



www.geminaerotoools.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

v1.0.0.9
Update : 2025.06.28

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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 recommended)
- 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
- Advanced 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

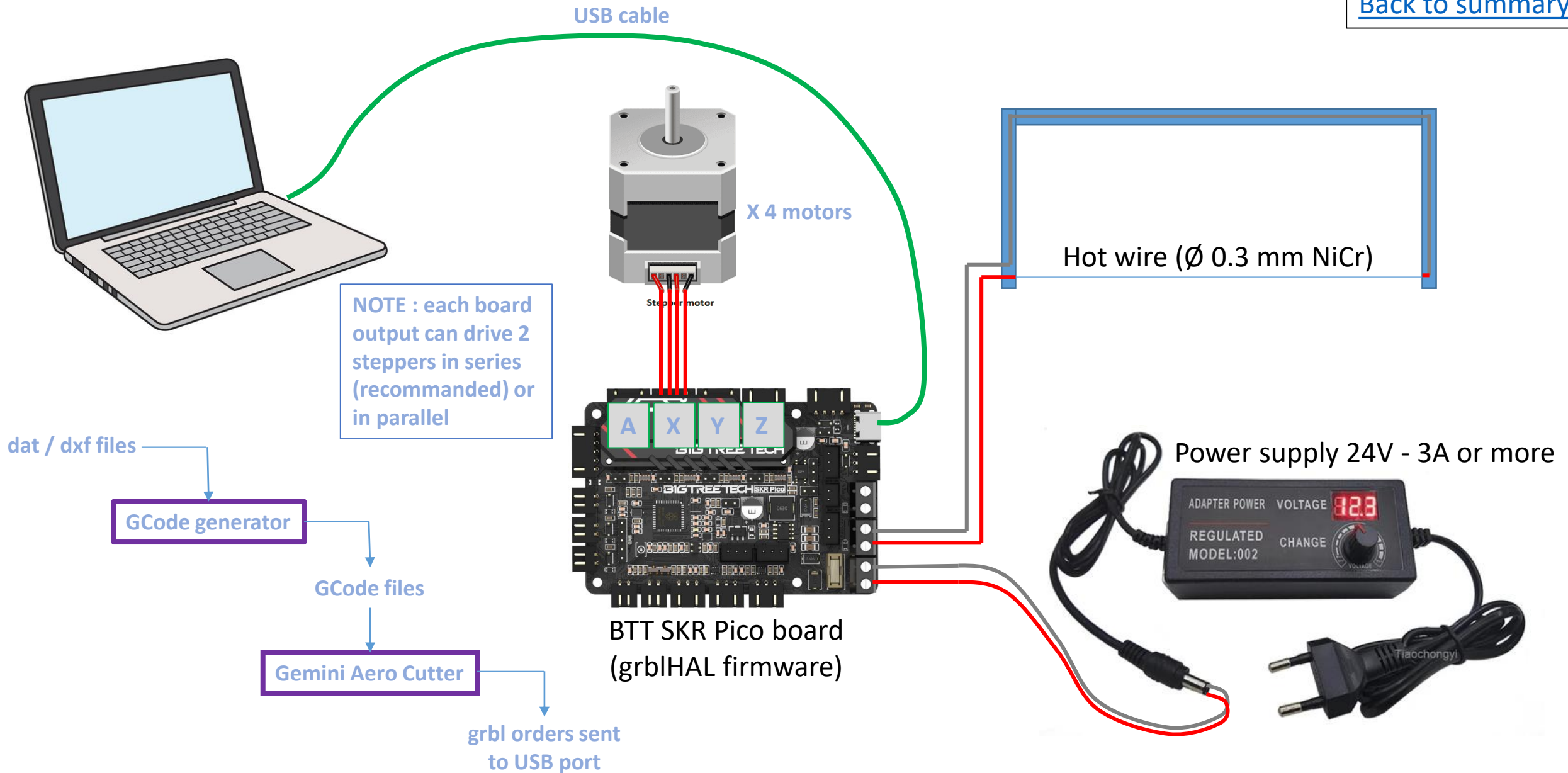
Gemini Aero Cutter is natively multi-language
If you need a new language and can help us in translation, please send a [request form](#)

Recommended GCode generators :

- Gemini Aero Foam (4 axis hot wire foam cutting) : <https://www.geminaerotoools.com/geminaaerofoam.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>

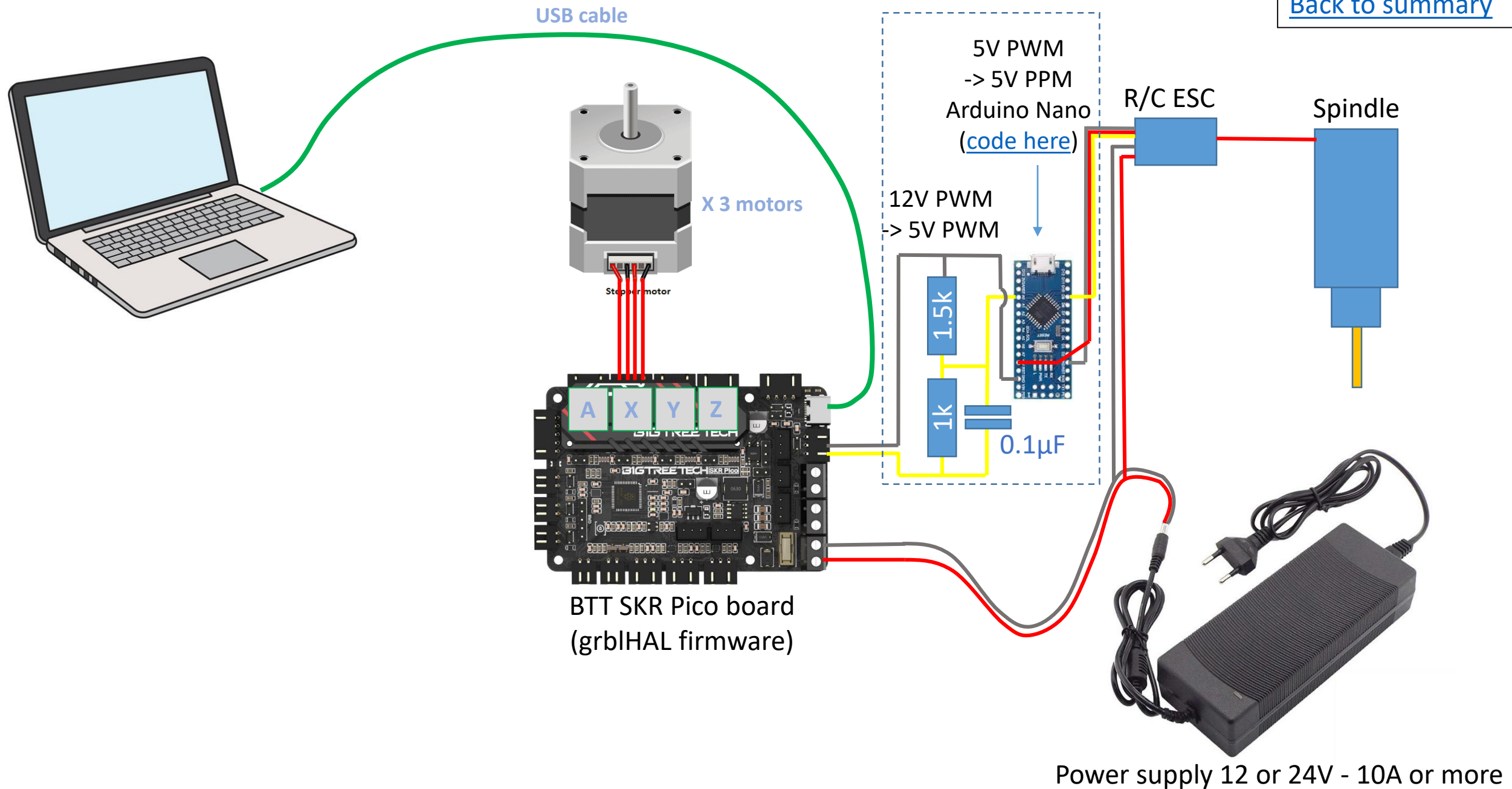
Typical CNC configuration : SKR Pico + hot wire

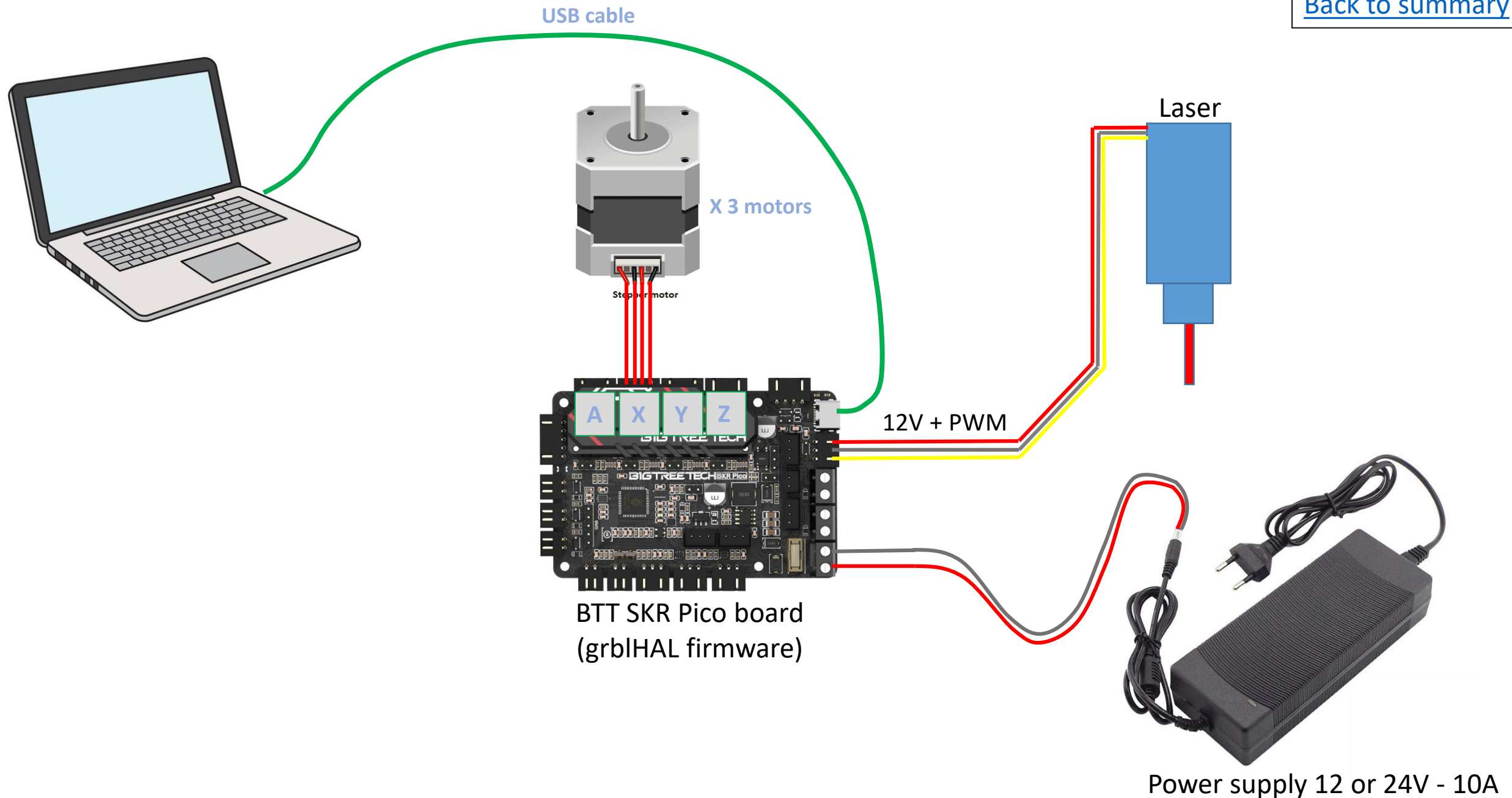
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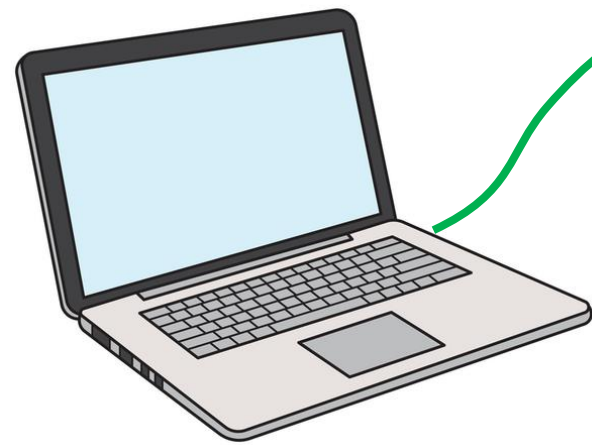


Typical CNC configuration : SKR Pico + milling

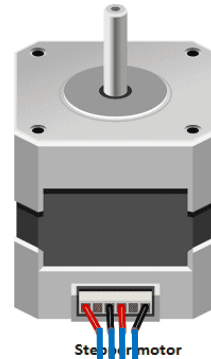
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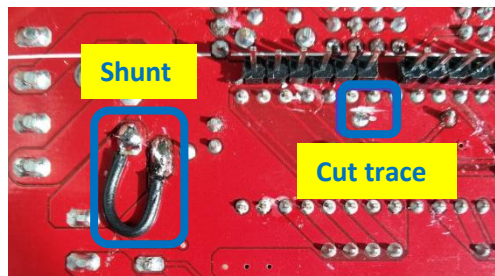




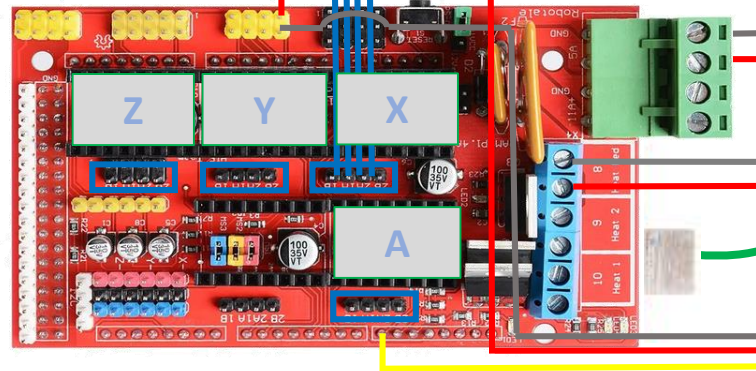
USB cable



X 3 or 4 motors



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



M2560 (Arduino firmware) + Ramps
Recommended motor drivers : TMC2225 (32 μ Steps)



Power supply 12 or 24V

Hot wire

5V PWM

Arduino 5V PWM -> PPM → Spindle
Laser

Installation

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

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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

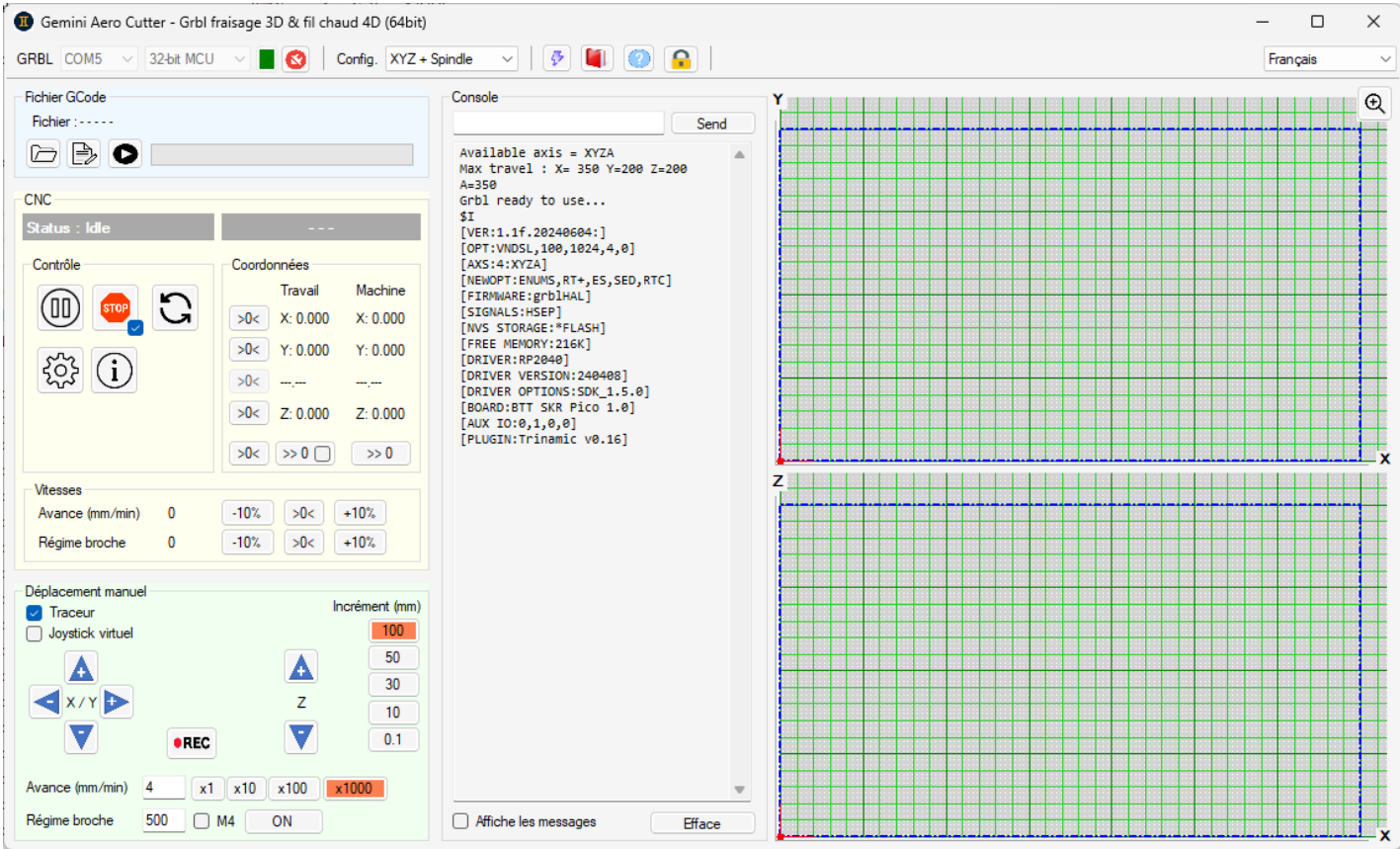
- Documentation
- Firmware
- Settings
- Toolpath
- GeminiAeroCutter_x32.exe
- GeminiAeroCutter_x64.exe

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

Launch GeminiAeroCutter.exe :

In demo mode :

- all functions are available except saving modified GCode
- a reminder message appears regularly



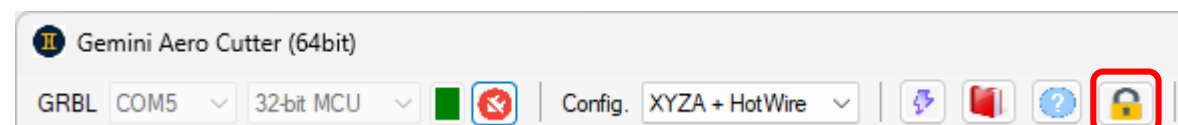
Go to <https://www.geminiaerotoools.com/geminiaerocutter.html>

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 :

www.geminiaerotoools.com'."/>

Click « Unlock application »

Enjoy 😊

Main interface (hot wire mode)

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, separately or in the same line of order.
Example : G90 G01 X30 F500
(go to absolute coordinate X = 30 mm at 500 mm/min)

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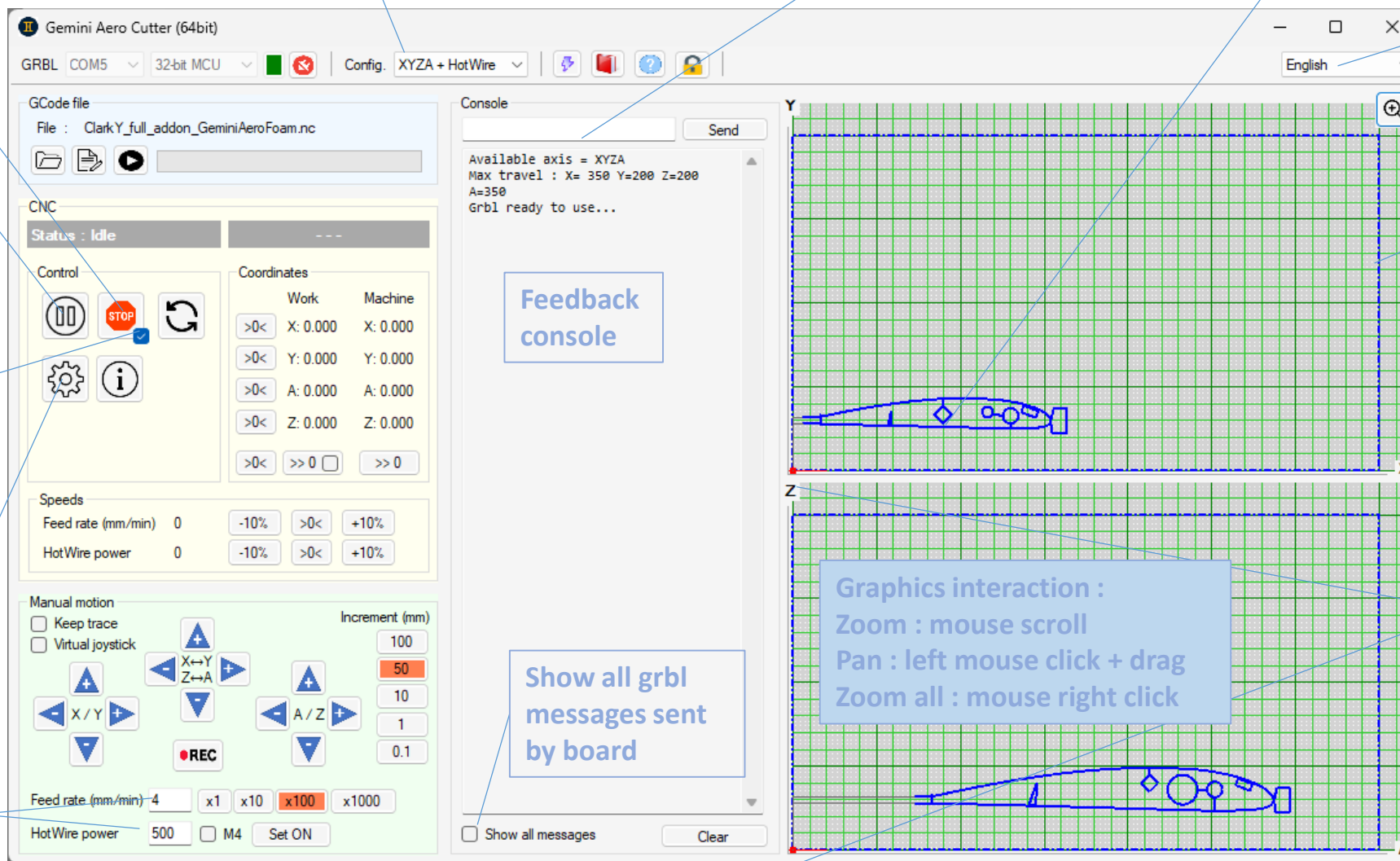
Stop motion

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 keyboard or mouse scroll



Toolpath

Language

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< »)

Feedback console

Show all grbl messages sent by board

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

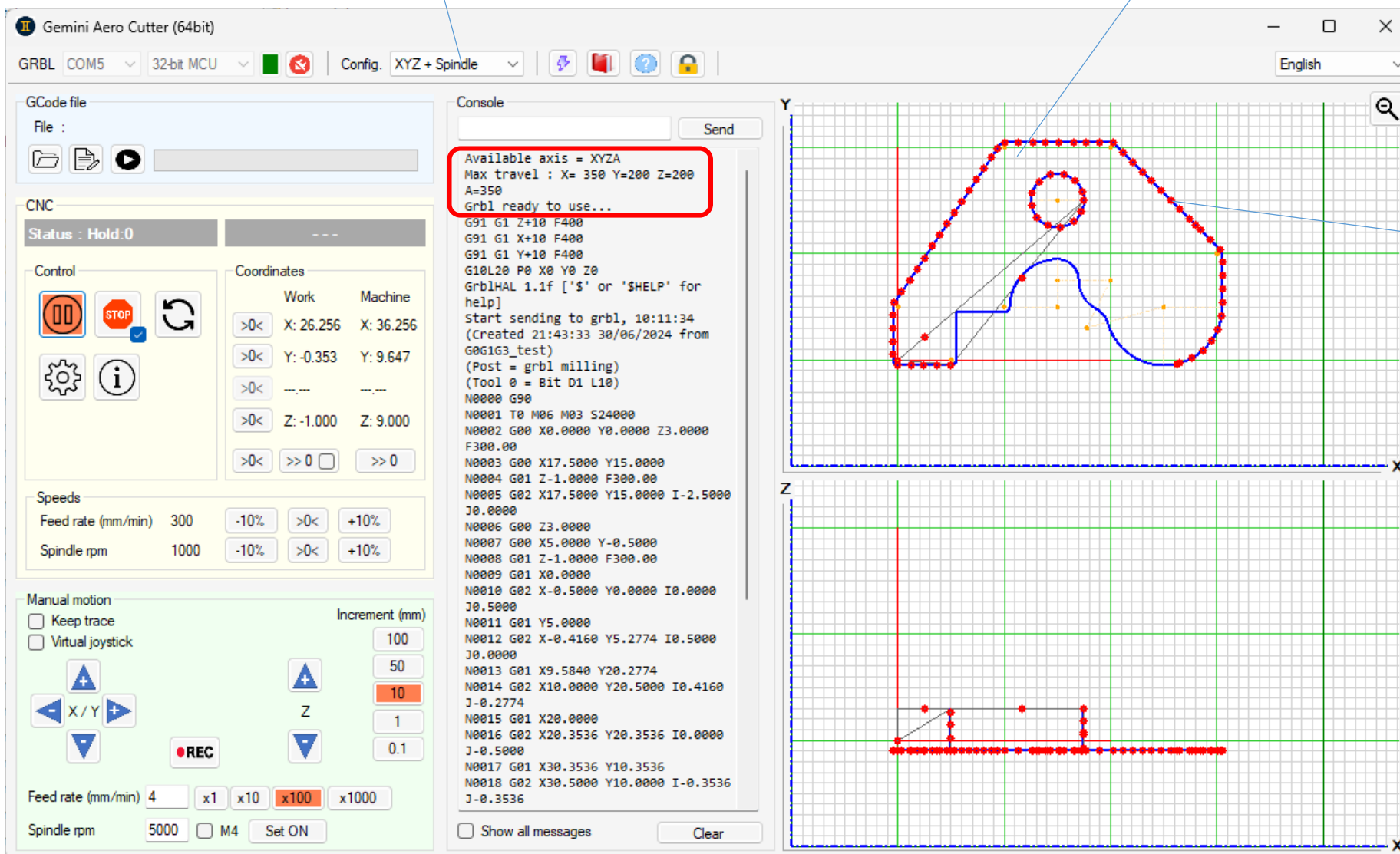
Main interface (milling and laser mode)

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

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G1,G2 and G3 toolpath demonstration

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

Tool trajectory during jogging

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.

The screenshot displays the Gemini Aero Cutter (64bit) software interface. The top bar shows 'GRBL COM5', '32-bit MCU', and 'Config: XYZ + Spindle'. The main window is divided into several sections:

- GCode file:** Includes a file selection button and a 'Send' button.
- CNC Status:** Shows 'Status: Idle' and 'Coordinates' for Work and Machine axes (X, Y, Z).
- Control:** Features buttons for 'STOP', 'Reset', and 'Jog' (represented by a red square).
- Speeds:** Includes controls for 'Feed rate (mm/min)' and 'Spindle rpm' with percentage adjustments.
- Manual motion:** Contains a 'Keep trace' checkbox, a 'Virtual joystick' option, and directional buttons for X/Y and Z axes. A 'REC' button is also present.
- Increment (mm):** A dropdown menu showing values like 100, 50, 30, 10, and 0.1.
- Console:** A text area showing the GRBL status and G-code commands being executed.
- Tool trajectory:** A large grid area on the right showing the tool's path during jogging. A red square indicates the current position, and a red line shows the trajectory.

Annotations with blue lines point to specific features:

- From the 'Return to work origin at working (G1) or fast (G0) speed' box to the 'Jog' button.
- From the 'Set the work origin at the current position' box to the 'GCode file' section.
- From the 'Draw the tool trajectory during jogging' box to the 'Tool trajectory' grid.
- From the 'Axis will move as long the button is pressed' box to the 'Jog' button.
- From the 'Macro recorder' box to the 'REC' button.
- From the 'Tool trajectory during jogging' box to the red line in the 'Tool trajectory' grid.
- From the 'Mouse right click on button(s) to edit value(s)' box to the 'Increment (mm)' dropdown.

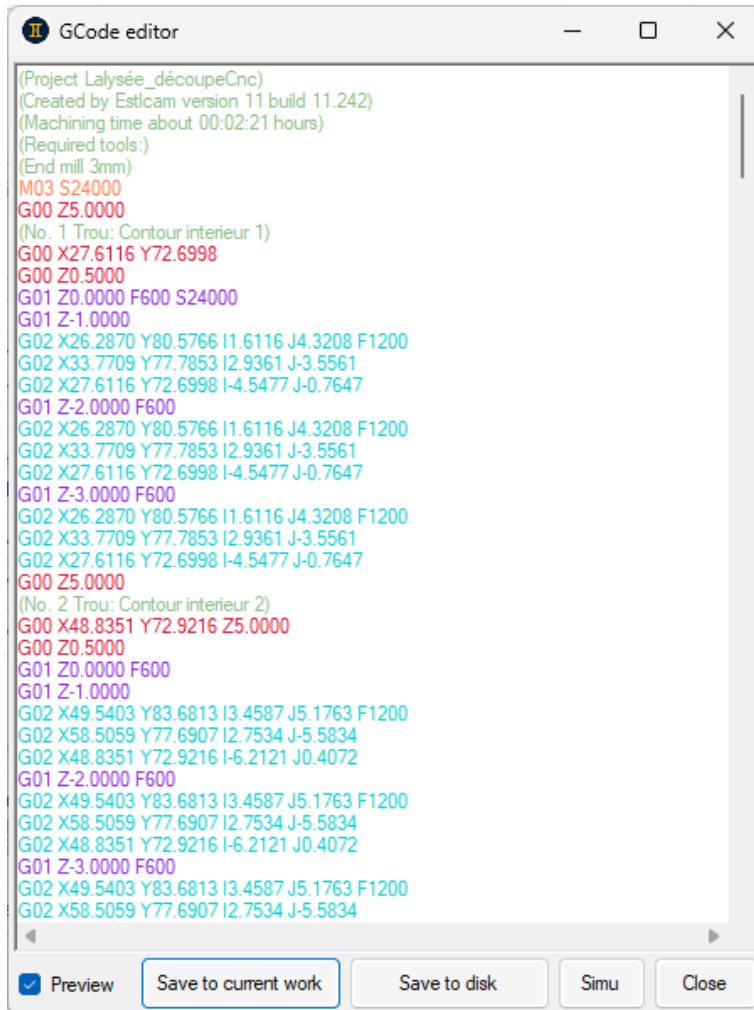
NotePad like text editor with copy / cut / paste ability (ctrl + c / x / v)

Syntax-highlighted text

Instantaneous graphics redraw

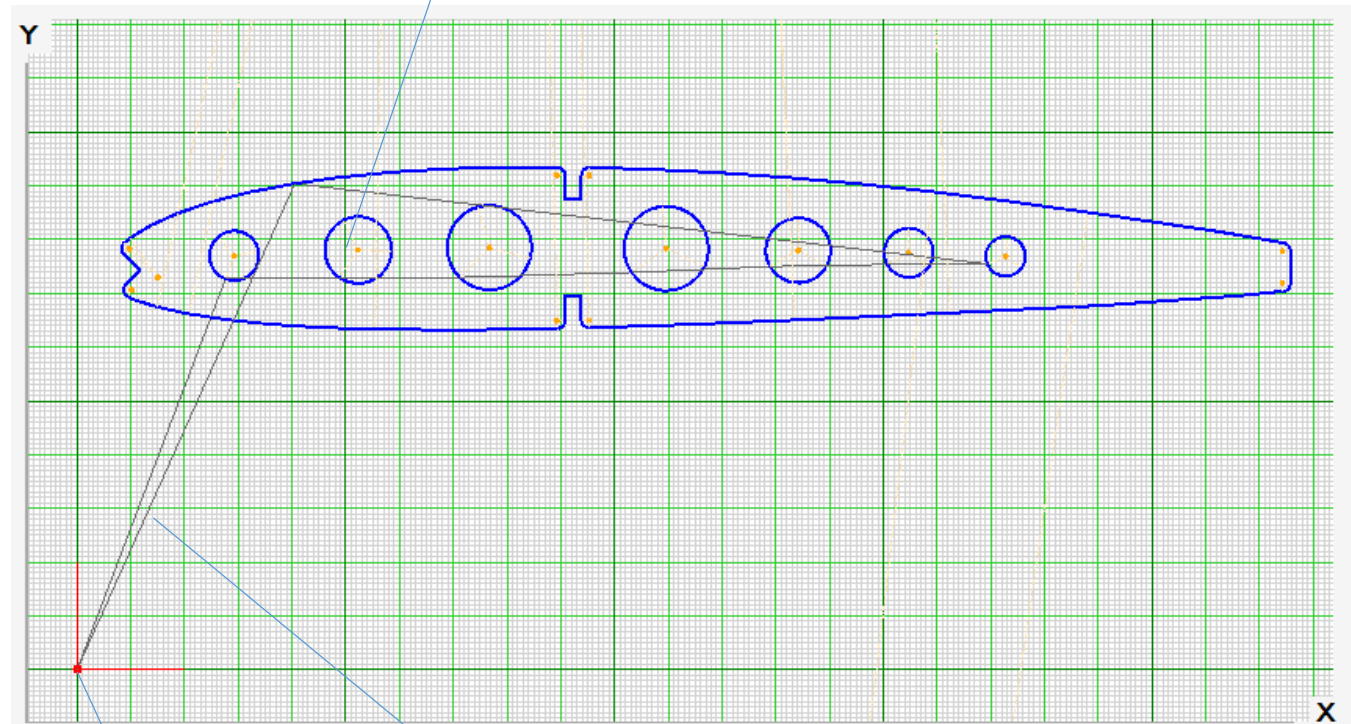
Can be use to make a simple GCode program from scratch

Simulate the Gcode with the « Simu » button



```
(Project Lalysée_découpeCnc)
(Created by Estlcam version 11 build 11.242)
(Machining time about 00:02:21 hours)
(Required tools:)
(End mill 3mm)
M03 S24000
G00 Z5.0000
(No. 1 Trou: Contour interieur 1)
G00 X27.6116 Y72.6998
G00 Z0.5000
G01 Z0.0000 F600 S24000
G01 Z-1.0000
G02 X26.2870 Y80.5766 I1.6116 J4.3208 F1200
G02 X33.7709 Y77.7853 I2.9361 J-3.5561
G02 X27.6116 Y72.6998 I-4.5477 J-0.7647
G01 Z-2.0000 F600
G02 X26.2870 Y80.5766 I1.6116 J4.3208 F1200
G02 X33.7709 Y77.7853 I2.9361 J-3.5561
G02 X27.6116 Y72.6998 I-4.5477 J-0.7647
G01 Z-3.0000 F600
G02 X26.2870 Y80.5766 I1.6116 J4.3208 F1200
G02 X33.7709 Y77.7853 I2.9361 J-3.5561
G02 X27.6116 Y72.6998 I-4.5477 J-0.7647
G00 Z5.0000
(No. 2 Trou: Contour interieur 2)
G00 X48.8351 Y72.9216 Z5.0000
G00 Z0.5000
G01 Z0.0000 F600
G01 Z-1.0000
G02 X49.5403 Y83.6813 I3.4587 J5.1763 F1200
G02 X58.5059 Y77.6907 I2.7534 J-5.5834
G02 X48.8351 Y72.9216 I-6.2121 J0.4072
G01 Z-2.0000 F600
G02 X49.5403 Y83.6813 I3.4587 J5.1763 F1200
G02 X58.5059 Y77.6907 I2.7534 J-5.5834
G02 X48.8351 Y72.9216 I-6.2121 J0.4072
G01 Z-3.0000 F600
G02 X49.5403 Y83.6813 I3.4587 J5.1763 F1200
G02 X58.5059 Y77.6907 I2.7534 J-5.5834
```

G2 and G3 arc centers
in orange points

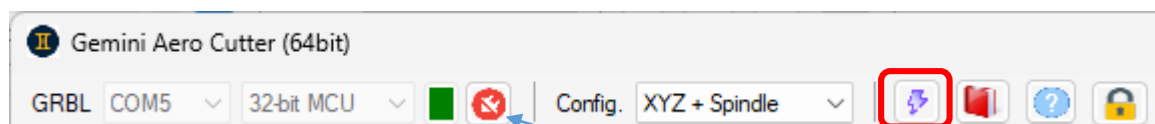


Working origin

G0 rapid motions are
shown in thin grey lines

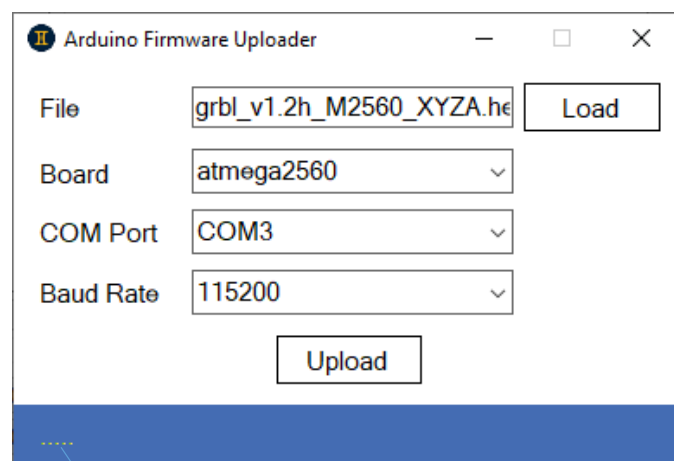
grbl 1.1/1.2 with Arduino UNO (laser and milling) and M2560 (laser, milling, hot wire) boards :

- 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

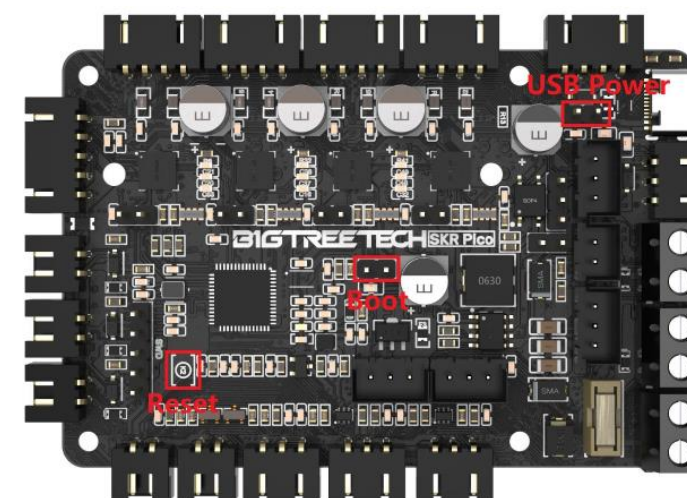
IMPORTANT (for all boards) : always connect the USB port of the board to the PC BEFORE powering the board0

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>

Driver: RP2040 (Pi Pico & Pi Pico W) [Homepage](#)
Board: BTT SKR Pico 1.0 [i](#) [Homepage](#) [Board map](#)



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.

GRBL settings

ID	Value	Unit	Name
\$0	10	microsecond (10 = default)	Step pulse length
\$1	87	millisecond (0-255)	Step idle delay
\$2	1;0;0;0	0 = normal / 1 = reverse	Step pulse mask (X;Y;Z;A)
\$3	0;0;0;0	0 = normal / 1 = reverse	Axis direction mask (X;Y;Z;A)
\$4	0	0 = normal / 1 = reverse	Step enable
\$5	0	0 = normal / 1 = reverse	Limit pins
\$6	0	0 = normal / 1 = reverse	Probe pin
\$10	1	see Grbl documentation	Status report mask
\$11	0.020	mm	Junction deviation
\$12	0.002	mm	Arc tolerance
\$13	0	0 = mm / 1 = inches	Feedback units
\$20	0	0 = disable / 1 = enable	Soft limits (req. homing)
\$21	0	0 = disable / 1 = enable	Hard limits
\$22	0	0 = disable / 1 = enable	Homing cycle (req. lim. sw.)
\$23	0;0;0;0	0 = normal / 1 = reverse	Homing direction mask (X;Y;Z;A)
\$24	25.000	mm/min	Homing feed rate
\$25	250.000	mm/min	Homing seek rate
\$26	250	microsecond	Homing debounce delay
\$27	5.000	mm	Homing pull-off
\$30	12000	% (0-100)	Spindle max rpm
\$31	550	% (0-100)	Spindle min rpm

Load settings from disk

Save settings to disk

Restore initial settings

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.geminiaerotoools.com/contact.html>
- or in the « Bug reports » section the forum : <https://geminiaerotoools.webboard.org>

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

Gemini Aero Tools

geminiaerotoools.com/contact.html

HomeDownloadOrderForumContact

Subject :
Other

Name :
Your name

Email :
name@domain.com

Country :

Message :
(please don't forget to provide your full coordinates for a licence key request)

Bug reports !

Your Message :
...

Contents of errorlog.txt file :
....

Security check :
(4+4)/2 =

4

Send

Your data will only be used in order to communicate with you and deleted once no longer needed for this. They will not be shared with any third party.


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Gemini Aero Tools

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geminiaerotoools.webboard.org/index.php

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Support for www.geminiaerotoools.com

Hi Guest!
As you're not logged in, some features could be unavailable. [Click here](#) to become a member of Gemini Aero Tools.

Username: Gemini

Password: *****

Cookies have to be granted please

Log in

Help

The time now is 01 Mar 2024 09:51

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Gemini Aero Designer forum




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Moderator Gemini

161814 Feb 2024 18:21
Gemini




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How-to, tips & tricks

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1113 Mar 2023 19:31
Gemini




Bug reports

Submit bugs and others problems

Moderator Gemini

96423 Nov 2023 18:23
Gemini




Improvement proposals

You have ideas of improvement or new features ?

Moderator Gemini

93328 Dec 2023 20:02
Gemini



Need help

Users mutual aid zone (this is not an after sales service !)

Moderator Gemini

75920 Jan 2024 13:12
Nico5934