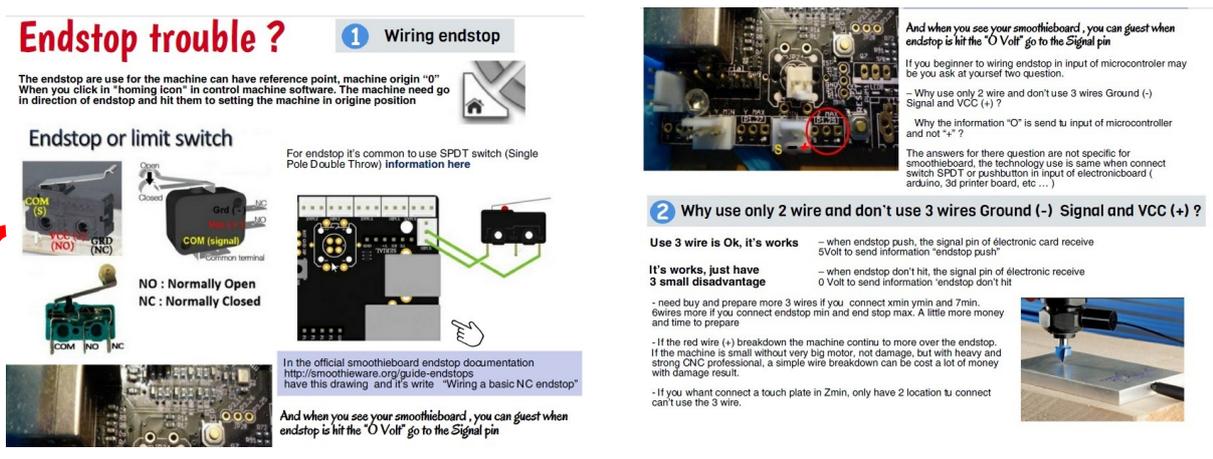


有關 pdf 檔的 Makerslide CNC 課程中文概要說明如下(5): (詳細請搭配看原英文講義) (P.4-1)

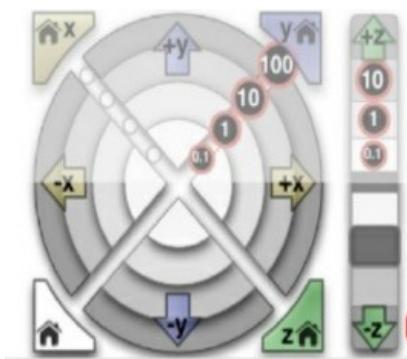


1.有關 Endstop (極限開關), 可參考 Smoothieboard 官網 [guide-endstop](http://smoothieware.org/guide-endstops) 頁面介紹

2.endstop 上的符號 NO 表示 Normally Open , NC 即表示 Normally Closed

3.目前我們的 CNC 只採用 2 條線: "S" (黃線)表示接信號; "—" (黑線)表當切割時機器運行碰到 endstop 時即停止,此時 Smoothieboard 設定給出 0 (Volt)給 endstop 令其停止,此種設計不會損毀機器。

4.為何不選擇用三條線接 endstop, 三條線即一條是 "s" 表示信號傳輸,一條是 "+" 表示當碰觸 endstop 令機器停止時是給出 5 Volt, 另一條 "-" 表示沒碰觸 endstop 時電路給出 0 Volt, 這種設計會增加成本及時間成本. 如果 "+" 線路損壞, 即機器碰觸 endstop 時卻不知道要停止但電路此時是給出 5Volt 就會有損壞機器的風險(如果是較大型 CNC 且馬達很強的話). 當然我們小型 CNC 還不致於有大問題, 但是為了更安全省時, 我們只採用二條線路的安全設計。



注意: 在 Pronterface 頁面開始測試時:

- 1).滑鼠點 homing icon (房子符號) X 即表示 X 軸回到零點,
- 2).點房子(Y) 表示機器 Y 軸(endstop)直接走回到零點.
- 3).不同的是 Z 軸設定了零點是在地平面(底板), 所以點房子(Z) 老師已經設定了沒有作用. Z 軸是要用右邊垂直那欄點上下, 往下就可到零點(底板), 這個設計是方便在準備切割前讓機器知道地平是零點然後開始向下進行切割開挖.

4).記住: Z 軸一定要先點擊往上(讓刀具不會碰觸底板), 此時才能點擊左下角只有房子圖示, 點此表示三軸回歸起始點即方型機器的一個角落點

**3** If use 2 wire, have setting for this in config file

The setting is to overcome the floating voltage level

**What this ?**

A way to learn about input information of microcontroller board

Explain in English

Explain in Chinese

A pin of input microcontroller board can't be unconnect.

If you do this the interference around create sometimes 4.8V; 0.15V 5V... and create fake information inside.

That's why in the first video sometimes the LED don't blink when push button and sometimes blink without push button. Have somethinks out of control.

**4** Why use normally closed endstop and "o" ground to send information ?

For each endstop, it's better to connect C to Signal and NC to Ground because this means the digital input pin (endstop connector) will be connected to Ground in it's normal state and cut from Ground when the button is pressed. This approach is less prone to noise than the reverse.

Another positive effect of this approach is, that if a wire breaks for some reason you get the same signal as if the endstop is pressed. That makes sure that even with a damaged wire you are not able to overrun the endstop.

**Important !!**

Check that you do not connect VCC ( red ) and GND ( black ) to a mechanical (microswitch) endstop! Depending on your wiring that may fries your smoothieboard instantly or when the switch gets pressed. *If you're not careful enough you can damage your board.*

1.我們使用的 Endstop 是採用二條線 (yellow 和 black) , 老師已經在 Config 內做好設定可以克服浮動電壓平衡問題. 想了解相關資訊可以掃描右上角的 QR-code.

2.更多有關微型控制資訊請掃描 QR-code,有英文跟中文 code 可自行掃描觀看.

注意: 如果 endstop 採用三條線時需要特別小心, (VCC) "+" 紅線 不可跟(GND)"-"黑線 靠得很近, 萬一當碰觸 Endstop 時, 不小心二個電流碰觸就容易損傷電路控制板, 我們的 Endstop 設定使用二線 : 黃色("S")與黑色("-"). 所以不會有此問題.

**5** The endstop setting section in config file

```

# Endstops
endstops_enable true
#corexy_homing false
alpha_min_endstop 1.24°
alpha_max_endstop 1.25°
alpha_homing_direction home to min
alpha_min 0
alpha_max 200
beta_min_endstop 1.26°
beta_max_endstop 1.27°
beta_homing_direction home to min
beta_min 0
beta_max 200
gamma_min_endstop 1.28°
gamma_max_endstop 1.29°
gamma_homing_direction home to max
gamma_min 0
gamma_max 200

```

Endstop 在 Config file 內的設定, 可以看到老師把 gamma 即 Z 軸 設定的不一樣

**All options of pin**

|   |   |   |
|---|---|---|
|   | invert pin                                | In smoothieboard like arduino board no need prepare pull up resistor for input pin, already have internal board resistor for this function. |
| o | set pin to open drain                     |   |
| ^ | set pin to pull up (Default on most pins) | Just activate the "pull up resistor" with option setting in config file   |
| v | set pin to pull down                      |   |
| - | to set no pullup                          | <b>So don't delete the " ^ " after the number the pin</b>   |
| @ | to set repeater mode                      | If you do this the function pull up resistor don't works  |

In enc can have endstop min for setting the "o" machine and endstop max for when the machine move over capacitie, stop automatically.

The Formosa don't have max endstop, it's just a option. With this way the cabling is more simple, users just need check if the drawing is under the maxi size the machine can cut. If the machine move over the limit don't worry just steppers motors loose step but don't have damage.

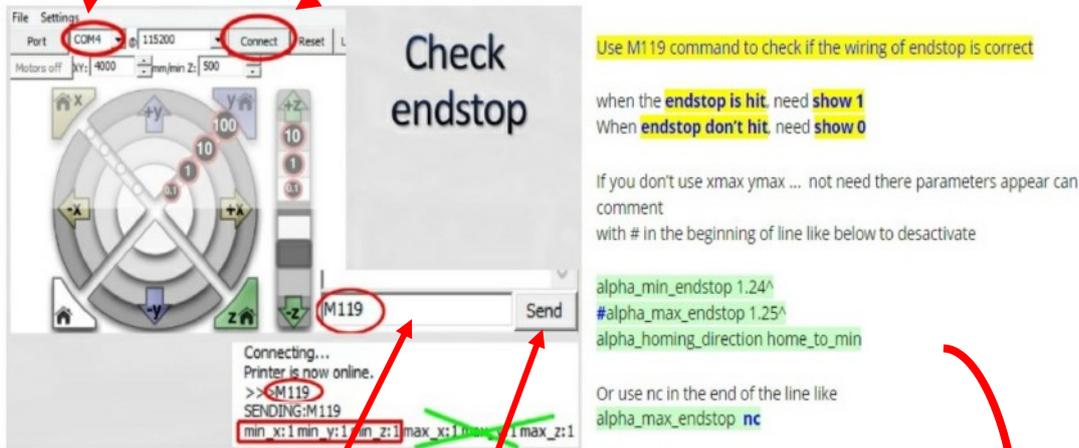
Config file 內的一些符號 都是有特定意義, 請勿隨便增加或刪除.

Formosa CNC , 老師在 Eendstop 設計簡單且不容易損壞機器, 如果切割圖案超出範圍最多只是 stepper motor 跳步而已,不造成危險.

這裡是根據每個人電腦使用選擇 COM1, 或 COM2, 或 COM3 .....

這裡選 CONNECT

### 6 Check the correct wiring and setting of endstop



如何檢測 endstop 設定是否正確?

- 1.在此打入 M119
- 2.用手指去碰觸這裡, 手別放開.



(三軸逐一檢測)

- 3.接著另一手滑鼠點 Send
- 4.螢幕會有訊息回報顯示  
如 Min x : 1 min y : 1 min z : 1  
(顯示 1 表示 endstop 有正常 touch)
- 5.手指放開後, 另一手滑鼠再點 Send, 此時訊息回報顯示  
如 Min x : 0 min y : 0 min z : 0 (顯示 0 表示沒有 touch), 這樣就表示 endstop 設定正常.

有關 Endstop 設定, 老師已在 Config 設定完成. 例如該行前面加個 “#” 符號即表示停止該行設定的作用. ....

這裡(綠色打叉處)顯示的訊息是 3DP 的暫時不用管它.

## 7

## Overcome problems with endstop

If an endstop is read as pressed when it is not, and not pressed when it is, then your end-stop is inverted.

You can fix that situation by inverting the digital input pin in your configuration file.

For example if your X min endstop pin is inverted, change :

```
alpha_min_endstop 1.28^
```

If a end-stop is read as always pressed, or never pressed, even when you press or release it, then you probably have a wiring problem, check everything.

```
To : alpha_min_endstop 1.28^!
```

If a endstop always reports 0, it probably means that it is not wired correctly.

If when homing the machine move just a little and after stop, that mean the "0" ground is disconnect

If the homing don't go in correct directio, check "homing\_direction" setting in config file

當 Endstop 有狀況時如何解決?

1. 例如 x 軸的 endstop 線路倒置時, 如 0 變成 touch, 1 變成沒有 touch 時, 不一定調換接線, 可以在 alpha\_min 那行字尾加 “!” 號 即相反設定了。
2. 如果 endstop 用手指測試去碰觸或放開都回報顯示同樣訊息, 碰不碰都顯示 1 或碰不碰都顯示 0, 表示 endstop 線路接線有問題, 全面檢查 endstop 線路。
3. 例如, 滑鼠點擊房子圖(Y), 但機器 Y 軸的 Endstop(下圖 A 點)無法直接走回到 home (零點) (即下圖 B 點)碰觸, 機器只走一點點就停住, 此狀況表示 endstop 線(black) 沒接好. 所以不過電。
4. 例如, 滑鼠點房子(y)時, 如果機器 Y 軸的 Endstop(下圖 A 點)沒有往回家(home 零點, 即下圖 B 點)的方向走, 但機器卻朝反方向(即往下圖 A 點的右向行走) 時, 這是設定出了問題, 此時就要到 Config file 檢查 “ homing\_direction” 的設定狀況。

