

# Robot Laser

*Ver. 0.5.1 Beta*

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User's Manual

**Robot Eyes Automazione**

*Belo Horizonte (MG) Brasil*

*Torino Italy*

[www.robot-eyes.com](http://www.robot-eyes.com)

[robotlaser@robot-eyes.com](mailto:robotlaser@robot-eyes.com)

## Introduction.

The RobotLaser software was created to manage the Laser Etching systems with firmware GRBL version 0.9j and later.

The software is structured as a full suite, able to manage manual movement and generate GCode (stereolithography code) from an image according to the parameters and the desired options finally Send them to the etching system.

## Installation.

You first need to install the serial driver for Arduino.

In case of Arduino Nano and duemilanove you must use the CH340 driver, Arduino Uno and Mega the FTDI driver.

Once installed the drivers and connected the USB cable you must identify the port:

Right click on <This PC -> Management -> Device Manager -> Ports (COM & LPT), and then verify that there is a USB-SERIAL CH340 (Arduino Nano) and note the COMx port.

The RobotLaser software is written in a portable way, then unpack it in the most pleasing folder (ex. C: \ RobotLaser) or on a USB stick.

## Licensing.

Although the beta version is free, you will still need to register the software.

At startup a warning will inform that it is operating in a Trial Mode (10 days)

In Trial mode you can not save view or upload the GCode.

To register, press [Info] and then [License]: you will see a summary screen license status.

Press the [Registration] button. Complete the fields User / Organization and eMail. CAUTION; Must be a valid email because the unlock code will be sent to this address.

Press the [Generation] button and wait, the operation can last a few minutes, depending on the type of PC and disk bios.

Email the code to robotlaser@robot-eyes.com; for convenience there is a button (under the [Generation] button) that creates the mail to be sent.

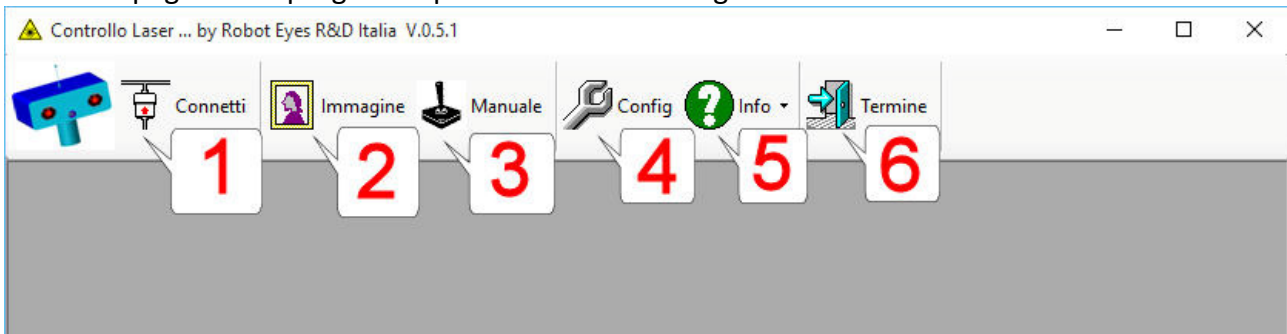
Upon receipt of the liberation code, copy it from the email and paste it into the appropriate field;you're your convenience there is a [Paste] button that performs the operation finally press [Register], the software now will operate without restrictions.

### **NOTE:**

The validation code is locked to the unit where the software is installed, so if you feel you want to use it on more than one PC, you should install it on a USB stick. Though ABSOLUTELY NOT MANDATORY, on the "info" there is a button to donate via PayPal a small contribution to sustain the effort made in making the program available to everyone.

## Start.

The main page of the program is presented as following:



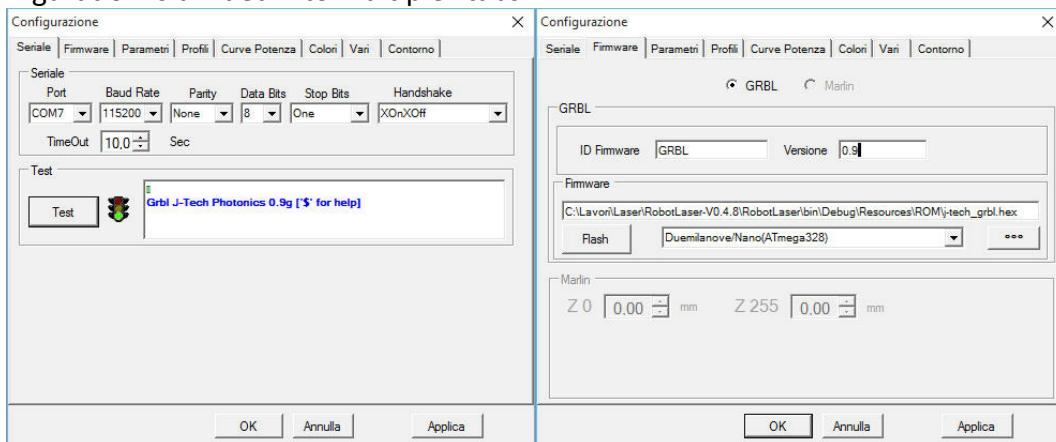
The buttons allow you to:

- 1) Connect the software to the controller (Arduino)
- 2) Manage the work of engraving the image
- 3) Manage manual movements
- 4) Configure the software
- 5) Obtain informations
- 6) Terminate the program

### 4) Configuration.

You first need to configure the software: press the button 4: Config.

The configuration is divided into multiple "tabs":



#### a) Serial

As first is necessary to locate the serial port:

i. Open "Device Manager"

Right-click on <This computer -> Manage -> Device Manager -> Ports (COM & LPT)  
Verify that there is a USB-SERIAL CH340 door (Arduino Nano) and COM port

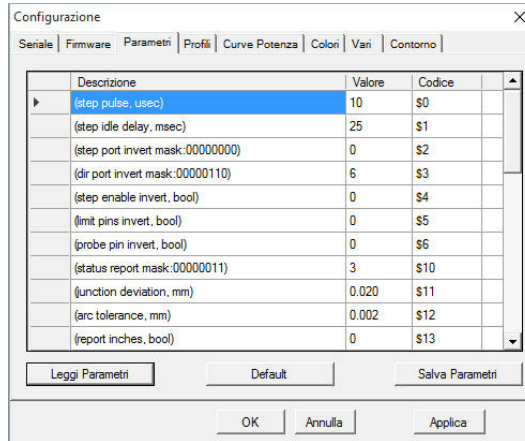
ii. Parametri for GRBL are [COMx | 115200 | None | 8 | One | None ]

iii. Press [Apply] then [Test] to verify the connection.

iv. If the firmware loaded IS NOT GRBL 0.9j or later, you can load it with **Firmware part**: choose the type of processor and the location of the firmware (HEX file) then press [Flash],

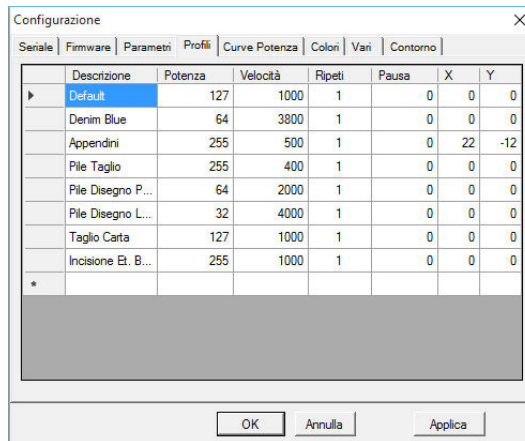
the programming will be done via an external program.

b) Parameters



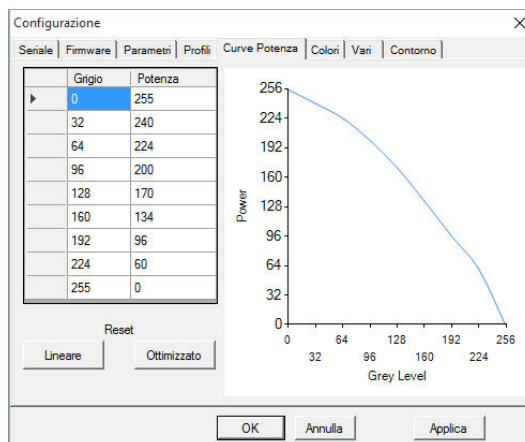
As first need to read the already stored parameters via [Read parameter] Change the values of the desired parameters and confirm changing line. Write the parameters to flash memory with [Save Parameters]. The first time (or after incorrect changes) it is advisable to press [Default].

c) Profiles



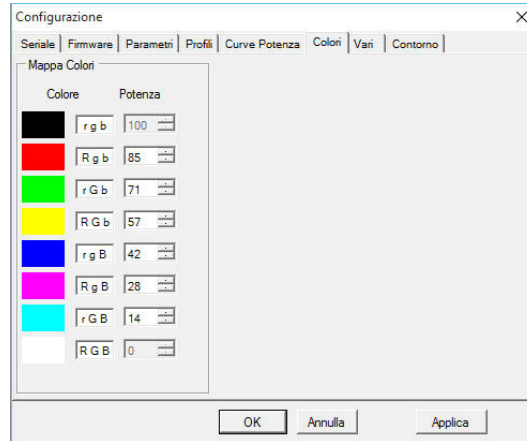
In this table you can set combinations of power, speed, repetitions, waiting time between reps and the other reference position, to be called if necessary.

d) Curva di Potenza



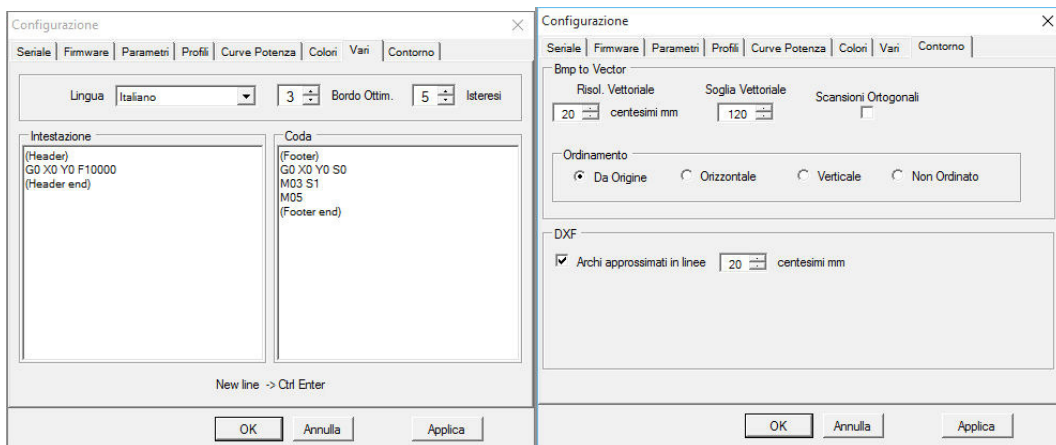
With this table you can correct the non-linearity of the Laser.

e) *Colori*



Normally the power of the laser is set in the same way for the entire image, but if for some reason it is necessary to use different powers for different areas just assign a different color to each area. NOTE: the colors BLACK (100%) and WHITE (0 %) are NOT editable.

f) *Vari*



You can select the GUI language (language change to the program will be restarted)  
Hysteresis is the minimum variation of the gray level as for the generation of a new GCode line.

The optimized edge is the amount of free travel to the extremes of a optimized raster image, necessary to avoid non-linearity due to the reversal of the direction of the laser (which obviously is not instantaneous).

The value is to be found experimentally for its own Laser and is approximately proportional to the maximum speed.

Header and Tail are lists of commands that will be inserted at the beginning and end of the code.

g) *Contour*

*Vectorial Resolution:* is the minimum length of a vector

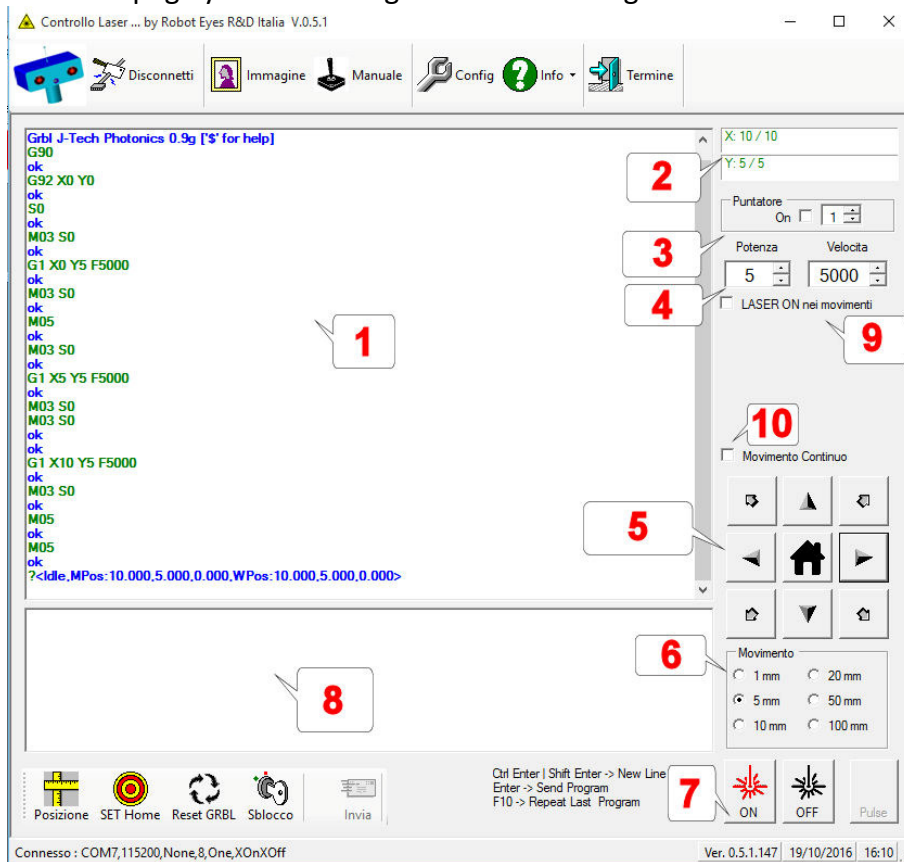
*Vector threshold* is the minimum gray value to identify an outline

*Orthogonal scans:* It allows to analyze the image orthogonally to find hidden edges, generally it is not necessary, activate only if there are non-detected edges.

Under DXF you can opt for the approximation of the arcs in lines if the processor does not recognize the G02 and G03 commands (CW and CCW ARCS). Normally this is done with Arduino Nano and the ones with low memory.

### 3) Manuale.

With this page you can manage manual handling.



The controls are mostly intuitive.

The main area consists of the console [1] which allows you to see the dialogue with the GRBL software.

Power and speed of manual movements are selectable [4] with the boxes above the "Joystick" [5] and do not affect the operating values (the main page).

The amount of movement for each press of the button can be changed in [6].

You can manually turn on and turn off the laser [7], but especially decide whether it should be turned on during the movements [9] (for example to make linear cuts or for a precise focus).

You can also turn on the laser at low-power for use as a pointer, [3]

In the upper right [2] you can read the current position in real coordinates and machine coordinates; all movements are in real coordinates.

To do continuously movements (X or Y) [10], you hold down the button of relative movement, with check [Movement Continuous Active].

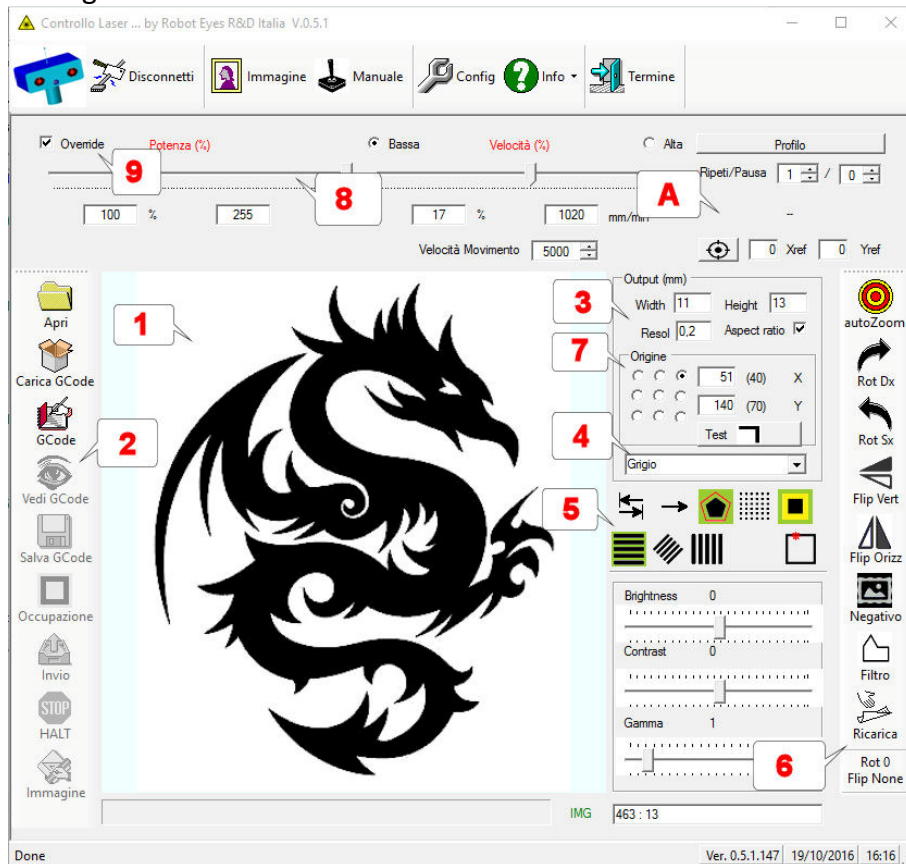
Also you can send individual commands to the controller. [8]

Is possible to write small programs, in this case, to go to a new line, use the Shift + Enter or Control + Enter while the Enter key alone sends the sequence.

The last sequence can be recalled by pressing the F10 key.

## 2) Lavoro.

Is the main operating screen.

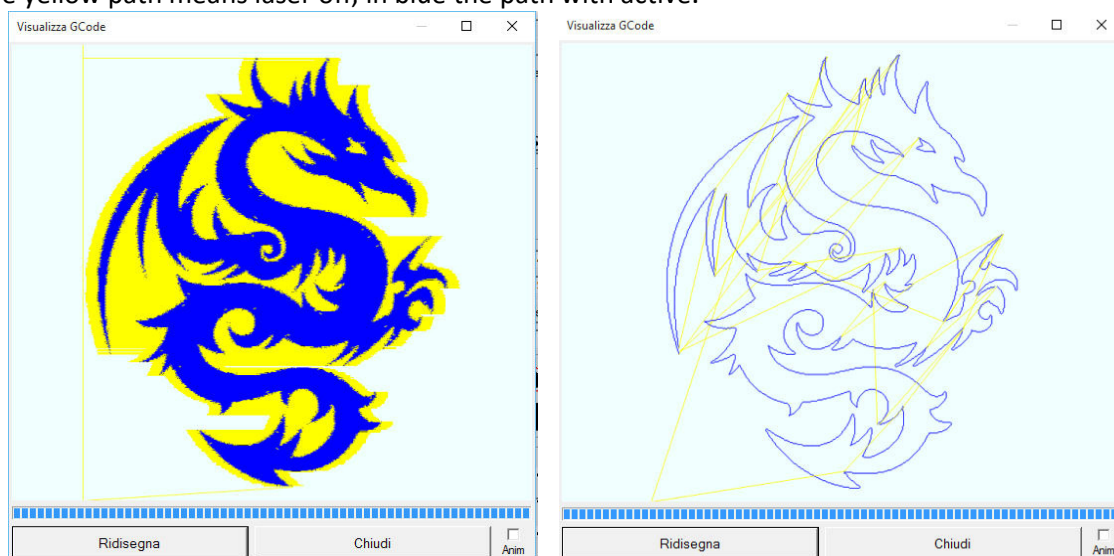


- The area [1] displays approximately the image to be sent, as engraved by laser.
- The toolbox [2] allows to operate on the image to be engraved:
  - Load an image (almost all Windows compatible graphics formats are supported)
  - It is also possible to upload vector files (DXF), it is currently supported DXF base version, known as Autocad LT2000.
  - Load a previously saved GCode
  - Display the current GCode
  - Save GCode
  - Show the area occupied by the image, it drag a rectangle with a minimum power laser (pointer)
  - Send GCode to the machine
  - Display the image that will be engraved
- The toolbox [6] allows you to change the image to be engraved:
  - Display in auto zoom (full-page picture) or in actual size (in pixels)
  - Rotate or Mirror the Image
  - Invert the image (negative)
  - Filter or the image to highlight the edges.
  - Reload the Image.
- The [3] screen lets you change the final size of the engraving.
  - width and height of the job in mm
  - Resolution (should be approximately equal to the size of the laser beam).
  - Aspect ratio, allows to keep the x / y ratio by changing the size.
- The [7] Screen allows to change the point of origin
  - Reference point (bottom left) and the reference point coordinates (and point 0.0)



- The List [4] lets you choose the mode for images
  - *Black / White* image at two levels according to the selected threshold
  - *256 Gray levels*, is possible to change brightness, contrast and gamma of the image, the real power sent to the laser will be changed according to the configuration power curve to compensate for laser non-linearity.
  - *Dirthing* : The image in gray is transformed according to the dirthing algorithm (pitting) Floyd-Steinberg. Very suitable for large size images.
- The [5] Area lets you choose the operating mode for generating GCode::
- First Row
  - Raster Scan bidirectional, monodirectional, vectorial (outline)
  - For Raster scan is possible to choose the Dot mode (point to point) or linear.
  - I also possibile to choose the optimized scan, that eliminate the empty parts of the row (laser off). This option permits a more rapid operation, but elveate speeds increase the non linearity effect at border caused by direction reversal (not istantaneous)
  - With this command is possible to add a little "white" border of some mm.
- Second Row
  - In case of raster scanning is possible to choose horizontal, diagonal or vertical raster, the option to be selected depends on the material being engraved, generally wood grain looks better with diagonal scans.
- The area [8] allows to adjust power and speed (from 20 to 6000 mm / min)  
These values will be used for the generation of GCode
- If the Override flag [X] [9] is enabled then the values set at the time the Gcode generation will be replaced with those selected. (power and speed in red), finally there is the option to select the movement speed (whith laser off).
- In addition to this, it is possible to set a number of automatic repetitions of the work (useful in case of cutting work) and the pause for cooling the laser between repetitions.
- The [A] area allows you to upload pre-recorded profiles.  
Is possible to store all values in [8] and give it a name, in order to recharge the setup for repetitive works
- Before send the code to the machine is possible to have a preview of what will be engraved ([Image] button in the left bar [2])

The yellow path means laser off, in blue the path with active.



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