# How to plot using Inkscape

FabLab Darmstadt

Version 1, April 2019

TECHNISCHE
UNIVERSITÄT
DARMSTADT

FABLAB
Darmstadt

## Contents

## 1 Settings summary

| Parameter | Value |
|---|---|
| Serial port | individual (i.e. *COM0* or */dev/ttyUSB0*) |
| Command language | HPGL |
| Resolution X | 1000,0 |
| Resolution Y | 1000,0 |
| Pen number | 0 |
| Pen force | ignored |
| Pen speed | ignored |
| Rotation | 90° |
| Overcut | 0,5-1,0 mm |
| Tool offset correction | 0,25 mm |
| Auto align | see chapter 4 |

**Table 1.1:** Inkscape export settings

| Parameter | Value |
|---|---|
| Speed | 25 mm/s recommended, more possible |
| Force | 75 g |

**Table 1.2:** Plotter hardware setup

## 2 Preparing your data

1. Select everything: *Edit* → *Select All* (*ctrl*+*a*)
2. Ungroup everything: *shift*+*ctrl*+*g*, repeat until all groups are dissolved.
3. Convert all objects to paths: *Path* → *Object to Path* (*shift*+*ctrl*+*c*)
4. If there are combined paths, break them apart: *Path* → *Break Apart* (*shift*+*ctrl*+*k*)
5. Rearrange the object order:
   - *Object* → *Objects...*
   - Select the objects in the list to identify them. You can skip through the list fast using the arrow keys.
   - The plotter will cut the objects in the order seen here. Change the order to minimize the required movements from one object to another.

6. optionally: Resize the page to your objects: *Edit* → *Select All* (*ctrl+a*), *Edit* → *Resize Page to Selection* (*shift+ctrl+r*)

## 3 Setting up the plotter

### Inserting the material

1. Move up the levers at the back of the plotter if not already.

2. Insert the material.

3. Slide the two rolls, that press down the material, so they both are above the material. You can grab them by the levers at the back side.

4. Align the material.

5. Push down the two levers to lock the position of the material.


**Figure 3.1:** Interface of the plotter

### Plotter settings

1. Set the speed with the *S+/S-* buttons. 25 mm s$^{-1}$ gives the best results, but faster settings may work, too.

2. Set the pressure to 75 g with the *P+/P-* buttons. This is the optimal value for *Oracal 751C* (the foil available at FabLab Darmstadt). Other materials may require different values.

3. Set the desired origin for cutting. The origin will be the lower right corner of your object or page:

- Press *Off-line*
- Use the *P* and *S* buttons to move the knife to a the new origin.
- Press the ‚crossed arrows' button to confirm. This will exit the offline mode.

## 4 Setting up the plotting extension in Inkscape

1. Open the plotting extension: *Extensions* → *Export* → *Plot*
2. At the *Connection Settings* tab (Figure 4.1a) set the serial port. Leave all the other settings at their default value. You can find the correct port in the Windows Device Manager. For Linux see section 5.1.
3. At the *Plotter Settings* tab (Figure 4.1b) set both X and Y resolution to 1000 dpi, the pen number to 0 and the rotation to 90°. *Pen force* and *speed* will be ignored by the plotter. Instead set these parameters at the plotter itself.
4. At the *Plot features* tab (Figure 4.1c) set the desired overcut (0,5-1,0 mm, depending on the size of your objects). For small structures this should be small, for bigger structures plotted with higher speed you may choose higher values. *Auto align* will ignore the size of your page and instead move the contents to the plotters origin.
5. Click *Apply* to start plotting.

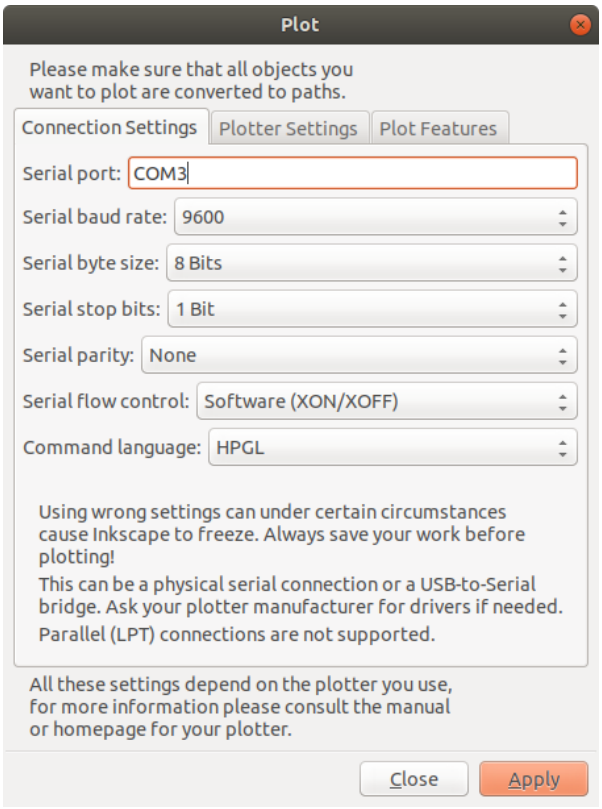


**Figure 4.1a:** Connection Settings

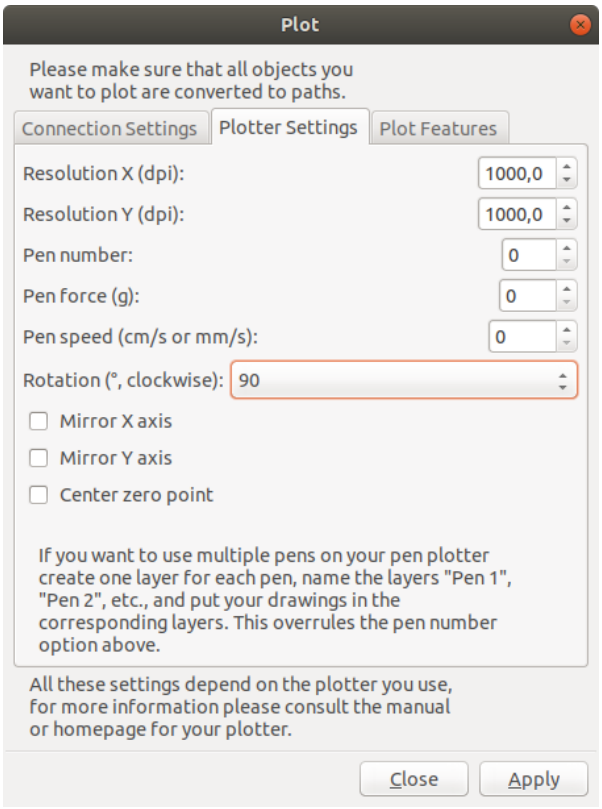


**Figure 4.1b:** Plotter Settings

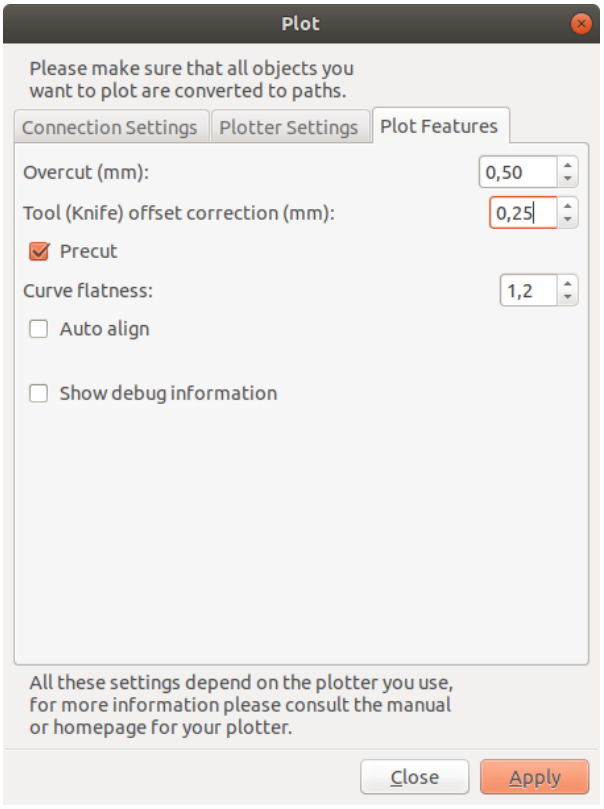


**Figure 4.1c:** Plot Features

# 5 Troubleshooting

## 5.1 Finding the correct serial port in Linux

Connect the plotter and open a terminal. Switch to the directory */dev/* using

```
cd /dev/
```

List all serial ports that are connected via USB:

```
ls | grep ttyUSB
```

There should be one device named *ttyUSB* with a number suffix, i.e. *ttyUSB0*. Use this as the serial port in Inkscape as */dev/ttyUSB<Number>*, i.e. */dev/ttyUSB0*.

## 5.2 Additional setup in Linux

If Inkscape cannot access the serial port you have to add the user running Inkscape (probably yourself) to the group *dialout*:

```
sudo adduser <username> dialout
```

In case Inkscape is telling you ”pySerial is not installed“, you have to install the corresponding package for your distribution. In Ubuntu this is *python-serial*:

```
sudo apt-get install python-serial
```

## 5.3 Fixing the Inkscape plotting extension

Without this fix the plotter will not lift the knife when returning to its origin after it has finished cutting, which will ruin your precious plot. We already applied this fix at the PC standing next to the laser cutter.

Open the Python script containing the plotting extension. In Windows this is *C:\Program Files\Inkscape\share\extensions\plotter.py*, in Linux it's */usr/share/inkscape/extensions/plotter.py*. Note: you need admin/root privilege in both Windows and Linux to edit this file.

Look for the last line in the function `convertToHpgl()`. It should be somewhere around line 107:

```
self.hpgl = hpglInit + self.hpgl + ';SP0;PU0,0;IN; '
```

Change this as follows and save the file.

```
self.hpgl = hpglInit + self.hpgl + ';PU0,0;IN; '
```

## 5.4 Fast blinking LED above *Off-line*

The plotter encountered an error. Press *Reset* and set up speed, pressure and origin again. This might happen, when you are trying to plot outside the range of the knife. Shrink your object or move the material and origin.