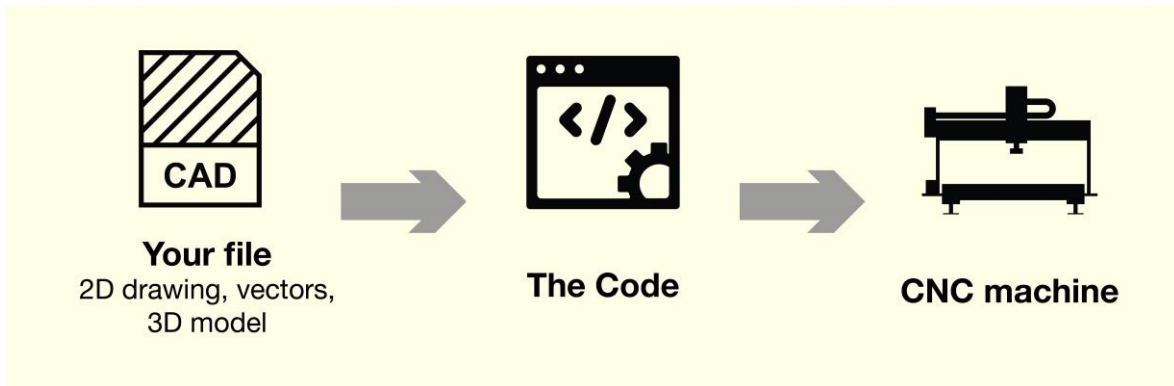


## TUTORIAL

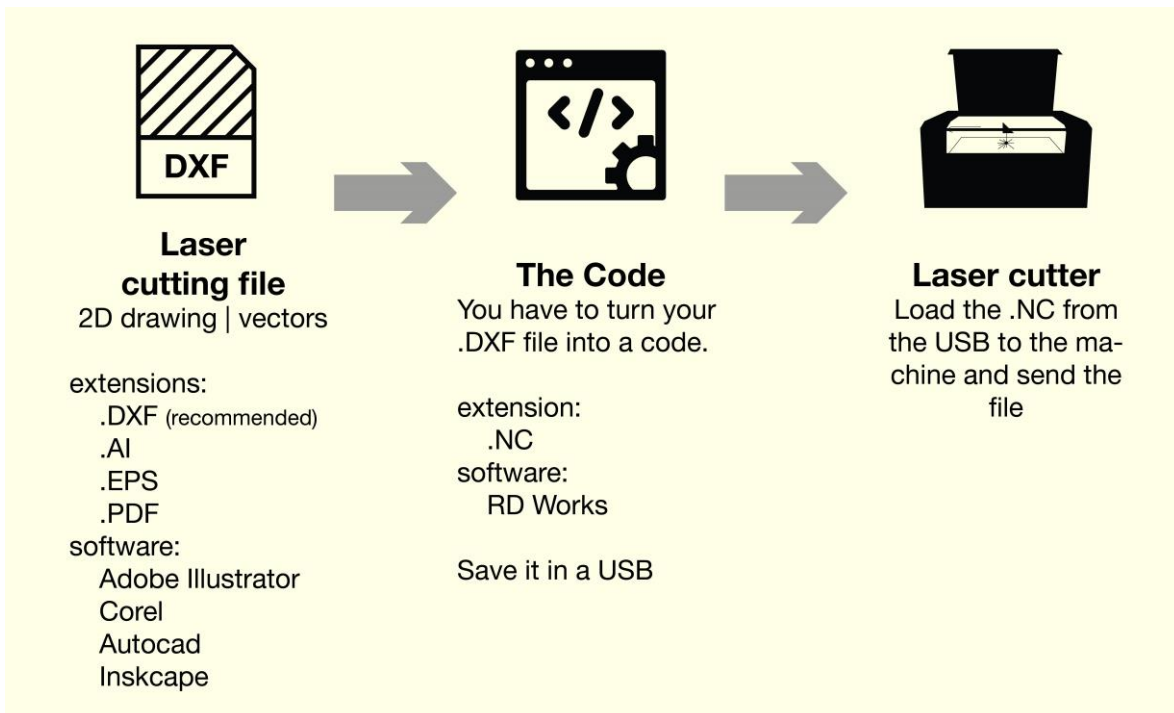
### HOW TO PREPARE YOUR FABRICATION FILES FOR LASER CUTTING

Before we start, please understand that:

CNC machines cannot understand your files. They work reading a code. Therefore, before sending your work to the machines, you have to convert your fabrication file into a code.



For laser cutting, you are going to need 1. A 2D vectors file saved in extensions such as .AI, .DXF or .EPS. | 2. Turn the file into a .RD code in a software called RD Works | 3. Save it in a USB and load it to the laser cutter.



\***Vector** graphics is the creation of digital *images* through a sequence of commands or mathematical statements that place lines and shapes in a given two-dimensional or three-dimensional space.

Let's begin

## 1. Make your vector file

There are many ways to generate your vector files. **The goal is to obtain a .DXF file.** Here are some strategies:

### a) Online Resources

#### a. Webpages

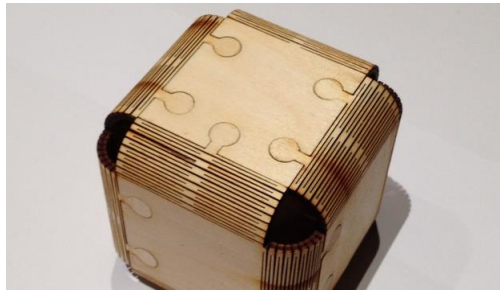
- i. For vectorized icons: [www.thenounproject.com](http://www.thenounproject.com)
- ii. For making a box: [www.makercase.com](http://www.makercase.com)
- iii. For making gears: [www.geargenerator.com](http://www.geargenerator.com)

#### b. Sites where to download files made by other people

- i. [www.thingiverse.com](http://www.thingiverse.com)

A cool cube, for example:

<https://www.thingiverse.com/thing:34286>



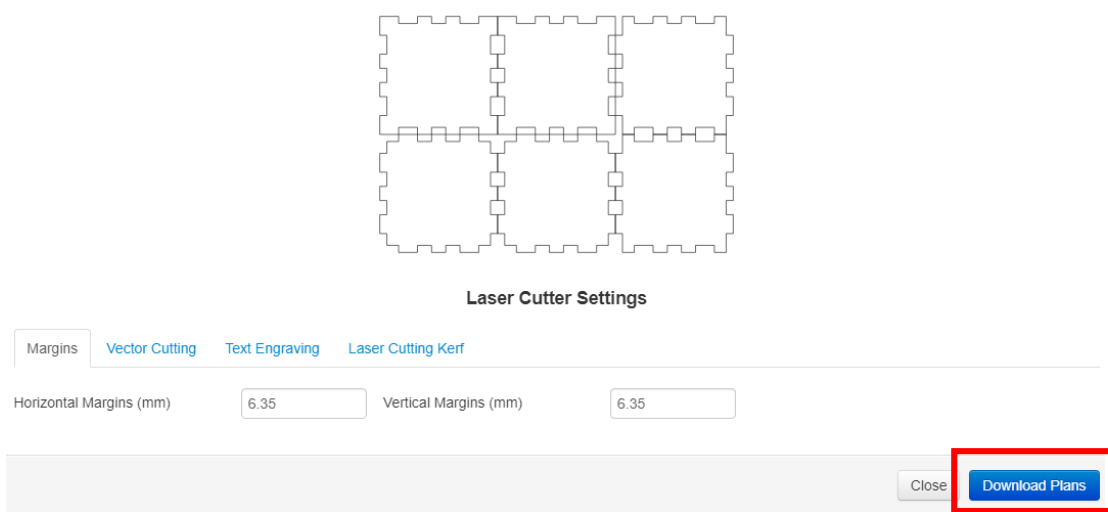
If you decide to go and use [www.makercase.com](http://www.makercase.com), here are some tips:

1. Go to the webpage
2. Change the settings to millimeters, the size and thickness of your cube and choose “finger” for joint slots.
3. Click on “Generate Laser Cutter Case Plans”

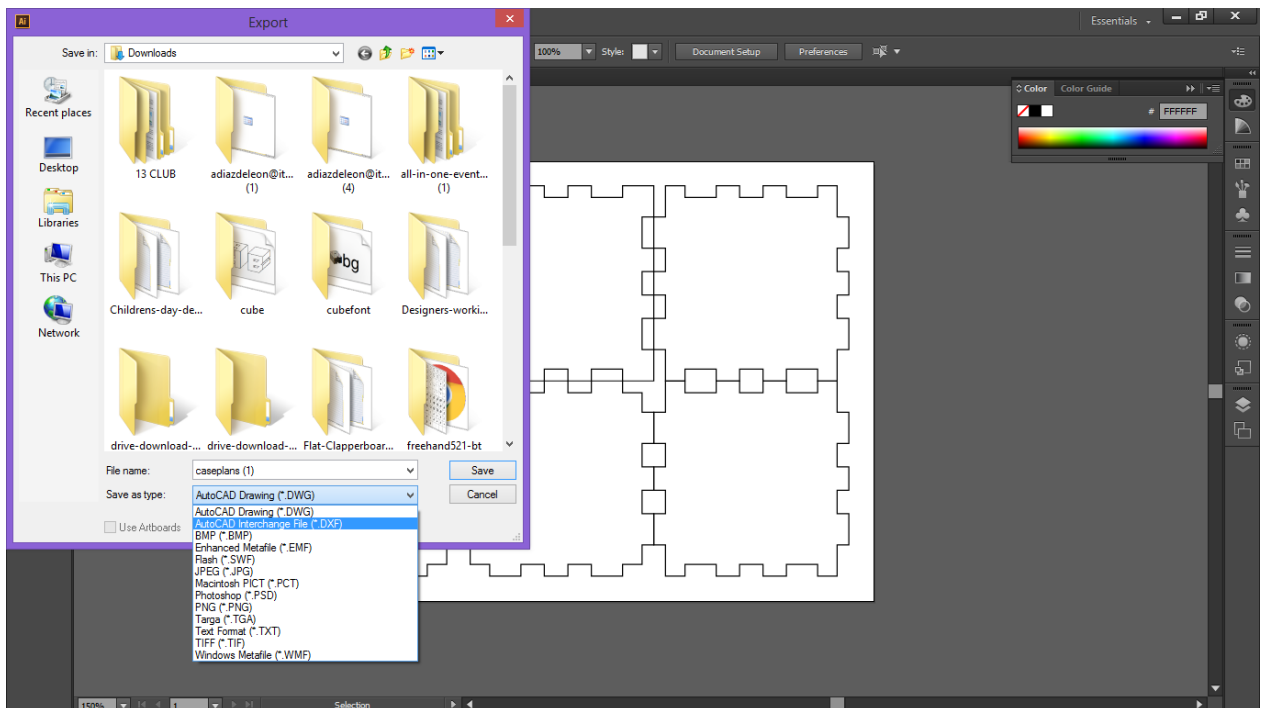


#### 4. Click on “Download Plans”

##### Laser Cutter Plans



5. You will get a .SVG file.  
.SVGs can't be open in RD Works, so you have to transform it into a .DXF in Illustrator.
6. Open Illustrator
7. Open you .SVG file in Illustrator
8. Go to File / Export
9. In “Save as type” select .DXF and click on “Save”



And that's it! Now you have a .DXF file, ready to be imported to RD Works.

**b) Make your own 2D drawings**

There are many softwares for making 2D drawings. Some of them are better for creating graphics and some other are better for more precise engineering drawing. **Use the one that suits you better!**

Here are some that you can use for graphics

- a. Adobe Illustrator<sup>1</sup>
- b. Coreldraw
- c. Inkscape (recommended)  
It's free and open source: <https://inkscape.org/es/>

Here are some other for precise 2D drawing

- d. Solidworks

Here is a tutorial: <https://www.youtube.com/watch?v=YWqxNtKpJGM>

- e. Autocad
- f. Rhinoceros (recommended)  
<https://www.rhino3d.com/download>

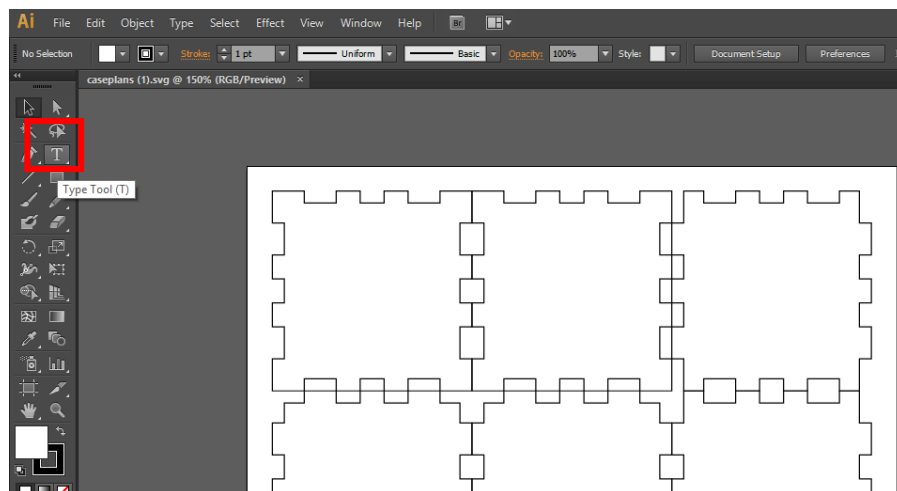
**c) Vectorize an image**

There is an option in Adobe Illustrator that lets you turn a .JPGE or .PNG into a vector graphic. If you want to vectorize an image, follow this tutorial:

<https://youtu.be/elazsVKzwks>

If you want to convert **Text into Vectors in Illustrator**, do the following:

- a. Click on the “Type Tool” icon

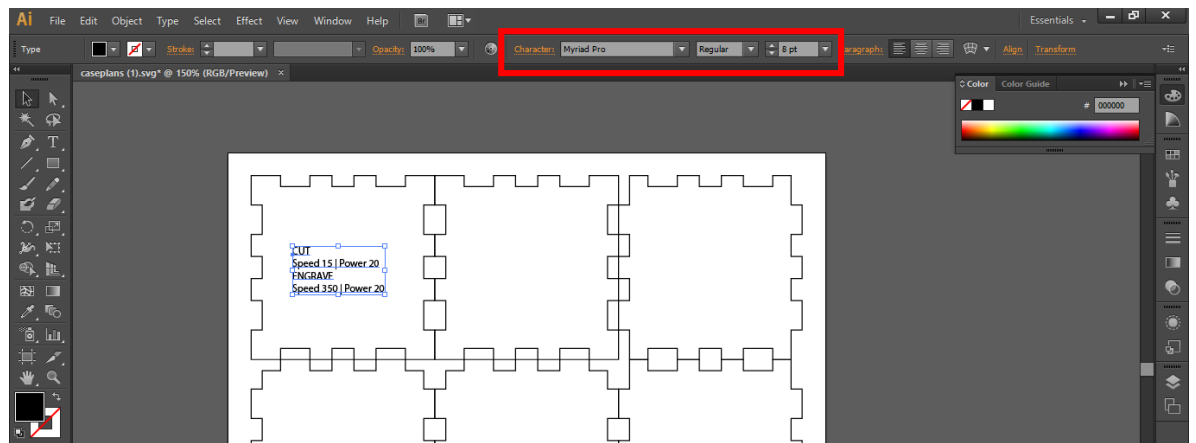


- b. Type down whatever you want.

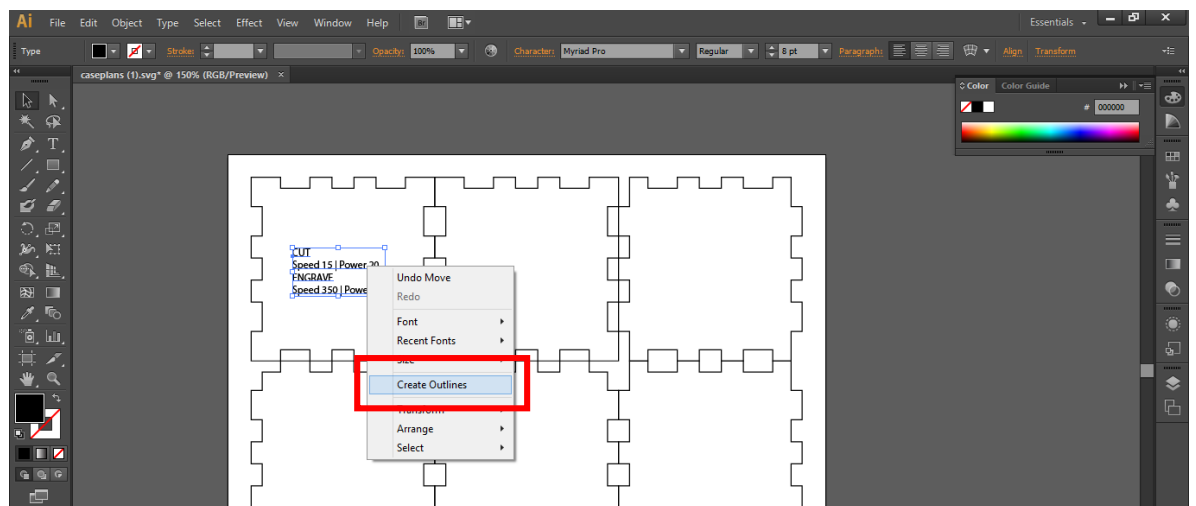
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<sup>1</sup> In the 1st floor of CETEC, they can install Solidworks and Adobe Illustrator.

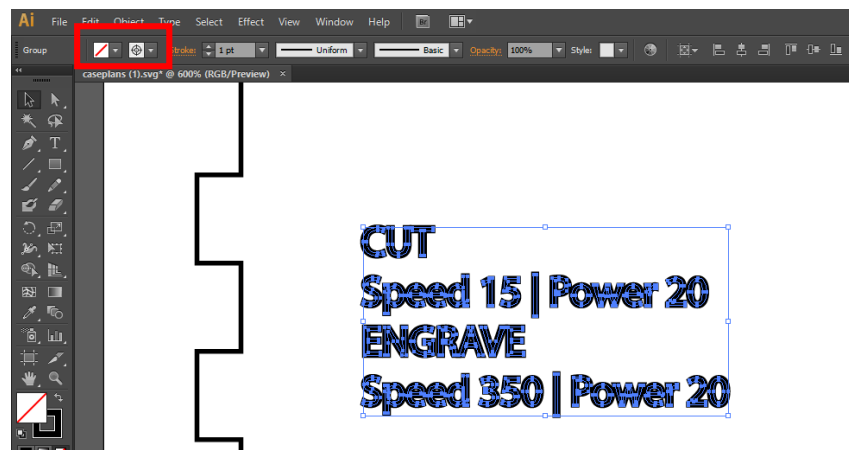
- c. Notice that, if you select the text, you will see a “Character” bar at the right top of the illustrator file. There you can change the Font and size of the text.



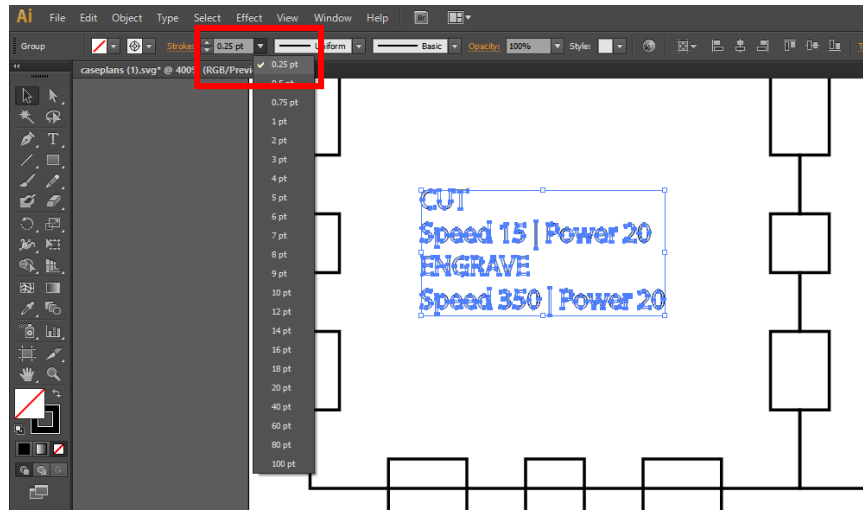
- d. Right click on the Text Object and select “Create Outlines”



- e. Now, remove the black infill and make the contour lines black.



f. The contour of the text is too thick now. Change the “stroke” to 0.25



#### d) Extract vectors from a 3D model

This option is highly recommended for precise fabrication. We expect you to work like this for your project since the first step for prototyping is to design and 3D model.

In this tutorial you can learn how to generate a vector file from your 3D model in Solidworks: <http://www.instructables.com/id/Tutorial-Laser-Cutting-from-Solidworks/>

## 2. Pay attention to tolerances

Once you have selected a strategy for creating a file, it's important that you consider that the laser might remove a millimetric amount of material that can change the measurements of your final piece.

This means that **the dimensions of your digital drawing might be different that the dimensions of the final physical object.** It depends on two things:

1. The material
2. The thickness of the material

Please take into consideration that during the HW #1 of the Fabrication Block (make a cube) you will have to make many tests in the laser cutter and many modifications to your files, before you can properly assemble your cube.