www.geminiaerotools.com

Gemini Aero Cutter

A versatile, portable and user-friendly grbl / grblHAL interface

All in one in the same software to drive your favorite CNC : hot wire cutting, laser and milling

User manual

v1.0.0.8

Update : 2025.05.14

Summary

Presentation

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Main features :

- Ultra light, versatile and portable grbl / grblHAL controler for Windows 7 to 11, 32 and 64 bits
- Reliable and professional made, digitally signed by certified organization (Certera Code Signing CA)
- Handle CNC 3 axis milling (XYZ) / laser (XY or XYZ) and 2+2 axis (XYZA) hot wire foam cutting
- Designed for grbl 1.1 & 1.2 (firmwares provided for Arduino and MKS Gen V1.0) and grblHAL (firmware provided for BTT SKR Pico V1.0)
- Compatible with grbl 0.9 (but 1.1/1.2 recommanded)
- Supports all common GCode commands (G0, G1, G2, G3, G4, G10, G28, G90, G91, etc., M0, M2, M3, M4, M5, etc.)
- Dual synchronized drawings (X/Y and A/Z or X/Z)
- Machine & Work origins and coordinates (with user defined offset)
- Automatic machine axis and working area identification on connection
- Automatic drawings autoscale on machine boundaries
- Software hold if machine limits reached
- Advanded grbl settings interface
- Automatic Gcode format recognition and translation (U->A, V->Z)
- Keep trace function
- Macro recorder
- grbl firmware uploading tool
- Syntax-highlighted GCode editor and creator

Gemini Aero Cutter is natively multi-language
If you need a new language and can help us in translation, please send a request form

Recommanded GCode generators :

- Gemini Aero Foam (4 axis hot wire foam cutting) : https://www.geminiaerotools.com/geminiaerofoam.html
- DesKAM2000 (milling and laser, abandonware but very well made and easy to use, works perfect in WinXP compatibility mode) : https://icedrive.net/s/NTRjxtTNtZf8aYw55wF7D7ARFV2B
- Estlcam (milling and laser, very similar to DesKam with great modern UI) : https://www.estlcam.de
- KrabsCAM (milling, freeware, very great) : https://github.com/mkrabset/krabzcam

Typical CNC configuration : SKR Pico + hot wire

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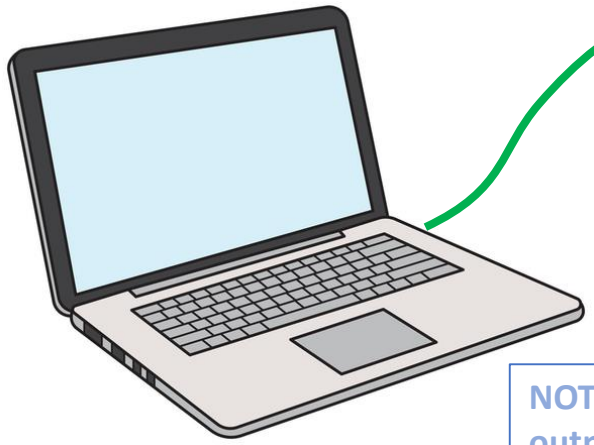
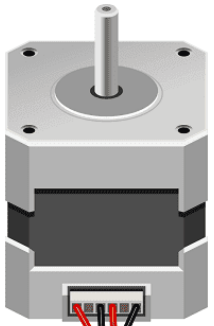


USB cable



X 4 motors

NOTE : each board output can drive 2 steppers in series (recommanded) or in parallel

Hot wire (Ø 0.3 mm NiCr)

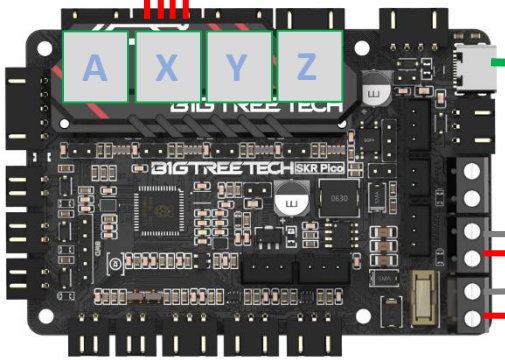
dat / dxf files

GCode generator

GCode files

Gemini Aero Cutter

grbl orders sent to USB port



BTT SKR Pico board (grblHAL firmware)

Power supply 24V - 3A or more

Typical CNC configuration : SKR Pico + milling

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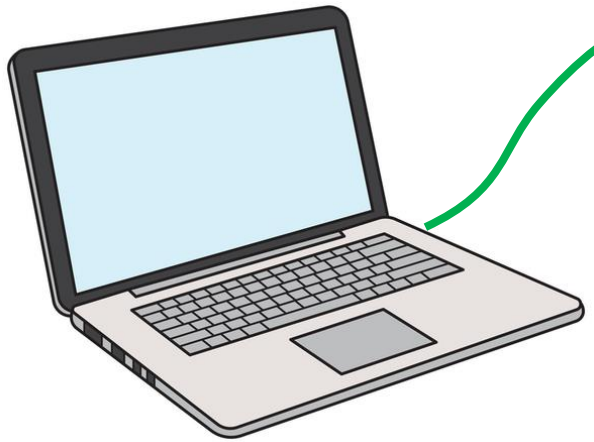
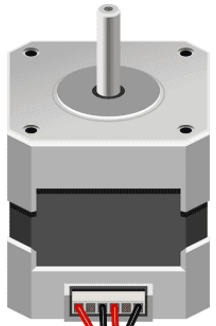


USB cable

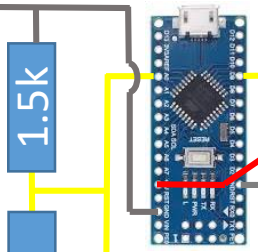


X 3 motors

Stepper motor

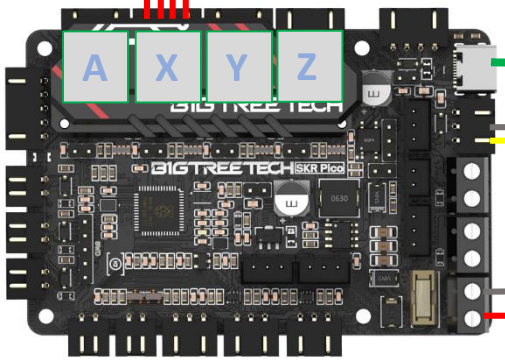
5V PWM
-> 5V PPM
Arduino Nano
(code here)

12V PWM
-> 5V PWM



R/C ESC

Spindle



BTT SKR Pico board
(grblHAL firmware)

Power supply 12 or 24V - 10A or more

Typical CNC configuration : SKR Pico + laser

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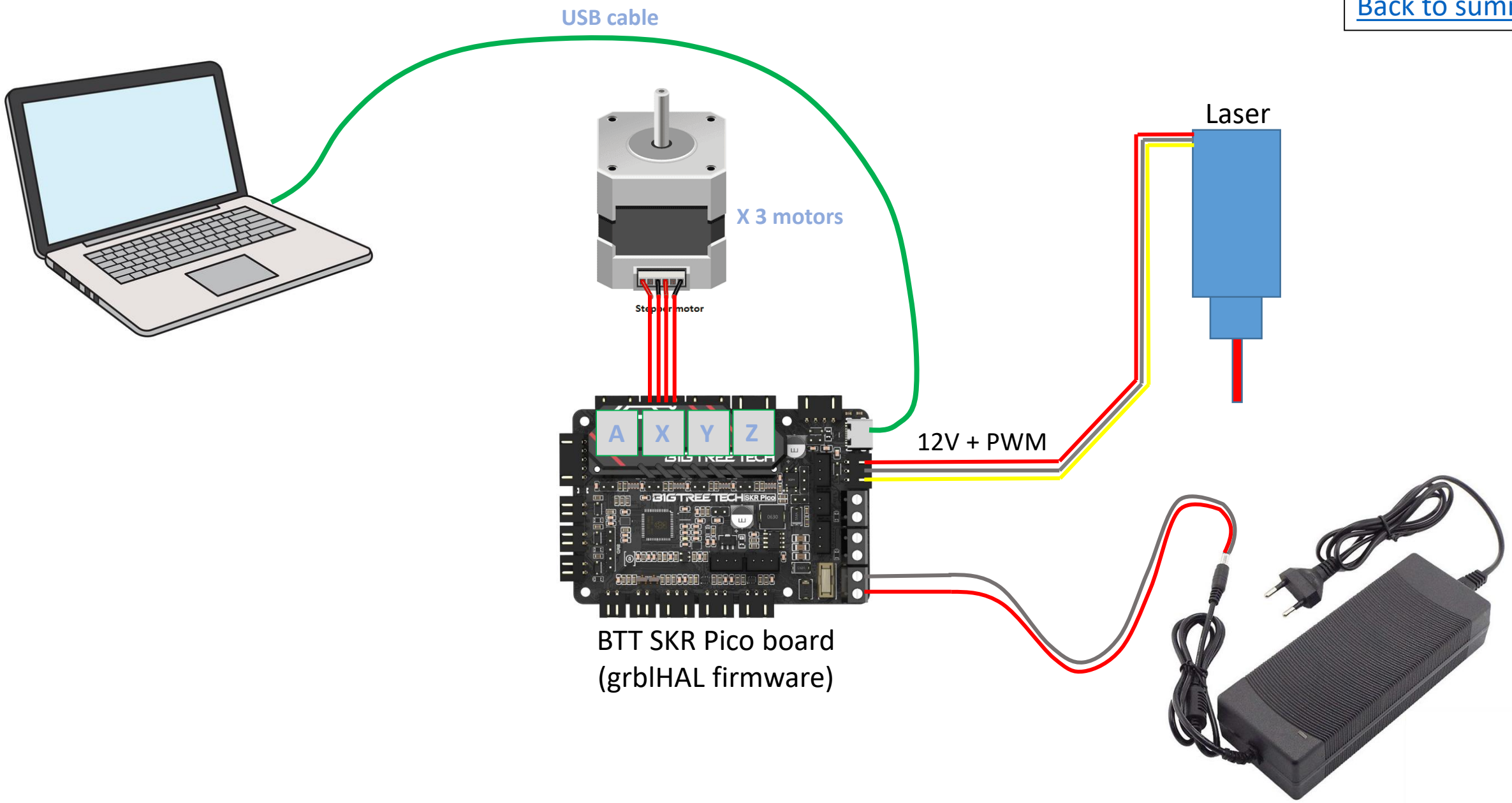

Typical CNC configuration : Mega2560 + Ramps 1.4 / 1.5 / 1.6

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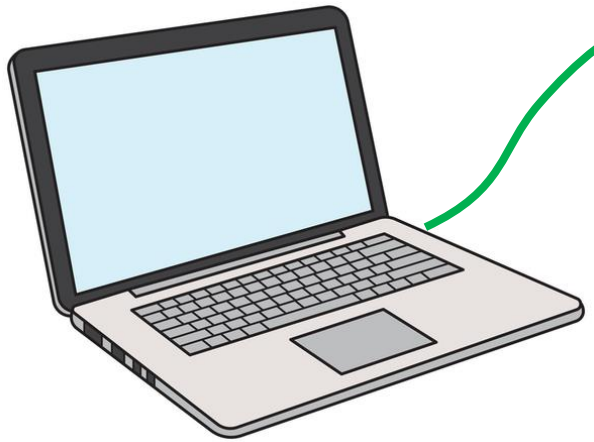
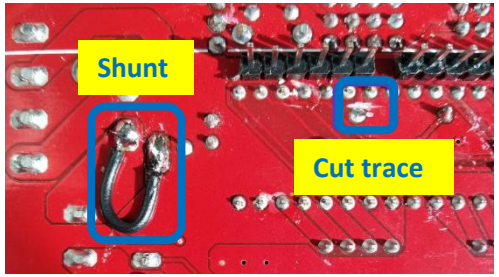
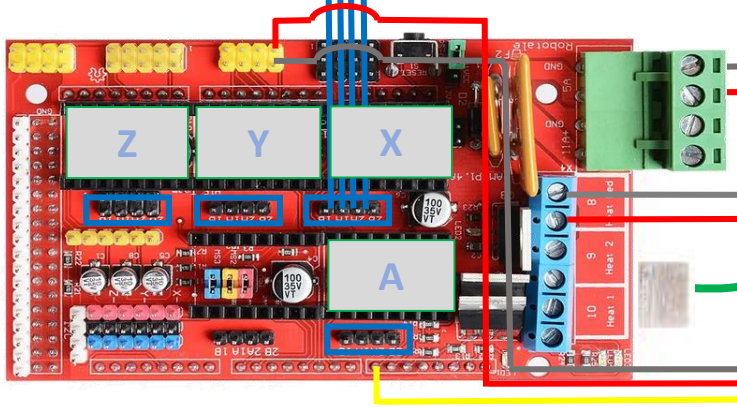


USB cable

X 3 or 4 motors



Ramps 1.4 & 1.5 power supply modification
(one supply for both motors and hot wire)



Hot wire

Power supply 12 or 24V

5V PWM

Arduino 5V PWM -> PPM → Spindle

Laser

M2560 (Arduino firmware) + Ramps
Recommanded motor drivers : TMC2225 (32 µSteps)

Installation

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Prerequisite : Windows 7 to 11 with .NET framework 4.5 or higher.

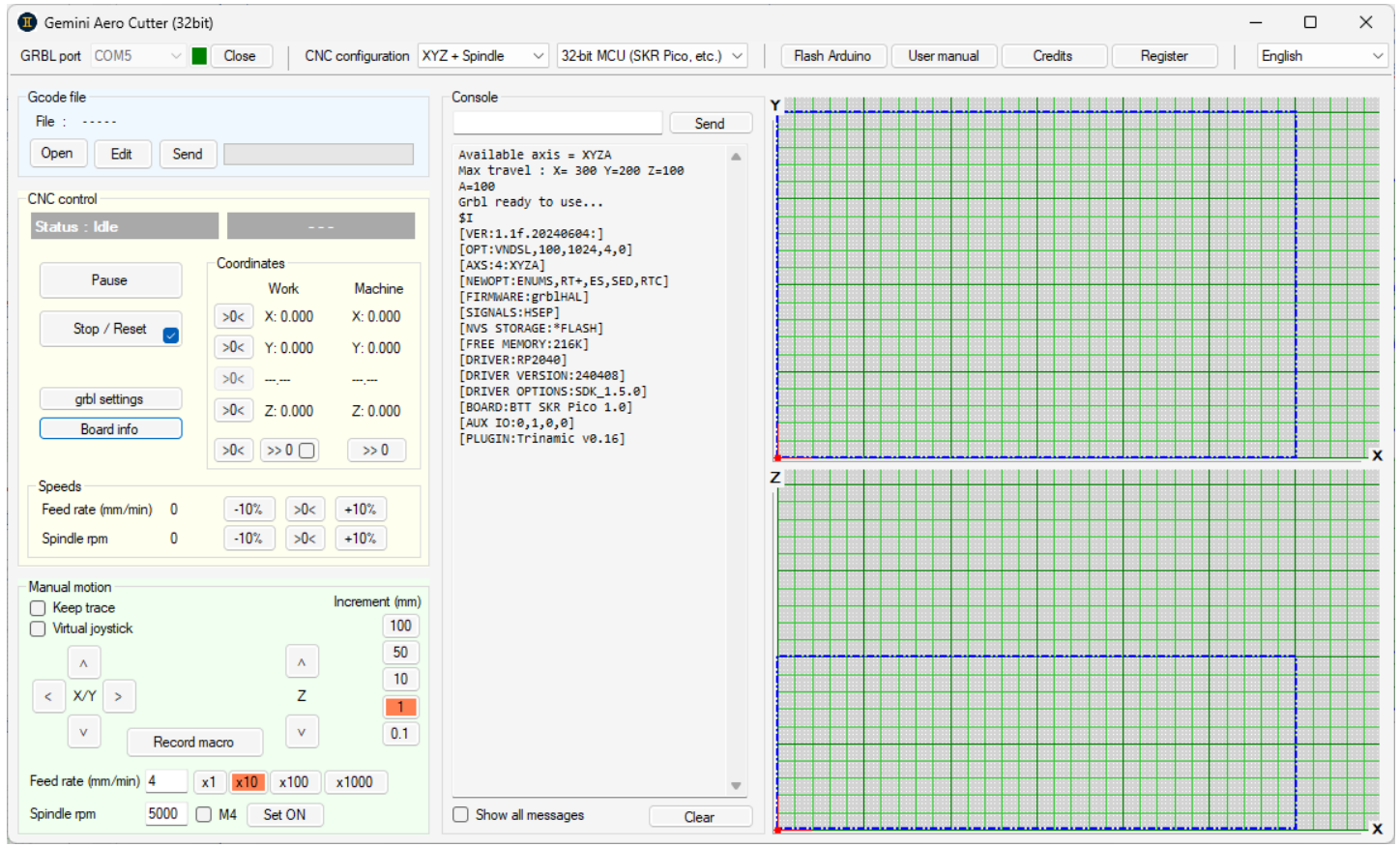
Create a folder (preferably at the root of the disk) on a physical drive (HDD, SSD or USB key) of your choice .

Extract the zip on these folder : C:\GeminiAeroCutter

- Documentation
- Firmware
- Settings
- Toolpath
- GeminiAeroCutter_x32.exe
- GeminiAeroCutter_x64.exe

Some anti-virus can make a false virus detection, please ignore it !

Launch GeminiAeroCutter.exe :



In demo mode :

- **all functions are available except saving edited GCode**
- **a reminder message appears every 20 lines of GCode sent**

Get a licence

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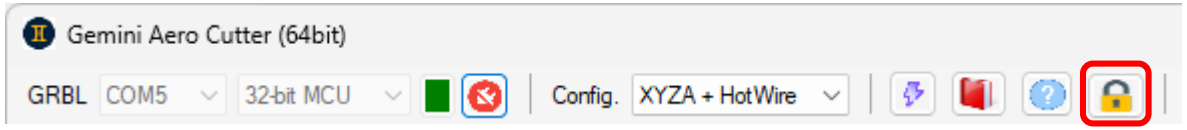
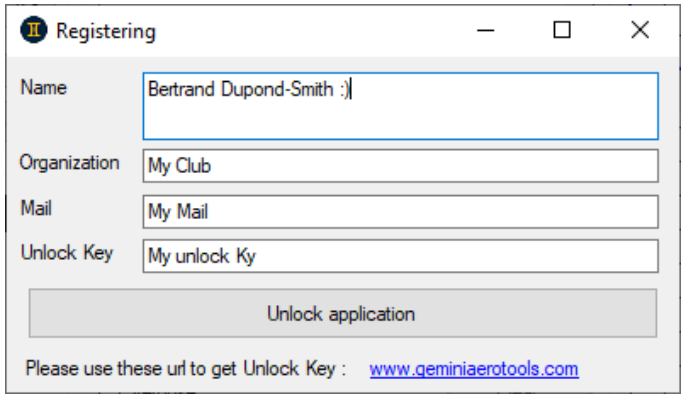
Go to https://www.geminiaerotools.com/geminiaerocutter.html
At the end of this page, you will find a PayPal button to buy a licence (credit card or PayPal)
You will received your licence by mail (as it is generated manually, it can take up to 1-2 working days)

Launch Gemini Aero Cutter
Click « Register » to open the registering form :



Copy and paste all the informations of the licence in the registering form :



Click « Unlock application »
Enjoy ☺

Main interface (hot wire mode)

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Most menus and buttons are self-explanatory ☺

Configure user interface for CNC

User text commands interface.
Motion mode (G90 = absolute, G91 = relative) and feed rate (F) must be specified, separatly or in the same line of order.
Example : G90 G01 X30 F500
(go to absolute coordinate X = 30 mm at 500 mm/min)

Toolpath

Language

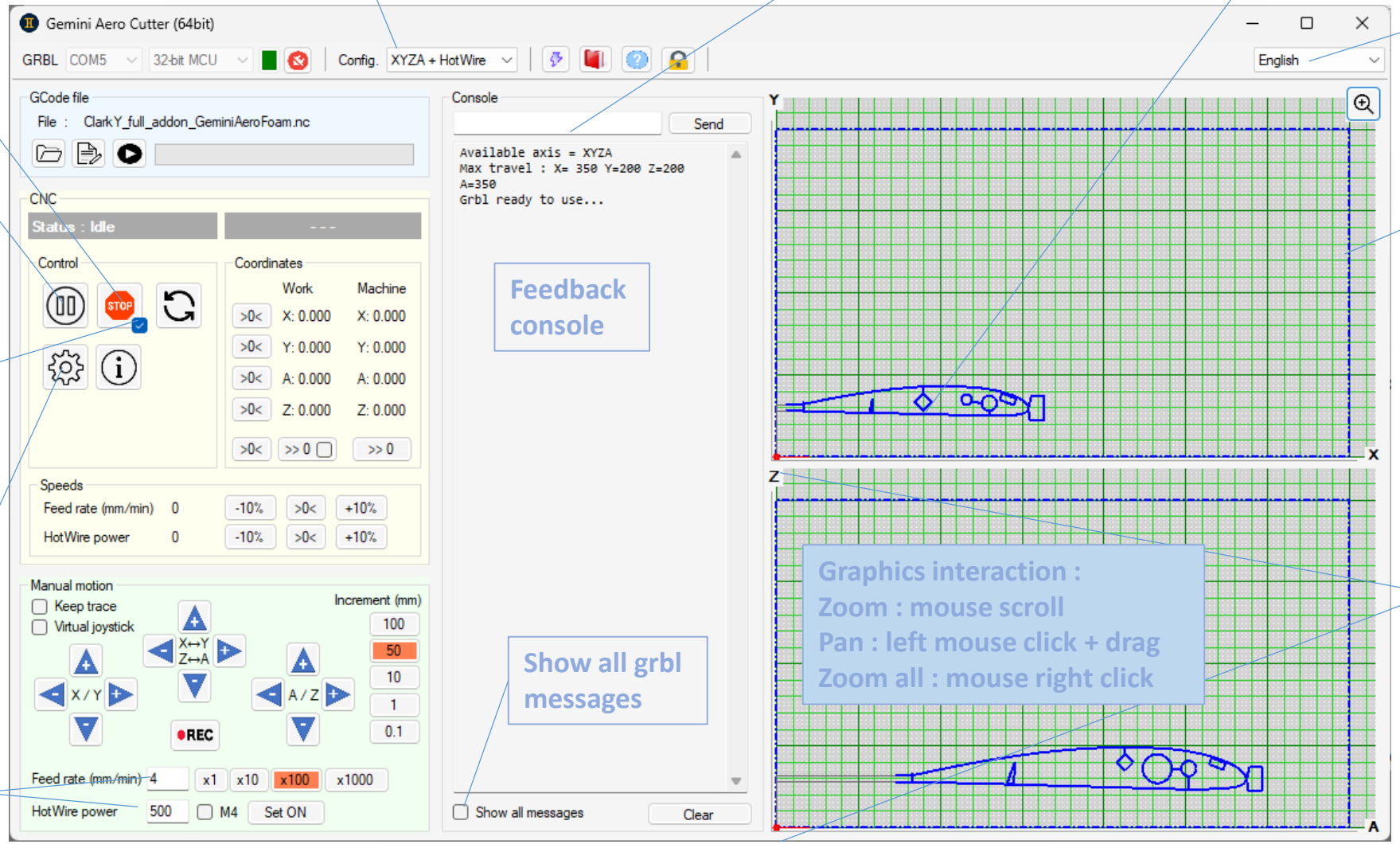
Stop motion

Pause / resume motion

Hold current position on Stop (otherwise, by default, grbl cuts motor power and current position can be lost)

Configure grbl board

Values can be changed via keybord or mouse scroll



Feedback console

Show all grbl messages

Graphics interaction :
Zoom : mouse scroll
Pan : left mouse click + drag
Zoom all : mouse right click

Machine boundaries (use "grbl settings" to change values according to your CNC)

Work origin (= machine origin at startup)
To set new work origin : manual move axis, then click « >0< »)

Main interface (milling and laser mode)

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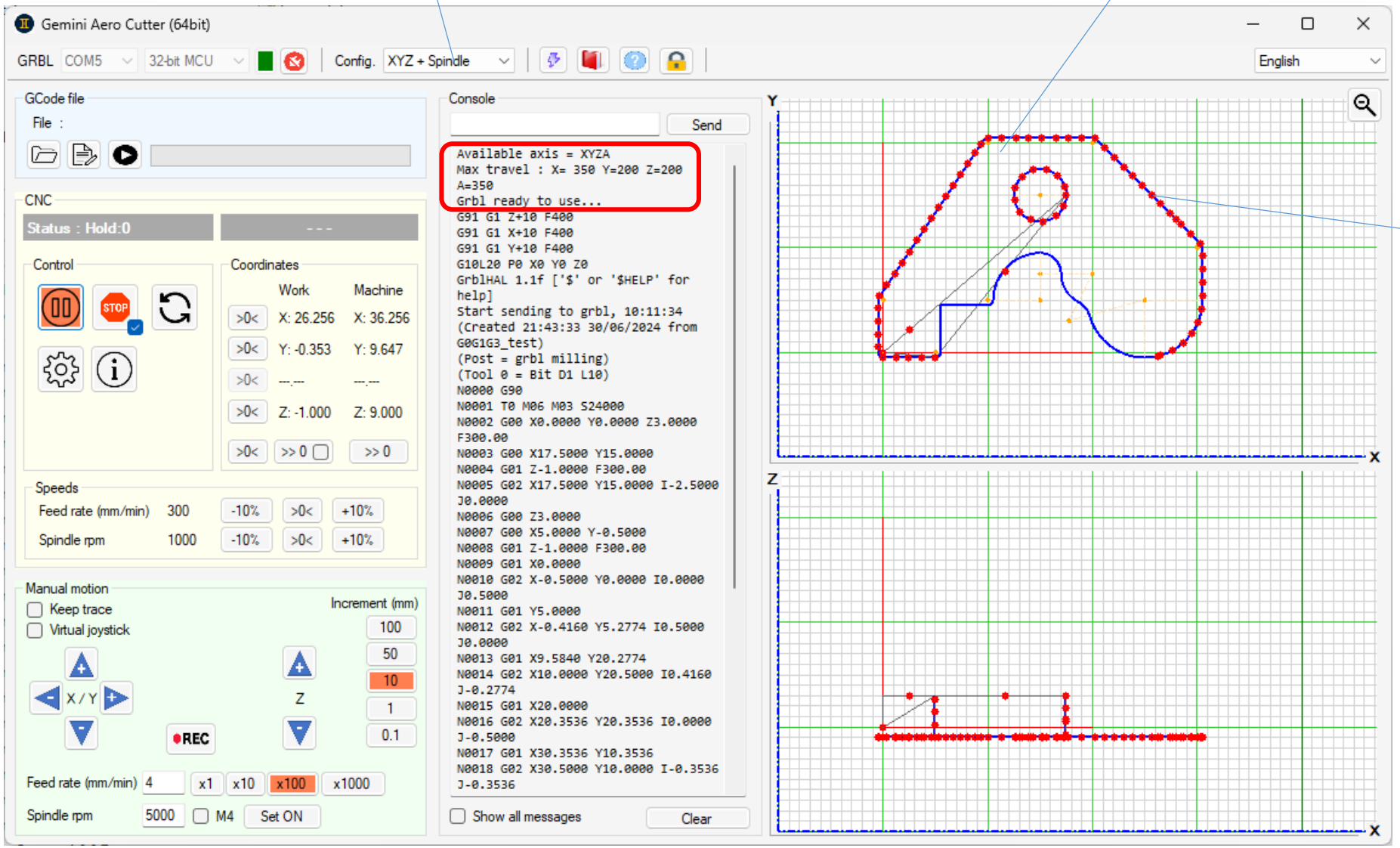
A 4 axis CNC board can be used to 3 axis milling, by selecting the appropriate configuration

G1,G2 and G3 toolpath demontration



Tool trajectory during operation. The distance between points is a function of the speed of movement.

Jogging (all modes)

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Keyboard can be used for jogging :
- CTRL + arrows for X/Y (laser, milling) or X+A and X+Z (hotwire)
- CTRL + PageUp/Dn for Z (milling)
- W (Azerty) or Z (Querty) + arrows for hotwire X/Y
- X + arrows for hotwire A/Z

Return to work origin at working (G1) or fast (G0) speed

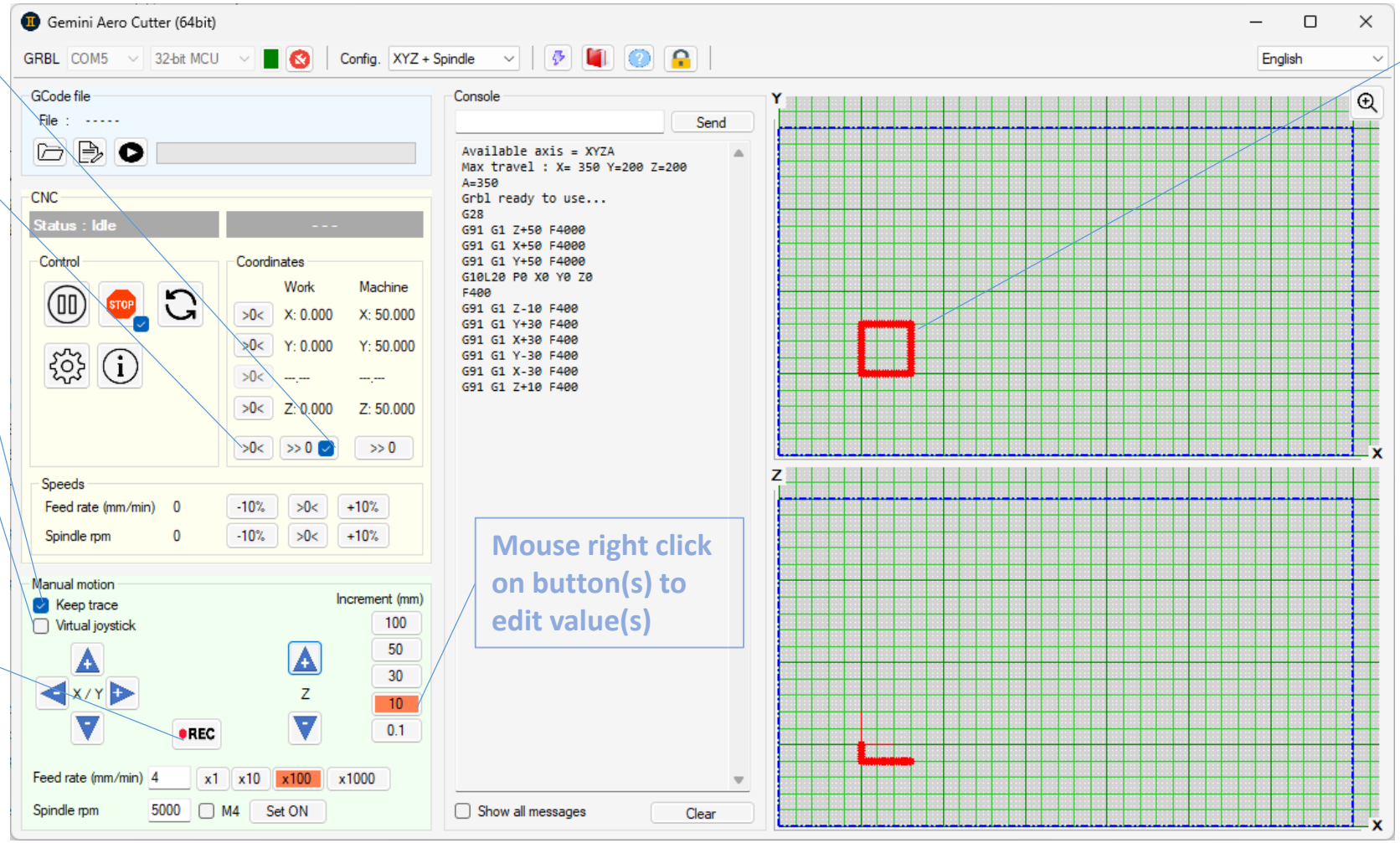
Set the work origin at the current position

Draw the tool trajectory during jogging

Axis will move as long the button is pressed

Macro recorder :
- click on button
- use jog or user text commands to do what you want
- click a second time to save to disk

You can now re-use it as a normal toolpath, for example to cut blocks.



Mouse right click on button(s) to edit value(s)

Tool trajectory during jogging

GCode editor & creator

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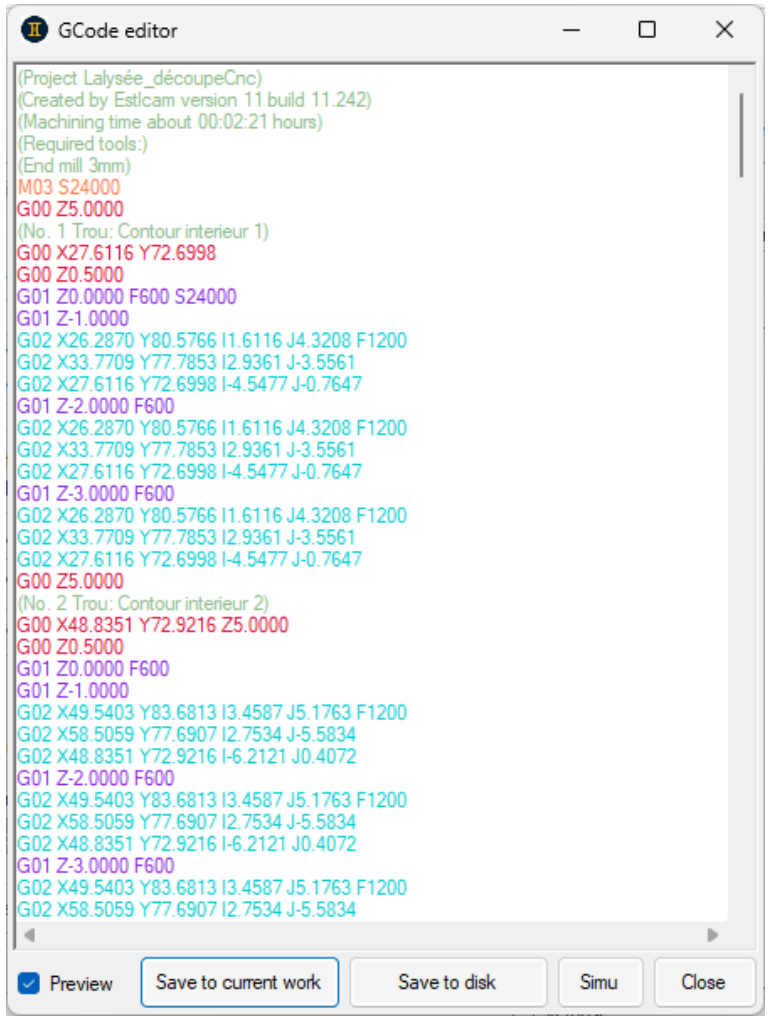
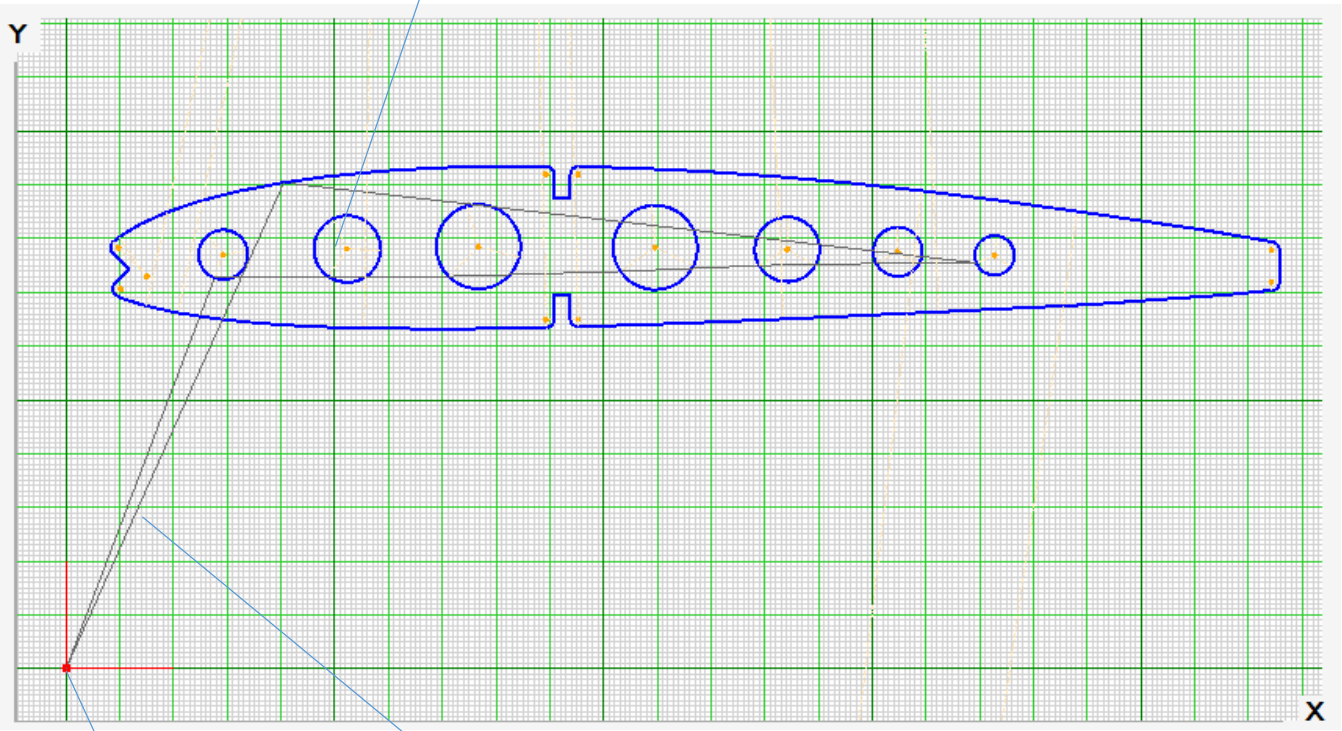
NotePad like text editor with copy / cut / paste abability (ctrl + c / x / v)
Syntax-highlighted text
Instantaneous graphics redraw
Can be use to make a simple GCode program from scratch
Simulate the Gcode with the « Simu » button



G2 and G3 arc centers in orange points



Working origin

G0 rapid motions are shown in thin grey lines

Flash firmaware

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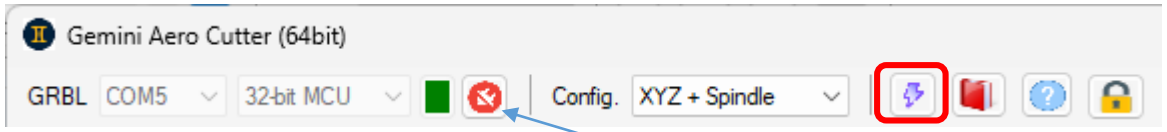
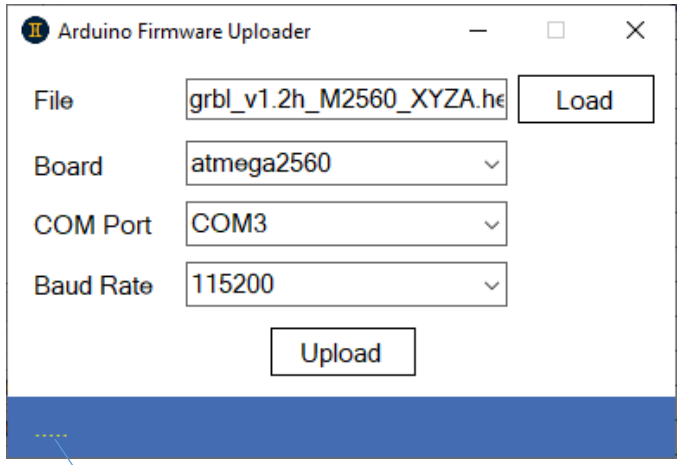
grbl 1.1/1.2 with Arduino UNO (laser and milling) and M2560 (laser, milling, hot wire) boards :

- connect board to USB port
- launch Gemini Aero Cutter
- click on “Flash Arduino” button



- set the appropriate parameters
- Click on “Upload” button
- board is now in working mode

If GRBL port is open, click on the disconnect button before uploading firmware

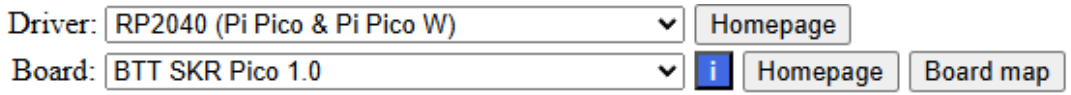


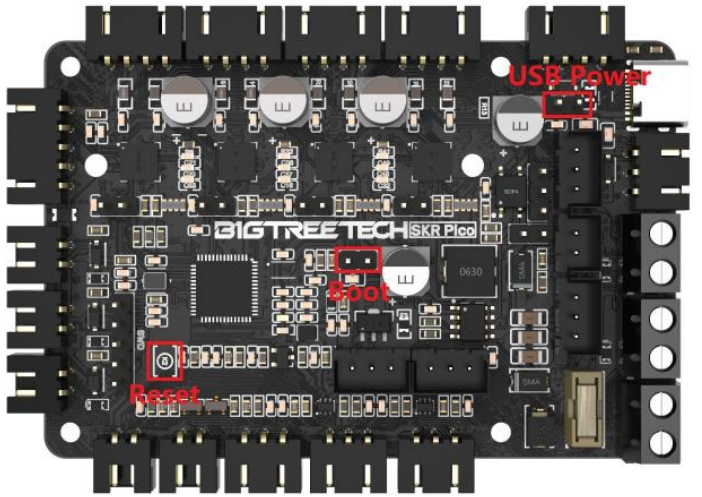
Status operation

grblHAL with BTT SKR Pico V1.0 board :

- plug jumper caps on Boot and USB Power
- connect the board to USB port
- a new USB flash drive (called RPI-PR2) is added to computer
- copy the pre-built grblHAL.uf2 file on this drive
- the board will automatically reboot
- unplug the Boot and USB caps (USB can temporary stay in place to test the board without powering it by the external power supply, but must be removed for using)
- click the Reset button or unplug / reconnect the board
- board is now in working mode

For who needs a custom grblHAL firmware, you can use this web builder :
http://svn.io-engineering.com:8080/?driver=RP2040





IMPORTANT (for all boards) : always connect the USB port of the board to the PC BEFORE powering the board0

grbl settings

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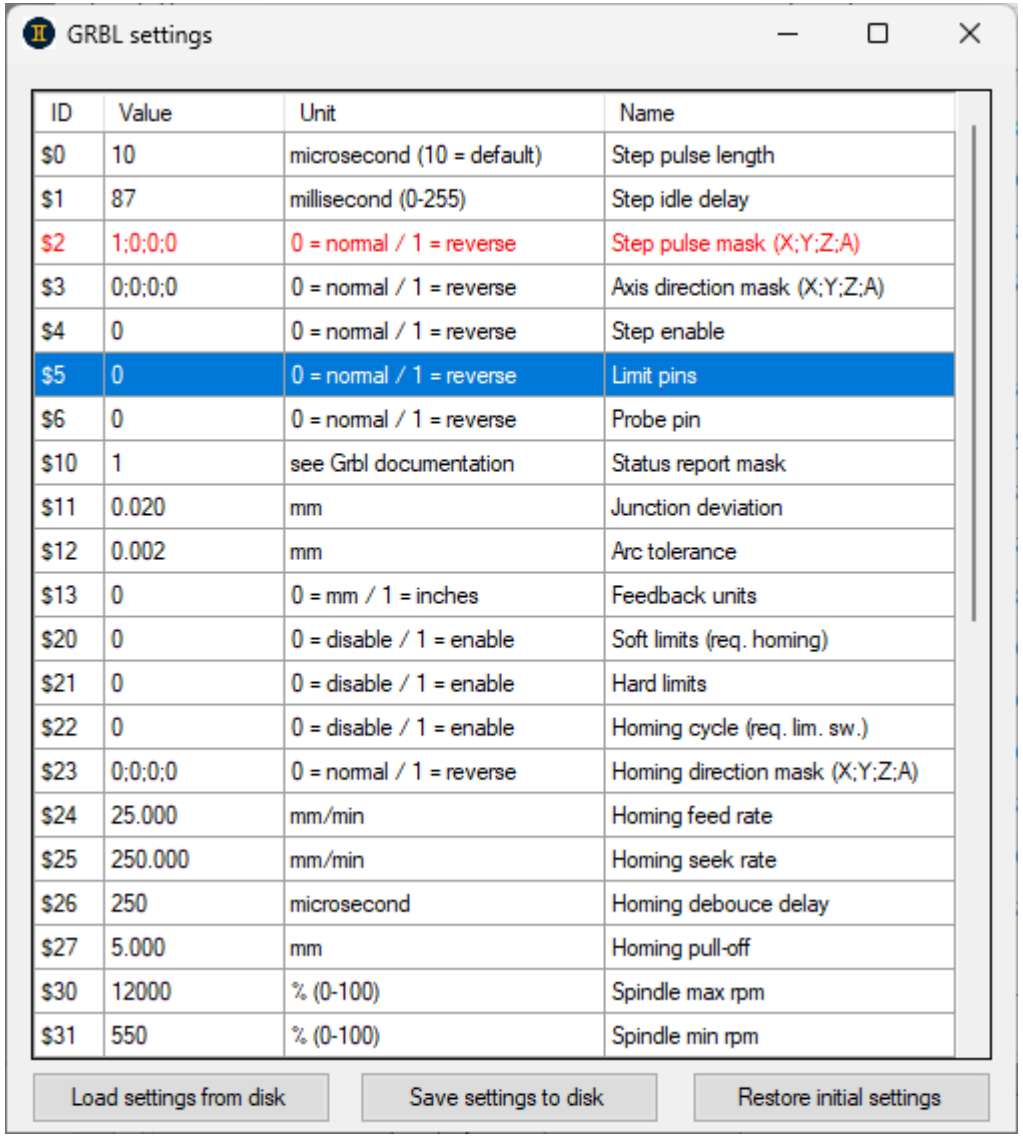
List of settings is automatically read on the board, and can be saved to (and loaded from) disk.
Each value modification (use enter key to confirm) is automatically sent to board and identified in red.



The configuration of the SKR Pico offers a few additional settings :

$140	500	mA	X axis current
$141	500	mA	Y axis current
$142	500	mA	Z axis current
$143	500	mA	A axis current
$150	16	8, 16, 32 or 64	X axis micro-steps
$151	16	8, 16, 32 or 64	Y axis micro-steps
$152	16	8, 16, 32 or 64	Z axis micro-steps
$153	16	8, 16, 32 or 64	A axis micro-steps

- stepper current is set programmatically by the $140-$143 parameters (instead of pots like on Pololu drivers).
  CAUTION : never leave these values at 0, otherwise the current will not be regulated and can damage board (max continuous current for the TMC2209 drivers is 2 A) and also steppers. A good starting point is 500 mA, then adjust it depending if your CNC loose its position at idle or loose steps during fast motion.
- micro-stepping is also set programmatically, by the $150-$153 parameters (instead of jumper caps like on RAMPS or MKS boards).
  Default value is 16, but you can go up to 32 or 64 (and even 128 or 256, but not necessary) with the built-in TMC2209 to improve resolution with direct belt drive systems. NOTE : this function works only if SKR Pico board is powered by external supply (i.e. drivers are powered) AND USB cap is removed (otherwise the board will use the default value of 16 microsteps and will have inappropriate motions !).

NOTE : $1 must be set to 255 (i.e. motors keep their torque at idle) for belt drive CNC
$2 is generally set to 0;0;0;0
$4 must be set to 0 (normal step)

Bug reporting

Despite of your efforts, some bugs or crash can occurs, nobody is perfect… ☹

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If the case, Gemini Aero Cutter will automatically create a file « errorlog.txt » in the working directory of the application.
You can open submit it via :

- the contact form : https://www.geminiaerotools.com/contact.html
- or in the « Bug reports » section the forum : https://geminiaerotools.webboard.org

Don’t forget to give some explanations (context, screenshots, etc.) to help us solving it !