety Goggles when the door is open.

- Change the Laser Height manually. On the Touchscreen, tap Settings > Laser > Adjust Laser Height. Set the Laser Height to 23.0 mm and then redo Auto Focus. If the Touchscreen keeps showing Failed, and several lines fail to be burnt out, lower the Laser Height (to 21.5 mm or 19 mm, for example), and try again.



- If the problem persists after you have tried the options above, and your built-in camera can not find the finest line while auto focusing (see picture below), then the Laser Module should be replaced.



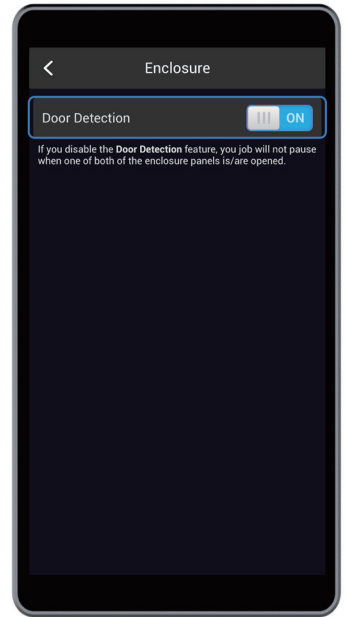
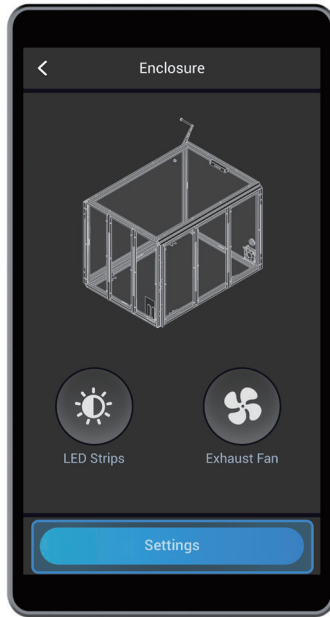
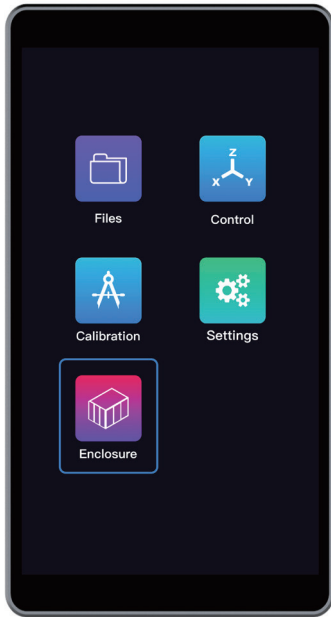
## 6.4 Laser Will not Burn Material When Enclosure Is Used

### Possible Cause

- The door of the Enclosure is open when the Laser Module is working.

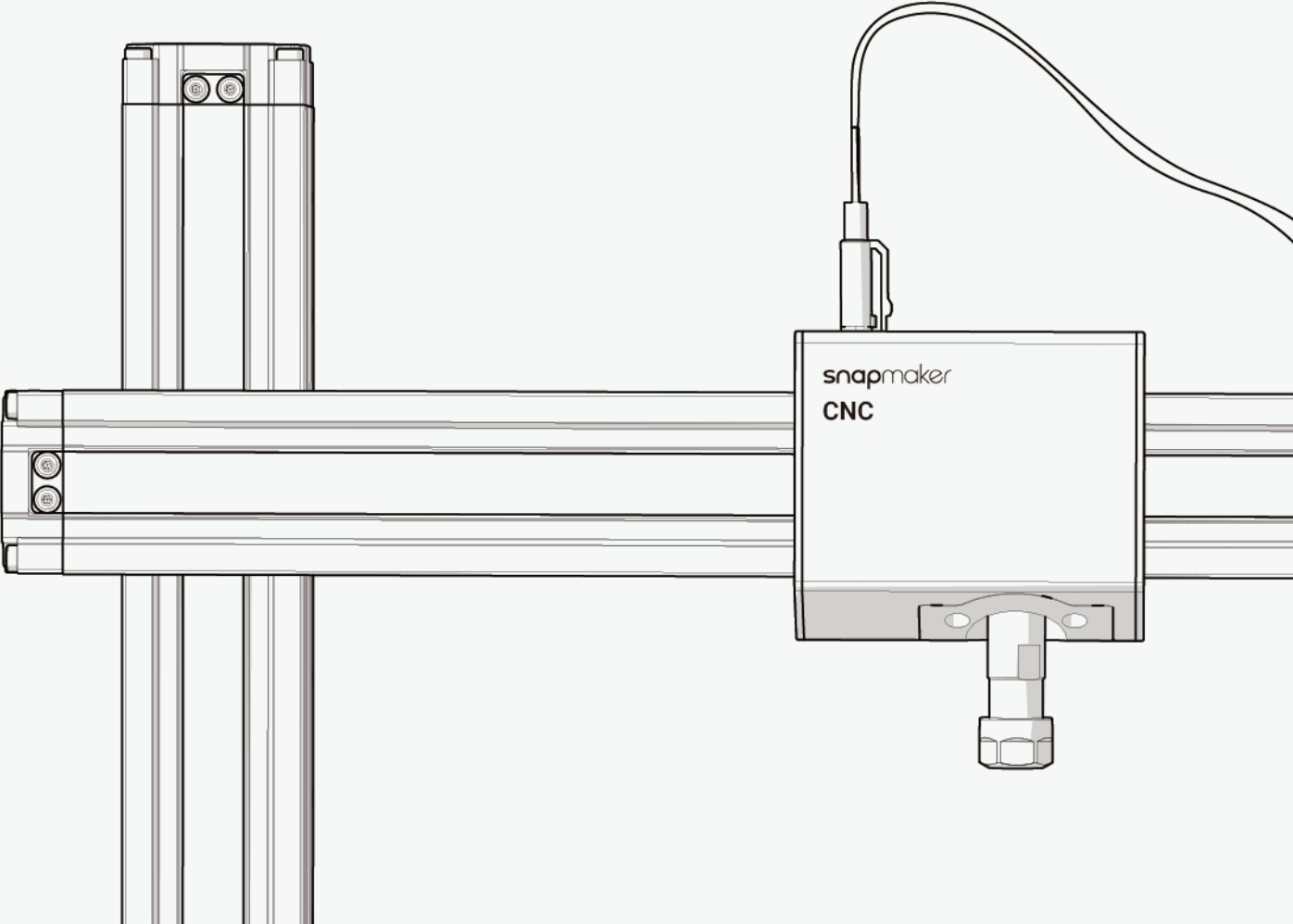
### Solutions

Close the enclosure doors before you start to use the Laser Module. Or, if you need the door open when using the Laser Module, turn off the Door Detection feature. On the Touchscreen, tap **Enclosure > Settings > Door Detection**.

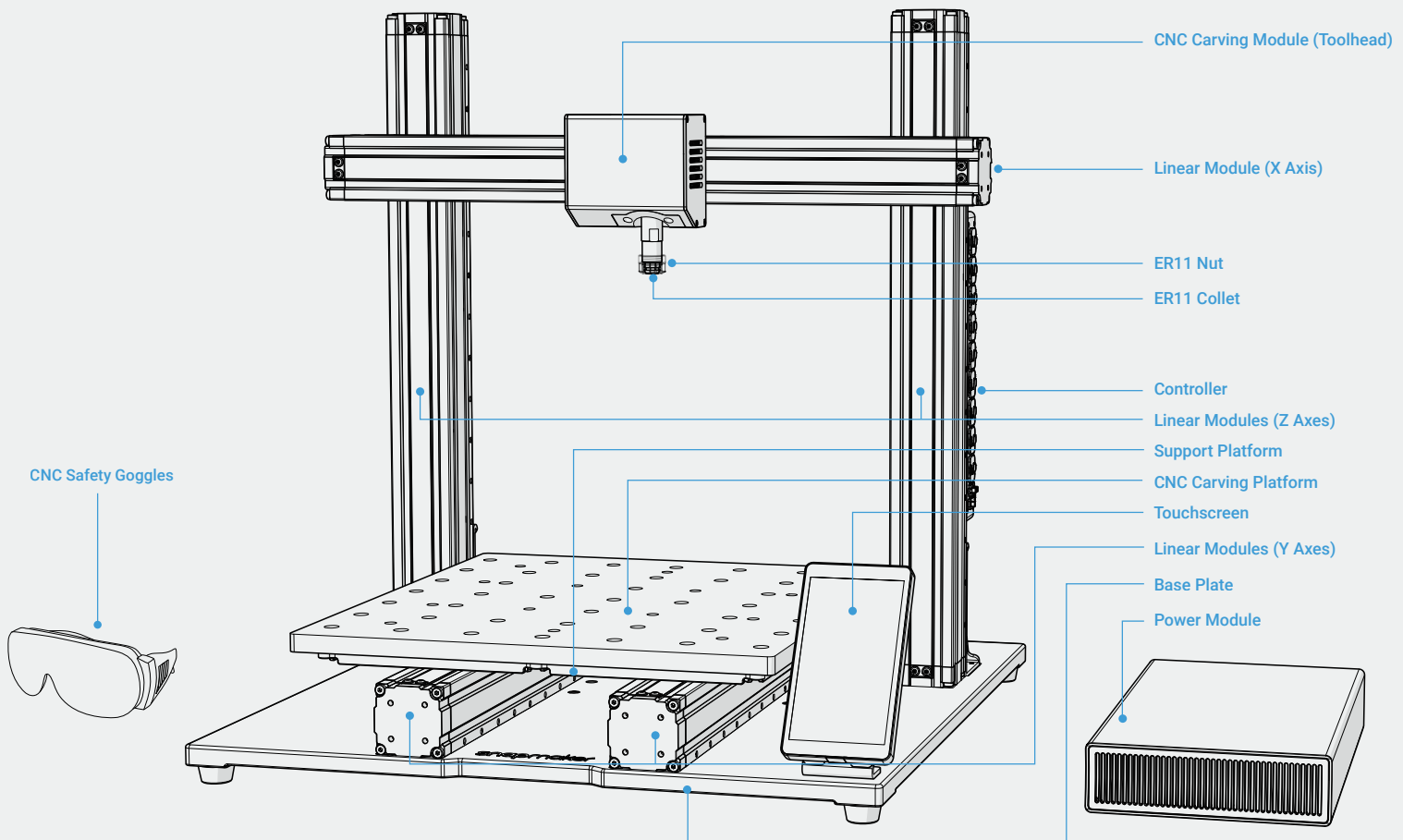


Wear the Laser Safety Goggles when the door is open.

# CNC Carving







<b>01 Operating Environment</b>	<b>139</b>
1.1 Workbench	139
<b>02 Material Library</b>	<b>139</b>
2.1 Material Overview	139
2.2 Wood	140
2.3 MDF	140
2.4 Acrylic	141
2.5 Carbon Fiber	142
2.6 POM	142
2.7 PCB	143
<b>03 Tool Library</b>	<b>143</b>
3.1 Tool Overview	143
3.2 Flat End Mill	144
3.3 Ball End Mill	145
3.4 Caving V-bit	146
3.5 Straight Groove V-bit	146
<b>04 How to CNC Carve</b>	<b>147</b>
4.1 CNC Carving Workflow	147
4.2 Clamp the Material	147
4.3 Attach the CNC Bit	152
4.4 Prepare the G-code File	153
4.5 Transfer the G-code File	153
4.6 Set the Work Origin and Start Carving	158
4.7 Clean the Finished Work	161
4.8 Power Loss Recovery	162

<b>05 Waste Disposal</b>	<b>163</b>
5.1 Packaging	163
5.2 CNC Bits	163
5.3 Wasted Material	163
5.4 Electronics	163
<b>06 Maintenance</b>	<b>164</b>
6.1 Maintenance Schedule	164
6.2 Before You Carve	165
6.3 Every Month	169
6.4 Every Three Months	172
<b>07 Troubleshooting</b>	<b>173</b>
7.1 The CNC Bit Bumps into Clamp Sets	173
7.2 The CNC Bit Breaks During Carving	173

# 01 Operating Environment

## 1.1 Workbench

Put the CNC carver on a sound and level workbench.

Put the workbench in a well-ventilated place as carving will produce dirt and sawdust.

Put the workbench near ventilation openings should you use the CNC carver with an enclosure or purifier.

# 02 Material Library

## 2.1 Material Overview

Snapmaker 2.0 CNC carvers support material including wood, MDF, acrylic sheet, carbon fiber sheet, POM, PCB, more being tested.

Material	Properties	Application	See
Wood	Easily machinable, biodegradable	Furniture, flooring, decorative accessories, relieves	<a href="#">2.2</a>
MDF	Strong, stiff, resilient to moisture, affordable	Furniture, flooring, decorative accessories	<a href="#">2.3</a>
Acrylic	Tough, stiff, excellent clarity, impact-resistant, heat-insulative, UV resistant, easy to thermoform, variety in color	Windows and wall partitions to lighting fixtures and canopies	<a href="#">2.4</a>
Carbon Fiber	Stiff, chemical-resistant, tolerant to high-temperature, low thermal expansion, low weight, high tensile strength	Aeronautical equipment, automotive components, sporting goods, jewelry, musical instruments	<a href="#">2.5</a>
POM	Easily machinable, tough, high dimensional stability, good wear and abrasion, low moisture absorption	Bearings and bushings, pump and valve parts, manifolds, gears, food processing and packaging machinery parts, wear pads, wear strips	<a href="#">2.6</a>
PCB	Highly unreactive, water-insoluble, fat-soluble, largely resistant to breakdown by acids, bases, and heat	Medical devices, consumer electronics, automotive components, aeronautical components, safety and security equipment	<a href="#">2.7</a>

The data sheets provided in this manual are intended for reference and comparison purposes only. Actual performance varies with carving conditions. Each user is responsible for judging the fitness for application in specific conditions. The data is subject to change without notice.

## 2.2 Wood

Work Parameters	
Step Down	2.2 mm
Work Speed	500 mm/min

Recommended Tool: Flat End Mill (Cutting Diameter: 1.5 mm)



To get more information on the hardness of a specific type of wood, see Wood Database at [wood-database.com/wood-filter](http://wood-database.com/wood-filter).

## 2.3 MDF

Work Parameters	
Step Down	2.2 mm
Work Speed	500 mm/min

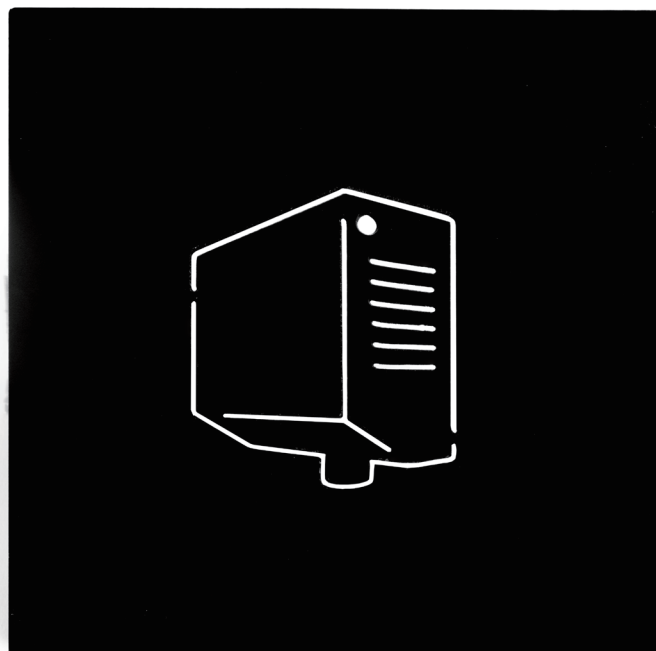
Recommended Tool: Flat End Mill (Cutting Diameter: 1.5 mm)



## 2.4 Acrylic

Work Parameters	
Step Down	1.4 mm
Work Speed	300 mm/min

Recommended Tool: Flat End Mill (Cutting Diameter: 1.5 mm, Single Cut)





Machining acrylic sheets may emit pungent odors, so wear protective masks before operation.

## 2.5 Carbon Fiber

Work Parameters	
Step Down	0.8 mm
Work Speed	150 mm/min

Recommended Tool: Flat End Mill (Cutting Diameter: 1.5 mm)



## 2.6 POM

Work Parameters	
Step Down	1.5 mm
Work Speed	500 mm/min

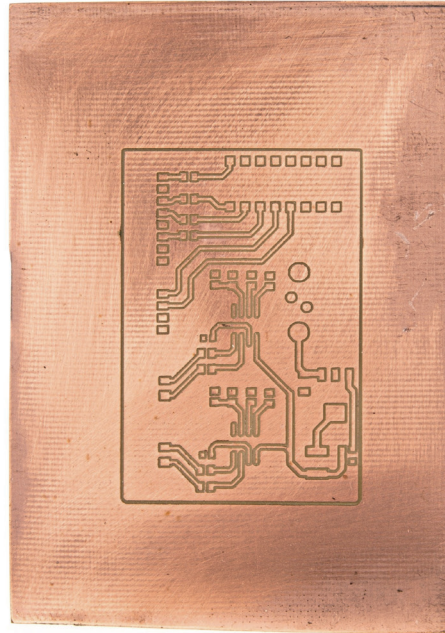
Recommended Tool: Flat End Mill (Cutting Diameter: 1.5 mm, Single Cut)



## 2.7 PCB

Work Parameters	
Step Down	0.25 mm
Work Speed	80 mm/min

Recommended Tool: V-bit (Cutting Diameter: 0.3 mm, Included Angle: 30°)




# 03 Tool Library

## 3.1 Tool Overview




Your CNC carver comes with an ER11-A 1/8" collet and collet nut, used to secure the CNC bits into the spindle. The collet supports a variety of CNC bits with shank diameters ranging from 1 mm to 7 mm.

The two CNC bits provided in the box, flat end mill (1.5 mm) and ball end mill, are of the same shank diameter—3.175 mm. Should you want to use other CNC bits, you can buy them from [Snapmaker's online store](#).

Should you want to use bits with different shank diameters, you can use other ER11 collets with different clamping bores ranging from 1 mm to 7 mm. But ensure that it is an ER11 collet; otherwise, your collet will not fit the ER11 nut.

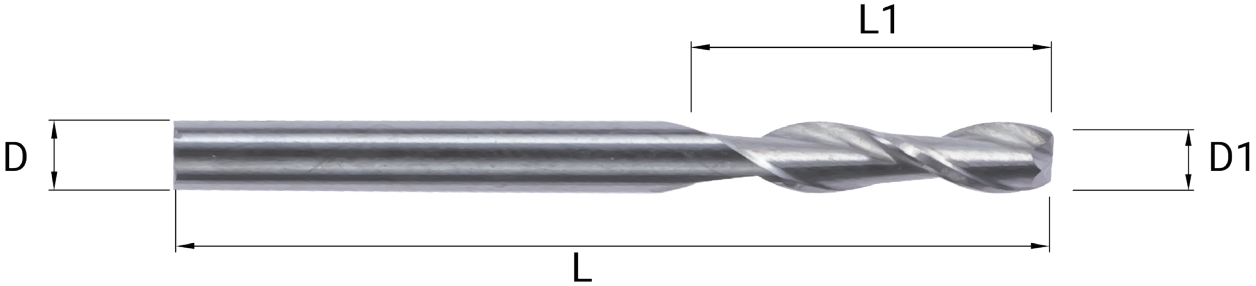
CNC Bit	Feature	See
 <p>Flat End Mill (1.5 mm)</p>	<p>Typically used for roughing operations, cutting 2D shapes, and flat-sided 3D shapes.</p>	<p><a href="#">3.2</a></p>

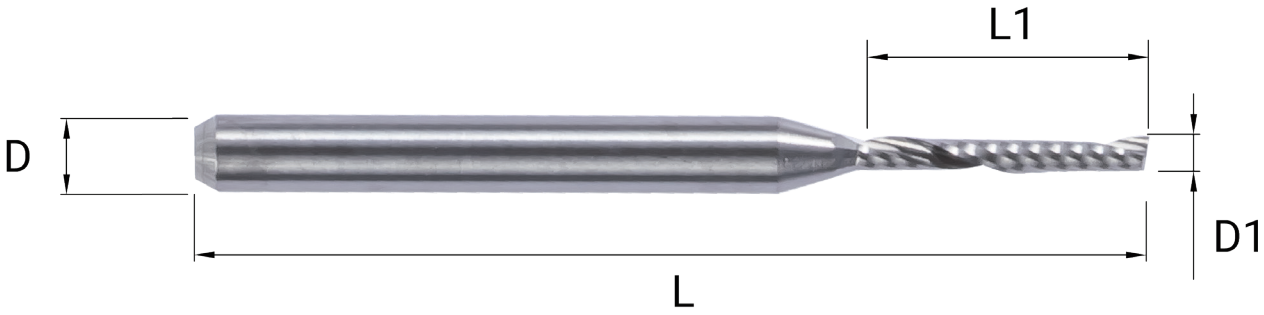


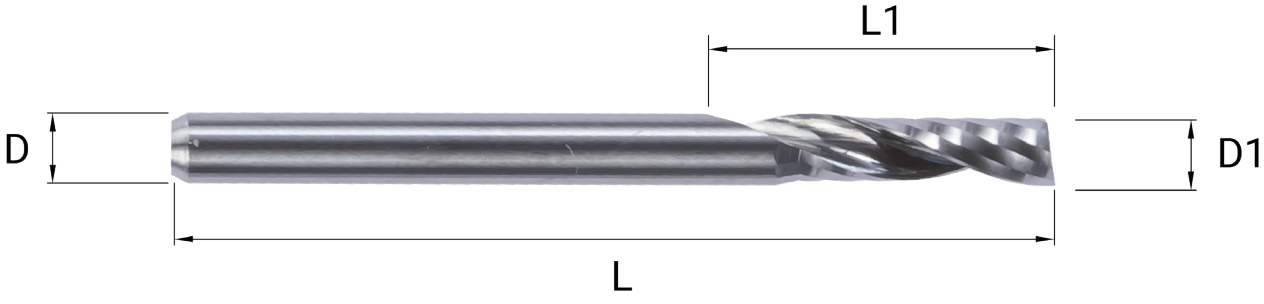
 <p>Ball End Mill</p>	<p>Features a round cutting edge, typically used for cutting curvatures and 3D shapes into materials.</p>	<p>3.3</p>
 <p>Carving V-bit</p>	<p>Features a narrow and sharp tip, used for carving intricate, detail-rich patterns.</p>	<p>3.4</p>
 <p>Straight Groove V-bit</p>	<p>Features a long and sharp carving edge, can penetrate deep into material and rendering high-precision creations.</p>	<p>3.5</p>

The data sheets provided in this manual are intended for reference and comparison purposes only. Actual performance varies with carving conditions. Each user is responsible for judging the fitness for application in specific conditions. The data is subject to change without notice.

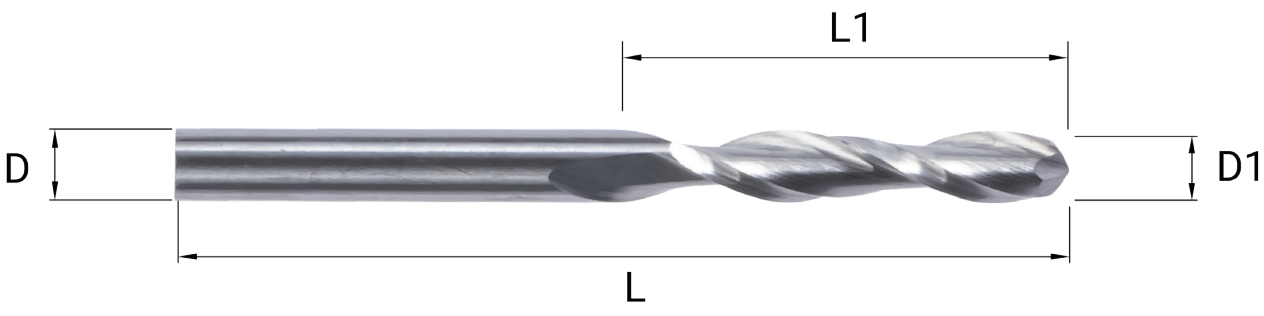
### 3.2 Flat End Mill

Flat End Mill (Double Cut)			
			
Total Length (L)	Cutting Edge Length (L1)	Shank Diameter (D)	Cutting Diameter (D1)
38 mm	12 mm	3.175 mm	3.175 mm

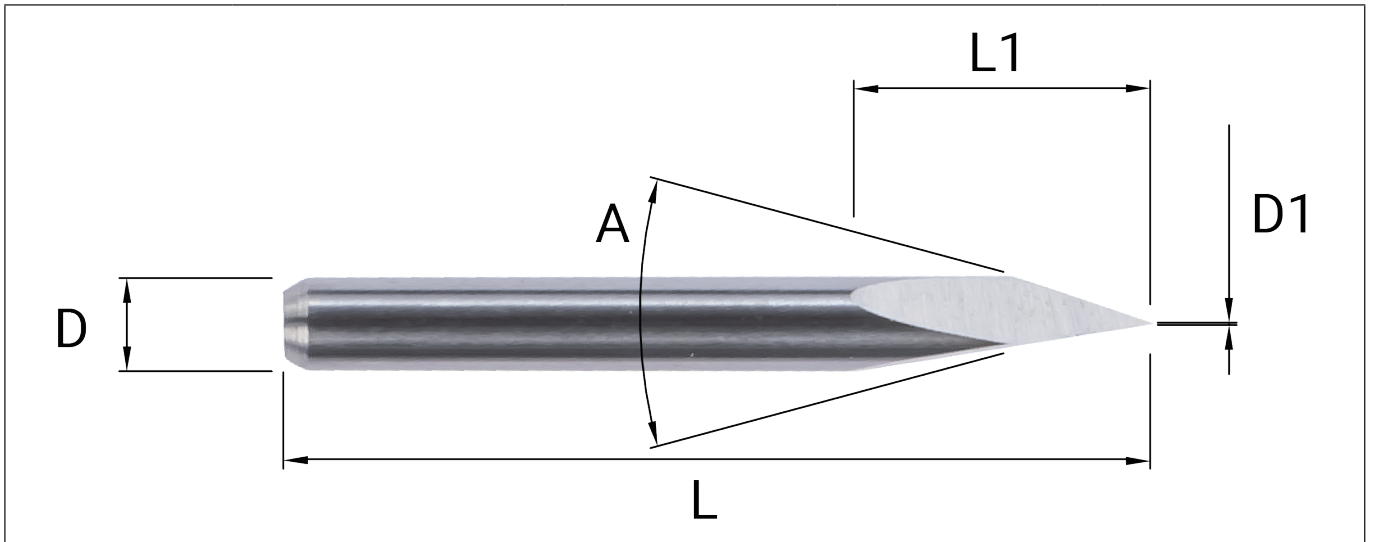
Flat End Mill (Double Cut)			
			
Total Length (L)	Cutting Edge Length (L1)	Shank Diameter (D)	Cutting Diameter (D1)
38 mm	12 mm	3.175 mm	3.175 mm

Flat End Mill (Single Cut)			
			
Total Length (L)	Cutting Edge Length (L1)	Shank Diameter (D)	Cutting Diameter (D1)
38 mm	12 mm	3.175 mm	3.175 mm

### 3.3 Ball End Mill

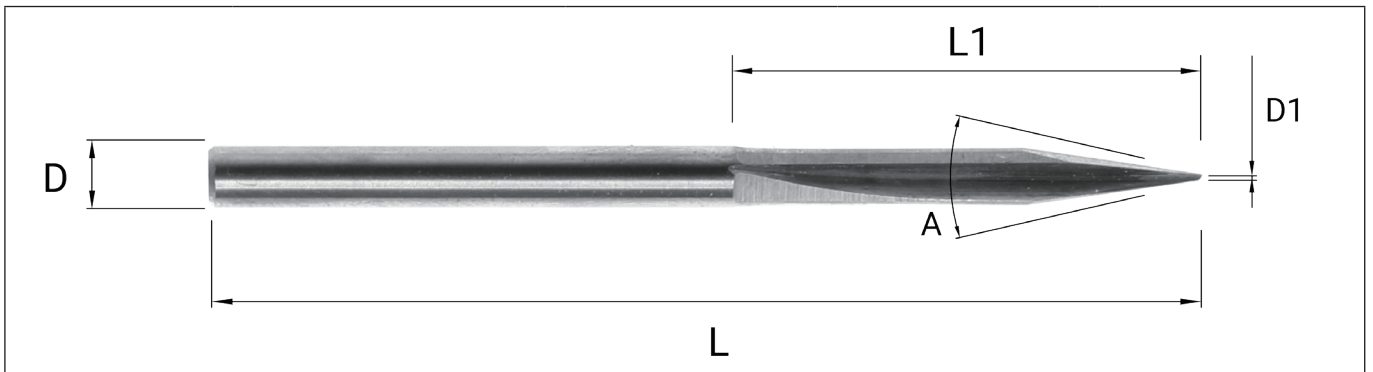
			
Total Length (L)	Cutting Edge Length (L1)	Shank Diameter (D)	Cutting Diameter (D1)
38 mm	17 mm	3.175 mm	3 mm

### 3.4 Caving V-bit



Total Length (L)	Cutting Edge Length (L1)	Shank Diameter (D)	Tip Diameter (D1)	Included Angle (A)
32 mm	5.5 mm	3.175 mm	0.2 mm	30°

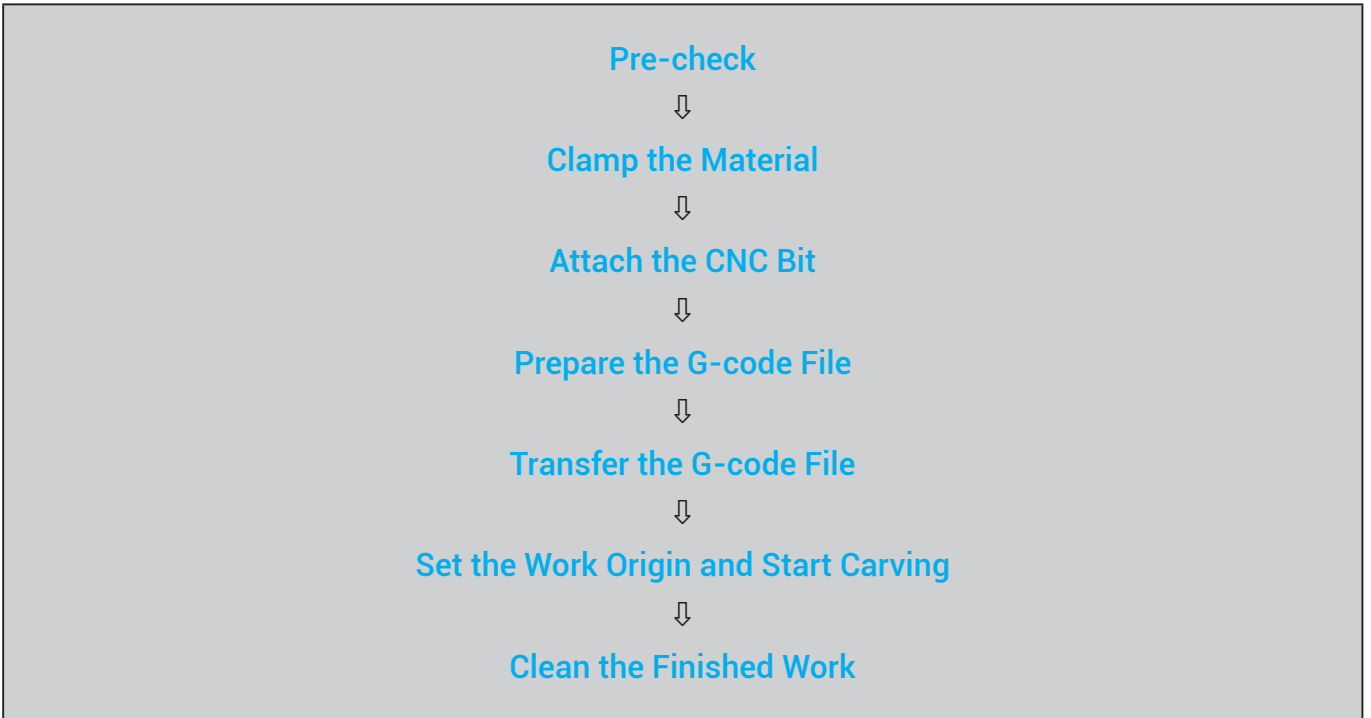
### 3.5 Straight Groove V-bit



Total Length (L)	Cutting Edge Length (L1)	Shank Diameter (D)	Tip Diameter (D1)	Included Angle (A)
50 mm	24 mm	3.175 mm	0.3 mm	20°

# 04 How to CNC Carve

## 4.1 CNC Carving Workflow



Before carving, you should thoroughly check the CNC carver and bit (see [6.2 Before You Carve](#)).

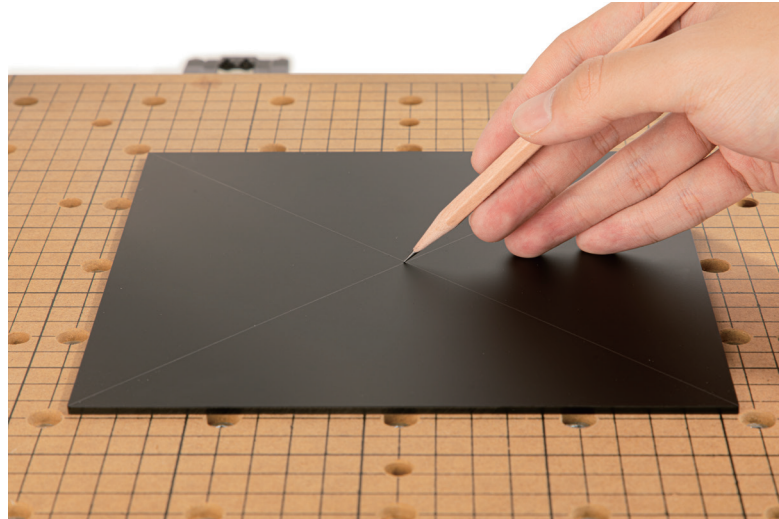
## 4.2 Clamp the Material

### Use Provided Clamp Sets

- (1) Peel off the masking papers from the acrylic sheet.

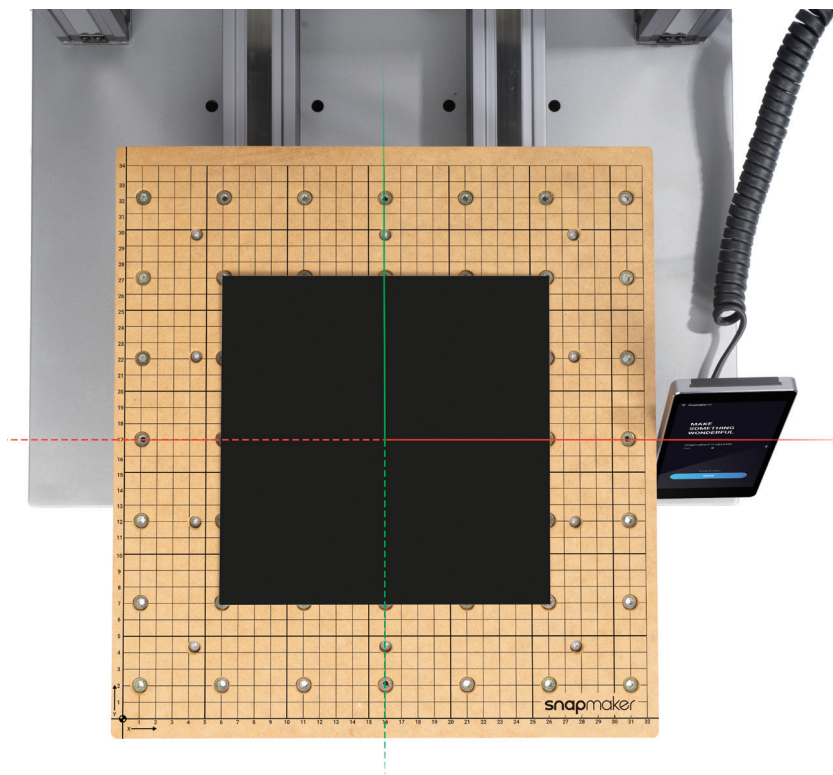


- (2) Draw two diagonals on the material surface using a pencil. Mark the material center for setting the work origin later.



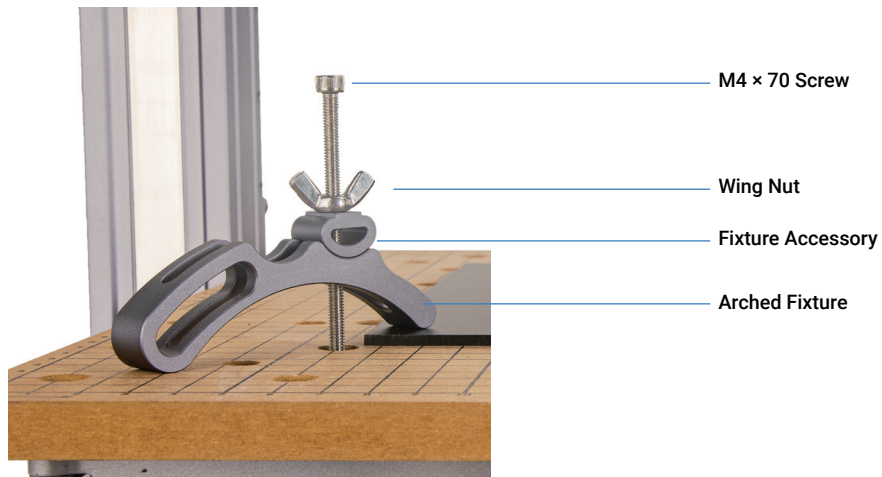
Alternatively, you can mark other positions on the material for setting the work origin, as long as the work area is limited within the machinable material size.

- (3) Place the provided material on the center of the CNC Carving Platform.  
Material Size: 190 width × 190 height × 2.8 depth (mm)

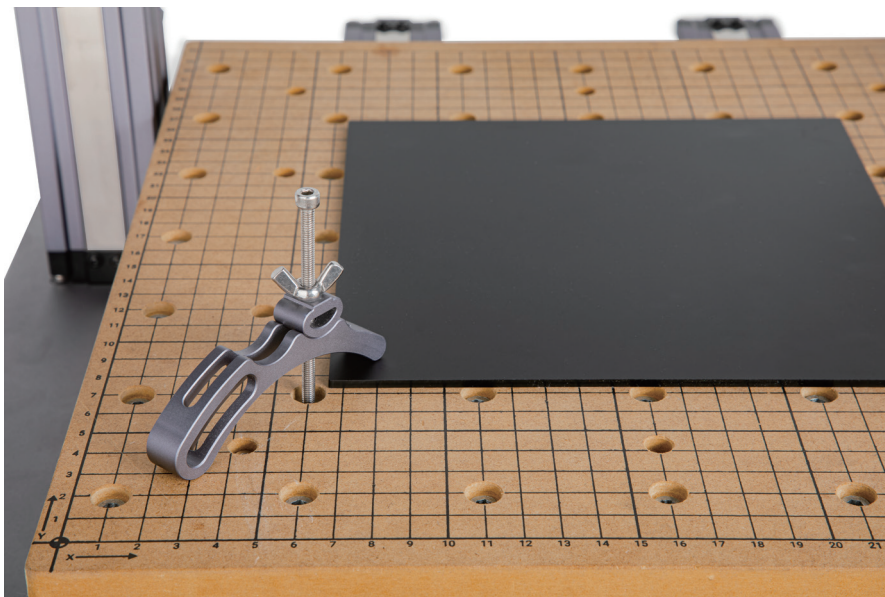


(4) Attach four clamp sets to the CNC Carving Platform.

- a. Thread each M4 × 70 screw with the wing nut into the fixture accessory, and then into the arched fixture as illustrated.



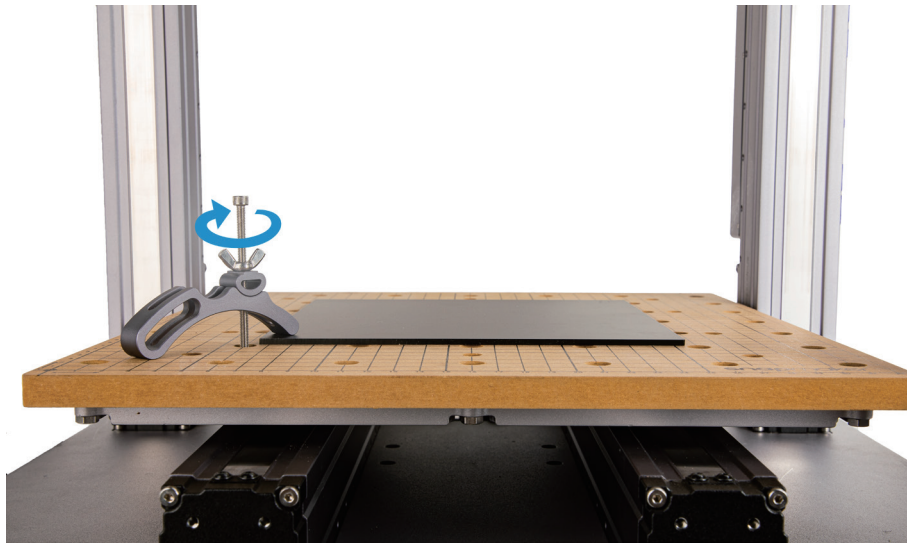
- b. Find a nut hole near the material to insert the M4 × 70 screw. Place the arched fixture onto the material, and adjust the fixture accessory to fit one of the slots on the arched fixture.



All the tree slots as illustrated can be used to fasten the material.



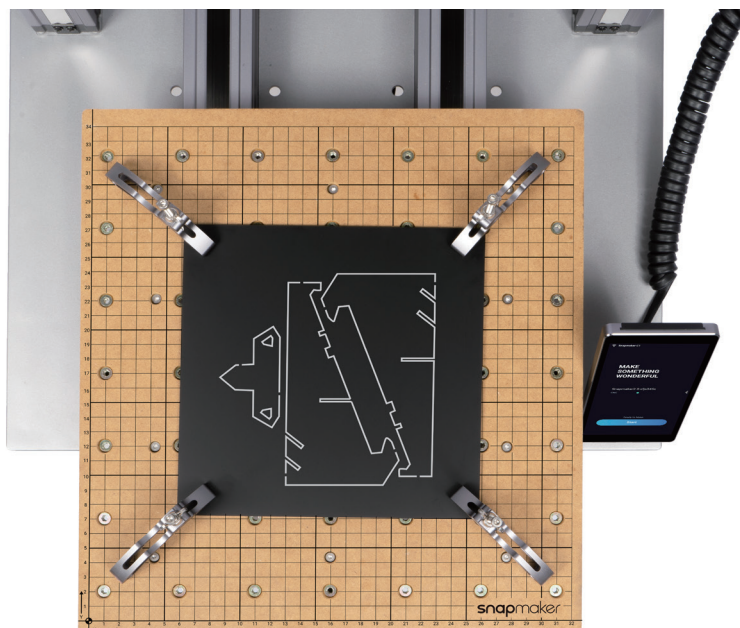
- c. Keep the M4 × 70 screw vertical to the CNC Carving Platform, and twist the M4 × 70 screw into the nut a bit. Fasten the material by screwing the wing nut.



Do not twist the screw down through the CNC Carving Platform. Otherwise, the protruding screw may damage the Y axes and impede the Y-axis movement.

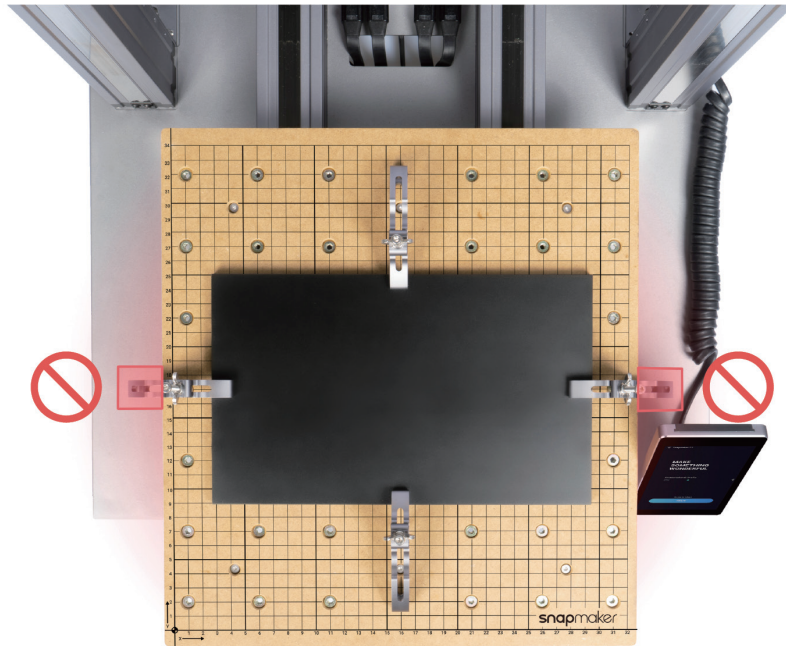


- d. Attach the rest three clamp sets to the CNC Carving Platform.





Ensure that all clamp sets will not impede the movement of the machine and CNC bit in any axial direction. Otherwise, the machine or CNC bit will bump into the clamp sets.

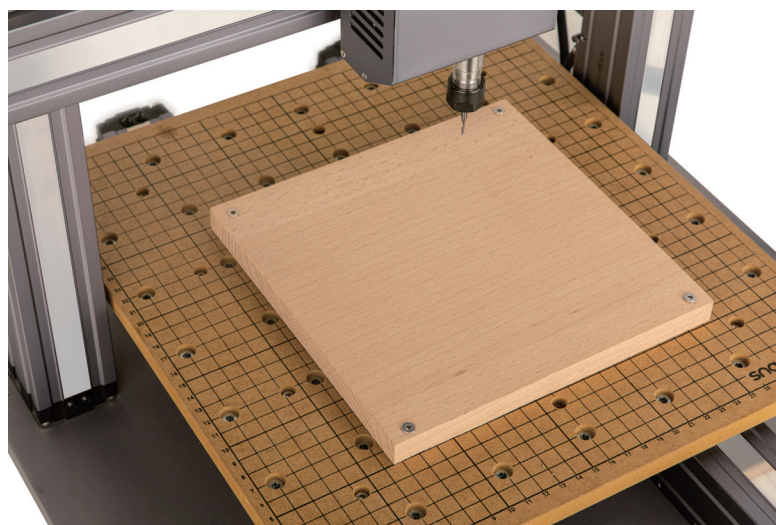


### Use Screws

Screws provide secure and flexible fixing for your material, while being fast and cheap. However, note that this fixing approach will damage the surface of the CNC Carving Platform.

Here are the steps:

- (1) Place your material (no thicker than 50 mm) on the center of your CNC Carving Platform.
- (2) Drill four holes into the corner of the material using an electric screwdriver.
- (3) Put four screws into the four holes. Drill the screws down through the material and then into the CNC Carving Platform using the electric screwdriver. Note that the screw should be long enough to penetrate the material.



Do not touch the electric screwdriver bit immediately after drilling; otherwise, you will be burnt.

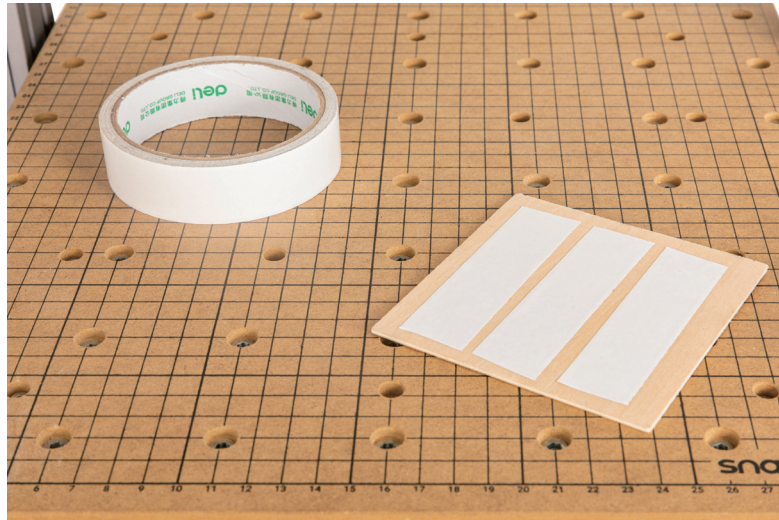


## Use Double-sided Tapes

Double-sided tapes are only applicable to thin, soft material. The reason is that machining this type of material will encounter less resistance and thus requires less strong fixing strength.

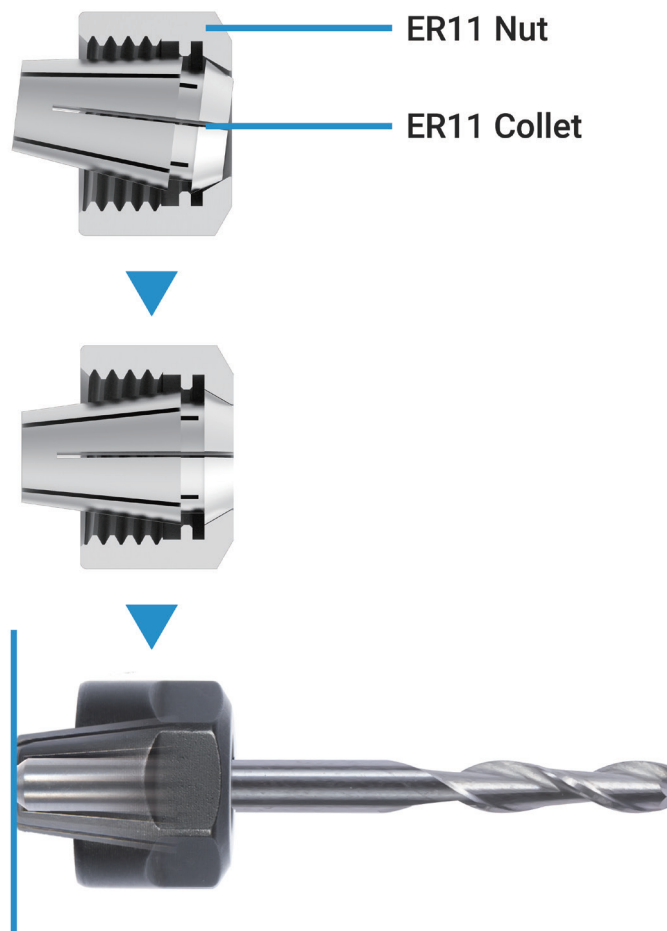
Here are the steps:

- (1) Cover the rear of the material with double-sided tapes.
- (2) Stick the adhesive material to the center of the CNC Carving Platform.
- (3) Press the material to ensure that it is firmly stuck to the CNC Carving Platform.



## 4.3 Attach the CNC Bit

- (1) Tilt the ER11 collet into the ER11 nut until the collet snaps into place. Insert the CNC bit into the ER11 collet until the shank bottoms against the collet.



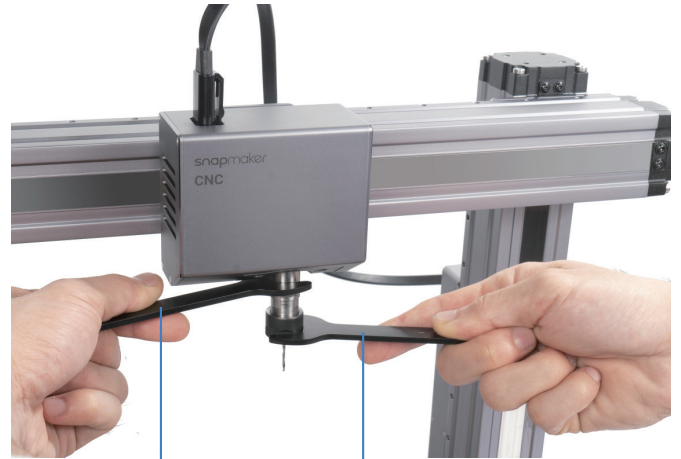


Caution the sharp bits and keep them beyond the reach of children.

(2) Twist the ER11 nut onto the CNC Carving Module, and secure the nut using the open-end wrenches.



14mm Open-end Wrench



17mm Open-end Wrench

## 4.4 Prepare the G-code File

### Prepare the Model File

Before generating the G-code file on Luban, you should prepare a model file. Here are a few options for preparing the model file:

- Use provided models in the Case Library of Luban.
- Design 2D images or 3D models using the design or modeling software.
- Take photos with your smart phone to get 2D images.
- Download free CAD files from the website, like [grabcad.com/library](http://grabcad.com/library).

As a reminder, Luban supports these design file formats: .svg, .dxf, .png, .jpeg, .bmp, .stl, more to be added.


### Generate the G-code File

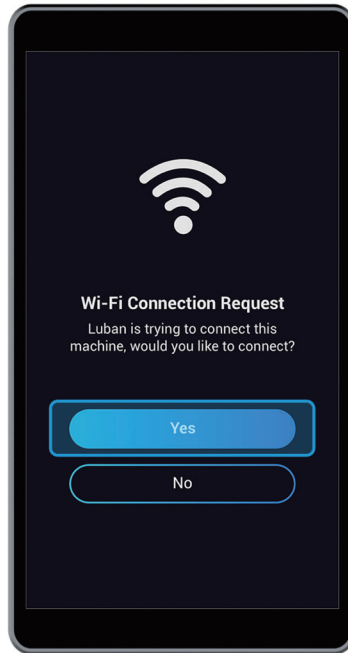
Open Luban and follow the [Snapmaker 2.0 Quick Start Guide](#) to generate the G-code file.

## 4.5 Transfer the G-code File

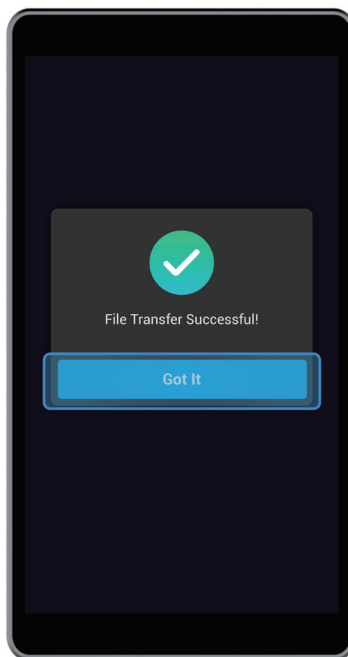
You can transfer the G-code file to Touchscreen or keep it on Luban for carving.

### Start Carving on the Touchscreen via Wi-Fi

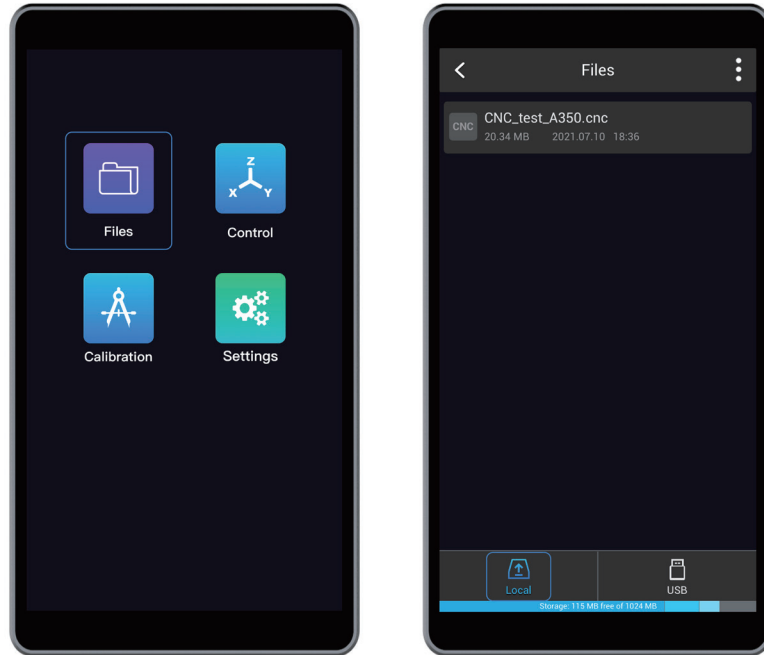
- (1) On Luban, click **Workspace**. In the Connection panel, click **Wi-Fi > Refresh**  > Select your CNC Carver in the drop-down list > **Connect** Luban to your CNC carver.
- (2) On the Touchscreen, tap **Yes** to grant Wi-Fi connection.



- (3) In Workspace, click **Send to Device via Wi-Fi**.
- (4) On the Touchscreen, tap **Got It** to receive the G-code file.



- (5) On the Touchscreen, find the G-code file by tapping **Files > Local**. For the next steps, see [4.6 Set the Work Origin and Start Carving](#).

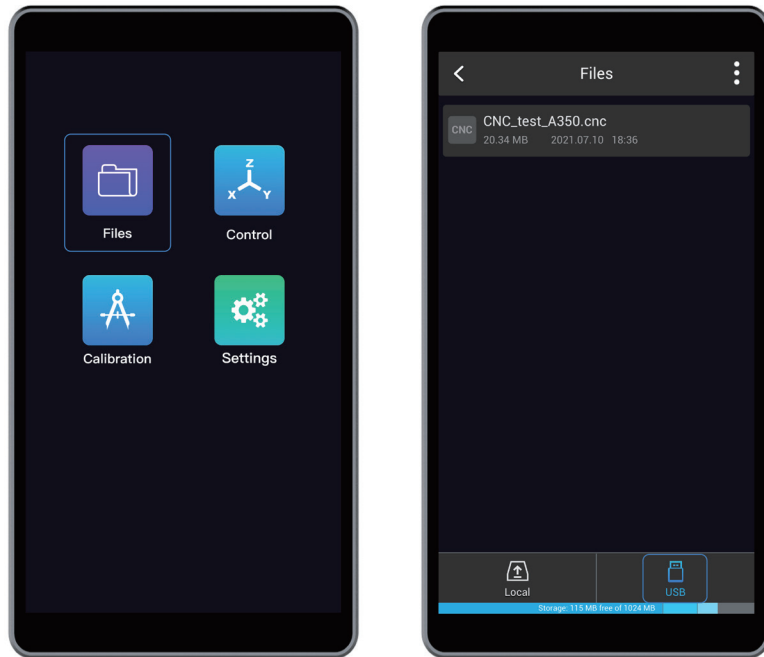


### Start Carving on the Touchscreen via USB Flash Drive


- (1) In the CNC G-code Generator, click **Export G-code to File** (in .cnc format) and save it to the USB flash drive.
- (2) Insert the USB flash drive into the Controller of the CNC carver.

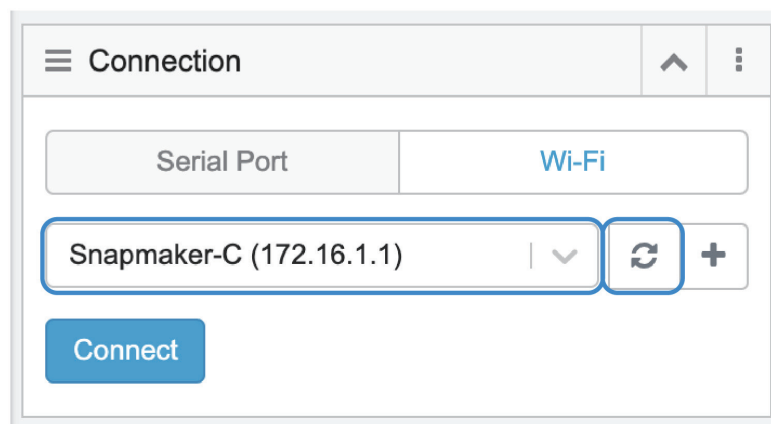


- (3) On the Touchscreen, find the G-code file by tapping **Files > USB**. For the next steps, see [4.6 Set the Work Origin and Start Carving](#).



### Start Carving on Luban via Workspace

- (1) In the CNC G-code Generator, load the generated G-code file to Workspace by clicking **Load G-code to Workspace**.
- (2) In the Workspace, go to the Connection panel. Click **Wi-Fi** > **Refresh**  > Select your CNC carver in the drop-down list > **Connect** Luban to your CNC carver.



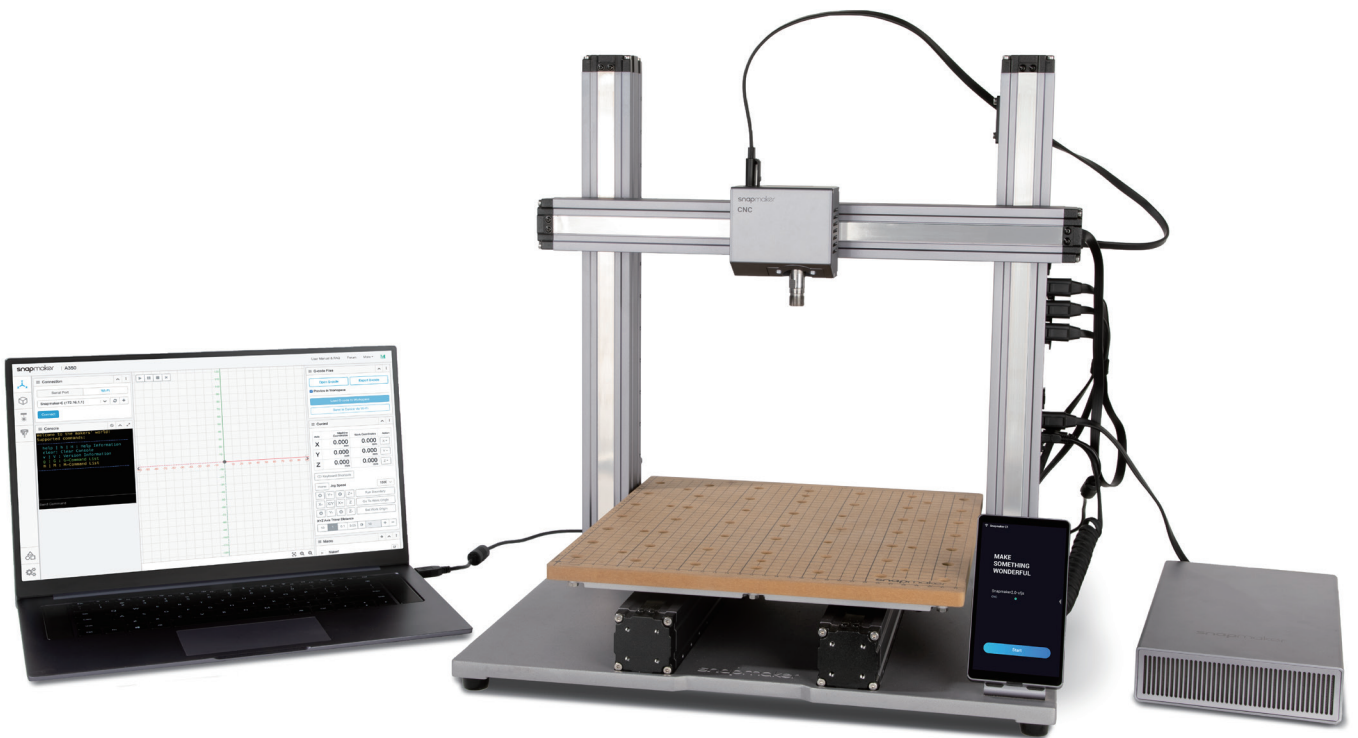
- (3) After connection, click the **Run** button  in Workspace to start carving.




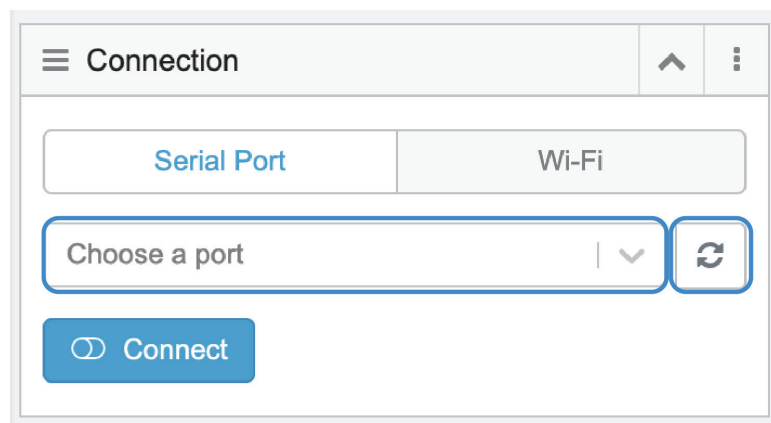
Should Wi-Fi be disconnected during carving, the Touchscreen will ask you if you want to keep carving. To keep carving, ignore the prompt; to stop carving, tap **Confirm**.


## Start Carving on Luban via USB Cable

- (1) In the CNC G-code Generator, load the generated G-code file to Workspace by clicking **Load G-code to Workspace**.
- (2) Insert one end of the USB cable into the computer, and the other end into the Controller of the CNC carver.



- (3) On Luban, click **Workspace**. In the Connection panel, click **Serial Port** > **Refresh**  > Select the port of your CNC carver in the drop-down list > **Connect** Luban to your CNC carver.



 If you can't find the port, unplug the USB cable and try again. For initial use, you need to download and install the driver from [snapmaker.com/product/snapmaker-2/downloads](https://snapmaker.com/product/snapmaker-2/downloads).

- (4) After connection, Luban will prompt you to select your machine model and toolhead. Select and click **Choose** to save the settings.

- (5) Set the work origin using the **X, Y, Z** offsets on Luban, and start carving by clicking the **Run** button ▶.

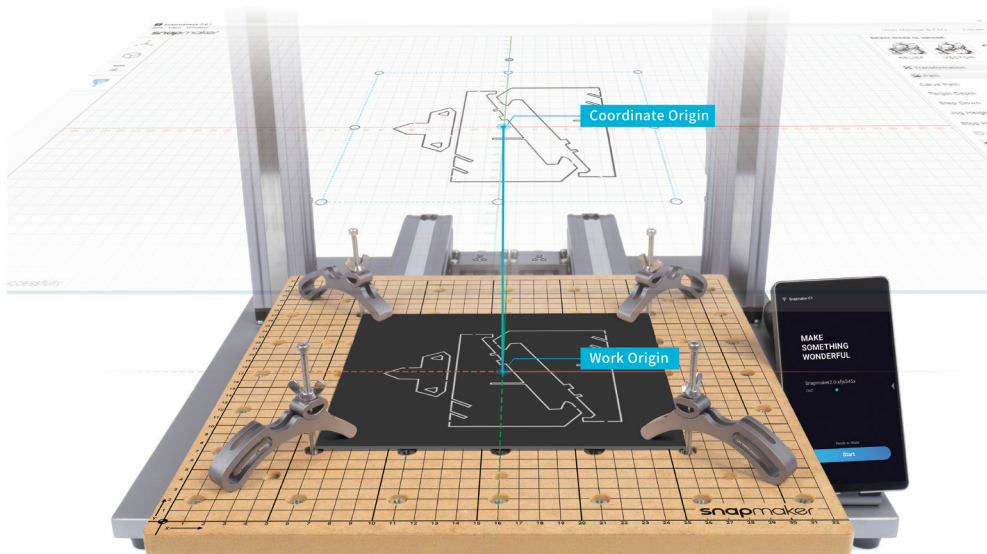


Keep the cable connected until the carving job is completed. Otherwise, the job will be stopped.

## 4.6 Set the Work Origin and Start Carving

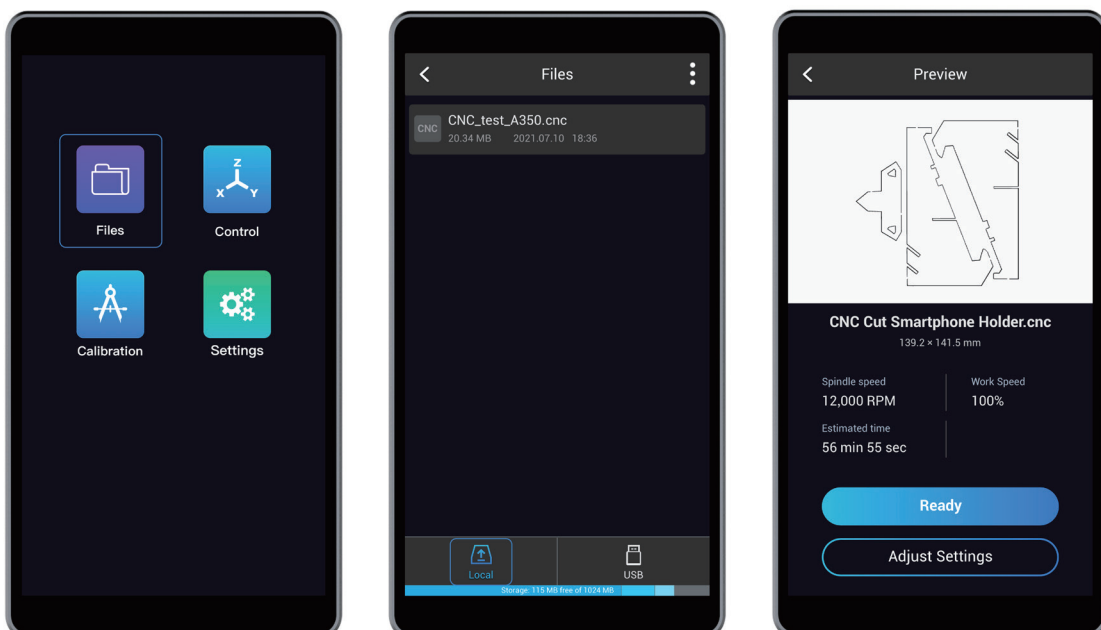
### How It Works: Work Origin

Find out where the carving will take place by setting the Work Origin. The Work Origin corresponds to the coordinate origin (0, 0) in the software.

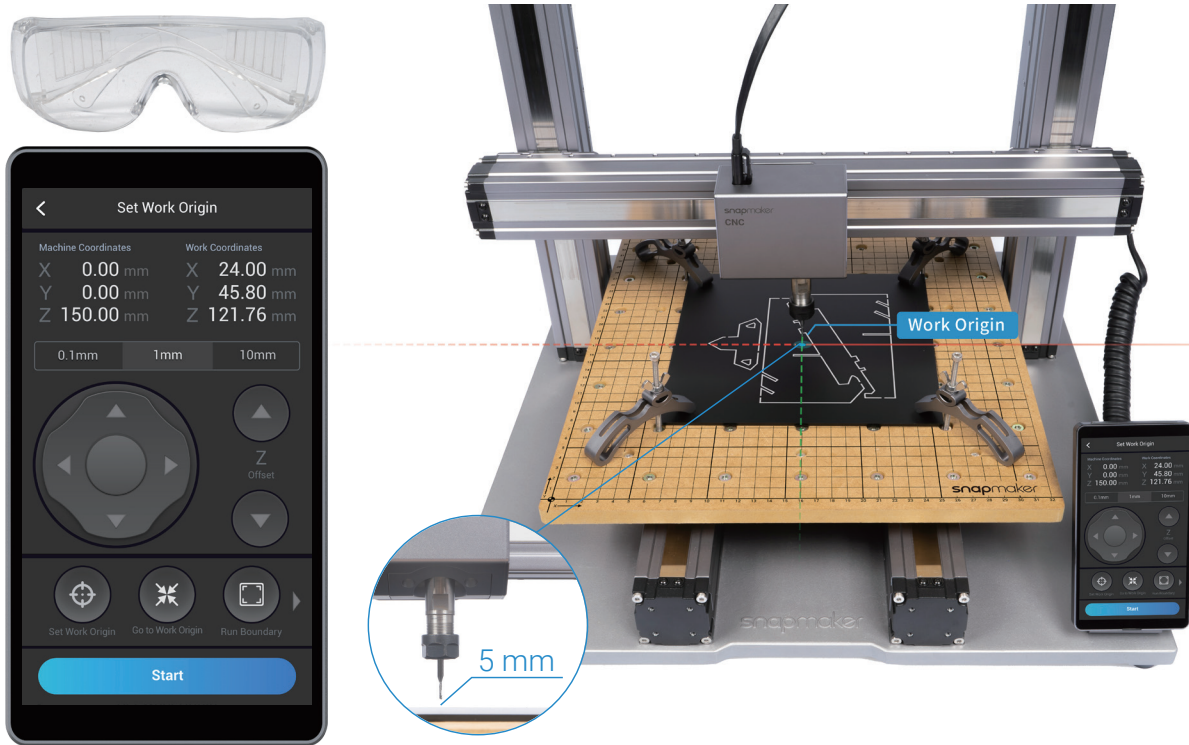


### How to Set the Work Origin

- (1) On the Touchscreen, select the file. After receiving the file, tap **Files > Local** or **USB** to select your G-code file. Preview the file, check the carving settings, and tap **Ready** to set the work origin.



- (2) Wear the CNC Safety Goggles. Previously, we have set the image center as the Work Origin of the design coordinate system on Luban. Now we need to set the material center as the Work Origin of the physical coordinate system. On the Set Work Origin screen, tap **X, Y, and Z Offsets** to move the CNC bit to where the Work Origin will be. Now the CNC bit should be 5 mm above the material.

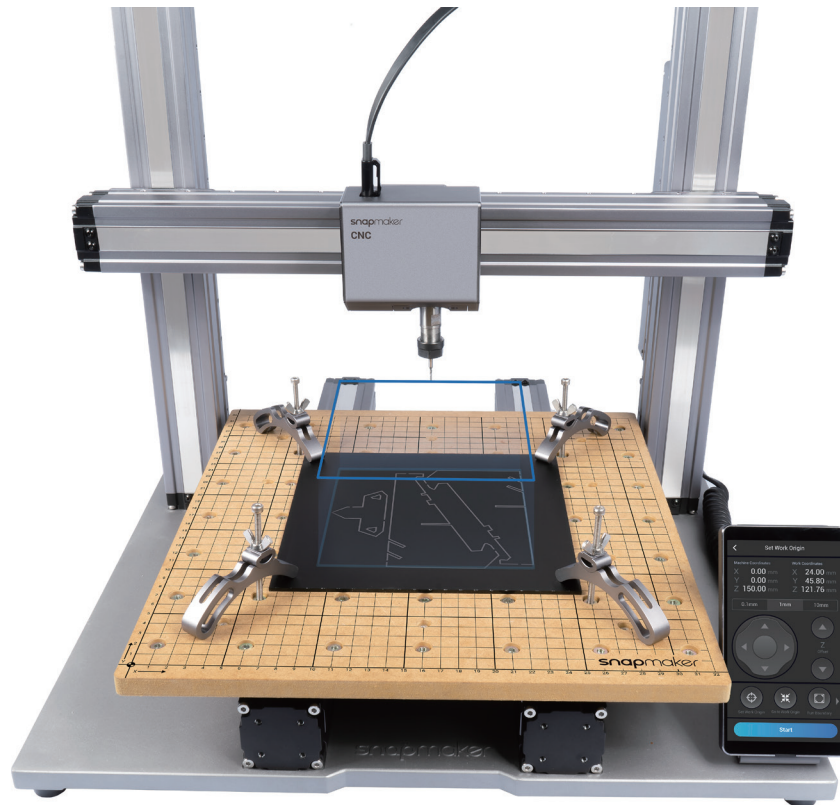



- (3) Fine-tune the work origin. Place the Calibration Card (0.1 mm in thickness) or a piece of A4 paper between the CNC bit and the material. Keep adjusting the height of the CNC bit by tapping the **Z Offset**, until you feel slight resistance when you pull out the Calibration Card, and it should be wrinkled when you push it forward. Tap **Set Work Origin**.



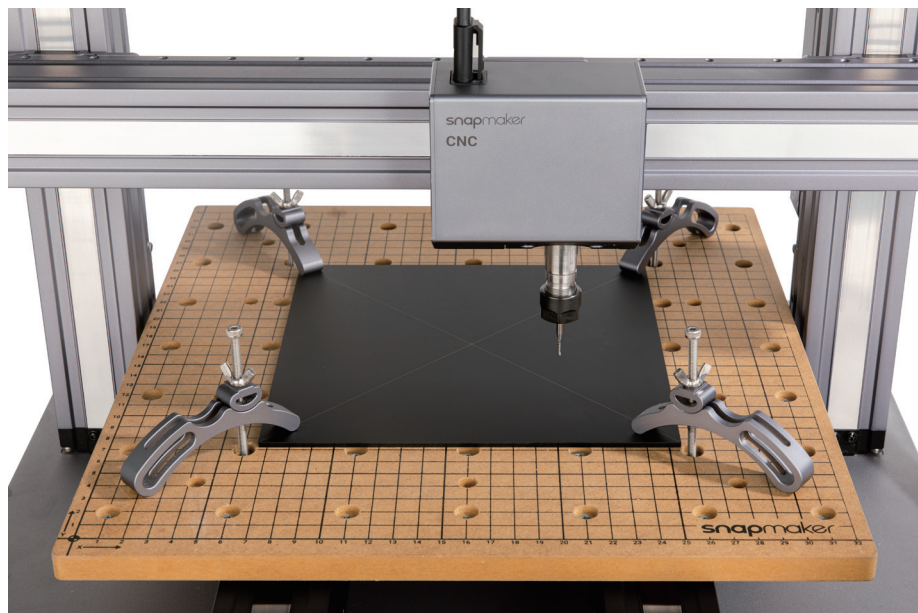


- (4) Check the work area. Tap **Z+** to lift the CNC bit above the clamp sets, and then tap **Run Boundary** to check if the work area is proper. If the boundary trailed by the CNC bit reaches beyond the material, or the CNC bit bumps into the clamp sets, reset the work origin and run the boundary again.



If the CNC bit bumps into the CNC carver, turn off the machine immediately or press the Emergency Stop Button . If the CNC bit is damaged, replace it with a new one.

- (5) Recheck the work area (optional). Lower the CNC bit to 10 mm above the material, and then tap **Run Boundary** to recheck if the CNC bit will bump into the clamp sets.



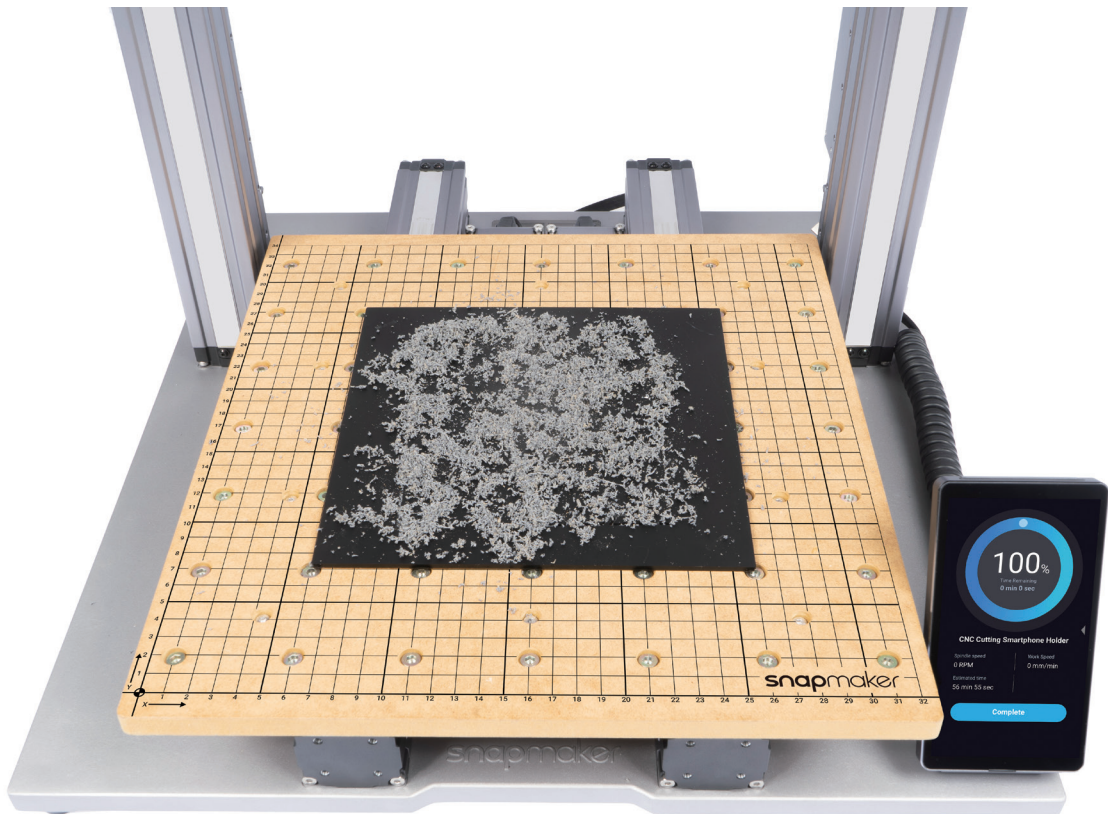
(6) Now you are all set. Tap **Start** to start carving.



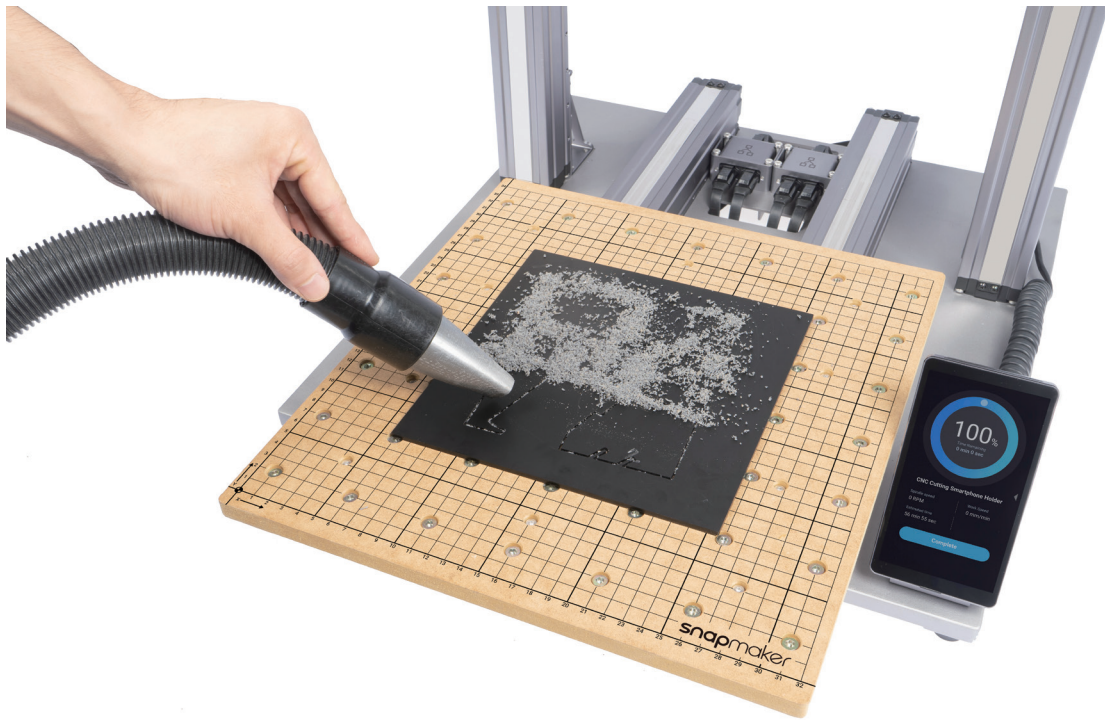
During carving, you can readjust settings by swiping left on the carving screen.

## 4.7 Clean the Finished Work

(1) Remove the clamp sets from the CNC Carving Platform.



- (2) Clean the finished work and the CNC carver using a vacuum.



- (3) Detach the pieces of the phone holder using the diagonal pliers. Assemble the phone holder as illustrated and now you are ready to use it!



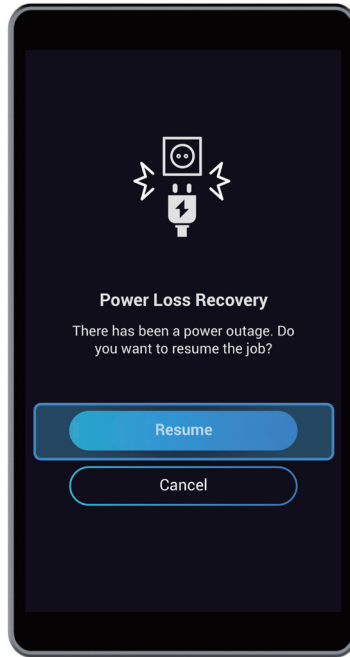
#### 4.8 Power Loss Recovery

If the Power Module is turned off, to resume the carving job:

- (1) Turn on the power switch.
- (2) After the CNC carver is restarted, tap **Resume** on the Touchscreen.

If the AC Power Cable is unplugged, to resume the carving job:

- (1) Turn off the power switch.
- (2) Plug in the AC Power Cable.
- (3) Turn on the power switch.
- (4) After the CNC carver is restarted, tap **Resume** on the Touchscreen.



## 05 Waste Disposal

Waste disposal laws and regulations vary with countries and regions. When you dispose of any waste, you should observe the local laws, regulations, rules, or requirements on waste disposal.

### 5.1 Packaging

The shipping packaging is made of corrugated fiberboard, withstanding great pressure and providing effective protection for your CNC carver. The packaging can be recycled or reused to store finished works or create DIY projects. Inside the packaging is Expanded Polystyrene (EPS) foam, protecting your CNC carver from collision during shipping. Littering non-degradable EPS foam is detrimental to the environment, so throw the EPS foam into the designated trash bin.

### 5.2 CNC Bits

Don't throw the CNC bits straight in the trash bin. CNC bits without protective wrapping will easily hurt someone who carries the trash bag or reaches into the trash.

Here are some tips to properly dispose of the CNC bits:

- (1) Wrap the CNC bits with a few layers of paper or cardboard, and secure them with tapes.
- (2) Put the wrapped bits into a thick sealing bag or container.
- (3) Write "SHARP" outside the bag or container to warn sanitation workers of sharp bits.
- (4) Throw them into the designated trash bin.

### 5.3 Wasted Material

Do not litter non-degradable material or failed works in nature. Throw them into the designated trash bin.

### 5.4 Electronics

Electronics can be discarded, donated, or recycled. Should the e-waste be no longer wanted or near the end of its useful life, you can throw it into the designated trash bin, or take it to a trusted charity or recycler.

# 06 Maintenance

## 6.1 Maintenance Schedule

This maintenance schedule is for reference only. Should you use the CNC carver more frequently, adjust your schedule according to your use frequency. Before maintenance, check [Snapmaker's Limited Warranty](#) void your warranty by self-servicing your CNC carver.



Cut the power supply before maintenance.

### Before You Carve

Task	See
Check the Cables	<a href="#">6.2.1</a>
Check the Support Platform	<a href="#">6.2.2</a>
Check the CNC Carving Platform	<a href="#">6.2.3</a>
Check the ER11 Nut and CNC Bit	<a href="#">6.2.4</a>

### Every Month

Task	See
Clean the Linear Modules	<a href="#">6.3.1</a>
Clean the Side Covers	<a href="#">6.3.2</a>
Check the Nuts in the CNC Carving Platform	<a href="#">6.3.3</a>

### Every Three Months

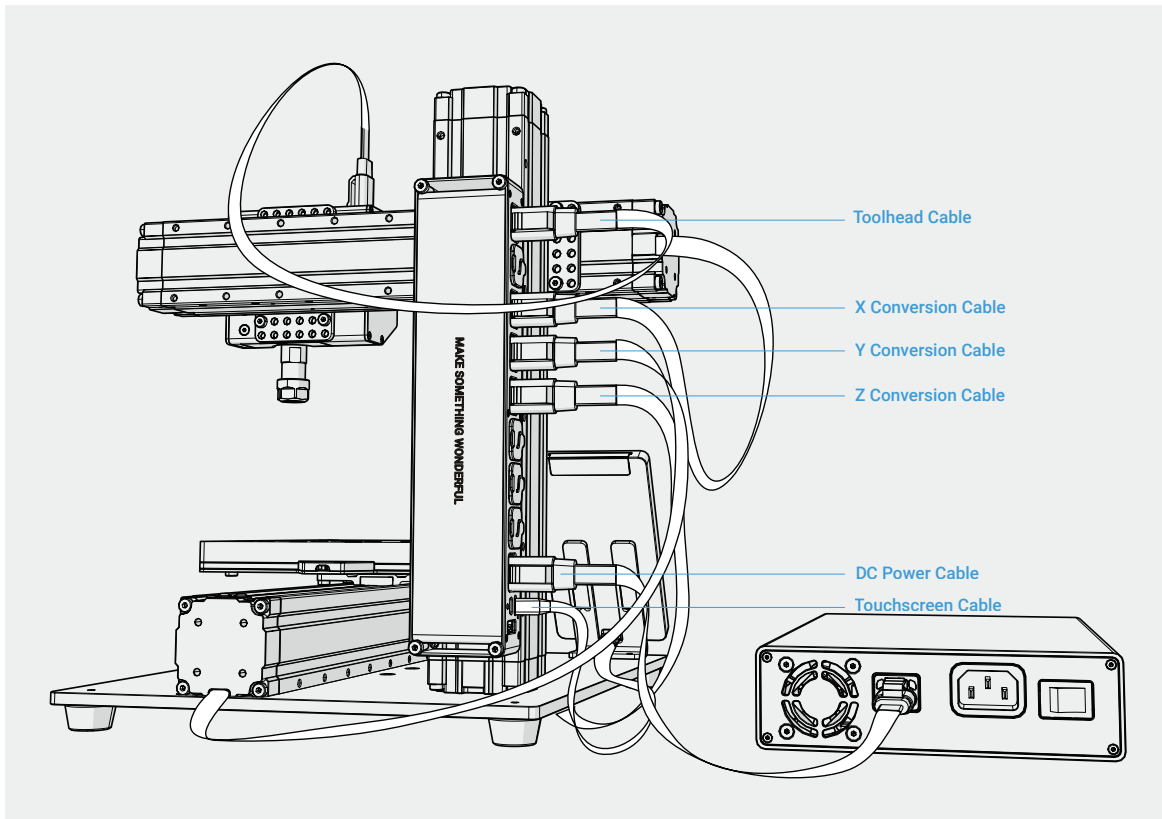
Task	See
Update the Firmware and Software	<a href="#">6.4</a>

## 6.2 Before You Carve

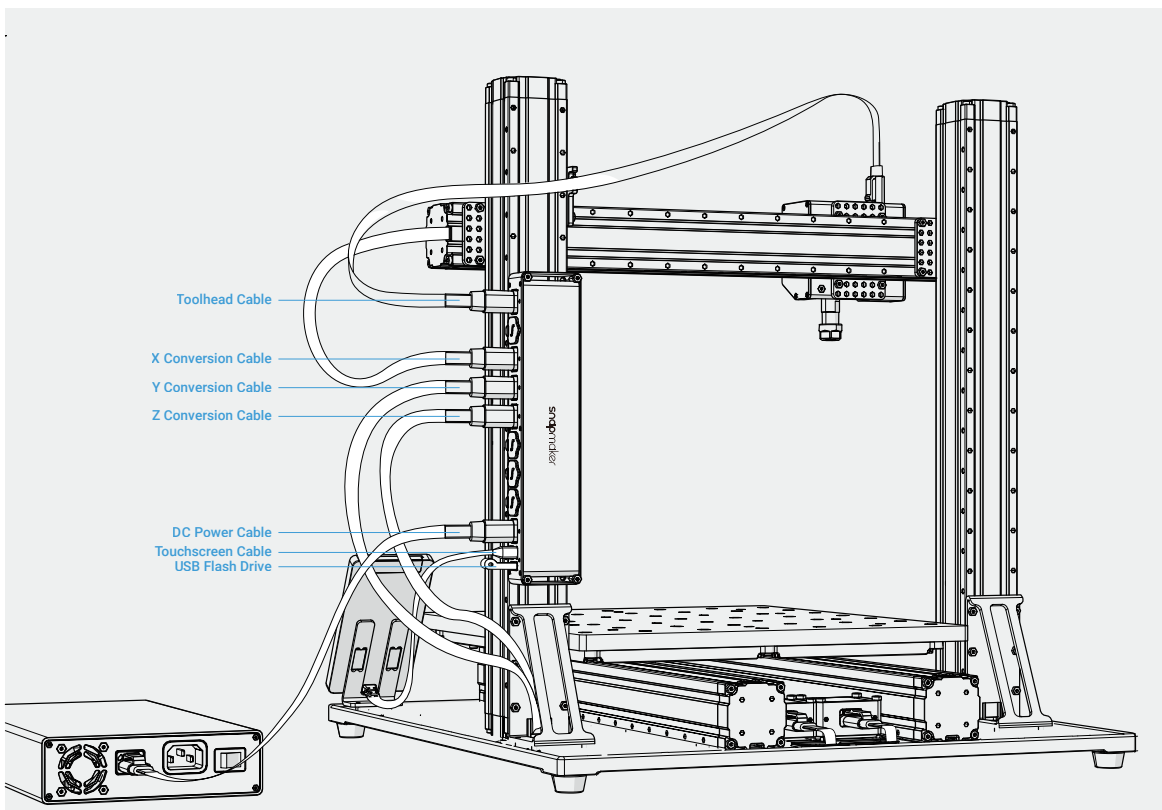
### 6.2.1 Check the Cables

Check if every cable is plugged into the right socket in the right direction.

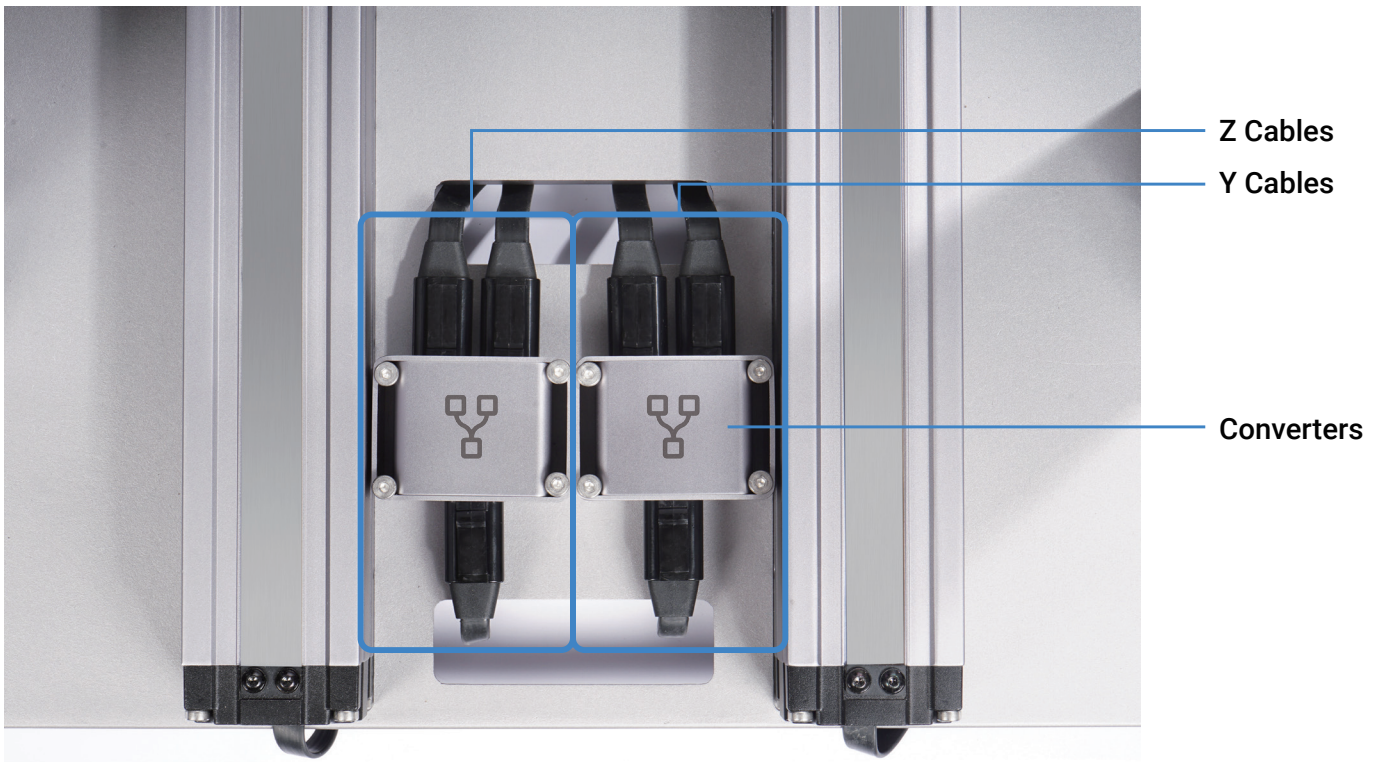
#### Into the Controller (A150)



#### Into the Controller (A250 & A350)

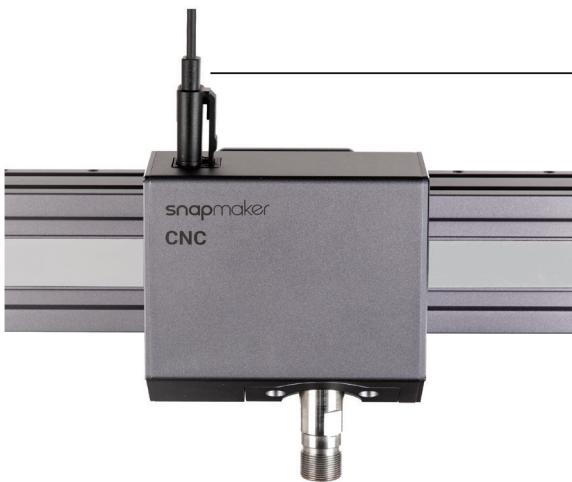


### Into the Converters



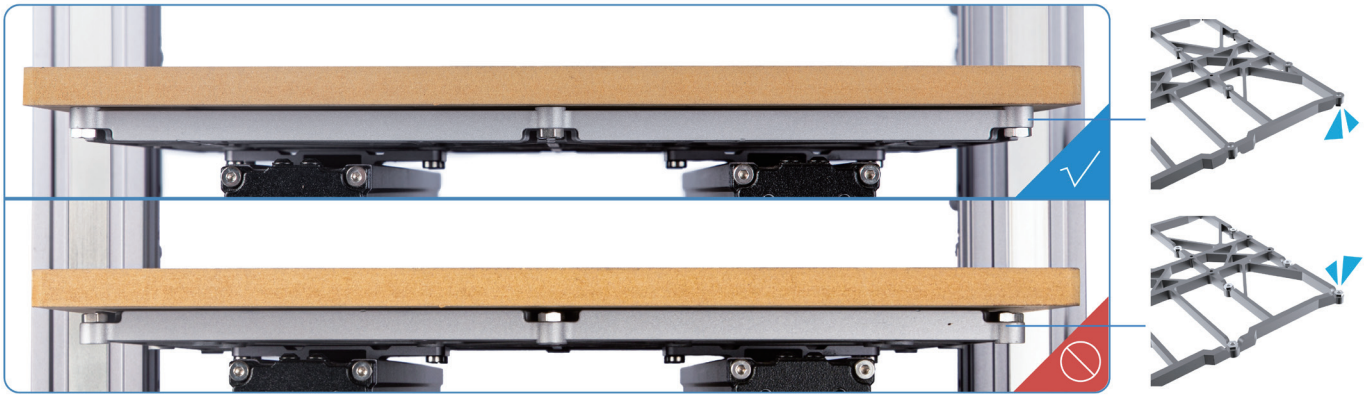
Snapmaker 2.0 A150 has no Converters.

### On the CNC Carving Module

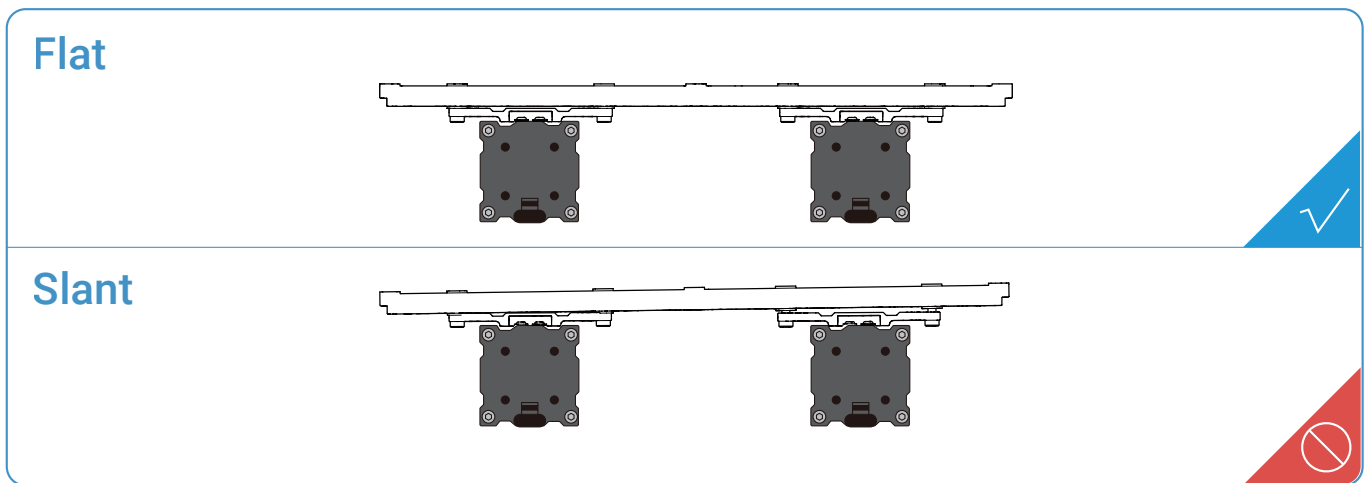


### 6.2.2 Check the Support Platform

Check if the Support Platform is assembled in the correct direction. The front without screws should face up, and the rear with some screws faces down.

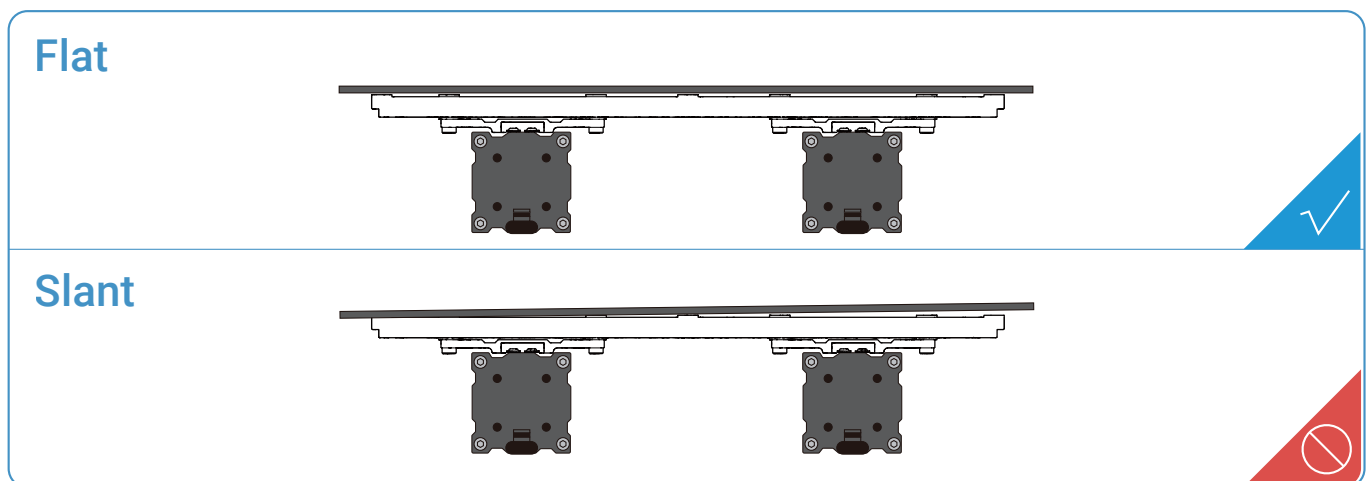


Check if the Support Platform is flat and stable, fully tightened with screws. If not, loosen all screws and reassemble the Platform.



### 6.2.3 Check the CNC Carving Platform

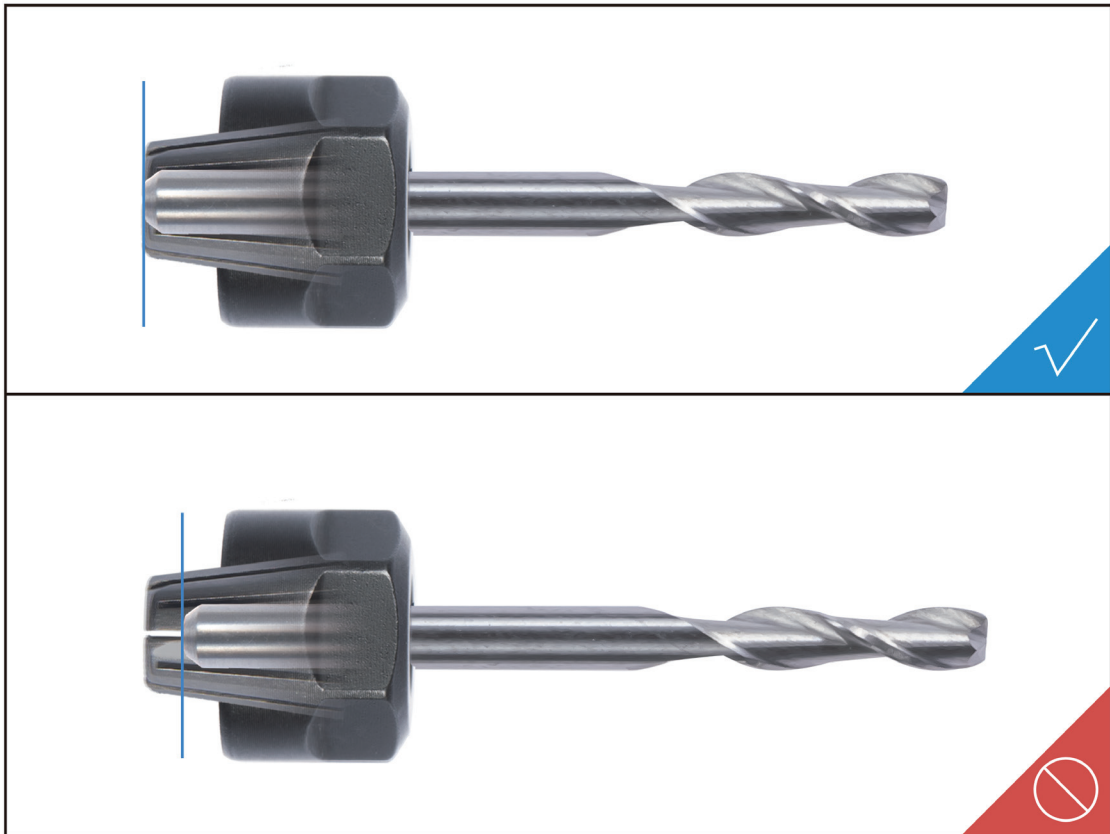
Check if the CNC Carving Platform is flat and stable, fully tightened with screws. If not, reassemble the CNC Carving Platform.



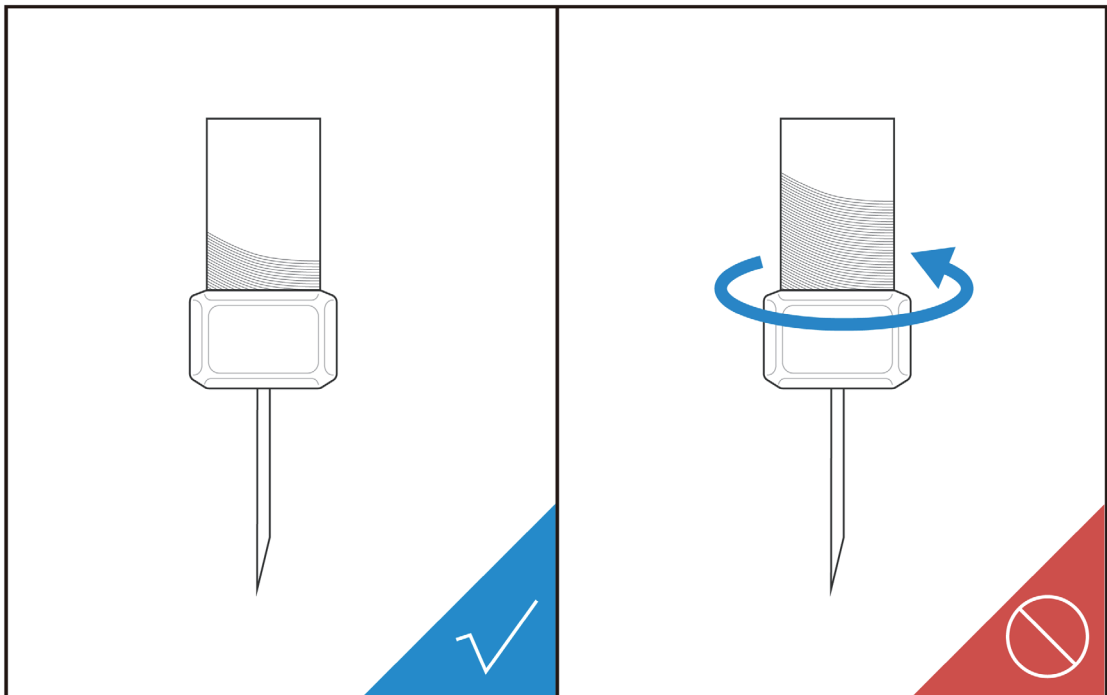


### 6.2.4 Check the ER11 Nut and CNC Bit

Check if the ER11 collet securely clamps the CNC bit.



Check if the ER11 nut is tightened onto the CNC Module using open-end wrenches.



Check if the CNC bit is broken or worn out. If it is, replace the old CNC bit with a new one.

## 6.3 Every Month

### 6.3.1 Clean the Linear Modules

Keeping all Linear Modules free of dust and other foreign matters can reduce friction and noise while the CNC carver is moving. To do so, gently wipe the Linear Module surface using a dry cotton cloth.



Usually, you should clean the CNC carver after each carving job. To always keep it free of sawdust, we recommend you to give the machine a thorough cleaning, especially of the Base Plate, Y-axis Linear Modules, and Support Platform.



While cleaning, do not press the steel strip.

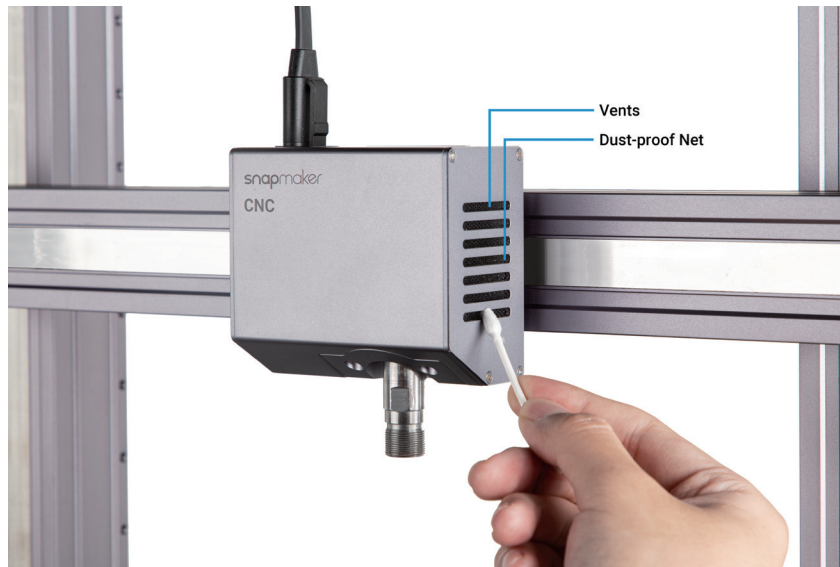
Do not dismantle the Linear Modules yourself, as doing so will void [Snapmaker's Limited Warranty](#).

### 6.3.2 Clean the Side Covers

The CNC Carving Module has two side covers, each with vents and a dust-proof net for heat dissipation. If the side covers are clogged by foreign matters, it will affect the airflow inside the 3D Printing Module. Consequently, the internal components will be overheated, and the CNC Module will malfunction.



To avoid this, you should check the vents and dust-proof nets monthly. Use a swab or vacuum to clean the foreign matters.



### 6.3.3 Check the Nuts in the CNC Carving Platform

Check if any nut is screwed out of the CNC Carving Platform. If so, follow these steps to glue it back:



Before operation, wear protective gloves to prevent contact with the toxic AB glue. Wear our provided mask to avoid inhaling the volatile, toxic gases. Do not misuse the A glue lid on the B one.

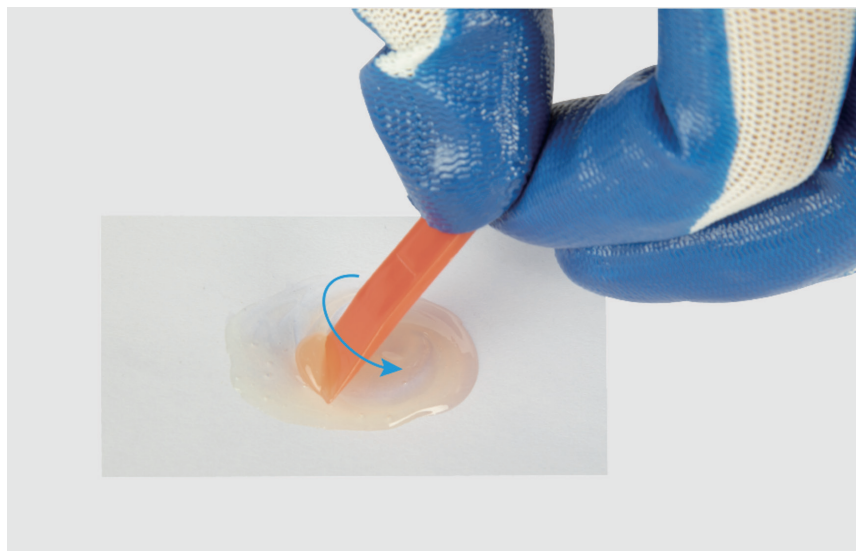
(1) Clear the sawdust on the nut.



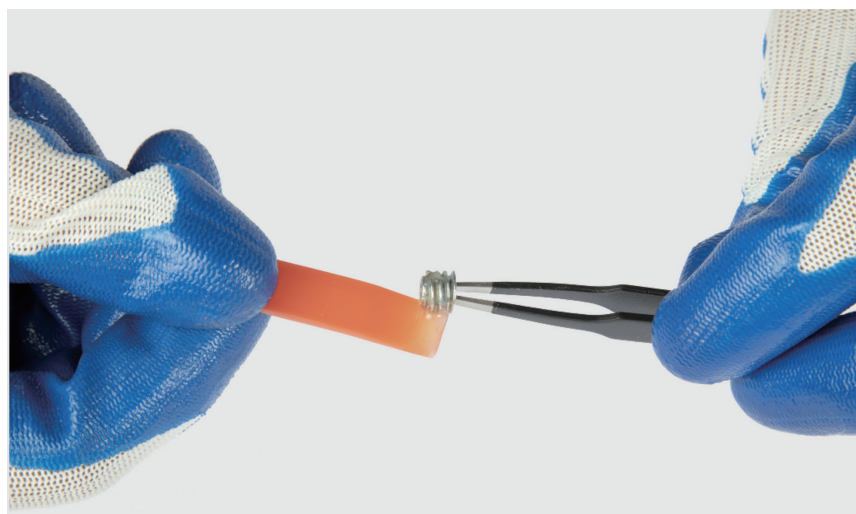
(2) Squeeze out the A glue and B glue in a 1:1 proportion.



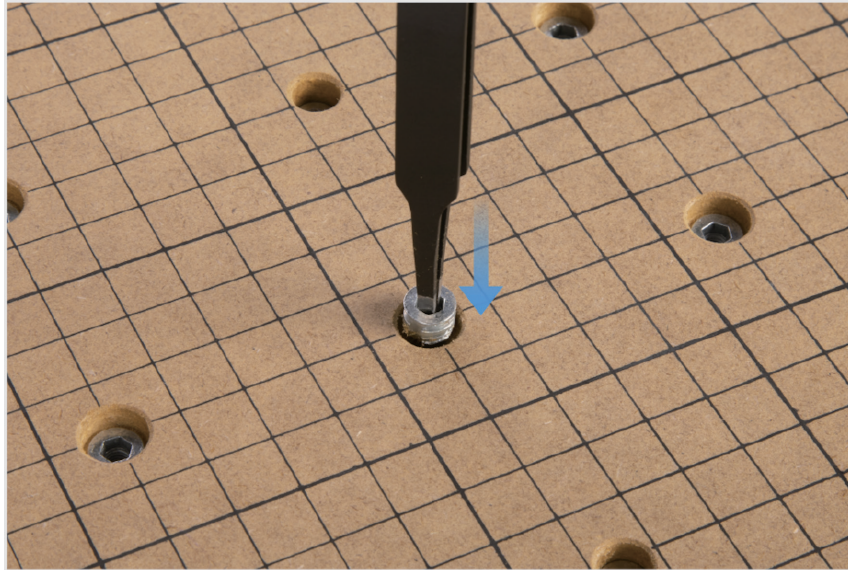
(3) Mix the A glue with the B glue using the red mixing stick, and stir them evenly.



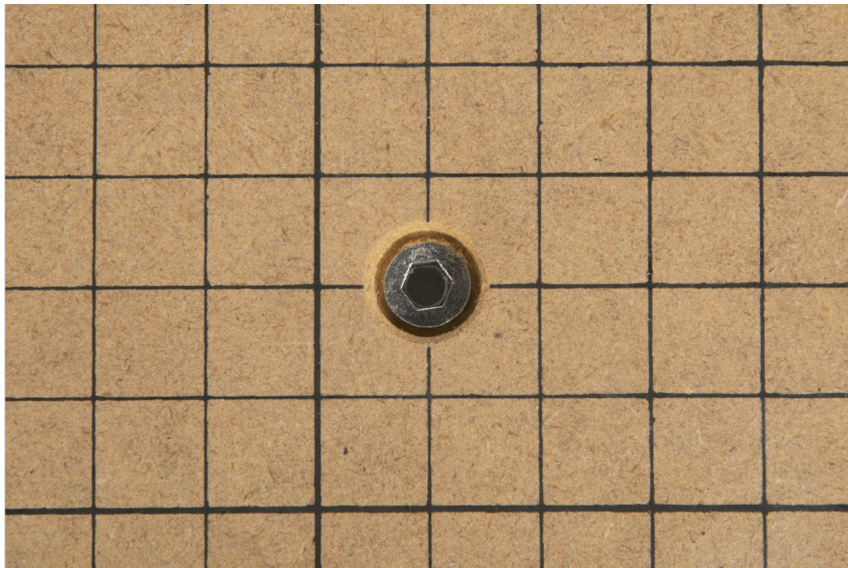
(4) Tweeze the nut out, and apply the mixed glue to the screw thread of the bottom of the nut.



(5) Tweeze the nut back into the hole of the CNC Carving Platform, and press it for a while.



(6) Wait for at least 24 hours to ensure that the mixed glue is cured before reuse.



## 6.4 Every Three Months

To keep your CNC carver and Luban up to date, update your firmware and software every three months. For how to update, see [Firmware](#) and [Software](#).

# 07 Troubleshooting

## 7.1 The CNC Bit Bumps into Clamp Sets

### Possible Causes

- (1) The work origin is set wrong.
- (2) The model size exceeds the maximum work area.

### Solutions

- (1) Reset the work origin and run boundary again.
- (2) On Luban, scale down the model size to fit the work area. Note that you should reserve a clamping area on the CNC Carving Platform while designing models on Luban.
  - Work area for A350: 320 width × 350 depth
  - Work area for A250: 230 width × 250 depth
  - Work area for A150: 160 width × 160 depth

## 7.2 The CNC Bit Breaks During Carving

### Possible Causes

- (1) The work speed is too fast.
- (2) Sawdust is clogged in the flutes of the CNC bit.

### Solutions

- (1) On Luban, lower the work speed. The work speed varies with material and tool types. Set a proper work speed based on your material and tool choices.
- (2) Change material. Plastic is likely to clog and thus melt during carving. Should you carve plastic materials, you should use a single flute end mill.

# Resources

This guide is subject to change without notice.

For Quick Start Guides and User Manuals:

<https://support.snapmaker.com/hc/en-us/categories/360005617793-Download>.

For general information or technical support:

[support@snapmaker.com](mailto:support@snapmaker.com).

For sales inquiries:

[sales@snapmaker.com](mailto:sales@snapmaker.com).

For product purchases:

<https://shop.snapmaker.com>.

Share anything you want in our forum:

<https://forum.snapmaker.com>.

Share anything you want via the following channels:



# Compliance

## FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

## ISED Compliance

This device complies with Innovation, Science and Economic Development Canada License exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device is compliance with RF exposure guidelines, users can obtain Canadian information on RF exposure and compliance. The minimum distance from body to use the device is 20cm.

Le présent appareil est conforme Après examen de ce matériel aux conformité ou aux limites d'intensité de champ RF, les utilisateurs peuvent sur l'exposition aux radiofréquences et conformité d'acquérir les informations correspondantes. La distance minimale du corps à utiliser le dispositif est de 20cm.



## Disclaimer

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"Life isn't about finding yourself. Life is about creating yourself."  
- George Bernard Shaw