MAKERA

FOR THE ERA OF MAKERS

CARVERA

Smart Desktop CNC Machine

EXAMPLES GUIDE

01 /04
LED light
Circuit 6
Base 14
Display board 16
Touch switch 19
Assembly 21

02 /22
Laser engraving

03 /26
Three-axis relief

04 /30
4th-axis relief

Introduction

Practice is the most direct and effective learning method. We provide a series of machining samples, materials and tools to make you familiar with the functions and procedures of using Carvera to do delicate works.

With fully automatic capabilities, Carvera greatly simplifies the machining process. However, we still recommend reading the Carvera instruction manual carefully before start using it. This will ensure that you get a quick knowledge of Carvera and avoid basic misoperations.

For specifications and more information, please visit our official website:
www.makera.com

If you have any problems with Carvera, please contact us directly:
support@makera.com

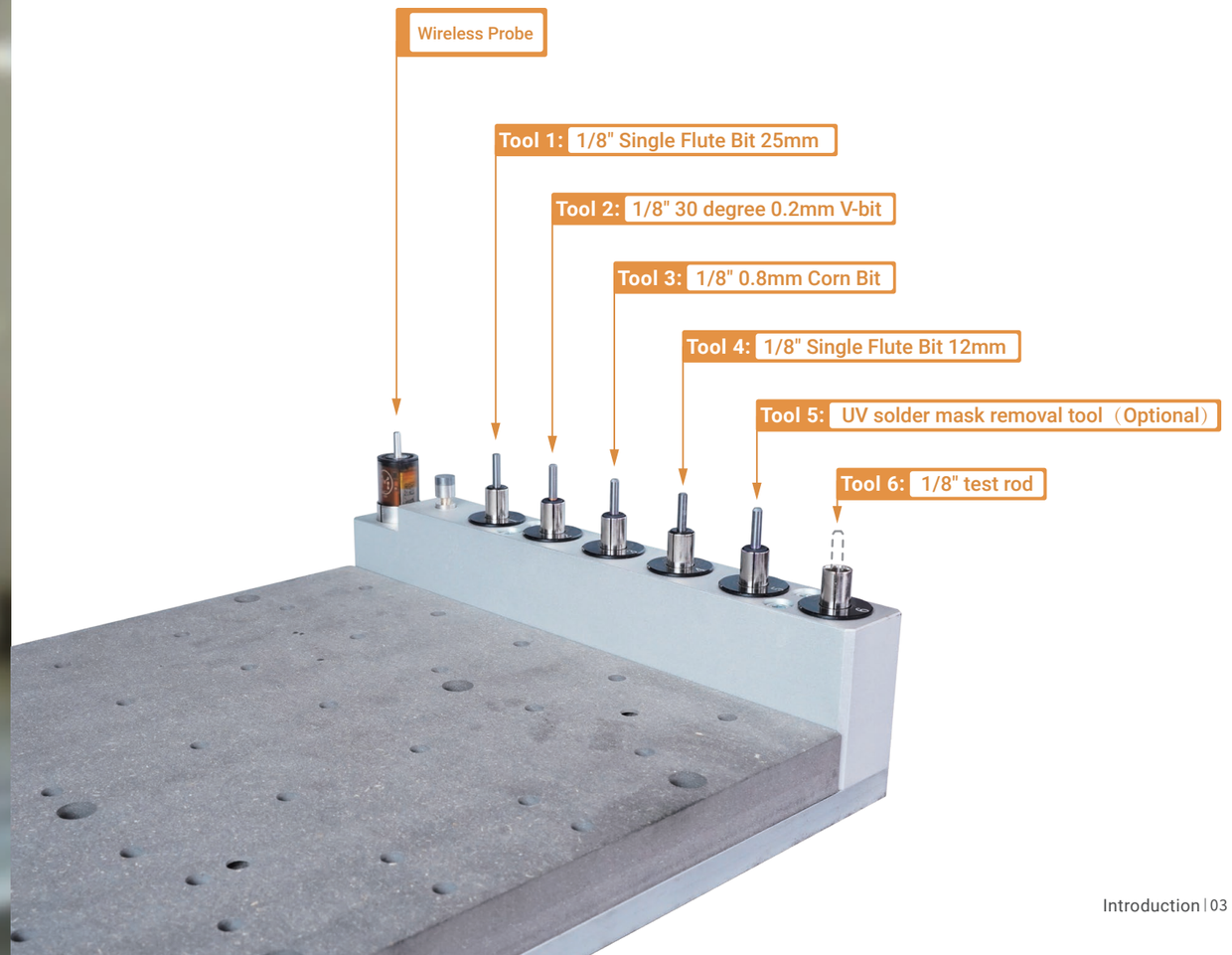
Also, join in the Facebook group to discuss and share your experience with other Carvera users:
www.facebook.com/groups/carvera

We will keep updating video tutorials and sample making cases on the YouTube channel, do not forget to subscribe!
www.youtube.com/c/Makera

Tool preparation

For easy transportation, the tools are not loaded by default. Please put the wireless probe and milling bits into right positions as shown in the figure. You can find the wireless probe in the accessory box, milling bits in the tool box and the optional solder mask removal tool in the PCB pack. The default tool installed is a test rod (No 6 tool).

This 1-6 tool positions are for the examples. If you run your own toolpath in the future, you should layout your tools accordingly.

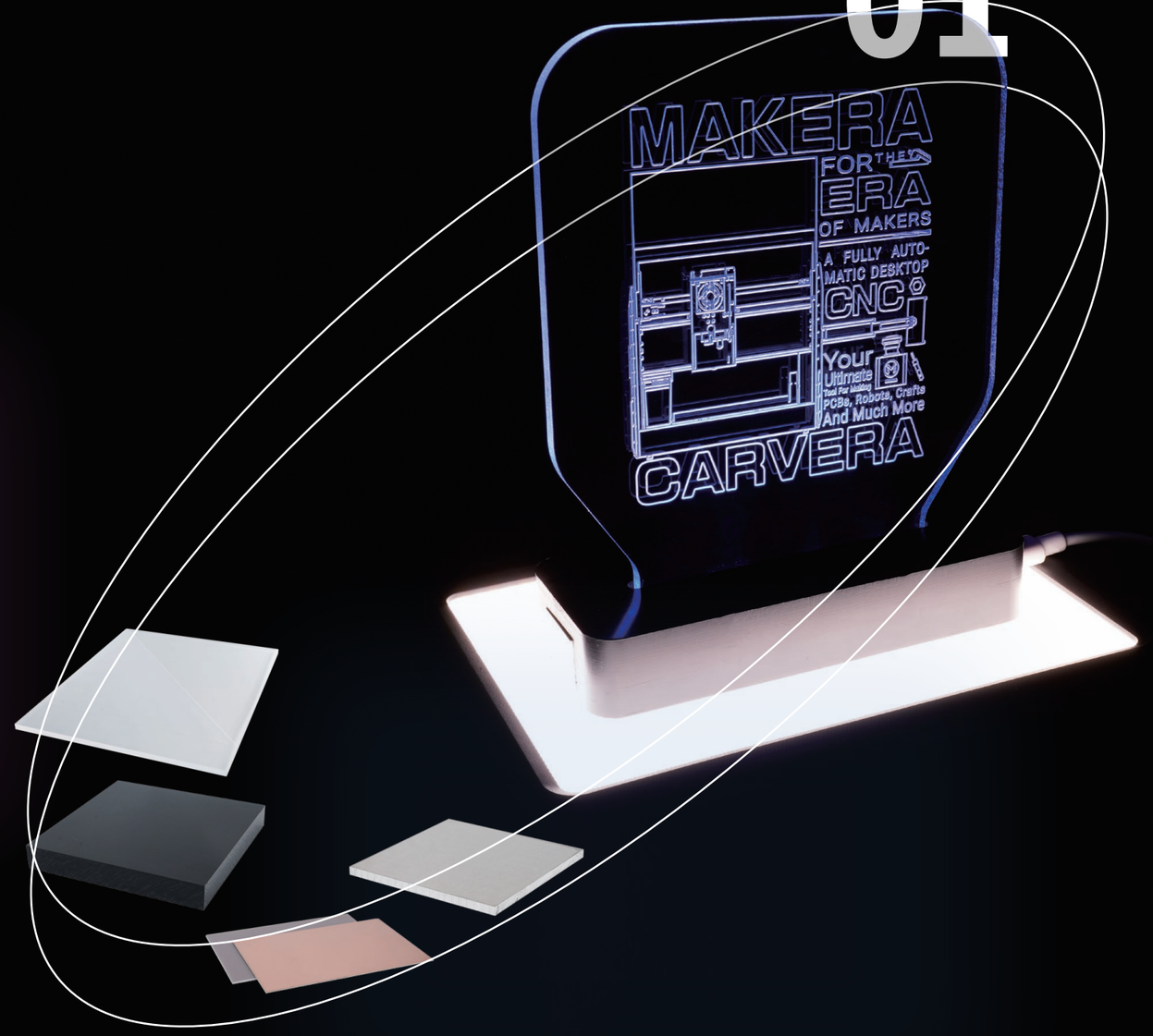


01

CARVERA

LED light

01

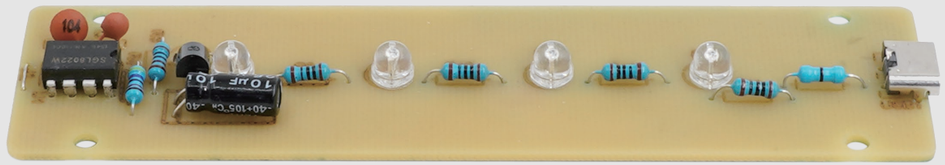


LED light

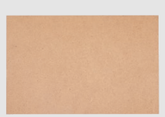
The LED light in this example consists of four parts: the circuit, the base, the display light board, and the touch switch, which shows the comprehensive capabilities of the Carvera smart desktop CNC milling machine.

With Carvera, you can greatly accelerate the speed from design to prototype and even commercial products. The CAM software using in this example are CopperCAM, ArtCAM, Fusion360 and LightBurn.

Circuit



Material preparation



MDF Waste board
(150*100*2mm)

Single side PCB
(150*100*1.5mmm)

Mini hand saw

Sand block

UV cure lamp

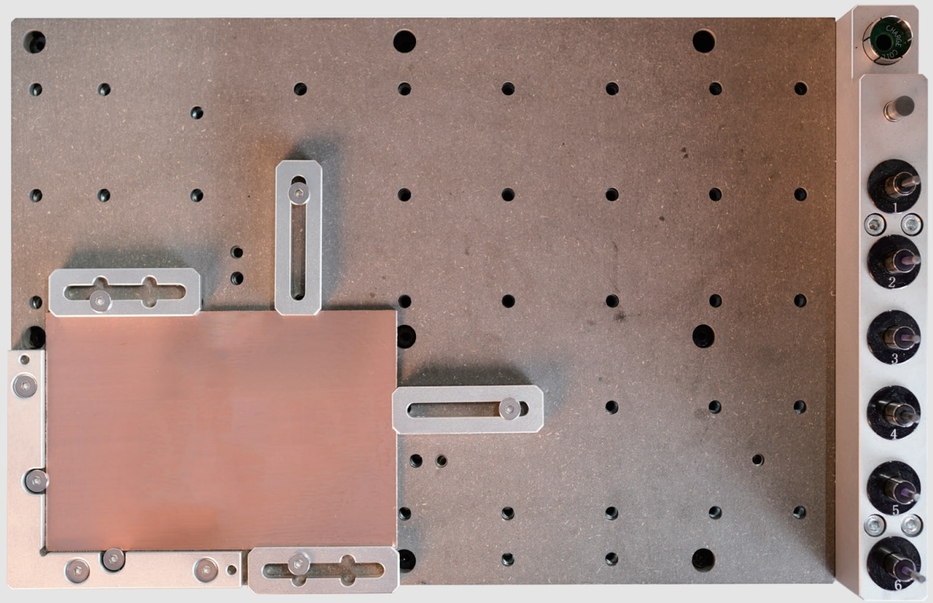
UV curable solder mask paint

UV solder mask removal tool

UV solder mask roller

Machining process :

1. Cut the 2mm MDF (Medium Density Fiberboard) with a size of 150*100mm as the wasteboard.



2. Fix the PCB and the wasteboard to the table, as shown in the figure. Place it close to the L-bracket at anchor point 1.

> Note: Use the edge of the top clamps to fix the PCB and leaves sufficient space for dust collection and milling.

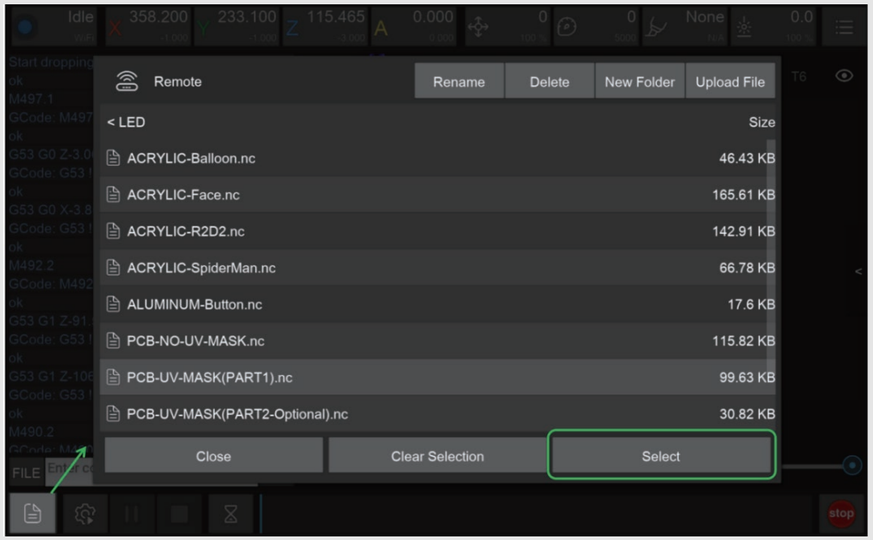
> Note: The PCB board may deform after being stored for a long time. It is recommended to flatten the PCB before machining to increase accuracy.Better use some double-sided tape between the wasteboard and the bed / PCB for further consistency.

3. Check if the milling bits are in the right position. No.2-30°0.2mm V-bit, No.3-0.8mm corn bit, No.5-UV solder mask removal bit (Optional.)

4. Turn on the power and wait for the automatic homing to complete.

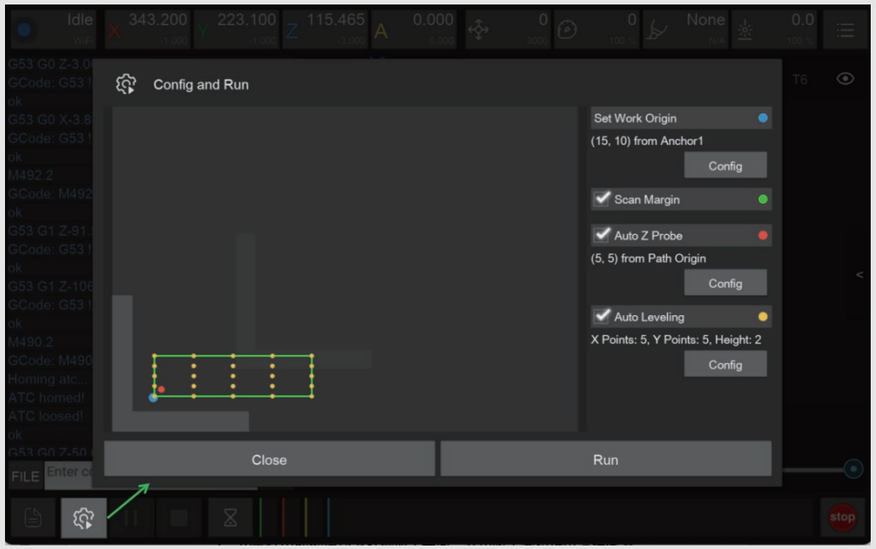
5. Open the control software and connect to Carvera (please read Carvera instruction manual for detailed steps.)

6. Open the Root->Examples->LED folder under the Remote directory and select the machining file. If you bought the PCB pack and want to use the UV solder mask, please turn to the Use UV solder mask section; otherwise, continue the No UV solder mask section.



No UV solder mask

1. Select the “PCB-NO-UV-MASK.nc” files to automatically run the tasks of PCB isolation, area cleaning, drilling and cutting contours.



2. Open the task configuration and operation dialog box.

3. Set working coordinate to X offset 15, and Y offset 10 relative to anchor 1.

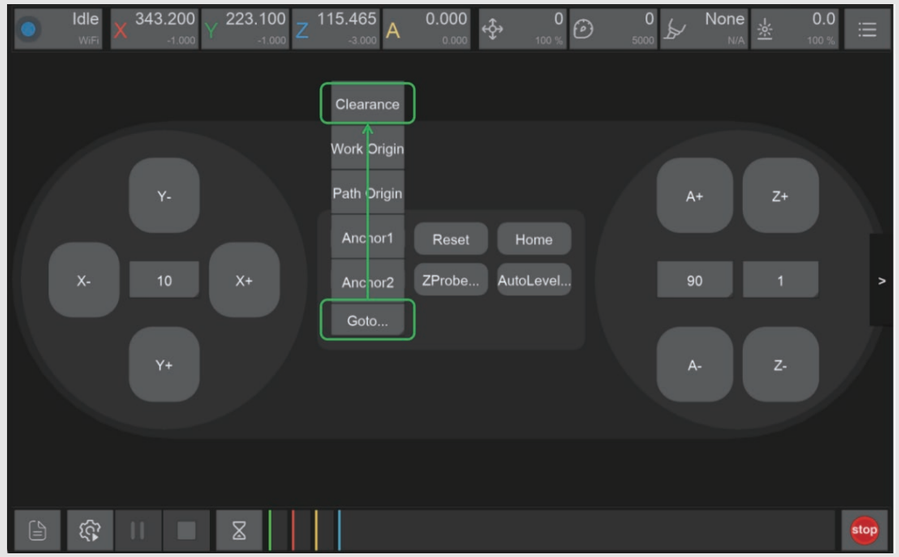
4. Check the “Scan Margin” option.

5. Check the “Auto Z Probe” option, set the probe point to X offset 5, Y offset 5 relative to Path Origin.

6. Check the “Auto Leveling” option, set the number of X detection points to 5, Y to 5, and the detection height to 2.

7. Check the configuration and click run, then wait for the completion.

8. You can move the machine to the clearance position after the operation is completed to reduce the interference to subsequent operations.



9. Take out the PCB board and cut off the tabs with the handsaw in the accessory kit.

Use UV solder mask（If you bought the PCB pack）

• Machining step 1: PCB isolation and area cleaning

1. Select the “PCB-UV-MASK (PART1).nc” file.

2. Open the task configuration and operation dialog box.(The figure is the same as the first step of not using the UV solder mask)

3. Set working coordinate to X offset 15, and Y offset 10 relative to anchor 1.

4. Check the “Scan Margin” option.

5. Check the “Auto Z Probe” option, set the probe point to X offset 5, Y offset 5 relative to Path Origin.

6. Check the “Auto Leveling” option, set the number of X detection points to 5, Y to 5, and the detection height to 2.

7. Check the configuration according to the figure above and click Run, then wait for the task to finish.

8. You can move the machine to the clearance position after the operation is completed to reduce the interference to subsequent operations.

• Apply UV solder mask

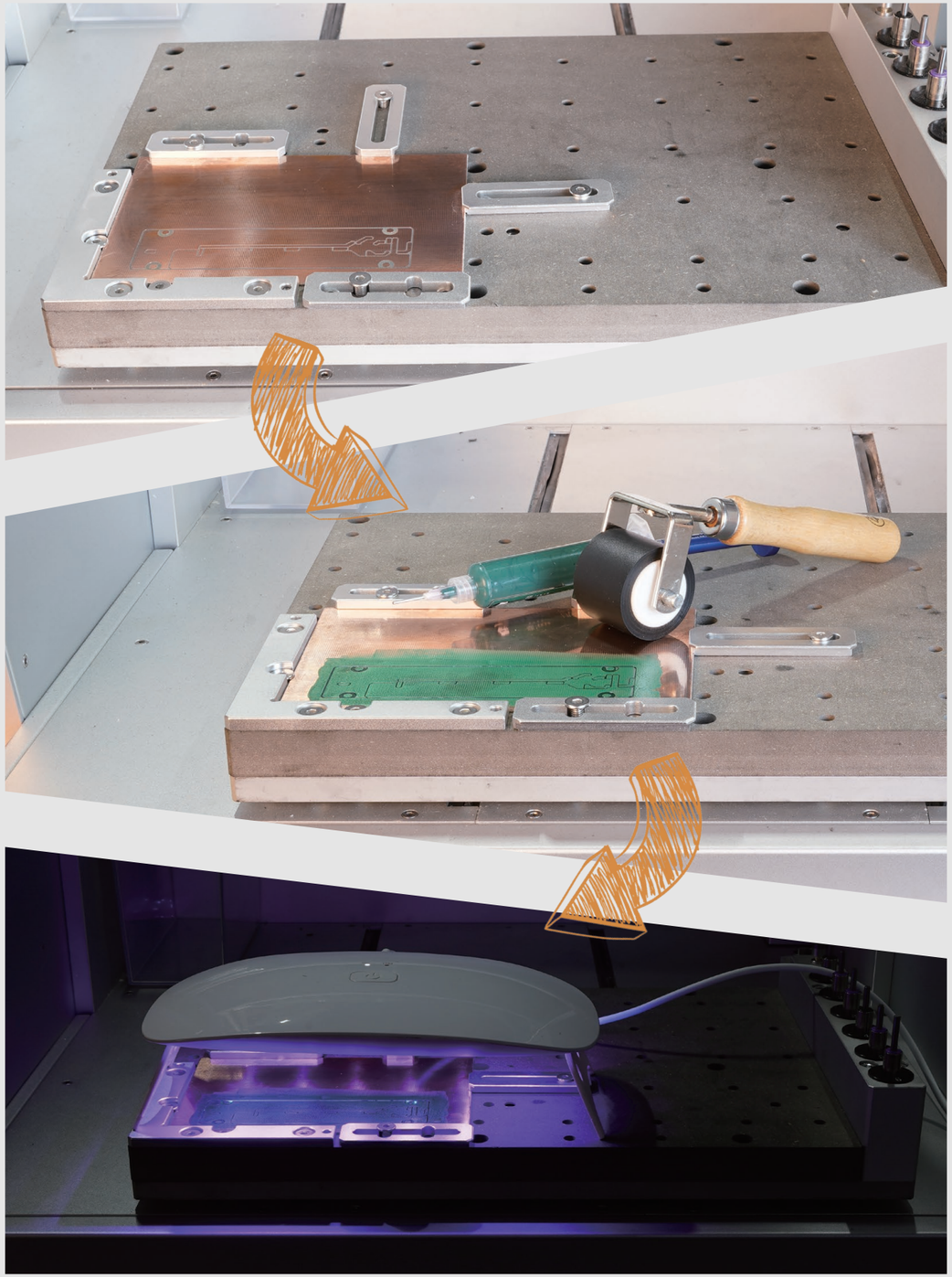
1. Use the sanding block in the accessory kit to polish the PCB surface.

2. Use the roller to apply a thin layer of UV solder mask evenly.

3. Put the UV lamp above the PCB and wait for the UV layer solid.

4. Clean extra solder mask on the roller and other parts using alcohol wipes.

> Note: Apply less UV solder mask first, increase later, its hard to clean up if apply too much. The curing time will varies with different UV solder mask and different UV lights. Please wait until the solder mask is completely solid.



- **Machining step 2: Remove UV solder mask, drilling and cutting contours**

1. Select the “PCB-UV-MASK (PART2).nc” file.

2. Open the task configuration and operation dialog box (the automatic detection has been completed in step 1, no need to redo here)

3. Uncheck“Scan Margin” option.

4. Uncheck “Auto Z Probe” option.

5. Uncheck “Auto Leveling” option.

6. Check the configuration and click Run, then wait for the task to finish.

7. You can move the machine to the clearance position after the operation is completed to reduce the interference to subsequent operations.

8. Take out the PCB board and cut off the remaining tabs with the handsaw in the accessory kit. Flatten the edges using the sanding block.

Base part

Material preparation

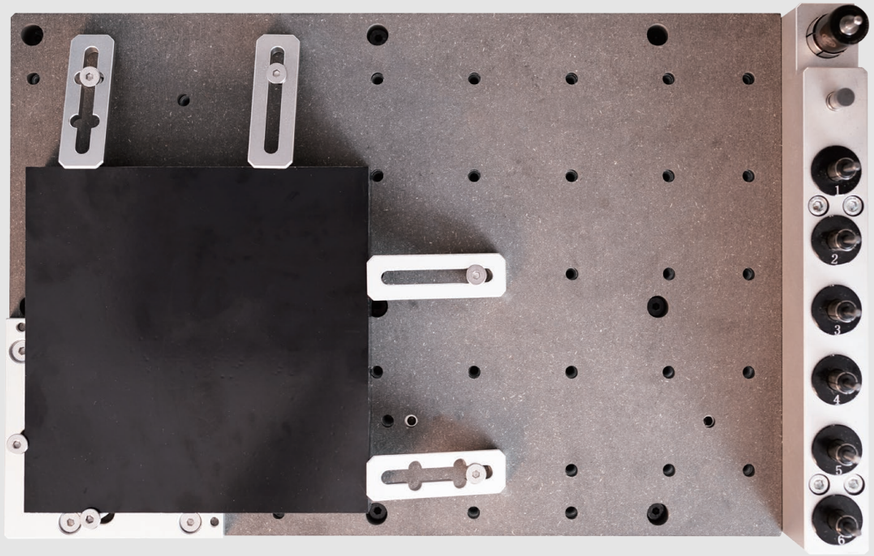
MDF Waste board
(150*150*2mm)

ABS Plastic board
(150*150*20mm)

Mini hand saw

Machining process:

1. Cut the 2mm MDF board with a size of 150*150mm as the wasteboard.



2. Fix the ABS plastic board and the wasteboard to the table as shown in the figure. Align it to the L-bracket at anchor point 1.

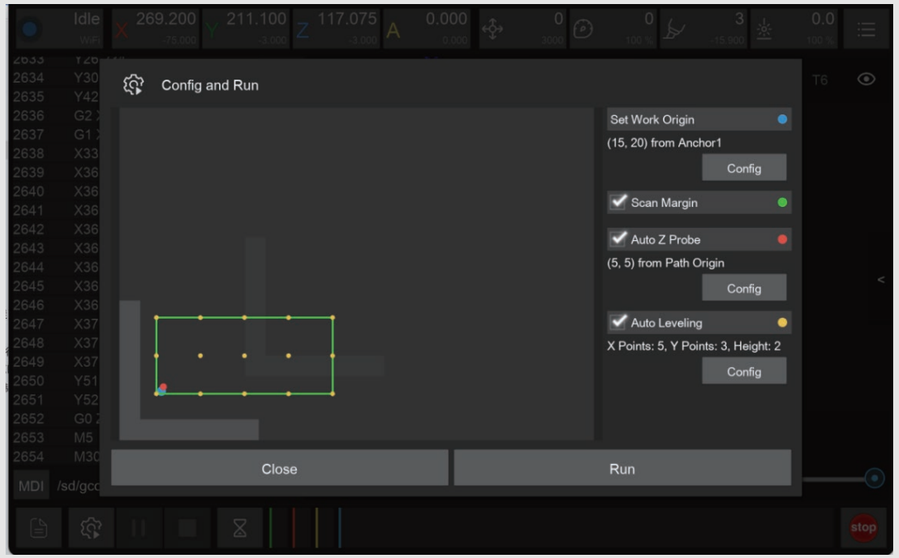
3. Check if the milling bits are in the right position. No.1-3.175*25mm single flute spiral bit, No.2-30°0.2mmV-bit.

4. Turn on the power and wait for the automatic homing to complete.

5. Open the control software and connect to Carvera (please read Carvera instruction manual for detailed steps)

6. Open Root->Examples->LED in the remote directory. Select“ABS-Base.nc” machining file.

7. Open the task configuration and operation dialog box



8. Set working coordinate to X offset 15, and Y offset 20 relative to anchor 1.

9. Check the “Scan Margin” option.

10. Check the “Auto Z Probe” option, set the probe point to X offset 5, Y offset 5 relative to Path Origin.

11. Check the “Auto Leveling” option, set the number of X detection points to 5, Y to 3, and the detection height to 2.

12. Check the configuration and click run, then wait for the completion.

13. Move the machine to the clearance position after the operation is completed to reduce the interference to subsequent operations.

14. Use a vacuum to clean the table, take out the ABS board and use the handsaw in the accessory kit to remove the tabs.

Display board

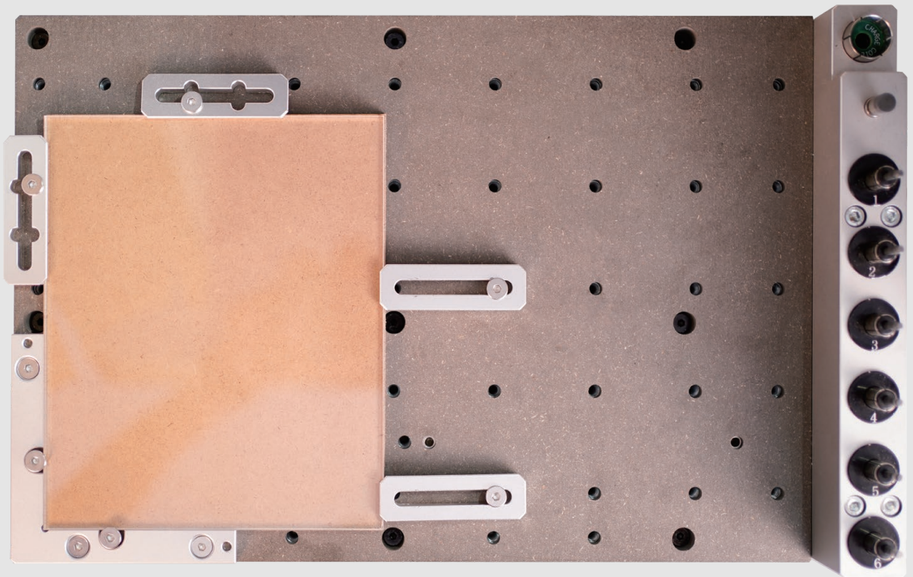
Material preparation

MDF Waste board
(150*180*2mm)

Acrylic plate
(150*180*4mm)

Machining process :

1. Cut the 2mm MDF board with a size of 150*180mm as the wasteboard.



2、Remove the protective film on the top. Fix the acrylic board and the wasteboard to the table, as shown in the figure. Align it to the L-bracket at anchor point 1.

3. Check if the milling bits are in the right position. No.1-3.175*25mm single flute spiral bit, No.2-30°0.2mmV-bit.

4. Turn on the power and wait for the automatic homing to complete.

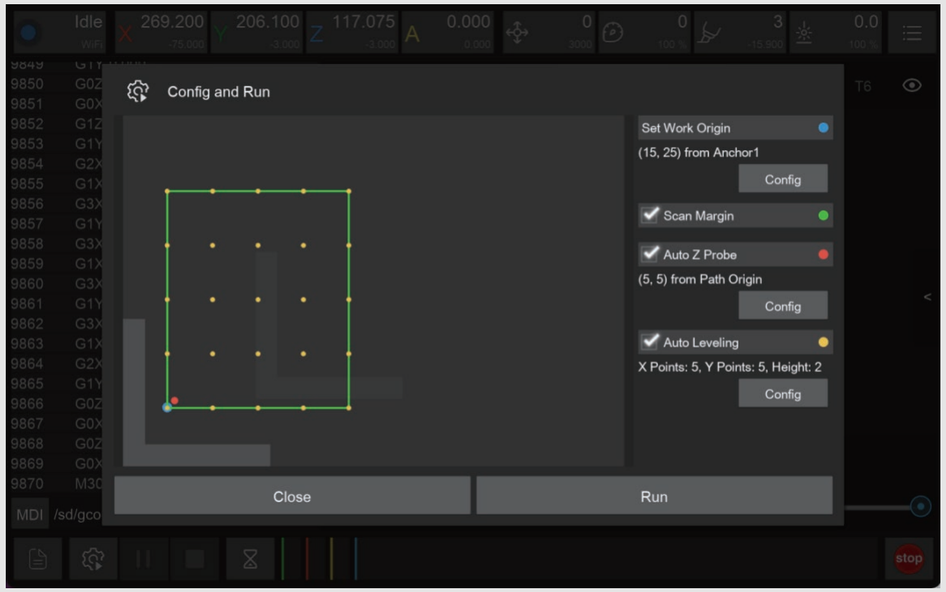
5. Open the control software and connect to Carvera (please read Carvera instruction manual for detailed steps)

6. Open Root->Examples->LED in the remote directory. Select the “ACRYLIC-XXXX.nc” file. Here we provided 5 pictures for you. You can choose the one of your preference.

7. Open the task configuration and operation dialog box.

8. Set working coordinate to X offset 15, and Y offset 25 relative to anchor 1.

9. Check the “Scan Margin” option.



10. Check the “Auto Z Probe” option, set the probe point to X offset 5, Y offset 5 relative to Path Origin.

11. Check the “Auto Leveling” option, set the number of X detection points to 5, Y to 5, and the detection height to 2.

12. Check the configuration and click run, then wait for the completion.

13. Move the machine to the clearance position after the operation is completed to reduce the interference to subsequent operations.

14. Use a vacuum to clean the worktop and remove the acrylic board.

15. Break the acrylic board by aligning the V-groove with an edge of a table.

Touch switch

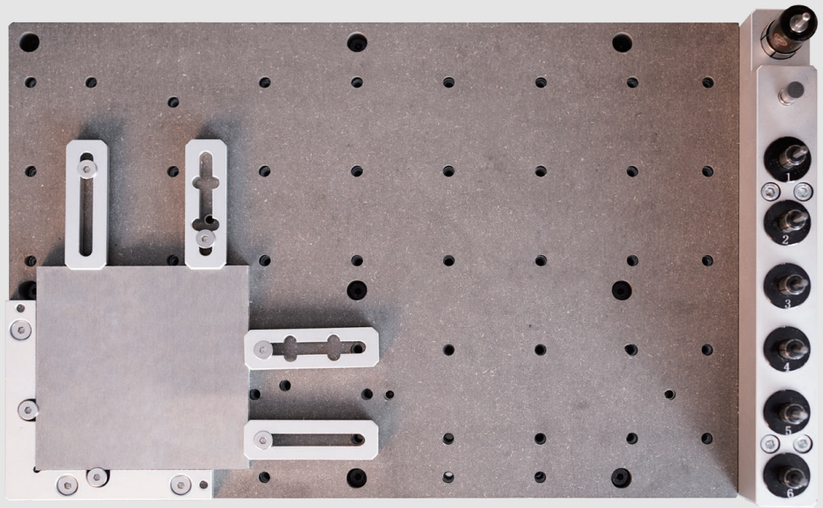
Material preparation

MDF Waste board
(100*100*2mm)

Aluminum plate
(100*100*5mm)

Machining process :

1. Cut the 2mm MDF with a size of 100*100mm as the wasteboard.



2. Fix the aluminium alloy board and the wasteboard to the table, as shown in the figure. Align it to the L-bracket at anchor point 1.

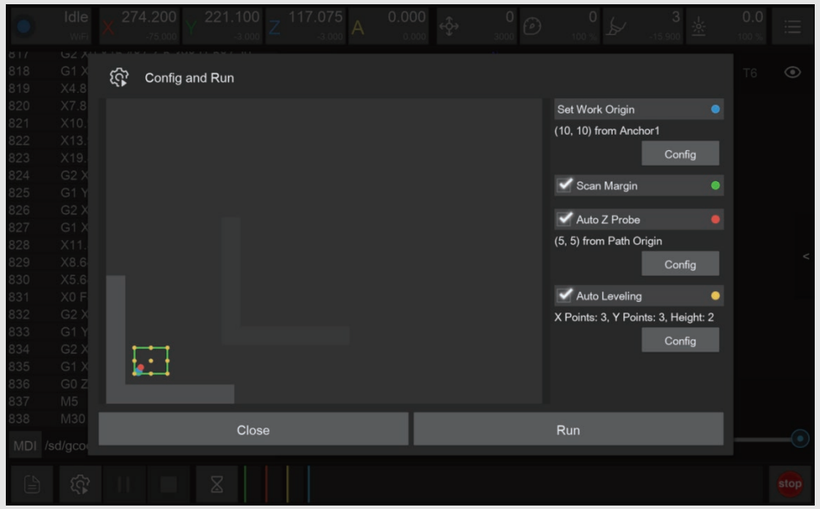
3. Check if the milling bit is in the right position. No.4-3.175*12 single flute spiral bit for metal.

4. Turn on the power and wait for the automatic homing to complete.

5. Open the control software and connect to Carvera (please read Carvera instruction manual for detailed steps)

6. Open Root->Examples->LED in the remote directory. Select the “ALUMINUM-Button.nc” file.

7. Open the task configuration and operation dialog box



8. Set working coordinate to X offset 10, and Y offset 10relative to anchor 1.

9. Check the “Scan Margin” option.

10. Check the “Auto Z Probe” option, set the probe point to X offset 5, Y offset 5 relative to Path Origin.

11. Check the “Auto Leveling” option, set the number of X detection points to 3, Y to 3, and the detection height to 2.

12. Check the configuration and click run, then wait for the completion.

13. Move the machine to the clearance area after the operation is completed to reduce the interference to subsequent operations.

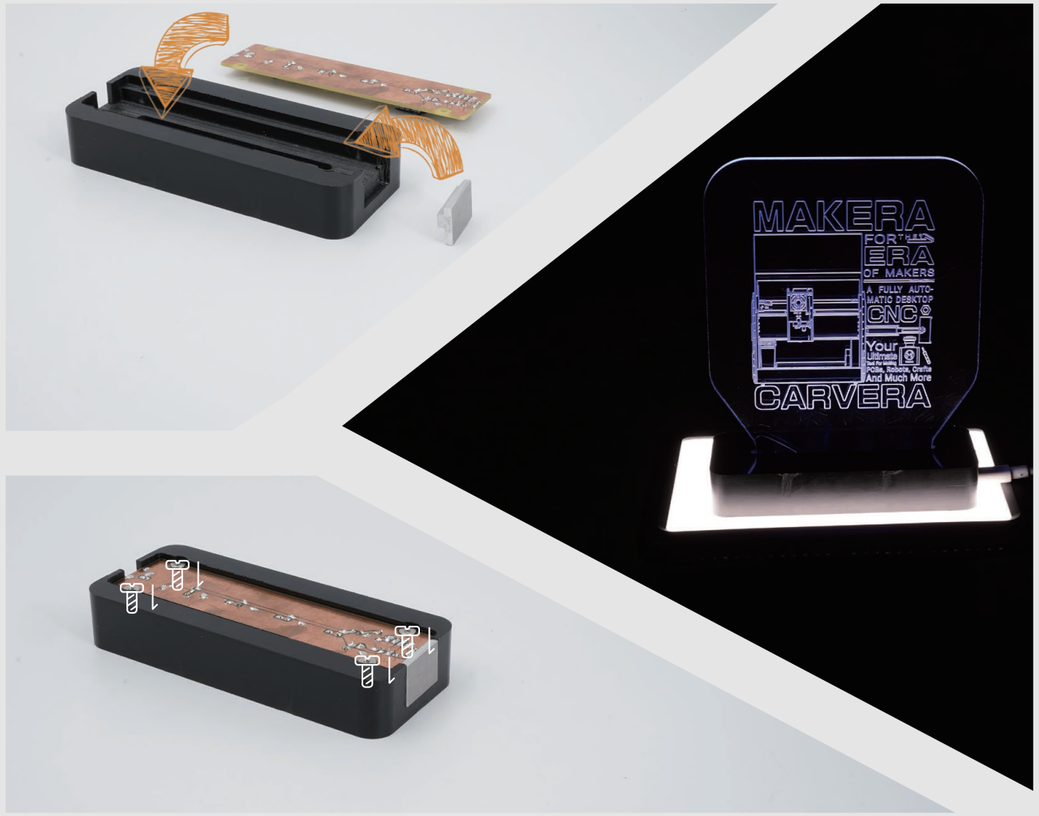
14. Use a vacuum to clean the worktop, remove the board and use the handsaw in the accessory kit to remove the tabs.

LED lamp assembly

Solder PCB（Optional）

We provide a soldered PCB for your direct use. If you want to make your own, please refer to our soldered PCB board for components choosing and placement.

Assembly



1. Glue the aluminium alloy touch button to the side of the base.

2. Fix the PCB board to the bottom of the base with 4 screws.

3. Insert the acrylic display board into base.

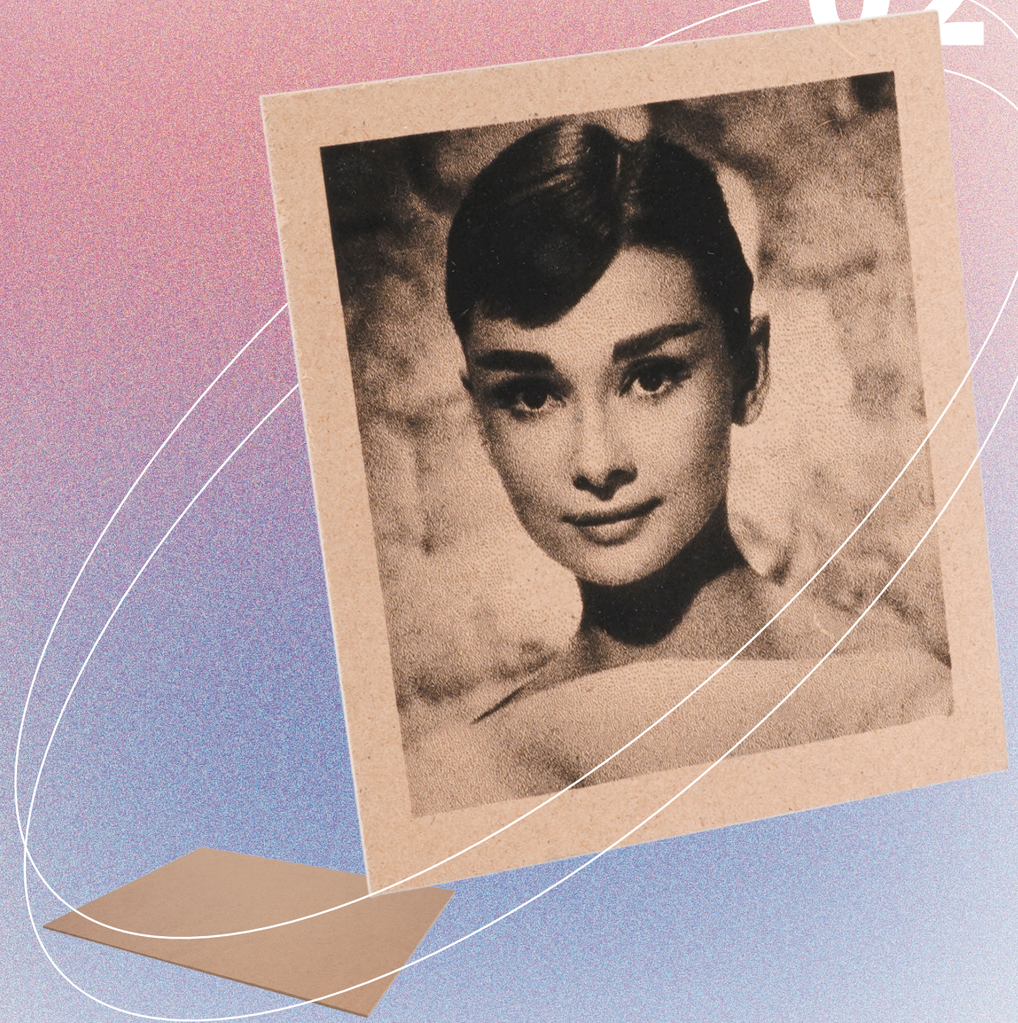
4. Plug Type-C USB cable and the assembly is finished.

5. You can adjust the brightness and turn on/off the light by touching the aluminum button.

CARVERA

Laser engraving

02



Laser engraving

Laser engraving is a auxiliary function in Carvera. We chose a 2.5W laser for mainly engraving the material, not for cutting. This case shows how to use the laser function to engrave pictures as black and white photos. We use LightBurn as laser CAM software here.

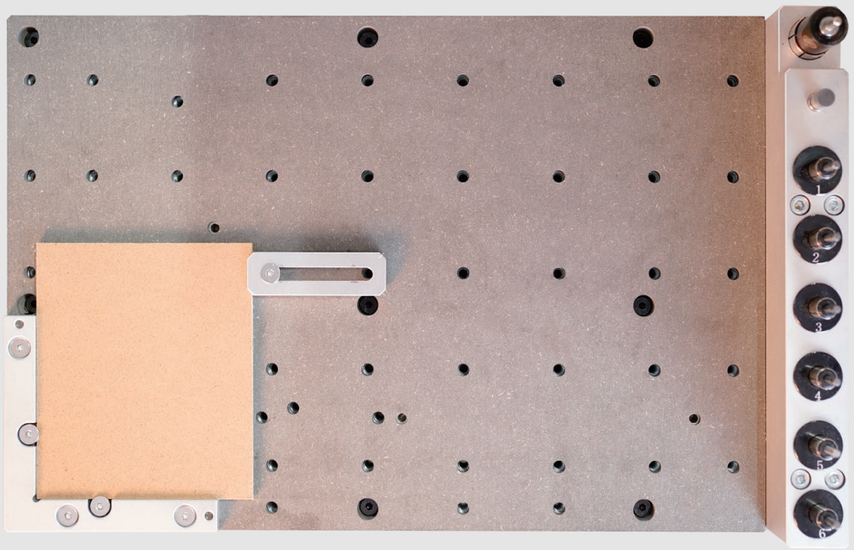
Material preparation

MDF Waste board
(100*120*2mm)

Laser goggles

Machining process:

1. Cut the 2mm MDF board with a size of 100（in direction X）*120mm（in direction Y）as the engraving Material.



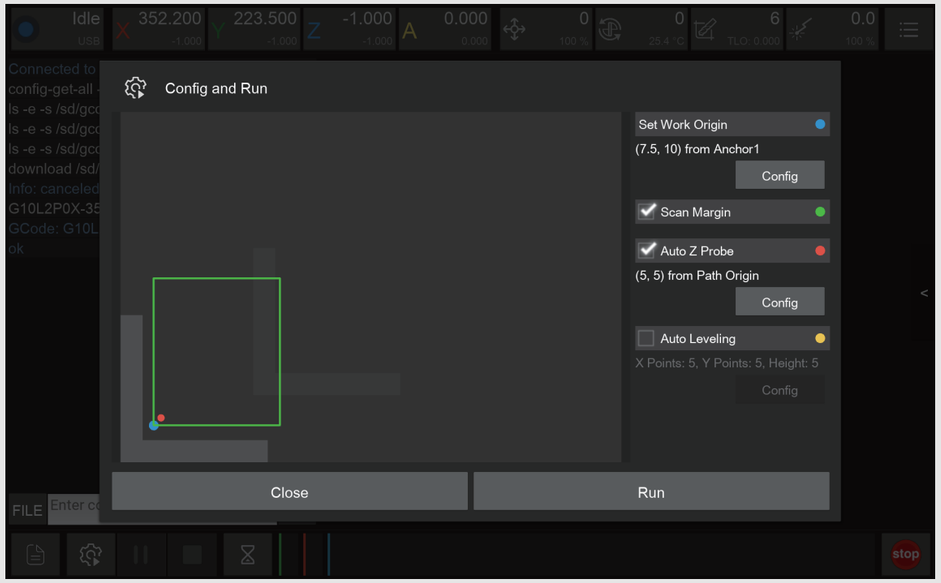
2. Fix the MDF to the table as the illustration above. Align it to the L-bracket at anchor point 1.

3. Turn on the power and wait for the automatic homing to complete.

4. Open the control software and connect to Carvera (please read Carvera instruction manual for detailed steps)

5. Open Root->Examples->Laser in the remote directory. Select the“AudreyHepburn.nc” file.

6. Open the task configuration and operation dialog box



7. Set working coordinate to X offset 7.5, and Y offset 10 relative to anchor 1.

8. Check the “Scan Margin” option.

9. Check the “Auto Z Probe” option, set the probe point to X offset 5, Y offset 5 relative to Path Origin.

10. Uncheck the “Auto Leveling” option(Because laser engraving has a high tolerance for flatness, no need for leveling).

11. Check the configuration and click run, then wait for the completion.

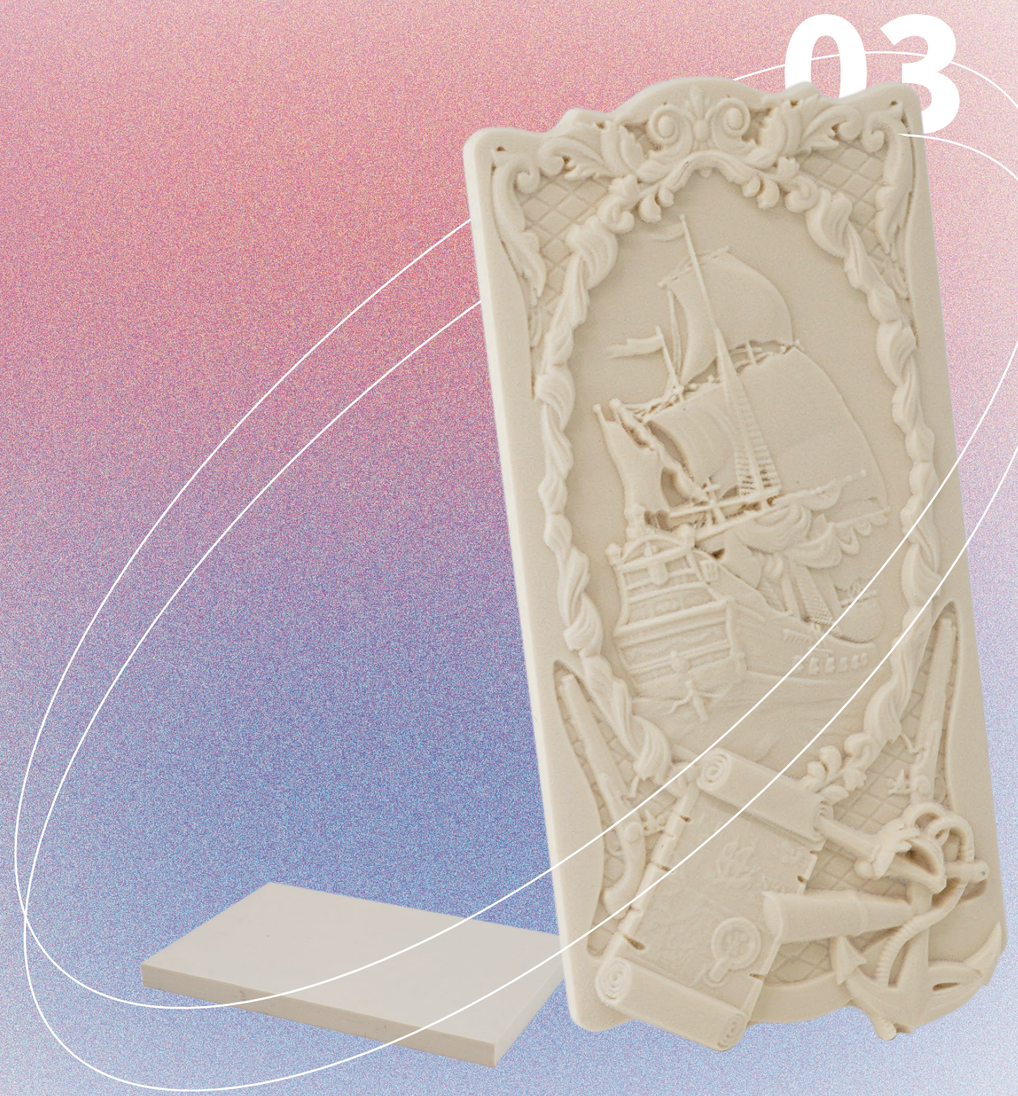
12. Move the machine to the clearance position after the operation is completed to reduce the interference to subsequent operations.

13. Remove the MDF.

CARVERA

Three-axis relief

03



Three-axis relief

This case shows you how to use Carvera's tool changing function to automatically complete roughing and finishing steps of machining a relief, providing you with an easy way to make exquisite craftwork. The CAM software is ArtCAM.

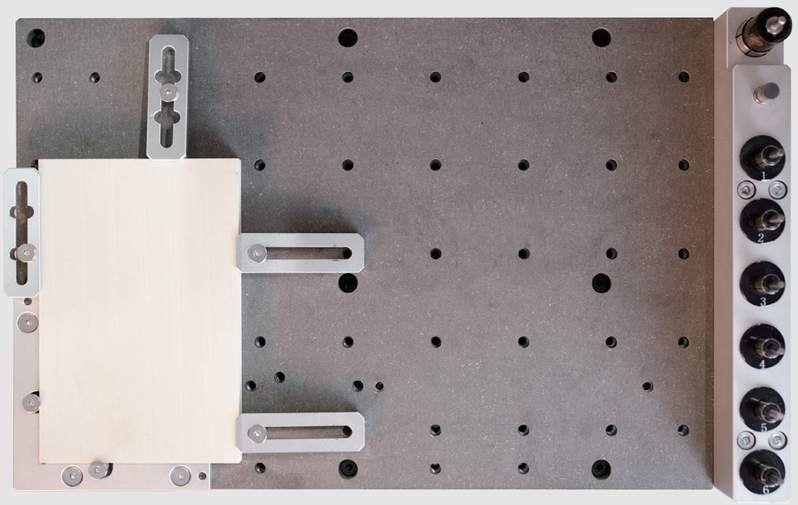
Material preparation

MDF Waste board
(100*150*2mm)

Epoxy tooling board
(100*150*10mm)

Machining process :

1. Cut the 2mm MDF board with a size of 100*150mm as the wasteboard. (You can reuse the PCB one)



2. Fix the Epoxy Tooling Board and the wasteboard to the table as shown in the figure. Align it to the L-bracket at anchor point 1.

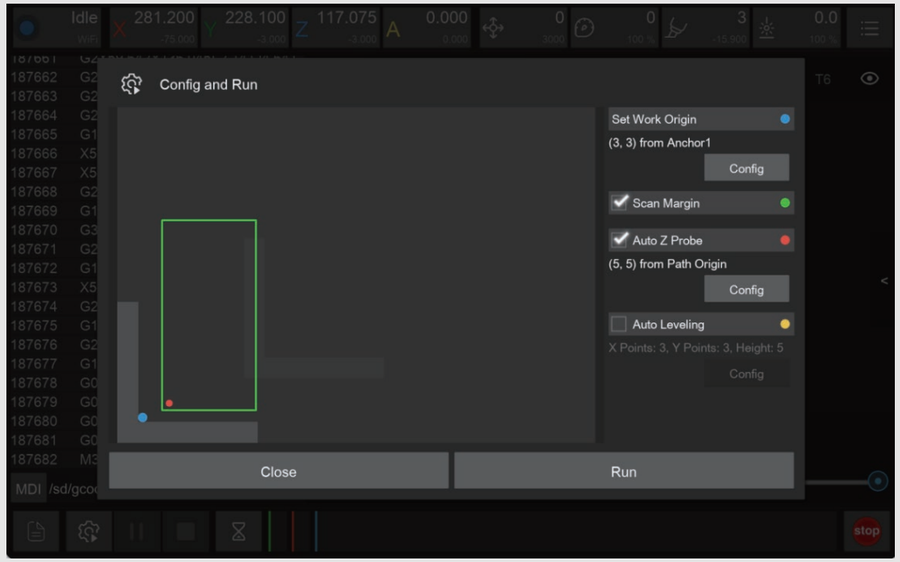
3. Check if the milling bits are on the right position. No.1-3.175*25mm single flute spiral bit, No.2-30°0.2mmV-bit.

4. Turn on the power and wait for the automatic homing to complete.

5. Open the control software and connect to Carvera (please read Carvera instruction manual for detailed steps)

6. Open Root->Examples->Relief in the remote directory. Select the "PirateShip.nc" file.

7. Open the task configuration and operation dialog box.



8. Set working coordinate to X offset 3, and Y offset 3 relative to anchor 1.

9. Check the "Scan Margin" option.

10. Check the "Auto Z Probe" option, set the probe point to X offset 5, Y offset 5 relative to Path Origin.

11. Uncheck "Auto Leveling".（Because the material's surface will be milled to a certain height, no need for automatic levelling detection）

12. Check the configuration and click run, then wait for the completion.

13. Move the machine to the clearance position after the operation is completed to reduce the interference to subsequent operations.

14. Remove the epoxy tooling board and use the handsaw in the accessory kit to take out your work.

04

CARVERA

4th-axis relief

04

4th-axis relief

This case shows you how to use Carvera's rotary axis to machine a 3D object. We don't use dust collection for rotary axis machining, so we split the roughing and finishing process into two jobs. You should clean the dust between the two steps. The CAM software used in this case is DeskProto.

The Nefertiti sample model in this guide was from Thomas Roussel - Thingiverse: @lecaramel.

Note: Some of the parameters for 4-axis and 3-axis machining are different: The 3-axis can be positioned using anchor point 1 or anchor point 2. The Y-axis position of the 4-axis is fixed, and the X-axis is positioned releative to the right edge of the headstock.

Note: We don't use auto-leveling for 4-axis machining, and the auto z probe position is fixed.

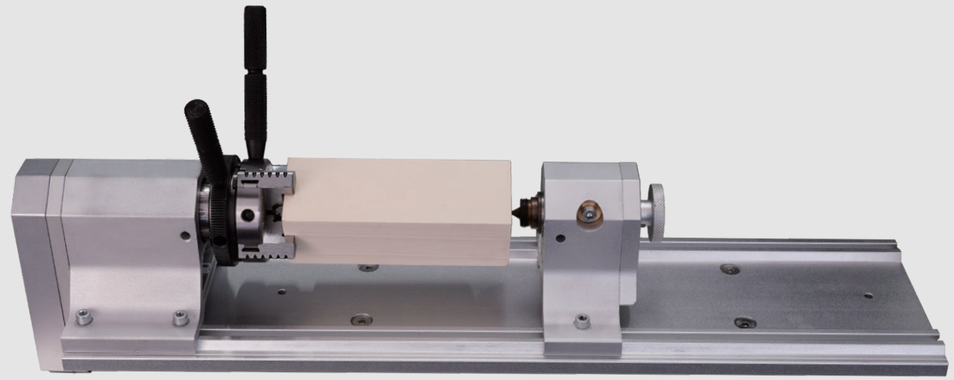
Note: We don't use dust collection for 4-axis machining. Please remove the dust shoe, lift up the dust shoe rail and fix the dust collection tube to the temporary point, take off the dust bin to prevent collision (Read Carvera instruction manual for more imformations)

Material preparation

Epoxy tooling board
(35*35*100mm)

Machining process:

1. Plug in the cable and Install the rotary axis. （Please read the Carvera instruction manual for using the rotary axis）If your Carvera is on, please power off the machine first before installation.



2. Fix the Epoxy Tooling Board to the rotary axis, let the corner direction up and down.

3. Check if the milling bits are on the right position . No.1-3.175*25mm single flute spiral bit, No.2-30°0.2mmV-bit.

4. Turn on the power and wait for the automatic homing to complete.

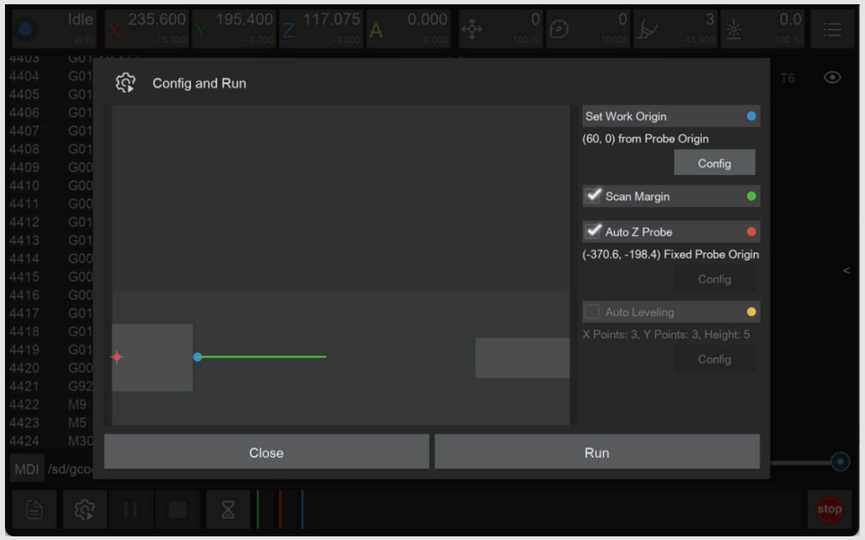
5. Open the control software and connect to Carvera (please read Carvera instruction manual for detailed steps)

6. Open Root->Examples->Rotation in the remote directory.

Roughing process :

1. Select “NefertitiRough.nc” roughing file.

2. Open the task configuration and operation dialog box.



3. Set working coordinate to X offset 50 (relative to the right edge of the 4th axis headstock), and Y offset 0.

4. Check the “Scan Margin” option.

5. Check the “Auto Z Probe” option(4-axis z probe at fixed position, no configuration required).

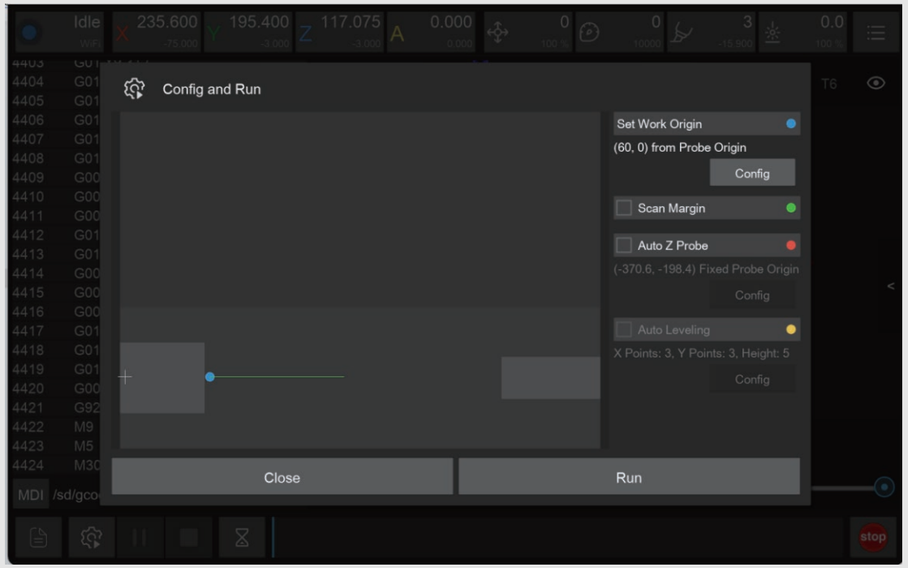
6. Check the configuration and click run, then wait for the completion.

7. This step can produce lots of dust, please use a vacuum to clean before next step.

Finishing process :

1. Select “NefertitiFinish.nc” finishing file.

2. Open the task configuration and operation dialog box (the automatic detection has been completed in step 1, no need to redo it here).



3. Uncheck the “Scan Margin” option.

4. Uncheck the “Auto Z Probe” option.

5. Check the configuration and click run, then wait for the completion.

6. Use a vacuum to clean up the dust and take out the epoxy tooling board.

7. Use the handsaw in the accessory kit to remove the remaining epoxy on both ends.

Examples Guide | www.makera.com | support@makera.com