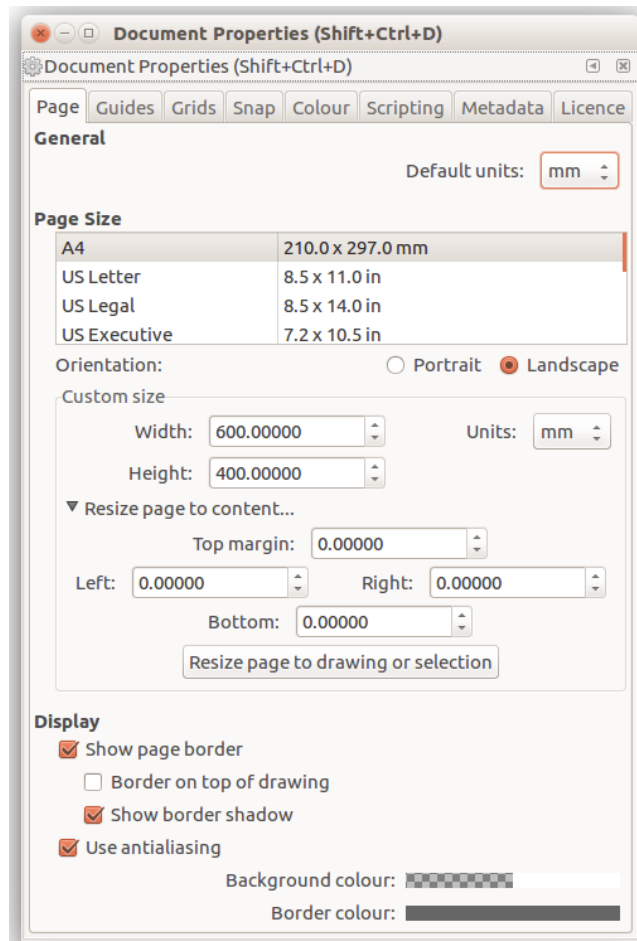# Learning to Laser Cut

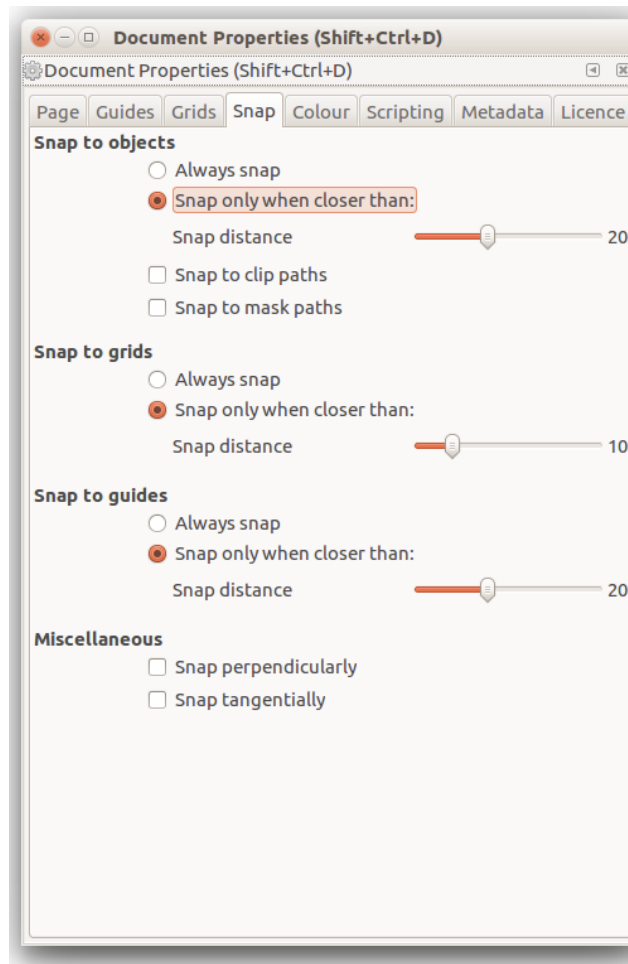# Inkscape for CAD

Creating a new default

File > Document properties > Page

1. Set Default units to mm
2. Set the page size to custom
   For this laser we need it landscape
   Width: 600.00
   Height: 400.00
   Units: mm

This is the size of the laser bed, remember you need to allow a margin for cutting too.
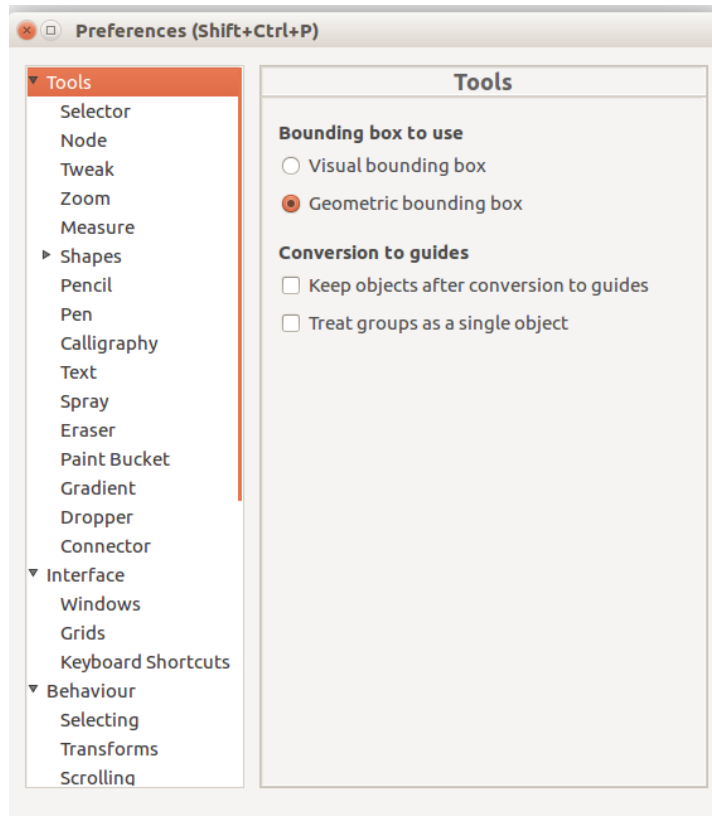
File > Document properties > Snap

Snaps are how shapes position in relation to other objects, page grids and guides.

These settings are for individual preference.

I never select 'Always snap' as depending on the type of drawing you don't always want it to.
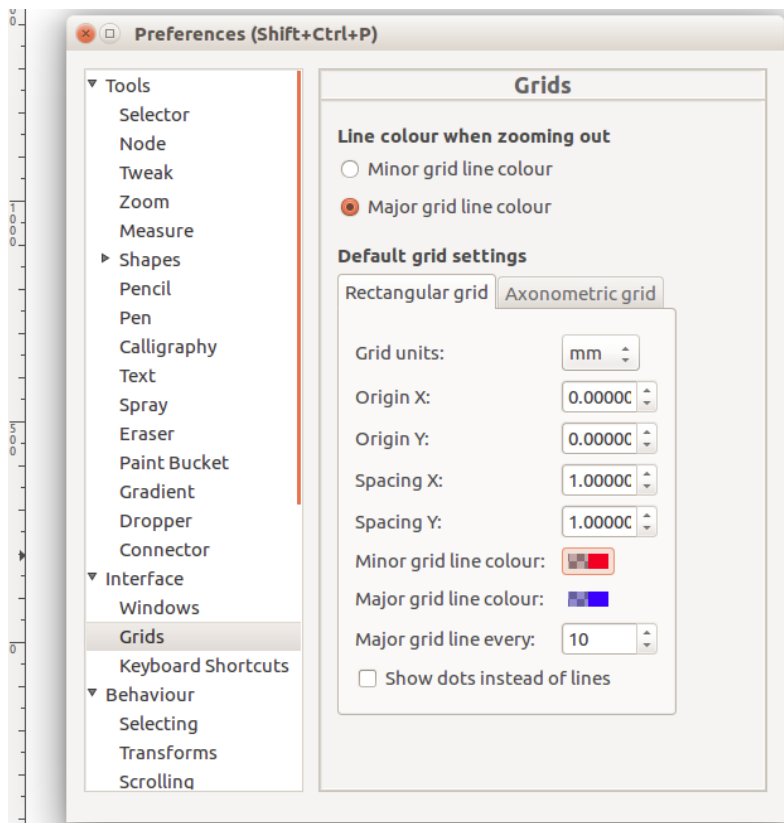
Edit > Preferences > Tools

Select Geometric bounding box

Selecting this resolves a problem with line width
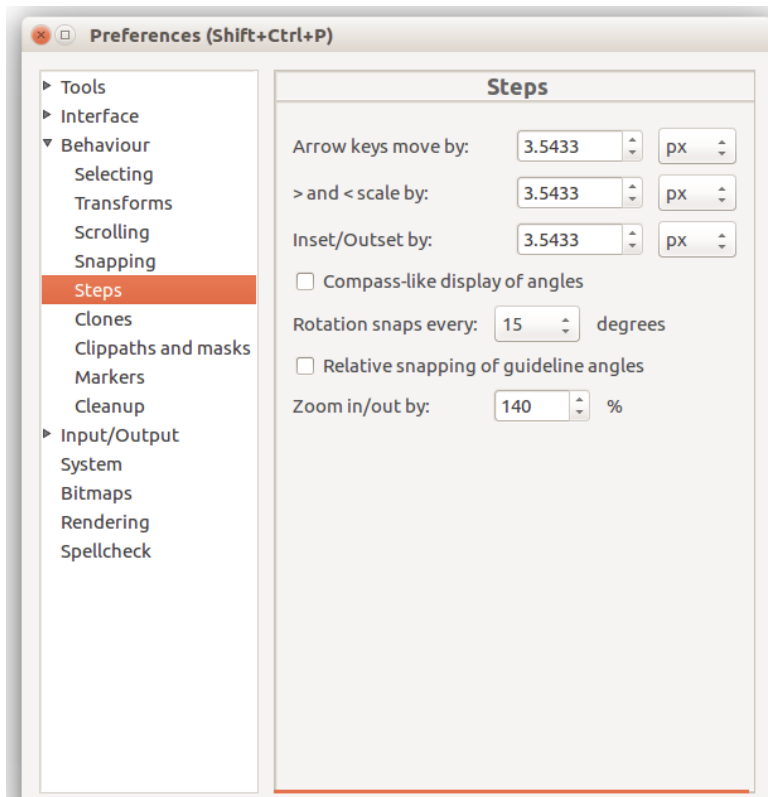
Edit > Preferences > Interface > Grids

Here set the grid units to mm

You can personalise the colour and spacing of major and minor grid lines.

If you don't like lines you can select 'show dots instead of lines'

If you don't want grids at all these can be turned off in View > Page grid

Edit > Preferences > Behaviour > Steps

Here ensure all settings are each set to 3.5433(07) px.

This will make each nudge 1mm based on Inkscape resolution of 90 dpi.

This should make the default template file use mm units and allow nudging with the arrow keys in 1mm increments.

Getting Started

There are 100's of Inkscape tutorials available across the web but I think the best way to get started is to have a play around.
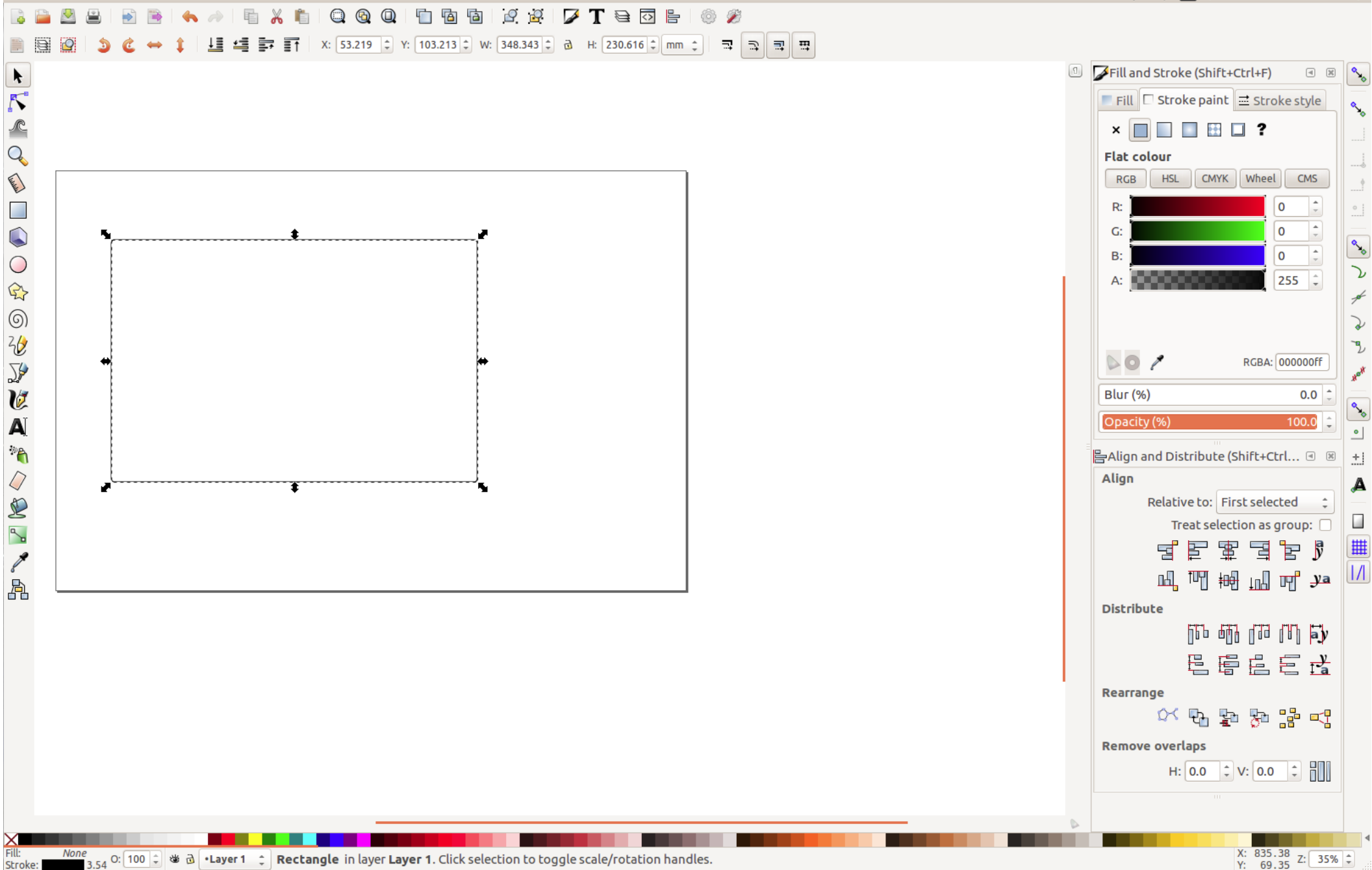
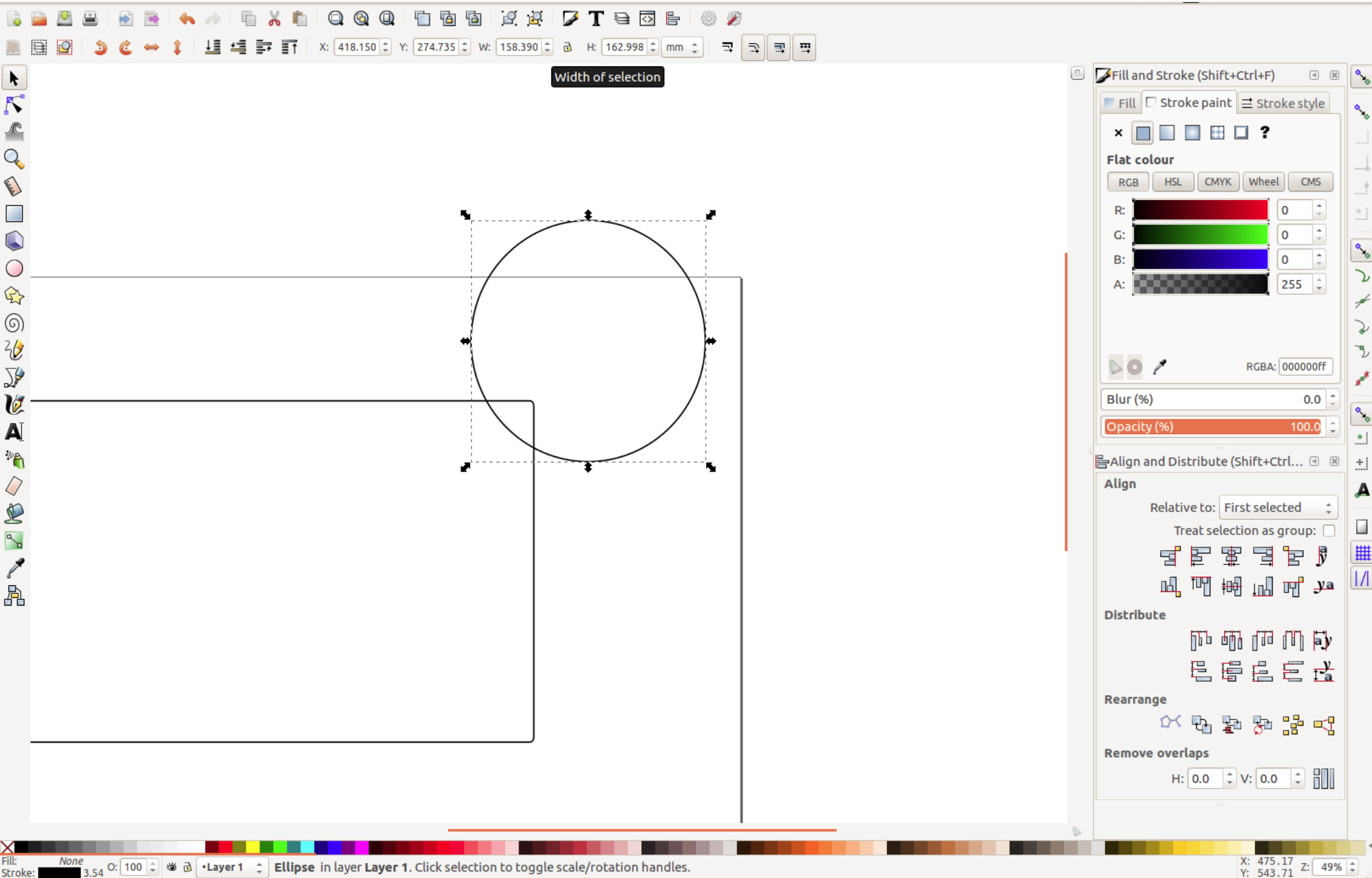Start with the toolbar at the left hand side.

With this you can:
Select
Select nodes
Draw rectangels, circles, stars and polygons etc
Add text

Use the toolbar on the left to draw a rectangle Line thickness, colour and fill can be set by double clicking in the left hand corner then setting these with the toolbox on the right.

When we draw a circle using the toolbar it isn't perfectly round. To change the properties of this we make the width and height the same (top toolbar when circle is selected). If we 'lock' this it keeps the scale even though the diameter can be changed.
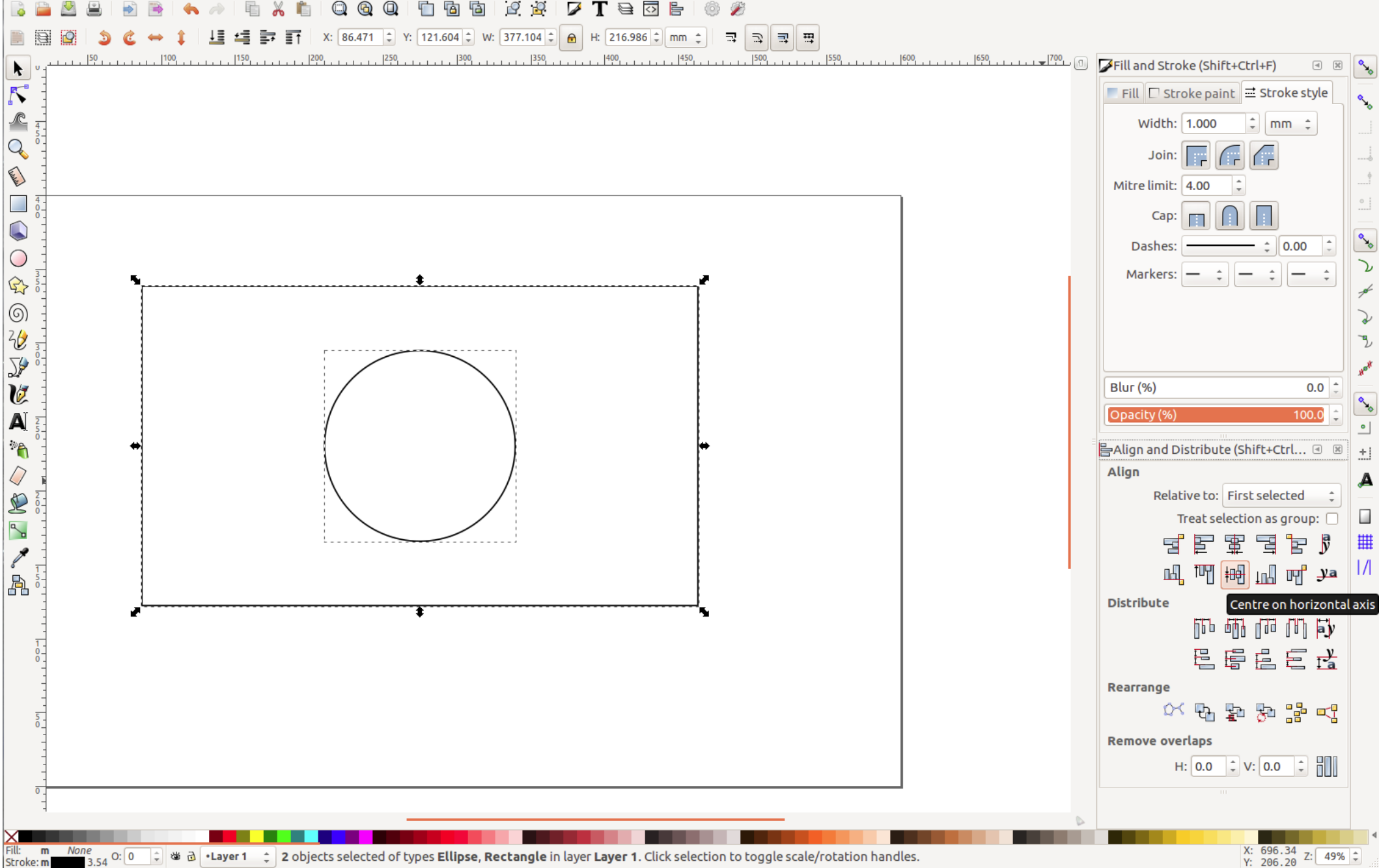
To position something relative to another object we use 'Align and Distribute.
Shft+Ctrl+*select 1st object*+*select 2nd object* then centre these e.g. on horizontal and vertical axis. This aligns the circle in the very centre of the rectangle.
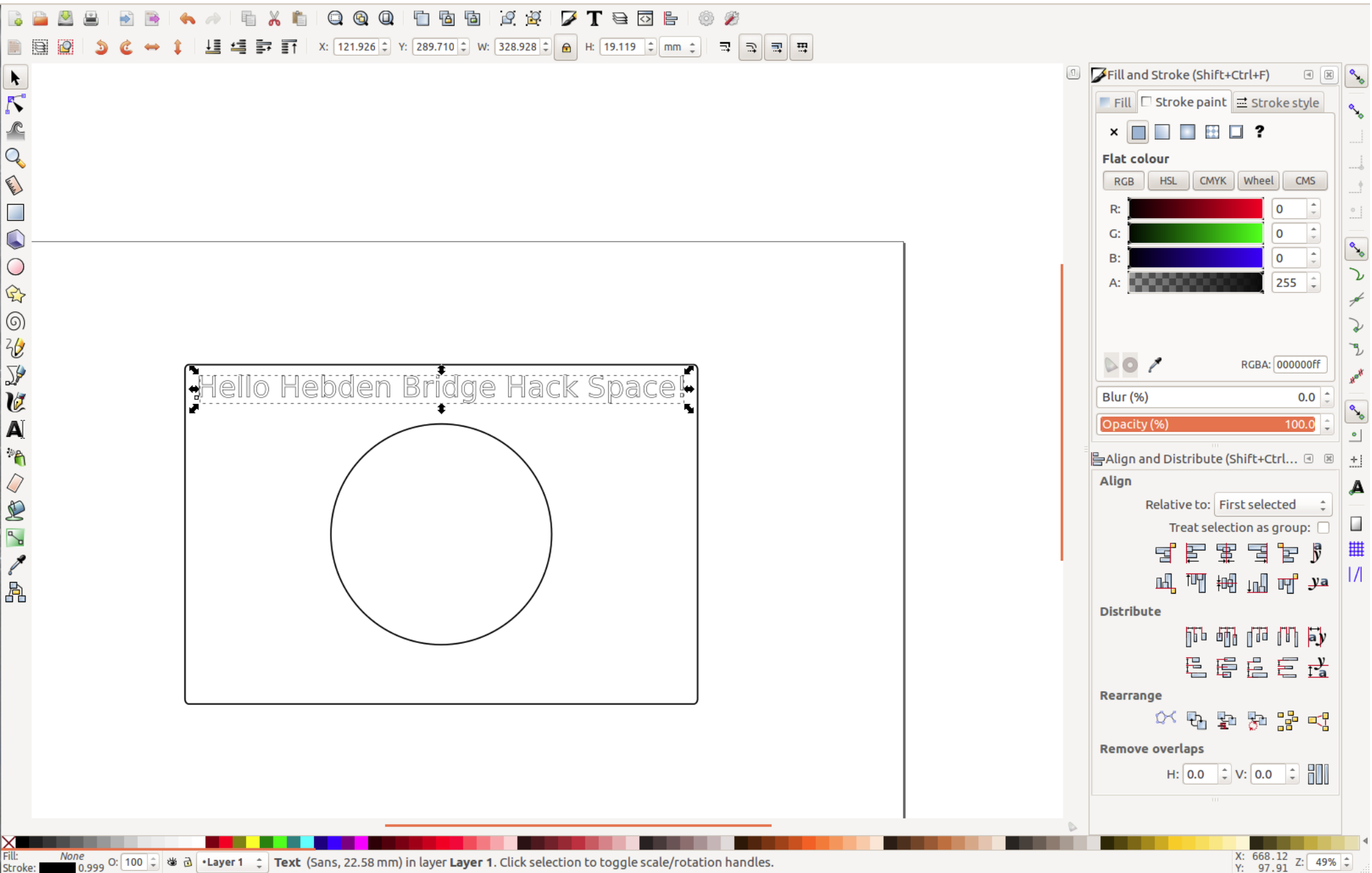
Text can also be added and aligned. We can also change the fill and stroke of text. When laser cutting text there should NEVER be a fill to it, only a stroke.
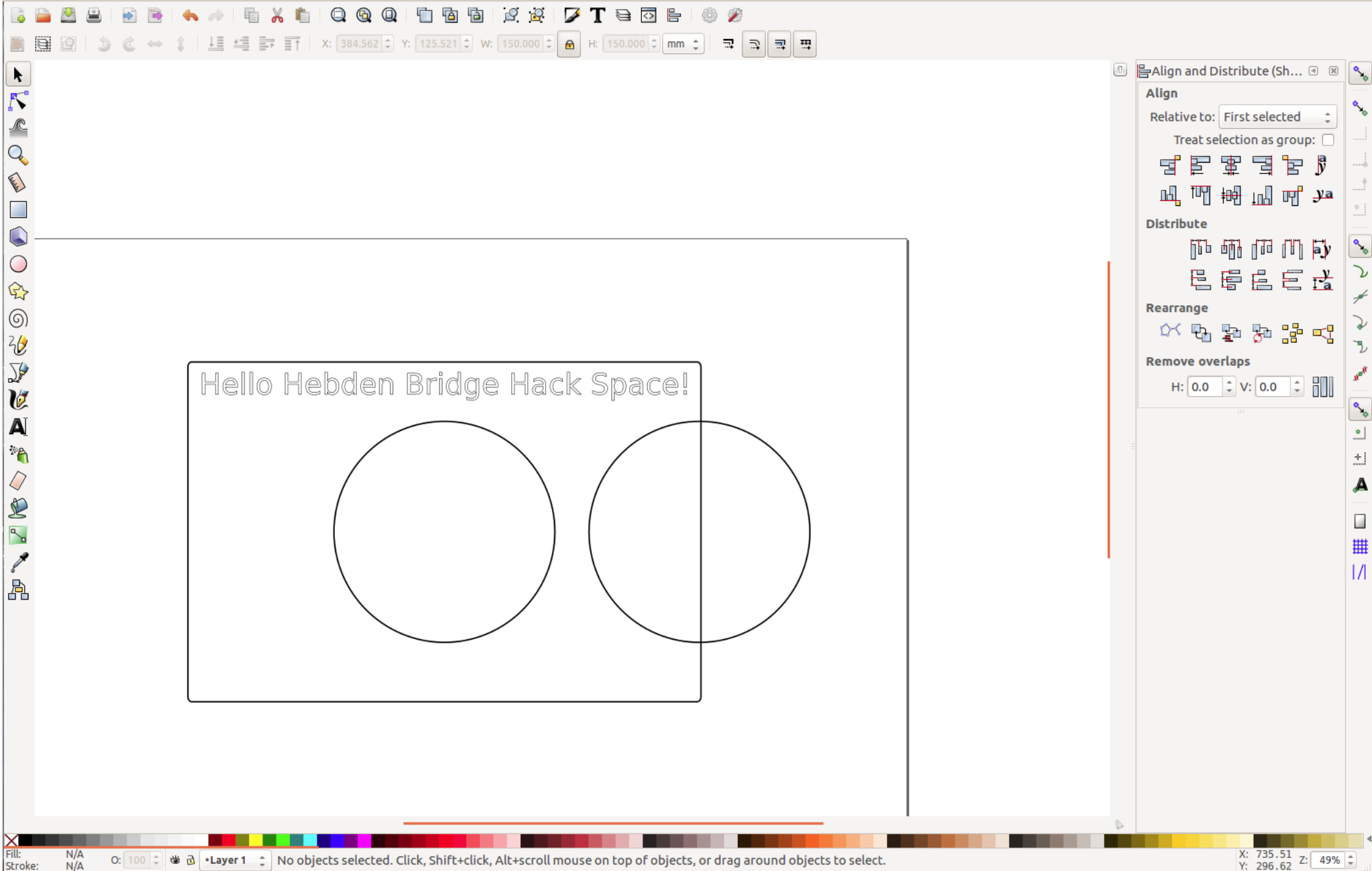
We can create custom shapes by combining.
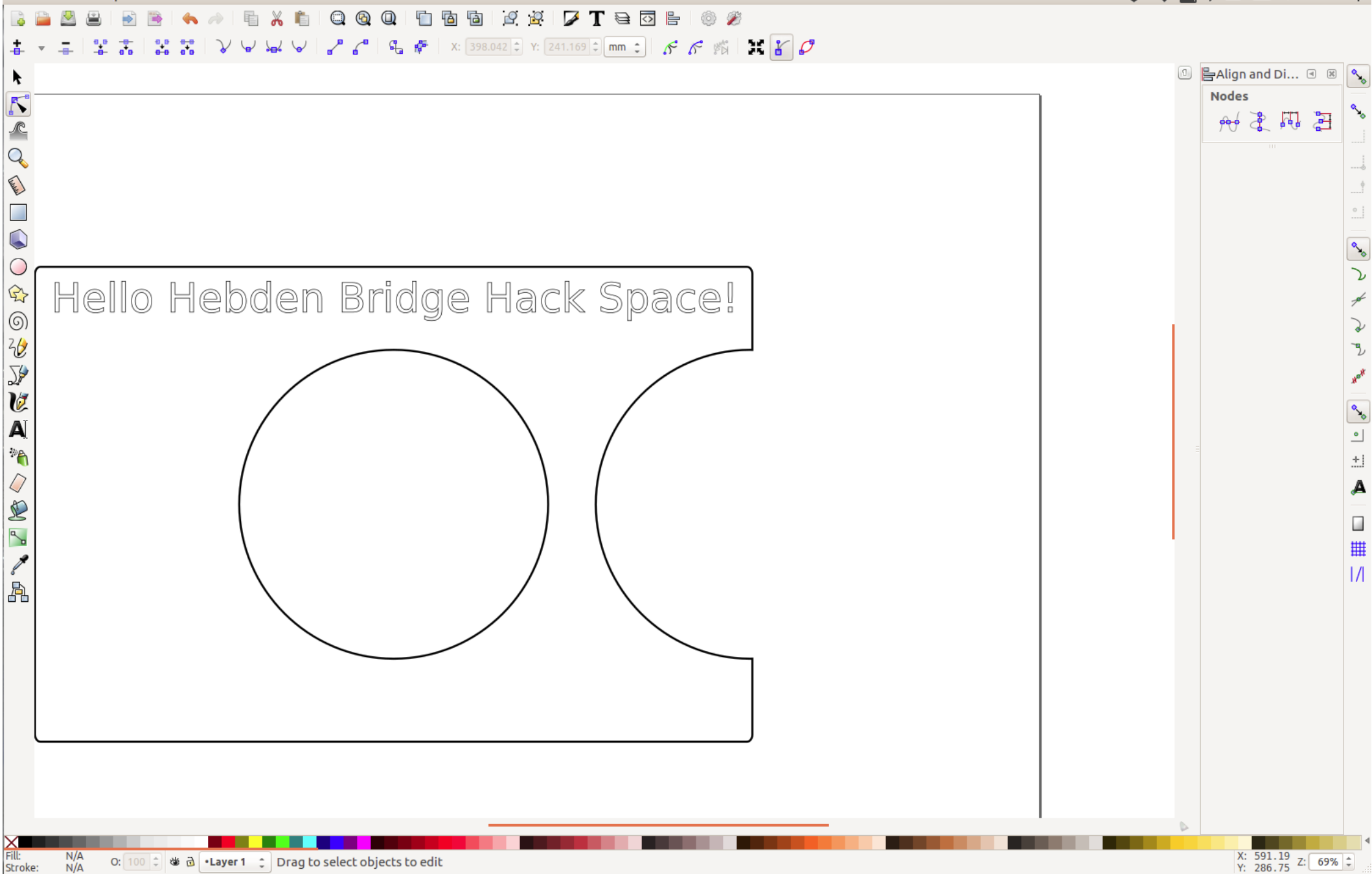
This is the difference of the original shapes. Select both using Shft+Ctrl+*select 1ˢᵗ object*+*select 2ⁿᵈ object* then Path > Difference
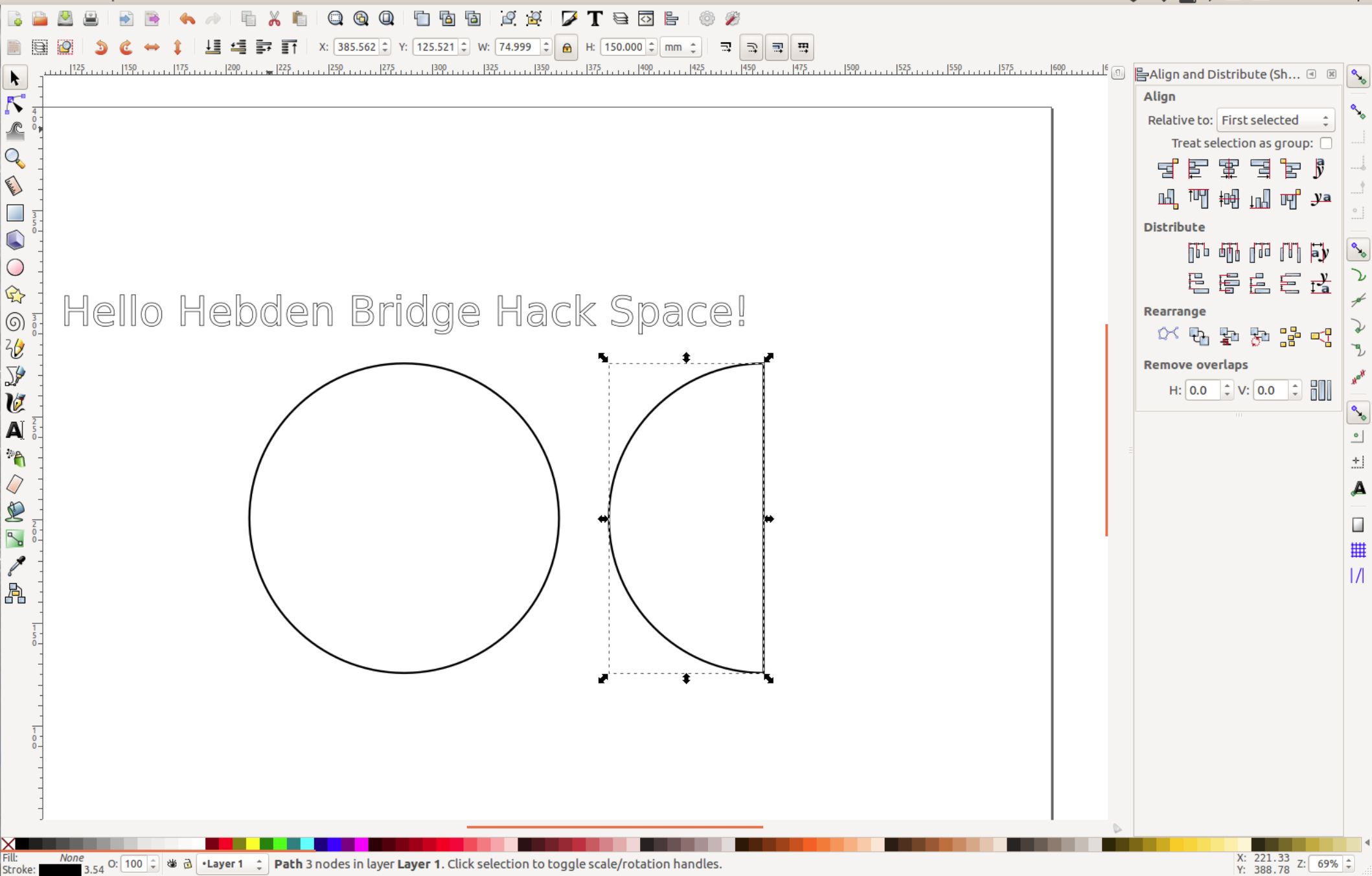
This is the intersection of the original shapes. Select both using Shft+Ctrl+*select 1st object*+*select 2nd object* then Path > Intersection
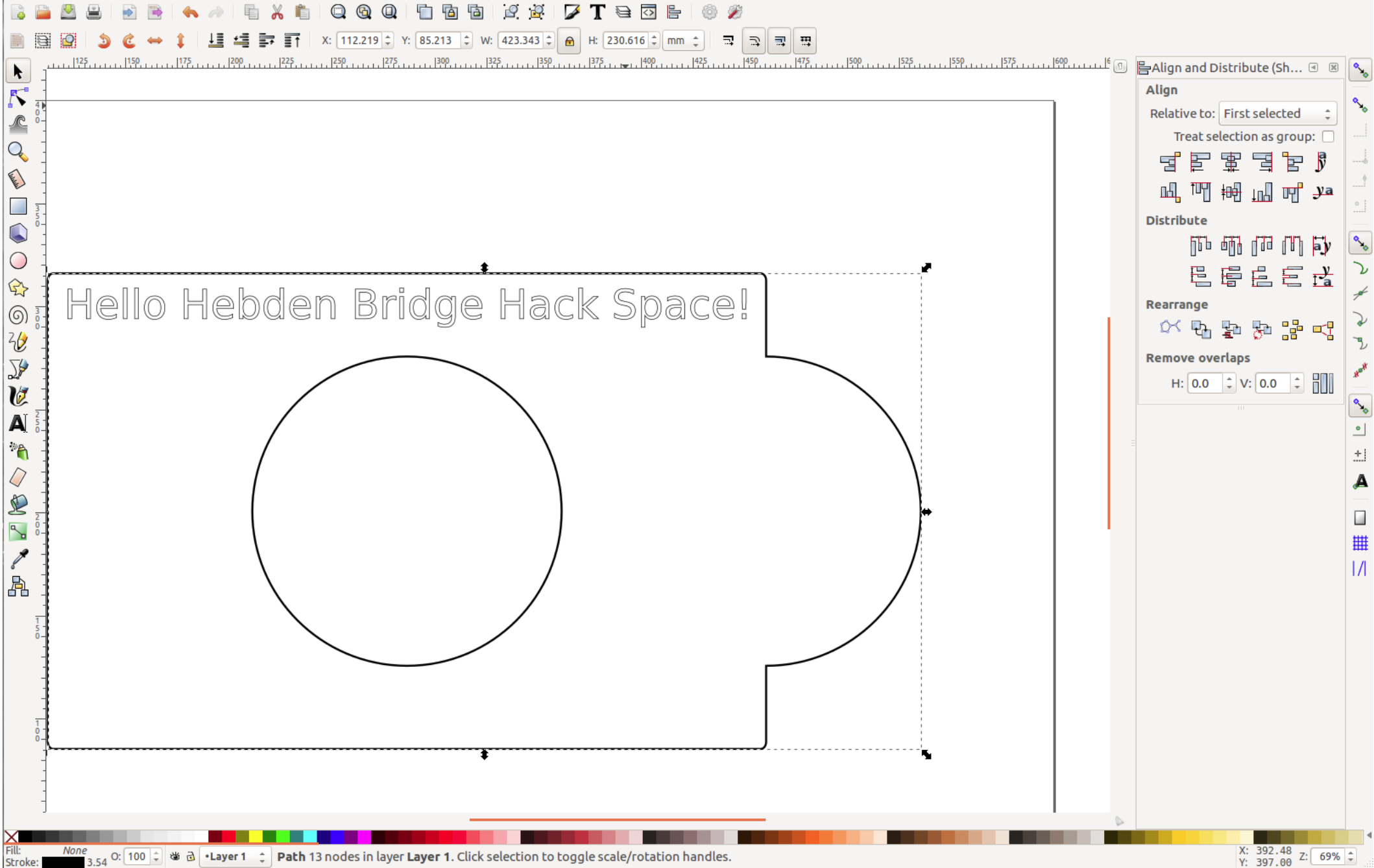
This is the union of the original shapes. Select both using Shft+Ctrl+*select 1st object*+*select 2nd object* then Path > Union

Cut Types

There are three main types of cut:
Cut through
Vector score
Raster engrave
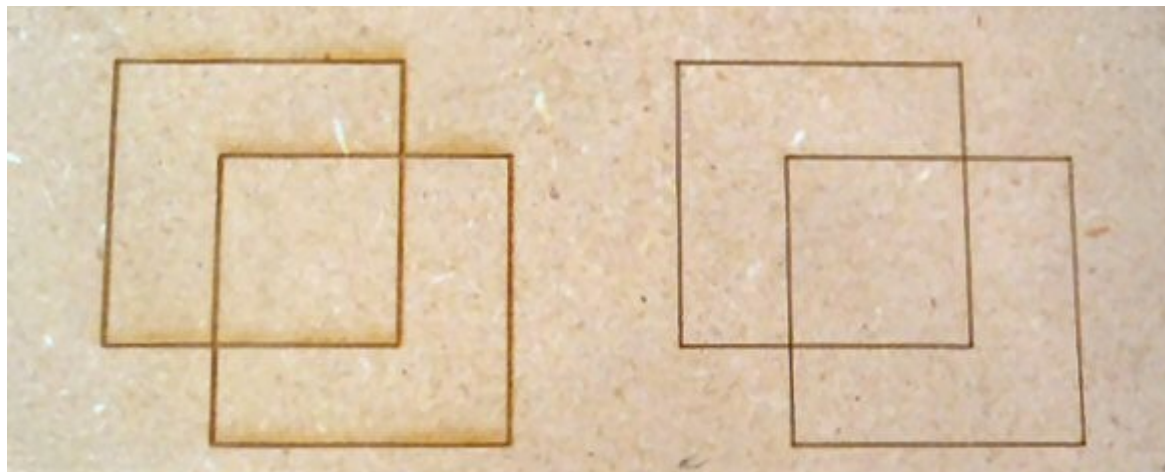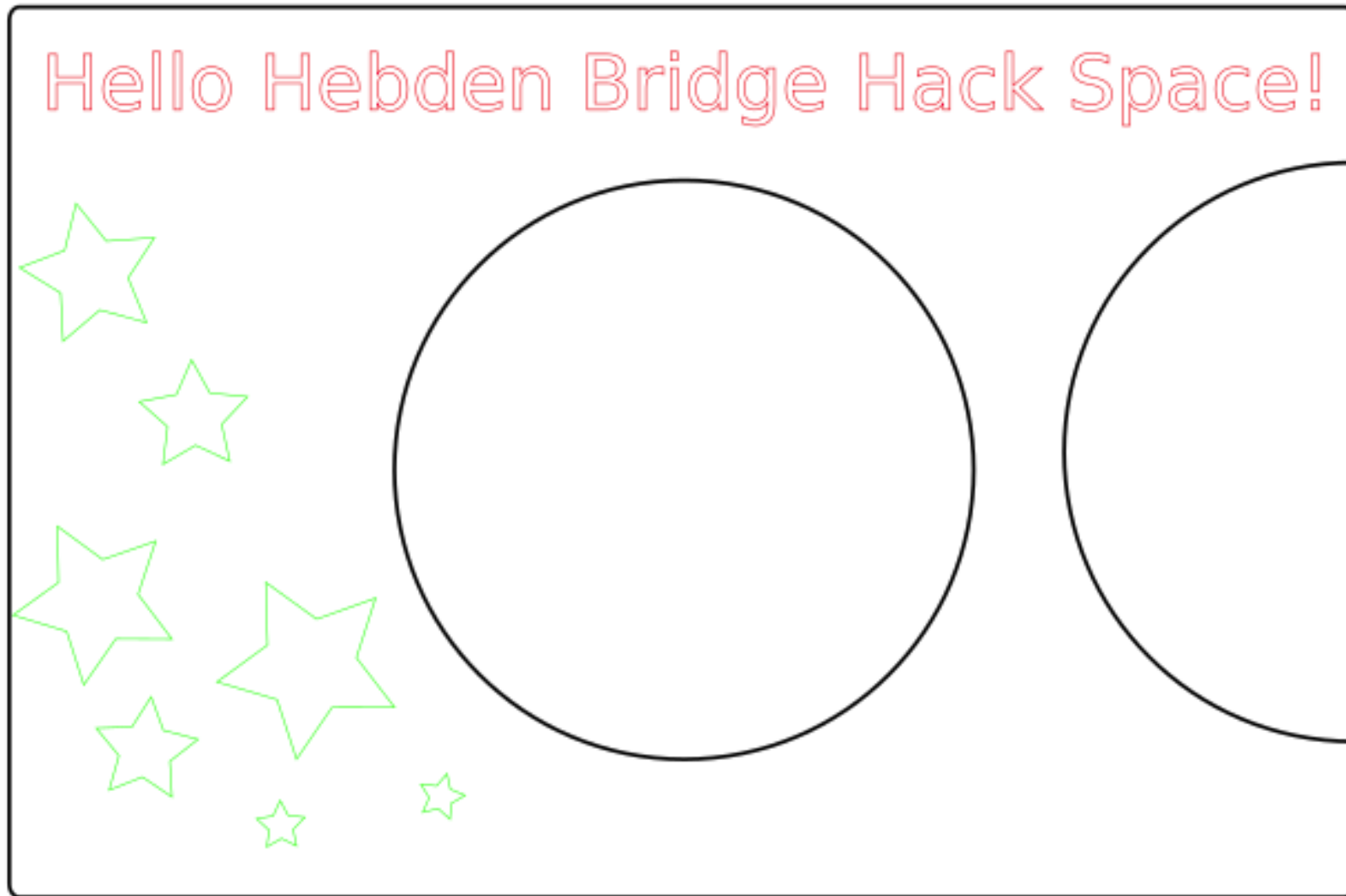
Different line colours are used to indicate the type of cut.

Black – Cut through
Red – Vector score
Green – Raster engrave
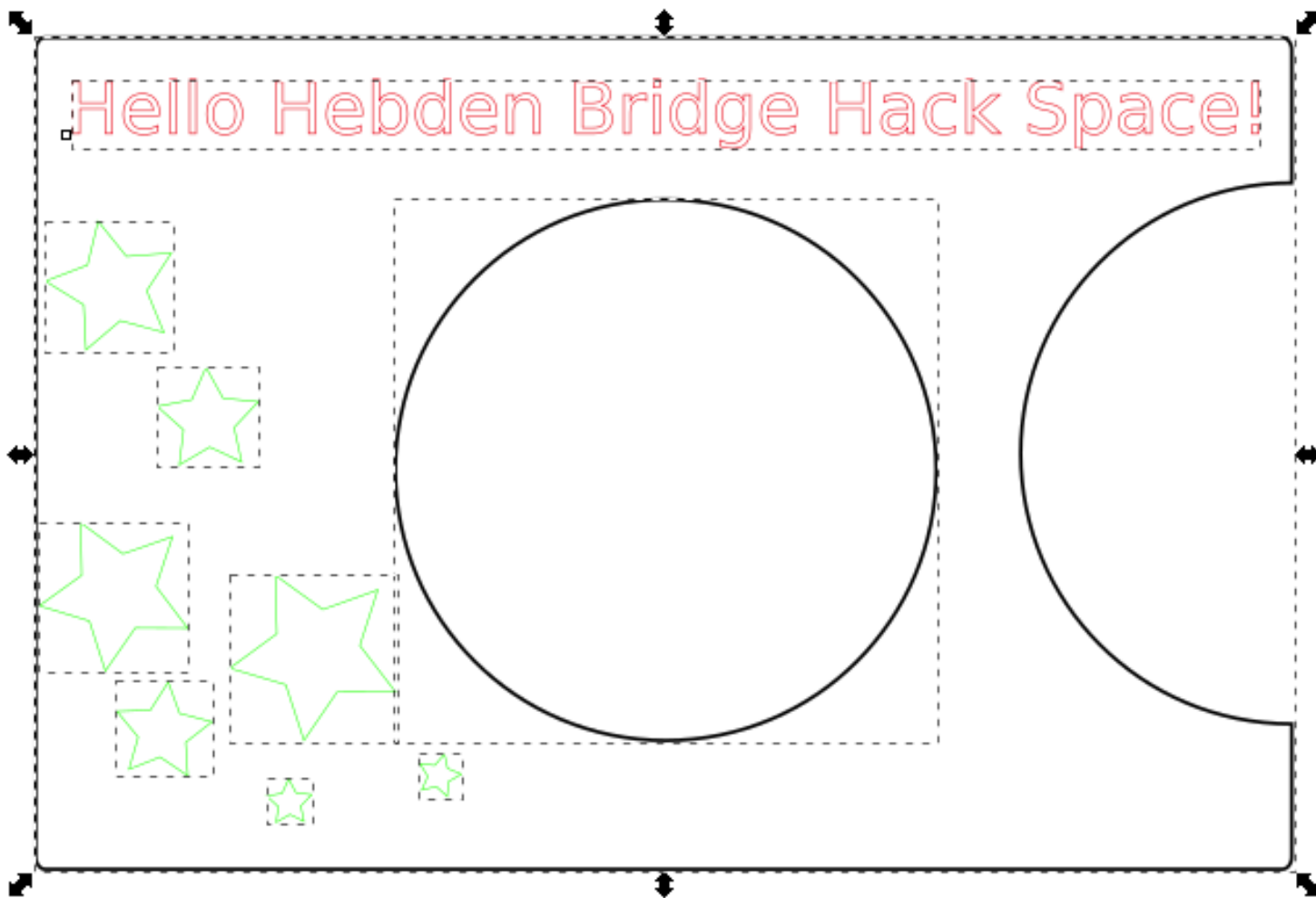
Before exporting to laser cutter software select everything with your mouse and

Path > Object to path

This keeps rounded corners rounded and enables exportation of text. If rounded corners are missing from design - you need to go back to Inkscape, convert all objects to paths (ctrl+shift+c) - this makes 'rectangles' with corners into paths that work.

Desktop Cutting Plotter

Options | Help

☐ use ROBO-Master type of spline output
☐ use LWPOLYLINE type of line output

Base unit | mm

Character Encoding | Latin 1

Layer export selection | All (default)

Layer match name |

Cancel | OK

1.Save completed file as dxf format.
2. de-select LWPOLYLINE + ROBO-MASTER
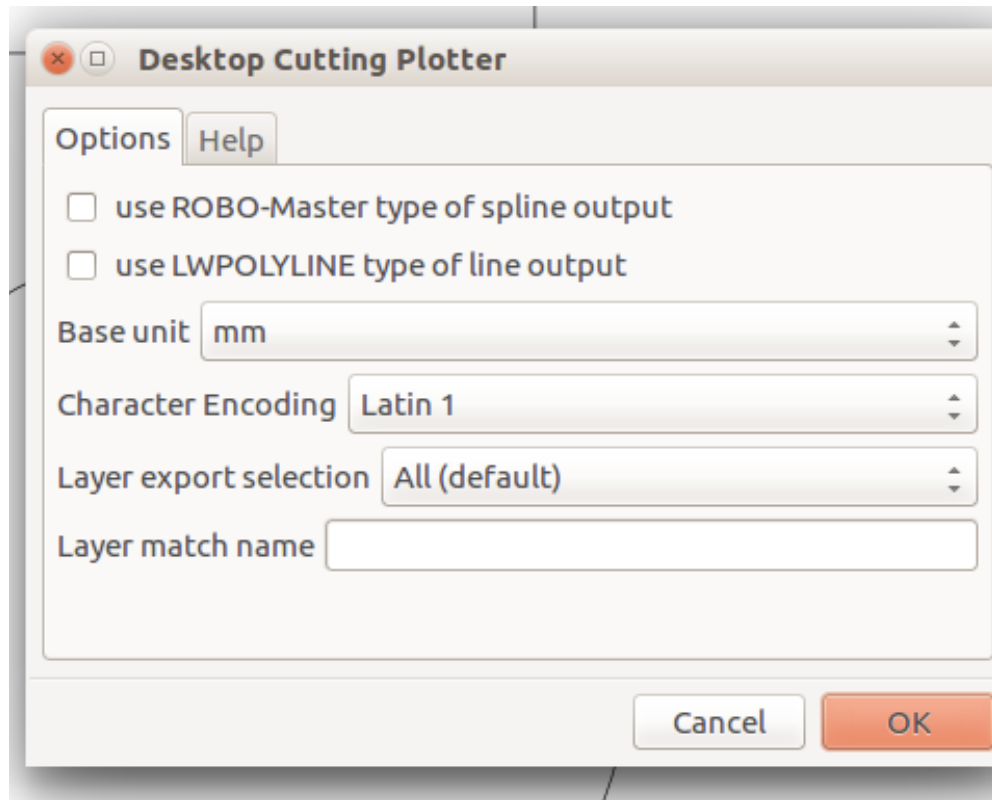3. Ensure the base unit is set to mm before competing save.
4. Save again as an Inkscape svg so you can revisit the drawing to make amendments if needed.
5. Copy this file to a memory stick and open and copy to the laser cutting PC.

Laser cutting software

Open laser cut software > File > Import > *chosen file*.

Check the physical dimensions of the file by *right click* > Set array output > *check properties.

For each cut/etch check the speed and power which the laser is set at for the material which it will be cut on.

Order the functions; anything etched should be first in the sequence and the cut outline should be last.

If text is included in the design – File > Unite lines. Repeat this for all text.

Speeds and powers

Speeds and Powers for each type of cut will depend on:

- Aesthetics

- Type of cut

- Type of material

- Age and condition of the laser

e.g. This is what we currently use at AB Open for 3mm clear colourless acrylic

	Speed	Power
Cut through (cut)	16	90
Vector score (cut)	40	15
Raster engrave (engrave)	150	40

**I would advise keeping a spreadsheet/table of cut speeds and powers for each material with dates.

Ready to cut?

Ready to be sent to the laser cutter? Download > Delete all > Download current.

Insert cutting material to bed of laser cutter and align the height of the bed with the groove in the laser using the tool.

On the laser cutter press Esc > Test. see if there is enough space for the design to be cut on this sheet of material.

If this is OK press the start/pause button.

USEFUL NOTE - Inkscape tends to output paths without joining them up. We can use a tool in the laser software to join said paths.

Select all > Tools > Unite lines.

Click OK for auto filled tolerance setting. This should join all paths that need joining - meaning things are cut in correct order
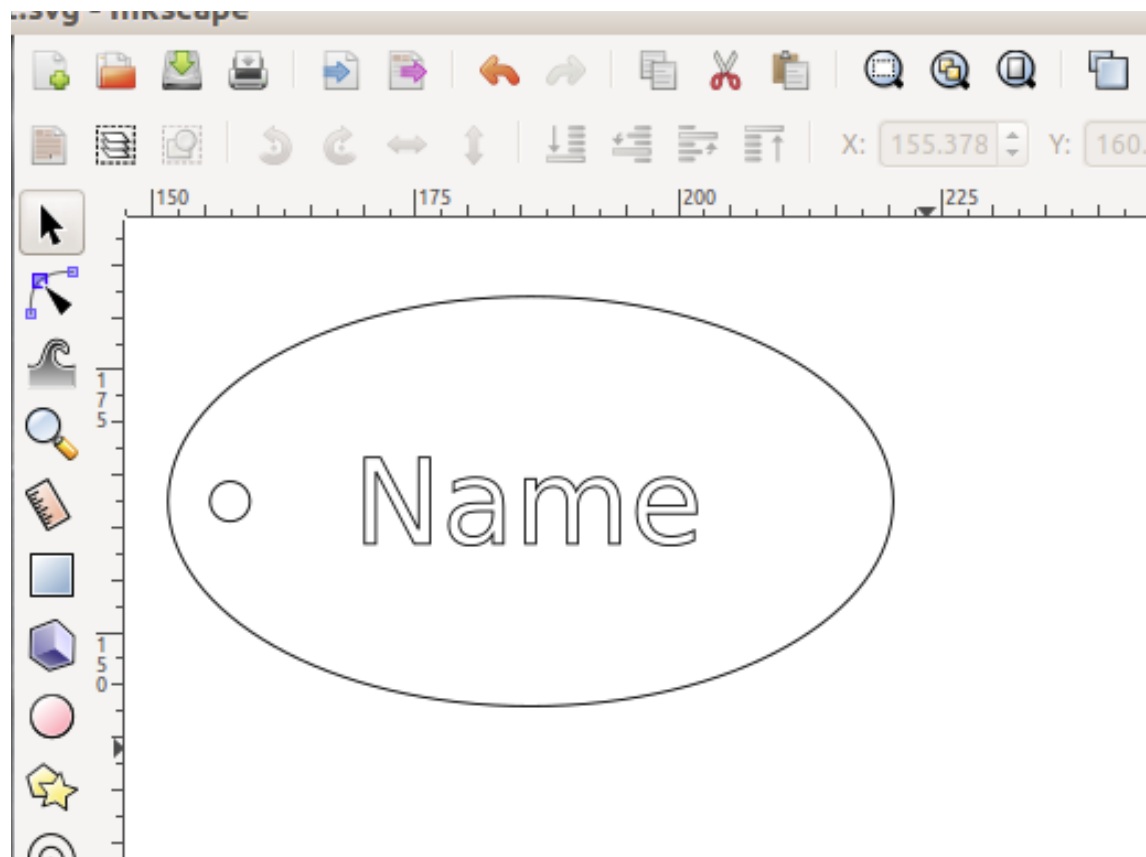
Have a go by making a personalised keyring!