

ARCHIVE



Milling the circuit

View in: English - Submitted by Federico_Vanzati on Tue, 10/01/2012 - 18:58

Interface language: [en](#) / [it](#) / [es](#)

Introduction / Objectives:

Mill a copper base, dividing the individual tracks on the circuit. The goal is to obtain well separated tracks, without reducing too much the welding area.

Part list:

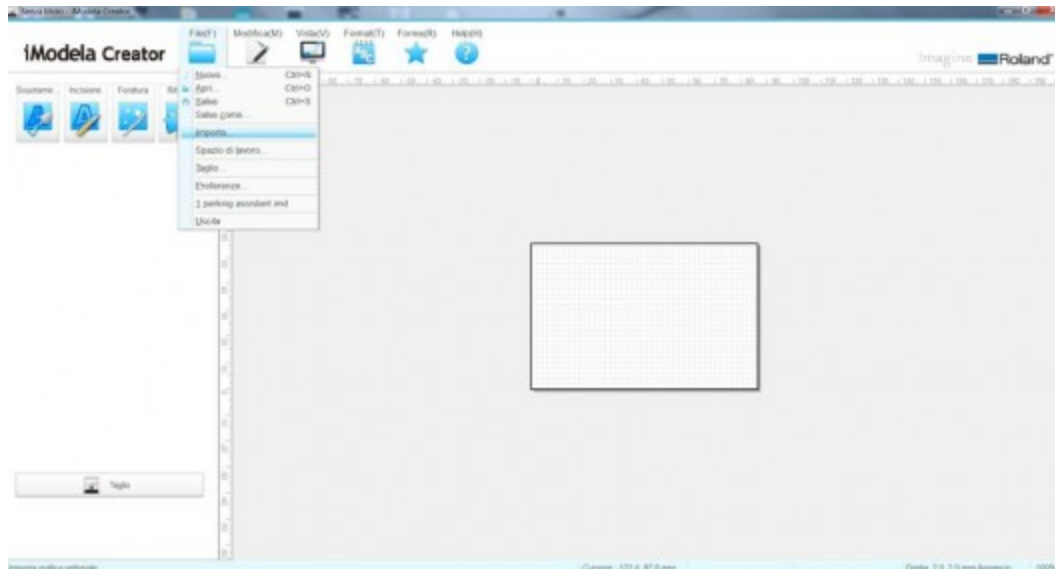
iModela
copper base for PCBs
engraving burin 45°
double-sided tape
lubricant (grease or oil)

Instructions:

CIRCUIT MILLING

iModela Creator

import the file with the .ai extension



considered the spacing between the Arduino pins is best to use a burin engraving.

the width, obviously, depends on the depth according to the following formulas:

- Depth of cut: P
- Width of the incision: L

45° engraving burin

$$P = L \times 1,21$$

$$L = P \times 0,83$$

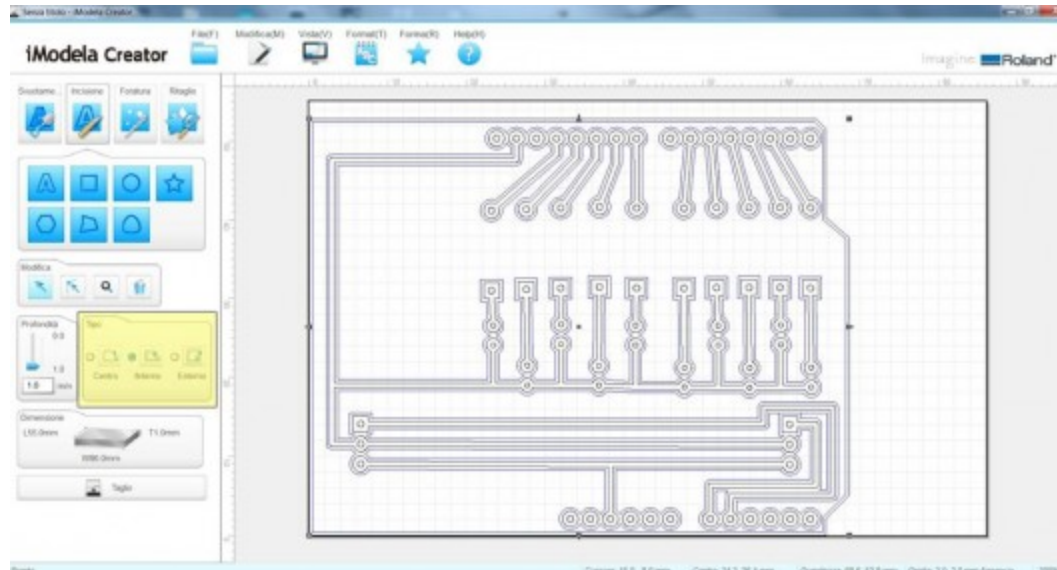
30° engraving burin

$$P = L \times 1,87$$

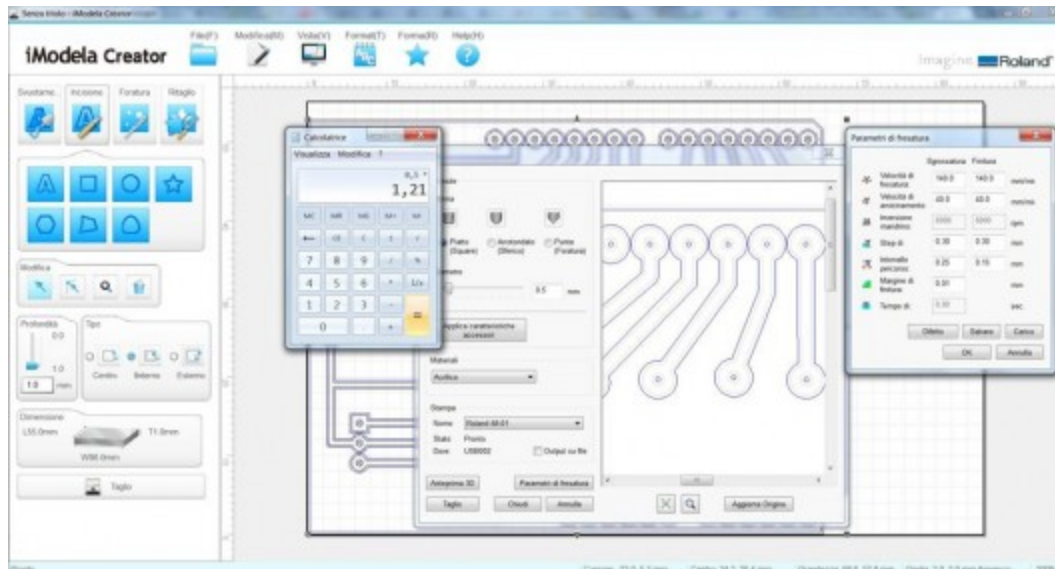
$$L = P \times 0,54$$

In this tutorial we will use a 45° burin to leave traces of 0.5mm, then 0.6mm deep

Set the engraving



select the path you just imported, select from the menu on the left **engraving**, then try to change the selection of the **type** (internal or external) for the path out of the slopes. Given how we created the file should be **internal**.



Clicking on **Cutting**, opens a window in which to set the parameters and the type of tip. There is no possibility of selecting the burin, but can be considered a tip for roughing (**flat**). Select **flat** and then as **0.5mm** diameter. The depth of cut is therefore 0.6mm.

Choose **Acrylic** as a **material and milling parameters** as shown:

	Sgrossatura	Finitura	
←↵→ Velocità di fresatura:	140.0	140.0	mm/mii
↵ Velocità di avvicinamento:	40.0	40.0	mm/mii
↻ Inversione mandrino:	6000	6000	rpm
↵ Step di	0.30	0.30	mm
↵ Intervallo percorso:	0.25	0.15	mm
↵ Margine di finitura:	0.01		mm
↵ Tempo di:	0.00		sec.

Difetto Salvare Carico

OK Annulla

In this way the drill will make two passes to reduce vibration and efforts on the spindle. The speed of rotation (**reversing spindle**) can not be changed from here, will be changed by the controller.

Then click **OK** on the pop-up of the **Milling Parameters**. If you have installed **Roland Virtual MODELA** at this point you can start **3D Preview**, if you are satisfied with the result and close the preview open **iModela Controller**.



On the iModela manual you will find all the directions for the correct calibration of the machine and how to use the controller, we are going to summarize only the essential aspects.

When the iModela is just turned on reaches the origin of the machine, which is the limit of all three axes. To set a different reference you must change the type of origin settings:



Set **User System Coordinate** in both pull-down menu (upper left and upper right).



clicking on the various alternatives of the Cursor Step (**continuous - x 100 - x 10 - x 1**) you choose how many steps the spindle moves on different axes, each step is 0.01mm

with the central arrows you can move the tip to reach the origin of the piece, which is the bottom left corner, on the upper surface of the PCB

bring the center of the PCB and get down up to touch the surface of the copper plate, when you are close you should go down slowly (**x10**). A trick to check the Z is to support a sheet of thin paper, where the tip will touch the PCB. Move it back and forth as you slowly lower the tip. As soon as the sheet is clamped between the two, remove it and lower the Z of 0.1mm. This operation is quite delicate, if you get down too much or set wrong values is easy to break the tip, damage the piece or even the machine.

After reaching the correct Z click below **Set Origin Point** on **Z**.

Raise the Z 0.3mm and move to seek the origin in X / Y.

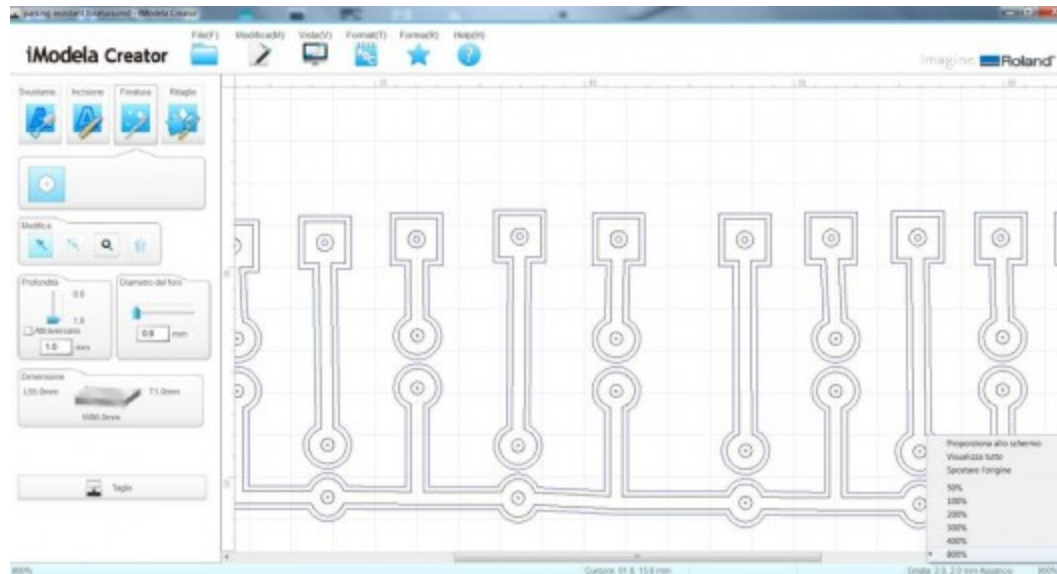
When you reach the desired point in X / Y click below **Set Origin Point** on **X / Y**

Now left the values of X, Y and Z should be 0.00 for all three.



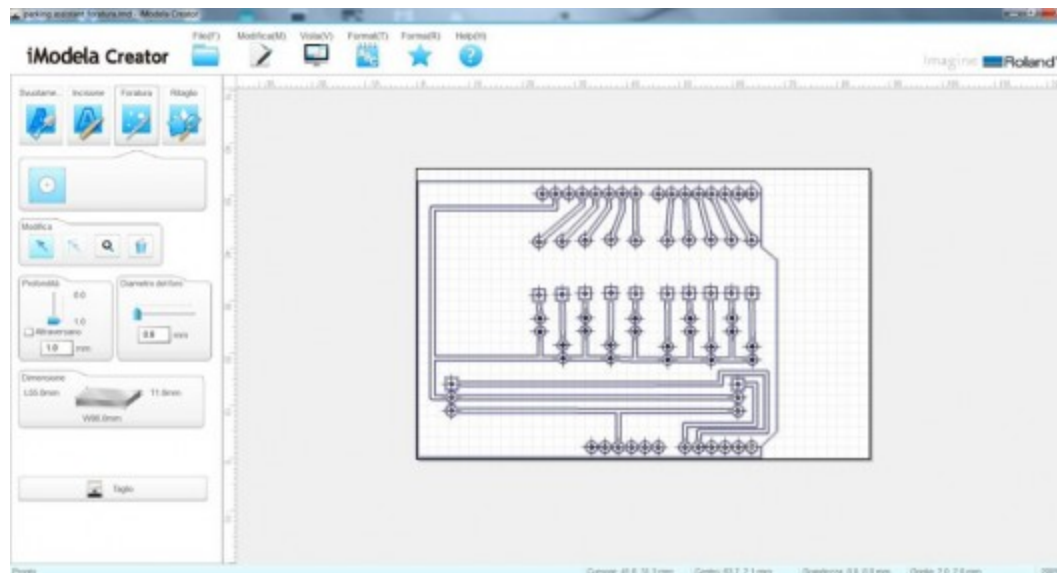
From the **Cut** panel on the right you can click on **manual**, change the speed in percentage. If set to manual you can also change during the milling phase.

Once you set the zero on the Z axis and the origin of X / Y you can start cutting. From the **Cutting** window, where you have previously set the cutting parameters, click **Cut**. Confirm that the cutter is ready and set correctly click **OK**. At this point, while the milling machine is making the circuit you can start preparing the next file for drilling.

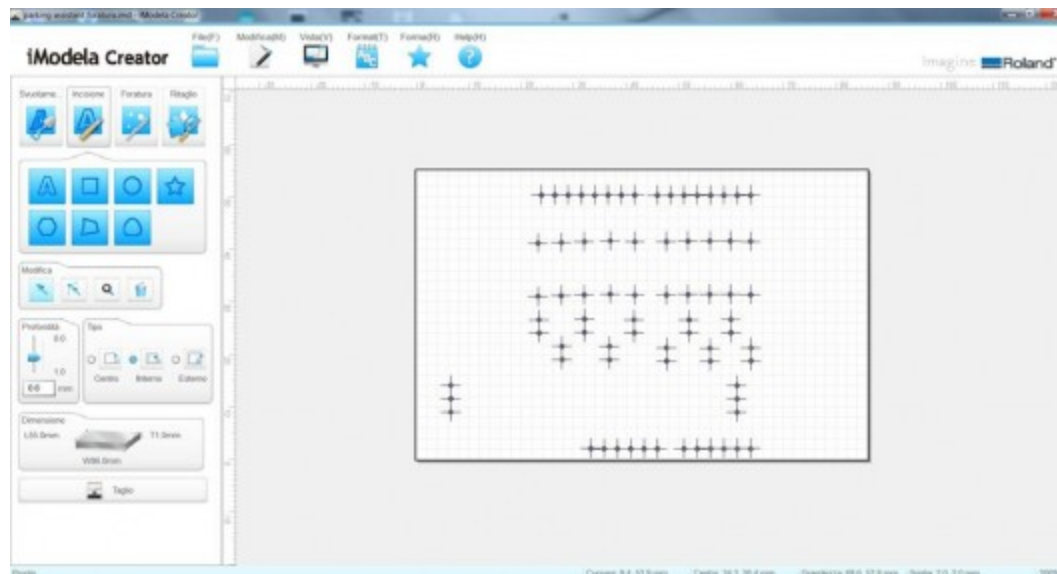


From **File** menu create a copy of the file with different name, such as name it file_holes.

Zoom to the maximum (**800%**) by changing the value in the lower right. Choose **Drilling** from the side menu, choose the **hole diameter** and **depth**. Set and **0.8mm** respectively **Through**. Now from the **Edit** menu with the first pointer click at the center of the holes.



when all the holes were positioned select the tracks and delete everything else.



Click on **Cutting** on the bottom left menu and set the parameters of drilling. In this case, the important thing is to have a **low speed of approach** (eg. **30.0mm/min**)

if you think the spindle is strained lower the speed further, at the contrary turn it up.

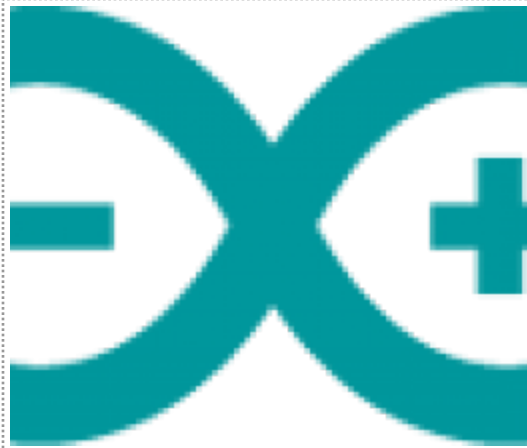


Once the holes has been made your PCB is over!

We recommend that you test the tracks and use the flux on the welding areas.

Images:

Comments



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/imagecache/browser_view/imagefield_default_images/ard-logo.png)

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