

FabShops: Intro to Laser Cutting Inkscape Tutorial

Inkscape is a free, downloadable software program that allows you to draw vector graphics and output them into vector files. These are important in laser cutting and other subtractive manufacturing processes as the vector files are used to create the G-code used in most computer numeric controlled (CNC) machines. Vector graphic files are different from other raster graphic files in that they are drawn with points, lines, curves, and polygons using mathematical expressions instead of using pixels. This means that vector graphics preserve their definition even at high magnification. In the CNC world, this means that they can easily output x-y coordinates into G-code. Inkscape will output files in .svg (scalable vector graphics).

Downloading and Running

On PC:

1. Go to inkscape.org/download/ and click “Installer” under “Windows”
2. After the .exe file is opened and installed, Inkscape should run

On Mac:

1. Inkscape requires a separate program on Mac in order to run. Go to xquartz.macosforge.org and click to download “XQuartz-2.7.5.dmg”
2. Go to inkscape.org/download/ and click to download “.dmg” under Mac OS X
3. Open XQuartz first, then open Inkscape. Give it a minute or two if it is the first time opening

Toolbars

The vertical toolbar on the left shows Inkscape's drawing and editing tools. In the top part of the window, below the menu, there's the *Commands bar* with general command buttons and the *Tool Controls bar* with controls that are specific to each tool. The *status bar* at the bottom of the window will display useful hints and messages as you work.

Many operations are available through keyboard shortcuts. Open Help > Keys and Mouse to see the complete reference.

The Selector Tool

The most frequently used Inkscape tool is the *Selector*. Click the topmost button (with the arrow) on the toolbar, or press **F1** or **Space**. Now you can select any object on the canvas.

When you click an object once, you will see eight arrow-shaped handles appear around the object. Now you can:

- *Move* the object by dragging it. (Press **Ctrl** to restrict movement to horizontal and vertical.)
- *Scale* the object by dragging any handle. (Press **Ctrl** to preserve the original height/width ratio.)

Now click the object again. The handles change. Now you can:

- *Rotate* the object by dragging corner handles. (Press **Ctrl** to restrict rotation to 15 degree steps. Drag the cross mark to position the center of rotation.)

- *Skew* (shear) the object by dragging non-corner handles. (Press **Ctrl** to restrict skewing to 15 degree steps.)

While in Selector, you can also use the numeric entry fields in the Controls bar (above the canvas) to set exact values for coordinates (X and Y) and size (W and H) of the selection.

Fill and Stroke

Fill and stroke are crucial in designing parts to laser cut. To open the Fill and Stroke window, go to Object > Fill and Stroke. Here you can edit Fill, stroke paint, and stroke style in three separate tabs. For laser cuts, make sure that strokes are set at 1 pixel width.

Drawing

To draw, you have the **pencil** and **pen** tool. The pencil tool will allow you to draw freely. Although this may not be useful for designing parts, it can be used to draw cool shapes to laser cut.

The pen tool is the one that you will be using the most. It allows you to draw straight lines and curves. To draw, just click to start a point. To draw straight lines, just press “Control.” Inkscape will remember your preference so it will begin to draw straight lines. To draw curves, just click and drag in the direction you would like your curve to be in. Press “Enter” to finish the drawing. The pen tool also lets you know when you have completed a circuit. This is especially helpful in drawing parts to laser cut to make sure they can fall out.

Shapes

To draw shapes, you have the **rectangle, circle, and shapes** tool. The rectangle and circle tools are pretty simple and self-explanatory. To use the shapes tool, click the shapes icon, and edit the parameters of your shape in the command bar at the top of the window. This will allow you to choose whether to draw a polygon or star, and to define the number of vertices/points.

Text

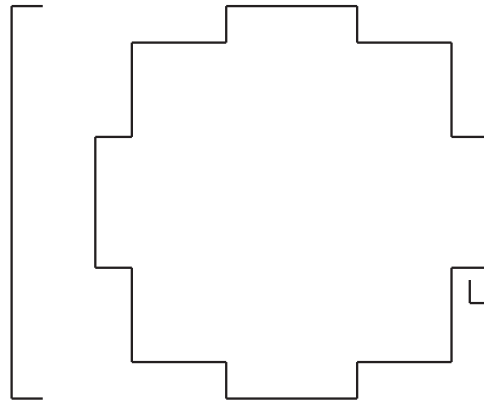
The nice thing about the text tool in Inkscape is that it automatically becomes a vector graphic that you can edit. This is not the same in other programs such as Adobe Illustrator. Just choose the font and once you are done, you can work with the text like any other object.

ONCE YOU FEEL FAMILIAR WITH INKSCAPE...

Try to design a three dimensional box that with dimensions of 60 mm x 60 mm x 60 mm using a material that is 5.58 mm thick. Design the parts to laser cut and design the parts to be able to snap together.

When you are done, compare it to the image example on the next page. Although it does not need to look exactly like the example, it should have the same concept.

60 mm



5.58 mm

60 mm

