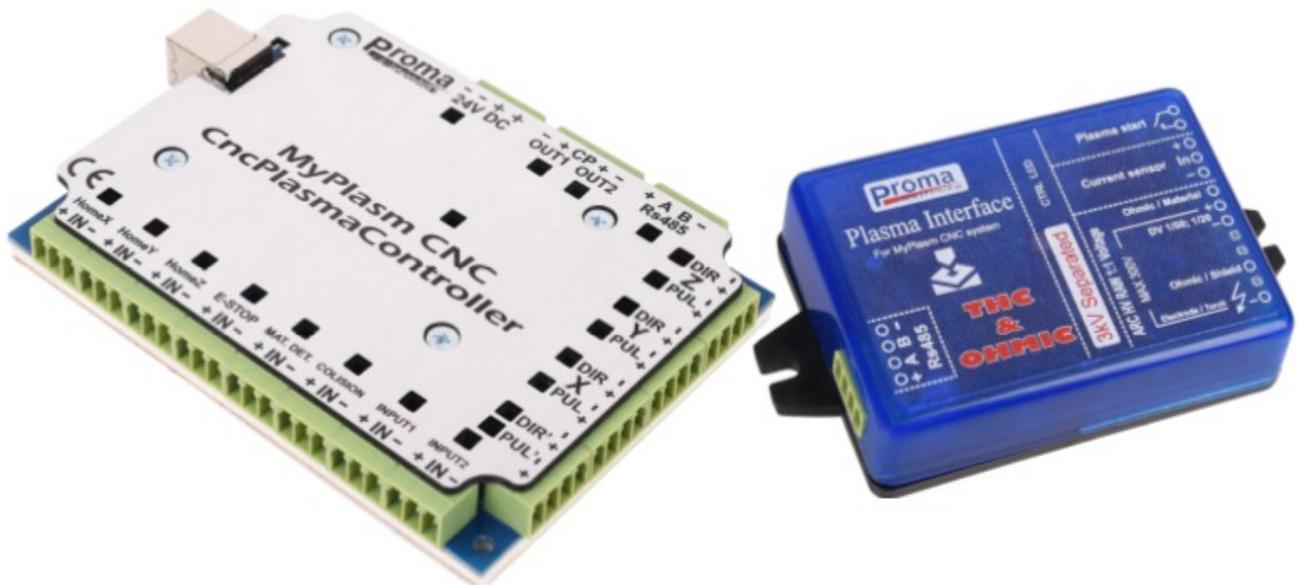


# MyPlasm CNC System

## Operating Manual



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# 1 General description of the Scheme

The MyPlasm CNC system controlling plasma cutting machines is the simplest system that allows people who do not have advanced knowledge of programming and controlling CNC machines to operate the machine. Although many professionals trust it, it is mainly for hobbyists and amateurs. For processes where productivity and quality is put at the highest level, professional programming tools should be used.

## The system includes :

- a. Advanced USB motion controller MyPlasm CNC
- b. Plasma interface ( **integrated THC controller and OHMIC** )
- c. MyPlasm CNC control software (for Windows PC / Laptop with USB port)

The main idea of the system is to control the machine on the basis of 2D drawing and not on the basis of G-codes as in other programs. This significantly reduces the required level of knowledge - the system does many operations automatically without the participation of the operator.

An additional advantage is the integration in one system of very simple MyMiniCAD modules for making simple drawings as well as MyMiniCAM for automatic toolpath creation, which completely excludes the purchase / installation / use of additional external programs for simple parts as well as reduces to a minimum the preparation time of the cutting process.

For more complex projects and/or to create advanced paths, you can use external CAD / CAM tools and import the finished cutting path into the system.

The system is intuitive and very easy to use - enough for most simple operations. However, it cannot compete with advanced control systems available on the market, which have unlimited possibilities and are operated by professional programmers and CNC operators. If you are one of them, this product is not for you.

## The latest MyPlasm CNC software version

**you can download for free from the manufacturer's website.**

**[proma-elektronika.com](http://proma-elektronika.com)**

**( program has the ability to simulate system operation )**

**The software must be installed BEFORE connecting the system to the computer!!!**

**MyPlasm CNC program like any software can have hidden defects. The manufacturer of the system is not responsible for possible damages resulting from improper operation of the program or its improper use. The manufacturer makes every effort to solve all reported problems as soon as possible by placing updates available on the manufacturer's website free of charge.**

**Technical info:**

Power supply : **24V DC / 0,6A**

Communication : **USB 2.0 Port**

Operation system : **Windows 7,8,10 32/64 bit**

Import files supported : **dxg, g-code(convert to draw), plt (hpgl), 2d**

Axes supported : **3 X,Y,Z + X'/Y'**

Axes signals : **Step / Dir**

Sensor inputs (8) :Inductive : **NPN NO** or Contacts : **NO**

Optional Outputs Out1 / Out2 : **NPN 0,5A**

Plasma Interface communication : **RS485**

Integrated THC+ OHMI: **Yes**

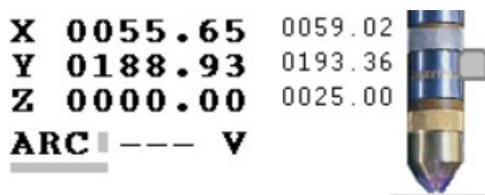
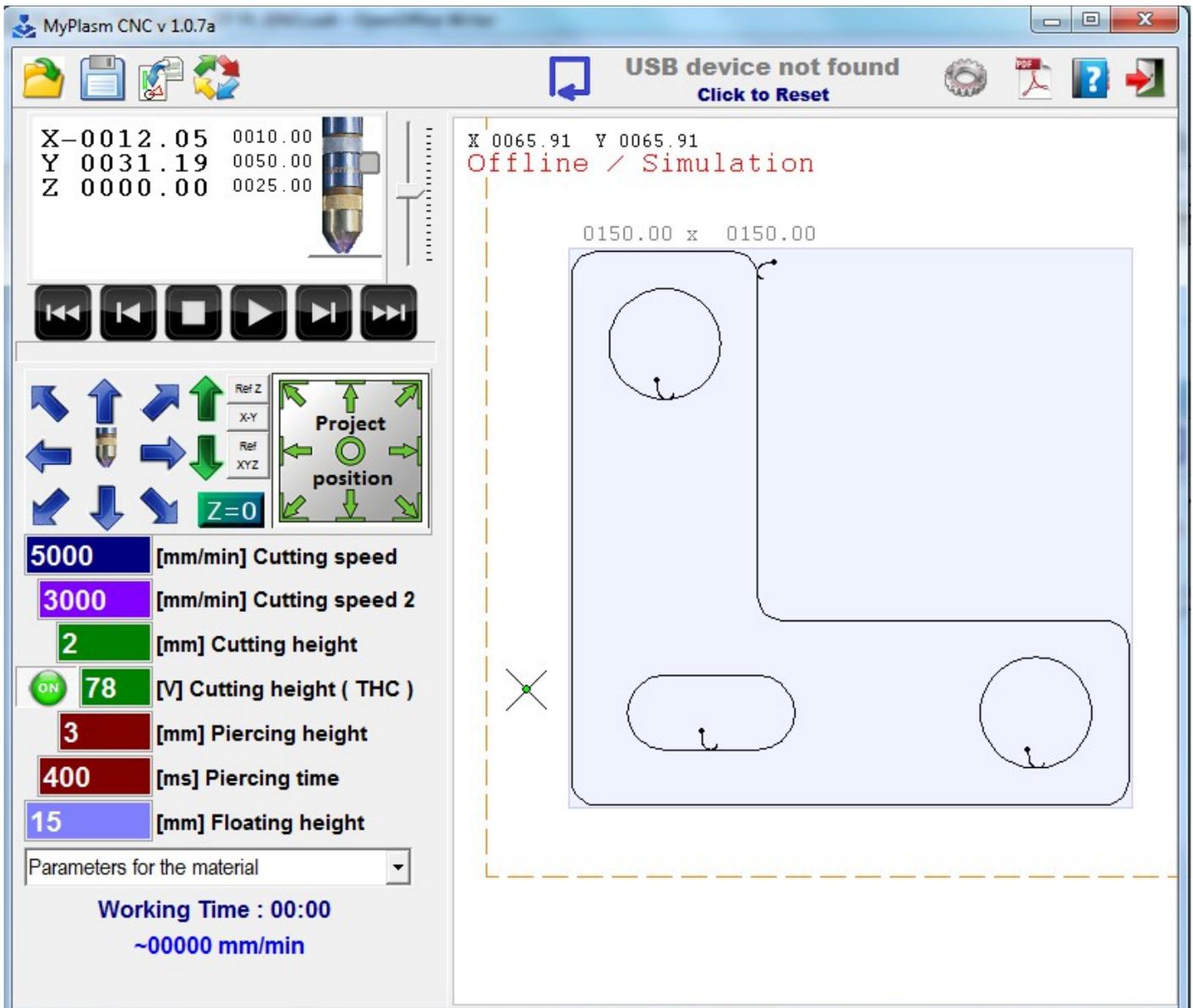
Integrated Voltage Divider : **Yes**

THC Voltage Range: **20-300 VDC**

HV/HF interference resistance: **10kV/1MHz**

Optoisolation: **Double**

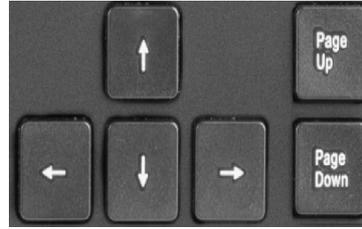
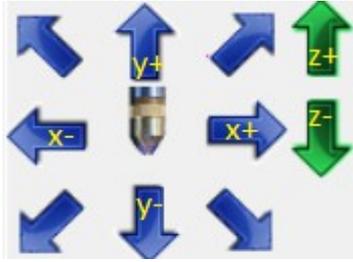
## 2. main program window :



Current coordinates of the torch position (in relation to material and machine), measured ARC voltage of the plasma arc (for height control of the THC controller). The torch drawing indicates the current position in Z-axis (height above the material) and signals the detection of the material height. Right-click to modify the coordinates



Automatic operation buttons - Scroll the program to any path (also possible by moving the blue progress indicator), stop and start the program. Holding down the **SHIFT** key, the program will be started without switching on the torch (**cutting simulation – machine will move only**).



Manual control. **Right-clicking** allows you to force the borders / working range as well as to ignore the activation of the borders. Holding down the **SHIFT** button, the movements take place at maximum speed and **CTRL** slows down. The torch symbol key activates the plasma source ( **SPACE** ).



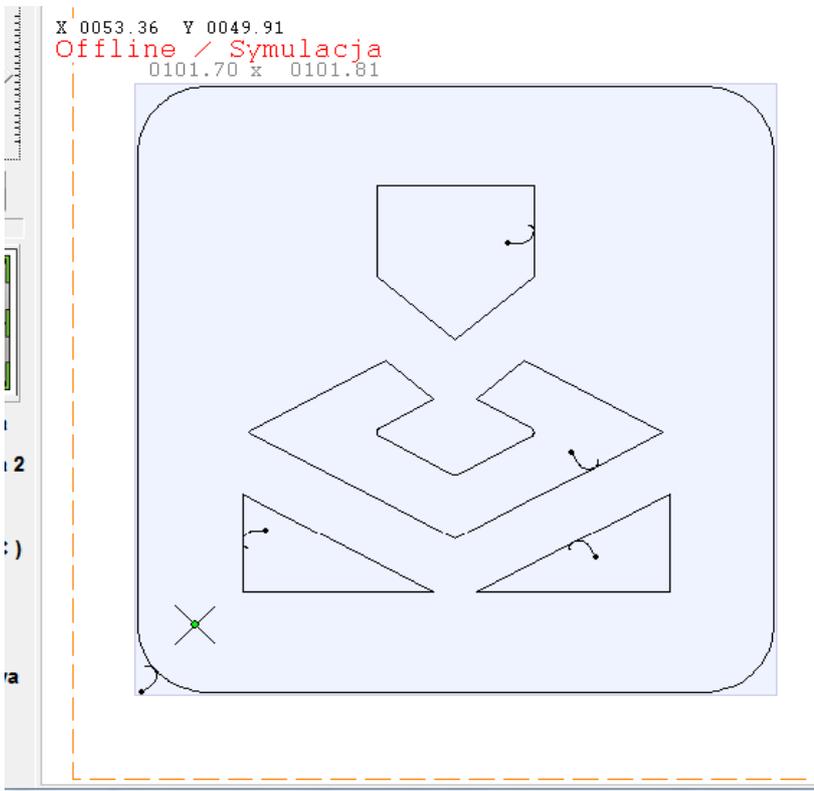
Zero/ set material coordinates / indicating the position of the project / material on the machine.



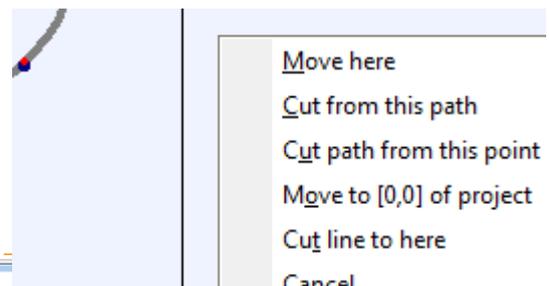
Cutting parameters. Detailed description on page 29.



Display of automatic operation time and current torch speed.



**Project preview** : mouse wheel enlarges/reduces preview, **left mouse button** can move preview. The orange dashed line shows the range of Soft Limits (if the function is active). By holding down the **right mouse button** you can move the project to any position. **Double-clicking** with the left mouse button resets the view ( adjusts the project to the window ). A short click on the **right mouse button** calls up an additional function window.





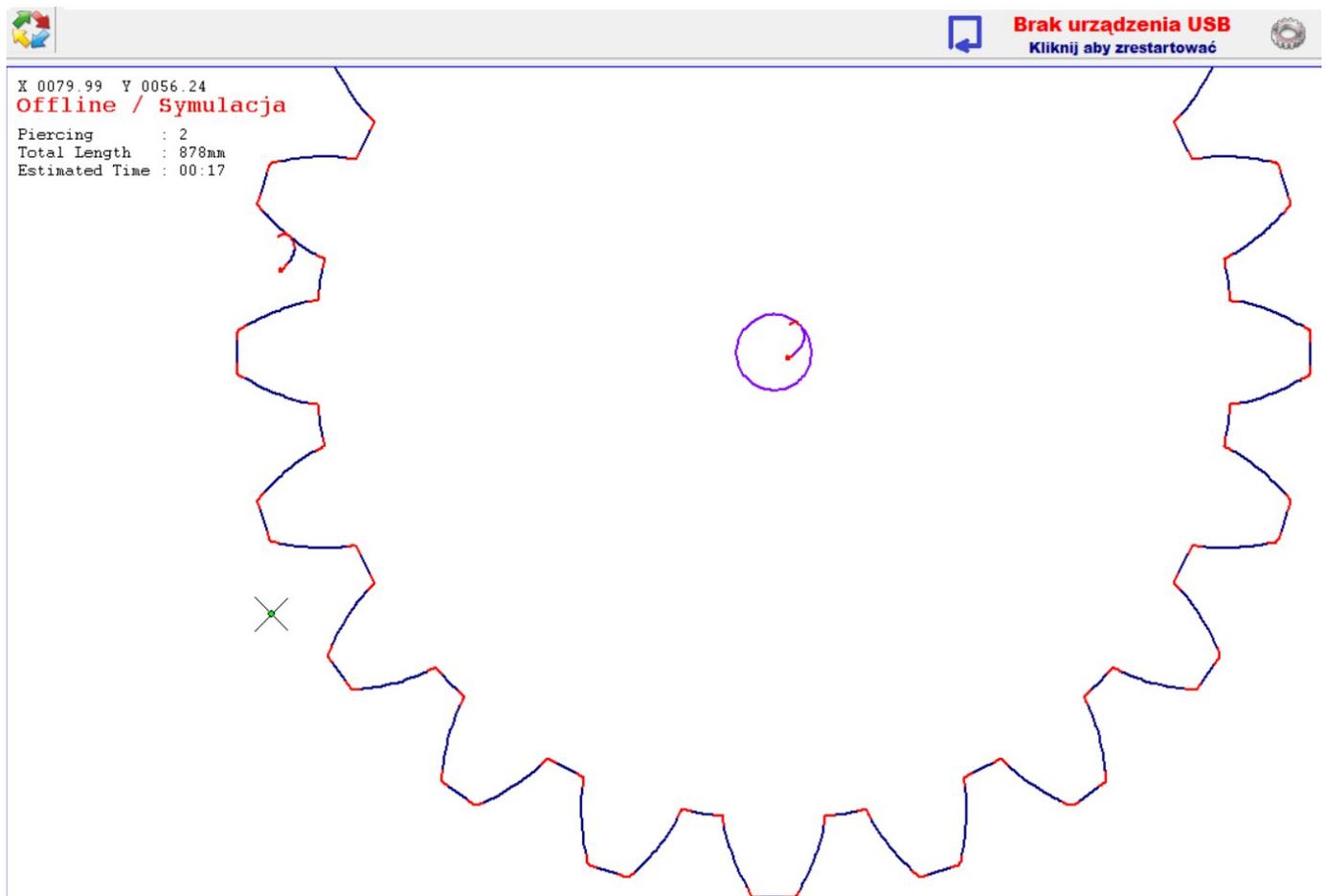
 Open / Save project

 files import to project ( **MyMini CAM module**),

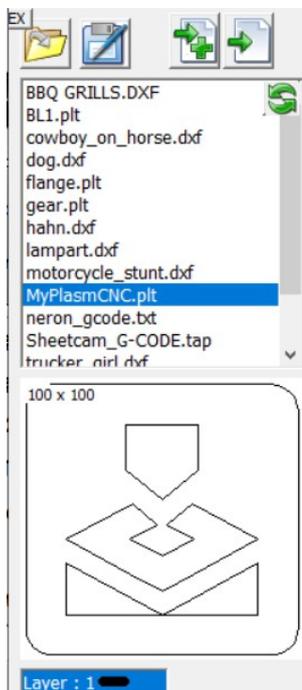
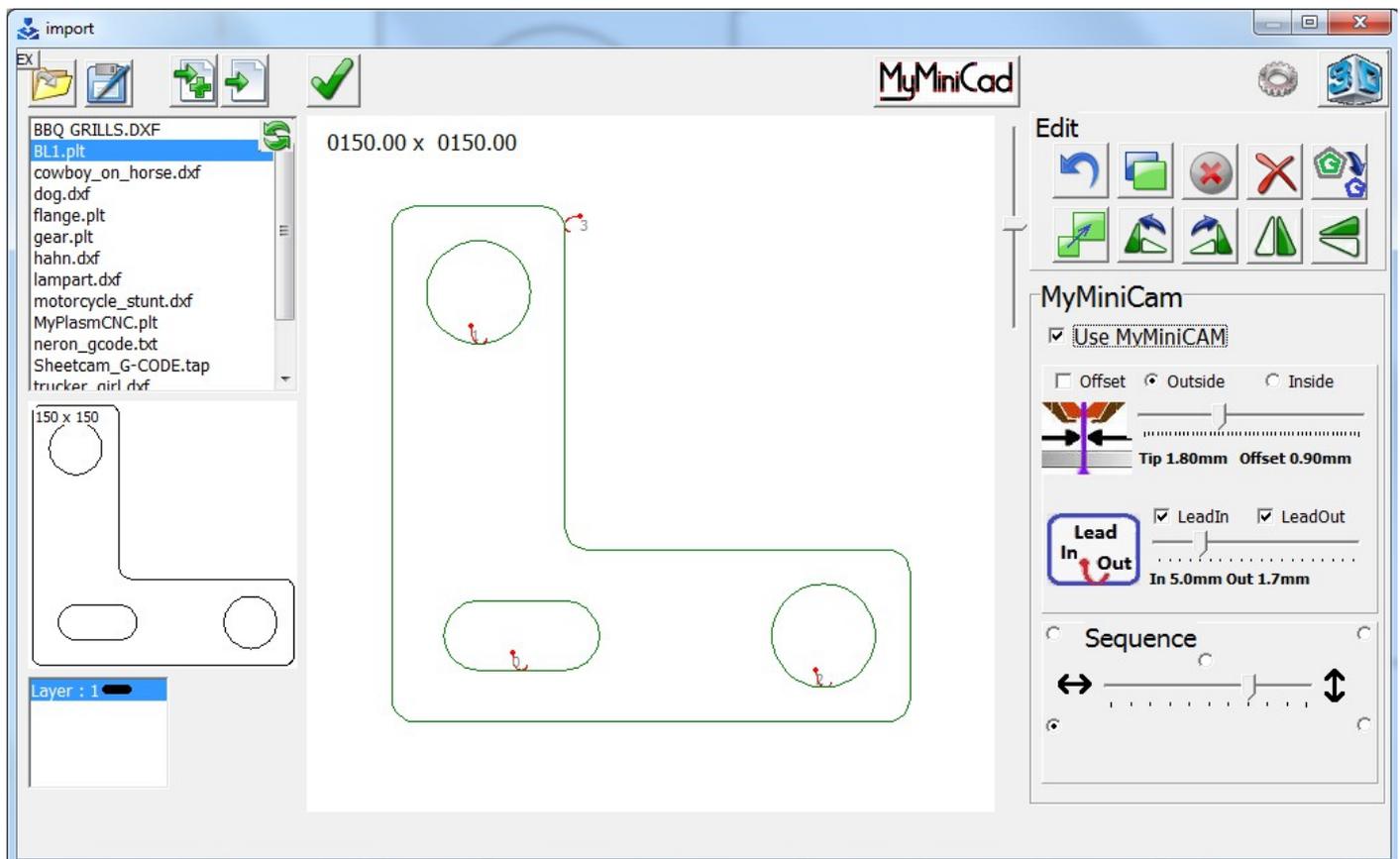
**USB device not found** USB communication status with the MyPlasm CNC controller,  
**Click to Reset**

 program and controller configuration.

 **Preliminary path analysis** Shows individual elements of the cutting path and estimates the approximate cutting time for the currently selected parameters. The red colour is marked on the fragments of the paths where it is not possible to maintain the preset cutting speed for the given machine and cutting parameters - in these places the THC torch height adjustment ( Anti-Diving Function ) is disabled.



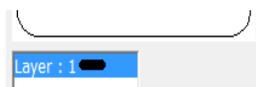
## 2. MyMini Cam window:



A file viewing window with a quick DXF, HPGL, G-CODE and 2d preview in the default ( last used ) folder.

 opening a file from another folder ( changing the default folder )

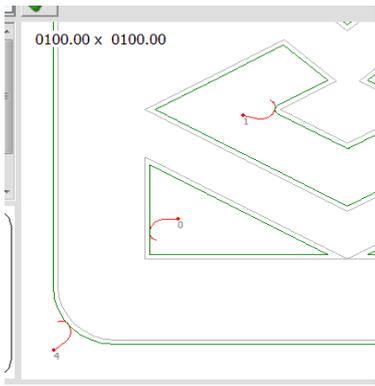
**EX** – Restore the list of sample files contained in the program

 Select the active layer / color to import..

 Importing a selected file.

 Adding another file to the project..

 Refresh the file list.



### Preview window of imported files:

Use the mouse wheel to zoom in / hold down the mouse wheel to move the view.

Left Mouse Button - select, move selected items. Holding down the CTRL key allows you to select/unselect multiple paths.

With the **right mouse button** you can change the firing position generated by the MyMini CAM module ( **if used** )

(CTRL+A) Select all objects, (CTRL+C) copy, (CTRL+V) paste intelligently

**Grey** : Original unprocessed file ( detail )

**Blue** : raw path untreated ( with MyMiniCam off )

**Green**: path generated by MyMini CAM module

**Red** : torch entry/exit paths



Basic editing tools for selected elements - scaling (the left mouse button scales the group of selected paths as a whole, the right button allows you to scale the selected paths in series individually, e.g. to change the diameter of several holes), rotation (the left mouse button rotates 90° and the right mouse button rotates 5°), vertical and horizontal mirroring.



Undo the last operation (CTRL + Z),



Duplicate objects, Right mouse button (CTRL + V) - Smart Paste



Deactivate the object,

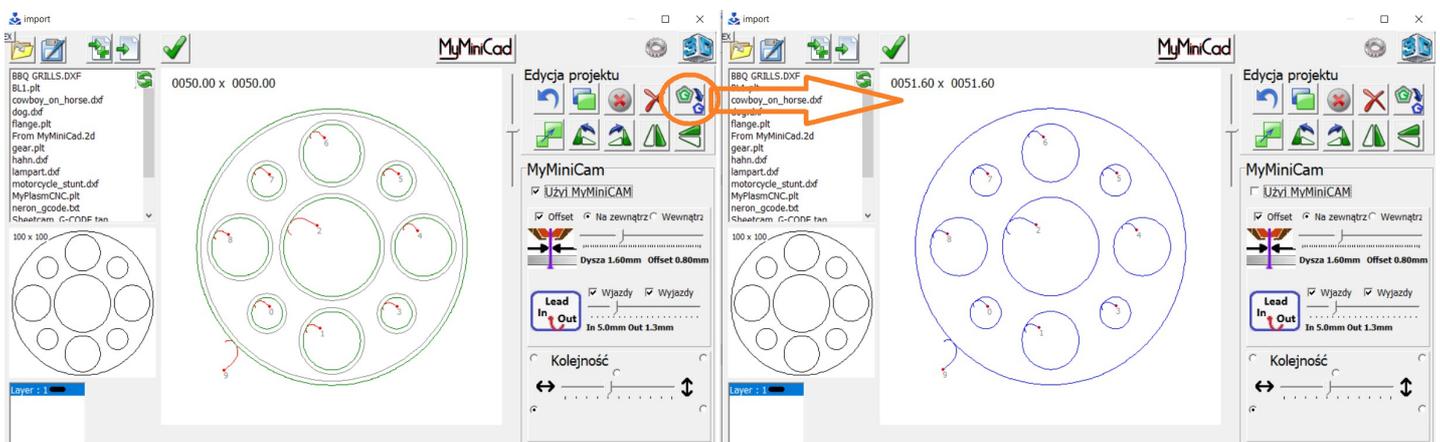


Delete (Delete key)

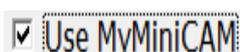


Converts the result of the MyMiniCAM module (offset, LeadIn/LeadOut/Sequence) to a fixed path. Useful tool when you want to e.g. duplicate a prepared output path and not input objects. Such a path is "frozen" and will not be further processed by MyMiniCAM.

Example of action::



By clicking CTRL+E it is possible to save/export the prepared path for future use.

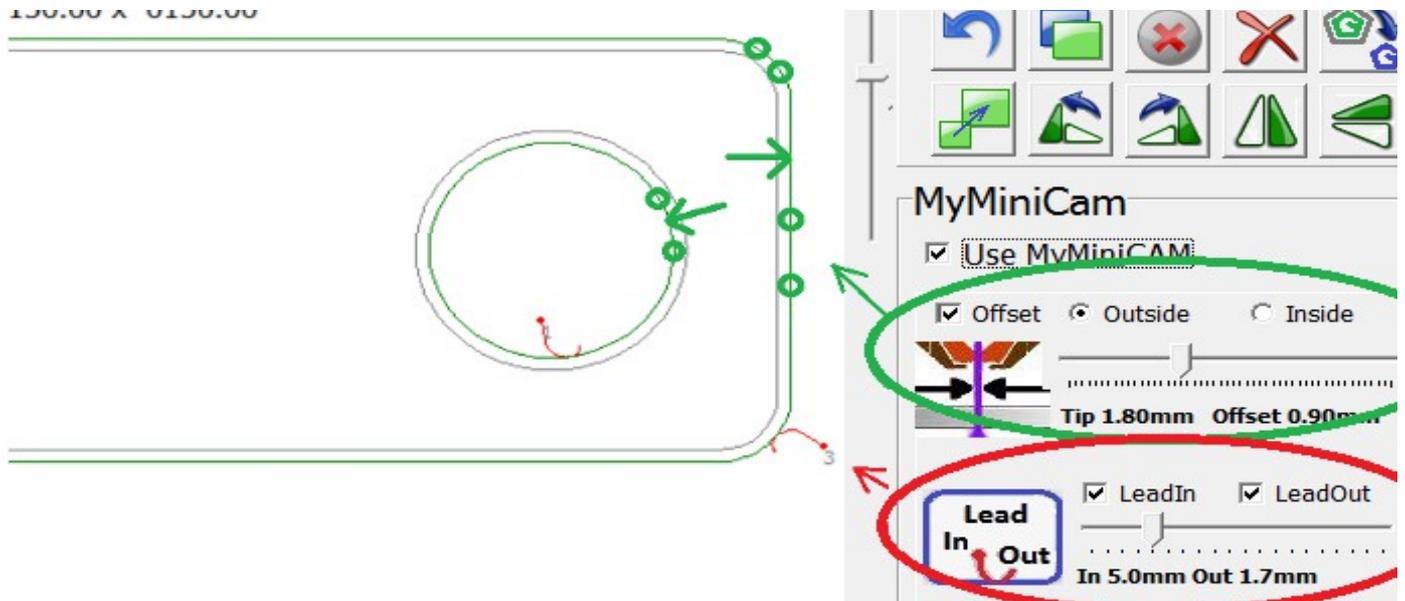


It activates the MyMiniCAM module to generate the cutting paths. For ready-made paths, e.g. G-codes generated in an external CAM program, you need the module **TURN IT OFF.**

**Offset** - the function moves the path (holes inwards, contour outwards) in order to introduce the correction taking into account the size of the nozzle.

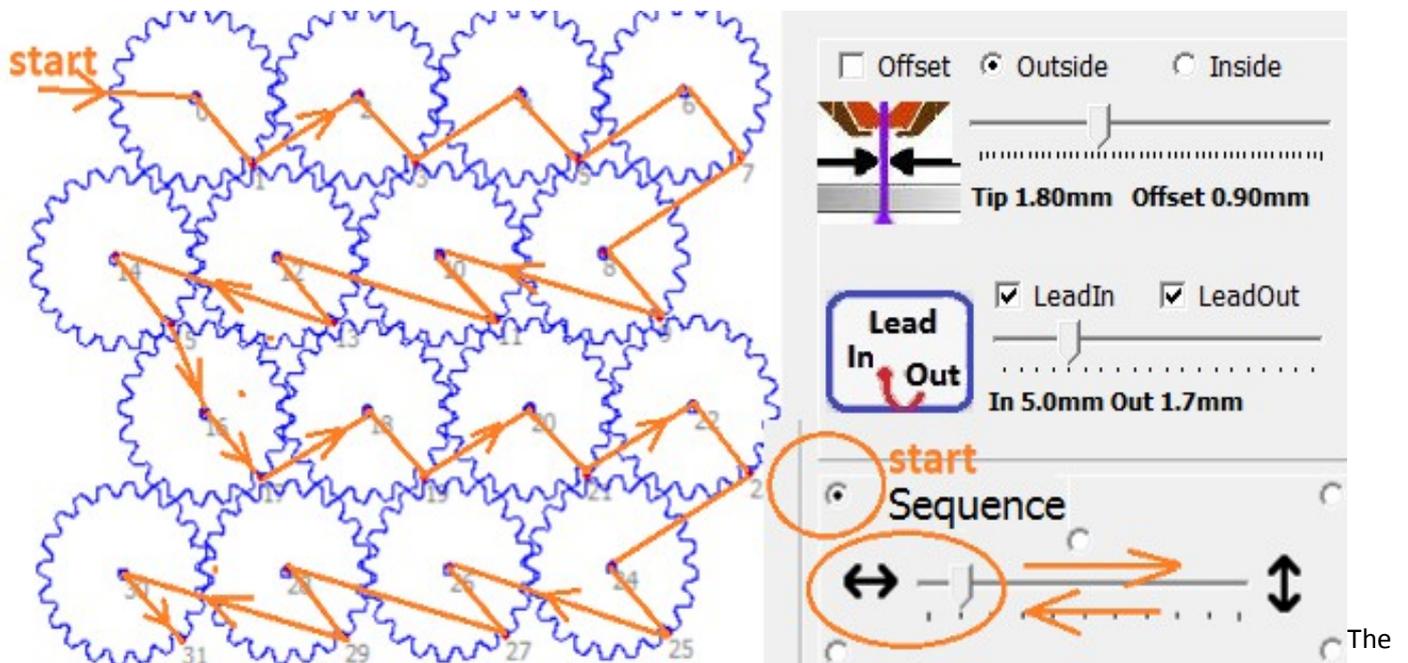
**Lead In** - Creates entry paths to penetrate the material beyond the edge of the workpiece in order not to damage it.

**Lead Out** - Creates exit paths to cut through thicker materials.

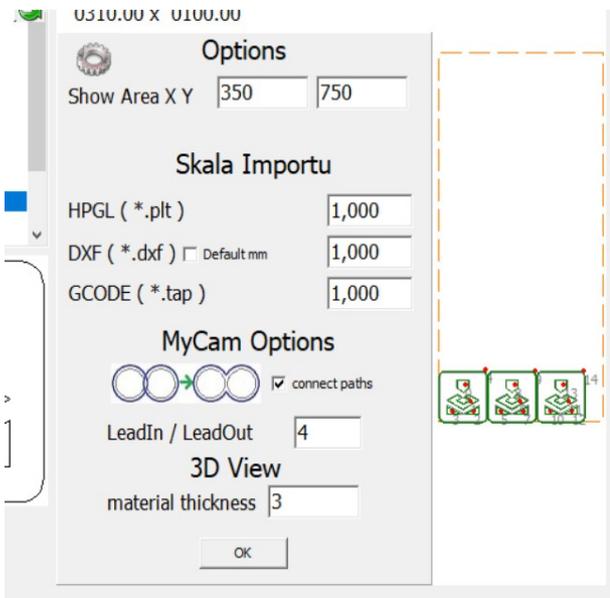


**Order** - Forces the starting point and direction of the path queuing.

Example:



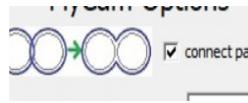
**MyMiniCAM** module is very simple and has only the basic necessary functions to automatically, very quickly and conveniently generate tracks from the drawing. **For more demanding projects use any external CAM program.**



The module's basic options:

**Show Area X Y** : shows the area on the screen (e.g. material size)

**Scale** : Default scaling of input files.



The function determines whether the resulting paths will be merged if a collision is detected (intersecting).



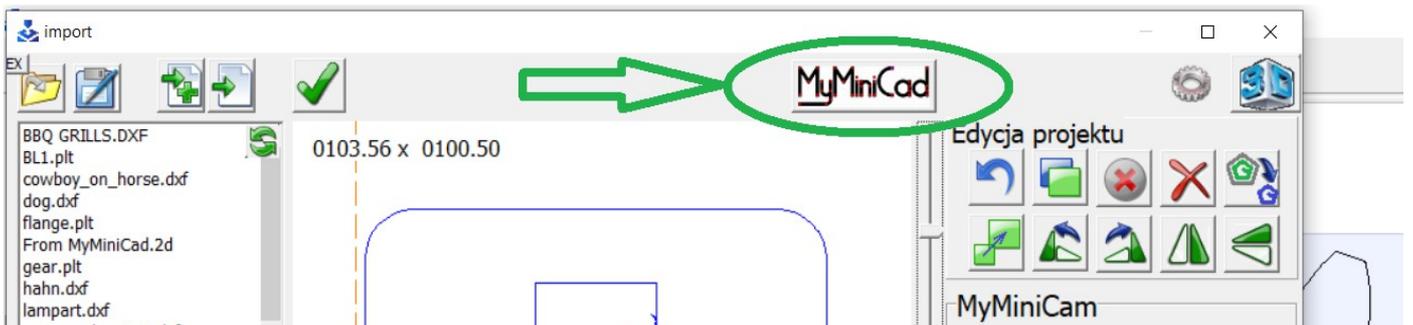
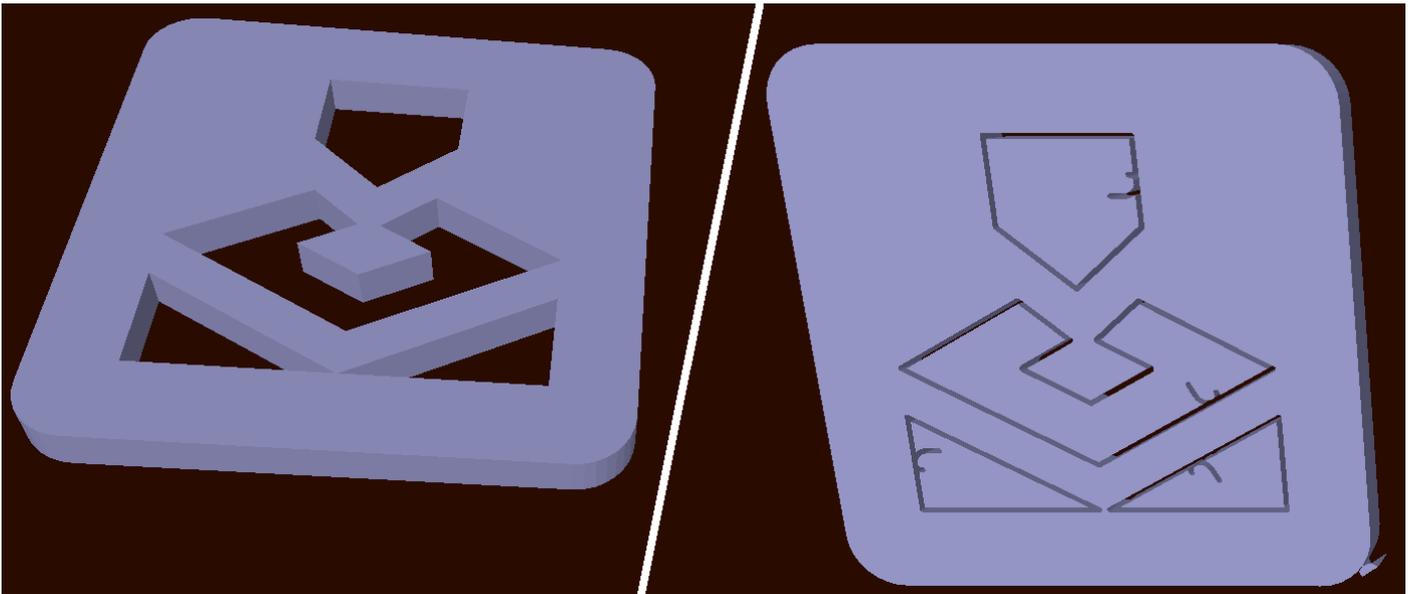
Lead In to Lead Out path ratio



Thickness of material displayed in 3D preview



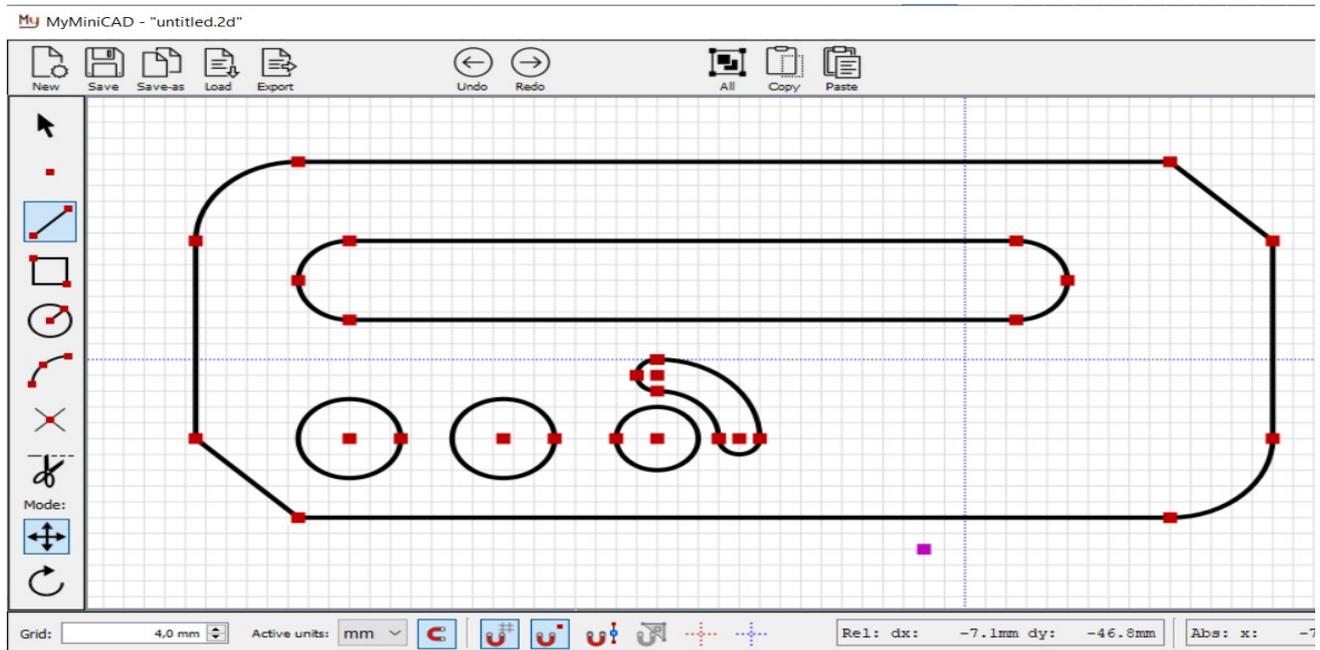
3D preview of workpieces / cutting paths



Starting MyMini CAD module for drawing simple details

## 2. MyMini CAD module

The program has a built-in **MyMiniCAD** module, which allows you to draw simple details with a few basic tools without using external AutoCad programs. Please note that this is not a professional tool and for complex projects you should use any professional external CAD program.



**New** : Cleans the window ( Creates New / Clean Design )

**Save** : Saves the project

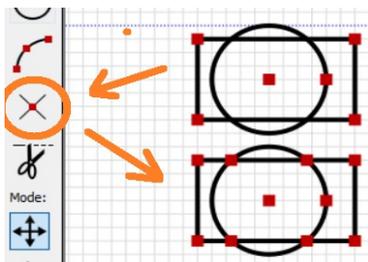
**Save-as** : Recording the project under a new name

**Load** : Saved file readout

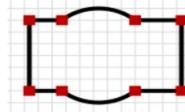
**Export** : Export file directly to MyPlasmCNC / Import Module / MyMini CAM. It significantly speeds up the process for "one-time" projects.

**Note** : The **Export** function overwrites the previously exported file so if you need to use them in the future, save the files with **Save / Save-as** option.

Selecting several tracks is possible by holding down the **CTRL** key

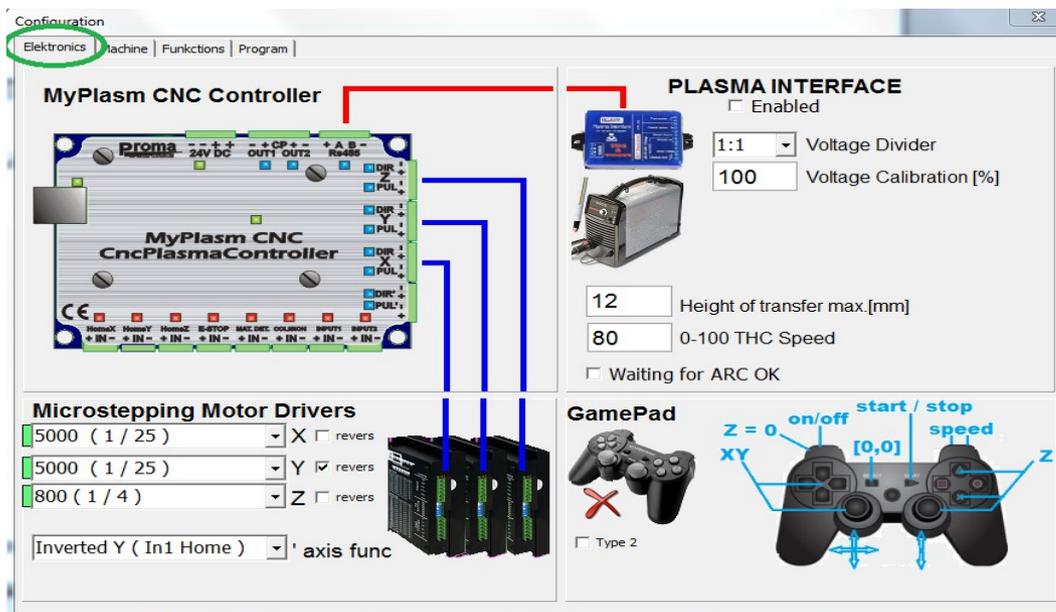


In addition to the basic drawing tools, the program has an intersection detection function, which makes it very easy to create resulting objects after removing unnecessary lines with the scissor tool. ( delete ).

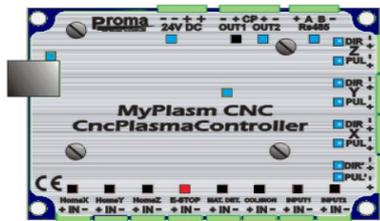


The rotation tool while holding the **CTRL** key forces a 5 degree rotation

## 2 Program and controller configuration

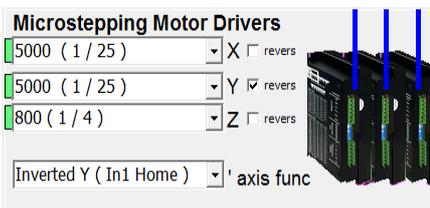


In the **Electronics** tab we configure external electronic devices connected to the System:

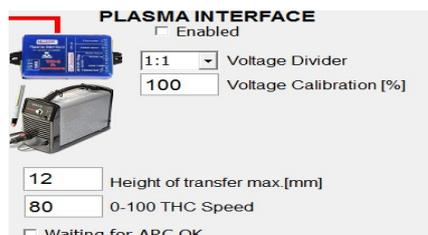


During an active connection, the **CNC controller symbol** shows the current signals that are received at the inputs (red shows the activated external input e.g. with a sensor / home edge).

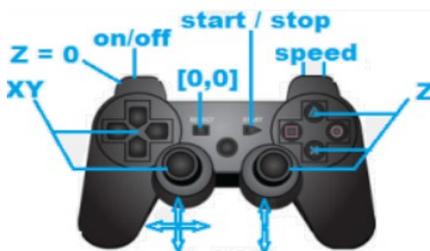
It also shows (in blue) the output signals Out1 / Out2 and the status of the RS485 connection to the plasma interface.



Determining the **microstepping** of motordriver - detailed description later in the manual



**Plasma interface configuration** - detailed description later in this manual



Connection status of the GamePad to machine control.

Control the operation of individual controller functions:

Feed rate XYZ, speed selection, material zero/height detection, positioning of the left bottom corner of the project [0.0], switching on the torch on/off, automatic cutting start ( holding the START button for 1s) Stop/stop ( short press of the START button ).

During manual cutting (in an X-axis or Y-axis straight line) with the GamePad, the torch is automatically switched off when the feed is stopped.

For the simplest controllers, both wired and wireless PC-compatible, it is not necessary to install the controllers and they work properly right after connection.

## The Machine tab:

Configuration

Elektronics Machine Funktionen Program

### XY Axis moving parameters

XY maximum speed [in/min] **400**

Hand XY speed [in/min] **150**

XY safety speed [in/min] **40**

Acceleration XY ( RAMP ) **20**

### Z Axis moving parameters

Z maximum speed [in/min] **100**

Hand Z speed [in/min] **40**

Z safety speed [in/min] **20**

Acceleration Z ( RAMP ) **20**

**Axis soft limits**

X Y Z

100 40 5

### Homing

Home switches active

Revers **40** X Speed [mm/min] **20** Z Speed [mm/min]

Revers **40** Y Speed [mm/min]

### XY moving / gear parameters

X Axis move per motor rev [ in ]

Y Axis move per motor rev [ in ]

### Z moving / gear parameters

Z Axis move per motor rev [ in ]

### Axle feed parameters:

**Maximum speed:** Determines the speed for pass-through / access pass-through ( when torch is off )

**Hand speed:** Basic speed of the axis feed manually (MAX is used with SHIFT, 10% with CTRL)

**Safe speed:** max. cutting speed in corners and small/complex shapes - too low a speed can significantly slow down the machining process (will reduce dynamics), too high a speed will reduce the working culture of the machine (jerking and knocking at sudden changes of direction - **possible loss of steps**).

**Acceleration (ramp length):** It determines the dynamics of the machine - too long ramp (low acceleration) can significantly slow down the machining process (will reduce the dynamics), too short ramp will reduce the working culture of the machine (jerking and knocking at sudden changes of direction - **possible loss of steps**). **Recommended value 10 for very light structures up to 50 for very heavy gates;**

**Soft limits :** Defines the machine's field of operation - shown in the main window as a dashed orange line. The total range of the Z-axis operation must be given as the operating range of the Z axis (from grate to maximum position).

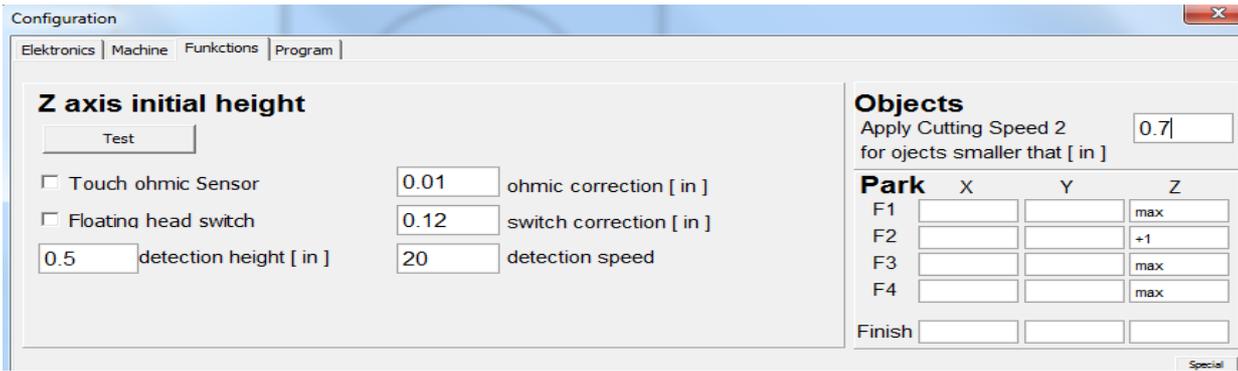
**Homing:** Defines the speed of the automatic axis base if HOME extremes are used.

**Axis gearing parameters :** Parameter Determines the axis displacement per motor rotation.

The correct setting of the axis ratio together with the setting of the step division from the "Elektronics" tab is the basis for the correct operation of the program - distances and speeds are calculated from these parameters.

**Correct configuration is easiest to confirm by comparing screen indications (coordinates) with physical axis displacement.**

## Functions tab:



**Z axis initial height** : see further details.

### Objects

Apply Cutting Speed 2  
for objects smaller than [ in ]

Determining below which size the objects (holes) will be made at a reduced speed 2 with the THC height control system switched off. This is to minimize bevelling when cutting small holes.

Park	X	Y	Z
F1	1200	2600	max
F2	m0	m0	+1
F3	+100		max
F4			max
Finish	+10	+10l	+20

### Parking

The program allows you to define any 4 parking spaces called with the keys F1 - F4 and the parking space after the cut-out.

Possible parking options:

**[ XXXX ] Absolute machine coordinates**, e.g. by defining 1200 2600 100, set the Z axis to [100mm] relative to the table and move XY to [ 1200,2600 ] relative to the lower left corner of the machine. **CAUTION: The use of absolute coordinates requires the machine to be properly Homing!**

**[ mXXXX ] Material Coordinates** : as above, however, the coordinates refer to the material/project position. e.g. defining m0 m0 m5 will move the torch into the lower left corner of the project [ X=0, Y=0 ] positioning the torch 5mm above the material.

**[ +XX / -XX ] Relative displacement relative to the current position.** e.g. defining "Finish" parking as +10 +10 +20 will cause the torch to be raised by 20mm after the cut is completed and the X,Y-axis shifted by 10mm - a function useful e.g. for driving down a gap to prevent splashing of the water table after the cut is completed.

**[ max ]** - determines the maximum absolute value defined in the Program Limits . e.g. defining in the **Z-axis limits** as "max" value will be move up to the maximum position.

Leaving an empty window, a given axis is not taken into account (remains in its current position).

## Special functions:

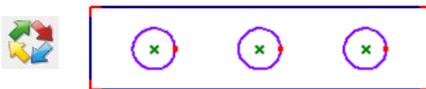
Extra individual functions for clients - Don't change it if you don't know about it !!! Special

0	5	[ ms / mm ] Pointing	<input type="checkbox"/> Oxygen Mode
40		[ deg ] Critical angle	
0		[ mm ] Next sense distance	
854		Piercing count	
327		Cutting count time [min]	
Laser On/Off		Out1 Mode	
during work On		Out2 Mode	
n/a		In1 Mode	
n/a		In2 Mode	

Setup Password

Save All Settings as default

**Pointing** : scoring function - for objects (holes) smaller than the declared diameter [mm], the torch is started for the time specified in the first field [ ms ]. For 0 ms, the function is disabled. Scoring takes place in the center of the object marked as **x** in the file analysis preview:



**Critical angle** : The angle of path below which the controller will not slow down to safe speed.

**Next sense distance** : You can specify the radius within which the next detection will not be performed since the last material height detection. 0 = Detection at the beginning of each track.

**Piercing Count** : Piercing counter ( double click to modify the value )

**Cutting count time** : Cutting time counter (double-click to modify the value)

**Out 1 / Out 2 Mode** : Outputs mode :

- n/a Inactive
- Laser On/Off : switched on at the beginning of the path, switched off at the end of the path
- During work on : switched on during automatic operation (e.g. for hoods, pumps etc...)
- On/Off Button : switched on via manual (own) button in the program

**In 1 / In 2 Mode** :

- n/a Inactive
- Torch UP / DOWN : external Height control if THC is not used
- Start/Stop : Start Automatic work (1s signal ) or stop ( short signal )

**Setup Password** : Password to block access to program/controller configuration

**Save All Settings As Default**: Saves the entire program configuration as default ( for restore )

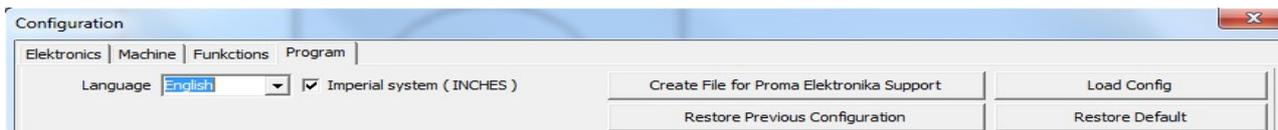
**Oxygen Mode** : Adds additional functions in the main window : Preheating time and height for Oxygen Cutting :

working time : 00:00  
~00000 mm/min

5 [s] Pre Heat Time

18 [mm] Pre Heat height

## Program tab:



Basic program settings such as Language, units and functions to restore program efficiency after a failure or accidental change of parameters.

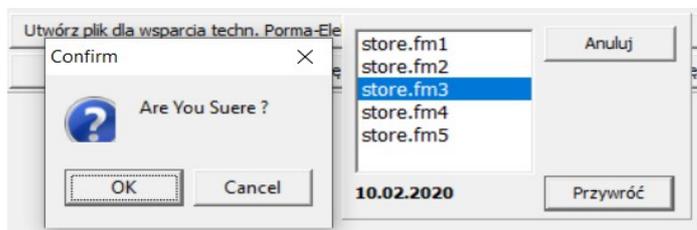
### Create File for Proma Elektronika Support

Function to facilitate the diagnosis of software-related problems - Creates a **MyPlasmCNC.zip** file on the desktop (with program configuration), which should be sent to [kontakt@proma-elektronika.pl](mailto:kontakt@proma-elektronika.pl) along with the problem description.

**Load Config** Allows you to load the program configuration from the support file.

### Restore Previous Configuration

The program automatically creates security copies of the program configuration. This function allows you to restore the configuration from the backup copy :

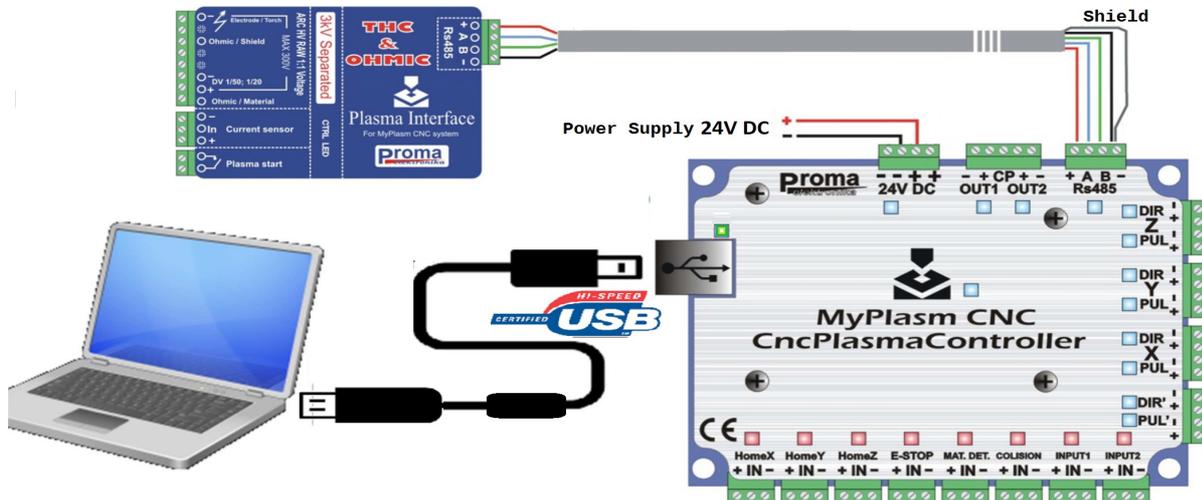


**Restore Default** Restoring the configuration saved as default in special functions.

## 6 Power connection / initial start-up

It is recommended to start the system in small steps. This makes possible errors easier to spot and remove than with extensive cabling and configuration.

First of all, connect the MyPlasm CNC controller with the Plasma Interface, connect the 24V DC power supply (power supply with a minimum capacity of 0.7A) and connect the USB cable to a computer with MyPlasm CNC software installed earlier.

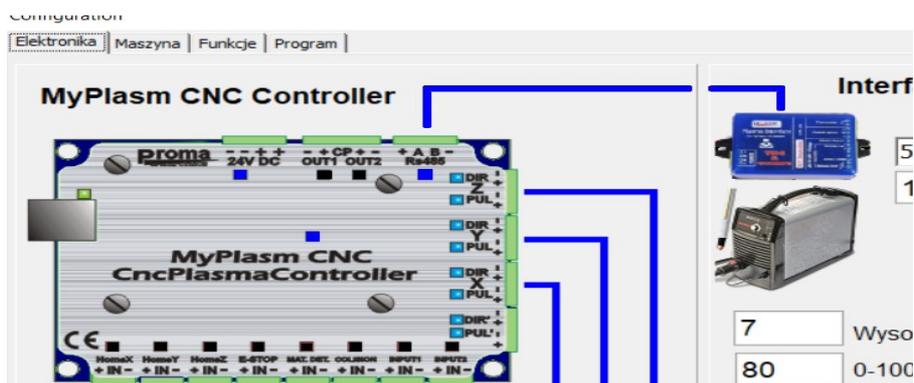


After establishing the communication, the compatibility of the controller's firmware version with the program version on the computer will be checked and, if necessary, the firmware in the controller will be updated.

If everything went well, the program will display the status of connection with the controller in green:



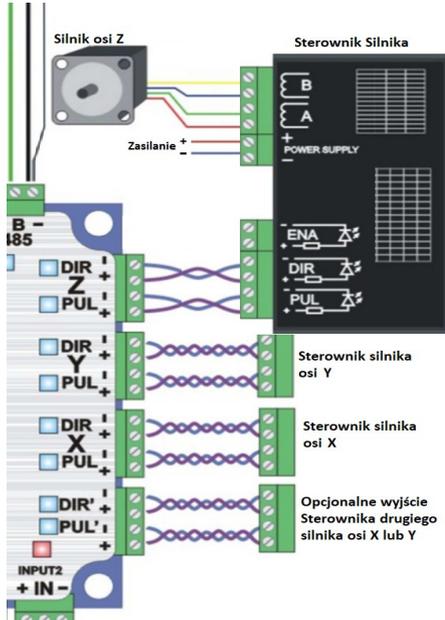
Going to **Electronics** configuration tab, the controller preview should look like below:



by clicking the torch symbol in the main program window or [ SPACE ] should switch on/off the plasma start relay in the plasma interface (indicated by the blue LED on the plasma interface).



## 7 Connection and configuration of motors



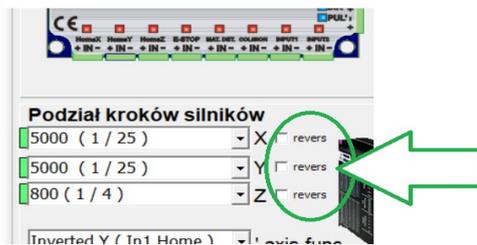
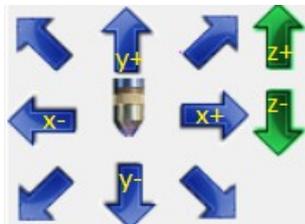
The MyPlasm CNC controller has **PUL/DIR ( Step/Dir )** outputs to control 4 stepper motors, servo-steppermotors or servo drives. **In order to minimize the impact of interference on the control signals, the connections should be made with twisted pairs of wires as shown in the figure.**

If the machine is equipped with a second motor on the X or Y axis, connect it to the optional **DIR' / PUL'** outputs and select the appropriate option from the **Elektronics** configuration tab:



The outputs of the second motor are clocked with a reverse signal - an identically connected motor will turn in the reverse direction

**After connecting the motors, check/adjust the X,Y,Z axis direction.**

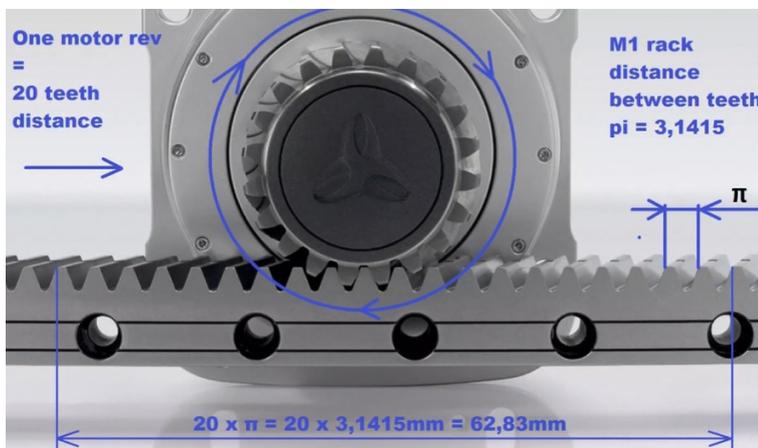


The next step is to determine the gearing parameters of individual axes.

**WARNING!!!! Together with the correct determination of the steps division, these are the most important parameters influencing the efficient (fast, smooth and precise) operation of the machine.**

In the **Machine** Configuration tab, the axis offset per one motor rotation must be specified. For example, the drive: if the 20 teeth sprocket with module 1 (distance between teeth =  $\pi \cdot 3.1415\text{mm}$ ) is mounted directly on the motor, the machine offset per motor revolution will be  $20 \cdot \pi = 62.83\text{mm}$ .

XY moving / gear parameters		Z moving / gear parameters	
62,83	X Axis move per motor rev [ mm ]	8	Z Axis move per motor rev [ mm ]
62,83	Y Axis move per motor rev [ mm ]		



For the **Z axis**, this is usually the pitch of the drive screw thread, taking into account possible gear ratios.

Then, in the **Electronics** configuration tab, the motordriver must be microstepping setup.

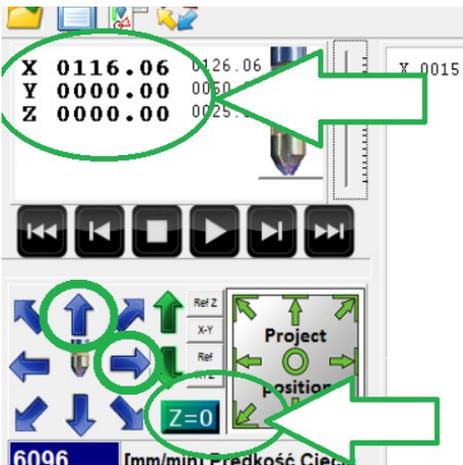


The program is marked in green for suggested values for previously specified axis ratios for fast and precise positioning. Red mean not recommended microstepping for your gears.



**WARNING !!!! Configuration of the controller steps division (usually set by means of microswitches / see the controller's manual) must be consistent with the settings in the program!!!!**

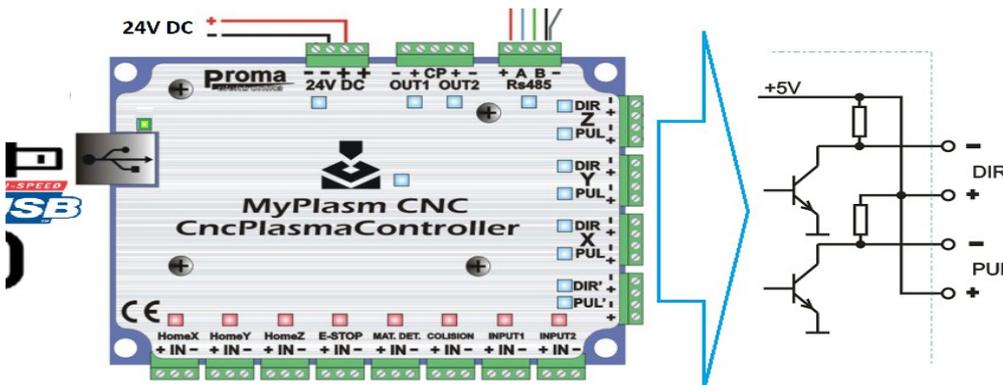
Correctly configured gears with step divisions can be checked by comparing the physical offsets of each axis ( X, Y, Z ) of the machine with the coordinates in the main program window. For convenience, the coordinates can be reset using the project positioning buttons.



**Tip: According to MyPlasm CNC users, the best results (high dynamics, speed and precision) are obtained with identical X,Y axis ratios within the range of 30-80mm feed rate per motor revolution and 8-20mm per motor revolution for the Z axis.**

YouTube video tutorial on gearbox configuration : <https://youtu.be/qD7s9NOhA6E>

Step/Dir outputs are as **Common-Plus**. Inner ideal diagram of Step/Dir outputs :



## 8. Soft Limits / Reference / Homing

The program allows to set machine limits (range of machine operation) within which the torch can move. The function works correctly only if a reference drive ( Machine base ) has been performed. The operating range of the individual axes must be entered in the **Machine** configuration tab.

<input checked="" type="checkbox"/> <b>Axis soft limits</b>		
X	Y	Z
2540	1016	127

### Manual Homing (without HOME switches):



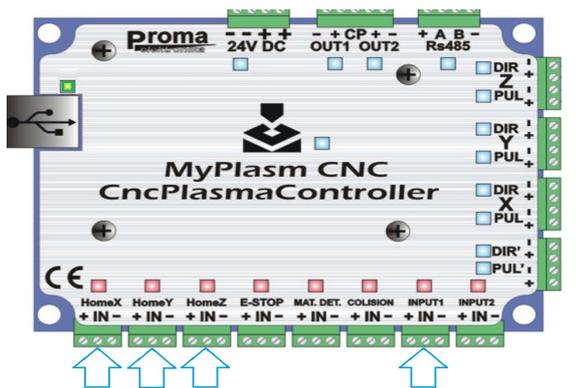
Lift the Z-axis upwards, the X-axis upwards to the Left and the Y-axis downwards (to yourself) and click REF XYZ.

**Tip: If the work limits do not allow movement, right-click on the arrows to force the work area.**

**In the case of a manual Homing, the HOME Switches must be disabled in the "Machine" / Base Room configuration window.**

### Automatic Basing (using HOME based limits)

For the correct machine Homing (setting of reference points) the HOME sensors / switches must be correctly connected.



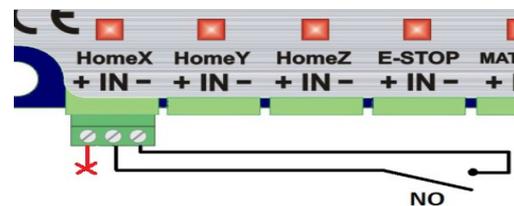
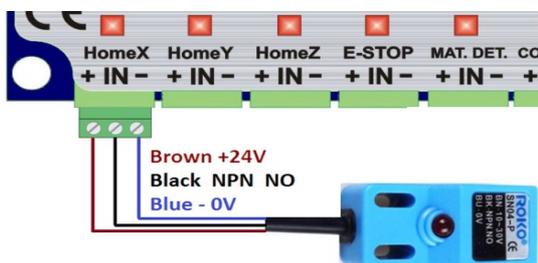
Sensors/switches Home for the **X, Y** axis can be mounted on either side of the axis (for zero or maximum points).

For the **Z** axis the **HOME Z** sensor must be mounted in its upper position.

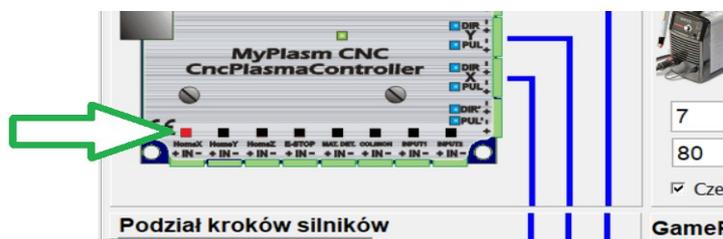
The basic inputs for sensors are **HomeX HomeY and HomeZ**.

The Home input for the **Slave X/Y axis** (if used) is **INPUT1**.

Connection of the **NPN NO** inductive sensor and/or mechanical switches :



Correct connection can be checked in the **Electronics** configuration tab - activation of sensors/endors should be activated both by the lights on the controller and in the program.

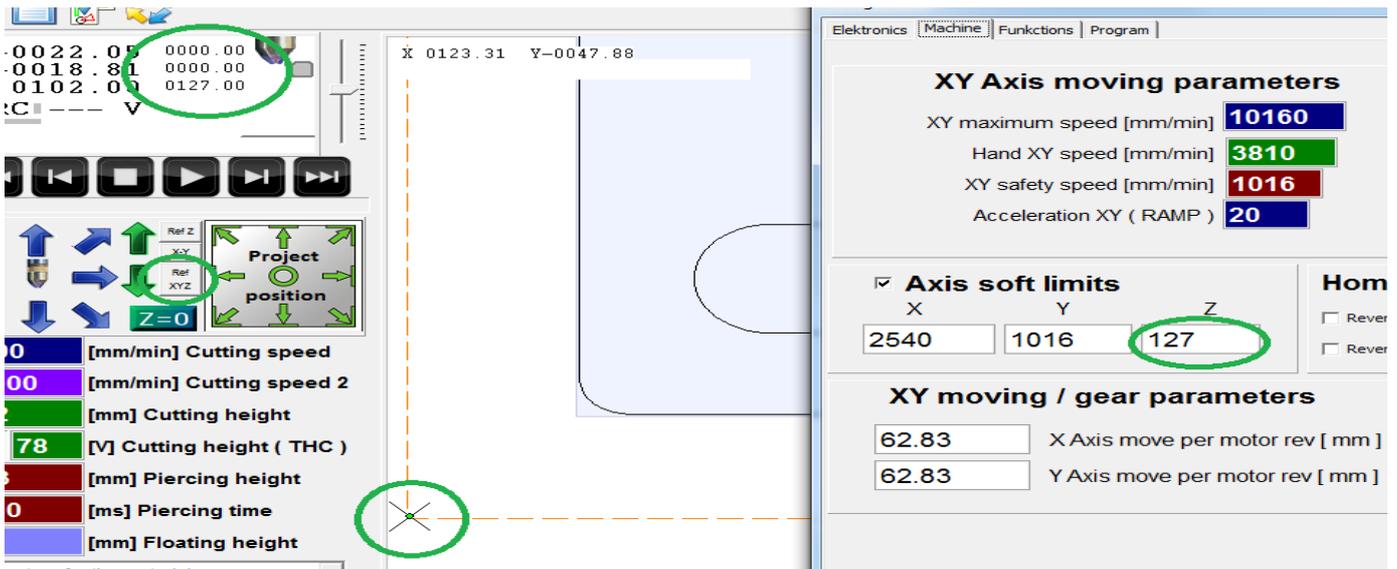


**Automatic Homing** must be activated in the **Machine** configuration tab.



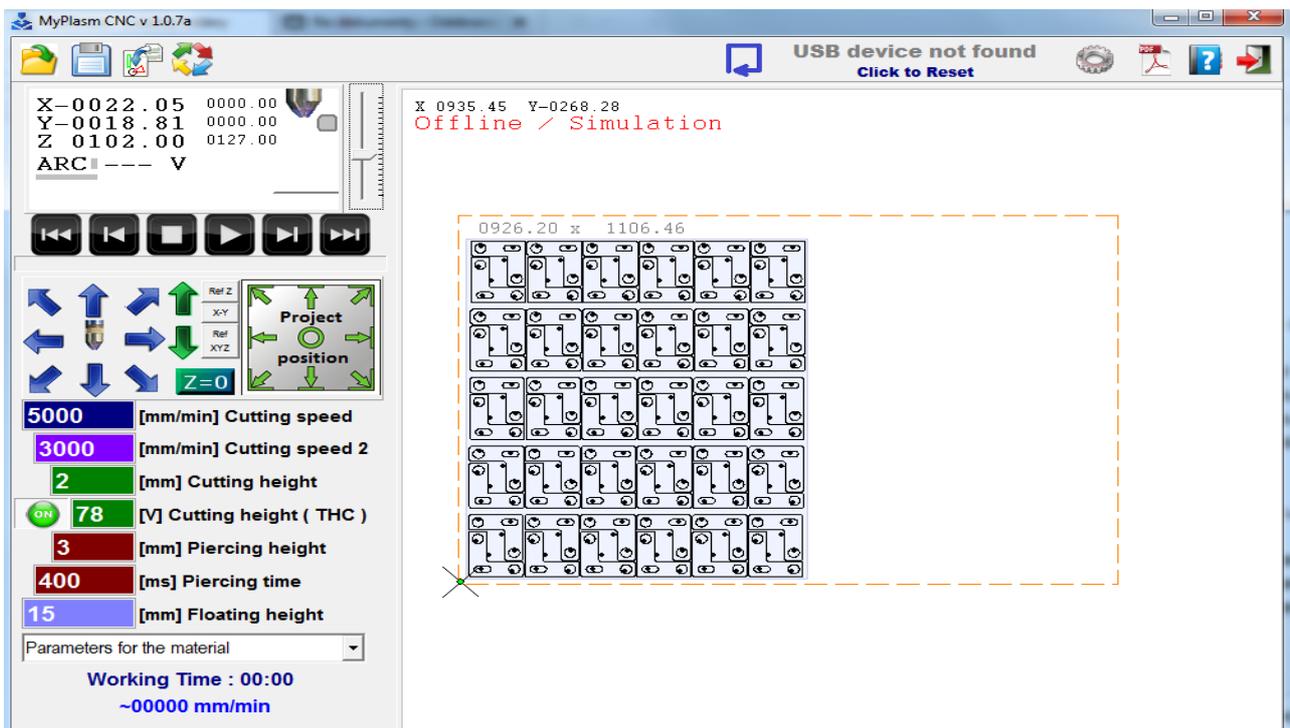
In the case of automatic homing, simply press the **REF XYZ** button and the controller will automatically perform a precise homing (reference drive) of each axis using the reference switches. Homing is done at the speed specified in the **Machine / Homing** tab. In order to speed up the automatic alignment process, you can manually drive up close to the limits and then start the alignment.

After the base, the maximum raised torch should be in the lower left corner of the machine and the machine coordinates should indicate 0.00 for the X and Y axes and Max for the Z axis :



A reference base/reference drive with program limits is not required for machine operation. However, it allows precise determination of the position of axes within the machine and easy return to interrupted operation, e.g. after a power outage or other failure.

It is recommended to carry out a homing/referential drive after each power-up of the machine



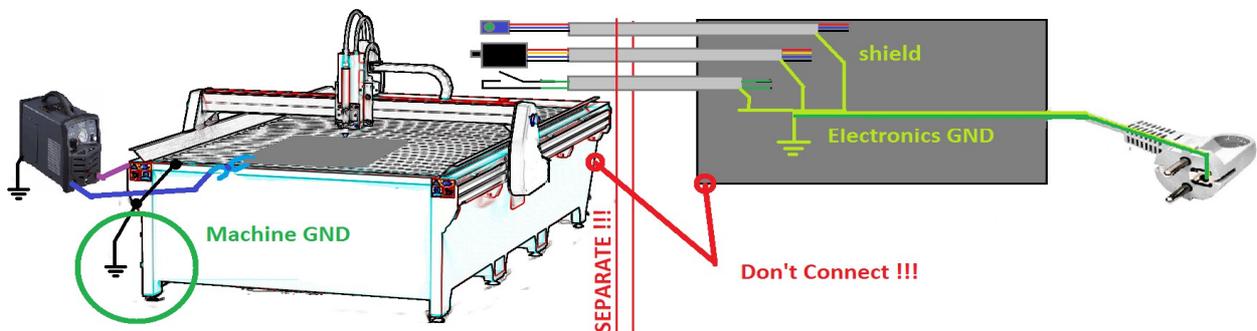
## 9. connection and configuration of the plasma source,

**Safety precautions !** The source of the plasma cutter generates voltage which is dangerous for life and health. All connections can be made only by a person with electrical privileges. When the plasma arc is struck, high voltages ( kV ) are present in devices with HV/HF ionization - use cables with appropriate insulation level. The voltage can/should be checked in the documentation of the connected Plasma Sources.

**It is very important that the mass clamp is well connected to the material. Actuating the plasma source without connecting the material terminal may result in irreparable damage to the interface and/or controller as well as other electronic devices.**

It is important to **properly ground** the machine structure, the plasma cutter and to use shielded cables, the **shielding** of which should only be connected on the control side, on the machine side should not be connected.

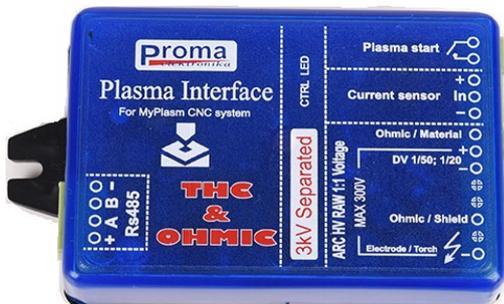
Do not connect the grounding of the machine/plasma cutter to the grounding of the electronic part. Otherwise, part of the charge/voltage from the machine/plasma cutter will be discharged to earth via the control box, which is not advisable for devices with such a high degree of overvoltage and interference generated.



MyPlasm CNC system works with any plasma source, but cheap / Chinese sources with HV / HF ionizers generate very high EMC interferences, so when the arc is glowing or fading, problems such as mouse suspension, keyboards, monitor dimming, computer reset and various other operating interferences can sometimes appear. The impact of interference can be minimized to a large extent by moving the torch cable and plasma source away from the automation system.

In CNC systems, plasma sources without HF/HV interference work much better. Especially recommended devices are those of Hypertherm, Spartus.

The connection of the plasma source is made by means of an opto-insulated interface, which controls the switching on of the cutter, arc voltage measurement (for the purpose of THC height control) and has a built-in material touch detection system (for torchs equipped with an isolated nozzle cover designed for this purpose).



**Plasma Start** - relay contacts switching the plasma

**Current sensor** - not connected ! ( option withdrawn )

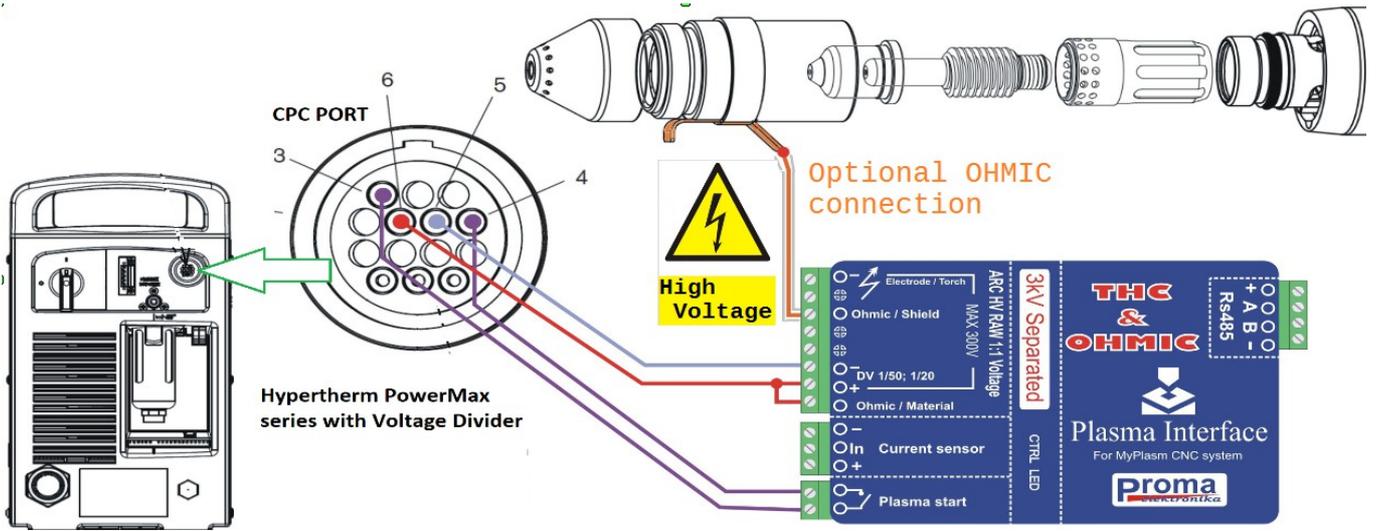
**Ohmic/Material** - ohmic detection circuit ( Material )

**+/- DV 1/50; 1/20** - low voltage measurement input from plasma sources equipped with internal voltage divider.

**Ohmic / Shield** - ohmic detection circuit (nozzle cover)

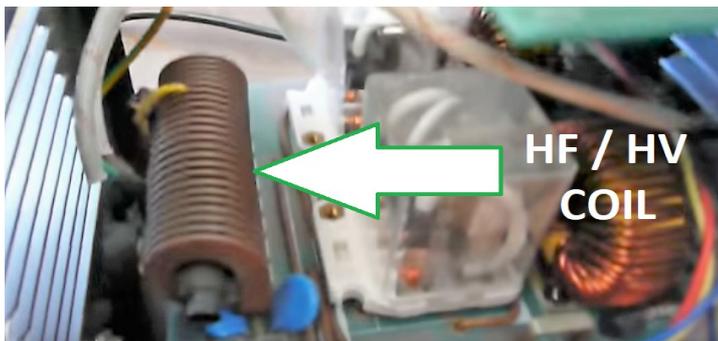
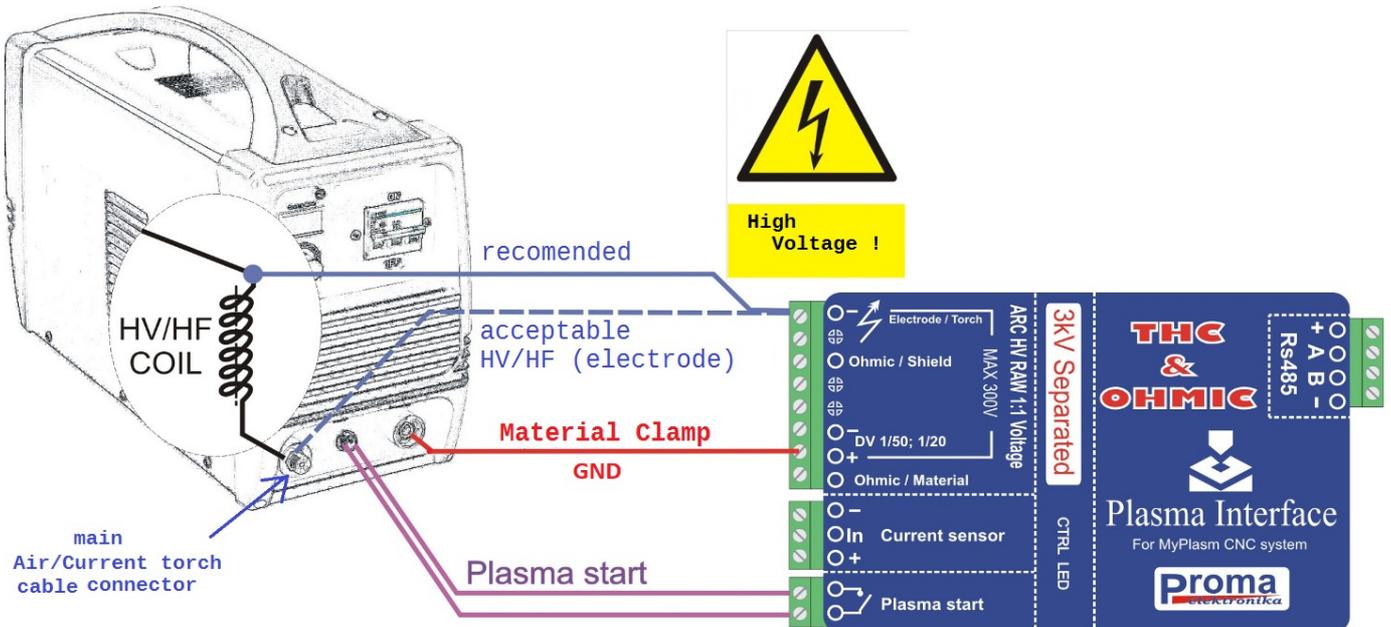
**ARC HV RAW 1:1 Voltage ( Electrode/Torch )** - Wejście pomiarowe wysokiego napięcia ( 300V - Elektroda palnika ) ze źródeł plazmowych bez wbudowanego dzielnika napięcia. Pomiar HV 1:1 jest dokonywany względem zacisku DV+, który musi być połączony z **KLEMĄ MATERIAŁU** podpiętą do uziemionego materiału !!!

Example of connection to a HyperthermPowermax plasma source equipped with a CPC port, a voltage divider and an isolated nozzle cover for the material detection system (OHMIC).



**WARNING !!!!** A high voltage may occur on the OHMIC SHIELD cable of the touch system (see the documentation of the plasma cutter) - use a cable with appropriate / double insulation.

The following is an example of a connection with a plasma source, without a built-in voltage divider with HF / HV ionization arcing:

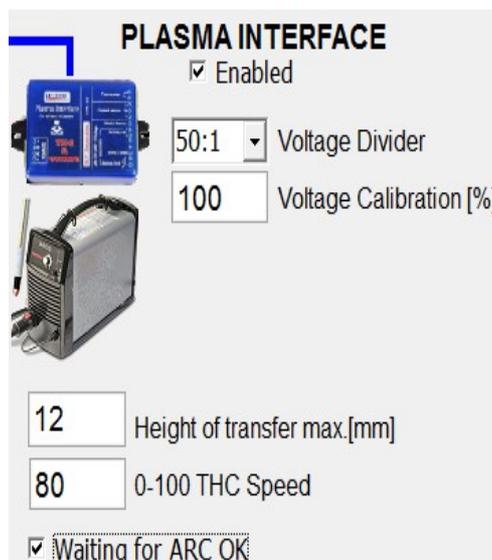


In order to minimize the interference generated by cheap/Chinese plasma cutters, it is recommended to connect the measuring wire before the coil (transformer) of the HF/HV ionizer. Most often it is the first element connected directly to the air/current connection of the plasma torch.

The picture shows a sample element of the ionizer.

**WARNING!!!!** Very high voltage may appear on the Electrode/Torch measuring cable (see the documentation of the plasma cutter) - use a cable with appropriate / double insulation.

## Plasma interface configuration.



**Plasma Interface Active** : Determines whether the plasma interface is connected/used.

**Voltage divider** :

**1:1** - Option for plasma cutters without voltage divider connected directly to the full / undivided electrode voltage (uses the voltage divider built into the plasma interface).

**20:1 / 50:1** - Option for plasma cutters with voltage divider connected to **DV** terminals of the plasma interface.

**Voltage Calibration** - Allows to calibrate the measured voltage in case of incorrect indications e.g. in case of high output resistance.

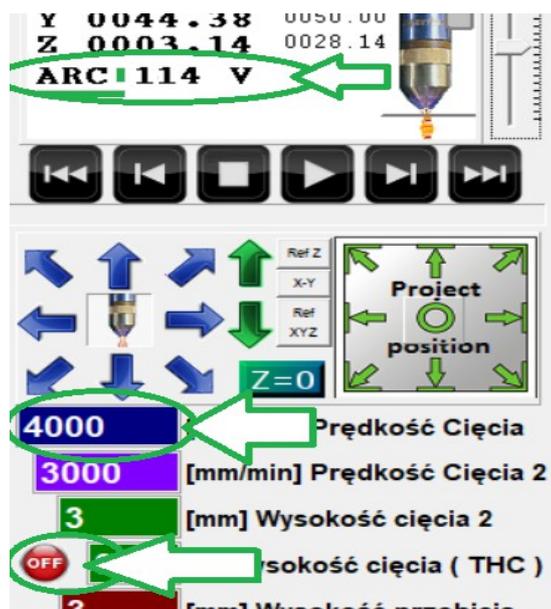
**Maximum transfer height** - The maximum height above the material at which the cutter is able to initiate the main arc (transfer to the material).

**THC speed** - Max. speed of the THC torch height regulator. ( percentage reference to the cutting speed ). This parameter depends on many factors such as bolt pitch, Z-axis step division ( it is recommended to use the division suggested by the program), plasma cutter/torch model and machine reaction speed.

**Wait for ARC OK (feedback)**: When the plasma cutter is switched on, the machine waits for the main ARC to strike, otherwise the machine will not start the XY feed rate.

### TEST :

A correctly connected and configured plasma interface can be checked by making a test long cut on an evenly laid straight 1-3mm thick material. For the moment of the test, switch off the THC regulator, set the appropriate cutting current according to the instructions of the cutter and set the appropriate cutting speed in the program.



Before starting each cut, make sure that the material's clamp is properly attached, otherwise there is a possibility of damaging electronic devices.

After switching on the power supply of the plasma source, place the torch approx. 3mm above the material.

Arc firing can be realized by using the space bar - immediately after firing the main arc you should start driving / cutting using the keyboard arrows in the chosen direction.

When the movement stops, the torch will be automatically switched off.

**If the interface is connected and configured, the measured ARC voltage should be between 60-160V during the test cut.**

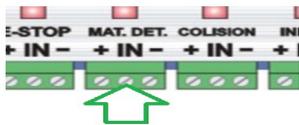
**Be particularly careful when starting the plasma cutter for the first time and be ready to switch off the main power supply at any time ("Emergency Button").**

## 11. material height detection system.

The MyPlasmCNC system enables automatic detection of the material height by the OHMIC touch system (only for torchs equipped with an isolated nozzle cover designed for this purpose) and/or by a mechanical floating head.

**The OHMIC touch system** is distinguished by a very fast action without bending thin materials, which increases the measurement precision many times over and does not mechanically damage the torch components. The main disadvantage of the tactile method is unreliability in case of dirty materials and the lack of possibility to detect painted / glued sheets.

**The floating head** (the torch is placed on an additional guide, activating the sensor/edge when encountering the material) is a mechanical detection system, which is a very reliable system for detecting dirty, corroded or painted/glued materials.



Detection input - sensor / floating head end is marked as **MAT.DET.**

**MyPlasm CNC** allows both systems to be used at the same time (automatically recognizing which system has been activated) which makes the material height detection system very fast, precise and reliable!

Configuration is done via the Functions tab :

Z axis initial height			
Test			
<input type="checkbox"/> Touch ohmic Sensor	0.254	ohmic correction [ mm ]	
<input checked="" type="checkbox"/> Floating head switch	3.048	switch correction [ mm ]	
12.7	detection height [ mm ]		508
		detection speed	

**Correction** : In addition to activating the corresponding function, the corresponding correction must be entered. For a touch system this is usually a negligible value. For a floating head, the correction value is the distance from the torch lift to the sensor/edge activation - remember that the smaller this distance is, the faster the detection.

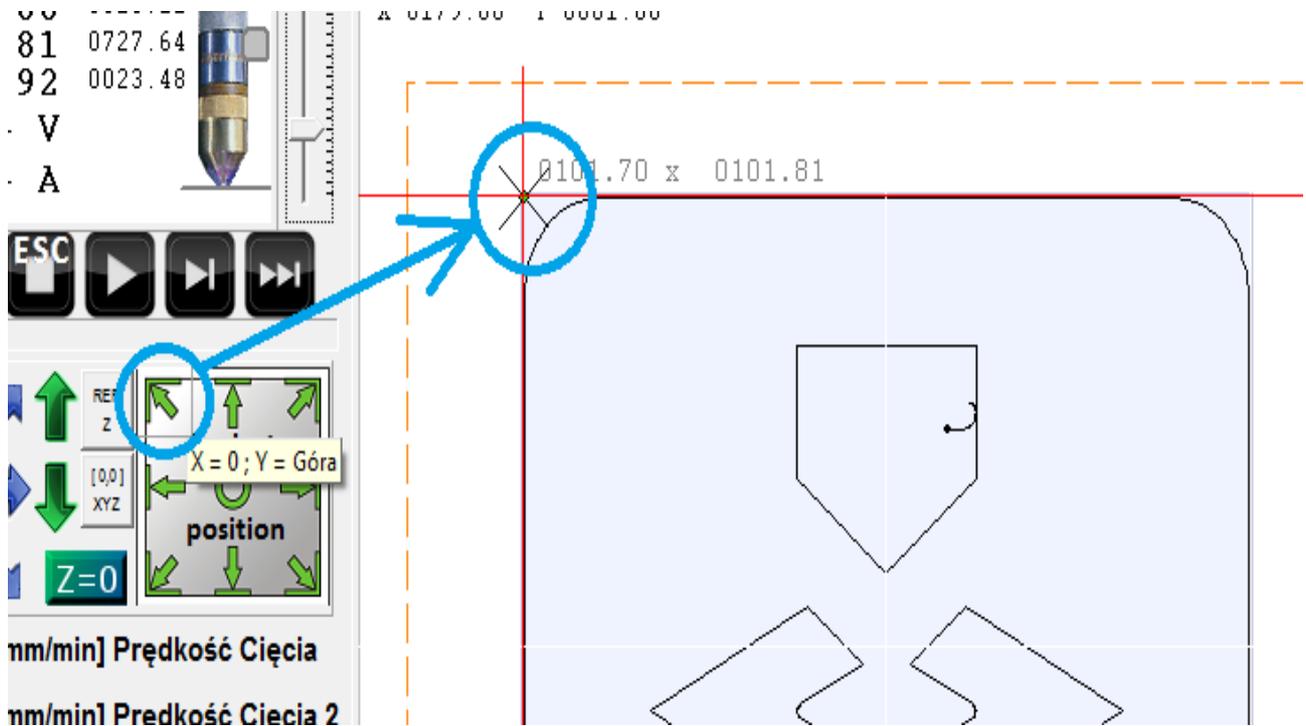
**Detection height:** up to this value, the torch will move at maximum speed (from a fixed through height) and then slow down to the detection speed in order to precisely determine the height of material.

**TEST - button** testing the correct operation of detection functions - after clicking the button, material detection will take place (before the first test the Z axis should be zeroed on the material (it does not have to be done with high accuracy) by clicking **Z=0** in the main window), the correct operation of the function should be checked by comparing the physical distance of the torch from the material with the indications of material coordinates:

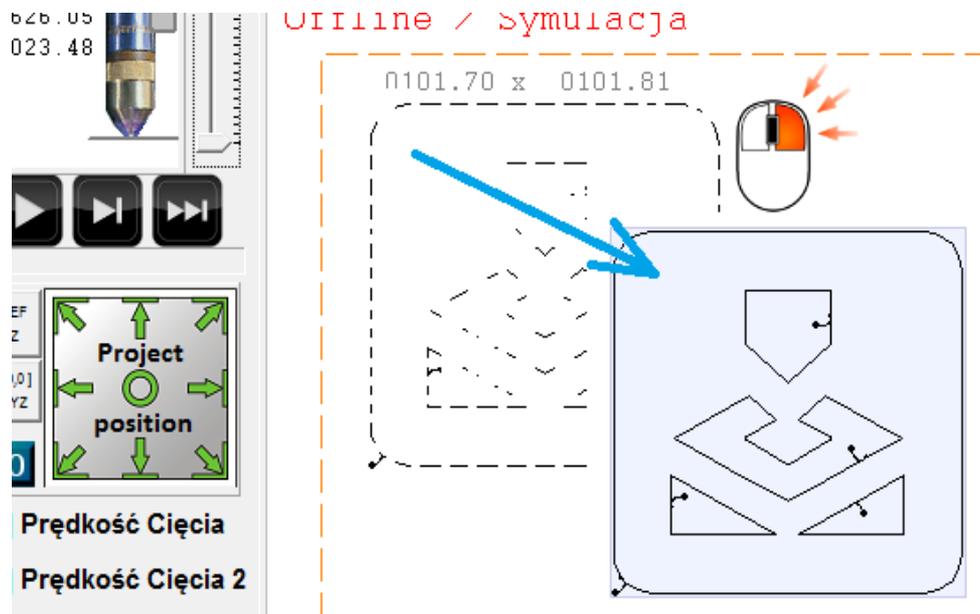
## 11. the Project's positioning.

There are several ways to determine the position of a project.

The quickest way to position the project is to indicate with a torch (it is convenient to use two crossed linear laser pointers) the place on the material in which we want to position the project. There are options to indicate any corner, "side" or center of the project.



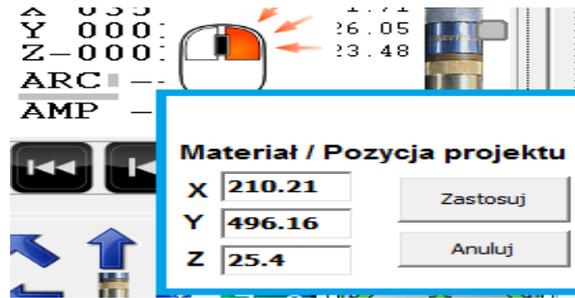
Right-click to move the project directly to any location:



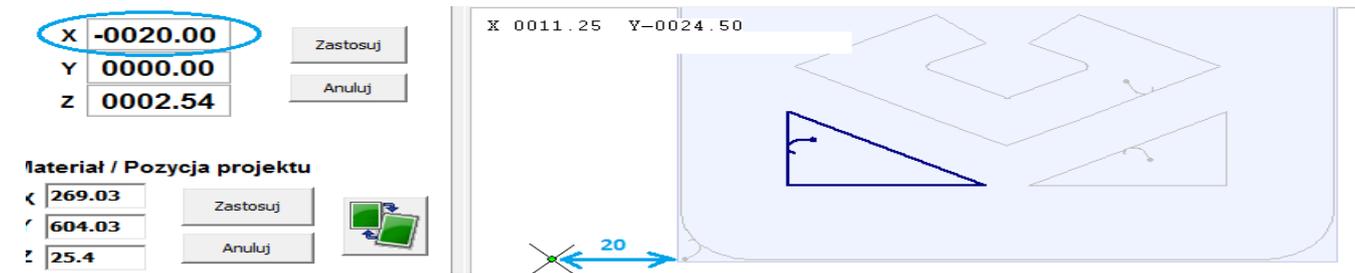
The Z-axis position (height) can be most easily determined by touching the material with the torch and clicking **Z = 0**.



The very exact position of the project in relation to the reference point [0.0] can be checked, corrected in the coordinate window / should be right-clicked for editing.

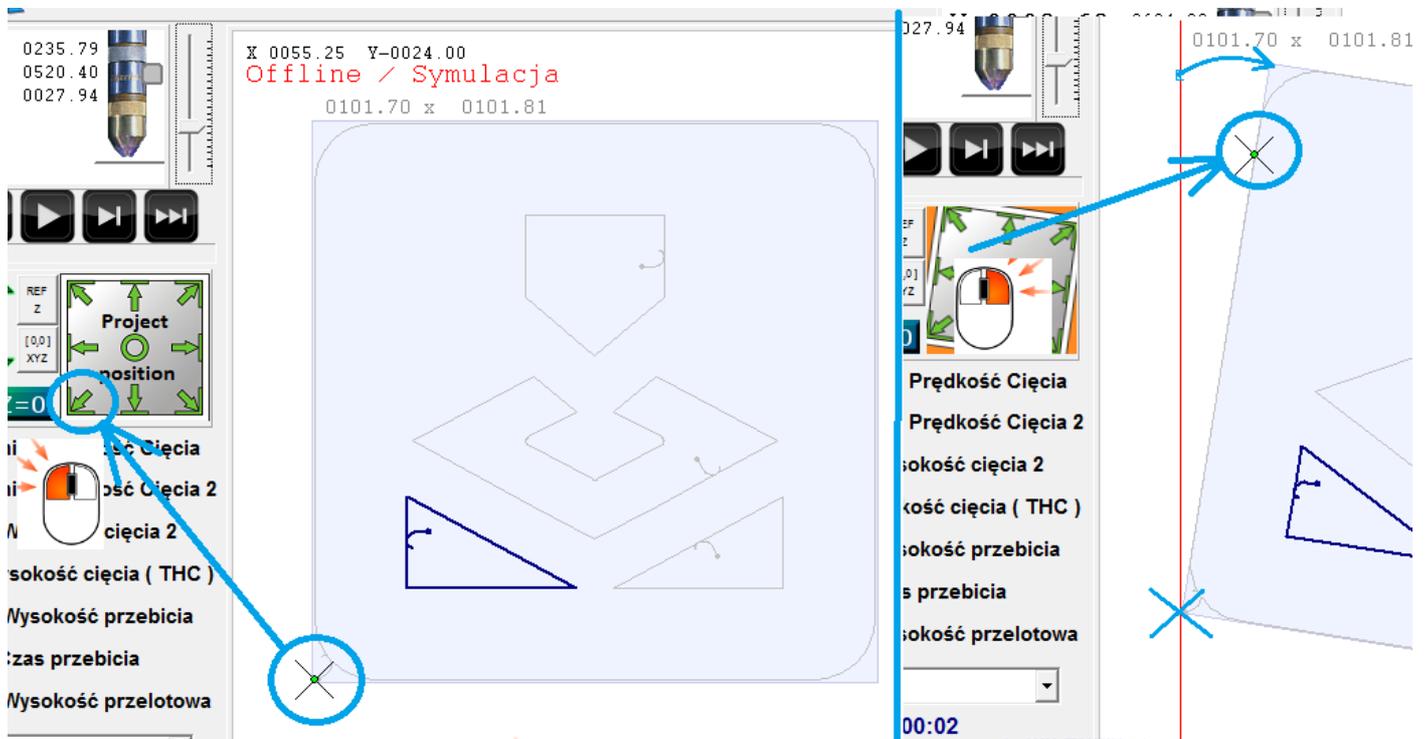


In the same Coordinate Edit window can be used to edit the torch position relative to the material which will move the project relative to the current torch position :



### Adjusting the design angle to the material angle:

To adjust the angle of the project to the angle of unevenly positioned material, simply point the torch to any corner as in normal project positioning and then the adjacent corner or edge and right-click in the positioning window - the angle of the project is automatically adjusted:

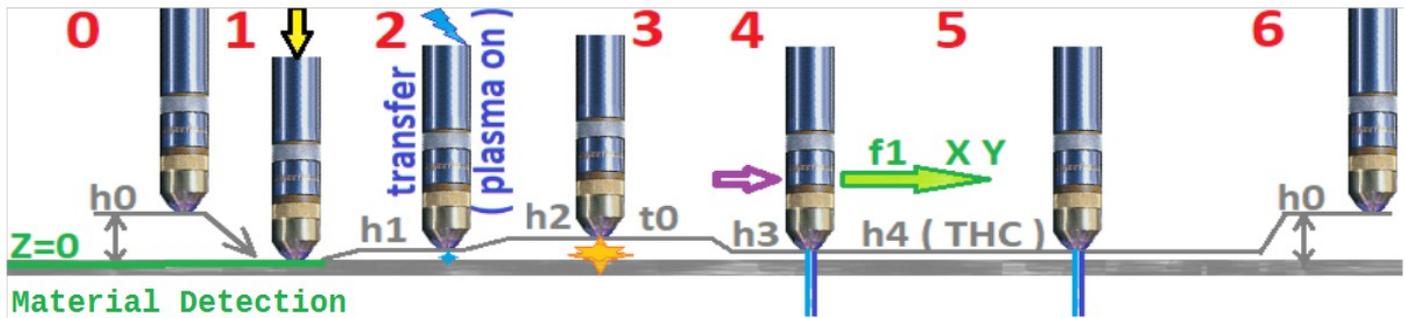


**The distance of the points indicated must be greater than 50mm.**

Example YouTube Video : <https://youtu.be/cxOsyKq0yA8>

## 12. Setting the cutting parameters

### Programme operating algorithm



0- starting position - torch at  $h_0$  ( **through height** ), access at maximum speed over the beginning of the selected path

1 - Material height detection

2 - Move the Torch to transfer height  $h_1$  or **piercing height**  $h_2$  if less than  $h_1$ , starting the plasma source ( **plasma on** )

3 - after detection of the main ARC, set the **torch** at the height  $h_2$  (piercing height) for time  $t_0$  (piercing time)

4 - setting the torch at the height  $h_3$  ( cutting height 2 ) and starting the feed X Y at  $f_1$  ( cutting speed ) or ( cutting speed 2 ) for small objects.

5 - When the set speed  $f_1$  ( Cutting speed ) is reached, the height ( $h_4$ ) is controlled by the THC - Torch High Controller ( if active ) based on the reading of the ARC plasma arc voltage and the set arc voltage [V] ( THC cutting height ).

6 - end of path - switching off the plasma source and raising the torch to  $h_0$  ( Floating height )

6000	[mm/min] Cutting speed	f1
1270	[mm/min] Cutting speed 2	
2.54	[mm] Cutting height	h3
ON 123	[V] Cutting height ( THC )	h4
5.08	[mm] Piercing height	h2
500	[ms] Piercing time	t0
12.7	[mm] Floating height	h0

Parametry materiałowe

MyPlasm CNC v 1.0.7a

**Cutting speed** - set cutting speed

**Cutting Speed 2** - Setpoint cutting speed for small objects/openings.

**Cutting height** - Setpoint cutting height for the THC function switched off.

**Cutting height THC** - Determination of the arc voltage for the THC height regulator - Higher voltage = higher cutting height with THC on.

**Piercing Height** - The height at which the material is punched at the beginning of the path - Active only for a time  $>300ms$  - if the time is shorter the punching takes place at the cutting height.

**Piercing time** - Waiting time after firing up the torch until the material is melted.

**Floating height** - The height at which the torch moves quickly between paths.

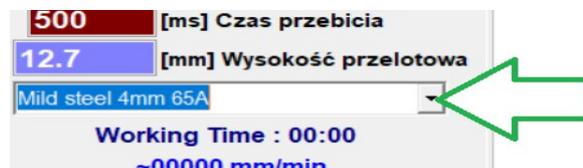
Establishing the correct parameters has a key impact on cutting quality. Unfortunately the parameters are individual for different plasma sources so it is not possible to give a ready-made solution. The parameters should be selected according to the recommendations of the plasma cutter manufacturer. The key parameters for the material are: gas pressure, current, cutting speed and cutting height.

If the THC controller is switched on, the cutting height is determined by the arc voltage and given in V. Otherwise, cutting height 2 is maintained - e.g. in the case of cutting holes where the THC function is switched off automatically.

#### Database of cutting parameters :

If the quality of the cut is satisfactory, it is worth saving the Parameters Group to the database for future use - to this end, enter any name of the Parameters Group and click **CTRL + S** (Save).

To remove the current position from the database, click **CTRL + D** (Delete)



Loading of previously saved parameters is automatic when selected from the list.

### 13 Automatic cut.

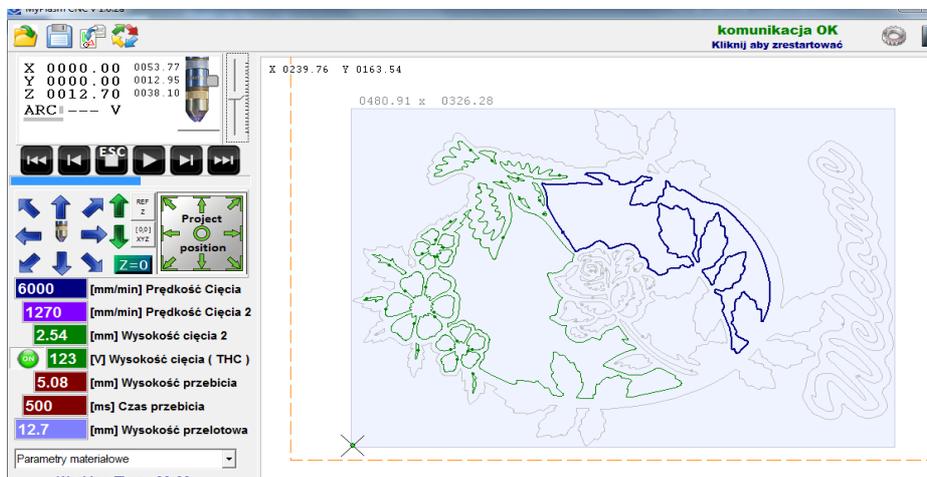
In order to start automatic cutting it is necessary to make sure that the cutting parameters are correctly entered and the project is well positioned (see point 6), the program is rewound to the right place, indicate the surface of the material + and press **START / F5** .

In order to stop the program, press **STOP** or **ESC (Escape)** - it is possible to resume operation by pressing **F6**.

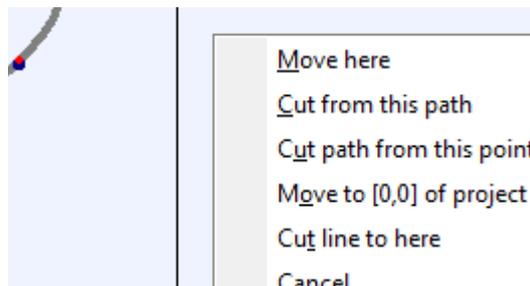
Execution of the program is possible from any place , the object from which you want to start can be selected by means of program scroll keys or by dragging the blue progress indicator to the desired position :



The currently selected path from which the program starts is in bold blue :



You can also point to an object with the Right Mouse button in the preview window, in addition, it is possible to indicate the location of the path from which it is to be executed:



To enable cutting **from the end of the path** (e.g. to cut an unfinished part), click **START** with the **CTRL** button held down. Only one selected workpiece will be cut from the end.

For simulation purposes it is possible to start the automatic mode without switching on the torch - for this purpose, click **START** with the **SHIFT** key held down. You can use **SPACE** for start ARC

During the cutting process it is possible to change the cutting height if the THC regulator is switched on, press **PgUp** or **PgDown** - current arc voltage, corrected by +/- 5V actual voltage measurement.

During cutting it is possible to change the cutting speed with the **+ / -** buttons.

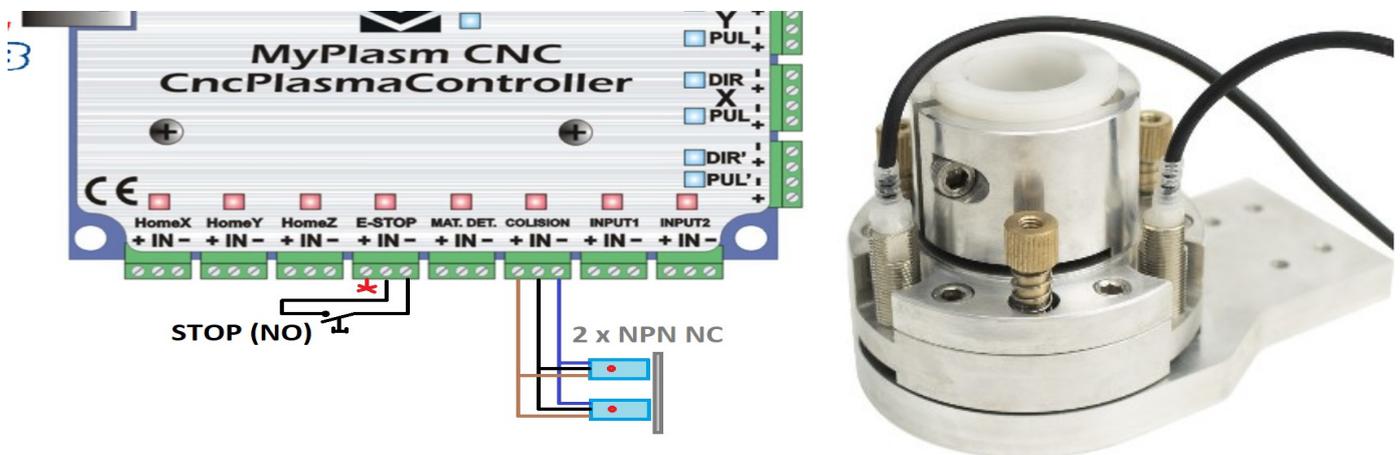
## 14. Inputs / Outputs

All signal inputs are "pulled up" by internal resistors up to +24V activated by low voltage (shorted to minus / ground of the controller) which is indicated by orange LEDs on the controller. Both inductive sensors with NPN transistor output can be used (each three-pin connector has +/- 24V DC power supply for their power supply) as well as mechanical terminals connected between MINUS and IN input, **PLUS TERMINAL UNCONNECTED**.

**Stop button input** - There is a possibility to connect a button (NO) to stop the controller operation. Thanks to the fact that it is connected directly to the controller it is more reliable than the keyboard's ESC button because there may be a situation when a computer, program or keyboard/mouse will stop working because of too much interference generated by the plasma arc.

**COLISION input** - input for stopping the cutting program when the torch encounters an obstacle (for machines with the torch mounted anti-collision system).

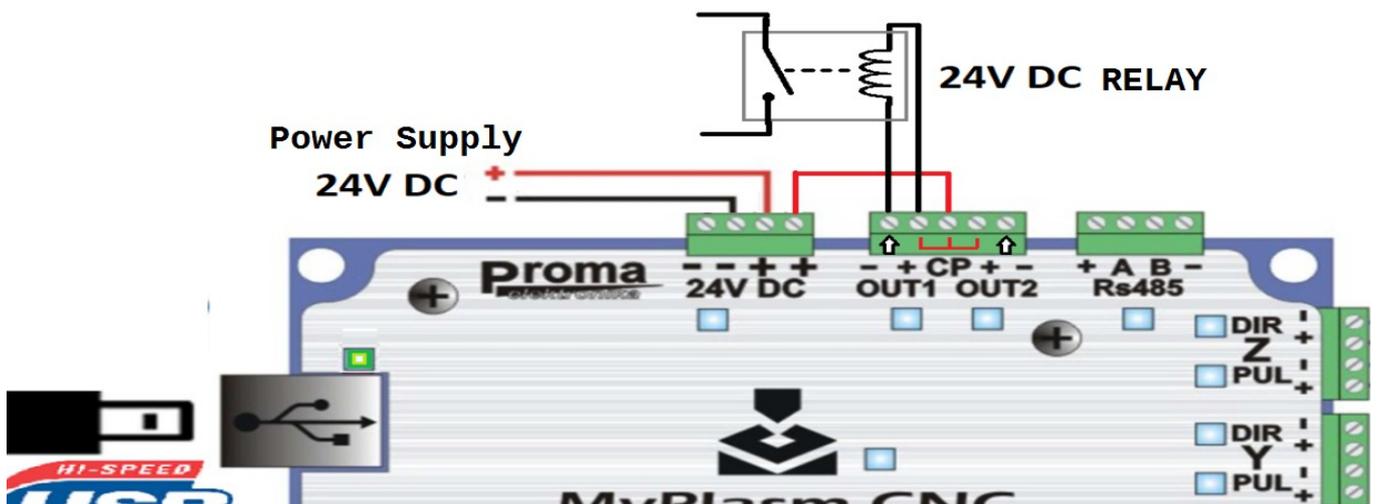
Example of connection of mechanical STOP button and anti-collision inductive sensors on the example of anti-collision holder CTH3T-01 from ROBOT3T



In the example, a combination of two **NPN NC** sensors is used, which in normal operation have continuous contact with metal and thus do not give a signal, in case of a torch collision with the material, the sensor is activated and the collision stop is activated.

\* It is possible to use the **collision** avoidance sensor for the material height detection function if the **OHMIC** touch system fails.

The **OUT1 / OUT2** outputs of the controller are transistor outputs of **NPN/OC** type (normally open to minus/mass). When an output voltage is needed, e.g. to drive a relay, it should be given to **CP** pin (**common plus**) :



## 15. simulation of work

Due to the specificity of the system: The machine is controlled by a MyPlasm CNC controller and not by a computer - the work simulation is only indicative and does not reflect the real dynamics of a real machine. It is an illustrative function for checking the correct path, sequence and direction of cutting.

Some functions such as the THC controller are not simulated and some may not work in accordance with reality (speed behaviour, ramps etc.).

Nevertheless, the Work Simulation can be used to familiarize yourself with the program as well as to catch possible errors in projects.

## 16. Defects.

The program needs administrator privileges to work properly - if there are any problems with the software, start by checking the privileges or "run as administrator".

**No USB Device :** Although the controller is properly connected to the USB port, a similar the device drivers have not been installed correctly. You should then uninstall/remove the device in Windows Device Manager, disconnect USB, reinstall MyPlasmCNC. If the problem only occurs during cutting (very high noise) it may indicate that the USB cable is of poor quality.message may appear if

**Lost of Communication :**



It means that the **USB** controller is correctly connected to the **USB port**, the drivers properly installed - check if the power supply voltage is **24V DC ( 22-26V )** if so, force the reinstallation of Firmware by holding down the **SHIFT** key and click the communication reset.

**Interface Error :** Lack of RS485 communication with the plasma interface - Check the correct connection of the **RS485** cable, If everything is connected correctly the error may mean that the plasma interface or rs485 bus drivers are damaged. Contact the manufacturer (Proma-Elektronics company).

**Other defects:**

Please contact the manufacturer (Proma-Elektronics).

A lot of useful information and tutorials can be found on the YouTube channel:

<https://www.youtube.com/channel/UC1OVTCmYWb0LAP2iQz6ysZA/playlists>