



# Hot Wire Foam Cutters & iXshaper software

User's Manual ver. 1.07



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## INTRODUCTION

Twister PRO hot wire foam cutters are computer-controlled CNC machines used for cutting expanded and extruded polystyrenes, i.e. EPS and XPS foams.

The cutting is done with a resistant hot wire, the type and diameter of which is determined by the machine manufacturer based on the machine size as well as the application.

Advanced electronics and the proprietary iXshaper software allow the machine to cut a variety of different shapes (the only limitation being the size and configuration of a particular machine). Shapes to be cut and their placement within the working area of the machine (and within the foam piece itself) need to be prepared in advance in a third-part graphics application such as e.g. CorelDraw, Rhinoceros or AutoCAD. With a properly prepared drawing it is perfectly to cut the entire block of foam in a single operation.

Each MegaPlot Twister PRO foam cutter is supplied with our proprietary iXshaper application which is used to preview the previously prepared cutting drawings, to set the working parameters, to simulate a cut as well as to control the cutting process, including on-the-fly adjustments of the cutting parameters.

Apart from the automatic cutting process the machine can also be used to manually cut a shape or block to desired dimensions, etc. This is most easily done with the optional wired handheld/remote which can also be used to adjust the cutting parameters on-the-fly while a cut is in progress (cutting speed and wire heating).

Twister PRO foam cutters are typically used for such applications as:

- advertising (lettering, logos, visual displays, etc.)
- packaging
- insulation: roofs, chimneys, walls, pipes, etc.
- sloped roofing systems
- SIP panels

## TECHNICAL PARAMETERS AND ACCESSORIES

Standard models in the Twister PRO series include:

	<b>Machine width (Z) (wire length)</b>	<b>Machine length (X)</b>
Twister PRO 1313 [444]	1300 mm [4 ft.]	1300 mm [4 ft.]
Twister PRO 1324 [844]	1300 mm [4 ft.]	2400 mm [8 ft.]
Twister PRO 1330 [8410]	1300 mm [4 ft.]	3000 mm [10 ft.]
Twister PRO 1524 [845]	1500 mm [4 ft.]	2400 mm [8 ft.]
Twister PRO 2024 [846 1/2]	2000 mm [6 1/2 ft.]	2400 mm [8 ft.]
Twister PRO 2524 [848]	2500 mm [8 ft.]	2400 mm [8 ft.]
Twister PRO 3030 [10410]	3000 mm [10 ft.]	3000 mm [10 ft.]
Twister PRO 4040 [13413]	4000 mm [13 ft.]	4000 mm [13 ft.]

Environmental requirements: ambient temperature of 0 – 40° C and non-condensing humidity up to 95%

Standard accessories included in the package:

	<b>Twister PRO STANDARD 2D models</b>	<b>Twister PRO PLUS 3D models</b>
Number of cutting wires:	1	1
Wire tensioning:	Spring or pneumatic	electrical

Industrial Windows 10 Touch PC	yes	yes
2D cutting	yes	yes
3D – independent axis control	no	yes
3D – TurnTable	no	yes (up to 3 pcs.)
3D – Lathe	no	yes
3D – ShapeWire Bar	no	yes

### Optional accessories:

- **a wired remote control/handheld** – facilitates the machine operation and allows for setting the project's zero point, manual movement in all direction, manual cutting as well as the adjustment of the cutting parameters on-the-fly while a cut is in progress



- **TitaniumWire** – the best resistant wire on the market which does not stretch or break as often as the industry-standard NiCr wire. Due to its limited stretch it can be tensioned more which has a positive impact on the cutting speed and quality. Custom made for MegaPlot and available in a number of diameters, including: 0.15, 0.25, 0.30, 0.35, 0.45, 0.55 and 0.6 mm.



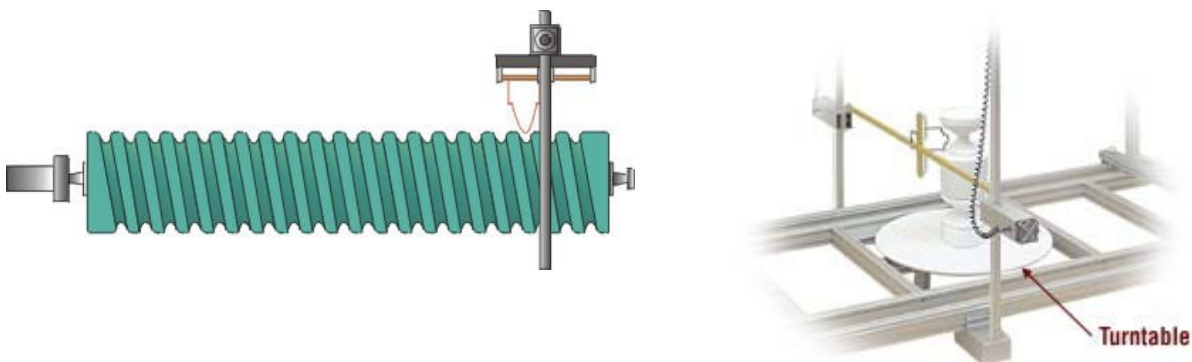
- **TurnTable** – it is used to cut a variety of different symmetrical and irregular shapes. The shapes to be cut can be modeled in 3D or can consist of a series of flat 2D drawings. Easy to use and fully automated but it can also be manually controlled. It can work with both the straight and the shape wires.



- **Lathe** – an automated additional horizontal rotary axis used to cut e.g. columns and other rotary elements. It can be used to cut a thread-like shape or grooves. Easy to use and fully automated but it can also be manually controlled. It can work with both the straight and the shape wires.



- **ShapeWire bar** – a 1 mm thick shapeable wire which the operator forms to the desired shape and which – when combined with TurnTable or Lathe – can be used to cut a variety of shapes such as grooved, thread, rotary elements, etc. Up to 50 cm of the 1 mm shapewire is supported. Easy to install and use.

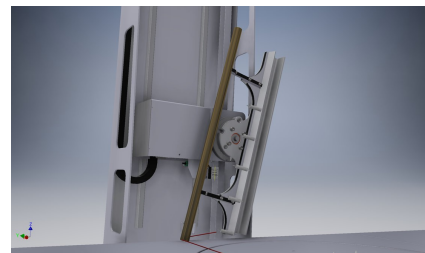
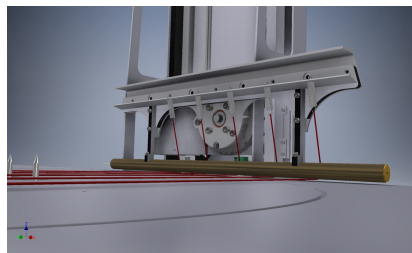
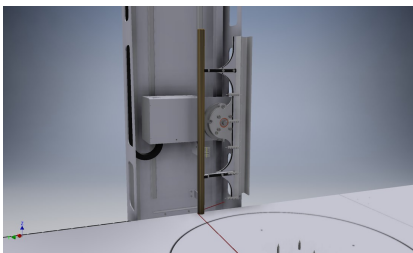


- **independent axis control** – two additional axes combined with the advanced electric wire tensioning system allow complete independence of movement of the two ends of the wire, the only limitation in their offset being the working area of the machine. Advanced wire tensioning and wire heating system allow for a variety of advanced cuts such as cones, sloped roofing

plates, wings and a variety of other irregular shapes.



- **5-wire MW add-on** – an accessory for the Open Frame series only allowing up to 5 cutting wires cutting identical shapes at the same time. The wires can be in a horizontal or vertical orientation as well as at a 13 degree angle for sheet cutting. The max. distance between the first and last wire is 60 cm. Easy to install and use with precise 1 mm increments for wire positioning.



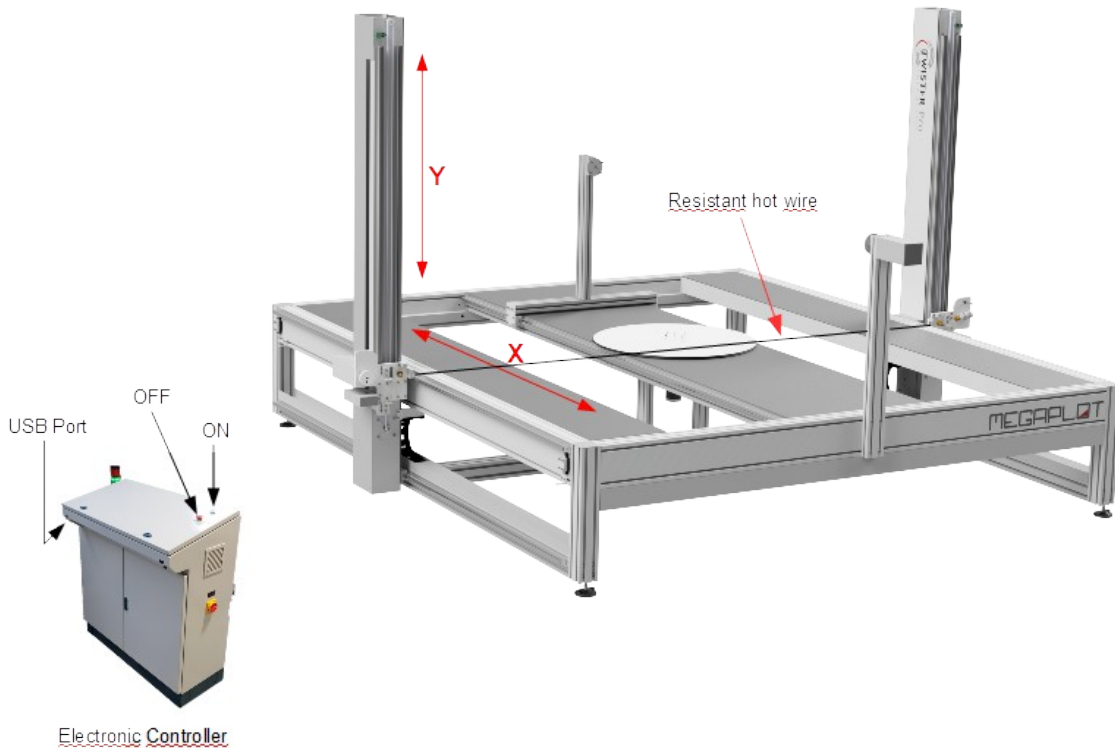
- **Barcode reader** – the barcode reader is a convenient device facilitating the cutting process, saving time and helping avoid human errors. iXshaper software allows the operator to save individual cuts (drawing + configuration settings in printable PDF files with unique bar codes. Once printed, such codes can be scanned any time to re-open a given drawing with suitable configuration settings. Built-in job manager supports an unlimited number of such sets and codes. This is a plug'n'play device requiring no other drivers. It does require its own USB port on the PC used to control the machine.





## BASIC TERMS

Before you start using the foam cutting machine, please take a moment to learn the basic principles involved.



The machine needs to be powered from a single-phase and properly grounded ~230V line. The main ON/OFF switch is located on the tight hand side of the electronic controller cabinet.

To switch the machine ON, press the green ON button on the top of the electronic controller. To switch the machine OFF, press the red OFF button located next to the green ON button. There is an additional emergency button located on the machine.

The PC used to control the machine needs to be connected to the machine's motherboard via USB (unless your unit came with a built-in touch PC).

There is a service display located inside the electronic controller which displays a variety of different parameters throughout the various stages of machine operation. During the boot up sequence it shows the machine type and CPU firmware version. It also shows the machine-PC USB connection status: CON (Connected) or DIS (Disconnected).

The moveable parts of the machine include:

- two trolleys with the cutting wire stretched between them – they move up and down as well as right and left
- TurnTable (an optional 3D accessory)
- Lathe (an optional 3D accessory)

## Start-up Sequence

To ensure the proper start-up of the entire system, make sure to always follow this sequence of steps:

- switch the power ON using the main ON/OFF switch on the side of the controller
- turn the controller ON by pressing the green ON button
- ensure the PC (either the built-in one or an external one) and the machine are connected via USB
- start up the PC (after the first start-up Windows OS will recognize a new USB device and will install it automatically – note this may take a few minutes for Windows to complete this process)
- open the iXshaper application supplied with the machine
- Home the machine by pressing the Home button on the Manual Control panel in iXshaper

During the Homing operation the machine travels towards the Home position and stops automatically when the Home position proximity sensors (limit sensors) detect the trolleys have reached their Home position. This operation needs to be performed each time the machine has been switched off and on again – there is no need to repeat this process after each cut.

**CAUTION!** Do not attempt to initiate a cut or any manual movement of the machine prior to having it properly Homed after it has been switched on.

## Installation of the Cutting Wire

The resistant cutting wire is stretched between both trolleys. Depending on the machine type and size, the wire tensioning may be realized in a number of ways:

- basic spring tensioning
- pneumatic tensioning
- electric tensioning (with a load cell and a tensioning and spooling wheel)

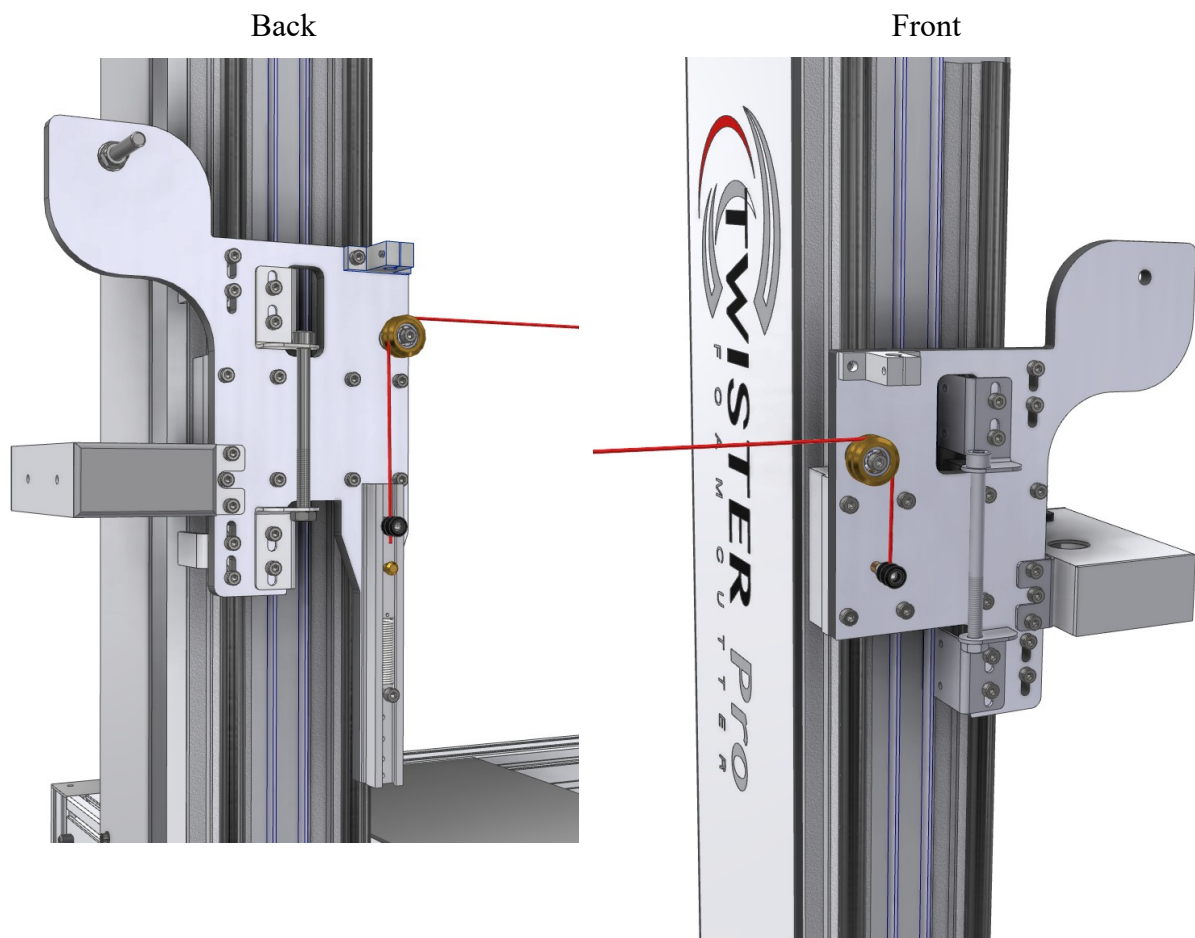
- dual-wire spring tensioning

Installing a new piece of wire can only be performed by a trained member of staff, with the local and national safety requirements being observed. Prior to installing a new piece of cutting wire the machine needs to be stopped and the wire heating system needs to be switched off.

Do not ever attempt to move the trolleys in any direction manually while the controlled is switched off as it may result in a cog belt failure.

### Spring tensioning

Here is the proper way to install the cutting wire on standard machines with the spring tensioning system:



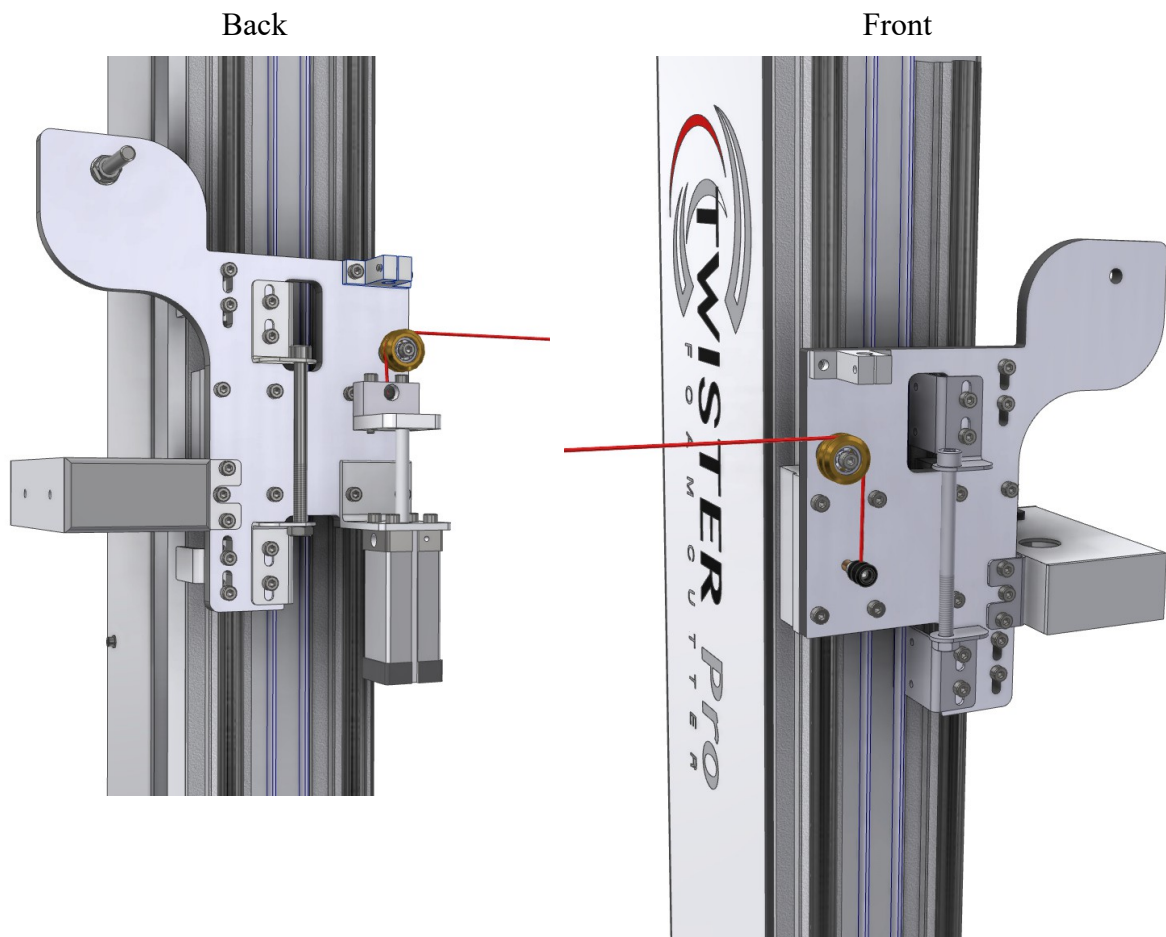
Always follow these steps when installing a new piece of spring-tensioned wire:

- fix one end of the wire by loosening the black knob, inserting the end of the wire into the hole and then tightening the knob again
- stretch the wire and guide it on the brass rollers, making sure not to twist it or bend it which could cause a premature wire failure

- prepare the tensioning mechanism on the other trolley: stretch the spring by sliding the brass cylinder until it locks in the hole allowing convenient wire installation
- loosen the black knob, insert the end of the wire into the hole and tighten the knob again
- release the mechanism by pulling the brass cylinder from the hole
- verify the wire tension as explained in Setting correct working parameters

## Pneumatic Tensioning

Here is the proper way to install the cutting wire on standard machines with the pneumatic tensioning system:



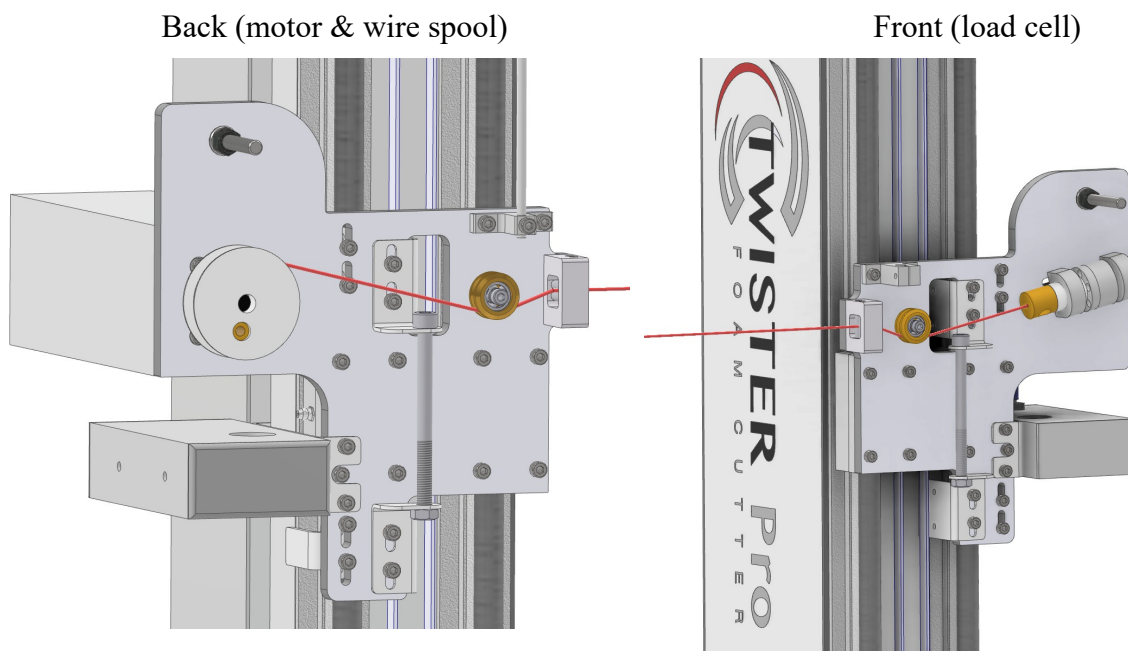
Always follow these steps when installing a new piece of spring-tensioned wire:

- fix one end of the wire by loosening the black knob, inserting the end of the wire into the hole and then tightening the knob again

- stretch the wire and guide it on the brass rollers, making sure not to twist it or bend it which could cause a premature wire failure
- close the compressed air inlet and pull up the wire holder up from the air cylinder
- fix the other end of the wire with the cylinder up by inserting the wire into the hole and tightening the bolt
- turn the air back on and ensure the wire tension is corrected as explained in Setting correct working parameters

### Electrical Tensioning (load cell + wire spooling wheel)

Here is the proper way to install the cutting wire on standard machines with the pneumatic tensioning system:



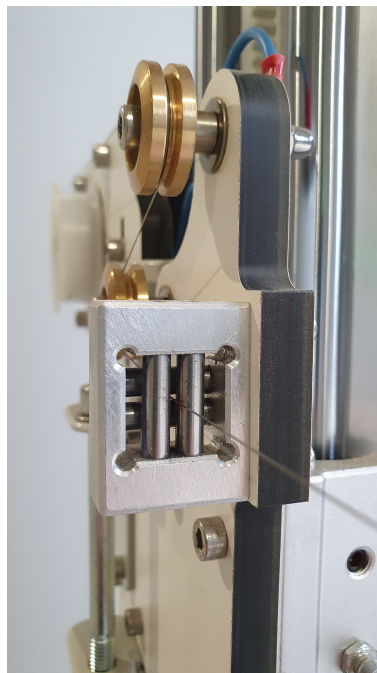
Temporary assistance from another person is recommended for a quick replacement of the cutting wire on independent axis machines with the electric wire tensioning.

Always follow these steps when installing a new piece of spring-tensioned wire

- Home the machine
- move the wire holders to the opposite ends of the machine diagonally to ensure the installed piece of wire will be sufficiently long for the largest possible trolleys' offset (wire length change). This can be easily done by temporarily disabling one of the sides' movement on the

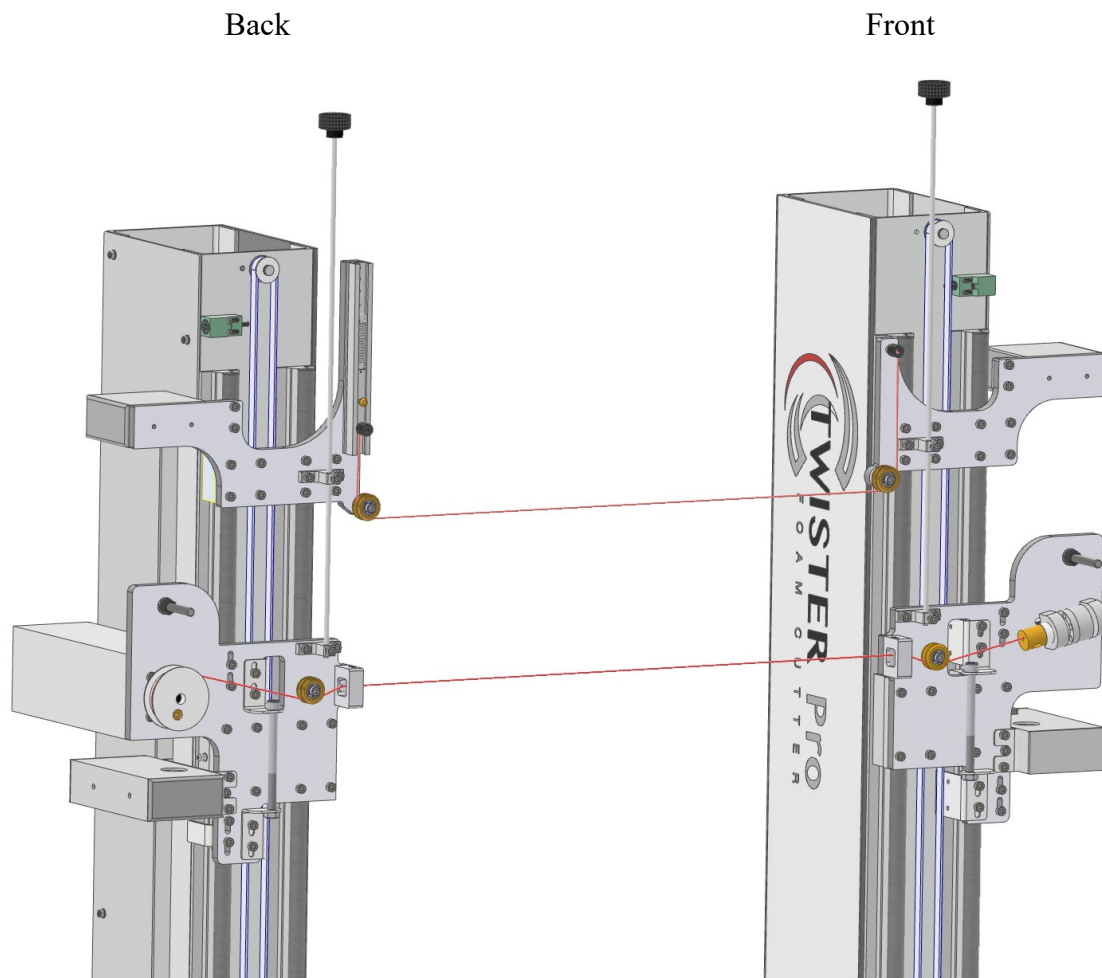
Manual Control panel in iXshaper.

- ensure the wire heating is switched off (remote's display should read: *Heat OFF*)
- disable the electric wire tensioning by moving the tension slider in Manual Control all the way to the left until it reads 0N.
- guide one end of the wire through the very center of the front trolley's wire guide cube and fix it to the load cell using the side fixing bolt
- feed the second end of the cutting wire through the very center of the back trolley's wire guide cube, wrap a single loop of the wire around the wire spool and fix the wire on the spool by feeding it through the hole and securing it with the bolt on the side of the spool.
- avoid twisting or bending the wire throughout the process as it may result in its premature failure later on
- tension the wire slightly using a tool with an insulated handle, e.g. a screwdriver and ensure its slightly tensioned throughout the subsequent wire spooling to avoid its coming off the brass wheels
- move the wire tension slider in Manual Control in iXshaper to 20-30N to begin the spooling process
- once the initial spooling completes and the wire is properly tensioned, set the wire tension value to the desired one based on the machine width and wire diameter (e.g. 40-50N). For more information please refer to: Setting correct working parameters.



## Spring Tensioning – dual-wire

Here is the proper way to install the cutting wire on machines with the spring tensioning system:



Dual wire machines may either feature one of the above types of wire tensioning or a combination of two of them so please refer to the above instructions for more details.

Ensure the top wire is perfectly level to the bottom one by adjusting its position on both sides. To adjust the wire height on a given side, loosen the black knob.

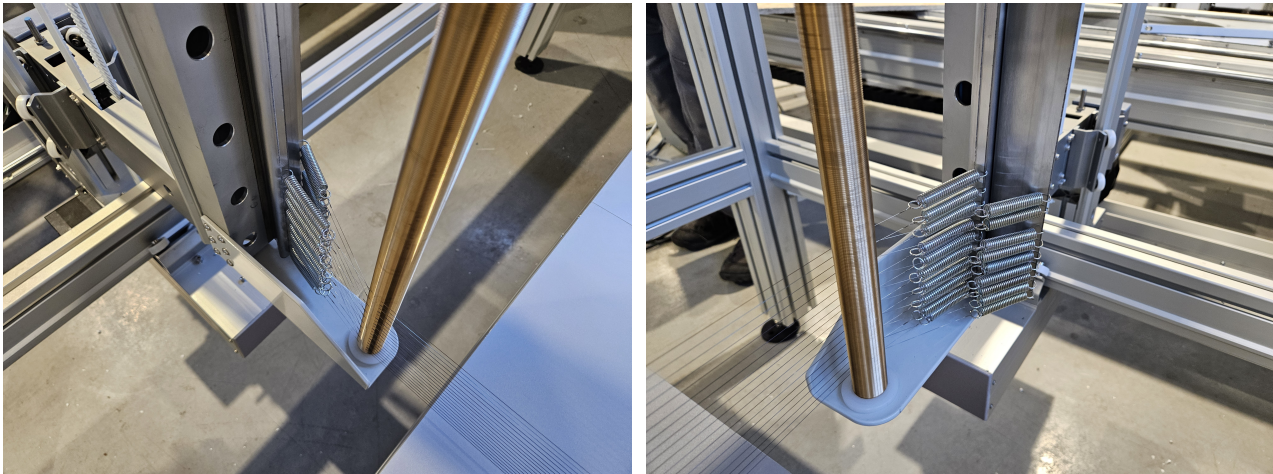
## Spring tensioning - MW series

The following visuals show the proper wire installation on the MW series :

Back

Front





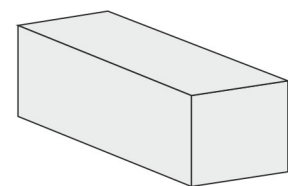
Please note the following:

- prepare the cutting wires by fixing a spring to one of the ends and either a second spring or an S-hook to the other end
- hook the springs and S-hooks to the mounting edge at distances close to the required wire spacing. Make sure the wires properly rest against the threaded rods on both sides.
- Set the final wire distances on the threaded brass rods using the 1 mm increments of the thread
- ensure the wires are properly tensioned as per the instructions in section Setting correct working parameters

## Setting correct working parameters

### EPS density

EPS foam is available in a variety of different densities, such as 15, 20 30 and 40 kg/m<sup>3</sup>. To ensure your cuts are precise you will need to set the following four parameters to correct values based on the size and density of your EPS block.



### 4 most important cutting parameters

1. Wire temperature - the higher the temperature of the cutting wire the higher the cutting speed. Yes there is a limit to a workable wire temperature as when set to too high a value the wire life will decrease significantly and will result in frequent wire breaks and the cutting quality may be compromised.
2. Cutting speed - directly related to the wire temperature and the density of your EPS block, and in general as you increase the wire temperature so should



you increase the cutting speed to maintain consistent cutting quality

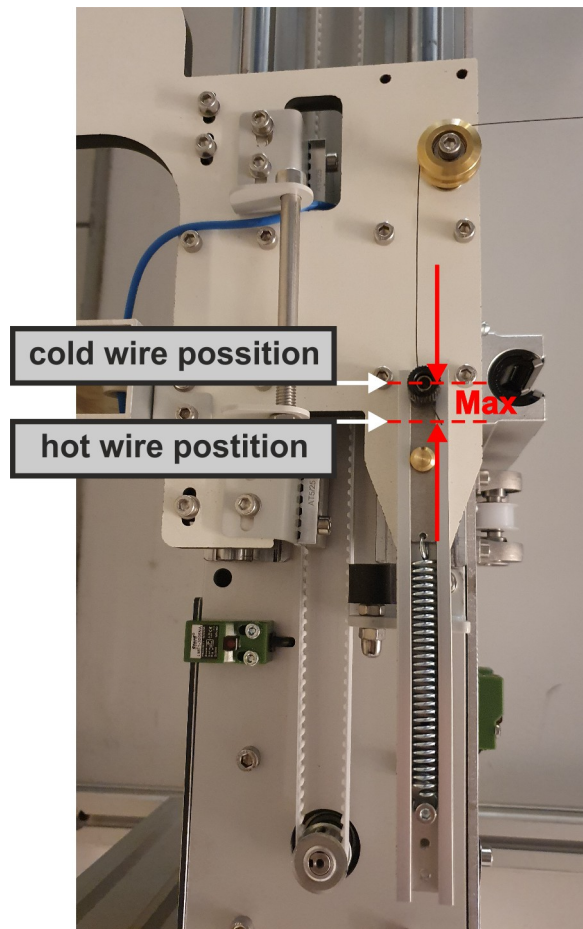
3. Angle pause - an important parameter controlling the fraction of a second the cutting wire is stopped for when changing the cutting direction to ensure all corners are nice and sharp and not unnecessarily rounded
4. Wire tensioning - it is essential that proper wire tension is maintained throughout the cut. As the wire gets hot it stretches a little and this elongation may have a negative impact on the wire tension which in turn will impact the cutting quality. Re-tension or replace the cutting wire when needed to ensure proper and constant tension throughout the cut.

### **Wire temperature – initial setting**

Start by setting the correct wire temperature. Its value will depend on a number of factors, including the type, length and diameter of the cutting wire, but also the size, density, quality and moisture of your EPS piece, the type of cut and cutting speed. Follow the below instructions to set the initial wire temperature value which you will be able to adjust later on.

In Manual Control set the wire temperature slider in the middle of the available range (the range may be different for different size machines). Place a small piece of EPS a couple of cm away from the cutting wire. Using the remote control/handheld (or the Manual Control software controls) turn the wire heating ON. Move the EPS onto the wire to see if it's hot enough to cut it – if not, increase the wire heating value in small increments until a high enough value is set. Avoid heating the wire all the way until it becomes unnecessarily red hot as this will have a negative impact on its performance (premature breaks, elongation, burnt EPS surface).

On machines equipped with the spring tensioning system, observe the spring as the wire gets hot – you should be increasing the wire temperature only until the point when the spring starts to contract a little: roughly 10 mm for a 1300 mm wide unit and up to 20 mm for a 2500 mm wide machine. Should you allow the spring to contract too much, it would indicate significant and perhaps permanent wire elongation which will prevent the spring from compensating for the wire change to a point when sufficient wire tension cannot be maintained.



### Wire temperature – a test cut

To verify your wire temperature setting perform a test cut.

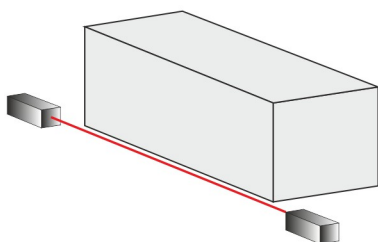
#### **CAUTION!**

Remember: EPS size and density are two of the most important factors which influence the cutting parameters. So bear in mind that despite having set the correct wire temperature, cutting speed: and angle pause for a given job, you may have to readjust these settings for another cut in a different size or density EPS block.

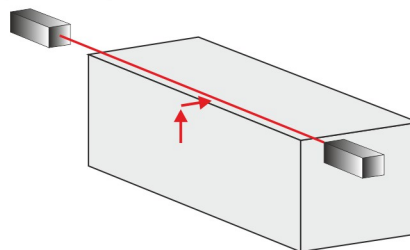
- A) With the cutting wire in the Home position, place your EPS piece a few mm away from it.
- B) Move the cutting wire above the top surface of your EPS piece (using the handheld or Manual Control arrows).
- C) In Manual Control set the speed slider to 250 mm/min and the wire temperature slider to the previously determined value. Note these are rough values only which should be a good starting point to your later trial-and-error tests in finding the most optimal settings.
- D) Use the down arrow to make a simple down cut.

- E) If the cutting quality is acceptable, open the Configuration window and set the speed and heat values there for subsequent use during an automated cut. If there is a quality issue, repeat the simple down cut test until optimal values are determined. Note you can save a number of different configuration settings in separate Configuration mcc files for convenient future cuts in similar materials.

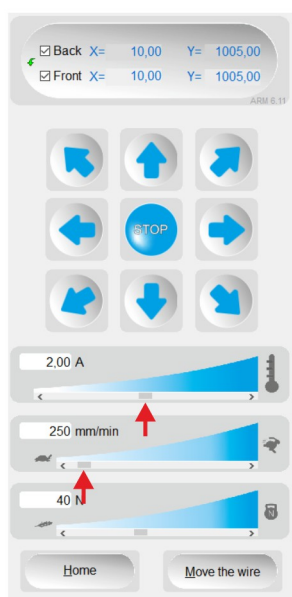
**A**



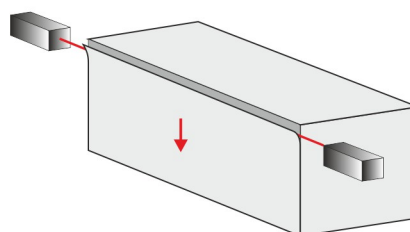
**B**



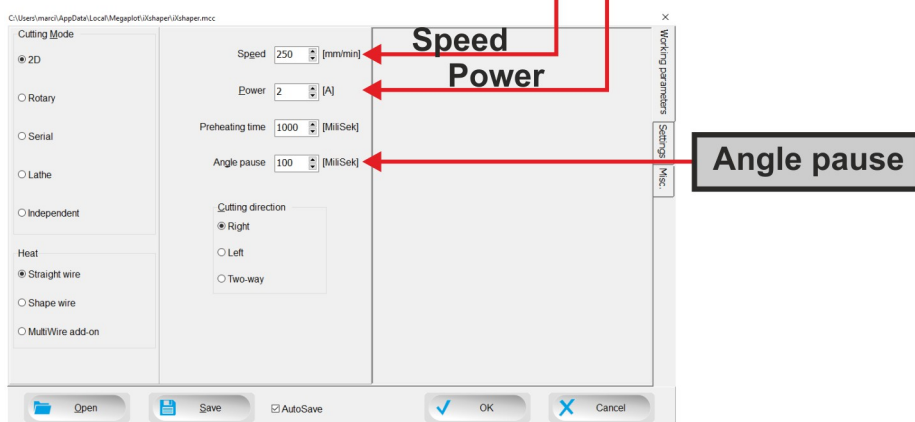
**C**



**D**



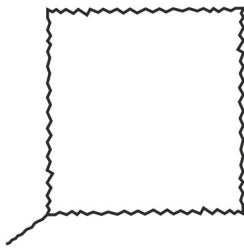
**E**



You may have to adjust both the wire heating value and the cutting speed at the same time to ensure the surface quality is perfect, without any over-burn or wire marks.

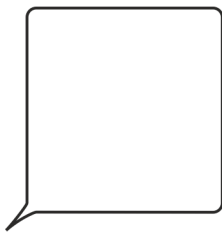
### Angle pause

This is an important parameter which determined the amount of time the cutting wire is stopped for when changing the cutting direction to ensure all corners are nice and sharp and not unnecessarily rounded. A good starting point here is 150 ms, although in higher density doams it may be beneficial to increase this value to 200-300 ms or even more. The below table explains the things to bear in mind when setting the angle pause, wire heat and cutting speed.



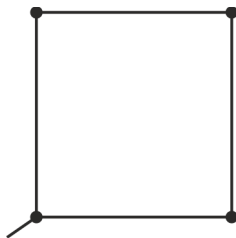
**Issue:** surface chatter

**Solution:** decrease the wire heating and/or increase the speed slightly



**Issue:** rounded corners. The exit line does not match the entry line.

**Solution:** increase angle pause, decrease speed and/or increase wire heating

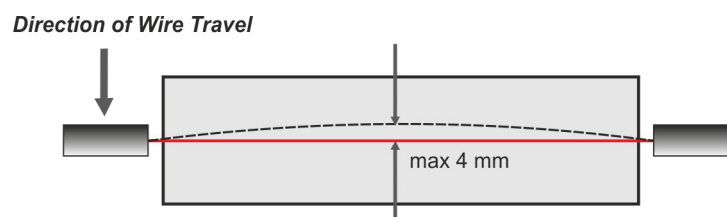


**Issue:** overburnt corners

**Solution:** decrease angle pause

### Wire Tensioning

It is essential the cutting wire is properly tensioned throughout the cut. You will get the best results when the wire drag is as small as possible as once it reaches a significant value (4 mm or more) visible imperfections and reduced wire life can be expected.



## REMOTE CONTROL/HANDHELD

The handheld is an optional accessory. This is a plug'n'play device, so even if you ordered your machine without one, you can always order it at a later time as the electronic controller of your machine ships from the factory with the handheld support built-on.

The handheld can be used to move the machine manually in all direction, turn the wire heating on and off or set a cut's zero point. It can also be used to adjust the cutting speed and wire heating on the fly while a cut is in progress. The remote's display shows the project's current co-ordinates (in relation to the zero point of the project) as well as the wire heating and cutting speed values.

Wire co-ordinates in iXshaper are in relation to the Home position of the machine determined by the physical limit switches. Therefore the co-ordinates shown in the software automatically zero out every time you Home the machine by clicking the Home button in the software.



Co-ordinates on the remote control (handheld) are in relation to a project home which you can change as you wish. Press & hold the "0,0" button on the remote to set a new Project Home (which will zero out the co-ordinates on the remote only). From now on a short press of this button will move the machine back to this new Project Home. Press and hold again in a different location to save a new Project Home and so on.



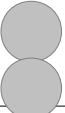











And if you do this while the machine is in the Home position, the co-ordinates shown on the remote will match with those shown in the software. Otherwise it's perfectly normal for them to differ.

The operator using the handheld should stay in a safe distance from the moveable parts of the machine.







Handheld buttons:

	Off Wire Heating	Switch wire heating OFF
	On Wire Heating	Switch wire heating ON

	Wire Heating -	Decrease wire heating power
	Wire Heating +	Increase wire heating power
	Z ↑	TurnTable or Lathe rotation
	Z ↓	TurnTable or Lathe rotation
	STOP	Stop the movement/cut
		Move in X & Y
	Speed -	Incremental decrease of the movement speed
	Speed +	Incremental increase of the movement speed
 (short press)	Slow	Set the speed to a previously saved SLOW speed value
 (short press)	Fast	Set the speed to a previously saved FAST speed value
 (press & hold)	Slow	Set the current speed as the new SLOW speed
 (press & hold)	Fast	Set the current speed as the new FAST speed
 (press & hold)	START	Start the cutting of a drawing opened in iXshaper application
	START	Continue (after a cut has been stopped)

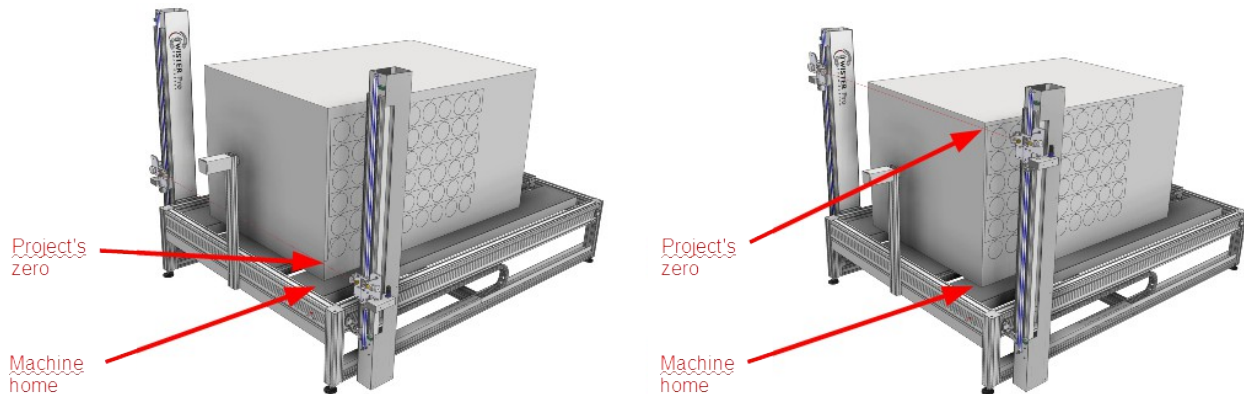


(short press)		
 (press & hold)	0,0	Clear the X and Y co-ordinates displayed on the handheld (but only temporarily - until the start of the next cut).
 (short press)	0,0	Move the wire to the location from which the previous cut started.
		Not defined

## DRAWINGS' PREPARATION

### Machine's Home position vs. the drawing's starting point

It is essential to understand the difference between the machine's Home position and the starting point of a drawing. Each time the machine is switched on it needs to be Homed – its Home position is determined by the physical location of the proximity switches and this location cannot be changed by the operator.



The EPS block can be placed anywhere within the working area of the machine. The cuts will start from the current wire location and this is the drawing's starting point. Most cuts start either in the lower left or the upper left corner of a drawing.

If a cut is to start from the upper right corner of a drawing, the wire needs to be brought up by the operator prior to initiating the cut.

### Supported file formats

iXshaper accepts drawings saved to one of the following formats: PLT, DXF, AI /EPS (Adobe Illustrator 8), NC. It is important your vector files does not feature any overlapping lines as this will result in double passes and incorrect cutting path.

#### DXF file requirements


- all elements of the drawing need to be located on the same zero layer
- do not use BLOCKS, the entire cutting line needs to consist of polylines, curves, etc.
- lettering needs to be converted into curves (in AutoCAD, use the Express tools (express \ text \ explode \ explode text)).
- save your dxf files to the AutoCad R12/R13 format

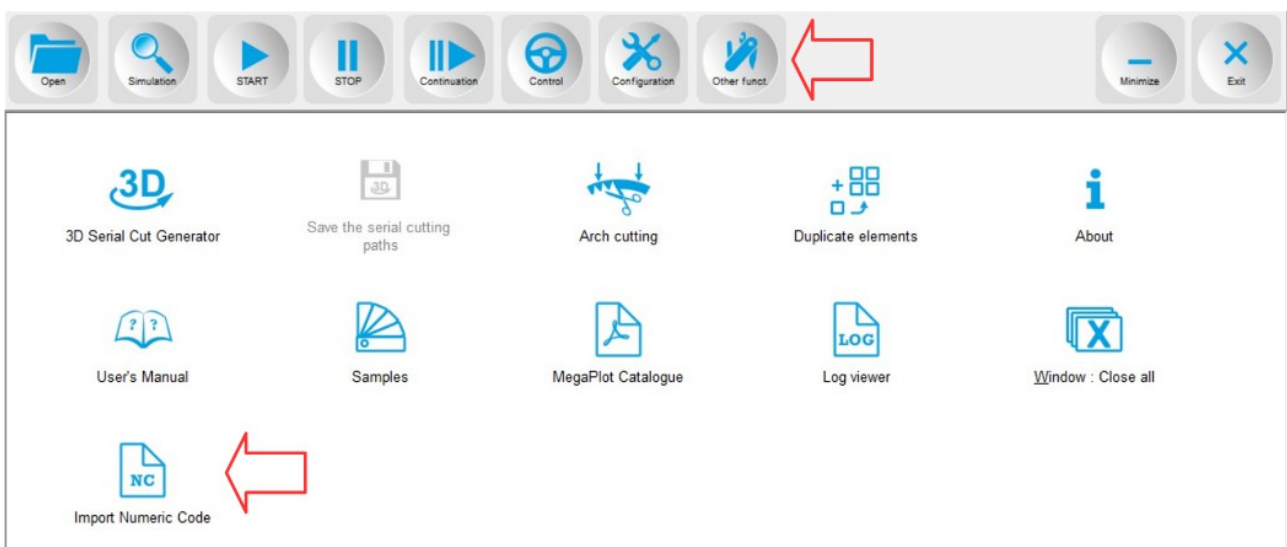
## NC codes (G-codes)

iXshaper supports the import of NC numeric codes (G-codes) for both standard 2D files as well as 4-axis independent axis cuts.

These NC codes provide advantages during the cutting process as apart from the actual cutting path they may also include such cutting parameters as cutting speed, wire temperature and more as outlines below.

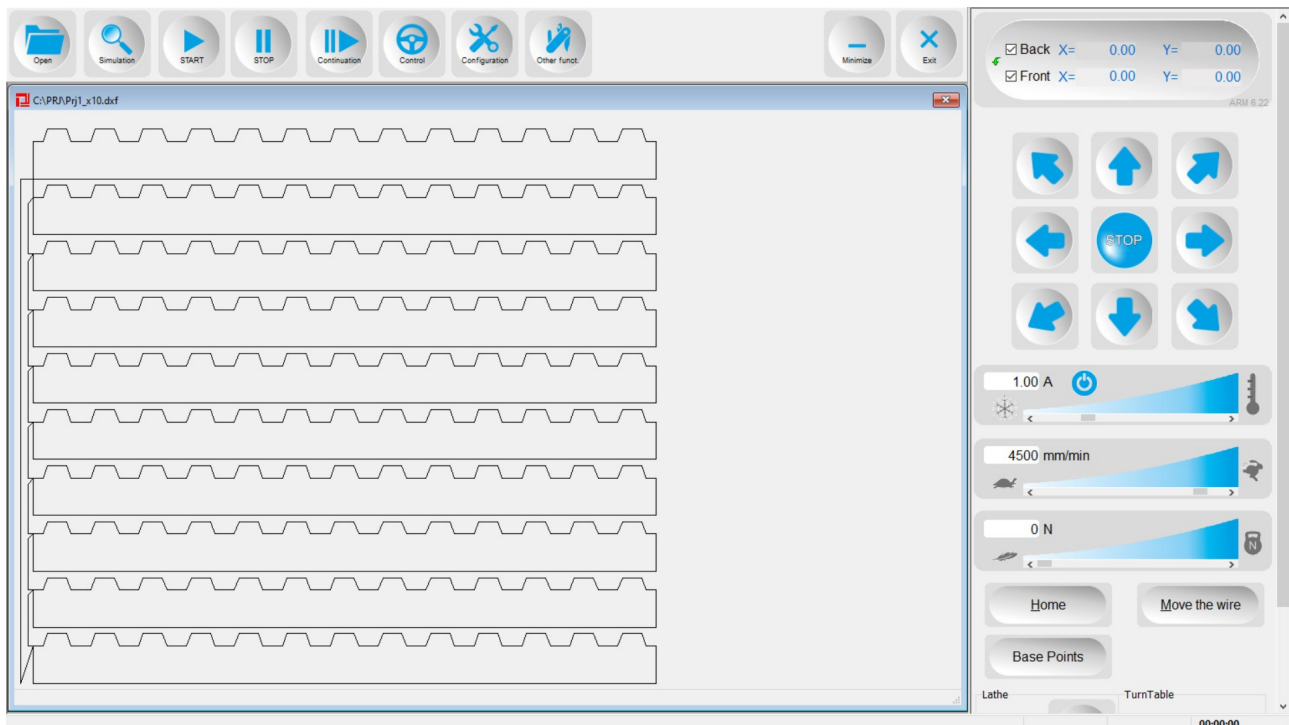
The complete NC specification is listed below.

To load an NC code into iXshaper, please use either the **Open** option  or use the “Import NC” button from the “Other Funct.” section.



In the pop up window please select the file to load. All files within a folder with the .NC extension will be shown at this time.

Press the “OPEN” button to load the file. A preview will be displayed confirming the file can now be either previewed or cut.



**Note!** When loading an NC code the software interprets the drawing and converts it to DXF and it is the DXF file that is previewed.

### **2D cuts**

**iXshaper** recognizes the type of cut in the G-code based on the **PROJECT\_TYPE** parameter. If set to 1, iXshaper will consider the file to be 2D. When loading such a file the iXshaper automatically sets the cutting mode to 2D in Configuration to ensure both trolleys move in unison during such a cut. When the project type parameter is missing from the G-code the file will be considered to be 2D as well and only X and Y coordinates will be taken into consideration. The second set of coordinates for the other side (A & B) will be ignored.

Should the file not include commands setting the cutting speed and wire heating (F & S), these will be loaded from the current iXshaper Configuration. To start a cut based on a G-code file the operator presses the “Start” button, just as when cutting a standard DXF or PLT file.

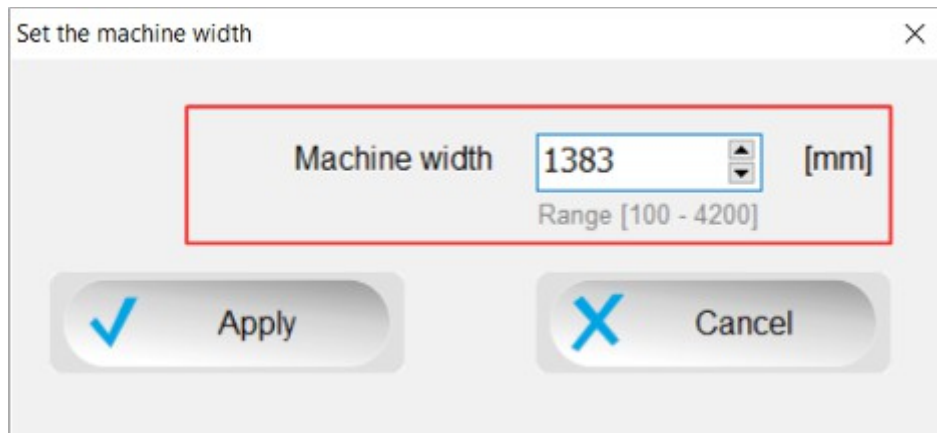
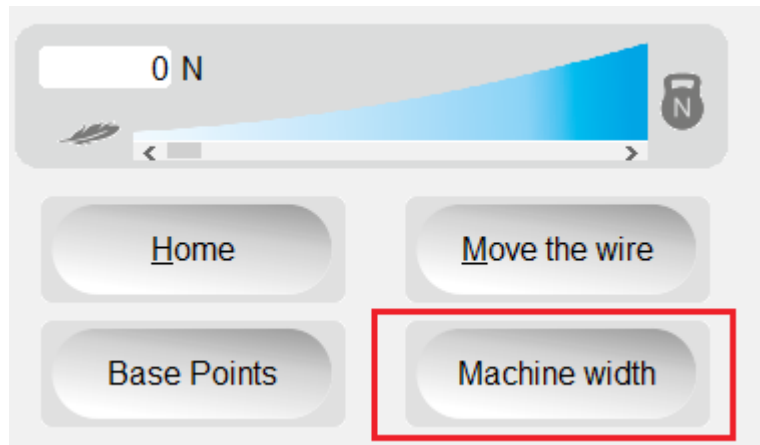
### **4-axis independent axis cuts**

If the **PROJECT\_TYPE** parameter in the NC file is set to 2, this indicates a 4-axis independent axis cut. In this case the X & Y coordinates control the front trolley (green), while A & B control the back trolley (red).

To facilitate the cutting process the G-code for an independent axis cut may include additional information. When not set, a pop up window will be presented prior to the cut where the operator will be able to set the wire length, material width or the distance from the material to the front trolley.

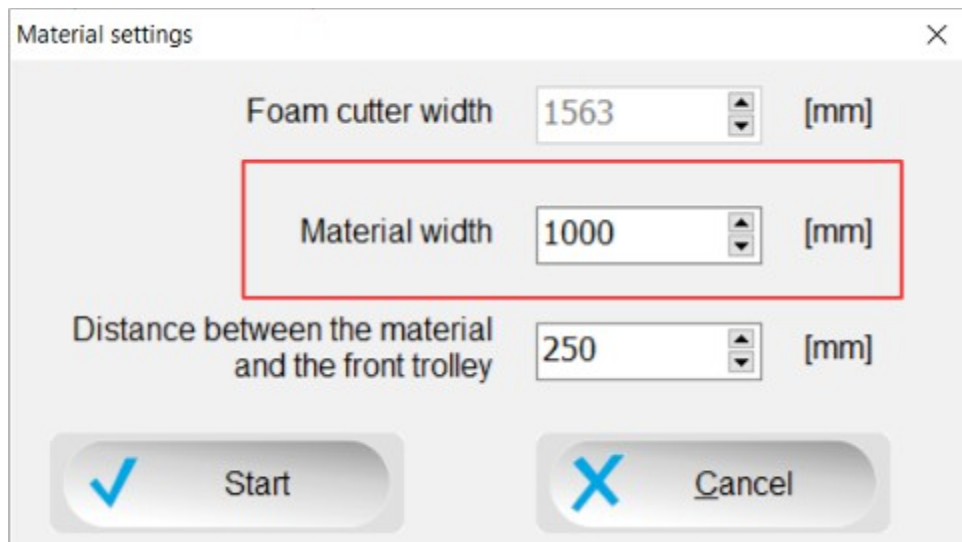
Supported parameters:

**WIRE\_LENGTH:** This option is only visible for machines with the variable wire length feature. It determines the length of the cutting wire (distance between the trolleys) when making an independent axis cut. When a G-code with this parameter is open the wire length will not be set automatically on its own to avoid a possible collision with an EPS block which may be present on the machine table. To set the wire length one needs to press the Machine width button and if the previously opened G-code includes the wire length parameter when the value will be loaded automatically in the pop up window. When the Apply button is pressed the machine width will be set automatically. If the wire length (machine width) is not set, the machine will perform the cut with the current wire length.



For all standard units without the variable wire length feature this option is hidden.

**MATERIAL\_WIDTH:** This parameter determines the width of the EPS block in which the independent axis drawing will be cut. This value will be shown in the pop-up window which is shown upon pressing the Start button.



Material settings

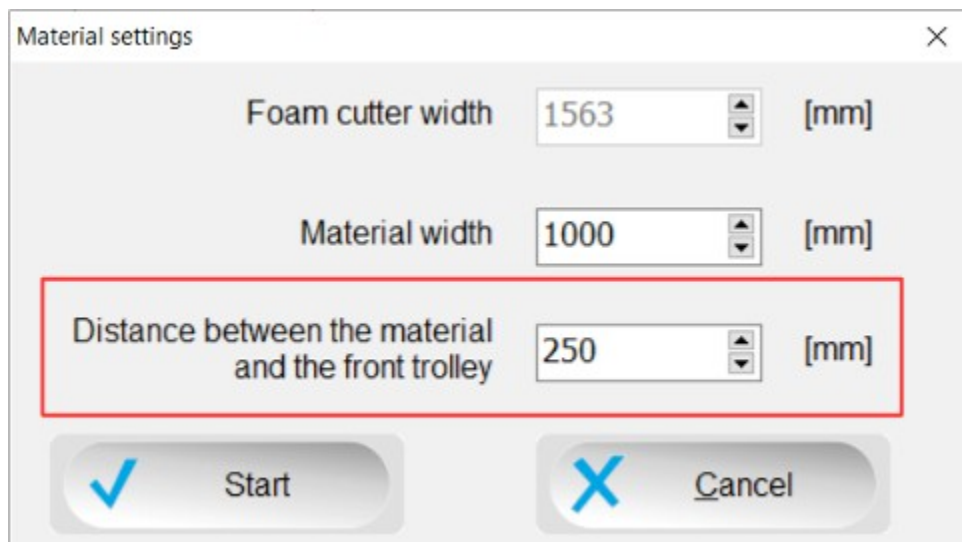
Foam cutter width 1563 [mm]

Material width 1000 [mm]

Distance between the material and the front trolley 250 [mm]

Start Cancel

**DISTANCE\_FROM\_FRONT:** This parameter determines the position of the EPS block on the machine table in relation to the front trolley. This value will be shown in the pop-up window which is shown upon pressing the Start button.



Material settings

Foam cutter width 1563 [mm]

Material width 1000 [mm]

Distance between the material and the front trolley 250 [mm]

Start Cancel

### ***Supported G-codes***

The iXshaper interpreter supports the following G-codes:

**G0** - rapid movement

**G1** - linear feed rate movement

**G2** - clockwise arc move (2D cuts only)

**G3** - counterclockwise arc move (2D cuts only)

**G4** - stopping wire movement without switching the wire heating off (dwell)

**G17** - XY plane

**G20** - imperial system - inch

**G21** - metric system - mm

**G22** - loading subprogram defined by G98

**G90** - absolute positioning

**G91** - relative positioning

**G98** - start of subprogram definition

**G99** - end of subprogram definition

### ***Supported M-codes***

The iXshaper interpreter supports the following M-codes:

**M12** - mirroring in X plane

**M14** - mirroring in Y plane

### ***Other supported codes***

The iXshaper interpreter supports the following M-codes:

**X** - front trolley X coordinate

**Y** - front trolley Y coordinate

**A** - back trolley X coordinate

**B** - back trolley Y coordinate

**F** - feed rate

**S** - wire heating value in Amps

**I** - relative offset from the start point to arc center in X axis in G2/G3 (2D only)

**J** - relative offset from the start point to arc center in Y axis in G2/G3 (2D only)

**R** - arc radius in G2/G3 (2D only)

**H** - stopping the wire movement in seconds, support for fractions, e.g. H0.01

**U** - number (name) of the subprogram

**W** - number of repetitions of the subprogram

### ***Parameters***

The iXshape NC interpreter supports parameters. Parameter format:

**#<PARAMETER\_NAME> = PARAMETER\_VALUE**

## Comments

The iXshaper NC interpreter allows for the presence of comments inserted in the following two ways:

- ( ) - text in brackets will be ignored during the NC interpretation
- ; - text following a semicolon will also be ignored

## Additional information

Please observe the following rules when generating an NC code for iXshaper:

- All not supported commands will be ignored.
- There are no commands to switch on and off the wire heating, this is handled automatically by iXshaper (when the wire is in motion)
- All movements are done in the XY plane (G17); planes cannot be changed.
- If the NC file does not include any speed commands (F), the speed setting from iXshaper Configuration will be used.
- iXshaper automatically adds angle pauses in order for the wire to straighten up prior to changing direction to ensure sharp corner cuts. This value is taken from Configuration.
- It is possible to introduce additional stop points using the **D4** (dwell) command. This pause duration is set by the **H** command in seconds, fractions supported, e.g. 0.010.
- If the **G4** (dwell) command is not followed by the time value (H), the angle pause setting from Configuration will be used.
- For 4-axis independent axis (conical) cuts only linear **G0/G1** movements are supported - **G2** & **G3** arc movements are not supported.
- In 4-axis independent axis (conical) NC codes, each line must have the movement defined for both trolleys, XY and AB.
- In the case of 2D cuts when both trolleys move in unison only the XY values are used and are also used for AB. So if a 4-axis independent (conical) NC code is loaded as a 2D file, the AB coordinates will be ignored and XY will apply to both sides.

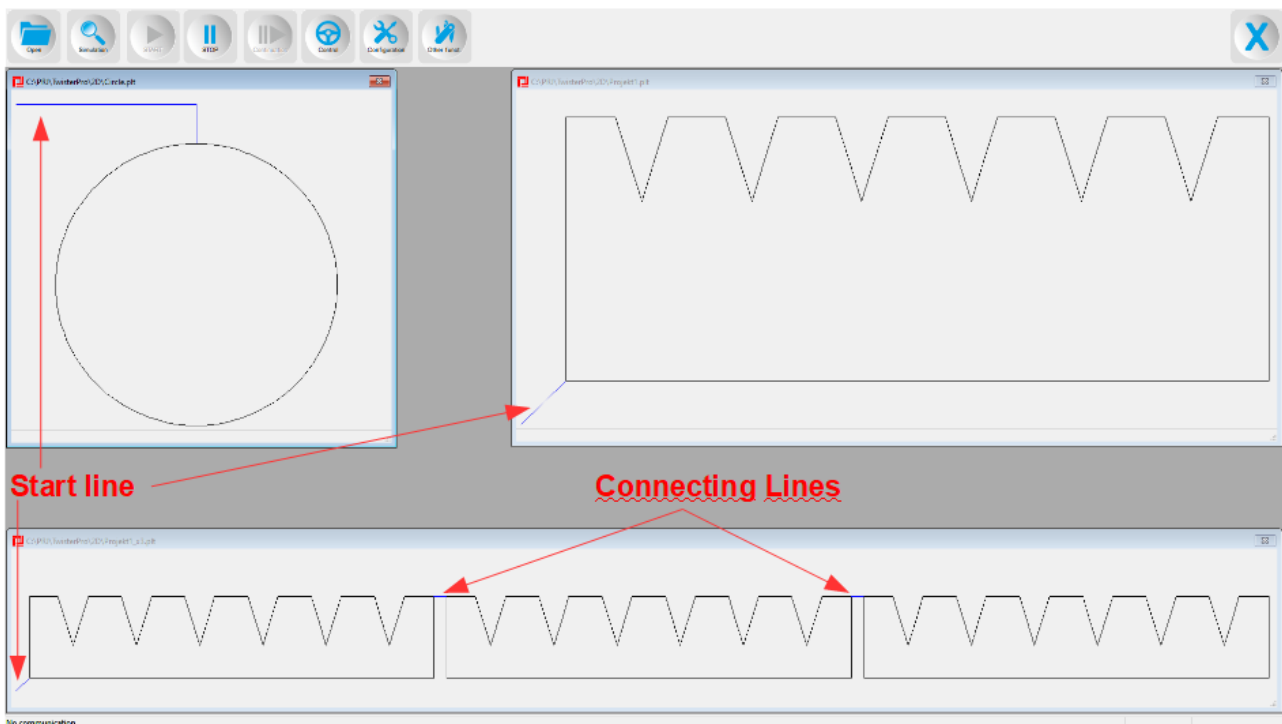


## Preparing the cutting path

Depending on the diameter of the cutting wire as well as your cutting parameters the cutting kerf will be smaller or larger but it will always be there as a certain amount of EPS will be evaporated during the cutting process. This needs to be taken into account when preparing the drawings as a suitable outline will ensure precise dimensions of the final EPS piece.

With the kerf and the subsequent EPS drop in mind, it is always recommended to prepare the cutting line in a way ensuring the cut starts from the top and works its way down layer by layer. For the same reason in case of a drawing consisting of a number of shapes, it is best to draw them in a way where each shape is cut completely prior to the wire moving onto the next piece.

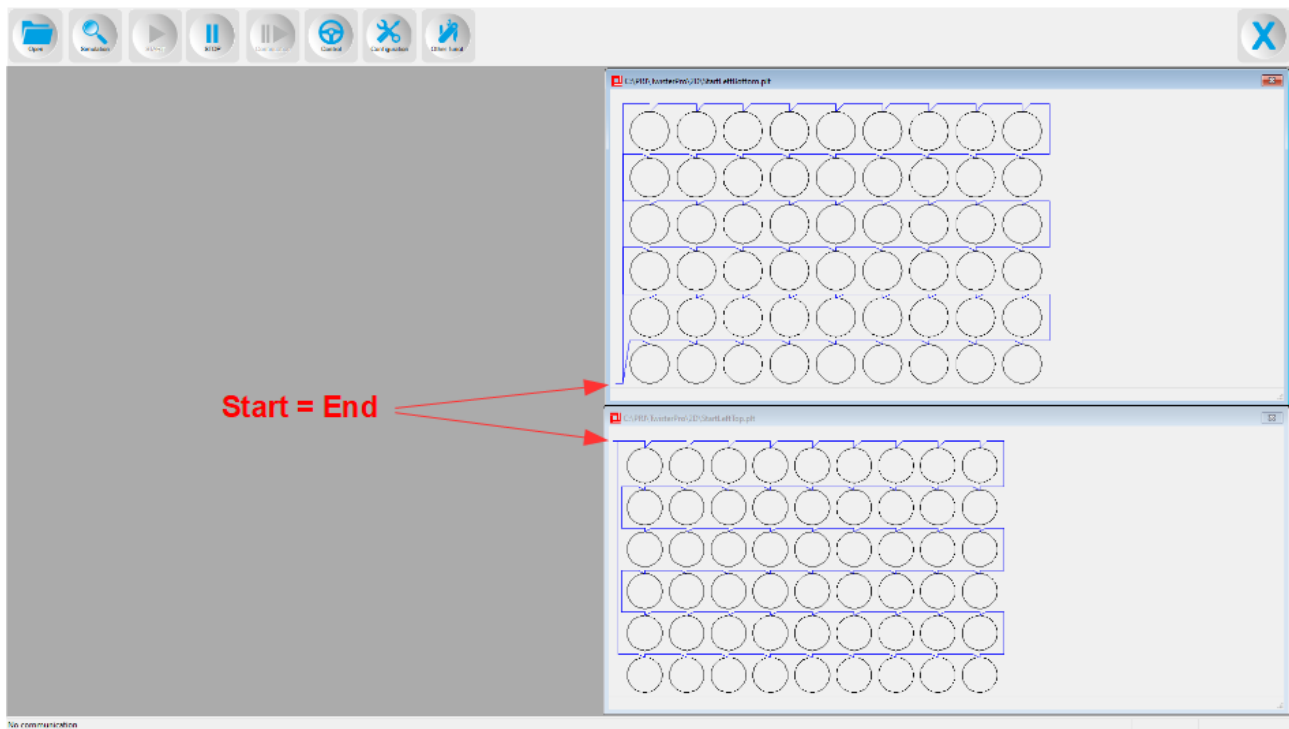
When drawing closed shapes it is essential all the node-to-node connections are proper. A properly drawn closed shape will be displayed in iXshaper in the black color. If it is blue instead it means the shape is not closed and should be corrected prior to cutting. All entry and connecting lines are normally displayed in blue but closed shapes should show up black.



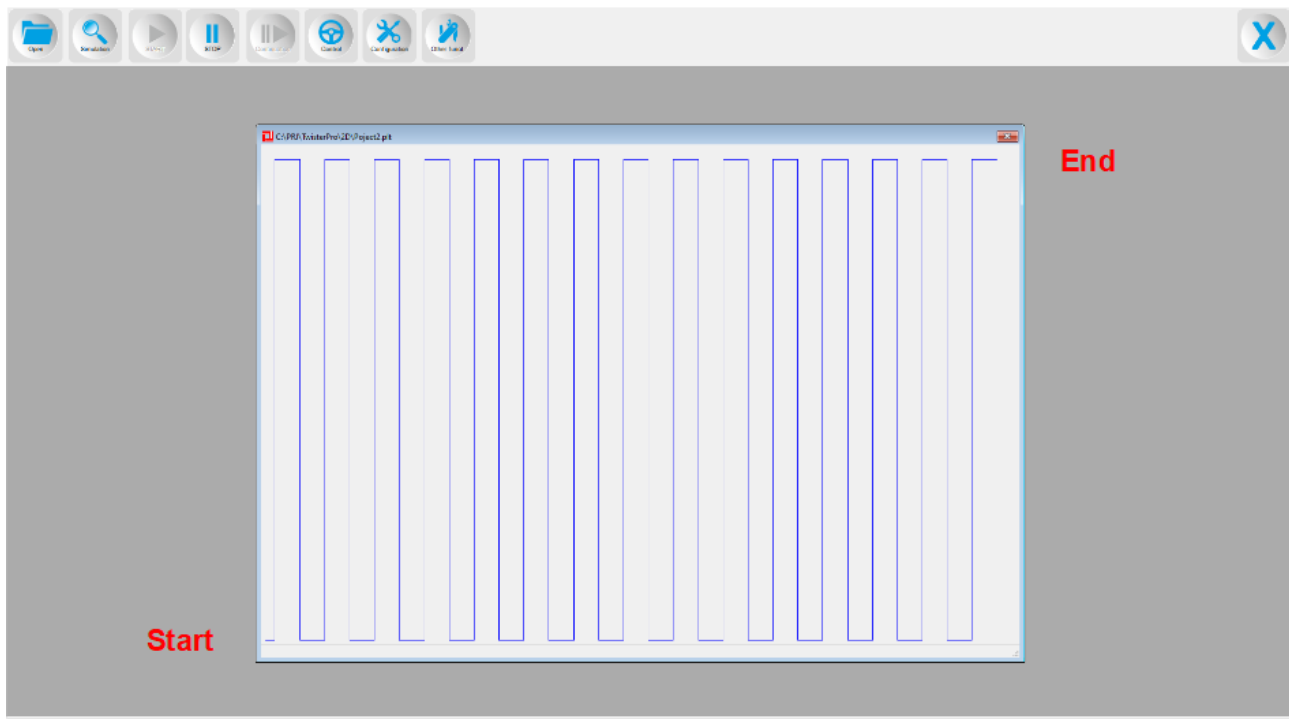
If a drawing consists of a number of unconnected shapes the iXshaper application will connect them automatically. However, with the above in mind, it is often a better idea to manually connect the shapes back in the graphics application. The entry line should start in the lower left or the upper left corner of a drawing and should reach an node on the first shape to be cut in the top section of the drawing. Ideally the starting line should be drawing in a way ensuring the cut starts and ends outside of EPS. All the connecting lines between the shapes need to be drawn node to node.

All cuts consisting of closed shapes start and end in the same spot. To force a cut to finish in a different location, all the closed shapes need to be opened and connected in a way making the entire cutting path a single open line. In this case a cut will begin from one end of the line and finish

at its end. This sort of single-line open drawing will be shown in iXshaper in blue.



An example of a cut starting on the left and ending on the right hand side.



## USING THE IXSHAPER APPLICATION

The iXshaper application is supplied with each Twister PRO foam cutter and is used to control the entire cutting process.

The drawings' preparation needs to be done in advance in a third-party graphics application. The iXshaper application supports the following file formats: PLT (CorelDraw), DXF (AutoCAD) or AI/EPS (Adobe Illustrator). Once a drawing is opened it can be scaled up or down as desired. The Simulation feature can be used to preview the cutting sequence prior to a cut and if not correct, one can go back and correct the drawing before a cut is initiated.

### Foam Cutter and iXshaper start up procedure

This is the correct boot up sequence for the machine and the control software:

- turn the machine on with the green ON button
- start the iXshaper application on the Windows PC
- Home the machine in iXshaper (Manual Control – HOME button)

The Home operation moves the machine to its home position determined by the location of the proximity switches. It needs to be performed each time the machine has been switched off and on again. It is not necessary to repeat this operation after each cut.

Caution! Do not attempt to initiate a cut or any manual movement of the machine until it has been Homed properly.

Should you experience a communication issue between the machine and the PC, please refer to: [COMMON ISSUES – BEFORE YOU REACH OUT FOR HELP](#).

### iXshaper settings

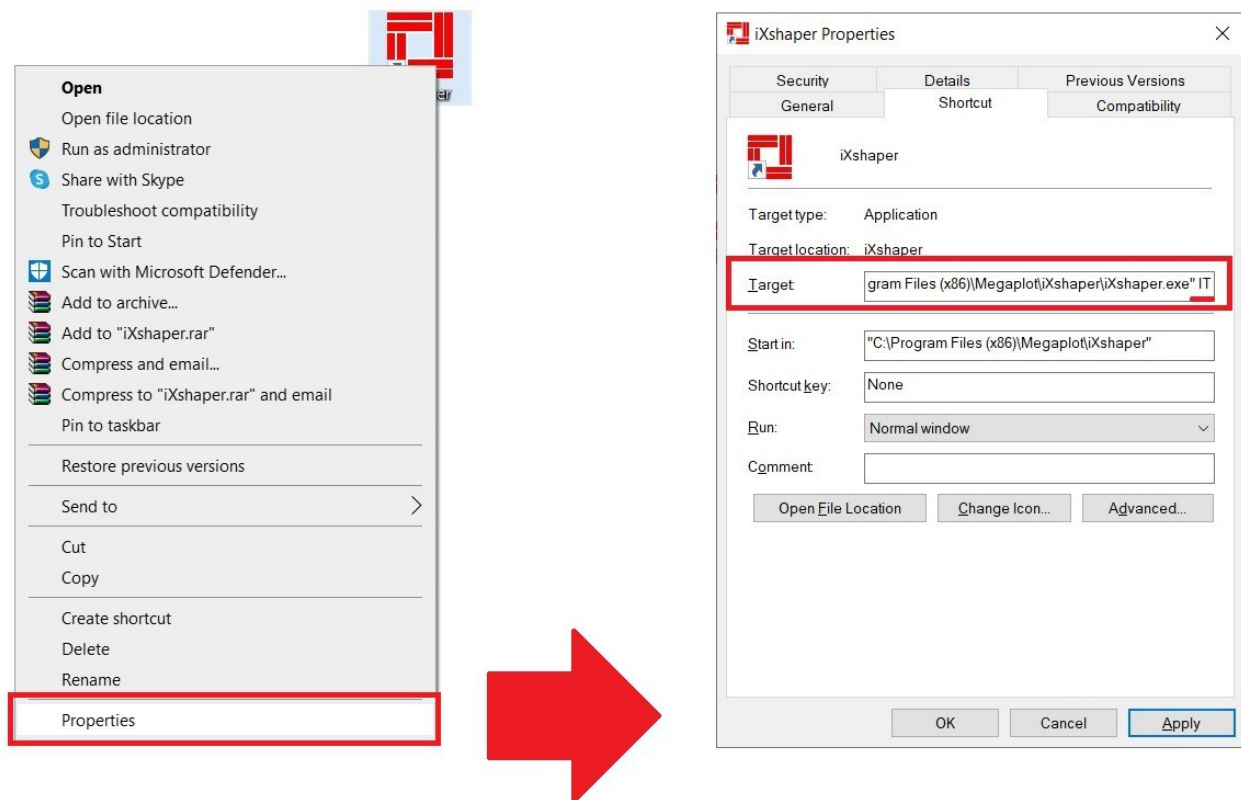
#### Language selection

iXshaper is currently available in: Polish, English, Italian, German, French, Spanish, Hungarian, Russian, Romanian, Slovakian and Chinese. The iXshaper application will always attempt to open in the same language as your Windows OS (if available). If not available, it will open in English as default.

Should you require iXshaper to be available in a different language, please reach out to us and we will be pleased to help with the process of having the application translated to your language.

To force iXshaper to open in any of the available languages regardless of your Windows OS language you will need to modify the iXshaper shortcut's target line (the shortcut is automatically

placed on your desktop after a standard installation).



In the Properties of the shortcut, add a space at the end of the Target Line and type the two-letter language code (e.g. IT for Italian).

Examples:

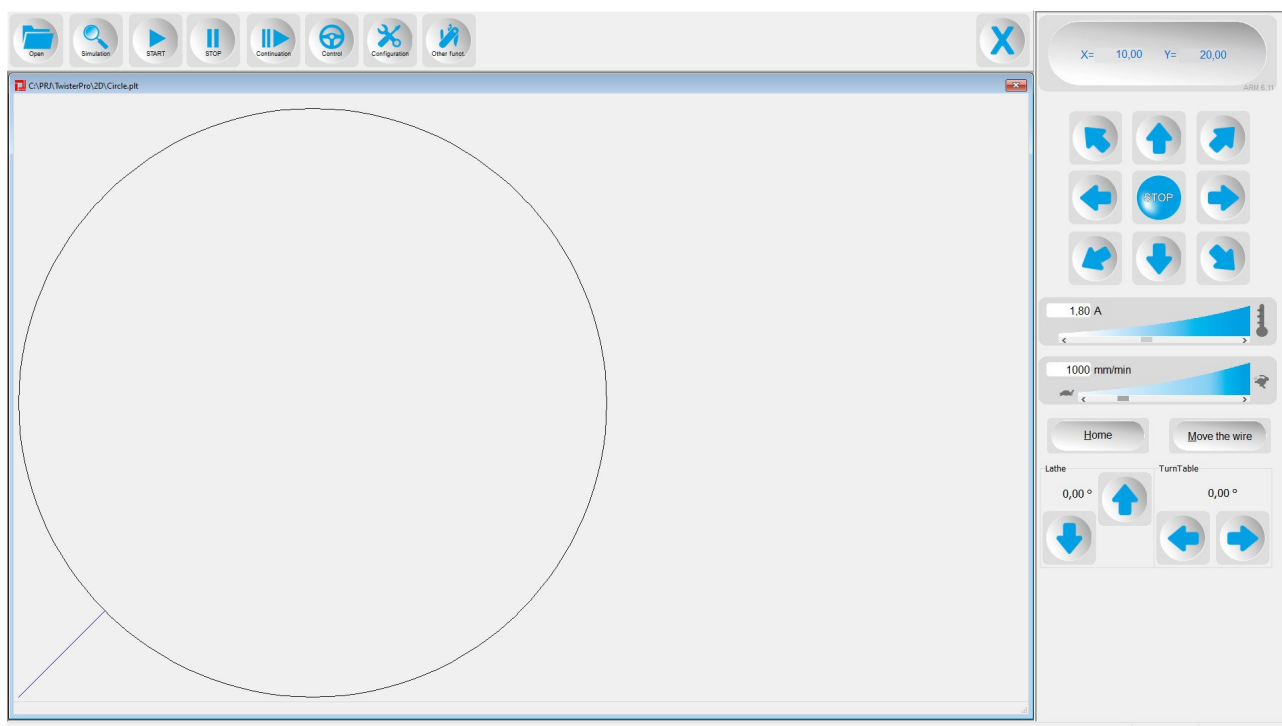
"C:\Program Files (x86)\Megaplot\iXshaper\iXshaper.exe" IT

## Main Window

Once the iXshaper application is started the main window is displayed – note it may differ based on the type of screen that it is displayed on. The biggest differences – between touch and non-touch screens – apply to the main window itself and the Manual Control panel.

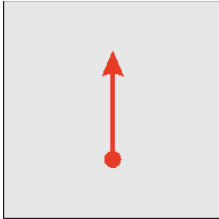
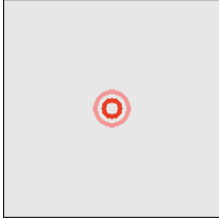
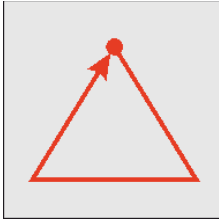
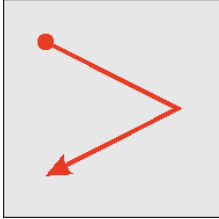
### Touch Screen Interface

On touch screens the iXshaper window will fill in the entire screen with the integrated Manual Control panel on the right. Once a drawing is opened it automatically fills in the entire screen. The control features are available by means of the large touch buttons on top of the screen and the user interface supports the touch gestures listed below.



Supported gestures on the main window of the application:

	<p>Close the currently opened and active front drawing. To close all the drawings at the same time, go to Other Funct. and select Close All.</p>
	<p>Swipe between all opened drawings starting from the last.</p>
	<p>Swipe between all opened drawings starting from the first.</p>

	Adjust the view to full screen.
	Display drawing information (double press)
	Simulate the cut (triangle or circle gesture)
	Start the cut

To close the iXshaper application please press .

To force this interface on non-touch displays you will need to add the TouchScreen parameter at the end of the target line in iXshaper's shortcut's Properties in the same way as explained in the section on selecting the required language version: [Language selection](#) ).

example: "C:\Program Files (x86)\Megaplot\iXshaper\iXshaper.exe" **TouchScreen**

### Non-Touch Screen Interface


In this case a slightly different interface is present – it allows for simultaneous preview of multiple drawings, comes with a different top menu as well as a bottom status bar.



To force this interface on touch displays you will need to add the NoTouchScreen parameter at the end of the target line in iXshaper's shortcut's Properties in the same way as explained in the section on selecting the required language version: [Language selection](#) ).

example: "C:\Program Files (x86)\Megaplot\iXshaper\iXshaper.exe" **NoTouchScreen**

## Manual Control window

The Manual Control panel is shown on the right-hand side of the main screen. It can be hidden and brought back by clicking this button (or pressing F5):  On non-touch screens the Manual Control is displayed in a separate window.

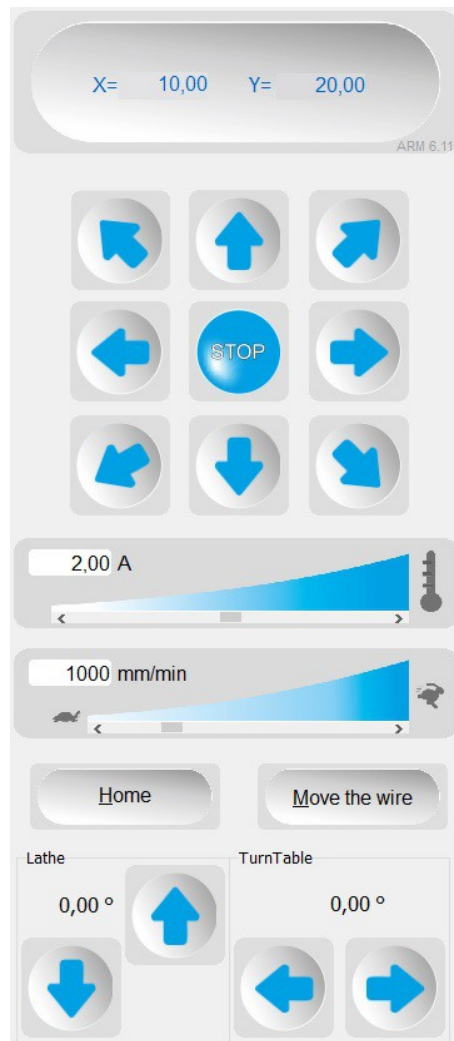
The Manual Control panel shows the wire's co-ordinates in X and Y in relation to the physical Home position of the machine determined by the location of the proximity switches. It is important to note these co-ordinates do not match those displayed on the wired remote (handheld) which are the project's co-ordinates and are unrelated to the machine Home position.

The Manual Control window may also show a “Broken Wire” message should the cutting wire's circuit be determined to be opened (e.g. because of the cutting wire having snapped).

Apart from directional arrows which can be used to move the machine around in all directions, the Manual Control panel also features:

- a slider for adjusting the temperature of the cutting wire (heat)
- a slider for adjusting the manual movement speed

- the Home button
- the Move Wire button (to move the wire by a given distance from the current location or to a specific spot in relation to the Home position)



Each time the machine is moved manually using the Manual Control directional arrows the wire heating switches on automatically. The movement speed and the wire temperature are determined by the sliders' settings. The same slider may be used to adjust the speed and heat of a cut in progress – however, bear in mind a cut always starts with the heat and speed values from Configuration.

## Homing Procedure

During the Homing operation the machine travels towards the Home position and stops automatically when the Home position proximity sensors (limit sensors) detect the trolleys have reached their Home position.

This operation needs to be performed each time the machine has been switched off and on again – there is no need to repeat this process after each cut, although you may want to repeat it when



a movement error is suspected or when the machine may have come into contact with an obstacle.

Only the first Homing procedure after a controller restart is a slow movement towards the proximity switches as explained earlier. Subsequent presses of the Home button will result in the machine moving towards this Home position at the Manual Control speed using one of the two movement methods set in Configuration (Misc. tab).

See the Maintenance section to ensure the proximity switches are set up properly for a reliable Homing procedure [MAINTENANCE](#) ).

## Move Wire

Use this feature to move the machine by a specific distance in one or both axes at the same time either from the current location of the wire or in relation to the physical Home position:

Move the wire Front & Back

**Move**

☐ to the Absolute Co-ordinates

☒ from the Current Position (Pos or Neg)

X= 0 [mm]


Y= 0 [mm]

Z= 0 °

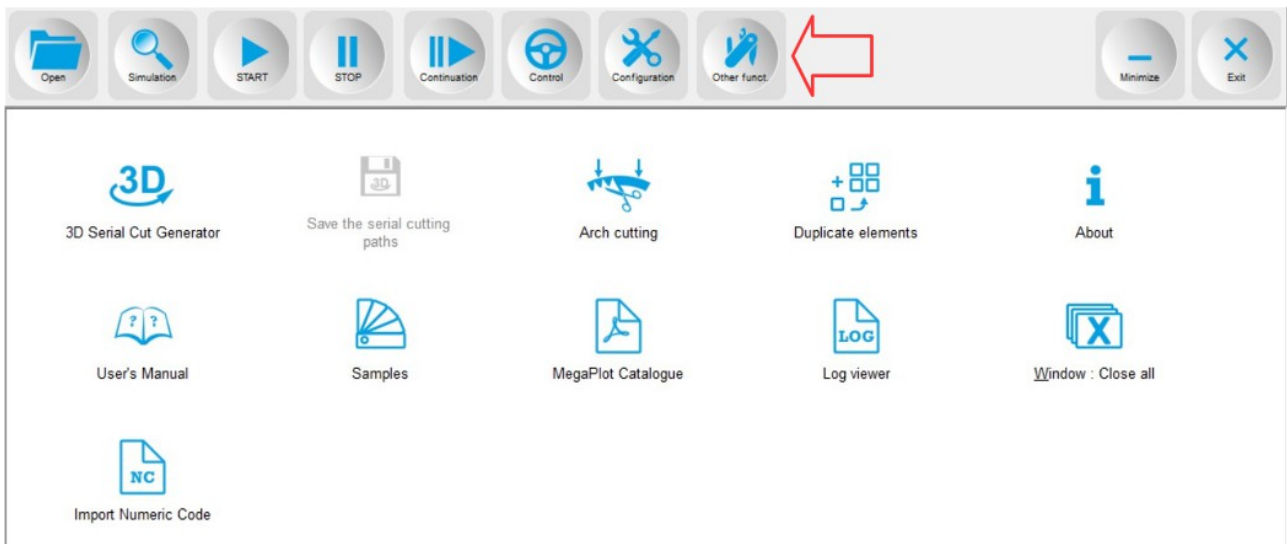
✓ Execute

✗ Cancel


## Other Functions

A number of features and functions have been grouped in iXshaper under the *Other Funct.* button  on the top right. The list of available features and functions displayed here will differ depending on the machine type and software configuration, and some will be greyed out until an action has been performed (e.g. a drawing has been opened).

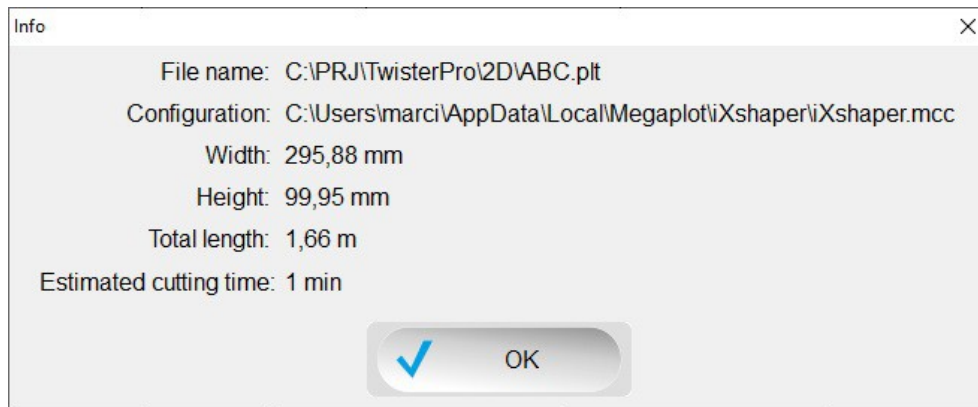
On non-touch screen displays all these features are accessible from the top menu.



## Opening a drawing

To load a previously prepared drawing press  or select *File – Open [F3]*.

Once a drawing is opened it is a good idea to double check its dimensions by double pressing on the opened drawing. On non-touch screens the same can be achieved by clicking *File \ Info* or right-clicking on the drawing and selecting *Info*.




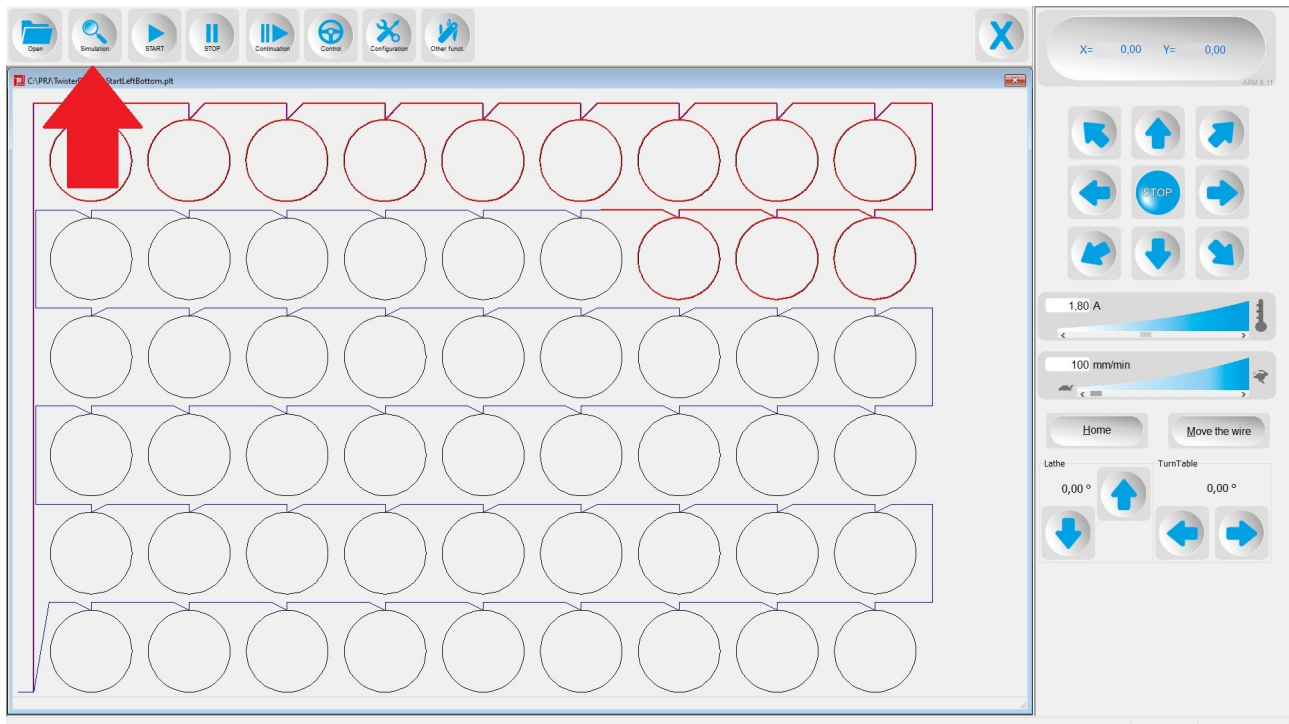
If the displayed dimensions do not match the dimensions from your graphics software, possible causes include:

- different size units set in the graphics software and iXshaper
- an export error e.g. in the case of plt files exported from CorelDraw 11 (which can be fixed by setting the scale setting in iXshaper to 101.6%).

The same pop-up window also shows the estimated cutting time based on current working parameters from Configuration.


## Simulation

It is recommended the on-screen simulation is performed once a drawing is opened but prior to initiating the cut. This will allow you to verify the cutting sequence is as expected (and if not, you can go back to the graphics software in order to modify the drawing prior to having it cut). To initiate the on-screen Simulation press this button  or perform a triangle or circle gesture on the touch screen. On non-touch screens the Simulation can be started by pressing the *F1* button or clicking *File\ Simulation*.



Cutting sequence and direction can be determined as explained in [DRAWINGS' PREPARATION](#).

## Configuration

To access the Configuration window, press the  button or select *Configuration* from the menu. All the working parameters are grouped under 3 tabs visible on the right hand side of the screen: *Working parameters*, *Settings* and *Misc*.

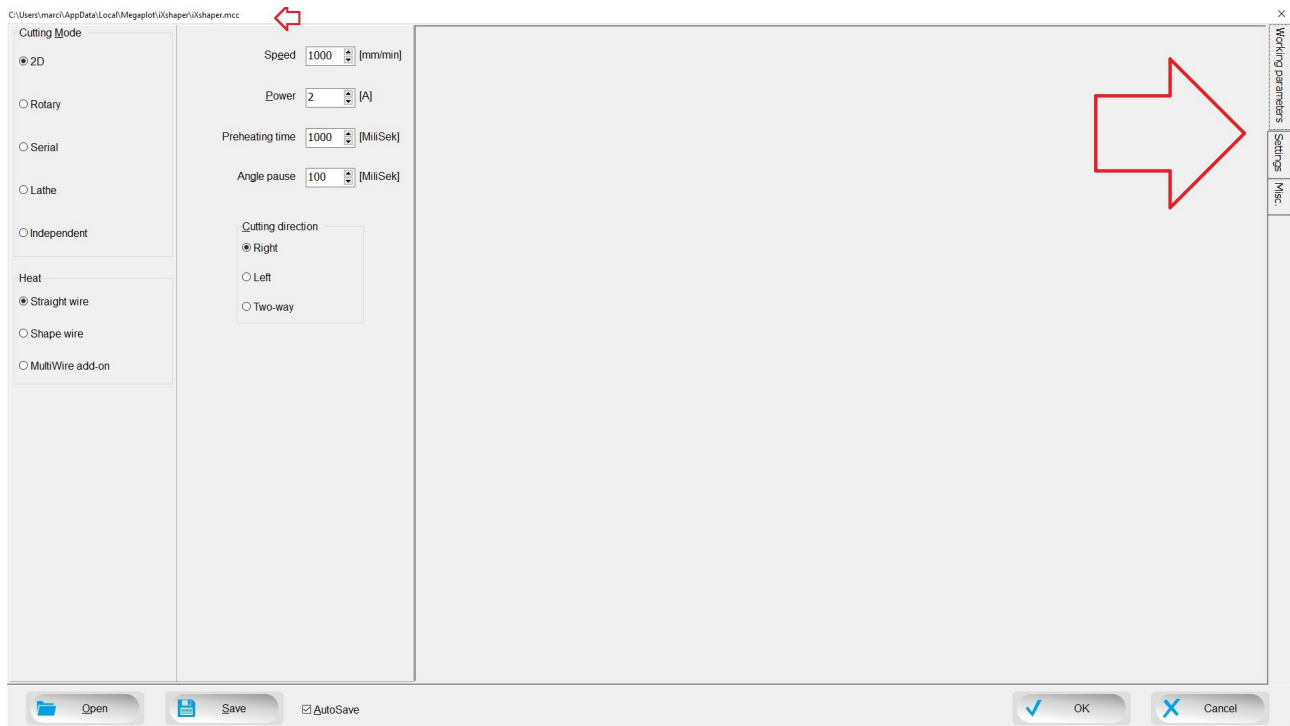
The *Working parameters* tab lists the most important cutting parameters and their exact number is determined by the currently selected cutting mode. These parameters should be set prior to having a drawing opened.

The remaining two tabs list parameters which are typically set only once at the time of machine installation. The *Settings* tab is used to configure the optional 3D accessories such as TurnTable or Lathe as well as the desired way the machine Homes. The *Misc*. tab includes the remaining, rarely

changed parameters related to the way the cutting drawing are handled.

The title bar shows the path to the current Configuration file. The *Save* button can be used to save the current configuration in a new file under a different name, while the *Open* button is used to load a previously saved configuration mcc file. Activating the *AutoSave* feature will ensure all the changes are saved in the current configuration file (and will not be lost after the current cut completes).

When diagnosing a cutting issue we may occasionally ask you to provide us with your current configuration file. If so, please e-mail us the .mcc file the path to which is displayed in the title bar as indicated below so we can replace your settings when diagnosing the issue.



### **Working parameters tab**

The number of settings available on this tab is determined by the currently selected Cutting Mode as well as the Heat output selection (both settings are listed on the left most part of the screen). Note that certain Cutting Modes, such as e.g. the Independent mode, will only be visible when a compatible and suitably featured machine is connected to the PC.

Below the Cutting Modes, the following Heat output settings are available:

#### *Straight Wire*

- this is the standard thin resistant wire stretched between the two arms/trolleys. It is used in the following cutting modes: 2D, rotary, serial and Independent. Standard max. available heating value is 4 Amp.

#### *Shape Wire*

- this is the 1 mm thick shapeable wire fixed to the optional shapewire

bar. It is used in the following cutting modes: rotary, lathe and 3D. Standard max. available heating value is 12 Amp.

*MultiWire add-on* - optional 5-wire add-on used to cut 5 identical shapes at the same time. Used in the 2D mode only. Wire heating setting in % (up to 100%).

The next section lists all the basic parameters common to all cutting modes:

*Speed* - this is the speed at which the resistant wire will cut your shape. It needs to be set based on the quality and density of your foam, the wire type and diameter, required accuracy, type of cut, etc. This speed setting can be adjusted while a cut is in progress using the Manual Control window or the wired handheld/remote.

*Power* - this setting determines the temperature of the cutting wire. It can be adjusted while a cut is in progress using the Manual Control window or the wired handheld/remote. The available range depends on the machine size, the cutting mode as well as the heat output setting.

*Preheating time* - the amount of time the wire is to preheat prior to starting a cut

*Angle pause* - the amount of time the wire stops for in corners to avoid wire drag and rounded corners.

*Cutting direction* - this setting applies to single-line drawings only (in which the start and end points are two different points). Such drawings can be cut always in the same direction (left or right) or left and right alternatively (e.g. the first cut start on the left and ends on the right and the subsequent cut starts from the right and goes back to the left).

The third column of settings lists cutting mode and heat output specific settings:

### ***Cutting Mode: 2D***

No additional settings when the straight resistant wire is used. In the case of the shape wire you need to set its shape and dimensions (in relation to the straight wire).

### ***Cutting Mode: Rotary***

The rotary mode is meant to be used with the straight cutting wire.

*Material diameter* - the actual diameter of your EPS piece (regardless of the size of the element you wish to cut)

*Movement speed* - the transit speed at which the machine will approach your EPS piece

*# of rotations* - the number of rotations of your EPS piece for a single pass of the cutting wire along the rotation axis. For example: a 0.5 setting will result in the EPS piece making half a turn while the cutting wire travels from left to right (or vice versa) resulting in a spiral effect. Set this to "0" to prevent any rotation from taking place.

*# of steps* - the total number of passes along the rotation axis (it determines the number of sides/surfaces e.g. your column will have).

*Hold after each stop* - if selected, the machine will automatically stop after each step allowing you to remove the cut EPS piece (and therefore preventing its uncontrolled drop on the cutting wire during the subsequent step)

*Adjust rotation direction* – optimization of the turntable or lathe rotation

*Rotation direction* - determines the direction of rotation of the turntable or lathe

*Rotary element* - lathe or turntable

## Cutting Mode: Serial

The Serial Cut mode is used with the straight cutting wire.

*Material diameter* - the actual diameter of your EPS piece (regardless of the size of the element you wish to cut)

*Movement speed* - the transit speed at which the machine will approach your EPS piece

*Hold after each stop* - if selected, the machine will automatically stop after each step allowing you to remove the cut EPS piece (and therefore preventing its uncontrolled drop on the cutting wire during the subsequent step)

*Rotary element* - turntable by default

*Rotation angle:*

*automatic (180 degrees divided by the number of plt files)*

- the same between each pass and determined by the total number of passes (plt files)

*manually inserted for each plt file* - allows the operator to specify the exact rotation after each pass in a pop-up window once the START button is pressed

*TurnTable rotation at movement speed* – allows for faster TurnTable rotation

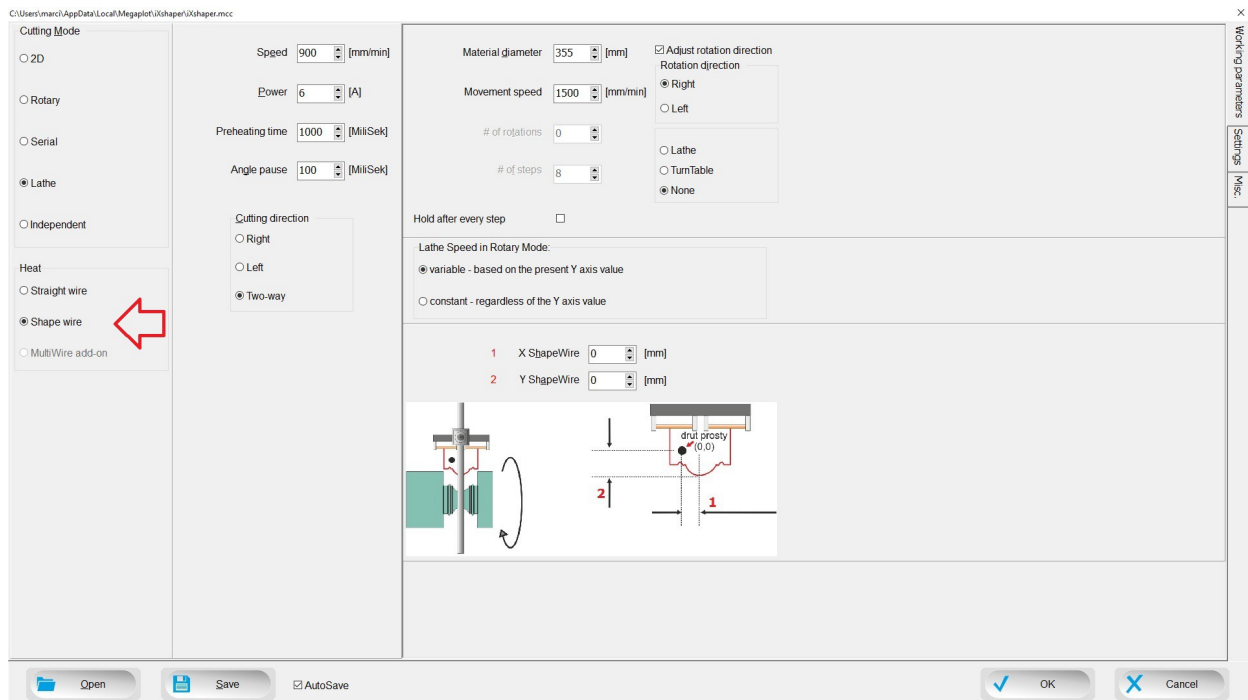


*Home the TurnTable prior to starting a cut* – after the START button is pressed the machine first homes the TurnTable

*Cut off after the last step* – when the serial cut completes the entire shape will be cut off horizontally at the bottom to avoid having it damaged if the EPS piece was fixed to the table using self-adhesive tape

### Cutting Mode: Lathe

The Lathe cutting mode is typically used with the shape wire.



*Material diameter* - the actual diameter of your EPS piece (regardless of the size of the element you wish to cut)

*Movement speed* - the transit speed at which the machine will approach your EPS piece

*# of rotations* - the number of rotations of your EPS piece for a single pass of the cutting wire along the rotation axis. For example: a 0.5 setting will result in the EPS piece making half a turn while the cutting wire travels from left to right (or vice versa) resulting in a spiral effect. Set this to "0" to prevent any rotation from taking place.

*# of steps* - the total number of passes along the rotation axis

*Hold after each stop* - if selected, the machine will automatically stop after each step allowing you to remove the cut EPS piece (and therefore preventing its uncontrolled drop on the cutting wire during the subsequent step)



*Adjust rotation direction* – optimization of the turntable or lathe rotation

*Rotation direction* - determines the direction of rotation of the turntable or lathe

*Rotary element* - lathe or turntable

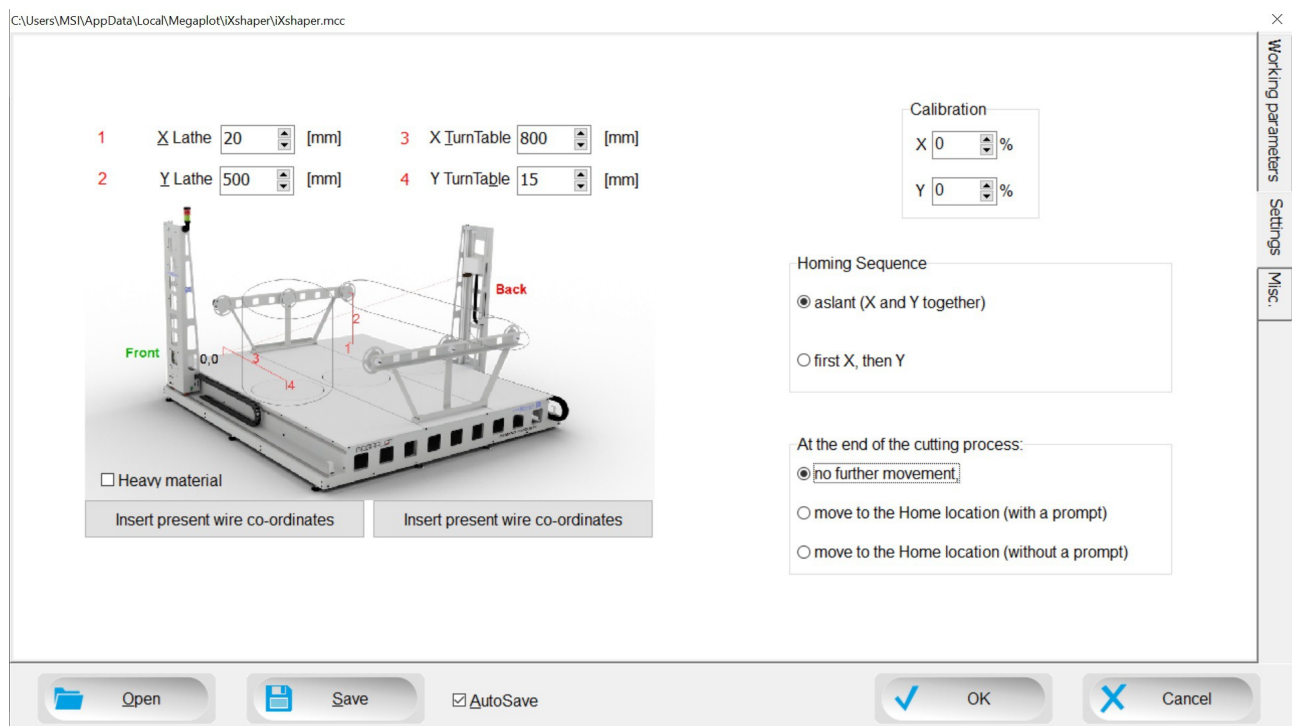
*ShapeWire XY co-ordinates* - they determine the location of the tip of the shape wire in relation to the standard straight wire. This is explained in details on the following pages.

### **Cutting Mode: Independent**

There are no additional settings for this cutting mode. A couple of additional parameters (material width and its distance to the front trolley) will need to be inserted in a pop-up window which will be shown after the START button is pressed.

### **Settings tab**

This tab is used to set certain machine-specific parameters, to calibrate the unit, to specify the preferred Homing method and the movement at the end of the cut.



*Lathe X and Y* - co-ordinates of the center of the lathe. To facilitate the process you can use the “Insert present wire co-ordinates” button. See here for more details: Lathe calibration.

*Lathe X and Y* - co-ordinates of the center of the turn table. To facilitate the process you can use the “Insert present wire co-ordinates” button. See here for

more details: TurnTable calibration .

- Heavy material* - slower acceleration and deceleration of the turntable and lathe, useful when handling larger and heavier pieces of EPS.
- Calibration X,Y* - should small and incremental inaccuracies develop over time, this Calibration can be used to calibrate the movement in each of the axes separately. For more details please see Machine Calibration .
- Homing sequence* - the first Homing procedure after a controller restart is a slow movement towards the proximity switches as explained earlier. Subsequent presses of the Home button will result in the machine moving towards this Home position at the Manual Control speed using one of these two movement methods:
- aslant* - both axes moving towards the Home position at the same time. The entire process is done at the faster Manual Control speed followed by a slow approach towards the proximity switches.
- first X, then Y* - the machine first Homes the horizontal X axis and once it reaches  $X = 0$  it starts movement down towards the  $Y = 0$ . The entire process is done at the faster Manual Control speed followed by a slow approach towards the proximity switches.
- At the end of the cutting process* - here you can set what should happen when a cut is complete (nothing or movement toward the Home position with or without a prompt).

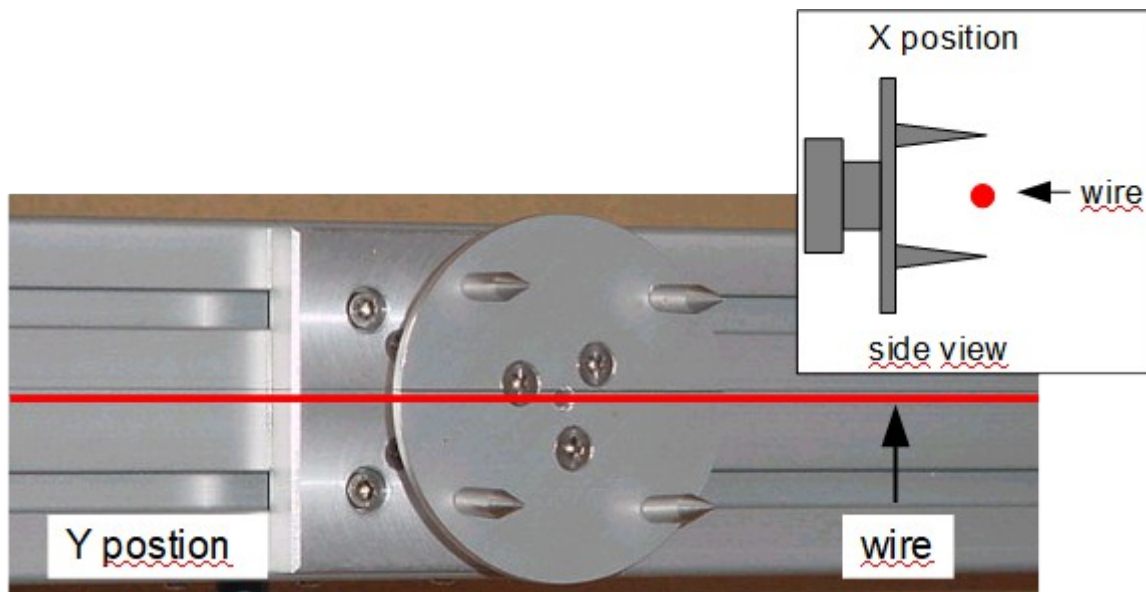
### **Lathe calibration**

Prior to attempting the calibration of the lathe make sure the machine itself has been homed: (Homing Procedure).

Use the wired remote/handheld or the movement arrows in Manual Control in iXshaper to move the wire up to the very center of the lathe mechanism. Please refer to the drawing below (Y axis).

Next move the wire to the left as close to the rotating plate as you wish bearing in mind you do not wish the cutting wire to come into contact with the steel spikes used to secure the EPS piece on the lathe.

In Configuration on the *Settings* tab press the *Insert the current wire co-ordinates* and the correct lathe's co-ordinates (X and Y) will be saved.



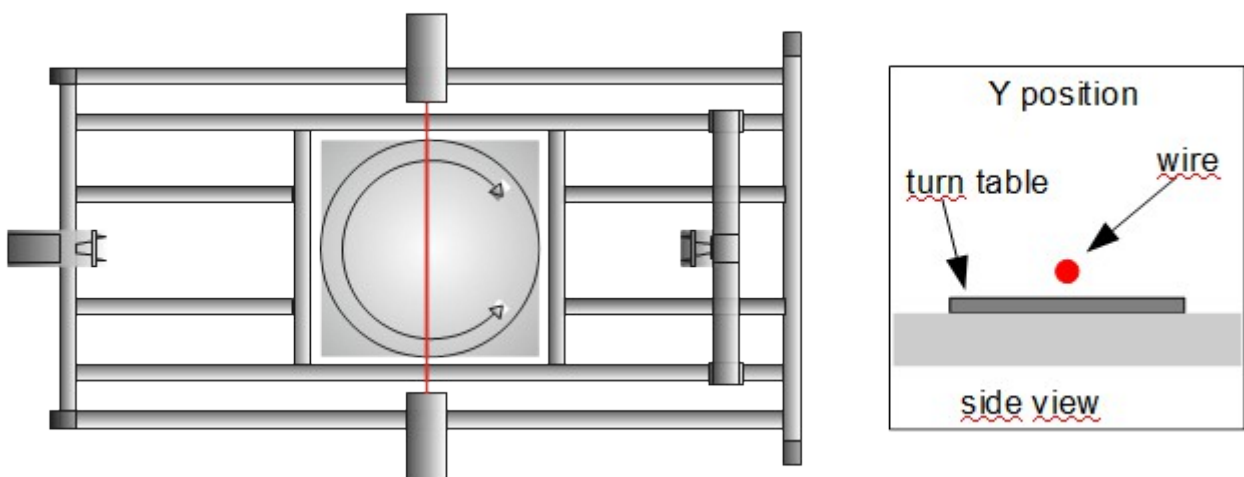
### ***TurnTable calibration***

Prior to attempting the calibration of the turntable make sure the machine itself has been homed: (Homing Procedure).

Use the wired remote/handheld or the movement arrows in Manual Control in iXshaper to move the wire about 20 mm and then over the very center of the turntable mechanism. Please refer to the drawing below (X axis).

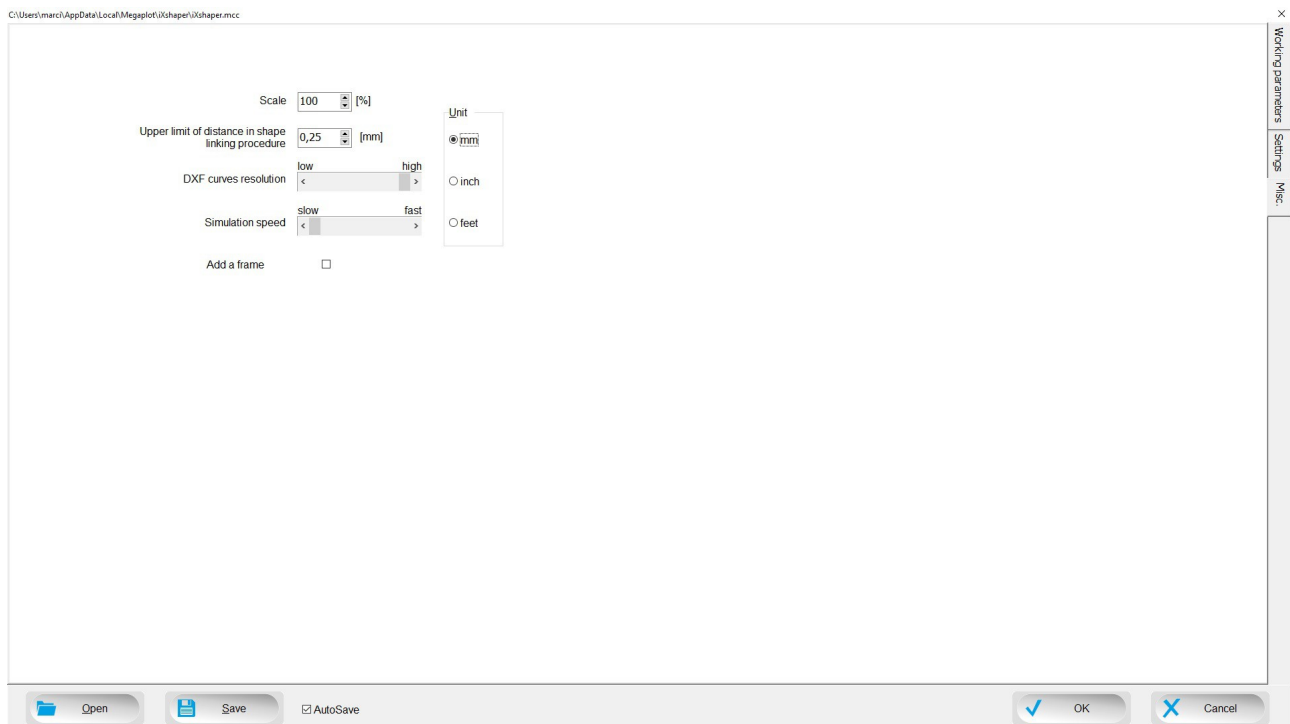
Next lower the wire until it is around 5 mm away from the turntable surface (see Y axis below).

In Configuration on the *Settings* tab press the *Insert the current wire co-ordinates* and the correct lathe's co-ordinates (X and Y) will be saved.



## Misc. tab

The Misc. tab lists a few different application settings as well as parameters related to the way the imported drawings are handled.



*Scale* - used to scale up or down a drawing

*Upper limit of distance in shape linking procedure* – determines the maximum distance between two points/nodes which the software will use to connect these individual shapes into a properly closed one

*DXF curve resolution* - curve interpolation resolution in case of DXF files

*Simulation speed* - allows you to set the speed of the on-screen simulation

*Add a frame* - adds a rectangular shape around the individuals shapes/letters of the drawing (for easier removal and packaging)

*Units* - measurement units used in the application

## The Cutting Process

Prior to initiating a cut, the operator should:

- set the cutting parameters in Configuration (cutting speed, wire heating and angle pause – all based on the density and size of the cut piece)

- load a drawing [F3]
- verify the cutting path by pressing the SIMULATION button [F1]
- move the wire manually to the correct starting point – based on the selected cutting mode:
  - [2D, independent]: the starting point of the drawing i.e. the lower left or the upper left corner of the drawing)
  - [lathe, rotary on the lathe]: over the EPS piece fixed horizontally
  - [lathe, rotary and serial on the turntable]: on the left of the EPS piece fixed to the turntable, slightly over the turntable top level
- start the cut by pressing START [F2]

Once the START button is pressed, the cutting wire heats up and then begins the cutting process from its current location. The cutting speed, wire temperature and angle pause settings (among others) all come from *Configuration*. The cutting speed and the wire temperature may be adjusted on-the-fly while a cut is in progress using the Manual Control panel or the wire handheld/remote.

Once the START button is pressed the cutting process will begin and will follow the sequence previously shown in Simulation.

The cutting process can be stopped at any time by pressing the STOP button. A stopped cut can be continued by pressing the CONTINUE button [*Shift+F2*] – the machine will return to the spot where the cut was previously stopped and will continue from there. Note a cut can be continued only if the controller and the iXshaper have not been restarted after a cut was stopped. Closing down the application or restarting the electronic controller will prevent a previously stopped cut from being continued.

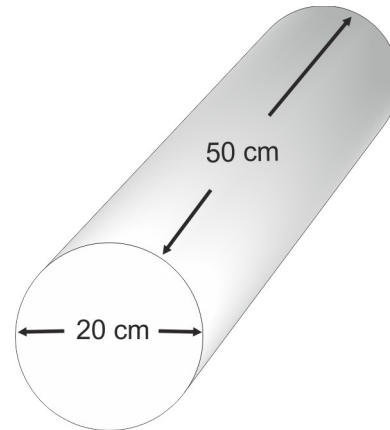
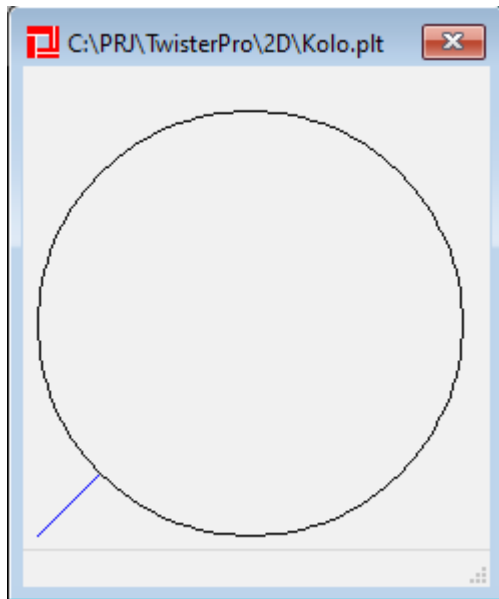
If a cut stops on its own automatically because of a broken wire, drive the trolleys to a place outside the block, install a new cutting wire and then move the wire as close to the place where it previously broke (and where the cut stopped). Once you press CONTINUE the wire will return to the exact spot at which it previously stopped using the shortest way possible and the cutting process will resume from there. Wire replacement is explained in: Installation of the Cutting Wire .

## Cutting a cylinder

Let's start with a simple cylinder of 20 cm diameter and 50 cm height (which we will use later on for some of the 3D cuts).

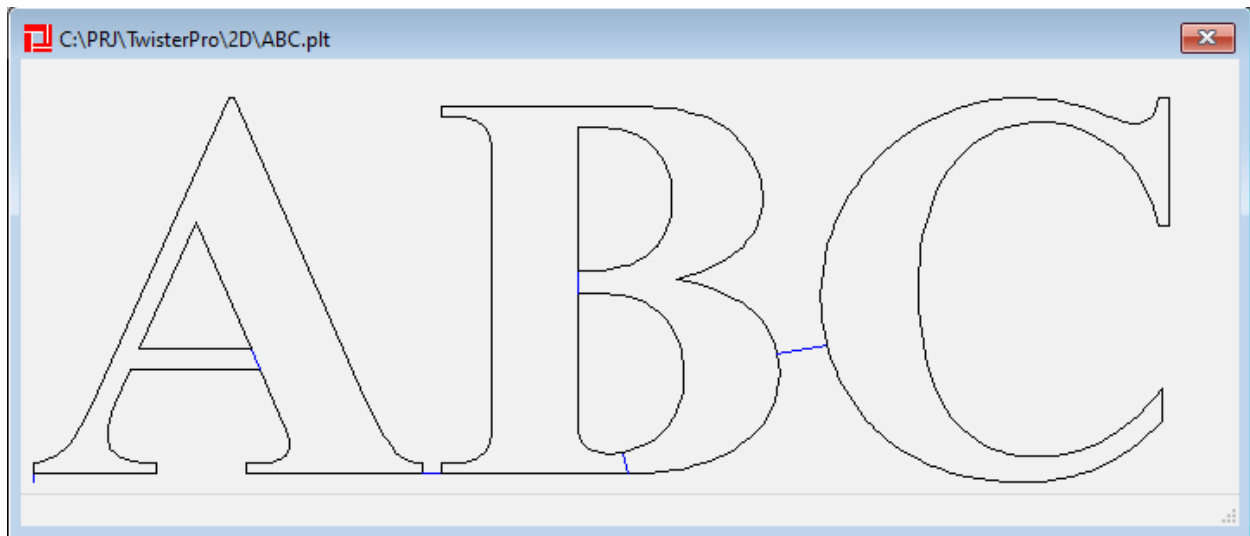
- Draw your shape      - using CorelDraw or any other suitable graphics software draw a 200 mm diameter circle and export it to one of the formats supported by iXshaper: PLT, DXF, EPS/AI
- Open Configuration   - set the Cutting Mode to 2D and set the cutting parameters (speed, heat and angle pause) as explained earlier

- Load your file - open the previously prepared file, move the cutting wire next to the EPS piece (or inside it) to where you wish the Cut to begin and press START.



## Cutting lettering and logos

- Draw your shape - using CorelDraw or any other suitable graphics software draw your letters or logos and export them to one of the formats supported by iXshaper: PLT, DXF, EPS/AI
- Open Configuration - set the Cutting Mode to 2D and set the cutting parameters (speed, heat and angle pause) as explained earlier
- Load your file - open the previously prepared file, move the cutting wire next to the EPS piece (or inside it) to where you wish the Cut to begin and press START.



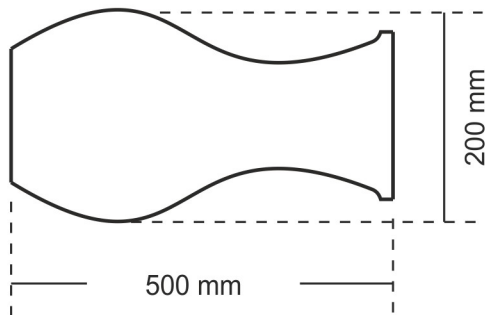
If your drawing consists of more than one object, you may have noticed iXshaper connected them automatically by introducing additional blue connecting lines. To prevent this from happening, you can add your own connecting lines and force the cutting path as desired. To achieve this:

- convert the text into curves
- add your own connecting lines between the objects anywhere you wish as long as each of them originates and terminates at a node

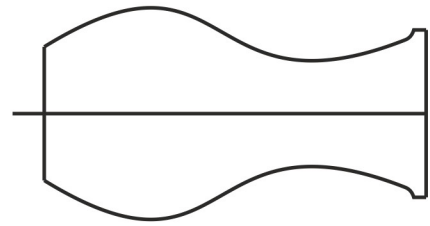
### **Cutting a glass shape using the lathe or the turntable**

- A) Draw the horizontal outline of the shape you wish to cut
- B) Draw a perfectly horizontal rotation axis in the very center of your shape
- C) Remove all the parts of your drawing except for the top art line and the rotation axis. The rotation axis should be located under the art line.
- D) Extend the rotation axis on the left so it protrudes around 20 mm on the left of the shape.
- E) Export your drawing to one of the supported file formats: PLT, DXF, EPS/AI

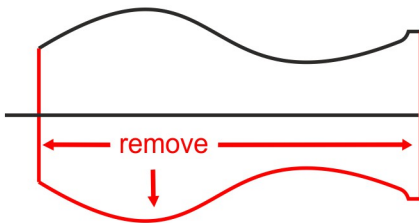
A.



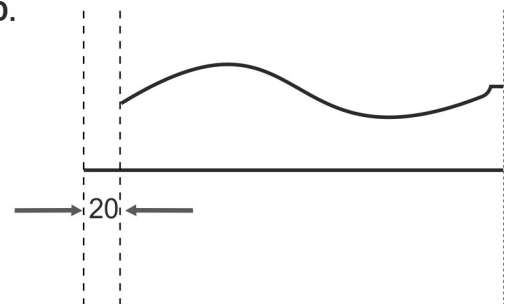
B.



C.



D.



Should you wish to cut this very same shape using the turntable instead of the lathe, you will need to rotate the shape and the rotation axis 90 degrees so they are both vertical. The rotation axis will need to be located on the right of your art line.

### Cutting a glass shape with straight sides on the lathe

A) Draw you shape in the way described above: (Cutting a glass shape using the lathe or the turntable ).

B) Go to Configuration and set:

*Cutting Mode = Rotary*

*Material Diameter* = insert the real diameter of your EPS piece, in our case it will be 200 mm (the diameter of the cylinder we cut earlier on)

*Movement speed* = the max. speed at which the wire will approach the EPS piece at which points it will slow down to the cutting speed when entering the piece of foam and beginning the cut

*# of rotations* = 0

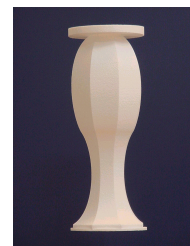
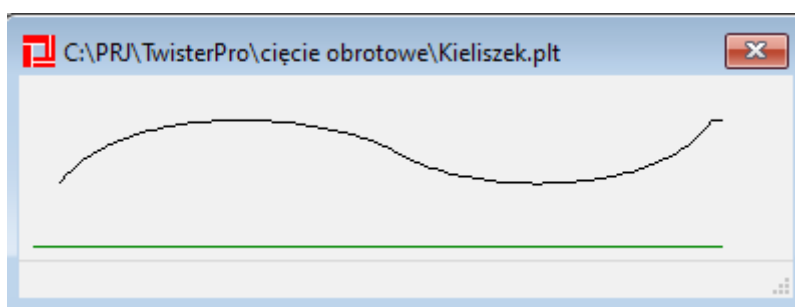
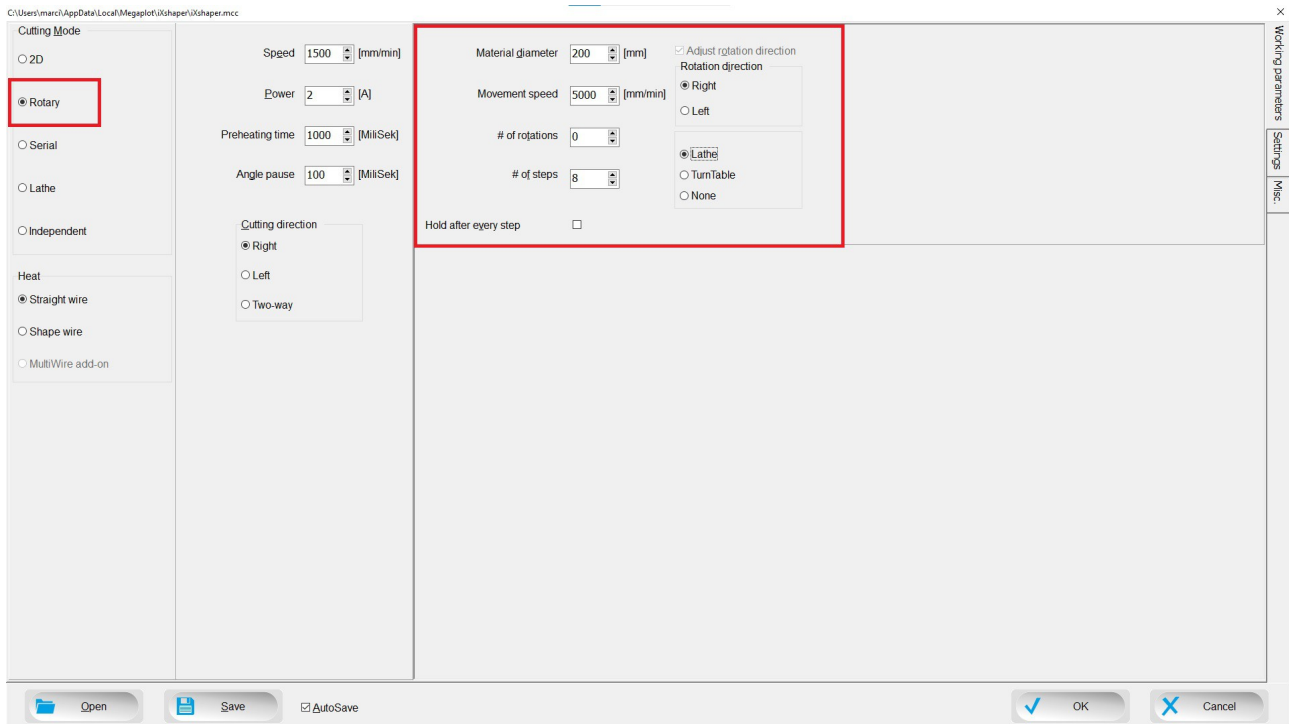
*# of steps* = 8.



The above settings will result in a shape with 8 flat sides (no twist at all – this will be demonstrated in the following cut). Make sure the other standard parameters (speed, power, preheating time and angle pause) are set properly.

C) Open the previously prepared drawing.

D) Move the cutting wire up – it needs to be above the rotation axis and the EPS cylinder. Fux the cylinder on the lathe and press the START button. The cutting wire will approach the EPS piece and the cut will begin.



**Cutting a glass shape with spiral sides on the lathe**

A) Draw you shape in the way described above: (Cutting a glass shape using the lathe or the turntable ).

B) Go to Configuration and set:

*Cutting Mode = Rotary*

*Material Diameter = insert the real diameter of your EPS piece, in our case it will be 200 mm (the diameter of the cylinder we cut earlier on)*

*Movement speed = the max. speed at which the wire will approach the EPS piece at which points it will slow down to the cutting speed when entering the piece of foam and beginning the cut*

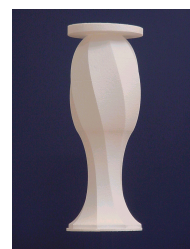
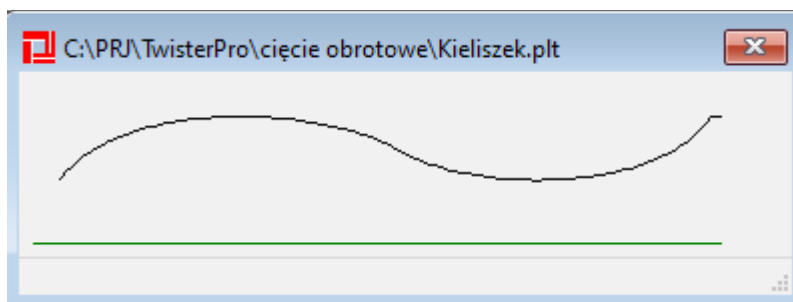
*# of rotations = 0.5*

*# of steps = 8.*

The above settings will result in a shape with 8 sides, each of them with half a rotation (0.5) along the entire length. Make sure the other standard parameters (speed, power, preheating time and angle pause) are set properly.

C) Open the previously prepared drawing.

D) Move the cutting wire up – it needs to be above the rotation axis and the EPS cylinder. Fux the cylinder on the lathe and press the START button. The cutting wire will approach the EPS piece and the cut will begin.



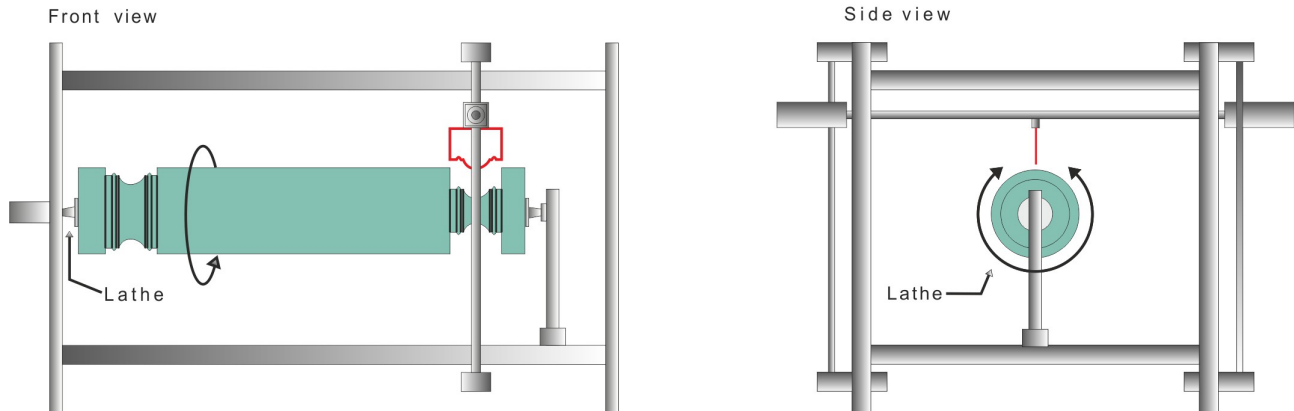
## Cutting with the ShapeWire

When using the shape wire, it is essential one specifies properly in the software its shape (outer

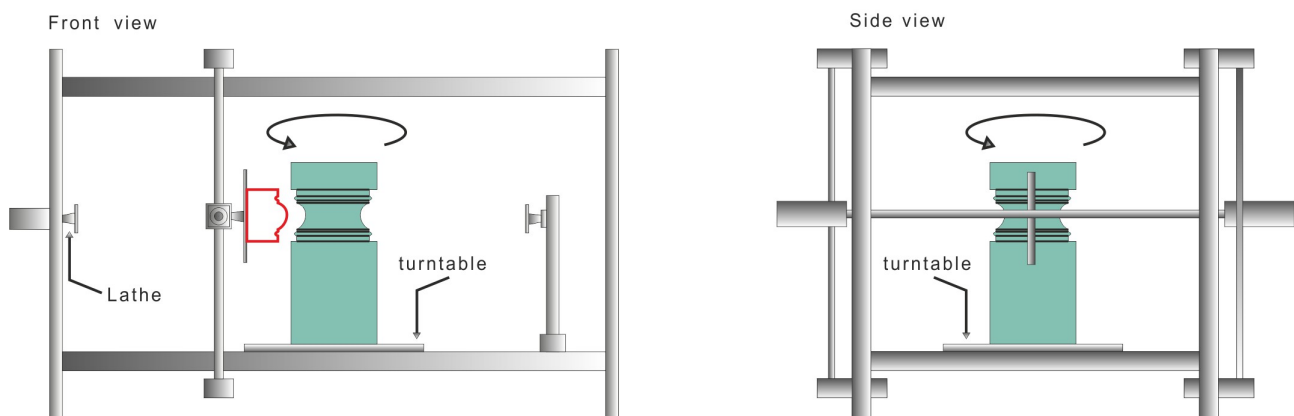
points) in relation to the standard straight cutting wire. The co-ordinates of the shape wire need to be manually updated each time the shape wire has been changed to be reinstalled.

The shape wire bar can be installed on the machine in a number of ways:

#### ***Cutting with a use of a shaped wire and lathe***



#### ***Cutting with a use a shaped wire and a turntable***

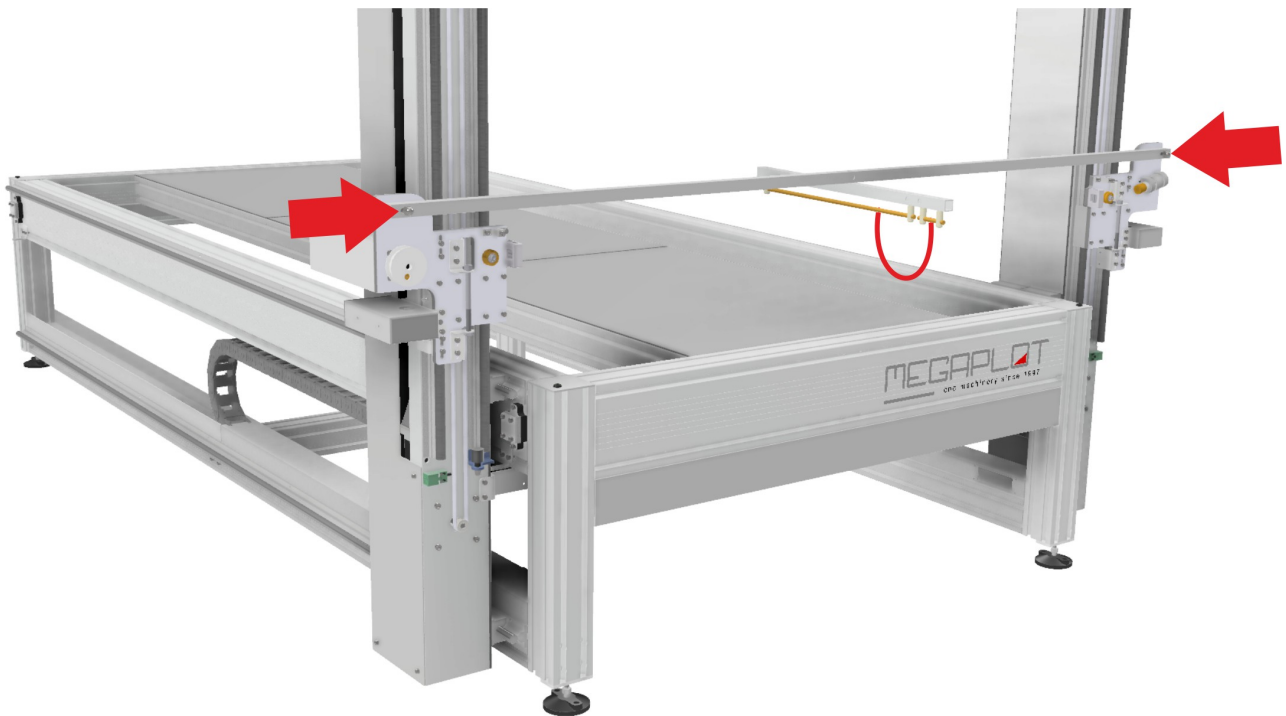


#### ***Installation of the shape wire bar***

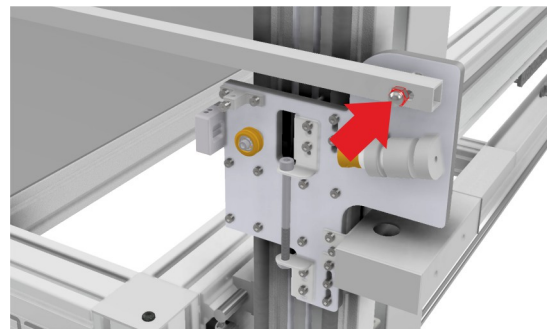
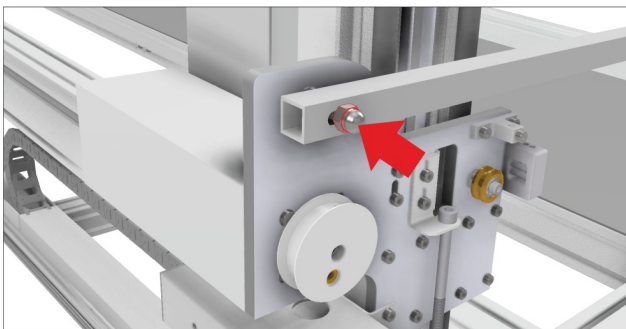
To install the shape wire bar:

- raise the trolleys to a comfortable height
- align both sides (in case of independent axis machines)
- close iXshaper
- switch the machine off

- fix the shape wire bar onto the bolts installed on the trolley (see below)



- note the shape wire bar orientation:
  - to use it with the lathe, ensure the wire fixing screws are at the bottom of the shapewire bar
  - to use it with the turntable, the wire fixing screws should face the center of the machine (toward the TurnTable).
- fix the bar with the nuts



- adjust the orientation of the moveable center section of the shape wire bar as required and tighten the nut

- connect the shapewire bar plug to the connector

### Calibrating the ShapeWire using Lathe

This is done to instruct the software on the location of the outmost tip of the shape wire in relation to the standard straight wire. The straight wire should be removed from the machine after the shape wire has been measured and its co-ordinates were saved in Configuration but before a cut is initiated.



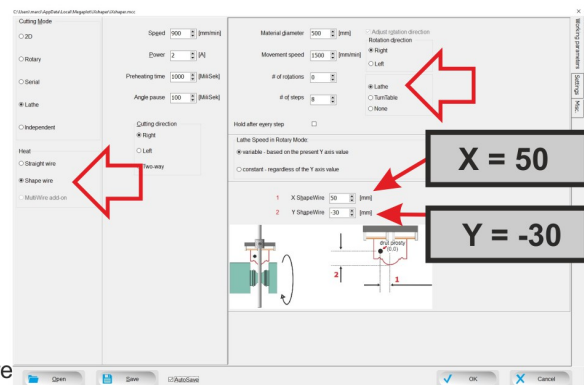
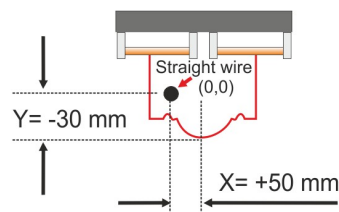
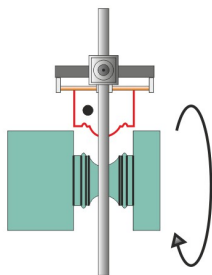
Side view



Measurement of the displacement of shaped wire in relation to a straight wire



Inserting shape wire X and Y coordinates



If the steps A, B, C has been taken you can disassembly straight wire

### Calibrating the ShapeWire using TurnTable



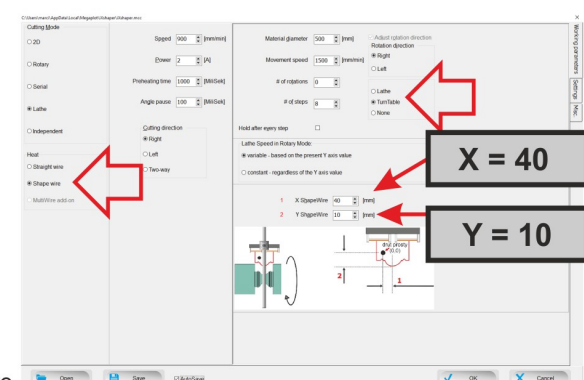
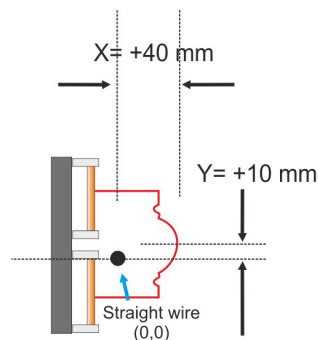
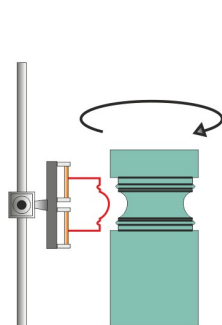
Side view



Measurement of the displacement of shaped wire in relation to a straight wire



Inserting shape wire X and Y coordinates



If the steps A, B, C has been taken you can disassembly straight wire

This is done to instruct the software on the location of the outmost tip of the shape wire in

relation to the standard straight wire. The straight wire should be removed from the machine after the shape wire has been measured and its co-ordinates were saved in Configuration but before a cut is initiated.

## Cutting circular grooves using ShapeWire and Lathe

To cut circular grooves using the ShapeWire and the Lathe, use the following settings:

Cutting Mode: lathe

Heat: shapewire

# of rotations: 1

# of steps: 1



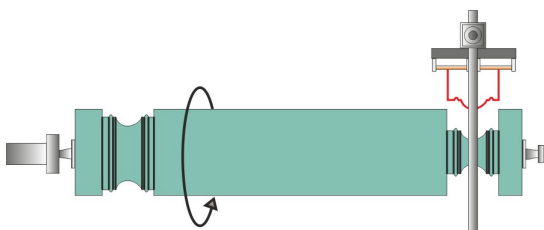
When using the shape wire installed on the aluminum bar, one should always bear in mind the following:

- The start of the art line should be at least 15 cm away from the left lathe plate with the steel spikes
- The end of the art line should also be at least 15 cm away from the right lathe plate with the steel spikes

If the above values are not observed, there is a risk of collision of the shapewire bar with the steel spikes' plates.



Side view (incisions on a column circumference)

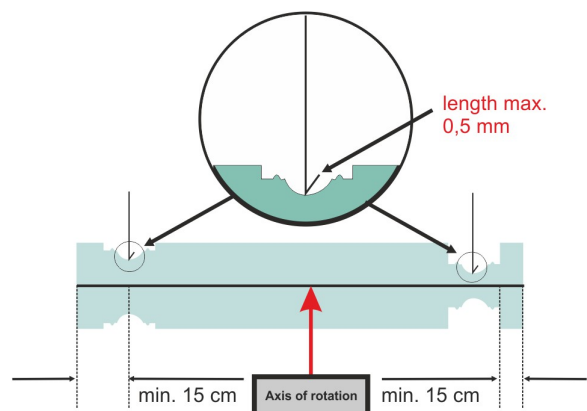


Side view (incisions on a column circumference)

Mark incisions in the chosen places by drawing the vertical lines ended with the slanting lines. The slanting line means that in this place the lathe should perform a full turn.

**IMPORTANT:** vertical line and slanting line should create ONE object.

Slanting line can't be longer then 0,5 mm.

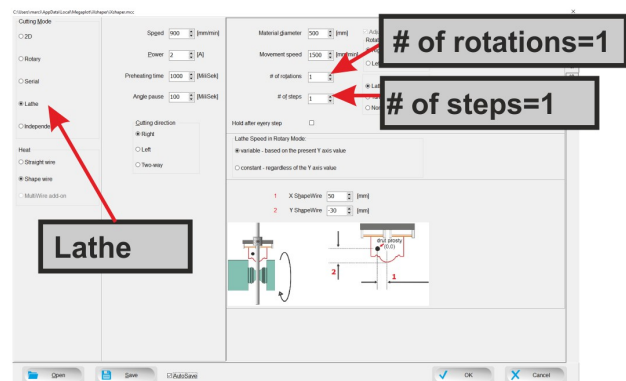


**C**

A drawing prepared for cutting

**D**

in „Configuration“ set:  
 # of rotations 1  
 # of steps 1.  
 Open so prepared file.  
 Press „Start“.



## Cutting a thread using the shapewire and the lathe or the turntable

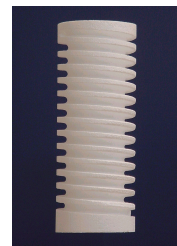
To cut circular grooves using the ShapeWire and the Lathe, use the following settings:

Cutting Mode: lathe

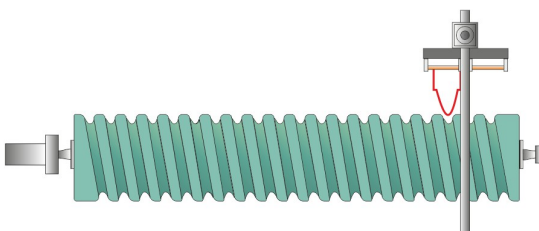
Heat: shapewire

# of rotations: 20

# of steps: 1

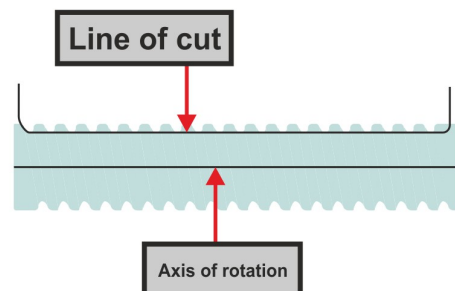
**A**

Side view (threaded screw)

**B**

Side view (threaded screw)

Draw a straight line of a cut at the bottom of a thread. Endings of a line (left and right) should be drawn over the edge of material. IMPORTANT: the horizontal line and its endings should create one object.

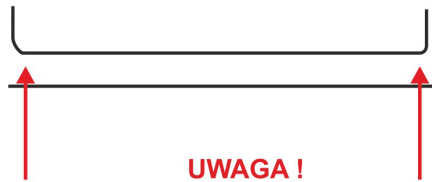




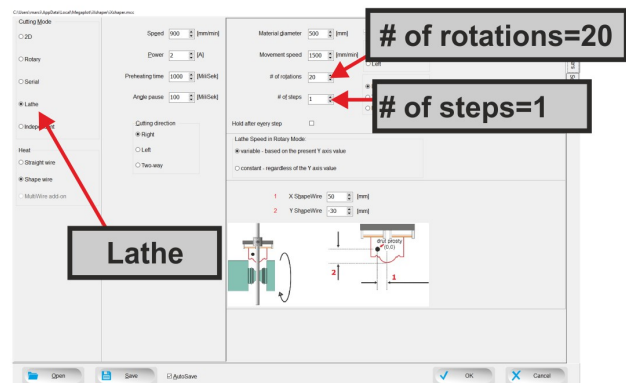
A drawing prepared for cutting.



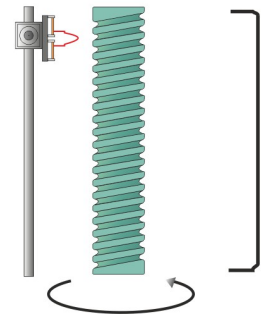
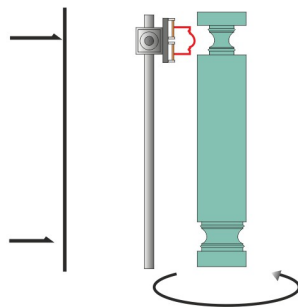
In "Configuration" set:  
# of rotations: 20  
# of steps: 1.  
Open so prepared file.  
Press Start.



**Make sure that the straight line does not create acute angle with its endings. In this case a foam cutter can perform a full turns in these places which is not needed.**



**You will perform the same steps while using a turntable instead of a lathe tool. However, you will have to remember that all the drawings should be prepared in a vertical arrangement. Pay attention to the fact that an axis of rotation should be always located on the material right side (as it is indicated in a picture below)**



## Cutting longitudinal grooves on a cylinder

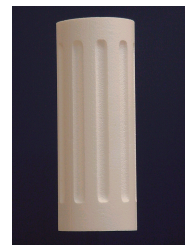
To cut longitudinal grooves using the ShapeWire and the Lathe or the TurnTable, use the following settings:

Cutting Mode: lathe

Heat: shapewire

# of rotations: 0

# of steps: 10



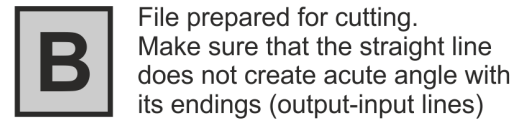
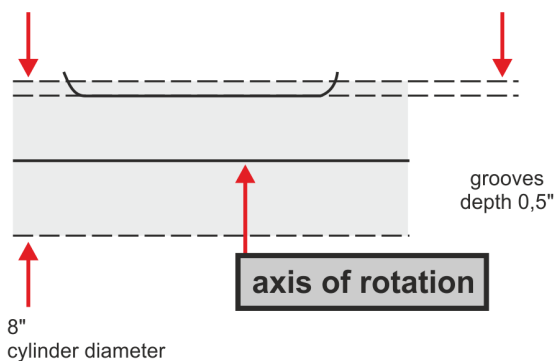
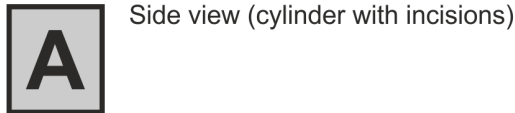
Draw a horizontal rotation axis in your graphics software ensuring the length of this rotation axis



corresponds to the length of your EPS cylinder. In our case the cylinder has the diameter of 20 cm and the length of 50 cm, hence this horizontal center rotation axis should be 50 cm long.

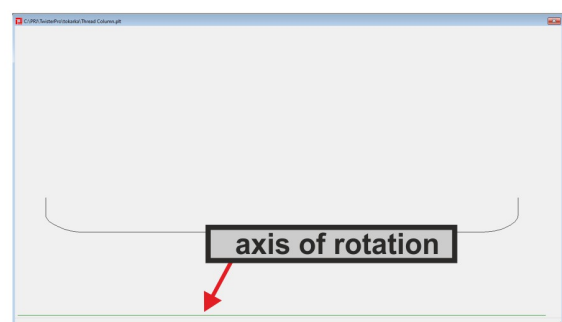
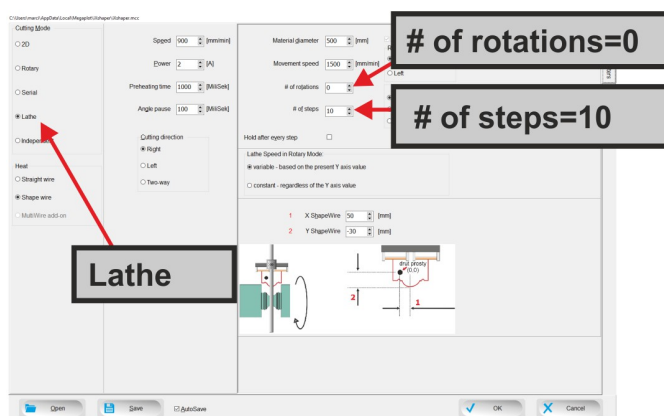
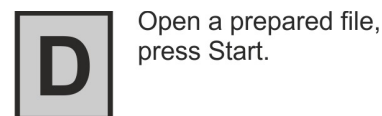
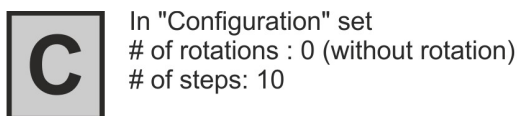
Draw the groove line above the rotation axis (ensure the start and end are in the correct places in relation to the beginning and ending of the rotation axis).

Prior to starting the cut, change the orientation of the shapewire bar. While it normally is perpendicular to the shapewire bar, for this cut you want it to be parallel.



**CAUTION !**

Make sure that the straight line does not create acute angle with its endings. In this case a foam cutter can perform unnecessary full turns in these places.



## Serial Cutting using a series of 2D outlines

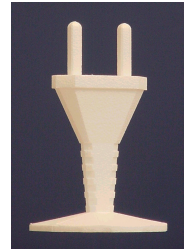
To perform a serial cut using a number of 2D outlines, use the following settings:

Cutting Mode: Serial

Heat: straight wire

TurnTable

Rotation angle: automatic (360 degrees divided by the number of files)



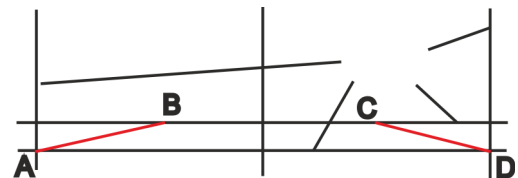
In our example we will cut an electric plug.

For this we will need a cylinder of 200 mm diameter and height of 350 mm for please prepare such a piece of EPS first. Set the cylinder in the very center of the TurnTable and secure it using the steel spikes and/or a piece of self-adhesive two-sided tape.

Use your graphics software to prepare the outlines for the individual passes from different angles. First decide how many cuts (or passes or views/outlines) you wish your final piece to consist of. The more passes the smoother the shape yet the cutting time will increase as well. The number of drawings or outlines you prepare will determine the automatic TurnTable rotations. During the entire cut the TurnTable will make half a rotation so the angle of rotation after each cut will equal 180 degrees divided by the number of cuts.

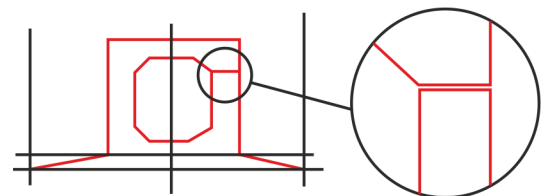
#### A few things to bear in mind when preparing the drawings:

Each of the individual drawings must have the axis of rotation in the very center as well as the same distance between the start and end lines. So you may wish to start by drawing the start and end lines and ensure they match in all the drawings and then add the art lines above them.



Each of the individual drawings needs to consist of a single line.

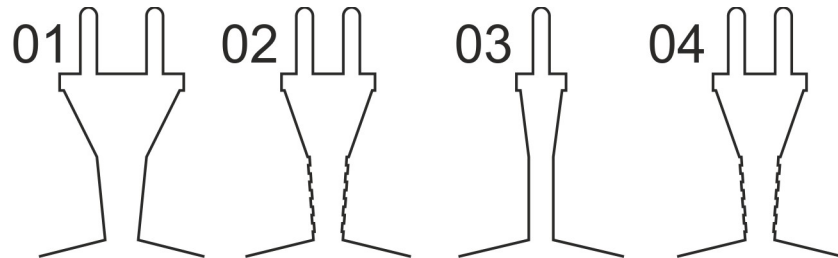
Avoid having an object within another object for the serial cut but if absolutely necessary ensure the entry and exit lines are drawn properly – your entire shape still needs to consist of a single open line (regardless of the number of objects it consists of).



Ensure your shape comes with a suitably large base which is necessary to keep the piece stable throughout the rotations and cuts. Lack of base may cause inaccuracies at the rotation points. And of course the base can be easily cut off at the end of the process.

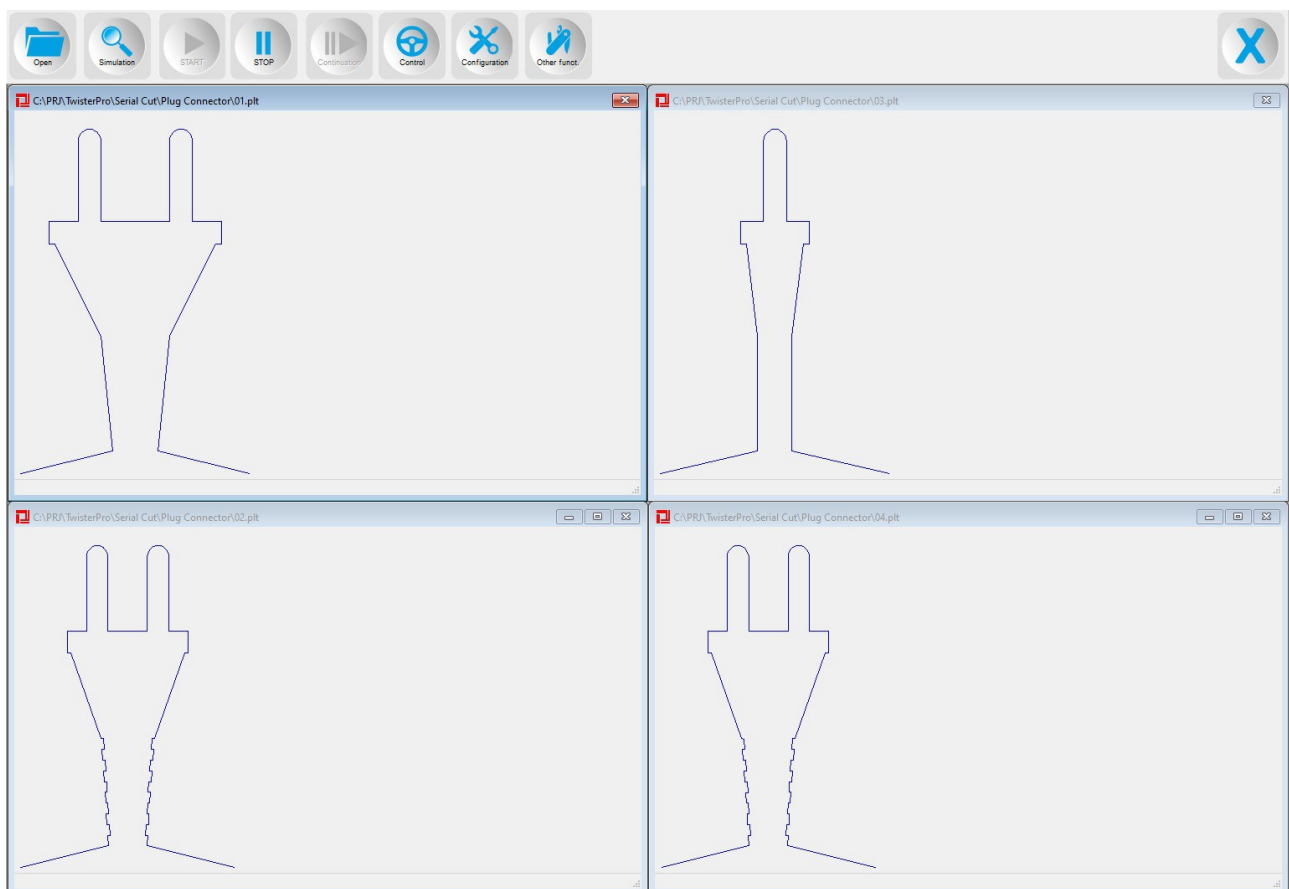
You will get best results with convex shapes. And of course the more passes your cut consists of, the more accurate the individual drawings will need to be.

See below the outlines for the electrical plug



All of the drawings which make up a serial cut need to be saved in a single folder and need to have consecutive names such as e.g. 01.plt, 02.plt, 03.plt, etc. Therefore do not save different sets of serial cut drawings in the same folder.

In Configuration, set the Cutting Mode: Serial, TurnTable, Heat: straight wire and the remaining cutting parameters. Open the first drawings from the series (01.plt) and the remaining drawings will open up automatically. Simulate each of the passes to ensure they will be cut as desired.



Sample Serial Cut drawings are located in the Samples folder which can be accessed by clicking *Other Funct.* and then *Samples*.



Here is the default path to the Samples folder:

"C:\Program Files (x86)\Megaplot\iXshaper\Samples"

### Serial Cutting with manually inserted angles between the cuts

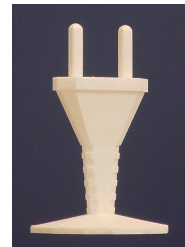
To perform a serial cut where you manually insert the required rotation between the individual cuts, please use the following settings:

Cutting Mode: Serial

Heat: straight wire

TurnTable

Manually inserted for each plt file

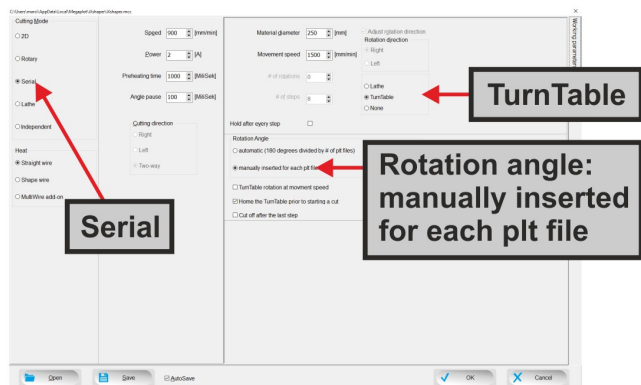


In this mode the rotation of the turntable between the cuts is controllable and is not longer automatically determined by the number of files/passes. In this case the operator can specify the exact rotation after each of the passes.

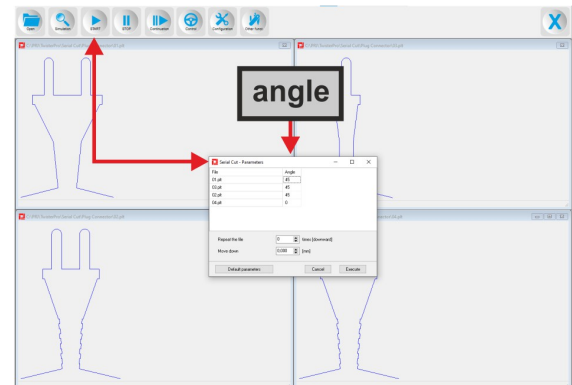
Prepare the outlines as explained here: Serial Cutting using a series of 2D outlines. Fix the EPS piece onto the turntable and then:

- A) In Configuration set the Cutting Mode to *Serial* and select TurnTable. Make sure to set the correct material diameter and then select "Manually inserted for each plt file". Open the previously prepared series of drawings.
- B) Once the drawings are opened, press the START button. A pop-up window will be displayed in which you can set the required turntable rotation for each cut. Insert "0" *Repeat the file X times [downward]* and *Move down* (so only one piece will be cut). Press Execute to confirm your selection and to have the cut start.

**A** In Configuration set the Cutting Mode to „Serial”. Select „TurnTable” on the right-hand side. Activate the manual rotation angle setting. Open the serial cut drawings.



**B** Once you open the drawings, press the START button. In the pop-up window you can now set the rotation angle after each cut.



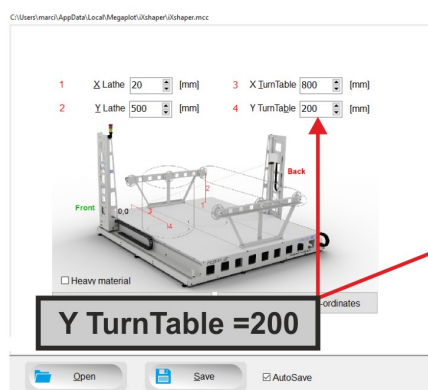
You can also cut a number of identical 3D serial cut shapes one after another by following this sequence of steps.

Should you wish to cut e.g. 2 additional pieces in the same EPS piece, ensure your piece of foam is 3 times taller than the individual shape + additional 3 cm for the 3 times 1 cm spacings between the shapes. The first shape to be cut will be the top one and the machine will then work its way down for the remaining cuts.

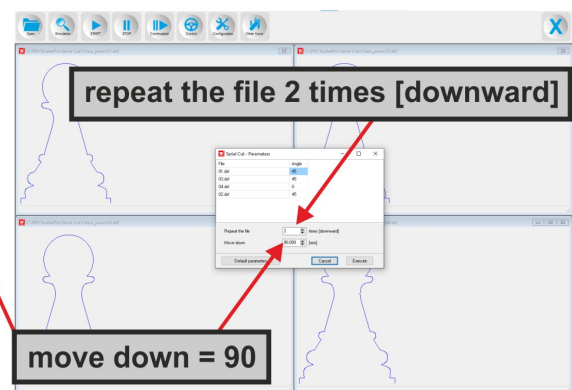
C) Insert the correct TurnTable Y axis value in Configuration. As shown on the below drawing, this is the bottom of your first shape (counting from the bottom). In our case this is  $200\text{mm} = 2 \times 90\text{mm} + 20\text{mm}$  where 90mm is the movement down and 20 mm is the safe distance over the table top.

D) Open your serial cut drawings and press START. In the pop-up window set the required rotations, number of repeats and move down distance and execute the cut.

**C** On the Plotter tab in Configuration set the TurnTable Y value.



**D** Open the drawings, press START and next specify the number of times you wish to have the shape cut as well as the Y axis shift between each of the cuts.



## Serial Cutting from 3D models

To cut a 3D shape out of a 3D model, please use the following setting:

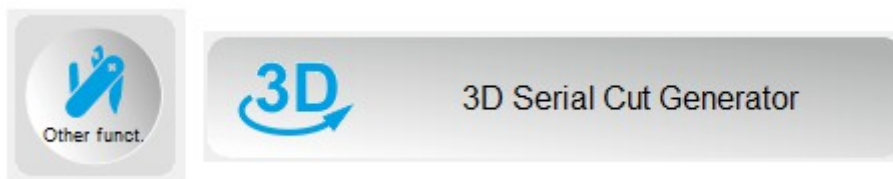
Cutting Mode: 2D

Heat: straight wire

TurnTable



We will use the 3D *Serial Cut Generator* which is accessible under the *Other Funct.* button.



iXshaper will generate the output files automatically, but you need to specify in how many steps (or passes) you wish to cut your shape. Increasing the number of cuts will result in higher accuracy but will increase the cutting time as well

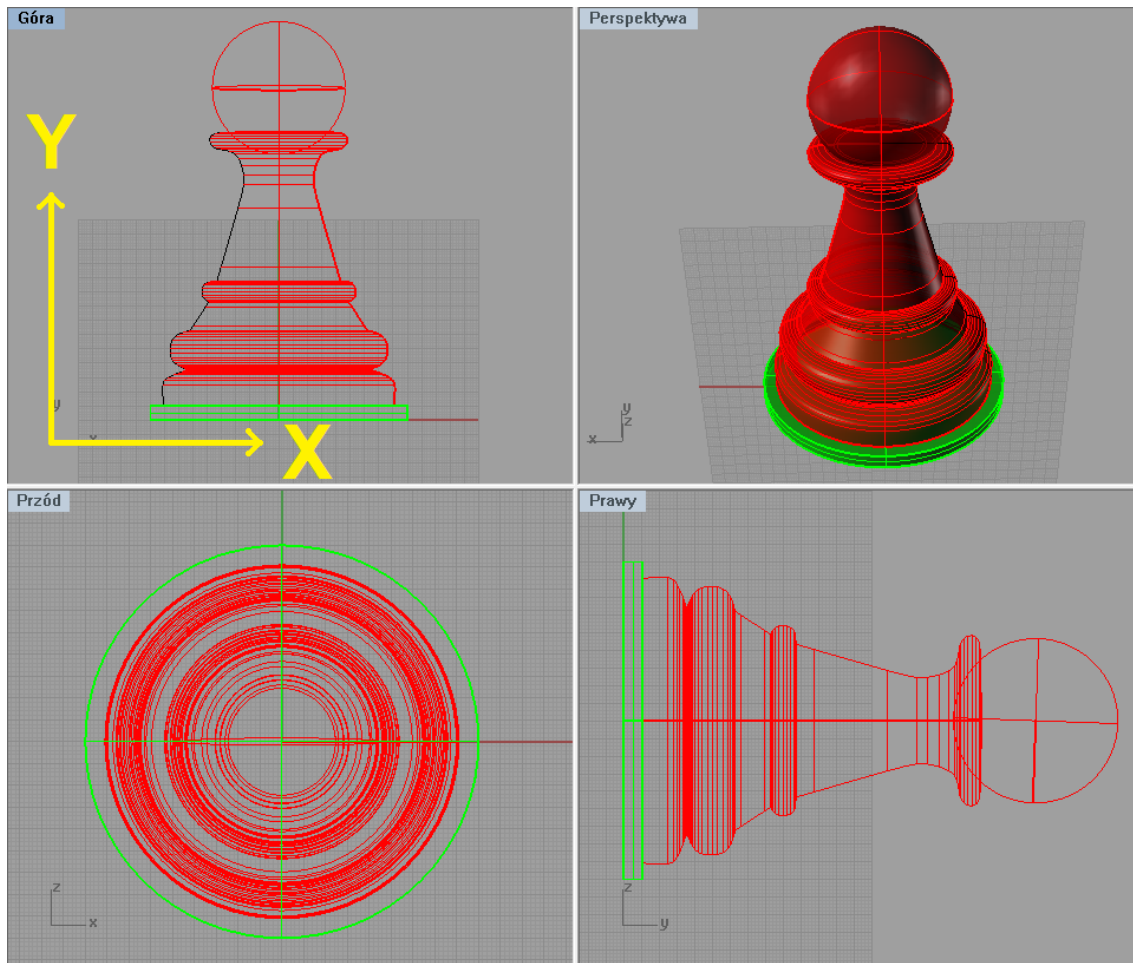
### Supported 3D file formats

Your 3D model can be saved in one of the three supported formats: RAW, STL or DXF 3D.

- |        |  |
|--------|--|
| RAW    | To prepare a suitable RAW file we recommend Rhinoceros 3D software or any other which can export to the RAW triangles format (e.g. Blender).   |
| STL    | Both text and binary files (stereolithography) files are supported.  |
| DXF 3D | If you opt for DXF, your shapes need to be represented by 3DFACE or POLILINE (poliface mesh) objects. iXshaper also supports INSERTs and BLOCKs but ignores any surfaces drawn as 3DSOLIDS |

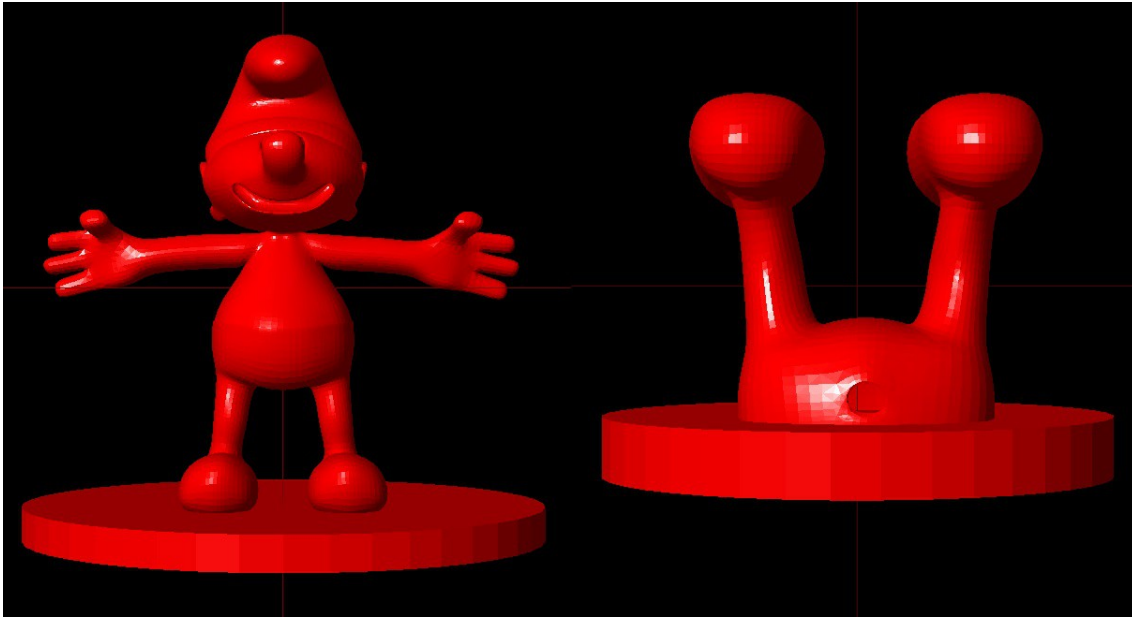
### Instructions for preparing 3D models

- place your model in the center of the co-ordinates system as shown below (the Y axis is the center rotation axis here)
- add a round base to the bottom of your shape, it needs to have a diameter slightly larger than the diameter of your shape (see the green shape below).



- the size of your shape will have great influence on the output files generation processing time, so try to keep your models relatively small (up to 40 cm high) and if need be, scale them up in iXshaper after the output files have been generated (Configuration \ Scale).
- note that all concave or inside elements of your shape will be ignored as they can't be cut by a piece of straight wire. If need be, consider dividing your shape into smaller 3D shapes which can be cut separately and then e.g. glue them together:





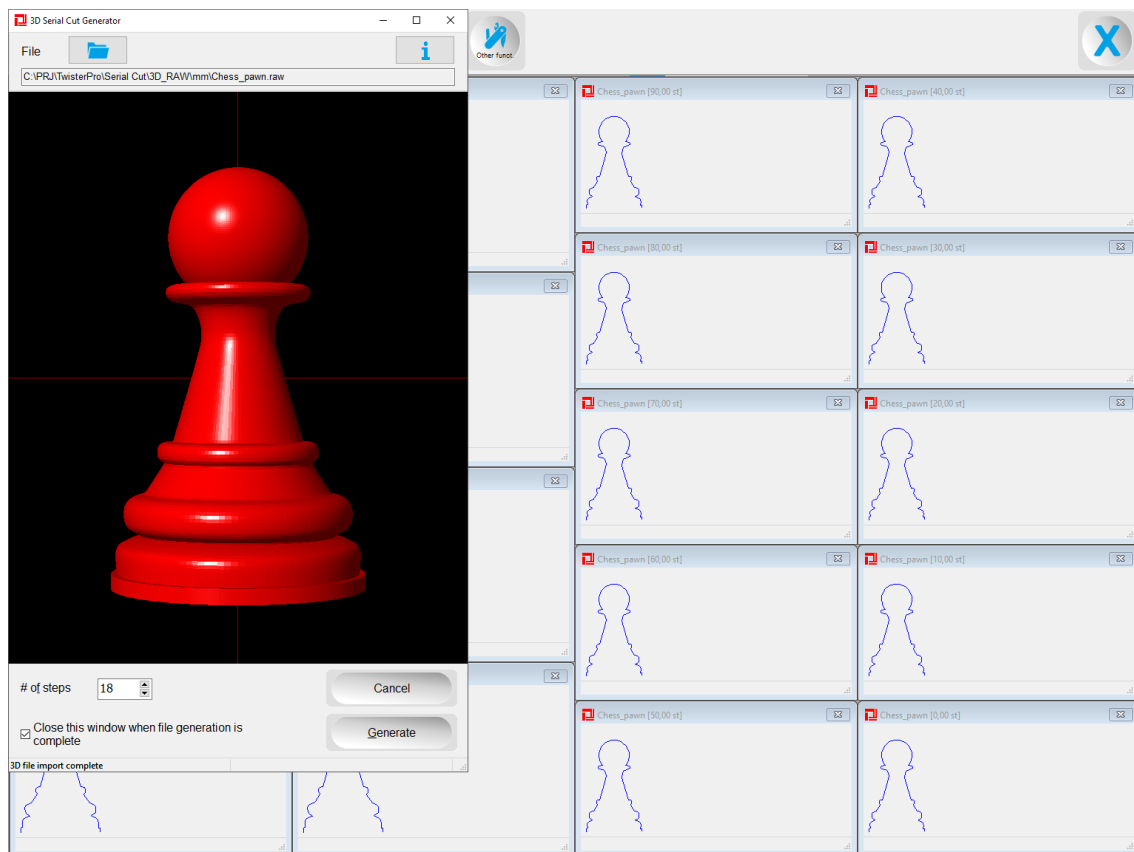
To cut a 3D shape on the TurnTable of a MegaPlot hot wire machine:

- use two-sided self-adhesive tape to fix your piece of foam on the TurnTable so it will not move during the cutting process. It is best to use a piece of foam in the shape of a cylinder with the diameter slightly larger than the diameter of your 3D model.
- move the hot wire anywhere to the left of your piece of foam
- *click Other Funct. - 3D Serial Cut Generator*



- load your 3D model by pressing the F3 key or double-clicking on the preview window (which is completely black prior to loading the shape)
- set the number of passes/steps (default setting is 18 steps, i.e. a cut every 10 degrees)
- set other parameters shown on the 3D window (e.g. select whether you wish to have the model cut off at the bottom automatically when the cutting process is over)
- select Generate and wait for iXshaper to generate and open the required output files
- press START

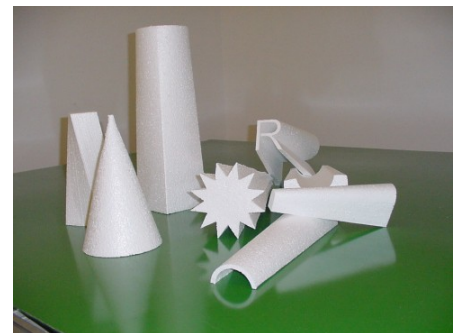




## Independent Axis Cutting

Megaplot units equipped in the independent axis feature can cut a variety of complex shapes, such as cones, sloped roofing panels, lettering with a 3D effect, etc.

Thanks to the advanced electrical wire tensioning system (with a load cell on one end and a wire spool on the other), each of the ends of the wires can move completely independently of the other.



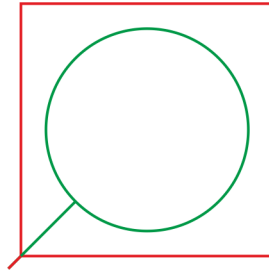
The Independent Cutting Mode is only visible in the software when a unit with this feature is connected to the PC (it automatically hides for non-independent 2D cutters).

Since you want each of the trolleys to cut a different shape, you will need two different art lines. Both will be exported to a single plt or dxf file. To make sure iXshaper reads your project properly, you will need to color code it.

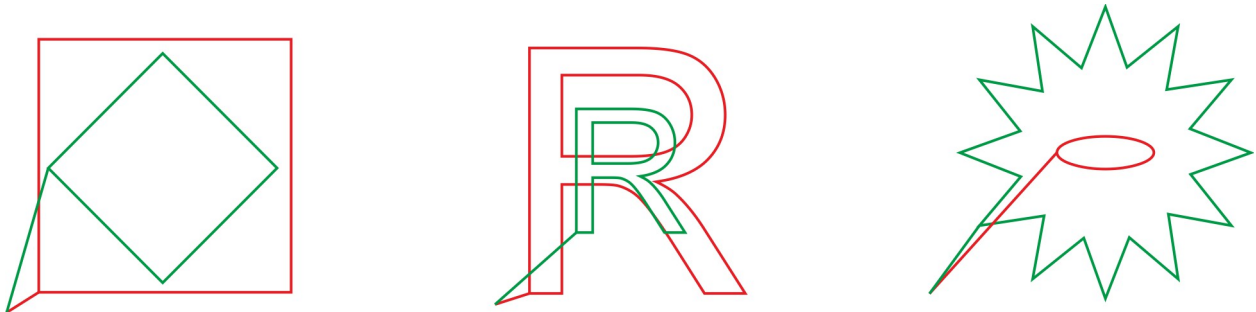
You should draw your shape for the front trolley in green, and the shape for the back trolley in red. Make sure to use the default color palette for this (RGB in CorelDraw).

Make sure your shapes are closed and that you draw starting lines for each of your objects. They do not have to overlap but they have to originate at the same spot.

In the example below one of the sides will cut a square while the other side will cut a circle:

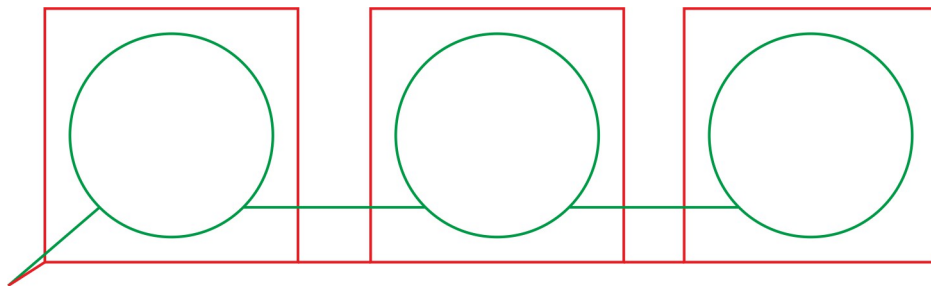


The same principles regarding the entry lines, shapes being closed, etc. apply regardless of whether we have two identical shapes of different size or two completely different shapes.



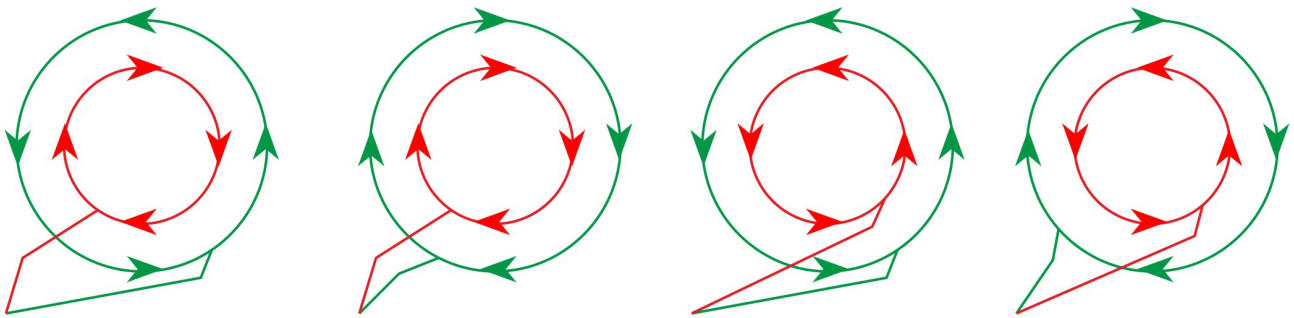
### Independent axis drawings with multiple shapes

Your drawing can consist of more than two elements. However, you will have to have an equal number of green and red figures. Also, you will still need a starting line as well as lines that will connect all your shapes (red and green, respectively). Below is an example.



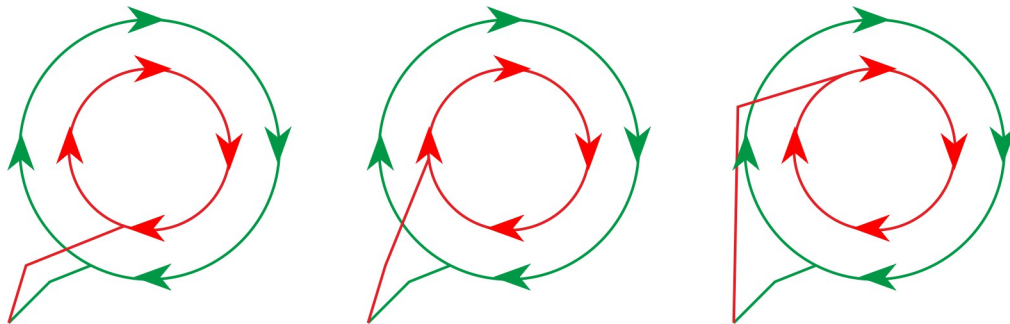
### Cutting direction

The starting line is a powerful tool which can force the required cutting direction. Let's say your project consists of two circles, one of them is a bit smaller than the other one. Depending on the entry point, the trolley can cut the circle to the left or to the right – when the cutter reaches the element to be cut, it will always go up first. See drawings below.



### Entry points

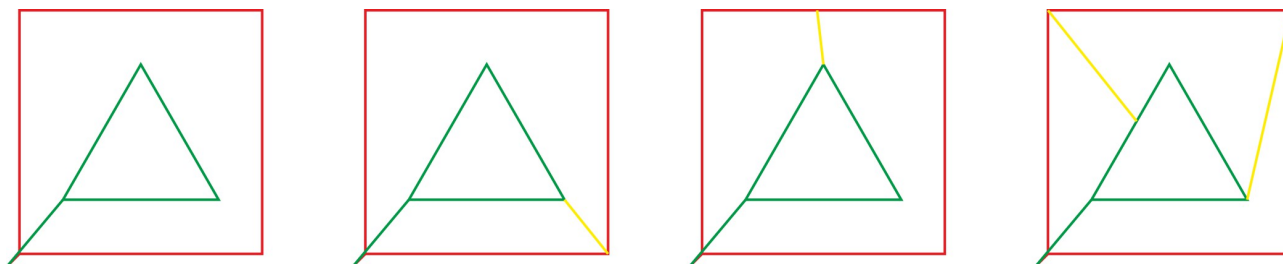
Please note that depending on the entry point, you might get many different outputs out of a single project. The examples below differ only in the place the red starting line connects to the red circle. The cutting direction is the same, but because the trolleys start at different points, the output will be different each time. Try to prepare similar drawings and run the simulation in iXshaper to see different results.



### Synchro lines

In the below example we have a triangle and a square so these shapes differ not only in shape but also the number of nodes. The algorithm will provide one of the ways to cut it when you click Simulation. If the result does not match expectations, you can force an alternative synchronization of the shapes using yellow synchro lines. Draw these yellow synchro lines between nodes on the red and green shapes in places where you want the wire to be at any given time. These lines will of course not be cut, they are only used to synchronize the two sides. It is important each of these lines starts at a node of the red shape and ends at a node of the green shape (add extra nodes on the shapes, if needed). Add these lines one at a time and check the result in Simulation prior to adding more. It is always recommended to use as few synchro lines as possible.

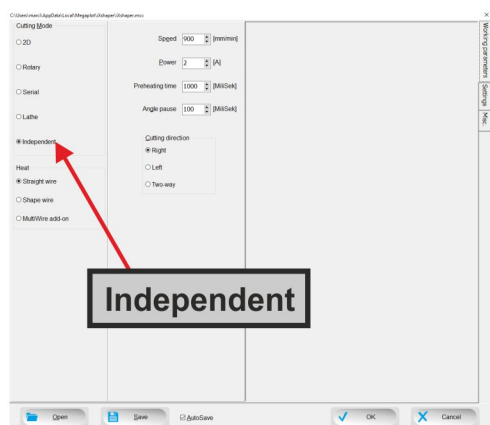
E.g. if you connect the first corner of the triangle with the third corner of the square, trolleys' speed will be automatically adjusted to make sure the front trolley will reach the first corner of the triangle at the exact time the back trolley reaches the third corner of the square.



To start with place the material in the center of the machine, bearing in mind the trolleys' movement may have to move over a much larger area than the size of your drawing (depending on the material size and the two geometries involved).

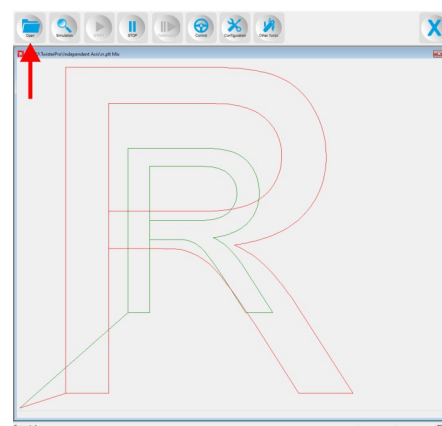
**A**

In Configuration set the Cutting Mode to: Independent



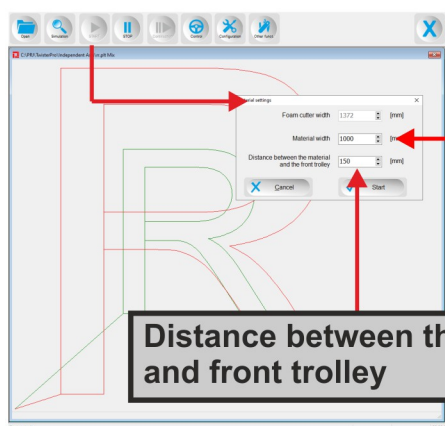
**B**

Open your drawing.



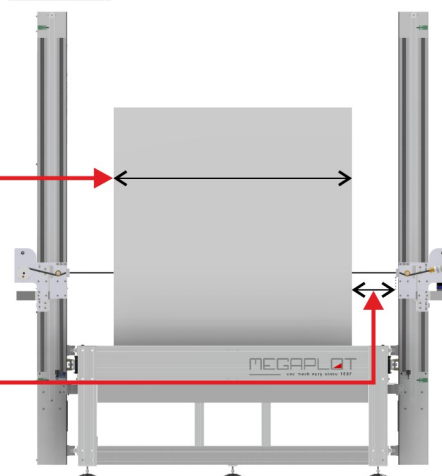
**C**

Press the START button and in the pop-up window insert: the width of your EPS piece the distance between the EPS and the trolley

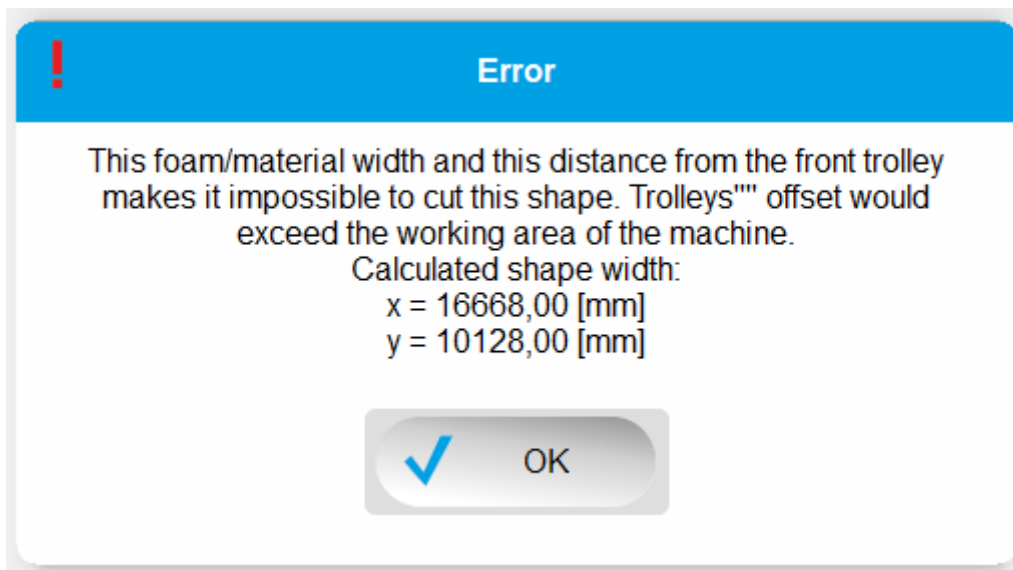


**D**

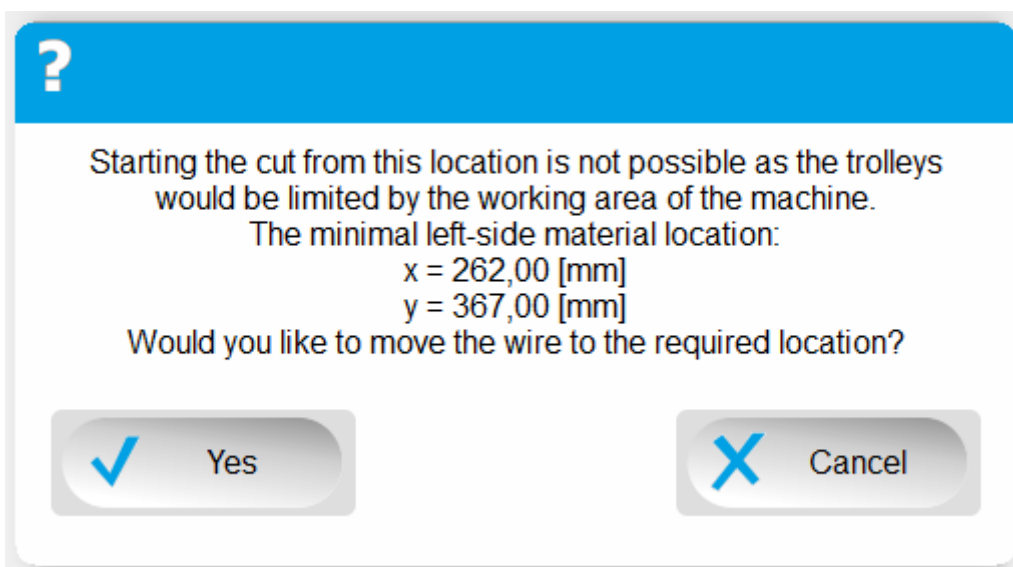
Reference view



Sometimes it may be physically impossible to cut a particular shape especially when the red and green shape differ significantly and the EPS piece is not sufficiently wide, as this would require the trolleys to move outside of the working area of the machine. In this scenario, the following pop-up will be displayed:



Sometimes, a cut may be possible but will require you to move the EPS piece to a different location on the machine and start the cut from a different spot. As the trolleys often have to move outside of the EPS piece both up and down as well as left and right, more often than not having the EPS piece in the center of the machine works best.



Prior to selecting YES, remove the foam from the machine. The machine will then move to the new starting point at which time you can load the EPS piece again. You can also cancel this operation and change the foam placement and the starting point manually prior to initiating the cut again.

## Arch Cutting

For the arch cutting, please use the following settings:

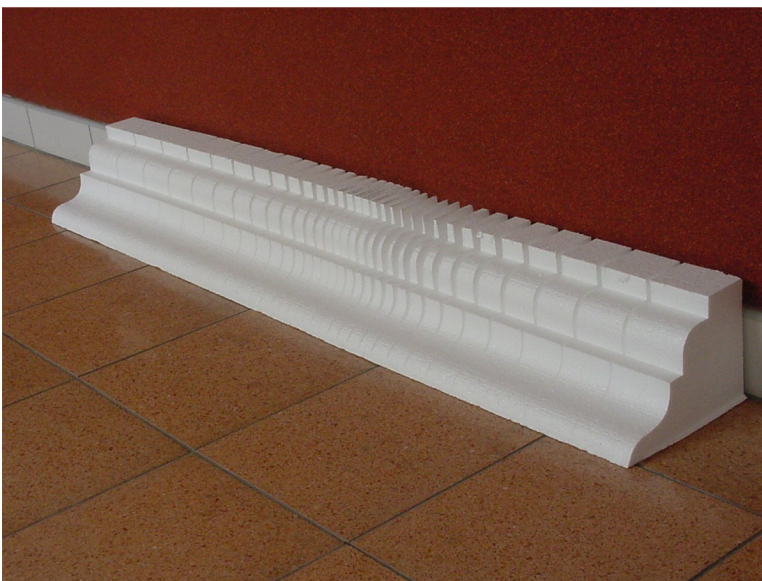
Cutting Mode: 2D

Heat: Straight Wire

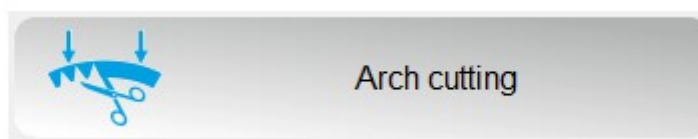
cut the standard straight profile and prepare a suitable curve drawing



The arch will be achieved by cutting a number of small cut-outs in your standard straight profile.



The Arch Cutting feature is available under the Other Funct. button.



Here is the complete sequence of steps:

- A) First cut you profile as you would normally do in 2D. Make sure the length of the profile equals or exceeds the total length of the required curve. Place the profile along the X axis of the machine & move the wire to the upper left corner of the profile.



- B) Next draw a curve of the required shape – this is the shape you final profile will have – it should be a convex open shape – see below for more details.
- C) Open the curve in iXshaper and right click on it to check its total length – this is the min. length your straight profile should have prior to starting the cut-outs.
- D) Click *Other Funct.* and then Arch Cutting.
- E) In the pop-up window type in the depth of the cut-outs – it is recommended to leave at least 3 mm at the bottom to prevent the profile from falling into pieces. This value will of course need to depend on the wire diameter, wire heat, cutting speed and angle pause. Use the node reduction feature if your curve consists of too many nodes resulting in too many cut-outs. Click *Generate*.
- F) If the output file is generated properly, click Start (F2). Otherwise, correct the settings and try again.

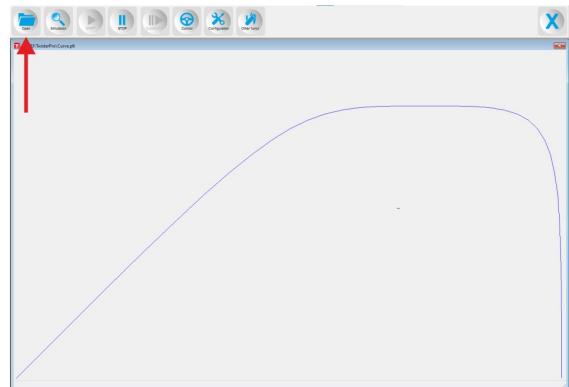
**A**

Cut the shape and place it on the machine as shown below



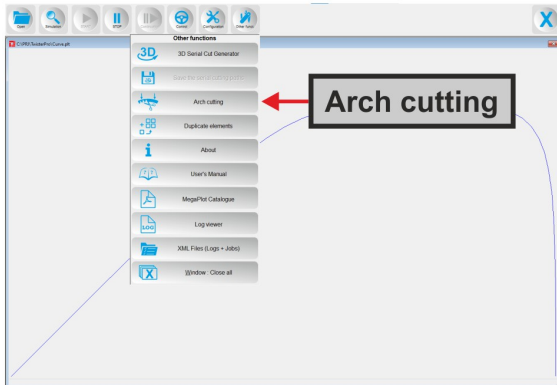
**C**

Open the previously prepared drawing of the curve

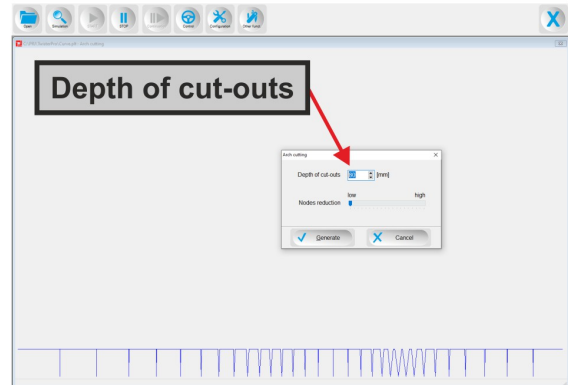


**D**

Select „Arch Cutting” from the „Other Funct.” menu

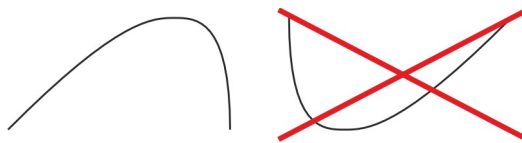
**E**

Insert the „depth of cut-outs” value and press the „Generate” button. A ready-to-cut drawing will show up. Click START to begin the cut.



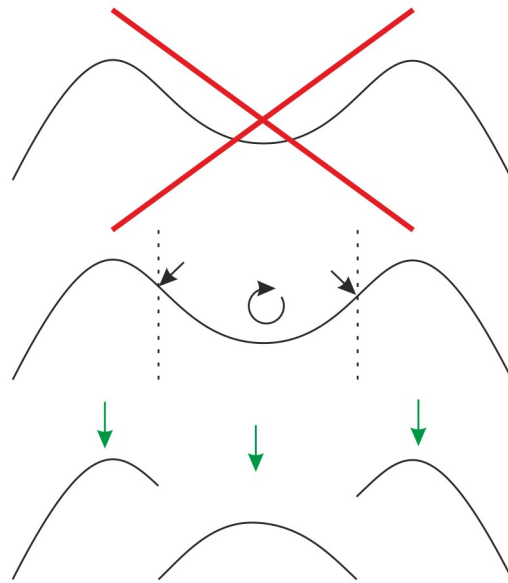
## Curve restrictions

- your curve should be convex, not concave.

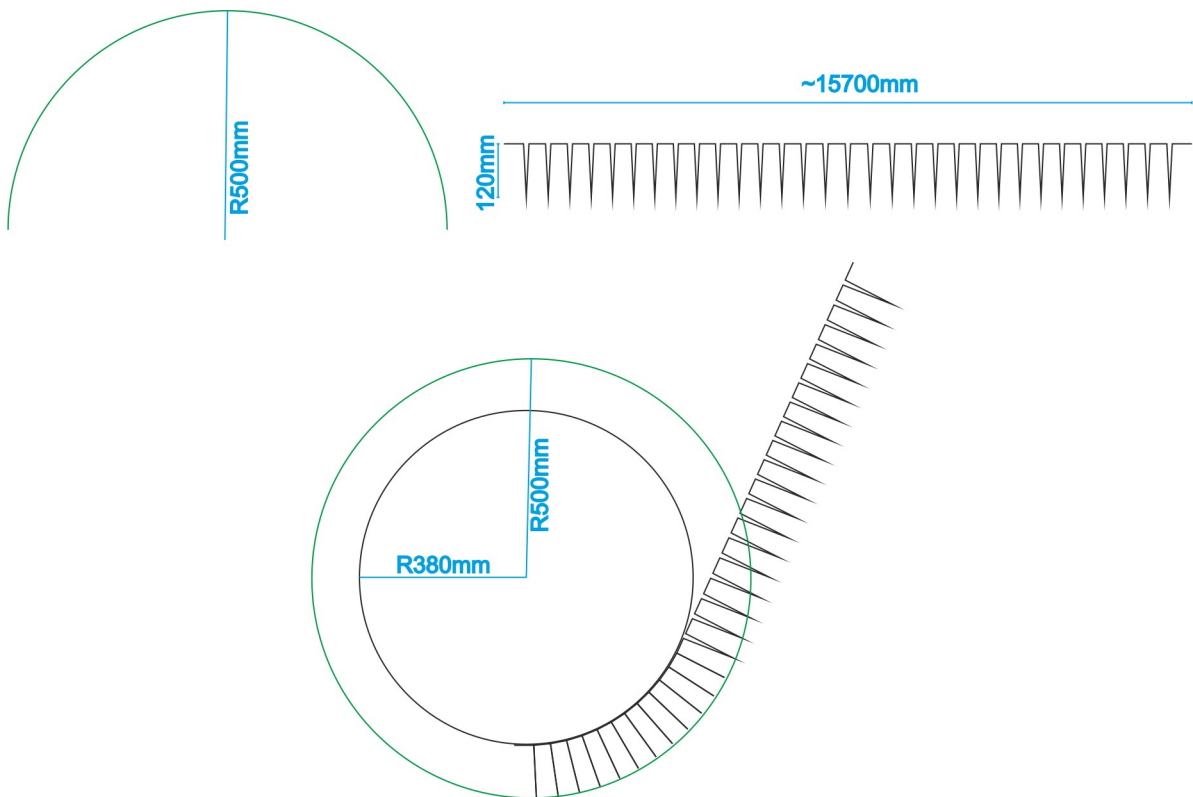


- If the desired shape is convex and concave, divide it into smaller convex segments as shown below, remembering to turn the profile upside down when necessary.

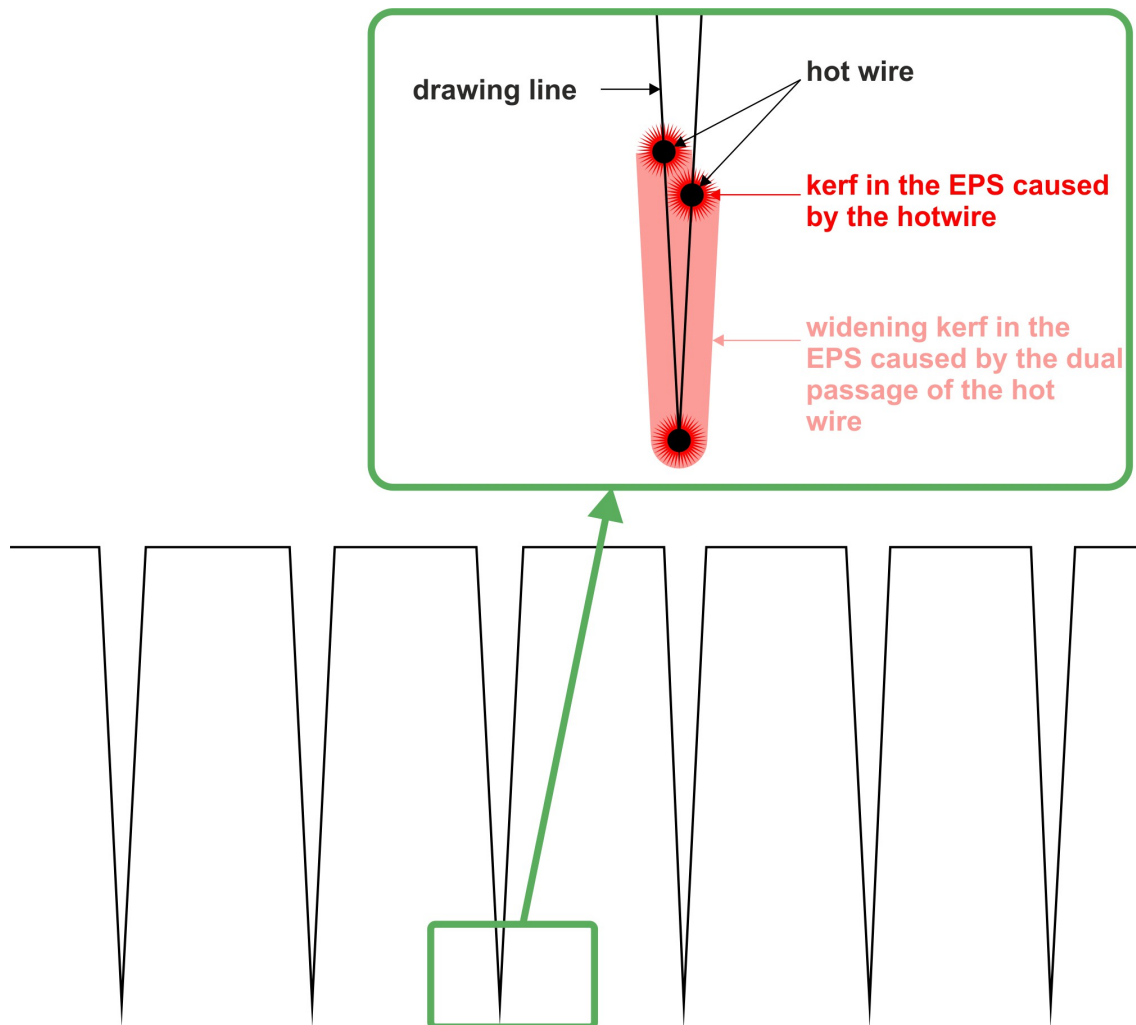




- your curve should be an open line, not a closed shape.
- your curve is the outside radius of the shape



- the algorithm used to generate the output file uses the original nodes of your plt of dxf drawing hence the quality/smoothness of the final shape will depend on the curve file you'd prepared
- sometimes you may get the following error, in which case it may be necessary to change the depth of cut-outs or change the shape of the curve.
- To prevent the final pieces from falling apart, you may want to leave at least 3 mm of EPS uncut. Note this will result in small inaccuracies. Further inaccuracies in the arch will be caused by the wire kerf:

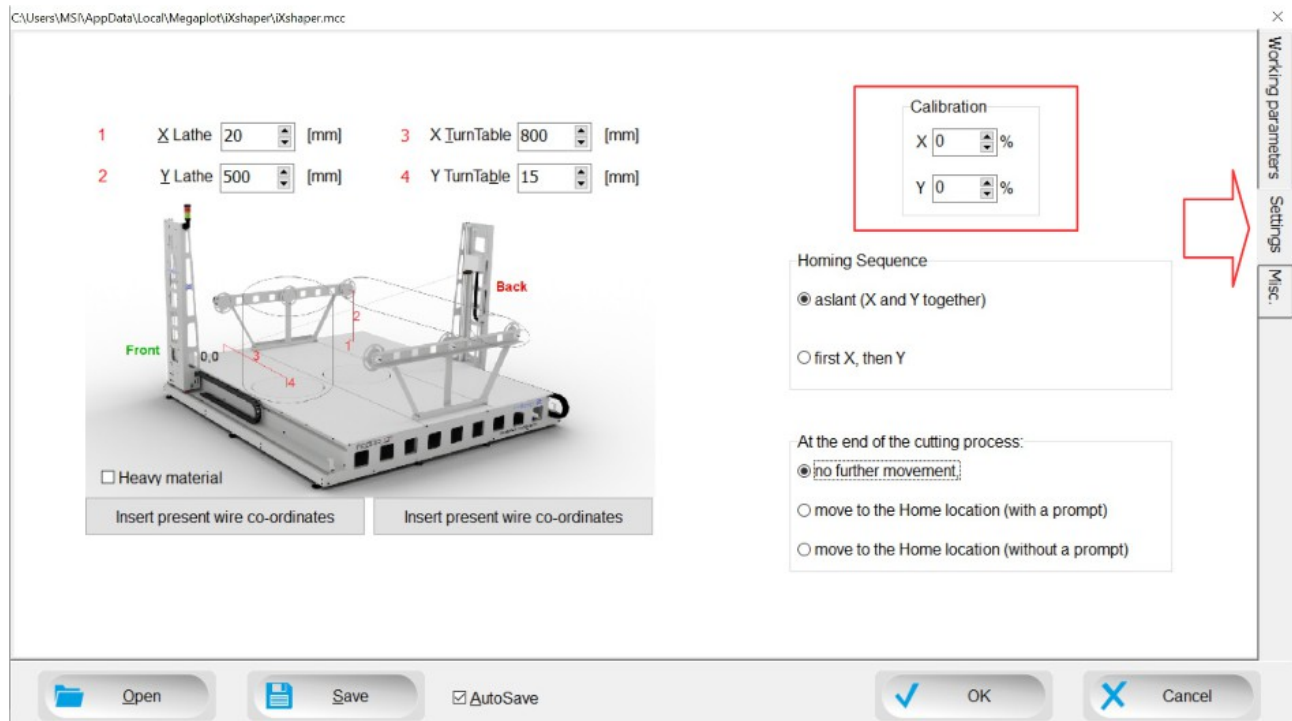


## Machine Calibration

Occasionally you may want to recalibrate your machine when you notice the distances the machine travels in one or both axes are not perfectly accurate and when the movement error is proportional across the entire working area. Each of the two axes – X and Y – can be calibrated

individually. You will first move the machine by a given distance (the larger the better, i.e. 1000 mm) and then measure the travelled distance and use this value to recalibrate the machine.

You will find the Calibration settings in Configuration under the Misc. tab. The below screen shows the calibration values of 0 i.e. the machine does not require any calibration.



To calibrate the hot wire machine:

- set the calibration values to the default 0 and 0 values
- Home the machine
- mark the current wire location on the machine frame
- move the wire 1000 mm in a given axis (Move Wire in Manual Control)
- measure the distance actually travelled
- insert the calibration values
- save the changes
- close the application
- start the application again

Example: the machine moved 997 mm instead of 1000 mm in X axis. Here are the correct

calibration settings:

X axis calibration = 0,3

Y axis calibration = 0



In this case the 0,3 mm value will increase the movement distance by 3 mm over the length of 1 meter. Should the machine move too far prior to calibration, use a negative value in the calibration window..

## Activity log

iXshaper v. 6.0.0.1 and later automatically logs various actions related to its use and the cutting process.

The following items are included in the log:

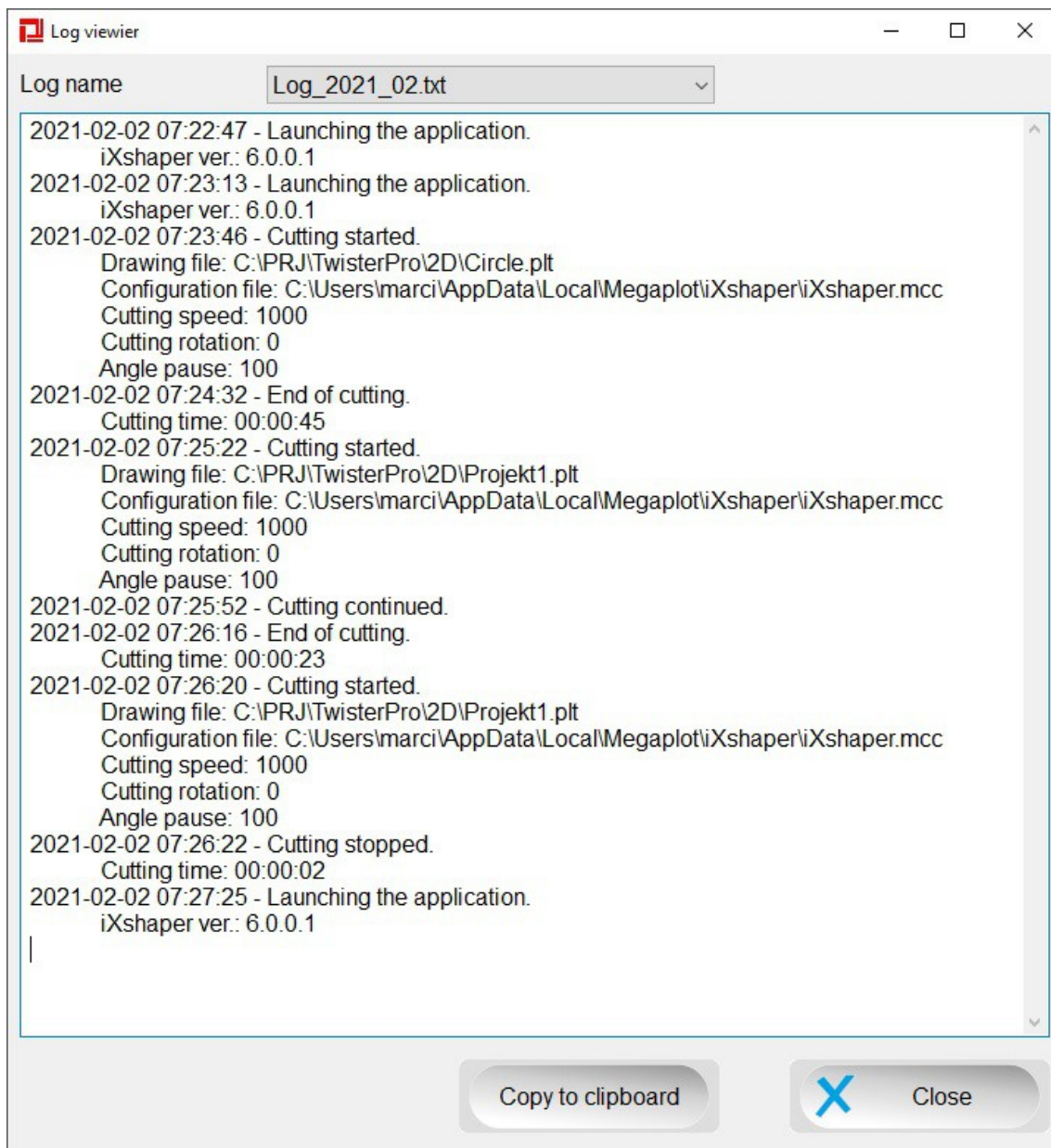
- opening and closing the application
- homing the machine
- start and end of the cutting process
- names of cutting files and configuration files
- basic working parameters: speed, wire heat and angle pause
- broken wire

The end user can access the log under the Other Functions  menu by clicking the LogViewer button . On the non-touch iXshaper interface this feature is available under File – Log Viewer. Once selected, the following window pops up.

One can use the Log name drop list to select a given month.

The Copy to clipboard button can be used to copy the currently open log to the OS clipboard.

The Close button closes this log preview window.



By default the logs are saved in txt files and each of these files contains a complete log from a given month. Only the last 3 months of logs are saved on the hard drive, with the older ones being deleted automatically. One can of course back them up before they are deleted.

Default location of the folder with the Log files is:

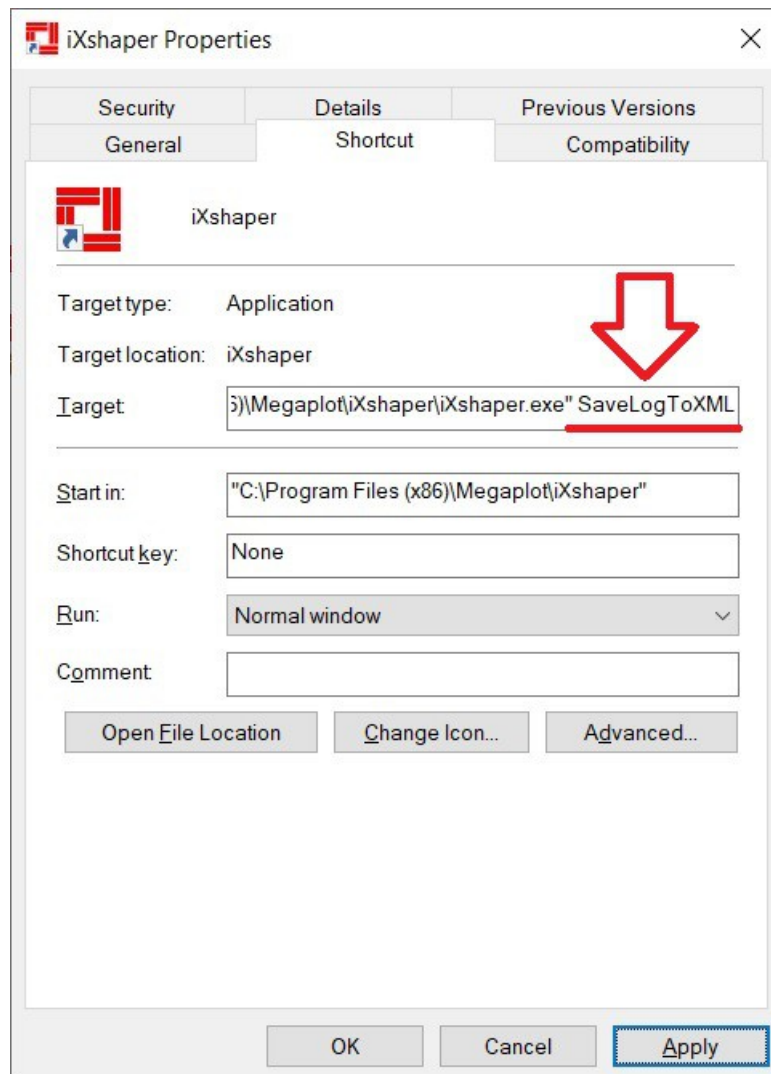
C:\Users\nazwa\_urzytkownika\AppData\Local\Megaplot\iXshaper\Logs



### **Saving the Activity Log to XML files**

In order to integrate with third-party IT systems one have the log files saved to XML files. This is a very popular and open forma, suitable for processing and analysis.

By default the logs are only saved in txt files. To activate the XML saving feature, one needs to add the following parameter to the iXshaper's target path:

### SaveLogToXML



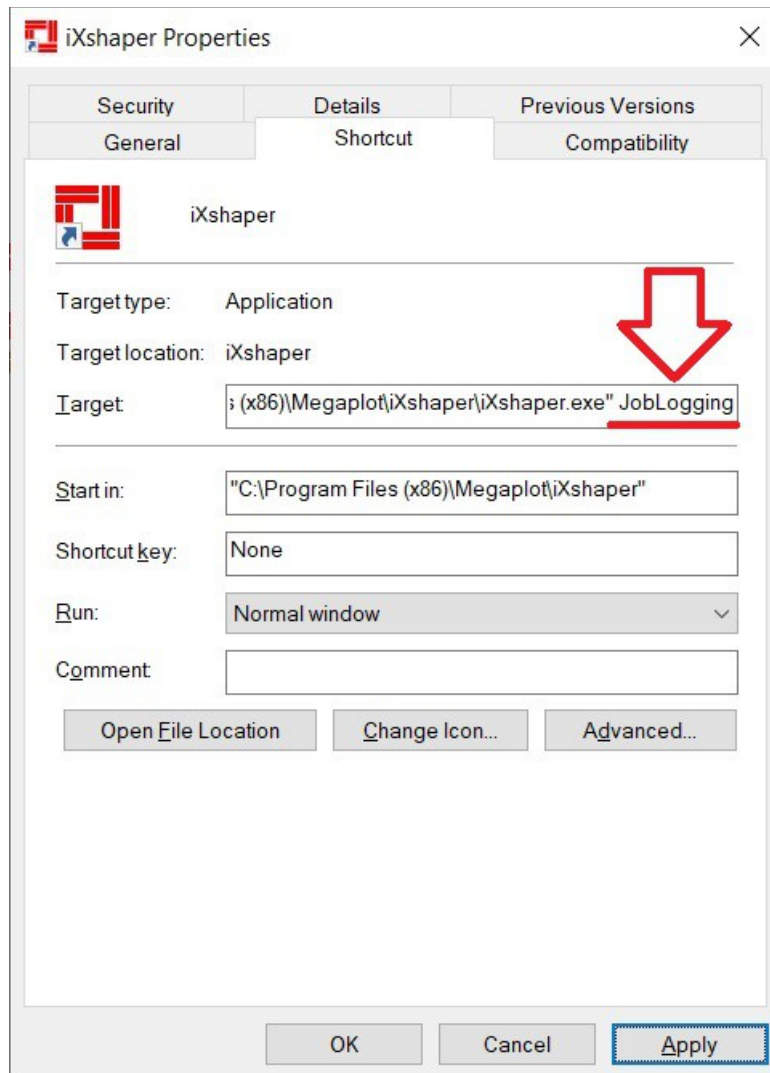
The logs in XML files are saved in the same Logs folder. To access this folder one can press the Other functions button  and then XML Files (Jobs and Logs) . On the non-touch iXshaper interface this feature is available under File – XML Files.

### Job registry

The latest iXshaper can also save the entire cutting history in the XML format which can then be imported into e.g. industrial IT systems for further analysis, processing and integration.

To activate this feature, one needs to add the following parameter to the iXshaper's target path:

## JobLogging



Once activated, a new Jobs folder will be created by the application. This folder contains XML files with information on completed and pending cutting jobs. If a cut is stopped, resumed or ended, the application will update the status in the file automatically.

Each of these files has a unique name consisting of the JOB prefix followed by the date and time of the cut start as well as a unique 32 digit UID. All the parts of the file name are connected with underscored and each of the files has the XML extension.

The following information is recorded in the Job XML file:

JobID - unique Job UID, the same as in the file name

Machine - machine name

StatusId - status ID number

Status - cutting progress status

StartTime - cutting start time

FinishTime - cutting end time

Duration - total cutting time



ProjectFile - name of the cutting file

ConfigFile - name of the configuration file used for the cutting file

CuttingPower - wire heating value used for the cut

CuttingSpeed - cutting speed

CuttingAnglePause - angle pause value

The Job XML files are saved in the same Logs folder. To access this folder one can press the Other functions button  and then XML Files (Jobs and Logs) . On the non-touch iXshaper interface this feature is available under File – XML Files.

Sample XML job file:

```
<?xml version="1.0" encoding="UTF-8"?>
- <Job>
  <JobID>AFAE89B3-10E6-45D0-A6D9-9463C8FACBFF</JobID>
  <Machine>iX2500M</Machine>
  <StatusId>3</StatusId>
  <Status>Cut completed</Status>
  <StartTime>02.02.2021 07:13:58</StartTime>
  <FinishTime>02.02.2021 07:15:27</FinishTime>
  <Duration>00:01:28</Duration>
  <ProjectFile>C:\PRJ\TwisterPro\2D\Projekt1.plt</ProjectFile>
  <ConfigFile>C:\Users\marci\AppData\Local\Megaplot\iXshaper\iXshaper.mcc</ConfigFile>
  <CuttingPower>0</CuttingPower>
  <CuttingSpeed>1000</CuttingSpeed>
  <CuttingAnglePause>100</CuttingAnglePause>
</Job>
```

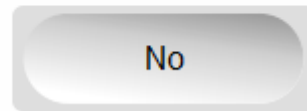
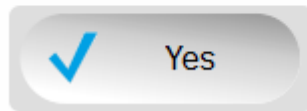
## Work Folder Monitoring

In order to facilitate working with a third-part application used to generate the cutting files, iXshaper can constantly monitor a local work folder in order to detect any new files which may have been saved there. If this feature is activated, the iXshaper application will monitor the folder periodically and when a new file is located within the folder the following prompt will be displayed:





A new file has been saved in the Work Folder.  
Do you want to open the Work Folder?



If one selects "Yes" the folder will be opened so the user can click and open the desired file. Selecting "No" will take the user back to iXshaper.

By default this feature is switched off. In order to activate it one will need to modify the iXShaper.ini file. One can also set the Work Folder path in this ini file.

## iXShaper.ini Parameters

Certain iXshaper configuration settings can be saved and modified in the iXShaper.ini file. Depending on the Windows OS it can be found in the following default locations:

for Windows 2000, XP and, Vista

C:\Documents and Settings\All Users\Application Data\Megaplot\iXShaper

for Windows 7, 8, 8.1 10 and 11:

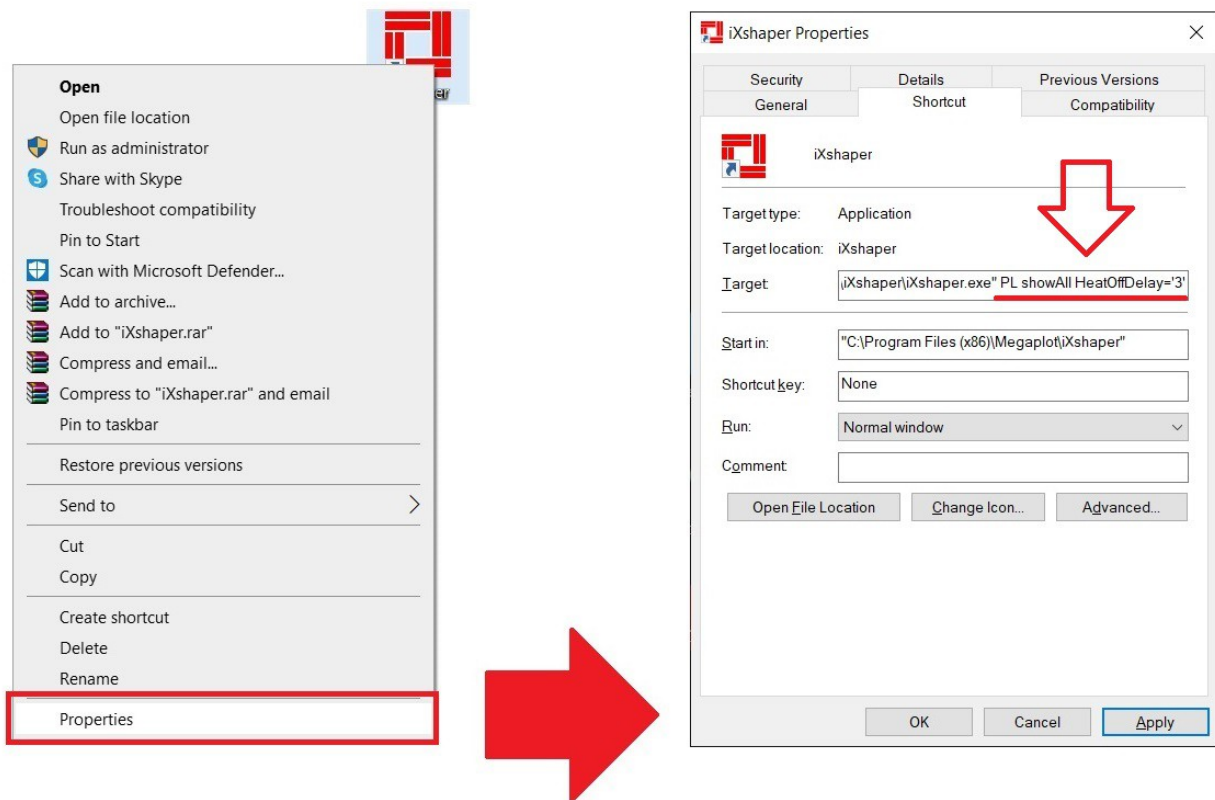
C:\ProgramData\Megaplot\iXShaper

The following table presents the parameters saved in the ini file:

Section	Parameter name	Description
Work Folder Monitor	Enabled	Setting this to „1” will activate the work folder monitoring. To disable this feature, change to „0”.
	WorkFolder	Path to the Work Folder on the hard drive, e.g.: C:\WorkFolder
	Interval	Amount of time [in seconds] between subsequence scans of the Work Folder. Default value is 10 seconds.

## iXshaper's Parameters

It is possible to start the iXshaper application with one or more of the supported parameters. To achieve this one needs to modify the parameters of the iXshaper's shortcut which can be found on the desktop (after a typical installation).



In the Properties of the iXshaper's shortcut, locate the *Target element* field, add a spare at the end of the line and type the parameter.

An example of having 3 active parameters at the same time:

**PL** (to force the Polish language version regardless of the Windows OS language setting)

**ShowAll** (to display in iXshaper all the cutting modes regardless of what machine configuration is connected to the PC at the moment)

**HeatOffDelay='number\_of\_seconds'** (delay in wire heating switching off at the end of the cut))

Assuming the application is installed in the default location, a typical *Target element* line will look like this:

**"C:\Program Files (x86)\Megaplot\iXshaper\iXshaper.exe" PL ShowAll HeatOffDelay='3'**

It is important to note all the spaces and single and double quote marks (in pairs).

Certain parameters may require the entire parameter to be contained within the quote marks, an example being the *OnlyMachine*='machine\_name' parameter which is used to control two different MegaPlot machines from two instances of iXshaper installed on the same. When configured this way iXshaper will only connect to the machine with a name matching the one from the parameter. And if the machine name contains a space then the entire parameter needs to be put within quote marks as shown below:

"C:\Program Files (x86)\Megaplot\iXshaper\iXshaper.exe" **"OnlyMachine='iR 1200M'"**

The exact name of the machine is shown in the About window within iXshaper (spaces and small and capital letters are all important and need to be copied exactly as displayed).

## MAINTENANCE

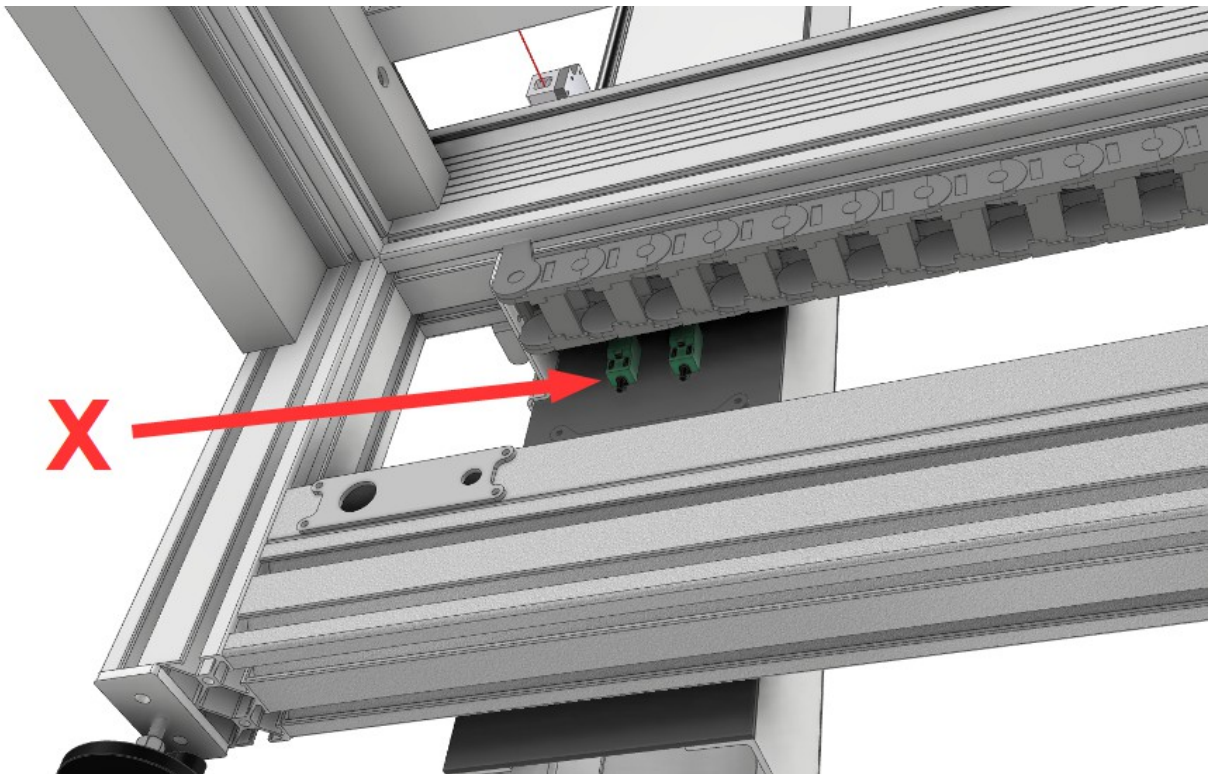
The operation of the machine needs to be performed in accordance with local safety laws.

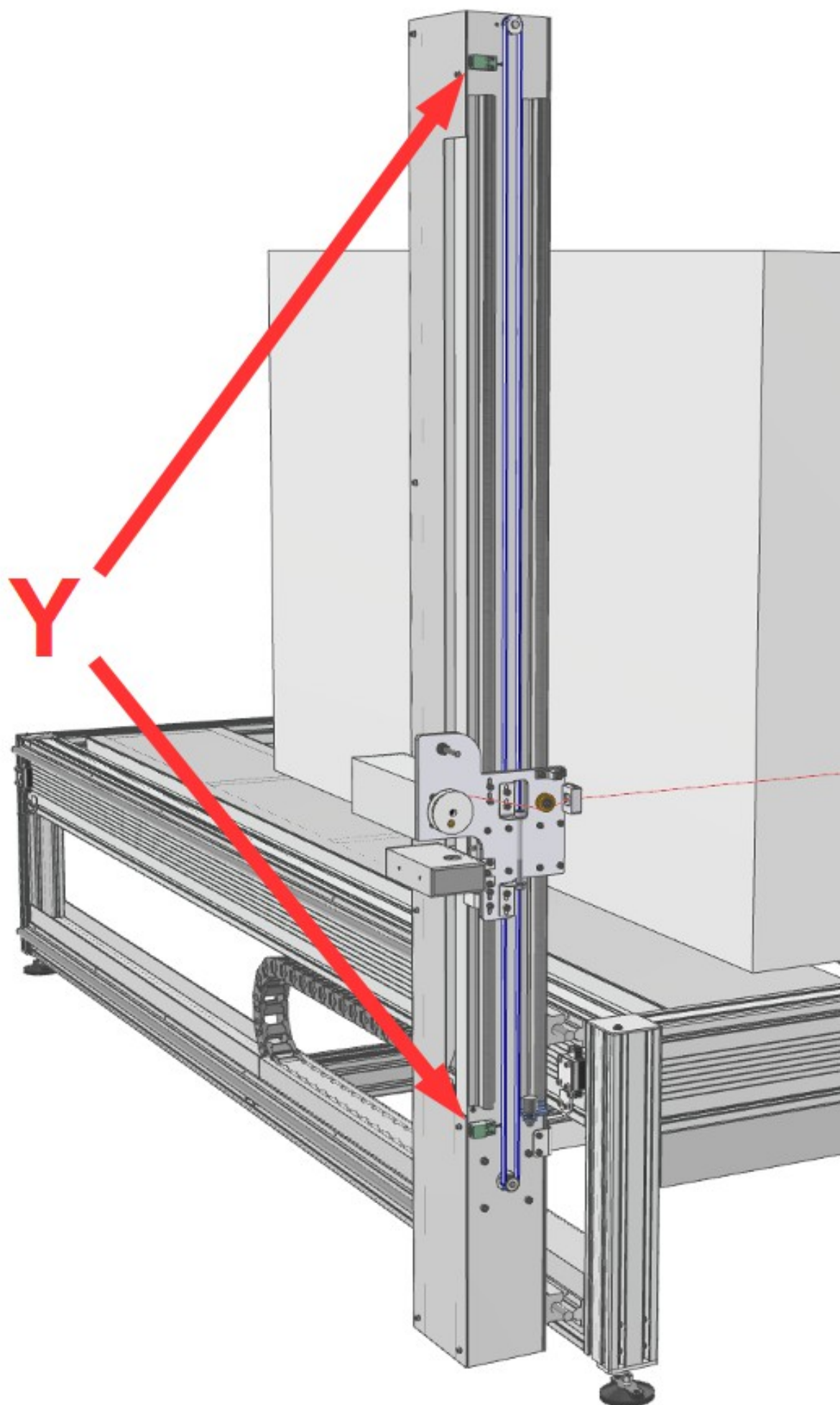
It is important to keep the lineal rails and the belts in both axes in a good and clean condition. The bearings should be greased on a regular basis to ensure their reliable performance.

To ensure long life of the cutting wire, make sure to use the correct type of wire for a given material and ensure the cutting parameters are set to values reflecting the requirements of the material being cut.

It is prohibited for the operator to be in the proximity of the working area of the machine (to clean it or hold the foam piece) while the machine is in operation.

To ensure the Homing procedure completes successfully each time, ensure the proximity switches are wiped clean on a regular basis.





## COMMON ISSUES – BEFORE YOU REACH OUT FOR HELP

Before you reach out for assistance, you may want to review the FAQs below to see if your issue may be already listed here:

A large drawing was not completely cut despite the fact the Simulation shown otherwise and the controller's display shows the message "End of data".

This indicates a USB connection issue. Ensure the PC is powered from a properly grounded power line. Disable all power saving features on the PC, including screensaver, hibernations, etc., as they all interrupt USB communication. Try lowering the number of nodes in your drawing. Make sure you're using a good quality USB cable of no more than 3 meters.

A PLT file from CorelDraw has incorrect dimensions when opened in the iXshaper application.

Certain versions of CorelDraw (e.g. ver. 11) come with a bug when exporting to PLT. To correct the difference in size, set the scale in the iXshaper application to 101,6% - in case of CorelDraw 11 for other versions the correct scale value may be different.

Circles and shapes cut from a PLT file are not smooth.

When exporting to PLT from CorelDraw, open the Advanced tab in the Export window and set a lower Curve resolution value. Alternatively, try exporting to DXF instead.

During Simulation (or during a cut) the wire does not move as expected.

Double check your drawing for overlapping shapes. Ensure all the shapes are closed node to node. If nothing else helps, please consider e-mailing us the file causing issues and we will be pleased to assist you

Homing problems

Ensure the proximity switches are clean and in their correct locations. Their detection distance is around 0,5-1,0 mm so it is important the metal piece they are supposed to detect is within this range in the Home position.

Check the proximity switches by touching them with a piece of metal – when this happens a red LED should lit up on the proximity switch and at the same time this proximity switch should be listed on the controller's display.

The cutting wire broke during a cut.

When the cutting process is stopped by the wire break detection system, do not close the application nor switch off the electronic controller, but instead replace the cutting wire by following Installation of the Cutting Wire .

I set the wire in the upper left corner of a drawing and my drawing has the start line in the upper

left corner but when I try to start the cut I get a message informing me it is not possible to perform the cut from the current wire location.

Make sure the machine has been Homed properly.

Check your drawing's height by clicking File – Info or right clicking on your open drawing. Move the wire up to a Y value equal or higher than your drawing's height.

The iXshaper application is unable to communicate with the machine

Make sure the controller is connected to your PC with the USB cable. Try a different, short and good quality USB cable. Try a different USB port on your PC. Restart the PC and the machine and try again. Try a different PC. If still no luck, please contact us for further assistance.

If your problem is not listed above, please reach out to us via email. To ensure prompt assistance, please provide as much details as possible:

- machine model & serial number
- FastWire application ver.
- machine CPU version (shown on the display during the start up as well as in the File – About

window)  Other functions button \  About

- problem description
- if you're experiencing a problem with a drawing, please attach the drawing as well as the configuration mcc file
- pictures and/or a movie.

The more details you supply the sooner we will be able to assist you.

## Updating the iXshaper application

Your Megaplot hot wire machine comes with unlimited free updates of the iXshaper application.

The latest version is always available for update from the following link:

[https://foamcutter.home.pl/pub/iXshaper\\_TPRO.zip](https://foamcutter.home.pl/pub/iXshaper_TPRO.zip)



## TECHNICAL DOCUMENTATION

### Machine Description

A hot wire foam cutting machine is a computer-controlled device used to sheet and/or contour cut expanded (EPS) and extruded (XPS) styrofoam. The drawing to be cut on the machine is first prepared in a suitable graphics format (e.g. PLT, DXF or EPS/AI) and next this drawing is opened in the control application supplied with each machine. This control application is used not only to initiate a cut but also to control various settings and features of the cutting process.

The basic working principle of a hot wire foam cutting machine is a piece of resistant hot wire moving in 2 axes at computer-controlled speeds and cutting the EPS or XPS foams to the desired size and shape.

### Machine Construction

The hot wire foam cutting machine consists of two main components:

#### **I. Main machine body consisting of:**

- an aluminum frame (P series) or a set of aluminum trolleys (T, MW or Twister PRO series) or steel trolleys (OpenFrame series),
- stepper motors
- drive mechanisms
- wire heating, guide and tensioning systems
- machine wiring

#### **II. Electronic controller (stand-alone or built into the machine) consisting of:**

- power supply system providing correct voltages and currents for the individual components of the system
- control system responsible for the machine's speed, movements and stepper motors' torque, as well as the temperature of the cutting wire
- communication system based on the USB protocol for sending and receiving data to and from the PC via a USB cord
- memory system collecting and storing information necessary to perform a cut
- safety and control systems interrupting the machine's operation in case of a broken wire,

presence of out-of-range voltage values or out-of-range temperatures.

- Control panel consisting of:
  - power button
  - LCD display which shows current machine information (data transmission, working status, end of work), electric and electronic components' status (temperatures, voltage values) as well as causes of emergency stops (incorrect voltage, temperature too high, broken wire, communication issue).
  - LED diodes:
    - green - power
    - red – together with an audible signal – indicates an error

## Working Principles

1. Drawings to be cut on the machine need to be prepared in a third-party graphics software capable of exporting to one of the supported formats: HPGL, DXF or EPS.
2. The control application supplied with the machine is installed on a customer's PC and is used to open the previously prepared drawing as well as to visualize it on the PC screen.
3. The machine operator sets a number of working parameters in the control application on the PC.
4. The operator positions the cutting wire in the place from which the cutting process is to start and then initializes the cutting process.
5. If the working area of the machine allows for the cut the job is sent from the PC to the electronic controller of the machine.
6. The cutting process starts with the settings and parameters previously set in the control application. Certain working parameters – such as the cutting speed and the wire temperature – can be adjusted by the operator during the cutting process.
7. At the end of the cutting process the machine stops and turns off the wire heating.
8. Should an issue arise during the cutting process, the machine stops and the control panel displays the reason of the stops and in certain urgent cases (voltage, temperature) additional audible signals are generated.

## Safety Precautions

This chapter explains actions which should be taken in order to avoid potentially dangerous situations when operating a hot wire foam cutting machines.

The machine comes with built-in safety features to protect the operator from electrical shock and thermal burns resulting from the use of hot resistant cutting wire, however, it is essential common sense actions are taken to prevent potentially hazardous situations:

1. Read the safety informations carefully prior to starting work with the machine.
2. Keep this safety documentation handy for future reference.
3. Disconnect the machine from the power line completely prior to performing any cleaning of the machine. Do not use any liquids or spray cleaners, a damp cloth is sufficient for standard machine cleaning.
4. As with all equipments powered from a mains source, it is essential the power plug is easily accessible at all times.
5. Keep the machine dry at all times and prevent excessive moisture levels in the working environment.
6. Ensure the machine is installed on level and hard flooring to prevent possible machine damage, malfunction or risk.
7. Prior to connecting the machine to the power line ensure the power line is rated for the correct voltage and that the power line is properly grounded.
8. Ensure the power cord is placed in a safe manner to prevent people from stepping on it. No items should be placed on the power cord at any time.
9. Always follow all safety and risk precautions which were supplied with the machine.
10. Should the machine not be used for an extended period of time, disconnect it from the power source to limit the risk of failure.
11. Never pour any liquids on any part of the equipment as it may cause its failure as well as cause electrical shock or fire.
12. Never disassemble or open any part of the equipment. For safety reasons such openings and disassembled can only be performed by qualified personnel.
13. Should any of the below take place, please discontinue its use, disconnect it from the power source and contact the machine manufacturer immediately:
  - a) the power cord or any of its connectors got damaged

- b) A liquid got inside any part of the machine.
  - c) The machine has been exposed to moisture.
  - d) The machine is not working properly or is working in a manner different than described in the manual.
  - e) Any part of the machine has been dropped and damaged.
  - f) Any part of the machine is showing visible signs of damage.
14. Never leave the equipment in an uncontrolled environment. Note ambient temperatures exceeding 60°C may cause its failure. The machine can be operated in ambient temperatures not exceeding 35°C. Noise level in the machine environment does not exceed 70 dB(A) [in accordance with IEC 704-1: 1982] during normal operation.
15. Power cord requirements: the power cord used to power the machine from the power line needs to meet all local safety requirements of the country in which the machine is installed (rated for 100-120VAC or 200-240 VAC). The machine-end connector needs to be compatible with the power connector on the electronic controller of the machine (CEE22/EN6032/IEC 320). The connectors on this cord need to come with the safety certificates as required by local law. The power cord cable must be of the flexible type HAR H05 VV-F. The cable itself needs to be rated for up to 2.5 Amp and for 100-120VAC or 200-240 VAC.
16. During the machine operation standard safety precautions need to be taken at all times to avoid the risk of fire, electrical shock or other hazards. Never operate the machine in close proximity of running or open water, i.e. close to a bathtub, sink, in a wet basement or close to a pool.
17. Never use a power supply close to a source of water or any other liquids. Never put any liquids on the power supplies.
18. To turn the machine on after it has been connected to the power source, press the green ON button located on the electronic controller. To switch the machine off, press the red OFF button.

## Machine's Installation Location

While the machine can be used in the operating temperatures listed below it is essential the machine is not subjected to significant temperature changes (e.g. when being moved from a cold outside into a warm production facility). Sudden and significant temperature changes may result in moisture condensation inside the electronic controller which may lead to subsequent failure of the electronic components inside the controller. In such cases it is essential to leave the machine in the new environment for a period of time sufficient for the machine to reach the new ambient temperature. Only then is it safe to connect the machine to the power source.

The PC the operator will use to control the machine needs to be placed in the immediately machine environment in a safe manner meeting the requirements for safe PC operation. It is recommended the PC is located right next to the machine to facilitate its control and parameters' adjustment while the machine is performing a cut. To connect the machine to the PC please use the supplied USB cord. Note long USB cables and USB cable extenders may introduce USB communication issues so if such are experienced, please revert back to the original USB cable supplied with the machine. Note light reflexes may inhibit display's visibility so it's essential the display is installed in a safe and shaded area.

The machine needs to be located in a well-ventilated environment with sufficient air flow. Do not cover or close any of the air vents on the machine. Do not install or operate the machine in direct sunlight.

While the machine may operate properly in extreme conditions, very low or very high temperatures and humidity levels may cause premature wear and even damage of certain machine components.,

Certain factors which may seem safe for the operator can be extremely difficult for any electric or electronic piece of equipment and these include static electricity, dust, water, steam or fat. Do not ever operate the machine in environments with the humidity exceeding 75% , or in open air areas or on construction sites and none of these are suitable for safe operation of such equipment.

## Operator's Safety

It is not allowed for the operator to manually hold the material being cut nor to add or remove any EPS pieces onto the machine while it is in motion.

It is not allowed to any one to be present within the machine working area while the machine is in motion.

**Always turn the machine off completely prior to installing a new piece of cutting wire!**

Safety risks which may be present during machine operation:	How to avoid them:
<p><b>1. Burns</b></p> <p>The resistant cutting wire reaches the temperature of up to 300°C while cutting EPS or XPS foams.</p>	<ol style="list-style-type: none"> <li>1. Stay away from the machine's immediate environment while it's working.</li> <li>2. Never touch the cutting wire while the machine is switched on.</li> <li>3. Prior to installing a new piece of wire, switch the machine off completely and wait at least for 5 seconds to allow the cutting wire to cool down completely.</li> <li>4. Always use the correct cutting wire as supplied by the machine manufacturer or one matching all the requirements as supplied by the machine manufacturer.</li> </ol>
<p><b>2. Electric shock</b></p> <p>All the voltages present on the electrical circuits of the machine are safe.</p>	<ol style="list-style-type: none"> <li>1. Make sure the machine is powered from a properly grounded power socket.</li> <li>2. To prevent accidental disconnection of a plug, always secure the plugs with the fixing screws and anchors which may be integral parts of the connectors..</li> <li>3. Inspect the machine wiring and connectors on a regular basis. Should wear and tear or damage be visible or suspected, disconnect the machine from the power line immediately and either contact the machine manufacturer or a qualified specialist to perform the necessary</li> </ol>

	<p>troubleshooting and repairs.</p> <p>4. Do not open the electronic controller. Do not open or remove any of the plugs on the machine and its wiring. Never attempt any modifications or repairs of the electrical systems of the machine. Should wear and tear or damage be visible or suspected, disconnect the machine from the power line immediately and either contact the machine manufacturer or a qualified specialist to perform the necessary troubleshooting and repairs.</p> <p>5. Never operate the machine close to open fire or in a humid environment.</p>
<p><b>3. Toxic fumes</b></p> <p>Small amounts of toxic fumes are produced when hot wire foam cutting expanded and extruded styrofoam (EPS and XPS).</p>	<p>1. Machine's installation location needs to feature ventilation outlets ensuring sufficient uptake of the fumes created during the cutting process.</p> <p>2. Air the room in which the machine is installed on a regular basis.</p>

**The hot wire foam cutting machine does not contain any components suitable for self-repair.**

**Should wear & tear or damage to any of the components of the machine be noted or suspected, disconnect the machine from the power line immediately and either contact the machine manufacturer or a qualified specialist to perform the necessary troubleshooting and repairs.**

## Freight

Prior to shipping the machine from our factory to its destination, the machine is taken apart and packed up in a number of boxes and/or crated. The packaging consists of EPS filling and sheeting out of corrugated PP or particle boards. Unless otherwise agreed the machine manufacturer is responsible for delivering the machine to its location.

Should it be necessary to move the machine to a new location (after its original installation by authorized personnel), the machine should be disassembled and transported in the original packaging it originally came in with. Should the original packaging be no longer available, it is possible to ship the machine in an alternative, similar packaging, as long as it sufficiently protects all the mechanical and electrical components of the machine.



## Installation

It is possible to self-assemble the machine with the use of the assembly manuals supplied by the machine manufacturer. Should any doubts arise during such self-installation do always contact the machine manufacturer prior to connecting the machine to the power line.

The machine needs to be installed on hard, flat and level flooring (suitable for a given machine's weight requirements). It is the end user who is responsible for the preparation of suitable place for the machine installation.

The end-user also needs to supply its own Windows PC which will be used to control the machine. It should run Windows 2000, XP, Vista, 7, 8 or 10 and come with a free USB port.

The machine needs to be powered from a properly grounded 230V or 110V line (determined at time of order).

The machine needs to be connected to the PC via the supplied USB cable.

Once the machine is connected to the PC for the first time, Windows OS will recognize it as a new HID device and will automatically install its own system drivers. Note this first installation may take anywhere between 1 and 3 minutes. Once the machine has been successfully recognized and installed by Windows OS, install the control application supplied by the machine manufacturer on a CD or download it from the server: <http://www.megaplot.org/software.html> Do contact MegaPlot if not sure which application is compatible with your machine.

Always ensure the ambient temperature and humidity are within the acceptable range when operating the machine.

## Machine Immediate Environment

As with any electric or electrical device, the hot wire machine needs to be installed in a safe place away from sources of open fire as well sources of humidity. The machine's installation location needs to feature ventilation outlets ensuring sufficient uptake of the fumes created during the cutting process. It is necessary to air the room in which the machine is installed on a regular basis. The machine should not be installed on construction sites or in open air locations.

Ensure there is always sufficient clearance available around the machine – do consult your local safety laws for the applicable values. The working space should be large enough to accommodate the machine itself as well as the electronic controller and the operator's stand with the PC.

Additional space around the machine will be necessary for daily operations, EPS loading and removal, as well as machine maintenance, inspections and servicing. The machine should not be installed in the vicinity of other equipment which may be a source of vibrations or significant dust.

## Machine Use

A hot wire foam cutter should only be used to contour and/or sheet cut expanded and extruded styrofoam (EPS and XPS).

Using the machine for any other purpose, including cutting any other materials, may void the warranty as well as cause a significant risk to the health and life of the operator.

Do not ever attempt any repairs and maintenance on the machine prior to disconnecting it completely from the power source.

## Maintenance

Your MegaPlot Hot Wire Foam Cutting Machines does not require any regular servicing or maintenance throughout its warranty to be performed by MegaPlot staff.

However, to ensure safe and trouble-free operation of the machine throughout the warranty and many years after, please observe the following maintenance schedule:

### WEEKLY

- wipe the X and Y axis rails free of dust with a damp cloth (P, T and MW series)
- inspect the X and Y axis cog belts for visible wear and damage (missing cogs, elongation, etc.), re-tension as needed
- ensure the trolleys are perfectly parallel and perpendicular in relation to the frame
- inspect - and clean, if necessary – all the brass and steel cutting wire guiding elements (rollers and bars)

### MONTHLY

- inspect the X and Y axis ball bearings (P, T and MW series) for visible wear and tear
- lubricate the X and Y axis linear bearings (OF/OC series)
- press the TEST button on the ELCB breaker to ensure proper operation
- inspect the wire tensioning spring for elongation
- verify the wire cooling fans are operating properly (P and T series)

## Working Environment and Power Requirements

### Temperature

- Working: 5°C ~ 35°C
- Storage: -25°C ~ 55°C
- Short-term: do 70°C

### Humidity

- Working: 30% ~ 75% (non-condensing)
- When off: 10% ~ 75% (non-condensing)

### Power Requirements

- 230V  $\pm$  5% or 110V  $\pm$  5% (to be specified at time of order)
- 50 Hz or 60 Hz (to be specified at time of order)
- grounding pin