MiniCut2D

The machine for projects

User guide

Renaud ILTIS – English version of 9/17/2014

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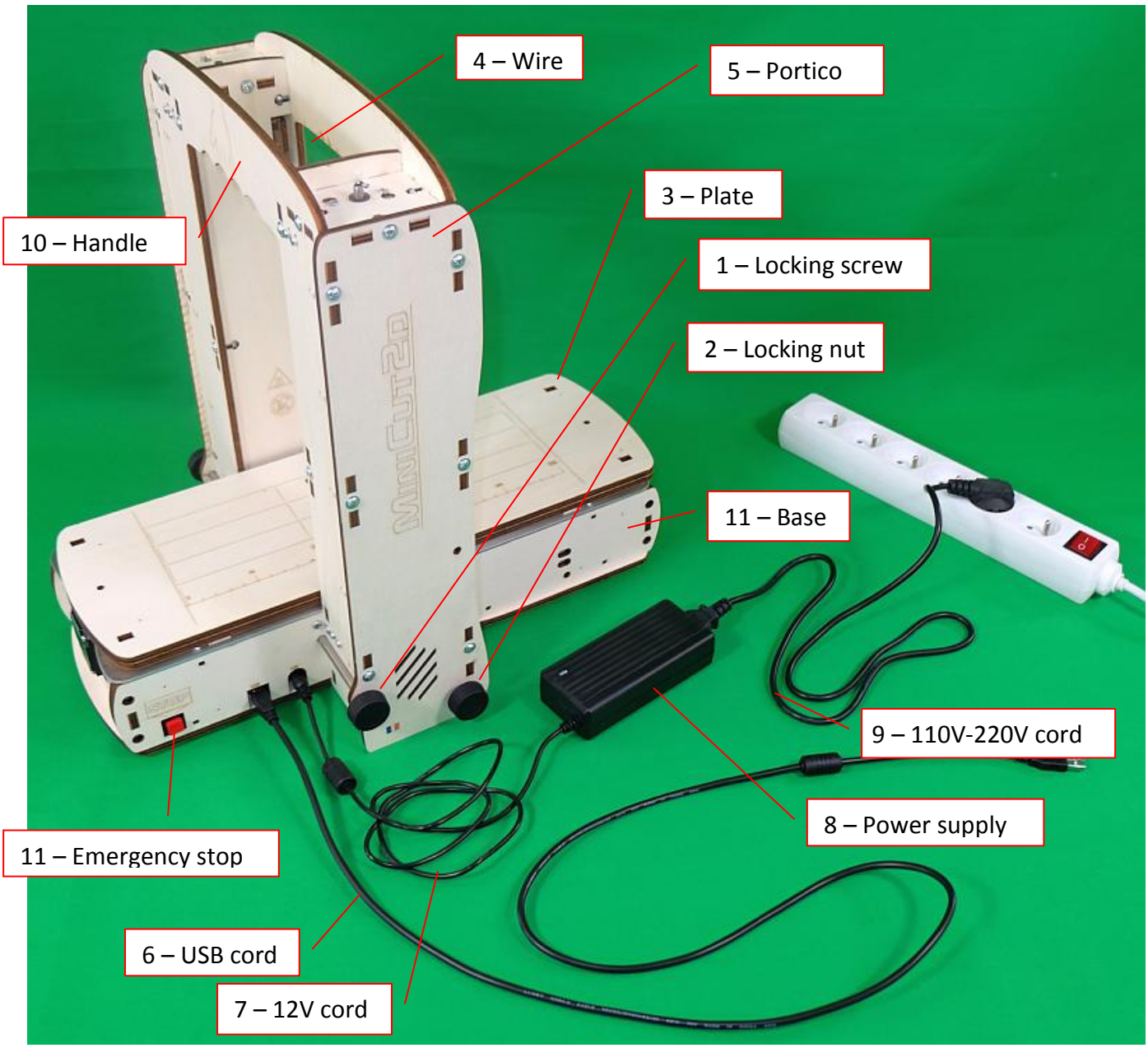
1. Description



The numbers of the photo above will be used in the text which follows.

2. Characteristics

Machine :

Weight: 3.7kg (power supply and cord included)

Folded Dimensions: 63cm x 34cm x 11cm

Unfolded dimensions: 44cm x 34cm x 43cm

Vertical working stroke: 263mm

Horizontal working stroke: 301mm

Effective cutting width: 150mm

Max speed of the wire and the plate: 8mm/s

Max cutting speed: 4mm/s

Power supply :

Voltage AC power supply: 100-240V at 50/60Hz

Continuous electrical output voltage: 12V

Max output current: 5A

3. Good usage

MiniCut2d is intended to cut some polystyrene of density lower than 45 kg/m^3. It can be expanded polystyrene (formed by agglomerated balls) or extruded (homogeneous material).

MiniCut2d is controlled by a PC computer (not supplied) using the software "MiniCut2d Software" which runs under Windows (XP, Vista, Seven and 8, 32 or 64 bits). The version of machine indicated by the user at the opening of the software has to correspond to the version of the machine to be used.

Never touch the heating wire during the cutting, risk of burn.

Never touch moving parts during cutting, pinch hazard.

Never reach into the base of the MiniCut2d, pinch hazard.

The cuts must be under the constant supervision of the user.

During cutting, the only user intervention on MiniCut2d corresponding to a conforming use is pressing the emergency stop button that interrupts both the movement and heating the wire. This judgment can also be done on the computer by using the stop button software.

The MiniCut2d is intended to be used in a dry and well-ventilated area, away from heat sources and other sources of moisture. The MiniCut2d is designed for use in a room whose temperature is between 15 ° C and 26 ° C.

The MiniCut2d is designed for use exclusively with the resistive wire supplied by the manufacturer. Any replacement must be done with a wire of the same type, provided by the manufacturer.

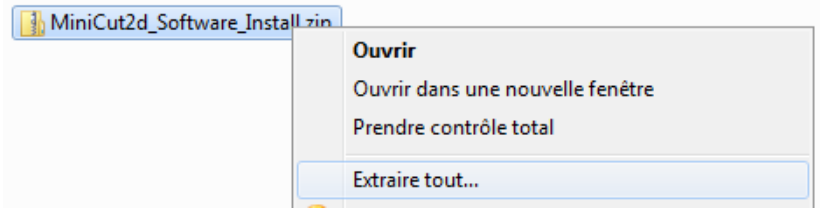
Details on correct use of MiniCut2d is given below. Any use other than those listed is not recommended and may cause damage or injury. The manufacturer can not be held liable for any damages resulting from improper use of MiniCut2d and the MiniCut2d Software.

4. Installing the software

The software is called MiniCut2d Software. It runs on Windows XP, Vista, Seven, 8, in 32 or 64 bits. Installation and operation have been successfully tested on these operating systems. This software does not run under Windows emulations from an Apple computer or from Linux-like operating systems.

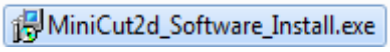
Download MiniCut2d Software on the website www.minicut2d.com

The software comes in the form of a compressed archive named "MiniCut2d_Software_Install.zip". Decompress the archive by clicking the right mouse button and selecting "Extract All ..." from the menu that appears and then click "Extract"



Attention must taken to ensure that you have administrator rights on the computer to install the software.

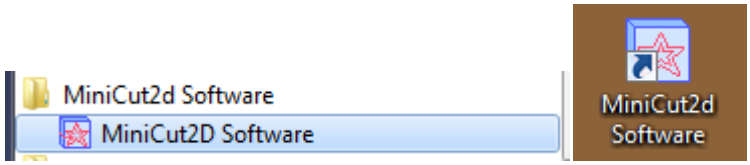
Double-click the executable file:



The installer starts. Follow the onscreen instructions.

Note that on some versions of Windows, an error may occur during installation. Just click "**Ignore**" and let the installation continue. If the software runs correctly, it means that everything went well.

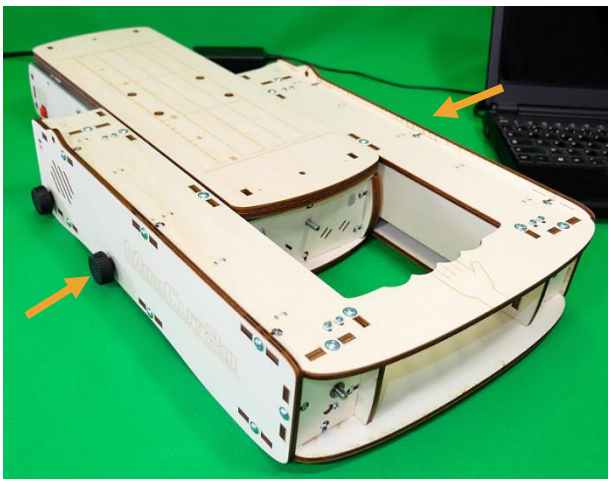
Once installed, MiniCut2d Software is available from the Start menu or a shortcut on the desktop:

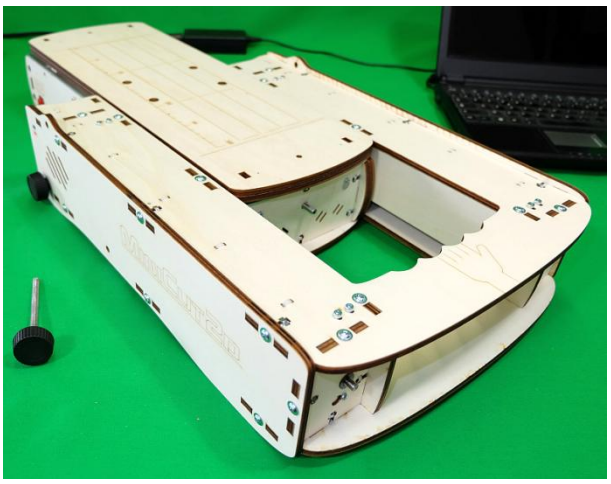


Potential problem during installation	Solution
Error message (registering library)	Click "**Ignore**" and let the installation continue. If the software runs correctly, it means that everything went well.
On 64-bit versions of Windows, it may happen that the software can not find the "vb6fr.dll file. "	Find the file in "c:\Windows\System32"and copy it to "c:\Windows \ SysWOW64".

5. Begin to use

Working on a flat surface. Loosen the two locking screws [1] and remove them; loosen both black plastic locknuts [2].





Gently unfold the portico [5] by pulling the handle. [10] Spread the bottom of the portico slightly if necessary to avoid forcing. Replace the screws in the bottom holes. Slightly tighten the screws and black plastic nuts. The machine must be carried by its handle [10] without moving the portico.

(Perform the inverse operations to fold the MiniCut2d.)

Connect the square cable end next to the USB cord [6] in the square hole. Connect the round power cord [7] in the half-round hole.

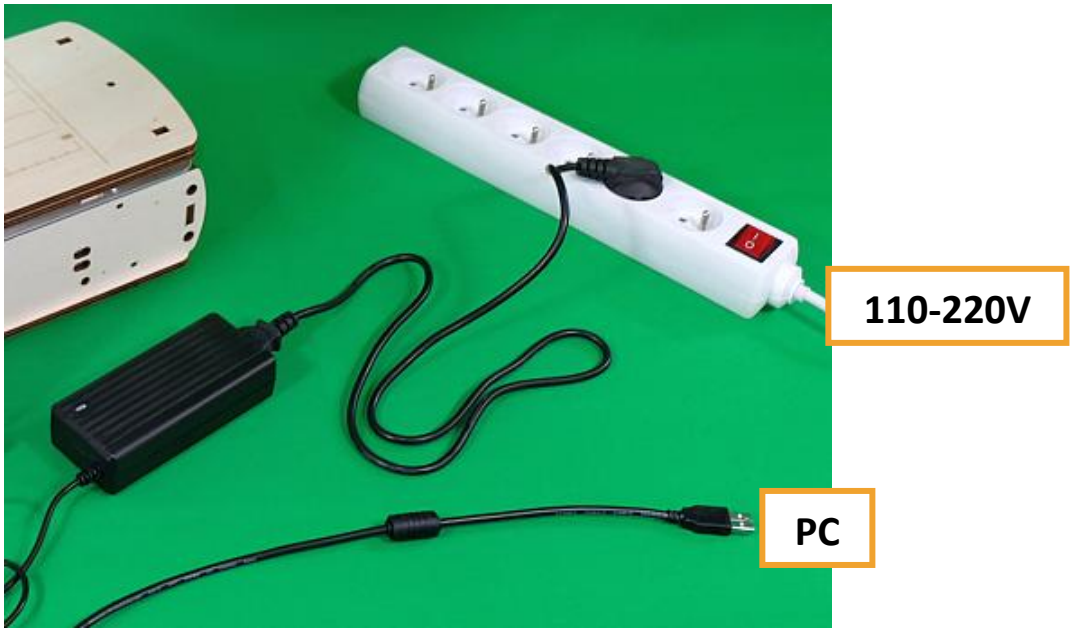
If MiniCut2d Software is opened, it must be closed before connecting the MiniCut2d to the USB port. This will allow the software to detect the machine at its next opening.

Connect the rectangular side of the USB cord [6] to the computer.

Launch the MiniCut2d Software. The home screen allows you to specify which software version of the MiniCut2d you will use. Click the large button on the left for version 1.2, click the right button for version 1 images. Make sure to select your version. Click the button at the bottom if you use the software without the machine.

WARNING ! This choice must be exact! If you use MiniCut2d v1.2 with the parameters of a v1, or MiniCut2d v1 with the parameters of a v1.2 you can cause damage to the wire and the machine. It would be improper use!

Strongly insert the power cord [9] in the power adapter and plug it on 110V or 220V. Plug the power supply into a 110-220V strip, with an ON and OFF switch which allows you to easily turn off the power without disconnecting the plug. The blue power lamp should light, otherwise the cable is incorrectly inserted.



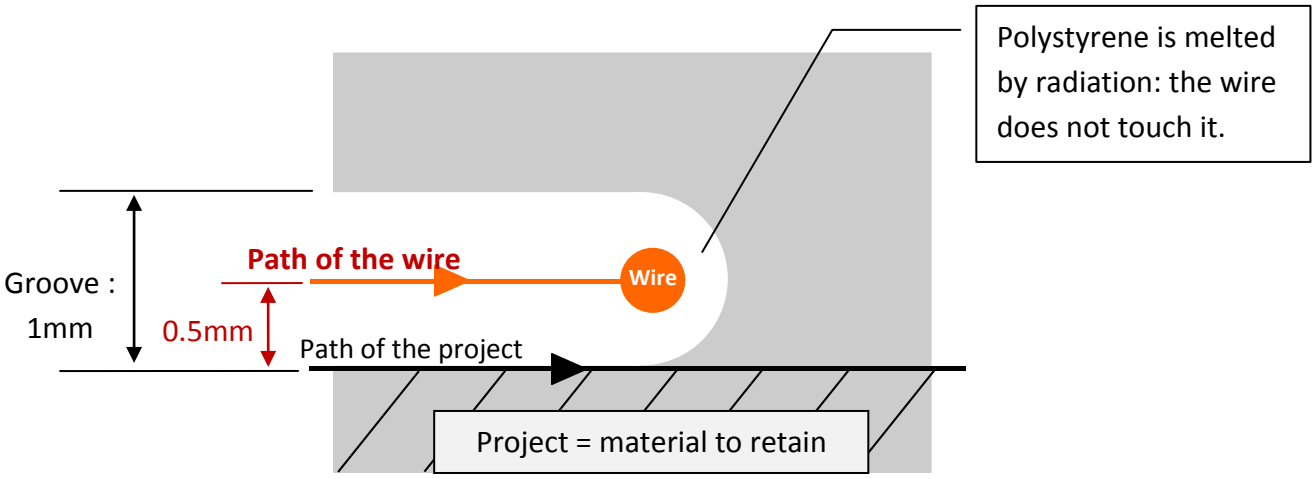
6. Principles of operation

Cutting and respect of the dimensions :

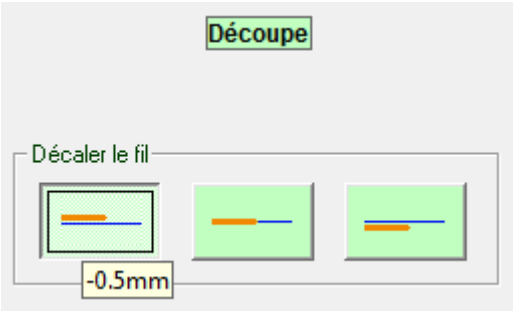
The wire of the MiniCut2d heats and melts the polystyrene in its path by a groove. Its path is shown flat (2D), like looking from the end of the wire.

The heater should be adjusted according to the type of polystyrene having a groove width of 1 mm. This allows for cutting radiation: the wire does not touch the polystyrene but melts it without touching.

The software can then shift the wire 0.5mm (half of 1 mm) to meet the project.



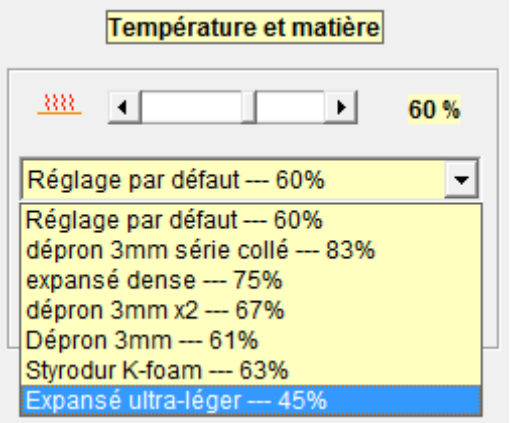
Choose the offset of the wire before starting a cut:



Three possibilities, depending on the project, are:

- shift outwards (-0.5mm), the classical case
- no shift
- shift inward (+ 0.5mm), for stencils for example

Heater and materials :



The heater wire is expressed in percentage.

100% is the highest value that can support the wire.

0% represents no heater.

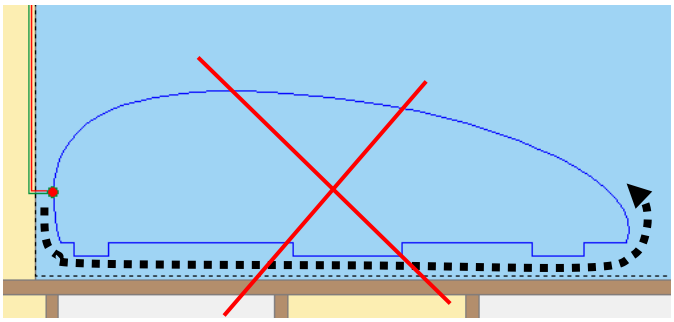
A heating value must be defined for each material used, and stored in the software.

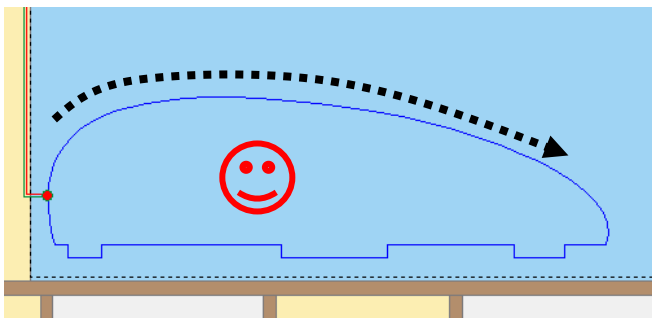
Thus, when repeating with the same material, its heat is directly accessible from a drop down list.

The ideal heater is one for which the wire is 1mm grooving in the material, at the cutting speed of the MiniCut2d (4mm/s). The procedure for determining the heating value is detailed below.

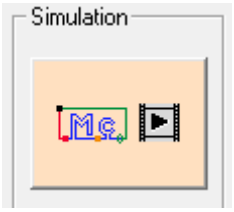
Direction of the cut :

Whenever possible it is best to rotate the cut motion in the clockwise direction, so as to cut downward last and thus avoid the cut falling into the groove made by the wire.



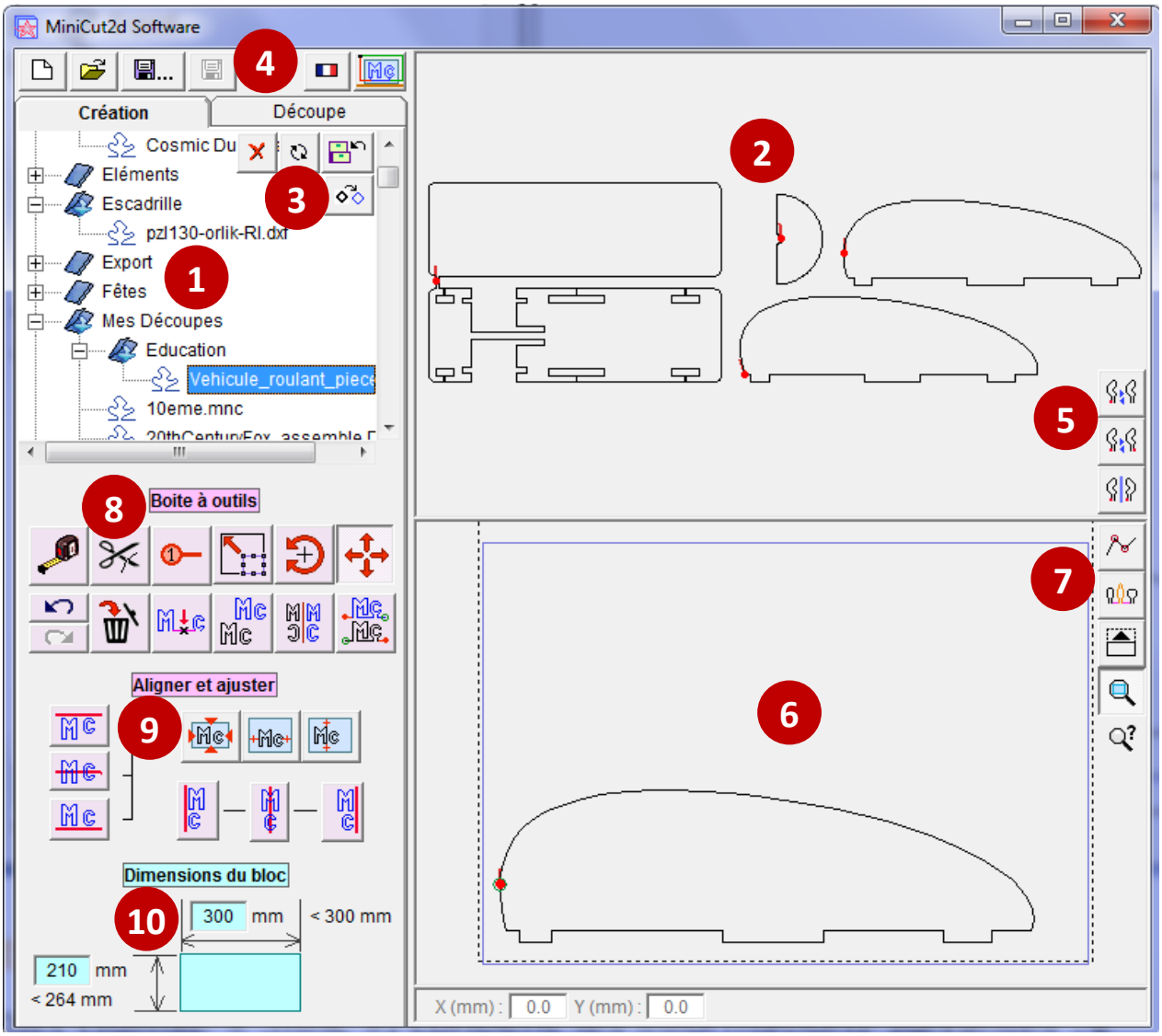


The direction of the cut can be tested through the simulation button that lets you see the movement of the wire:



7. Create a project

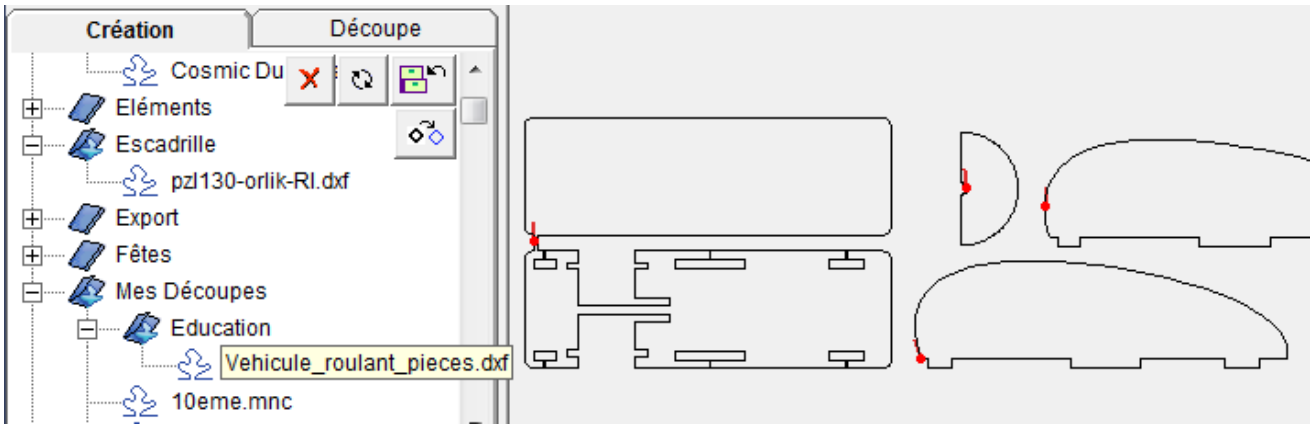
Interface of the project window



1. Library of projects and paths.
2. Display of the library selected file (1).
3. Library file management and image vectorization.
4. Project management, language selection, version number.
5. Orientation of the paths.
6. Viewing the current project. The blue rectangle represents the polystyrene block.
7. Showing points, showing the differents paths zoom tools.
8. Design project tools.
9. Alignment tools.
10. Enter dimensions of the polystyrene block.

The library and the paths files

The library displays all files of known types that are present in the folder C:\Program Files\MiniCut2d Software\Bibliothèque\



File formats displayed by the library are:

- **.dxf :** exchange format between computer aided drafting softwares, this is the preferred format
- **.mnc :** this is the recording format of a MiniCut2d project, if the project consists of several distinct paths, they are displayed individually but aggregated too,
- .dat : airfoil format used in model aircraft,
- .plt : plotter format,
- .eps : PostScript format.

Note: Every path (curved or not) is constituted by a set of points which follow. The wire will go from one point to another to make the cut.

MiniCut2d Software can read text files (txt) containing the coordinates of points, that you can write using Windows notepad or created with other software.

To be usable, these files must have the following structure:

Path1 (there must be a letter on the top of the word).
x1:y1 (coordinates of the first point of Path1, separated by a colon)
x2:y2...
Path2
x1:y1 (coordinates of the first point of Path2)
x2:y2..... (to close a path, we must put the first point to the end)

You can find examples of realization of such files (with SketchUp plugin, or Scratch program, or by hand) on the website www.minicut2d.com

The library has buttons that allow :

- putting a file in the Windows garbage,
- refresh the file view,
- adding a file to the library, located elsewhere on the computer (for example on the desktop or My Documents).

ATTENTION: Importing directly from an external device (USB key ...) is sometimes a problem. It is better to import from the hard drive of the computer (Windows desktop or My Documents folder).

MiniCut2d Software is also able to vectorize image files (jpg, bmp) to turn them into cuttable paths.

Access to vectorization is done using the button and will be detailed later.

When you click a file, the paths it contains are displayed in the view frame to the right. Paths can be open or closed.

The point and the small red segment indicates the start and direction of motion.

It may happen that the paths are reversed (including closed paths). If so, you then must use the buttons to the right of the window to change the guidelines:

- The first button is used to hide / show the orientation
- The second button allows you to reverse the direction
- The third button is used to mirror

Using these buttons do not change the source file, but allows you to drag a good path in the block.

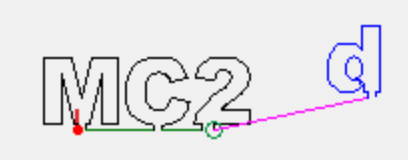
The paths

The design of a cutting path can be done before using MiniCut2d Software, for example, in a CAD program with a DXF registration format. In this case, MiniCut2d Software serves essentially to position the path in the block and to control the cutting.

But MiniCut2d Software has also tools for creating project by manipulating existing routes.

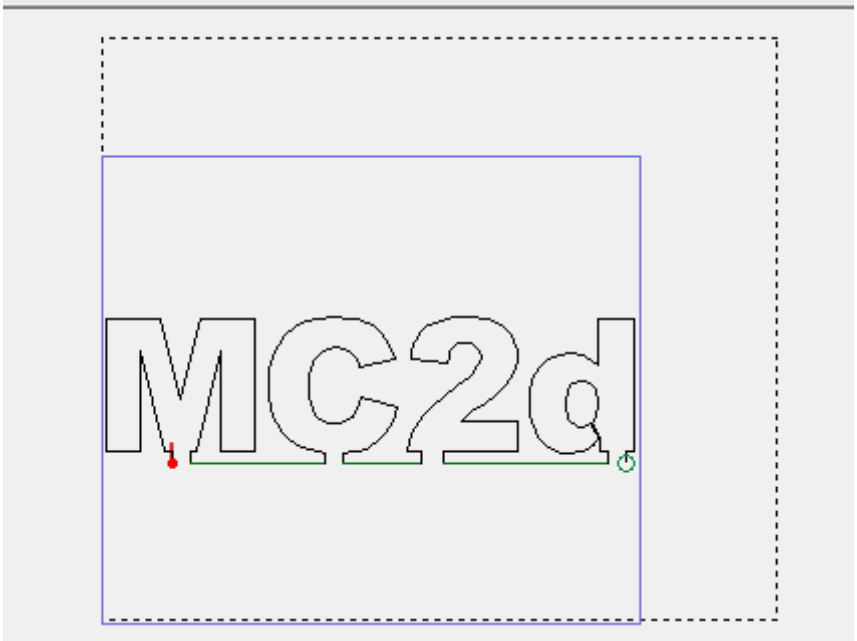
Adding a path to the project can be done in two ways:

- Double-clicking the path in the top frame. The path will align automatically on those already present (useful for lettering for example).
- Clicking on the path through the top and sliding it under the bottom. The path connects automatically to the beginning or the end of the project, based on its location.



The display of the project shows:

- the working area of the machine (dotted rectangle),
- block of material (blue rectangle),
- paths which have been dragged into the block (black),
- junctions between the paths (green),
- the start point (in red),
- the end point (green circle).



The four buttons on the right help in the visualization:

- the first displays the paths points (useful for Measuring and Cutting tools that work only on points),
- the second allows you to change the color of a paths on two (useful after using the Cutting tool),
- the third expands the window on the project,
- the fourth allows you to zoom on the block of material.

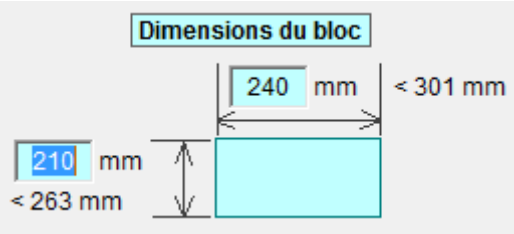
The image located below the buttons is clickable and displays a reminder about how to work the pan + zoom, that is:

- click with the right mouse to the place you want displayed in the center of the window,
- zoom using the mouse wheel or the up and down arrow keys.

Note: Right click is required to activate the zoom.

Block size

The size of polystyrene block or sheet fits in the fields at the bottom left. Please note that the validation of input values must be performed by supporting the TAB or Enter keys. The maximum values are shown.



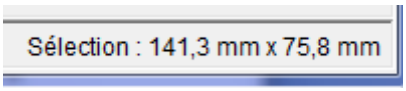
Tools with selection

The toolbox on the left contains three tools for selection: the stretching tool, the rotation tool and the moving tool.

Once one of these tools enabled, the selection is made:

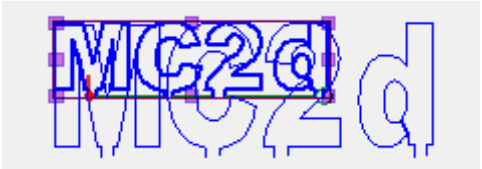
- by clicking on a single path: single selection,
- by creating a frame, per click + drag around paths to select,
- by pressing the Ctrl button for select operations to add or remove selections to the current selection.

The dimensions of the selection are shown in the bottom bar, right:

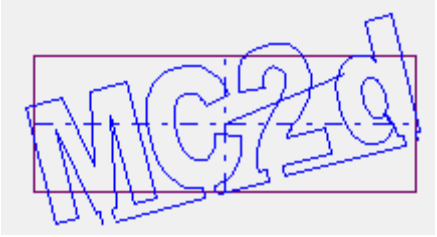


This is very important information that makes it easy to get the dimensions of the project.

The stretched tool is used to stretch by dragging the handles of the bounding box:



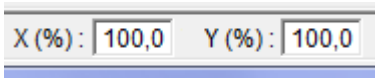
The rotary tool is used by clicking within the selection and sliding around the center:

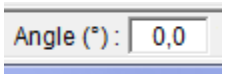


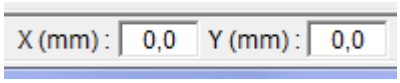
The moving tool is used by clicking inside the selection and dragging.

Important :

All these tools can be used with numeric values that must go into the fields in the lower bar:

Stretch : 

Rotate : 

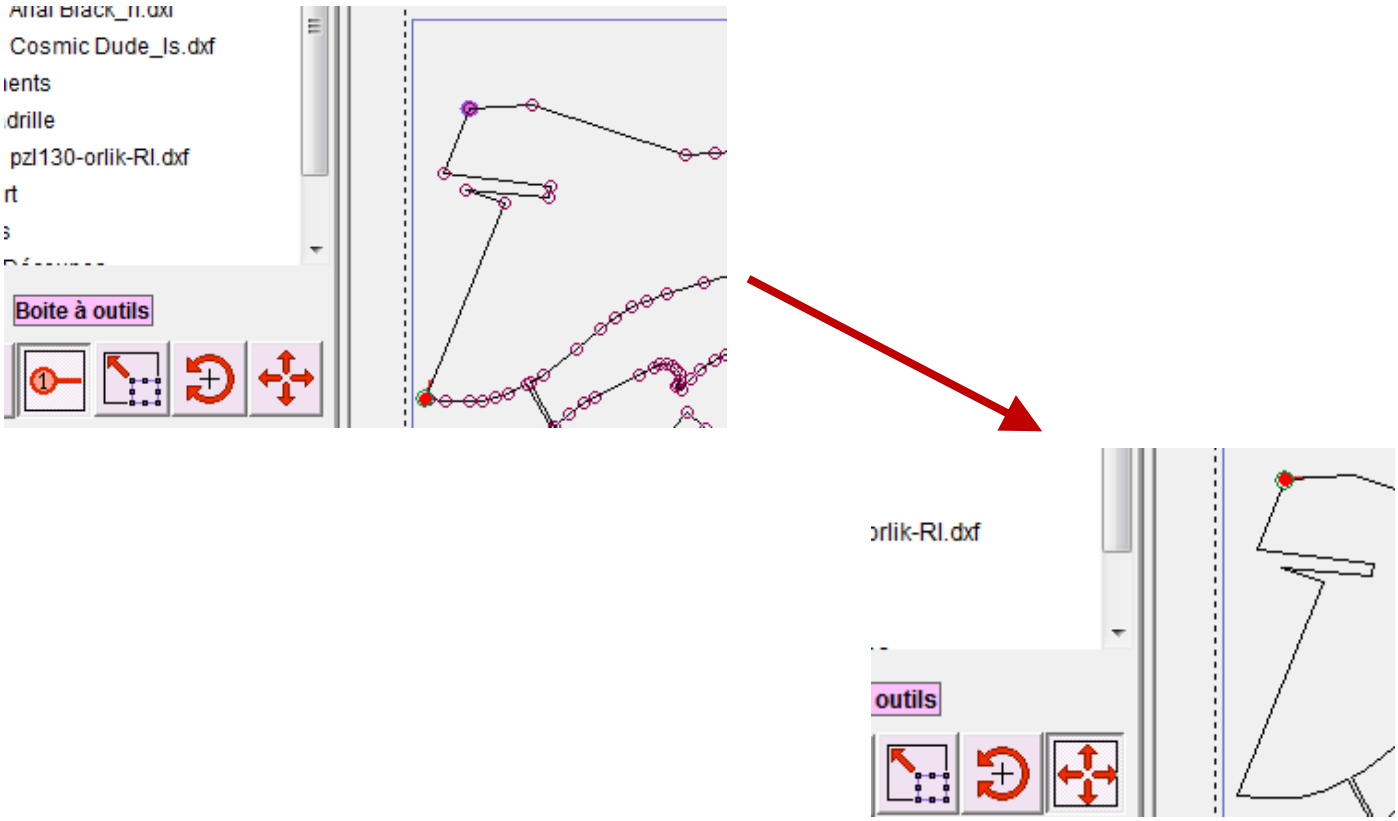
Move : 

This allows accurate positioning that can be controlled with the measuring tool described below.

Redefining the first point

You can change the location of the first point of a path using the dedicated tool :

Select the tool and simply click the new first point :

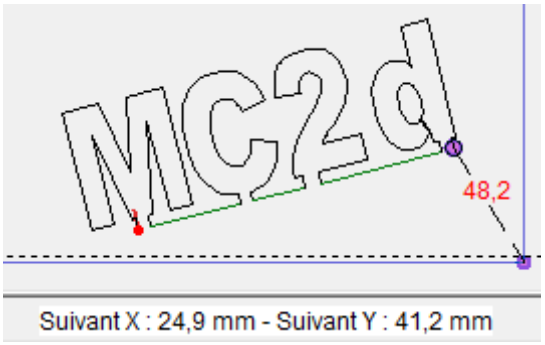


Measure and cut

Warning, these tools only work by passing the cursor over the points of the paths.

The first button is the measurement tool: it helps to know the horizontal distance (along X), vertical (along Y) and diagonal (shown in the figure) between two points. The points considered are:

- points of the paths,
- corners of the block,
- corners of the useful area.



This tool allows precise positioning of the paths.

The second button is used to cut a path to distort it, or keep only one end. It automatically switches on the alternating colors of the paths.

It can for example be used to obtain an arc from a complete circle, or to remove a part in a path.

Undo, redo, delete

The arrow pointing to the left is used to undo the last action.

The right-pointing arrow is used to redo the action that has just been cancelled.

The trash can button is used to remove the paths that are selected. We get the same result by using the Delete key.

Additional tools

The first button is used to insert a point between two selected paths. The point itself becomes a path and may be displaced to deviate the wire path.

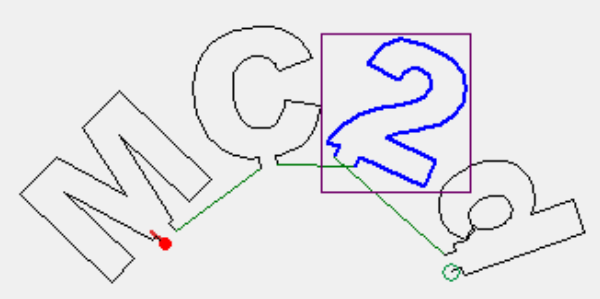
The second button is used to duplicate the selected paths.

The third button is used to make a mirror with the selected paths.

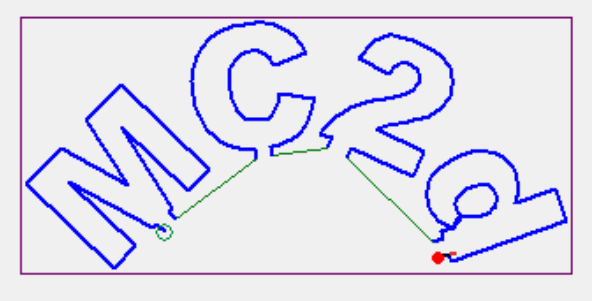
The fourth button is used to change the direction of the selected paths. If you want to reverse the entire project, select all paths.

Examples :

- Ci-cons: the meaning of "2" was reversed by mistake, the green paths of arrival and departure intersect. You have to click again on the inversion tool to restore the situation.



- Ci-cons: reversal of the entire project, the path begins right and end at the left.



Adjustment to block tools

WARNING! These buttons remain depressed when clicked. To remove the effect, you have to click a second time.

The first is used to return the project within the block dimensions: the project is stretched so that it can enter the block with a small margin around. The project is not moved to the center in the block. You must use the other two buttons for that.

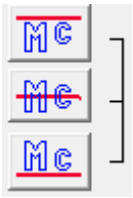
The second button serves to center the project horizontally from the block.

The third is used to center the project vertically relative to the block.

Alignment tools

The three buttons below are used against the vertical alignment of the paths.

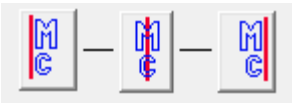
The first aligns the highest point of all selected on the highest point of the selection path.



The second aligns all selected on the midpoint of the path selection midpoint.

The third aligns the lowest of all selected on the lowest point of the selection path item.

The three buttons below are used for horizontal alignment paths.



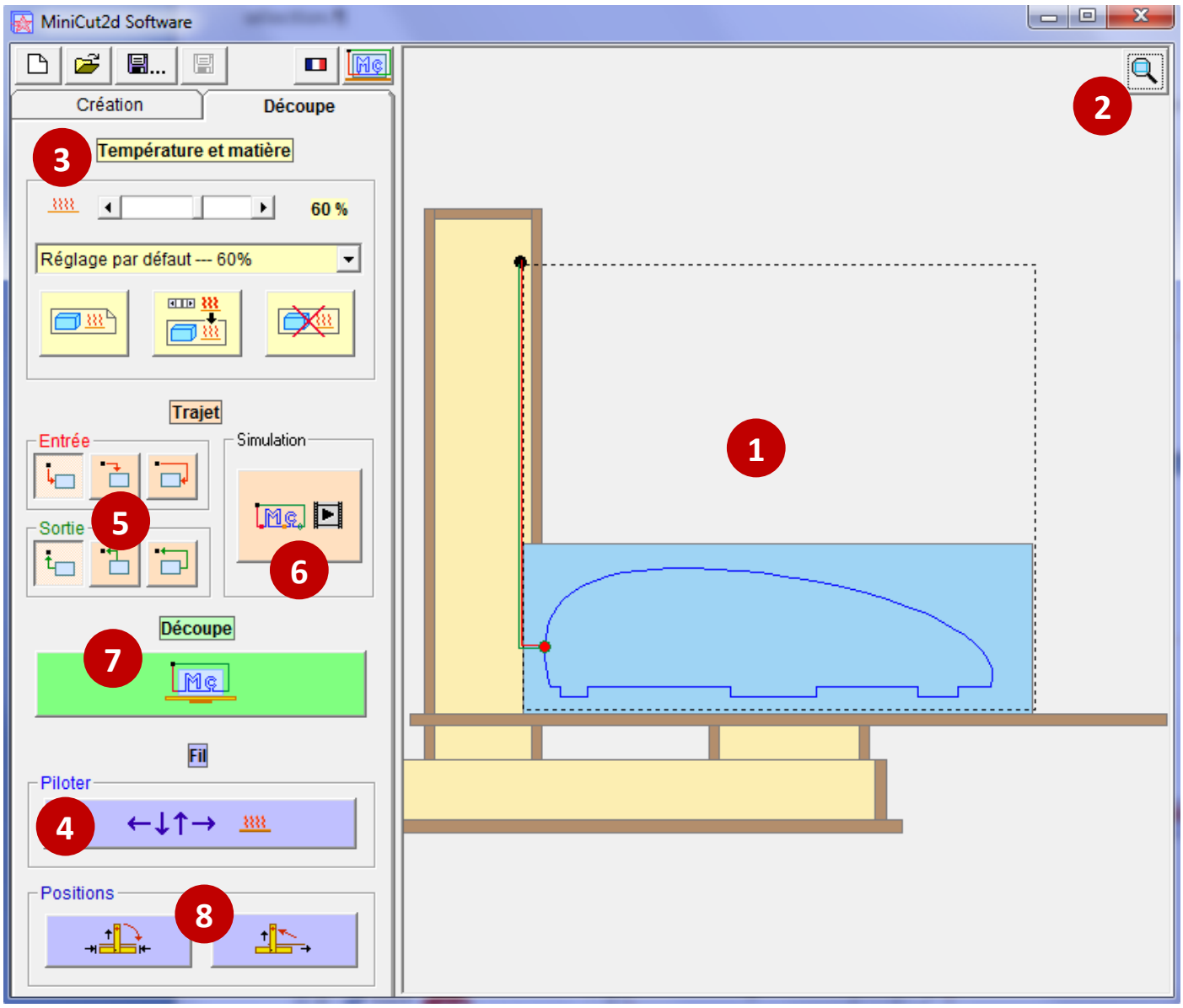
The first aligns the leftmost point of all selected on the leftmost point of the selection path.

The second aligns all selected on the midpoint of the path selection midpoint.

The third aligns the rightmost point of all selected on the rightmost point of selection paths.

8. Cut

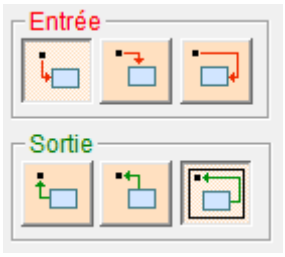
Cutting window Interface



1. Visualization of the machine, the block and paths.
2. Zoom on the block.
3. Storing the ideal heater for each material.
4. Access to the manual control of the wire and heating.
5. Choice of paths of entry and exit.
6. Simulation of motion of the wire in the block.
7. Access to the selection of the shift wire and launch cutting.
8. Motion of the wire and the plate into the origin position, or into the storage position (folding).

Input and output paths

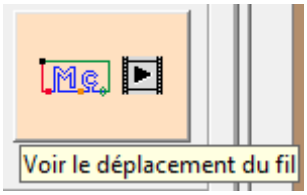
The first thing to do is to finalize the wire path. To do this, you must define its input and output paths using the buttons below:



The choice of these trips depends on the project and the location of the input and output points of the path.

Simulation

Once the routes are ready, click the simulation and verify that the movement of the wire follows the chosen path you provided (in the sense of clockwise) :



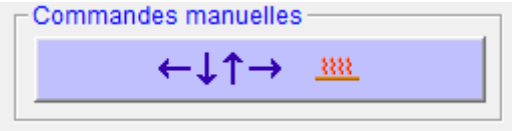
Press the button again to stop the simulation.

If the wire is not going in the right direction, we must return to the Project tab and reverse the orientation of the whole cut by selecting all paths in a box and clicking the reversal button.

Then return to the Cut tab, check the entry and the output, and launch the simulation again.

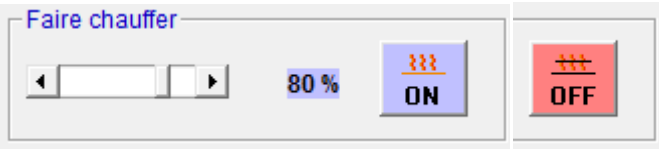
Manual control

To determine the ideal heater for a material, go through manual movement of the wire by clicking the button below:

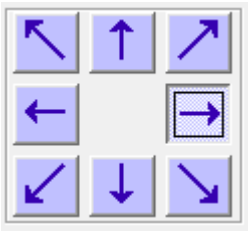


Here are the features of this frame:

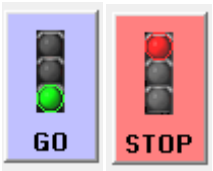
The slider below adjusts the value of the wire heater. The right button is used to start or stop the heater. There is a timer setting temperature of the wire that appears when you put the heater ON.



The eight arrows shown against indicate which direction will move the wire. WARNING! The plate moves in the opposite direction of the wire. When no arrow is pressed, no movement happens.



The movement starts by clicking on the green light and is stopped by clicking on the red light:



It can change direction or heating value while traveling**.**

A golden rule :

Always carefully check the wire when you insert the polystyrene or when the value of the heater is changed. If not, in a day or two it will be too cold and it will break.

This applies to manual control or when cutting a project.

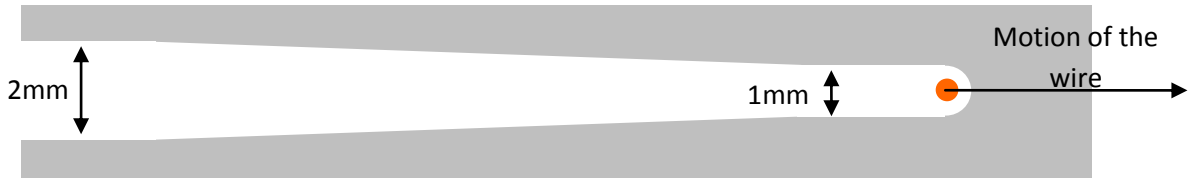
If you follow this golden rule, you will never have to change your wire because you will have time to stop with the emergency stop button or software.

Determinig the ideal heating

The principle is as follows:

The wire is heated to 100%, then it is moved manually in the polystyrene that is being tested.

Heating is gradually reduced during movement until a groove is established approximately 1mm wide.



Heating : 100%.....90%.....80%.....70%.....60%.....52%.....52%.....OK

When the value is found, it brings out the wire up for removal of the polystyrene block and then stops the motion and heating.

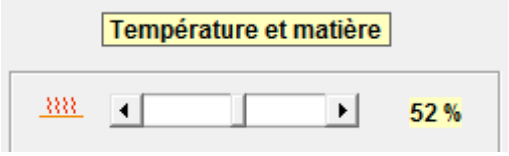
Once the heating value is found, leave the part of the manual movements:

Be careful not to let the heat over 100% longer than necessary, most polystyrenes are cut to less than 80% for heating.

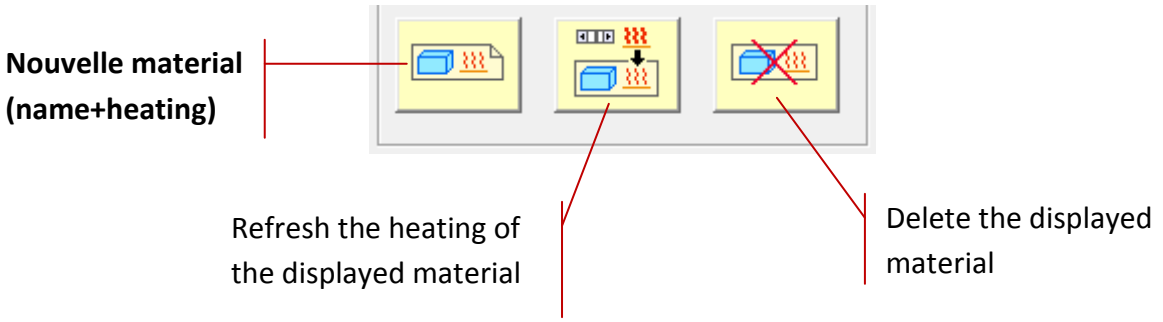
Always turn off the heat and movement when MiniCut2d is not in use (under surveillance).

Memorizing

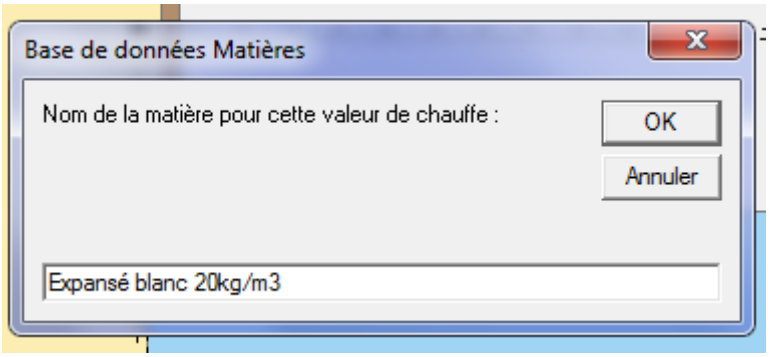
The value of the heater can be found under "Temperature and material":



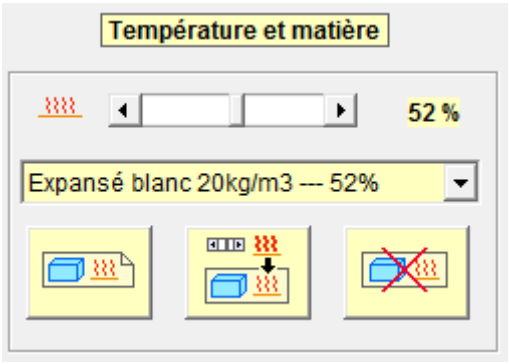
Now we have to store this value and the name of the material by clicking on the first yellow button:



An input window allows you to enter a descriptive name:



Your new material appears in the dropdown list and is stored in the file "MiniCut2d Software.ini":



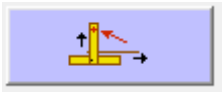
It will be available in future use of the software.

If you want to correct the value of the heater without changing the name, use the second button.

The third yellow button is used to remove material from the material database.

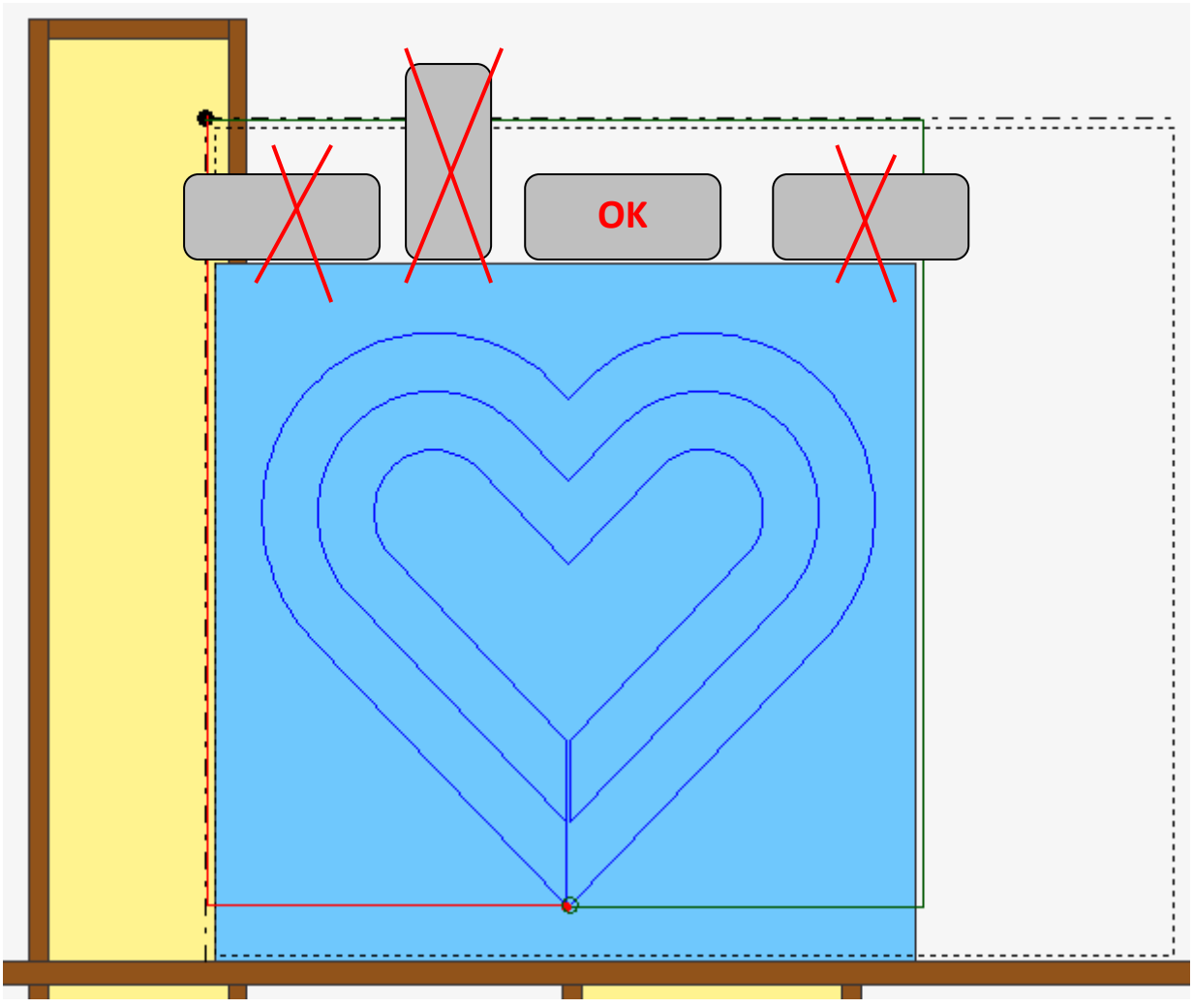
Launch the cut

Put a polystyrene block large enough on the board. To work more comfortably we can first bring the wire to the rest position between cuts (origin) by clicking the appropriate button:

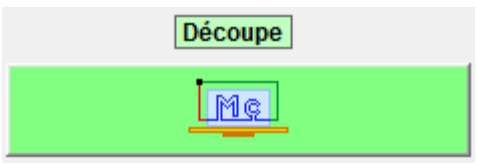


Case of polystyrene sheet, do take it vertical with one or two combs (see video explanation of this at www.minicut2d.com).

For bulk materials, they should be stabilized by placing a small sinker on to a suitable location so that the wire does not touch (shown the example below).



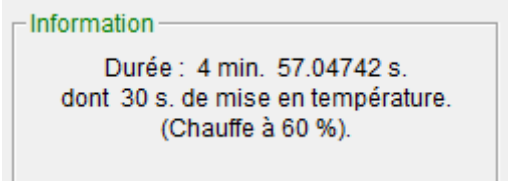
Then click the cut button to access the starting procedure for:



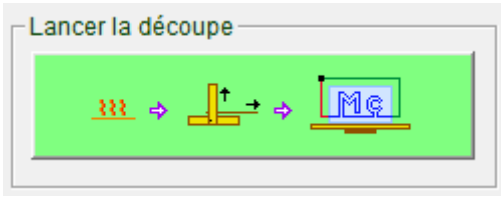
.

Select the wire offset that you want. The offset is 0.5 mm which corresponds to a groove of 1 mm which is obtained by controlling the heater.

Check the cutting time and the value of the heater:



Start the cut by pressing the green button:



The MiniCut2d will first make a homing, then preheat the wire, and then start cutting.

Do not touch the wire, the machine (except the emergency stop button if necessary), or the polystyrene, until the cut is completed.

Homing can make a little noise (shots). It is quite normal and is not a problem for the functioning of the MiniCut2d.

Once the cut is complete, you can restart a cut with another piece of polystyrene, or exit the cutting frame by clicking the cancel button:

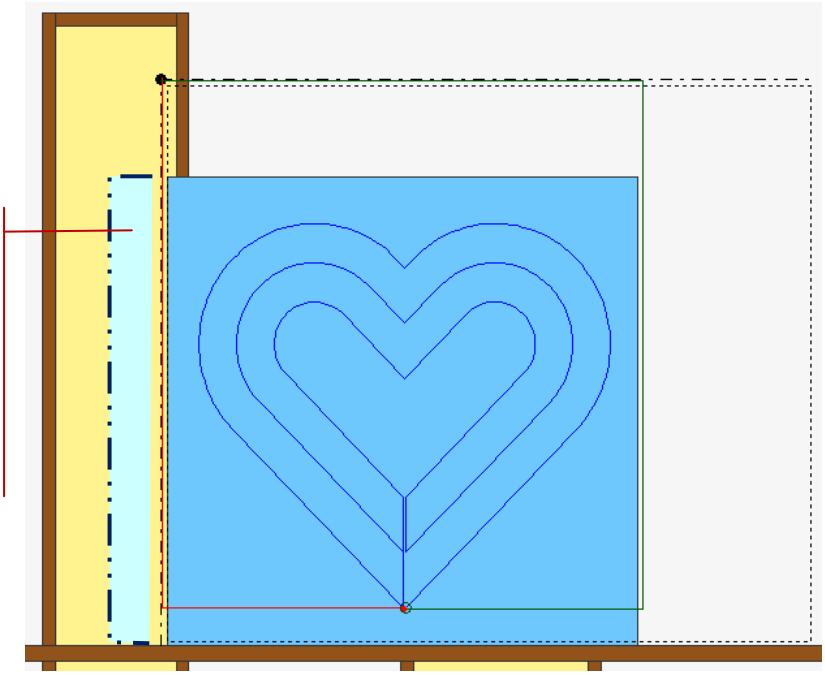
Tips and tricks for cutting

- **Block a bit bigger:**

During the preheating, the wire stores some heat it releases through the top of the blank prior to stabilizing its temperature. The groove of the beginning of the blank is often somewhat larger than predicted.

To allow time to stabilize over before hitting the path of the project just take a piece of polystyrene a little bigger than expected and place it so that the wire passes through during the trip departure (indicated in red on the screen) :

During the real cutting, we take a little longer than expected block and allow it to extend below the origin: the wire is thus obliged to pass through and the temperature stabilizes before beginning the cutting project.



- **Dynamic adjustment of heating:**

The ideal value of the heater is responsive to the temperature of the room. One season to another, there may be a difference of a few percent.

It is possible to correct the heating during cutting to reflect this change without stopping the wire. For this, once cutting has started, click on the padlock at the bottom of the frame cutting, which will activate the edit cursor

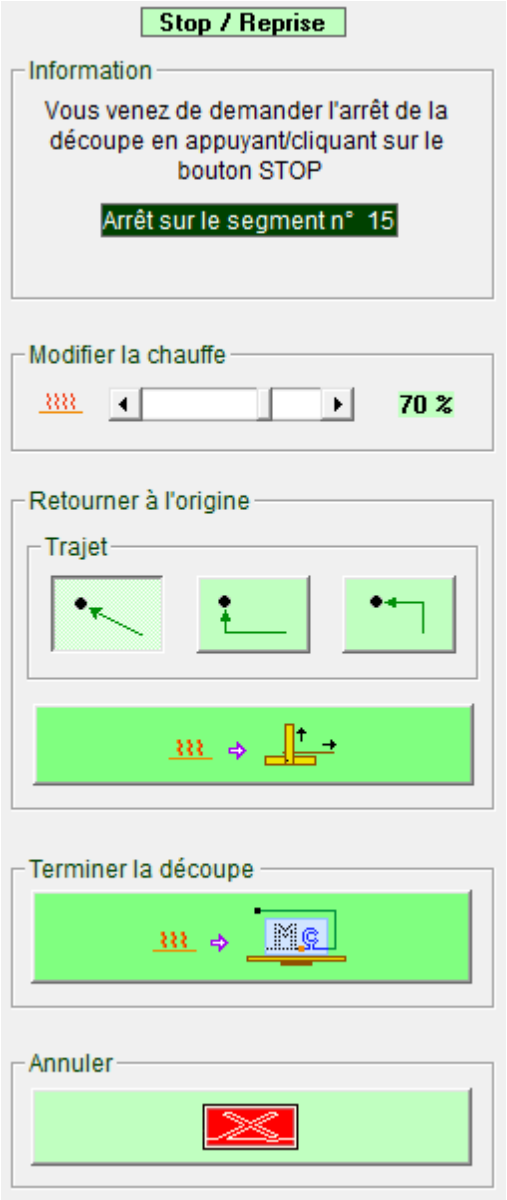
Attention : Increase the heater gently, percent per percent, especially when the temperature drops! Apply the golden rule: Eyes on the wire while you change the heater.

Once the heater is corrected, lock the cursor again by clicking on the padlock.

Stop during the cut

Stopping during the cut can be done in two ways: Pressing the emergency button of MiniCut2d or clicking on the "Stop" button in the software:

It then accesses the frame "Stop / Resume":



"Information" indicates the segment where the cutting stopped.

The following changes the value of the heater if you want to make the cut with a different value (if there is calibration error, or other reason).

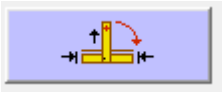
The following serves to return the wire to the origin.

Choose the way back: diagonally, from the left or from the top, and then start the movement back by clicking on the big button.

"Finish the cut" button to resume cutting where it stopped. The software first heats the wire. At the end of the cut, the software launches a homing procedure by security.

The last button will simply cancel any cutting.

Storing the MiniCut2d

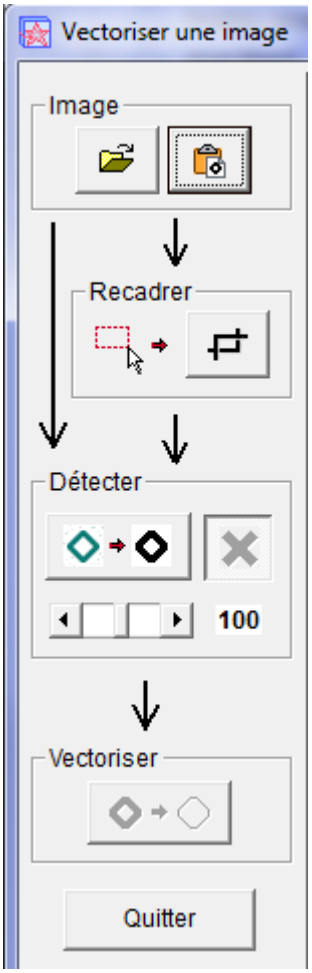
The next button will return the wire to the origin, and then center the plate: 

This will store the MiniCut2d (folded or not) without the risk of pressing the plate above.

Click it to let the procedure finish, and then turn off the power supply of the MiniCut2d.

Picture vectorizing

Access to the window vectorization is done using the button in the library.



The image can be loaded from a file or pasted from the clipboard of Windows using the two buttons in the "Image" frame:

An image with the longer side of about 1200 pixels is a good compromise for vectorization quality.

The image may require cropping. To do this, simply draw the frame with the mouse around the area to keep and click on this crop button:

Once the image is cropped, click on the button detection drawing. The slider allows you to change the sensitivity for low contrast images.

It can boost several times the detection by clicking on the red cross, until the desired result is achieved.

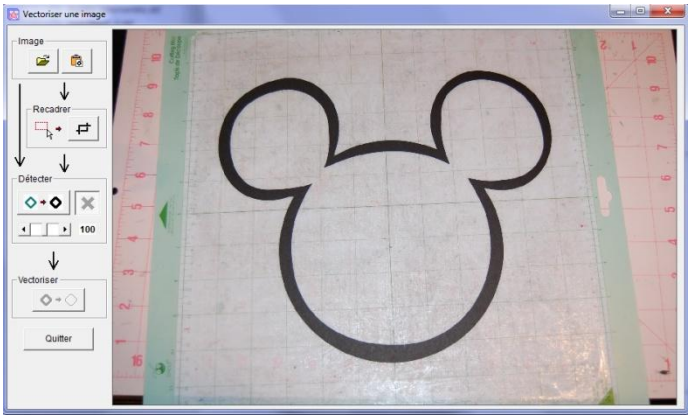
You can then start vectoring which will smooth the outer contour of the drawing and transfer it to the viewing window of the paths that is visible in the background.

Vectorization example

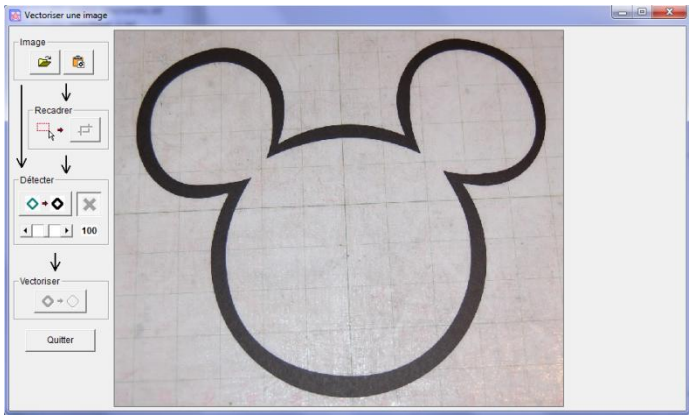
The plan is to cut the unmistakable silhouette of Mickey's head.

I run a search in Google Images with keywords "silhouette" and "mickey" and "large" filter to focus the images to obtain good vectorization.

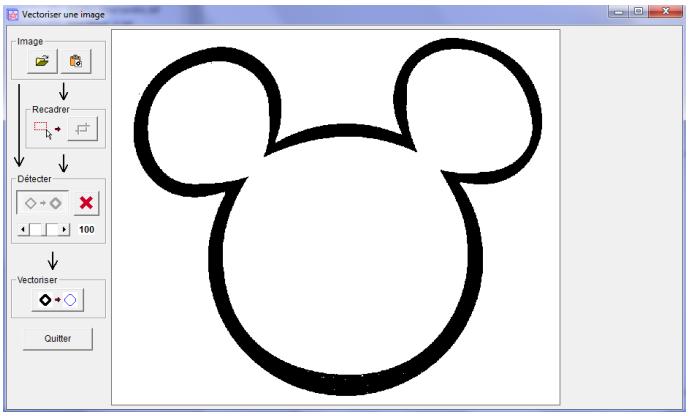
I choose an image whose outer contour is good for me, I display it in full size. I copy it (right click + "copy image"), then I paste it in the window vectorization.



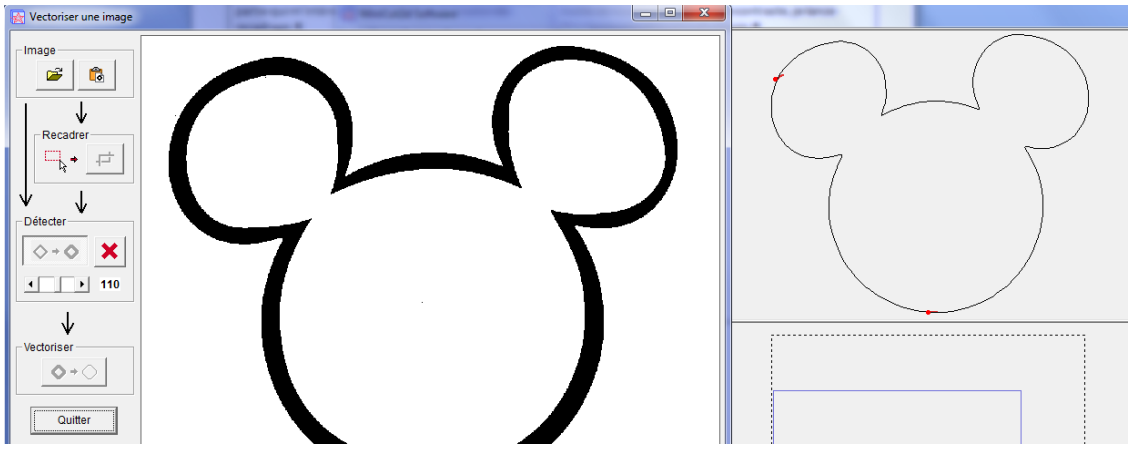
I immediately draw a box on the image to identify the part that interests me and I click the button cropping.



The contrast of my image is strong (black), no need to touch the contrast slider, I run the detection of the drawing directly.



If I have too many white spots on my route, I move the cursor to the right and and I raise the detection of the drawing. I can then click on the "Trace" button and the path appears in the background. I can then click "Exit".

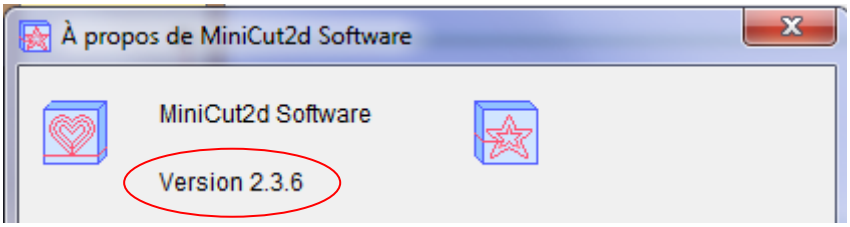


Change the language

To change the language of the software, click on the flag , make your selection from the list and click "OK".

Read the version number

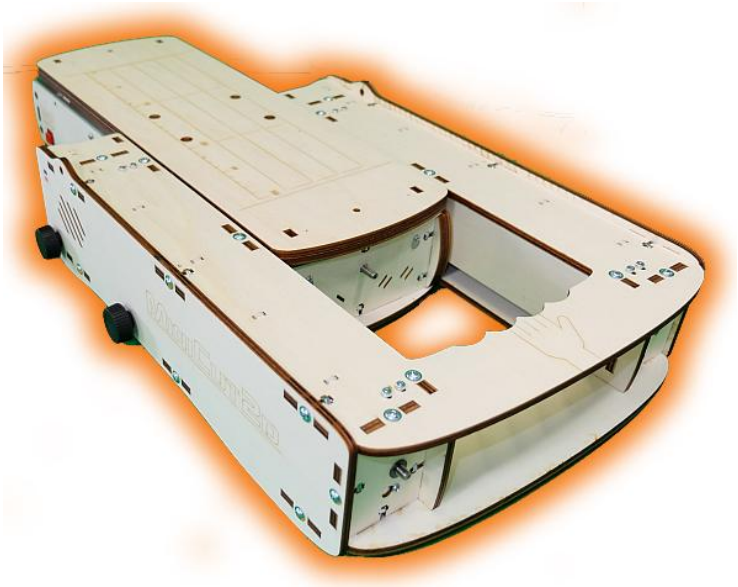
To know the version number MiniCut2d Software you use, click to access the window "About"



10. SAFETY WARNING

Warning! The following basic safety precautions should be observed when using the MiniCut2d to prevent any risk. Keep in mind that the wire [4] is heated and can cause burns if you touch it while the wire is heating (or heated). Keep in mind that the wire [4] and the carts that carry it are mobile and driven by motors. You never need to touch them or hinder their movement while they are moving. Keep in mind that the top plate [3] is mobile and driven by motors and you must never touch or hinder their movement while moving.

1. Keep your work area in order: a messy work area may be the cause of accidents.
2. Working in a place that is clear, stable, flat and level.
3. The workspace must be clear by at least 20cm on either side of the plate [3] to allow its free movement.
4. Ensure proper lighting in the work area.
5. Note the ambient conditions: do not expose to rain or moisture, do not use in a damp or wet environment.
6. Do not use in areas exposed to the risk of fire or explosion.
7. Do not expose to direct or amplified sunlight (car in sun for example).
8. Not use in air whose temperature is lower than 15 ° C or above 26 ° C.
9. Avoid contact with elements grounded (eg water pipes, radiators, earth, electric ovens, refrigerators, dishwashers, washing machine).
10. When cutting, work in a well ventilated room to ensure prompt removal of polystyrene melt vapors.
11. The use of Miniut2d should always be done under the supervision and responsibility of an adult.
12. Dress appropriately, do not wear loose clothing or dangling jewelry that could get caught in moving parts or damaged by the heated wire [4].
13. Secure long hair or slide under a protective cap so they can not touch the wire [4] or get caught in moving parts.
14. MiniCut2d is not intended for people with physical, sensory or mental abilities that are limited.
15. Never lift MiniCut2d by holding the plate [3].
16. Always open the 110-220V circuit when the MiniCut2d is not used, or to bend or to move or if abnormal operation power.
17. Before connecting and using the MiniCut2d, thoroughly inspect its condition, check that nothing is likely to block its operation.
18. Do not use the MiniCut2d for purposes other than those for which it was conceived.
19. Do not force the engine using materials too strong or too heavy or by loading the table [3] beyond the technical recommendations.
20. To avoid injury, do not leave unattended during operation.
21. Controlling the heater of each cutting wire by monitoring the input into the material. If the wire is deformed it means that it does not get hot enough. Quickly press the emergency stop button (in software or on MiniCut2d without touching moving parts). Then release the line with the options offered by the software.
22. Never touch moving parts.
23. Never put anything (object, hand ...) in the base of the MiniCut2d, especially during movement: risk of jamming or crushing of the introduced something (object, hand ...), and damage to the MiniCut2d.
24. Never pull the cord: pull on the plug.
25. Do not use cables for purposes other than those for which they were designed to protect them from heat, oil and sharp edges.
26. Never push objects in the MiniCut2d.
27. Never allow contact with a liquid, a spark or flame.
28. Disconnect completely (110-220V sector and computer) before working on the wire [4] (for example, to change it).
29. Never touch the wire [4] when MiniCut2d is connected.
30. During the movements of folding and unfolding of the portico [5] hold MiniCut2d only by the handle [10] without touching the wire [4]. Be careful not to pinch your fingers between the portico and the other parts.
31. Lift/carry the MiniCut2d only by the handle [10].
32. In case of change of the heating wire, use only the thread provided by the manufacturer of the MiniCut2d. Use of any other wire type in the MiniCut2d could be dangerous!



MiniCut2D

Help, tutorials, and information is found on www.minicut2d.com.

Projects, ideas, creativity, sharing is found on www.filchaud.com

The latest news is found on the page FaceBook.com/MiniCut2d

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