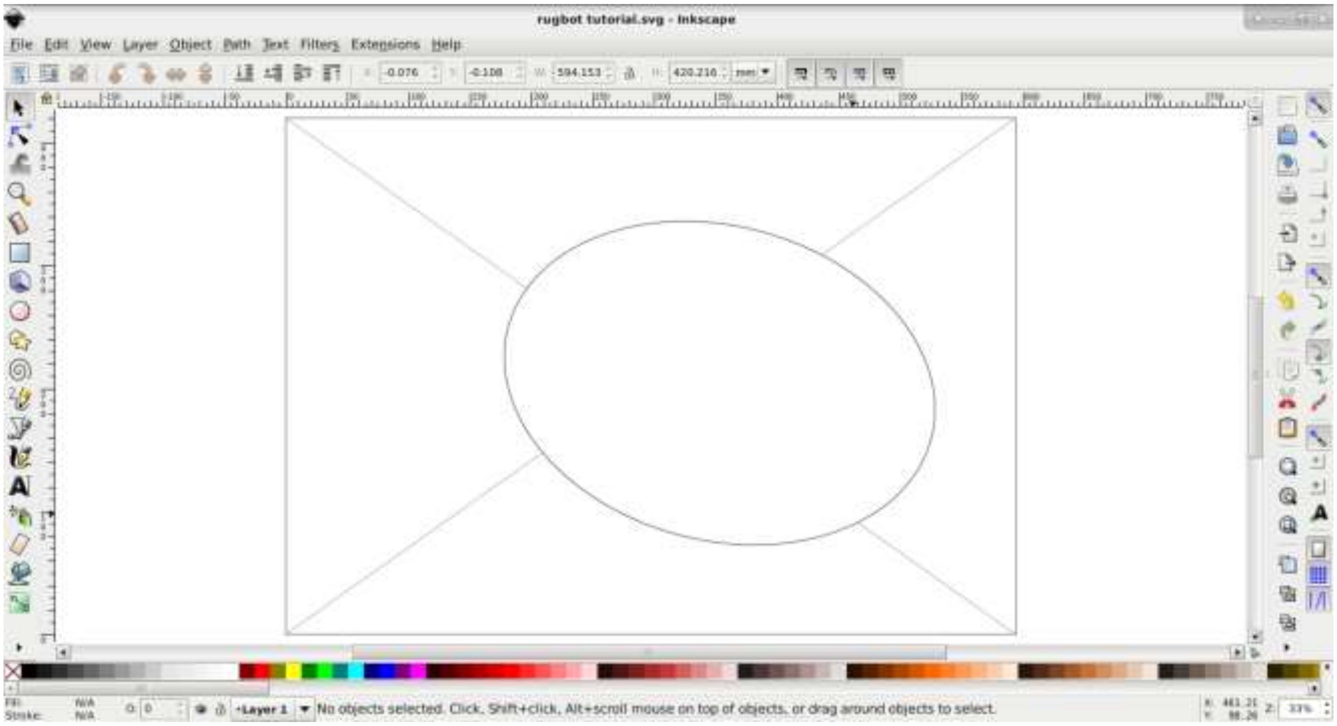
Inkscape Gcodetools Tangent A Axis Rug Tufting Tutorial

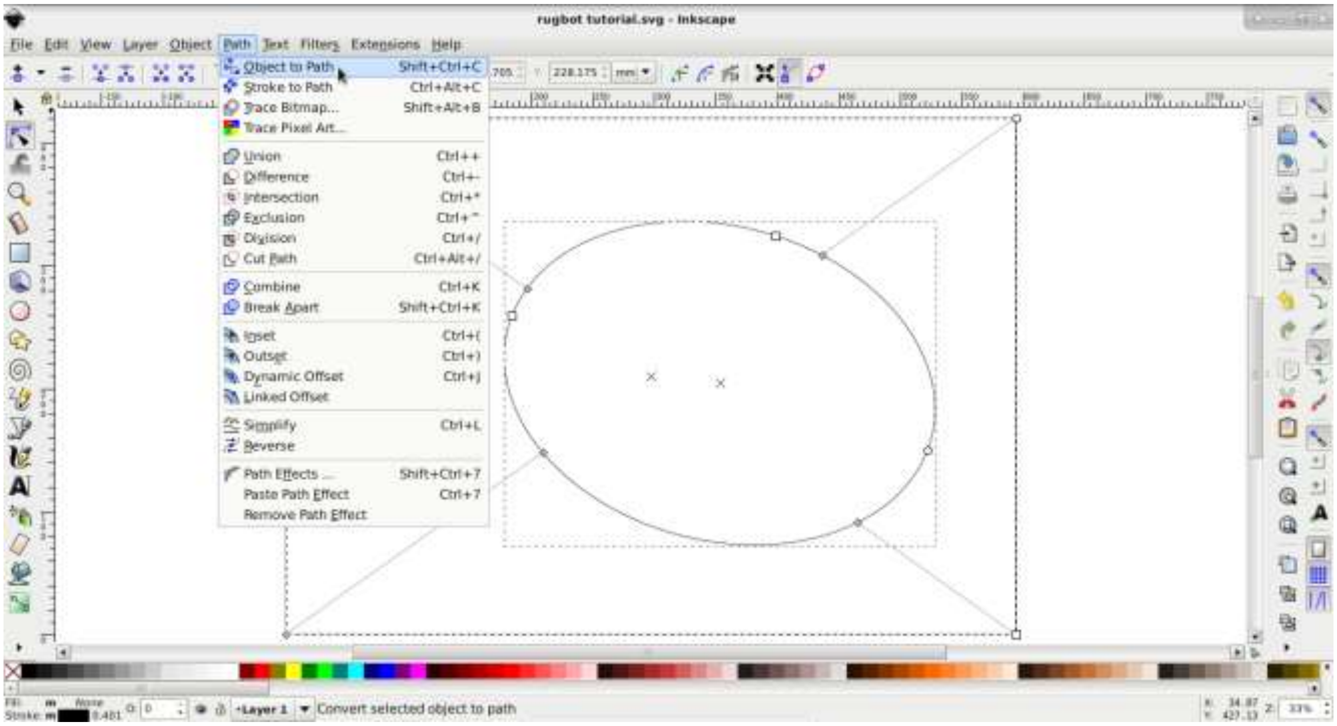
This is the method that I use make my designs and generate the computer code to operate my RugBot to make custom tufted rugs. While this is what I do for my project, the basic process may be helpful for other projects that would benefit from having A-axis control for whatever tool you are moving around. This project started a few years back and Gcodetools is no longer actively supported but it still works if you use a matching older version of Inkscape. To make this tutorial I did a clean install of Linux and then installed Inkscape 0.92.4. I believe that this is the most recent version before Inkscape upgraded to using Python 3 which causes some issues. There may be work arounds to use more recent versions of Inkscape but for my use having working Gcodetools is more important, and I would rather be making rugs instead of trouble shooting software. On other Windows computers that I have installed newer versions of Inkscape to try it out, I had issues with using Gcodetools even when I uninstalled the recent Inkscape and tried to use 0.92.4, but with a “clean” install it hasn’t been a problem.

This is not a tutorial on how to use Inkscape and those tutorials are abundant. If one knew how to code or make macros or whatever you could probably streamline the process, and please feel free to do it any way you would like.


rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
X: -0.076 Y: -0.108 W: 594.153 H: 420.216 mm
Fill: N/A
Stroke: N/A
Layer 1
X: 461.21
Y: 98.26
Z: 33%

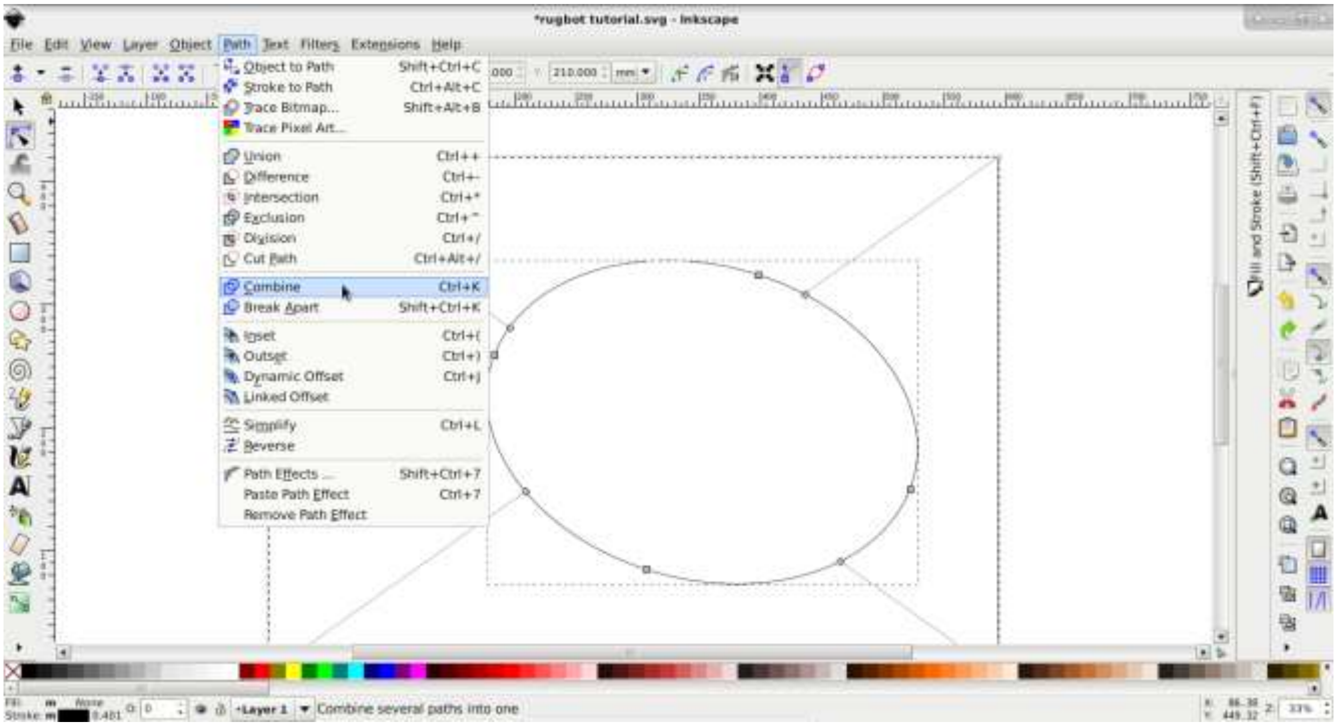
No objects selected. Click, Shift+click, Alt+scroll mouse on top of objects, or drag around objects to select.

I start with my design, which is usually more interesting than this one for this tutorial and do the following steps.



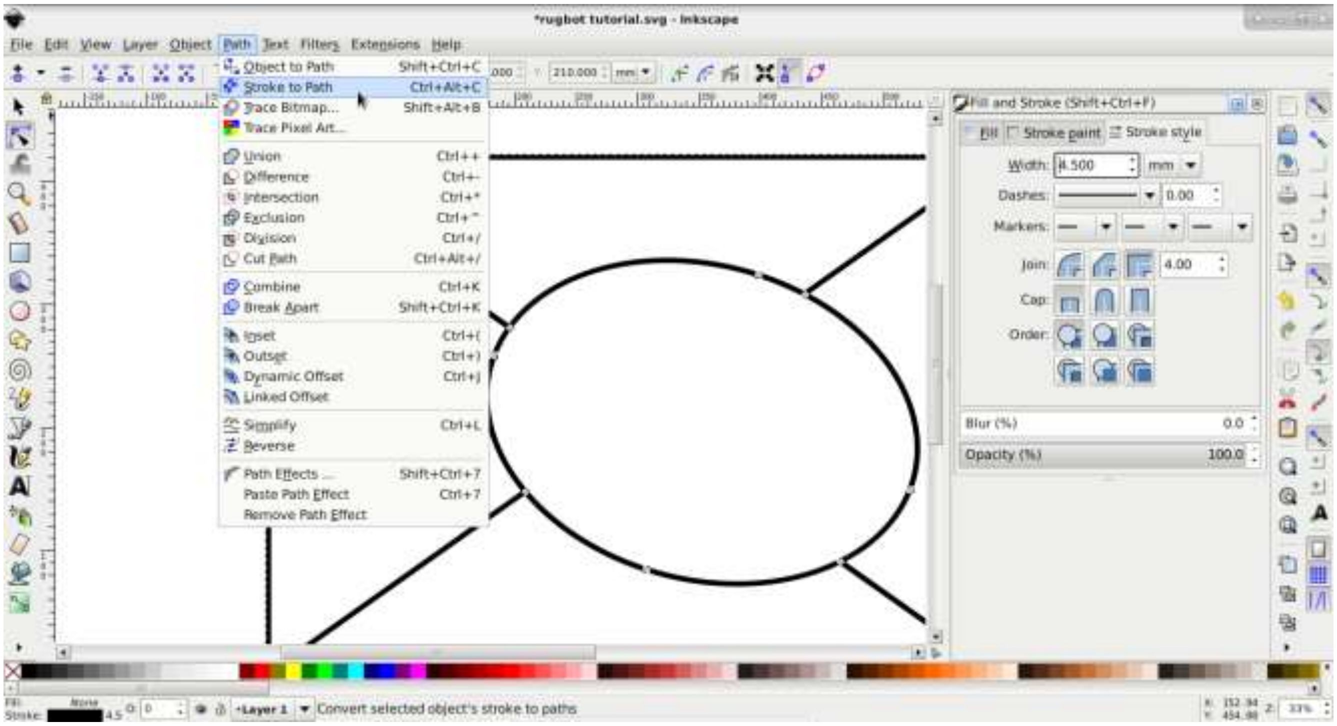
Convert selected object to path

You need to make sure that all the parts of the design are “paths” and not “objects” so select them all and use “Object to Path”.



Combine several paths into one

With all the paths still selected “Combine” them.



Width: 4.500 mm

Dashes: 0.00

Join: 4.00

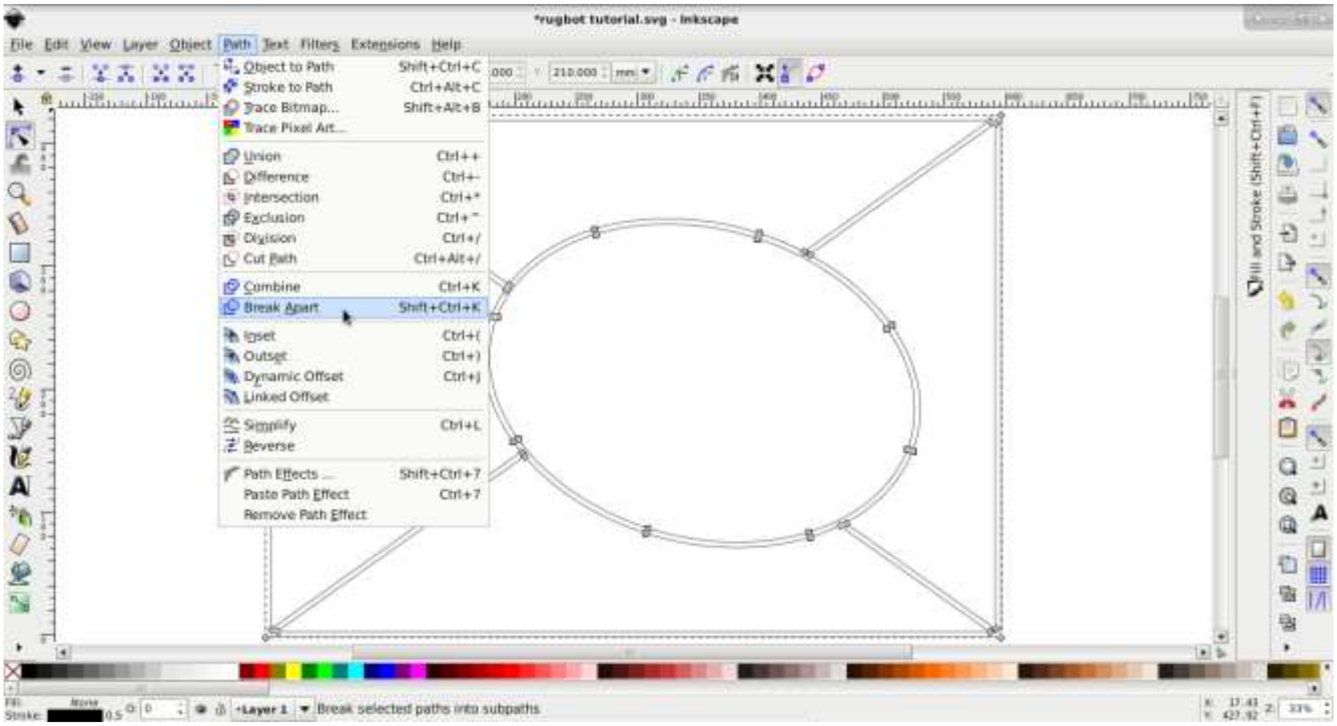
Blur (%) 0.0

Opacity (%) 100.0

Convert selected object's stroke to paths

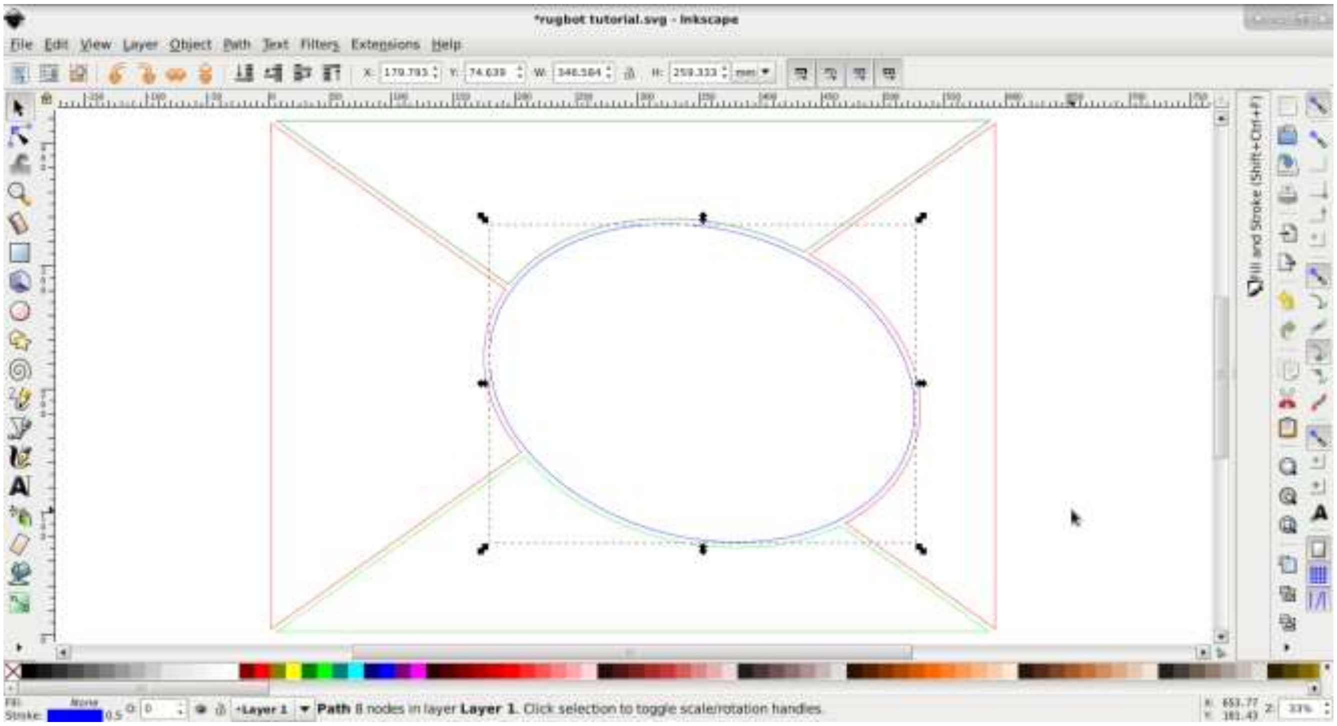
With everything still selected set the Stroke style width to 4.5mm, or whatever line spacing you need. Next select “Stroke to Path”, then back to stroke style and set the width to 0.5mm, Stroke paint to Black, and Fill to No Paint.

This may sound cryptic, but paths are defined by their centerline, and strokes are defined by their outer borders, so this allows you to change one line into two parallel lines.



Break selected paths into subpaths

Make sure everything is still selected and use “Break Apart” to ungroup the areas.


*rugbot tutorial.svg - Inkscape
File
Edit
View
Layer
Object
Path
Text
Filters
Extensions
Help
Fill and Stroke (Shift+Ctrl+F)

X: 170.793 Y: 74.639 W: 346.584 H: 259.333 mm

Fill: None
Stroke: 0.5
O: 0
•Layer 1

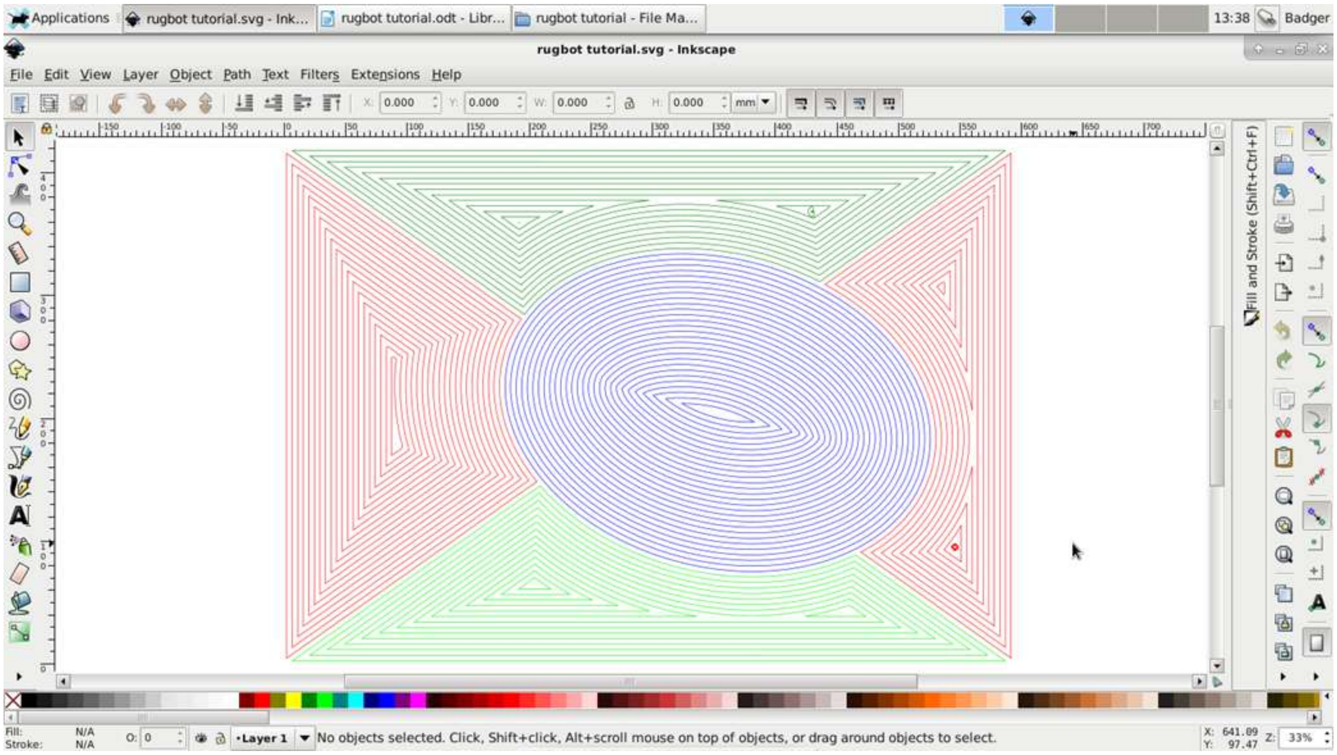
Path 8 nodes in layer **Layer 1**. Click selection to toggle scale/rotation handles.

X: 653.77 Y: 181.43 Z: 33%

You should now have the areas outlined and separated. I am not going to use the outer rectangle, so I deleted it, and I assigned random colors to each area to make the next steps easier to keep track of.

Select an area line and then repeatedly “Duplicate” and “Inset” to fill the area with concentric lines. This is easiest to do with the keyboard shortcuts “Ctrl+D” and “Ctrl+(”. You will need to set the offsets by going to the Edit tab and then Preferences, Behavior and Steps. Adjust the “Inset/Outset by:” to the amount you want, in my case 4.5mm but make sure you have the unit set to “px”. Yes, this should be “mm”, but I think you will find that “px” works.

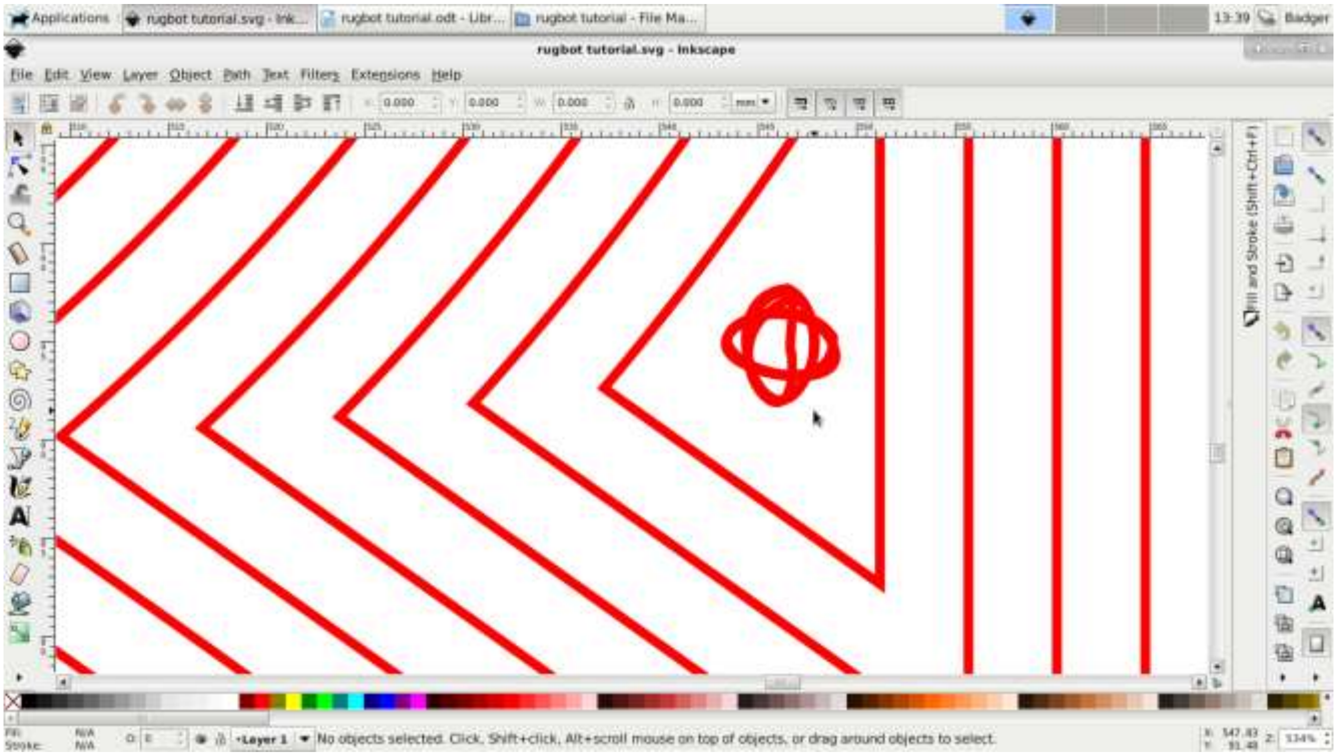
Be careful not to create duplicate lines that are not offset since they will cause duplicate moves later on. You will notice these if you move a node or part of a line and there is still a line there.



Applications
rugbot tutorial.svg - Ink...
rugbot tutorial.odt - Libr...
rugbot tutorial - File Ma...
13:38
Badger
rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
X: 0.000 Y: 0.000 W: 0.000 H: 0.000 mm
Fill and Stroke (Shift+Ctrl+F)
Fill: N/A
Stroke: N/A
O: 0
•Layer 1
X: 641.89
Y: 97.47
Z: 33%

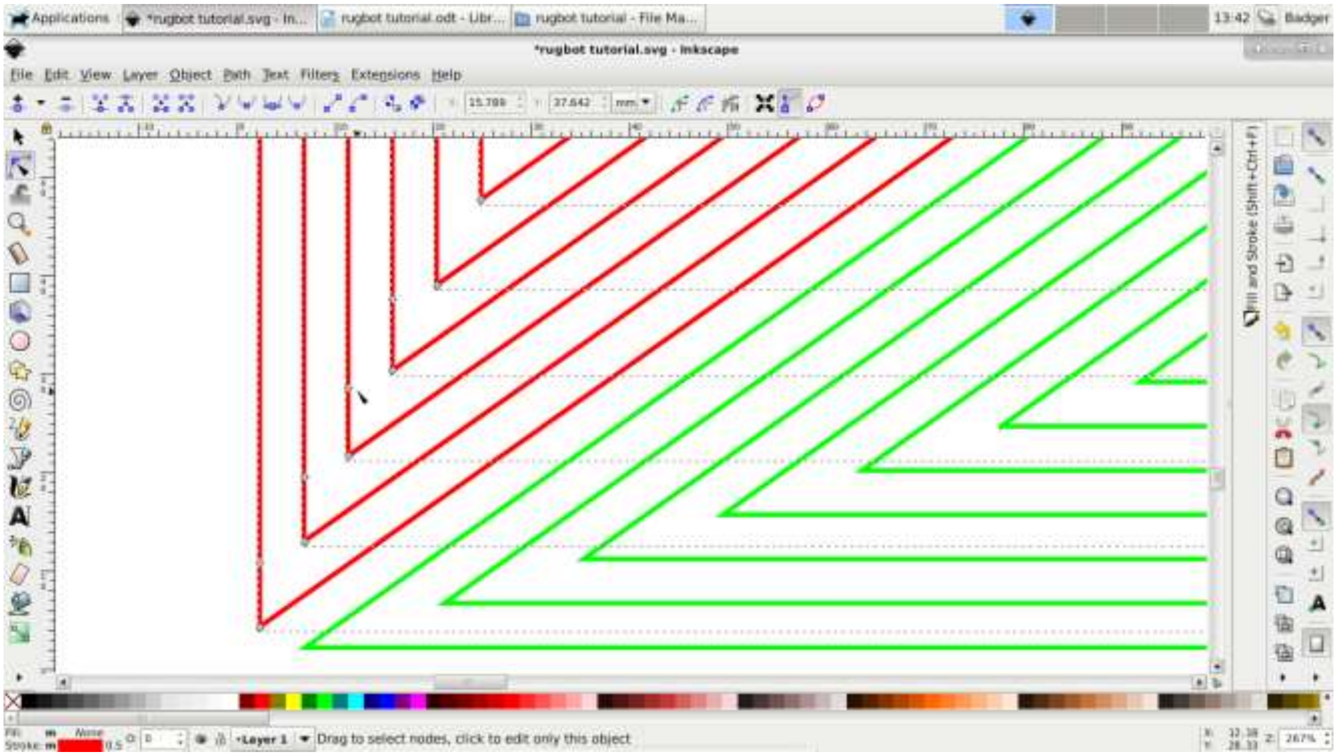
No objects selected. Click, Shift+click, Alt+scroll mouse on top of objects, or drag around objects to select.

You should end up with something like this.


Applications
rugbot tutorial.svg - Ink...
rugbot tutorial.odt - Libr...
rugbot tutorial - File Ma...
13:39
Badger
rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
Fill and Stroke (Shift+Ctrl+F)
Layer 1

No objects selected. Click, Shift+click, Alt+scroll mouse on top of objects, or drag around objects to select.

Look for odd results such as the centers of disconnected segment of the same area. This doesn't happen all the time, but it does happen. Delete the excess lines or they may cause duplicate machine moves later.


Applications
*rugbot tutorial.svg - In...
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rugbot tutorial - File Ma...
13:42
Badger
File Edit View Layer Object Path Text Filters Extensions Help
Fill and Stroke (Shift+Ctrl+F)
Layer 1

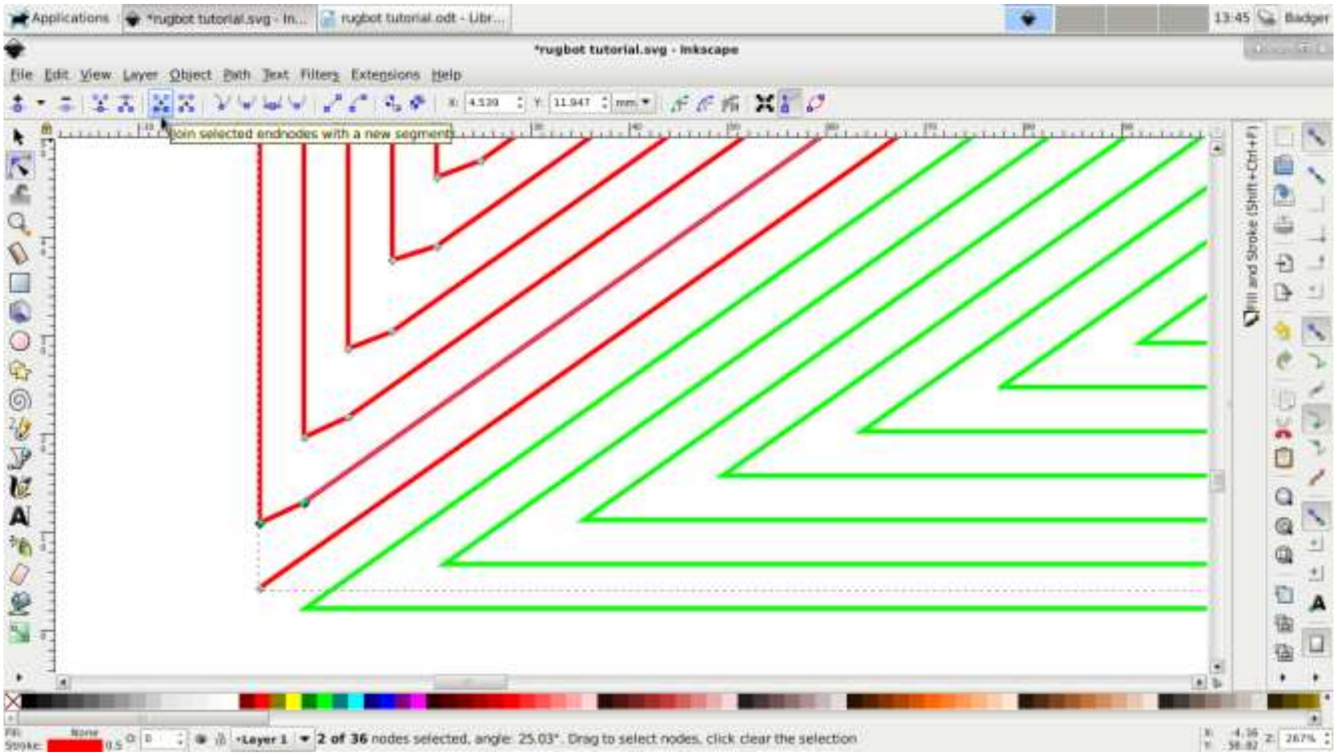
*rugbot tutorial.svg - Inkscape

X: 15.789 Y: 37.642 mm

Drag to select nodes, click to edit only this object

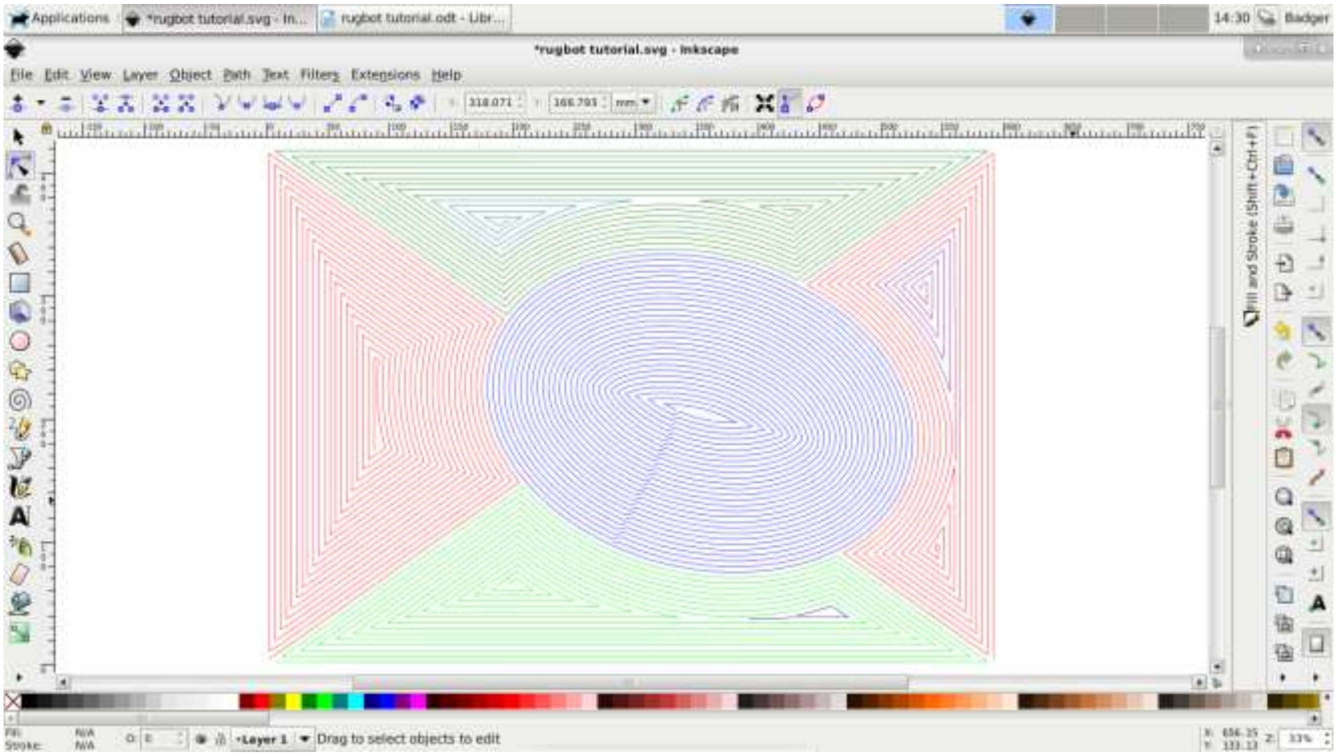
Fill: None
Stroke: 0.5
Z: 267%

While you could keep each line a separate path, I find it easier and quicker to stich the rug with the sub-paths connected together. Add extra nodes where you want to connect the sub-paths, break them apart with “Delete segment between two non-endpoint nodes”. You will have to repeat this many times so if you have a mouse or trackball with programmable buttons, it can assign the keyboard shortcuts to the buttons save youself much effort and time. (I use a Logitech M570)


Applications
*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
13:45
Badger
*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
X: 4.539
Y: 11.947
mm
Join selected endnodes with a new segment
Fill and Stroke (Shift+Ctrl+F)
Fill:
None
Stroke:
0.5
•Layer 1
267%

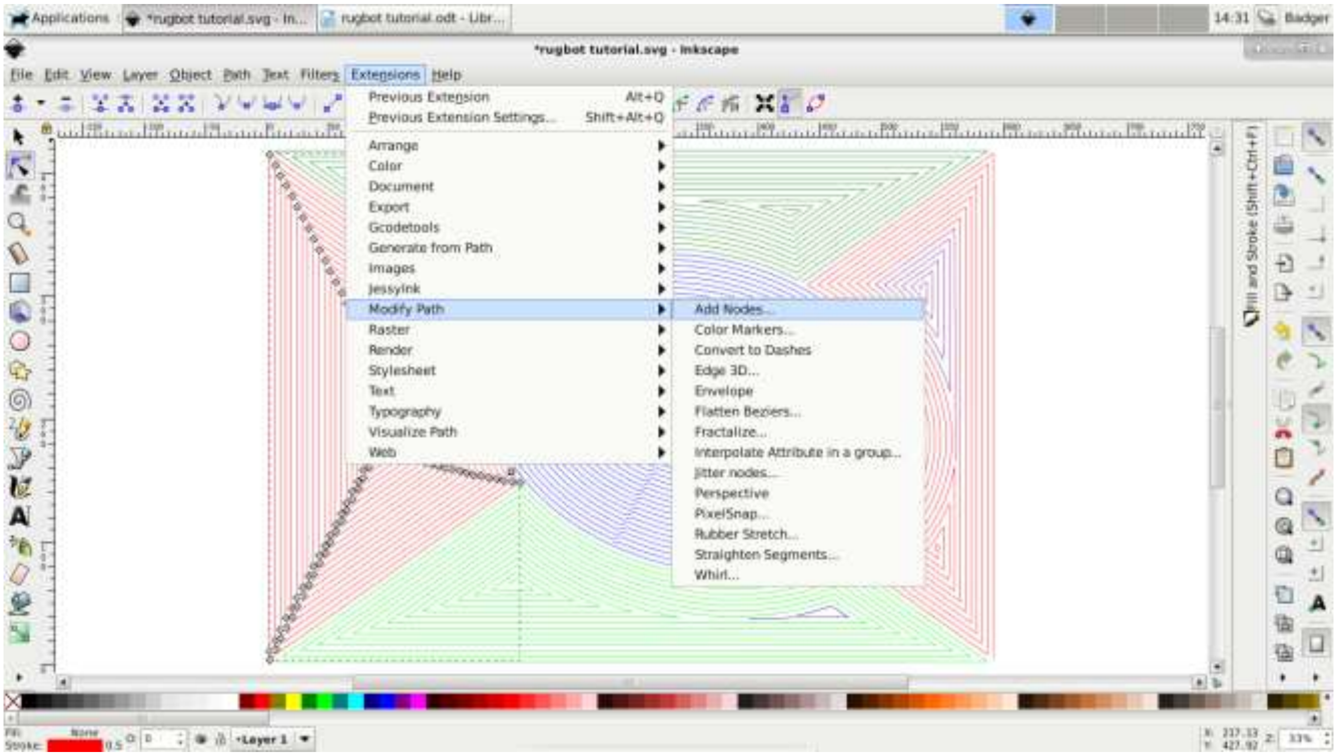
2 of 36 nodes selected, angle: 25.03°. Drag to select nodes, click clear the selection

Now connect the sub-paths together by selecting the end points and connecting them with “join selected endnodes with a new segment”. For making rugs the precision of this is not really significant and can be corrected later if needed.

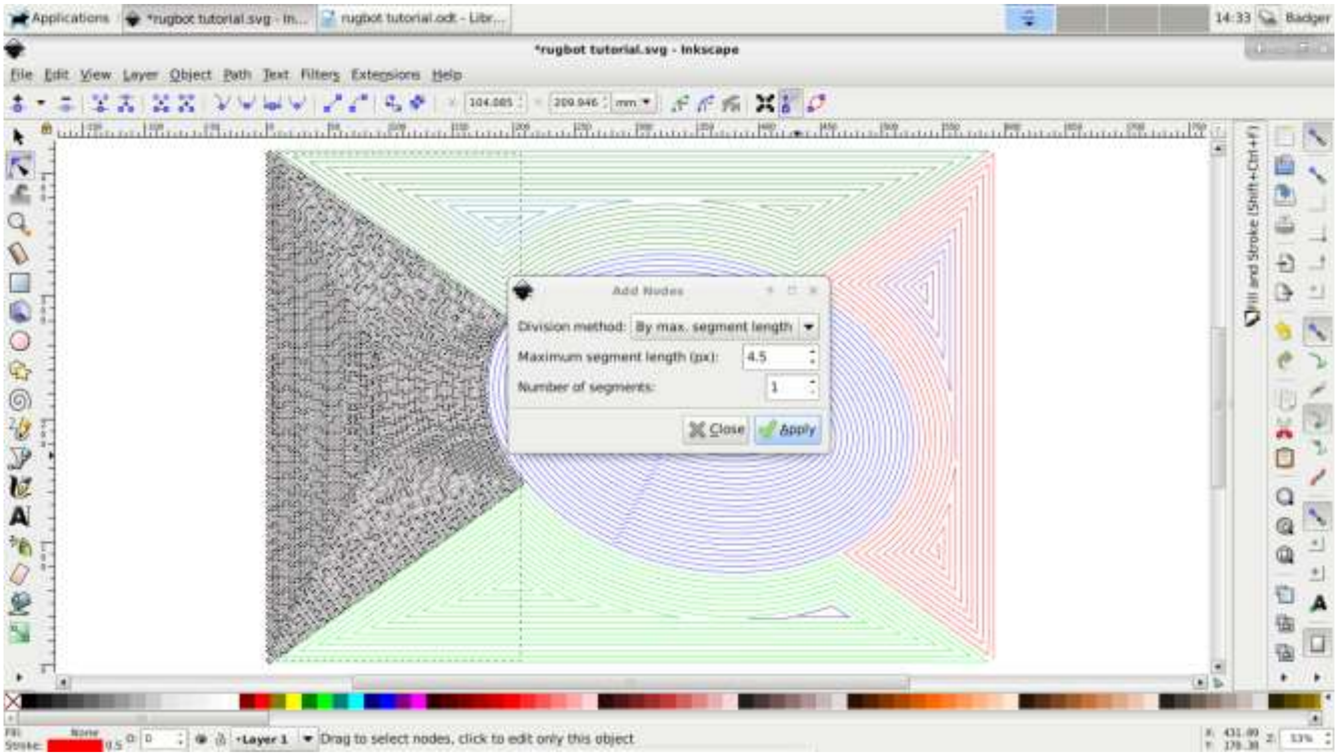


Drag to select objects to edit

In some cases, such as the top, right, and bottom sections of this example, you may end up with multiple sub-paths in any area. I like to select them and “Break Apart” from the larger path and assign them a contrasting color. This may or may not be significant with whatever you are doing.



Even though at this point you can go ahead and generate Gcode files I go ahead and do the following steps to change the nodes to “smooth” which in combination with the correct Gcode can make your machine move smoothly without stopping at the end of every segment. Select an area and add some nodes by going to Extensions, then Modify Path, and then Add Nodes.



Applications
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14:33
Badger
File Edit View Layer Object Path Text Filters Extensions Help
Fill and Stroke (Shift+Ctrl+F)
Layer 1

*rugbot tutorial.svg - Inkscape

Add Nodes

Division method: By max. segment length

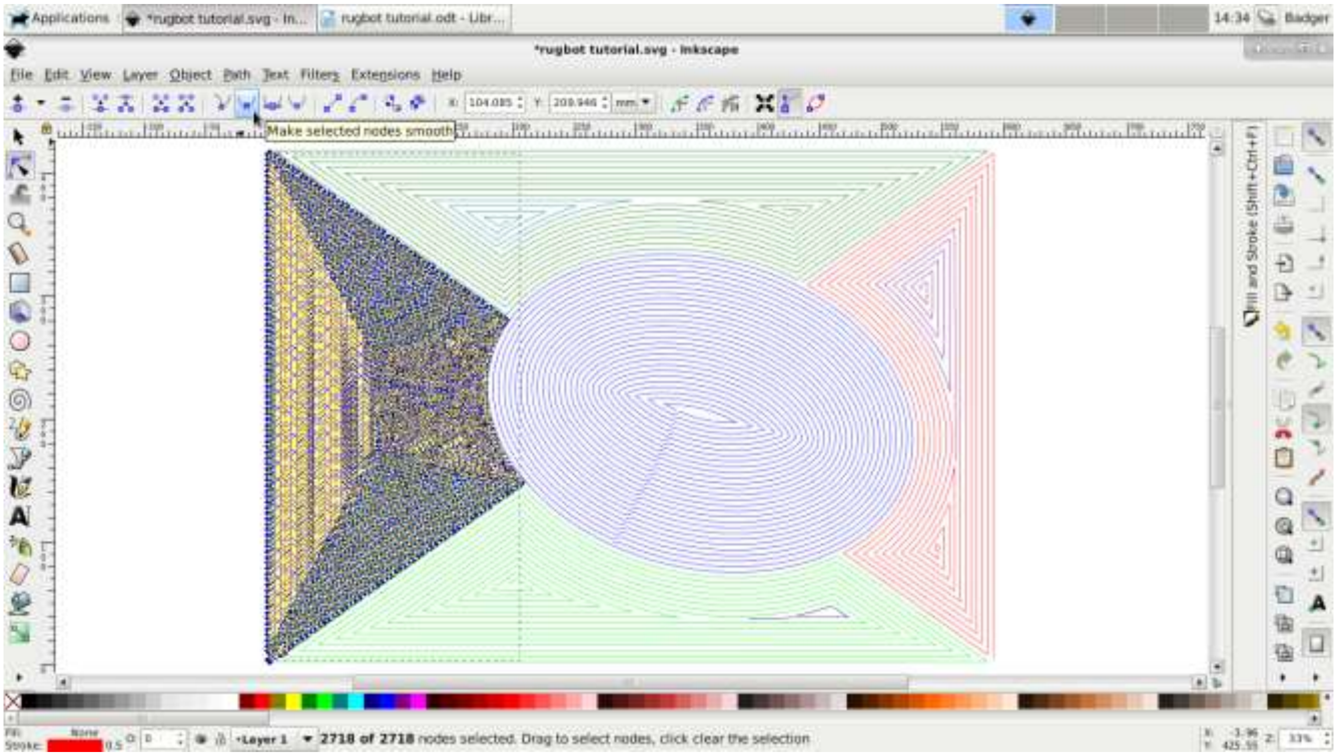
Maximum segment length (px): 4.5

Number of segments: 1

Close Apply

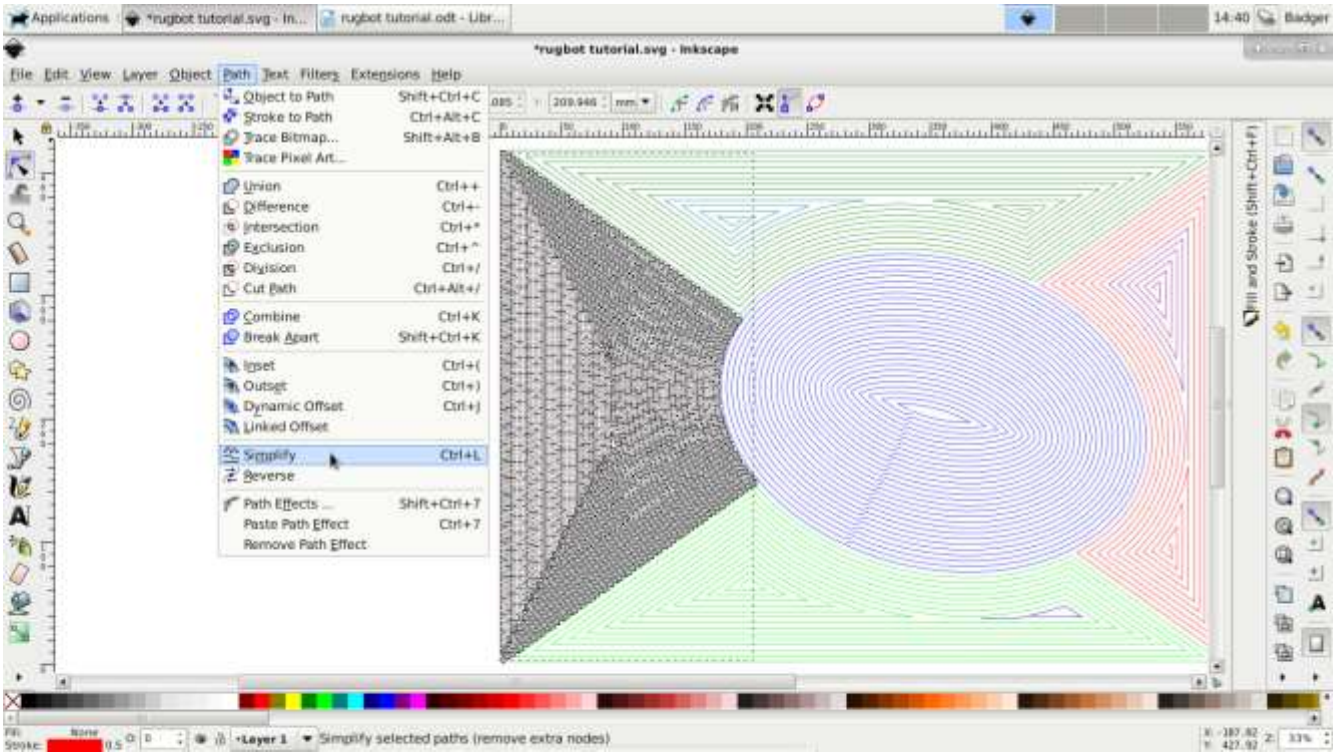
Drag to select nodes, click to edit only this object

You can play around with how many nodes you add but I usually use 4.5 and ignore the fact that units are stated as “px” when they are really “mm”. This may start to over-stress your computer so you may want to work with small areas, and it may help to zoom into an area so less nodes are displayed, even thought they are all computed. You also want to start saving frequently because we have now entered the realm of potential computer crashes.


Applications
*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
14:34
Badger
*rugbot tutorial.svg - Inkscape
File
Edit
View
Layer
Object
Path
Text
Filters
Extensions
Help
X: 104.085
Y: 208.946
mm
Make selected nodes smooth
Fill and Stroke (Shift+Ctrl+F)
Fill:
None
Stroke:
0.5
•Layer 1
33%

2718 of 2718 nodes selected. Drag to select nodes, click clear the selection

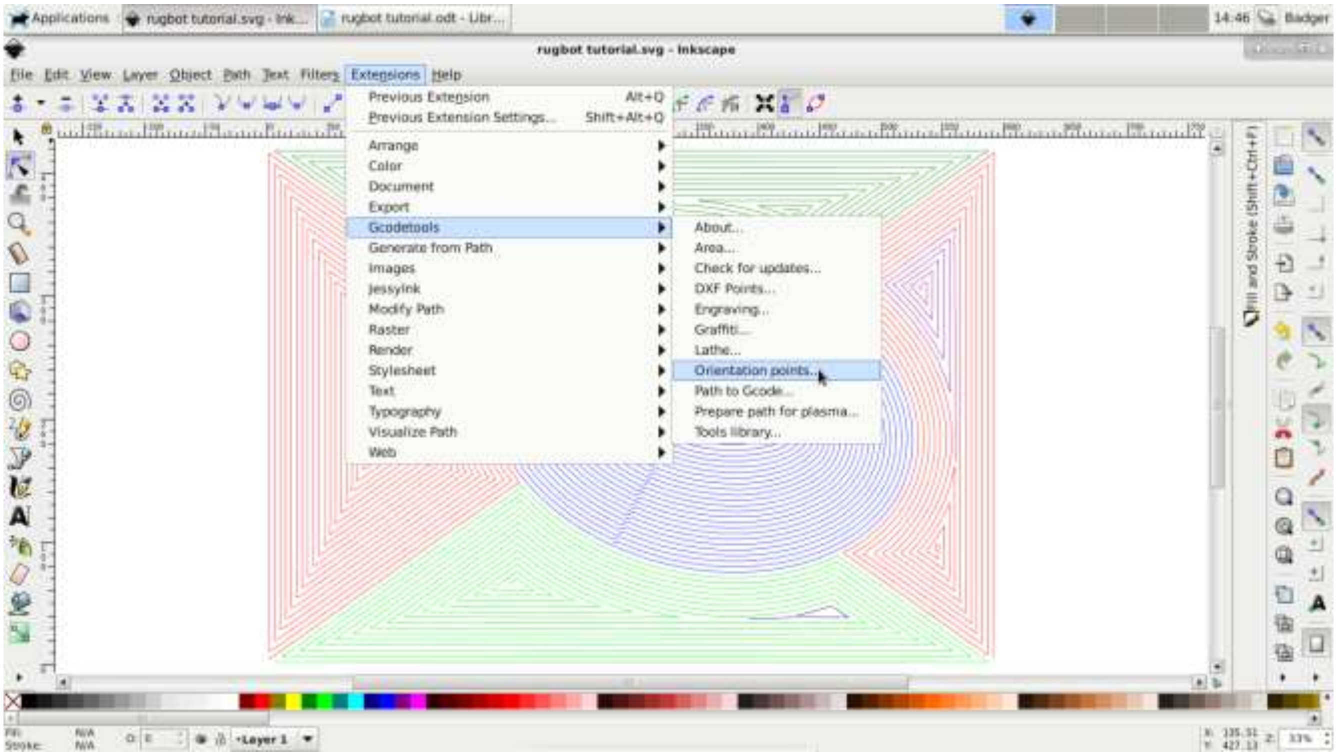
While you have all the new nodes selected make them smooth by using the icon on the tool bar or “Shift+S”.



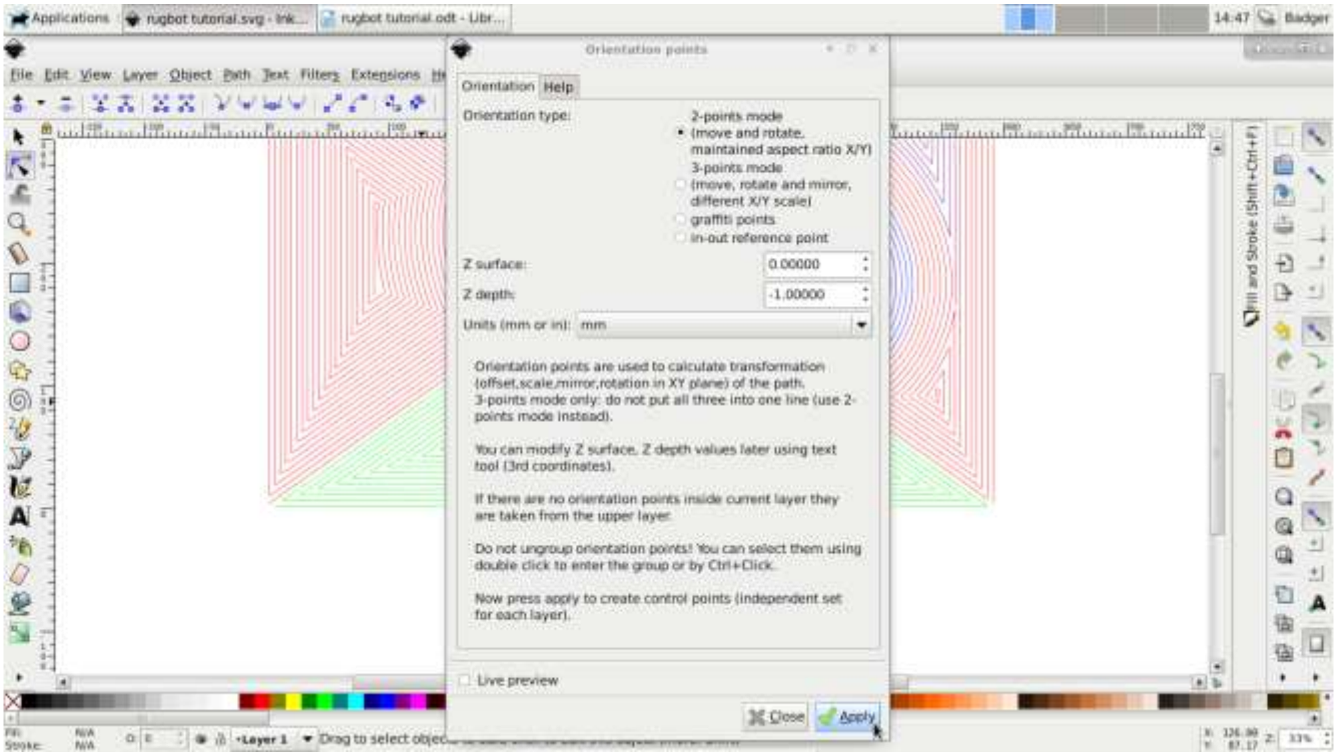
Simplify selected paths (remove extra nodes)

While you could generate your gcode from this path with its many nodes or you can reduce the number of nodes, which will reduce the number of lines of Gcode by using “Simplify” in the Path tab. The amount you simplify can be adjusted by opening Preferences and selecting “Behavior”, and to the right should be “Simplification threshold”. I use 0.0001 but you can try other values and see what happens. This may change some of the node types, so you want to make sure they are all selected and make them smooth again.

At this point you may want to check the way your path looks and make any edits as needed. Sharp angles sometimes get flared out some and need to be moved, and sometimes arcs get too close in the center of an area.



It is now time for Gcodetools! First go to “Extensions”, then “Gcodetools”, and then then “Orientation points”.


Applications
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rugbot tutorial.odt - Libr...
14:47
Badger
File Edit View Layer Object Path Text Filters Extensions He
Fill and Stroke (Shift+Ctrl+F)
Layer 1
Drag to select objec

Orientation points

Orientation | Help

Orientation type:
● 2-points mode (move and rotate, maintained aspect ratio X/Y)
○ 3-points mode (move, rotate and mirror, different X/Y scale)
○ graffiti points
○ in-out reference point

Z surface: 0.00000

Z depth: -1.00000

Units (mm or in): mm

Orientation points are used to calculate transformation (offset,scale,mirror,rotation in XY plane) of the path. 3-points mode only: do not put all three into one line (use 2-points mode instead).

You can modify Z surface, Z depth values later using text tool (3rd coordinates).

If there are no orientation points inside current layer they are taken from the upper layer.

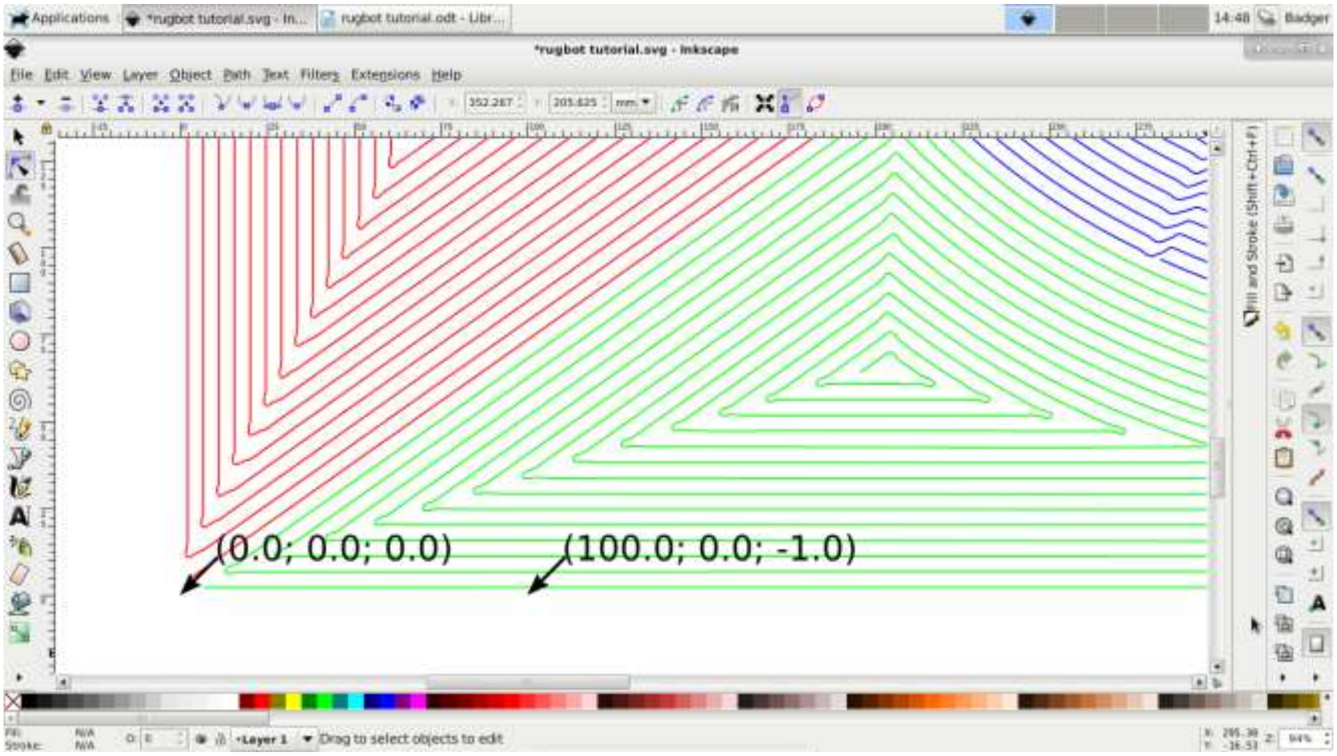
Do not ungroup orientation points! You can select them using double click to enter the group or by Ctrl+Click.

Now press apply to create control points (independent set for each layer).

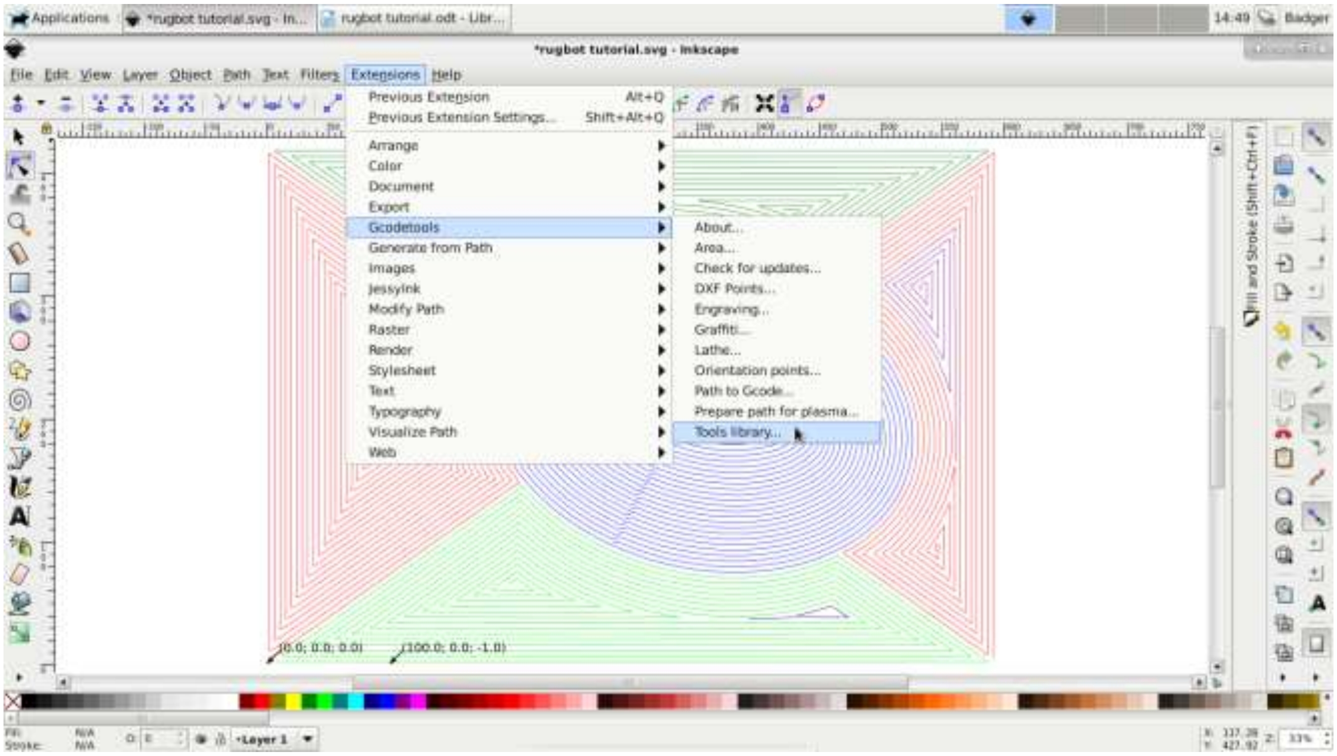
□ Live preview

Close | Apply

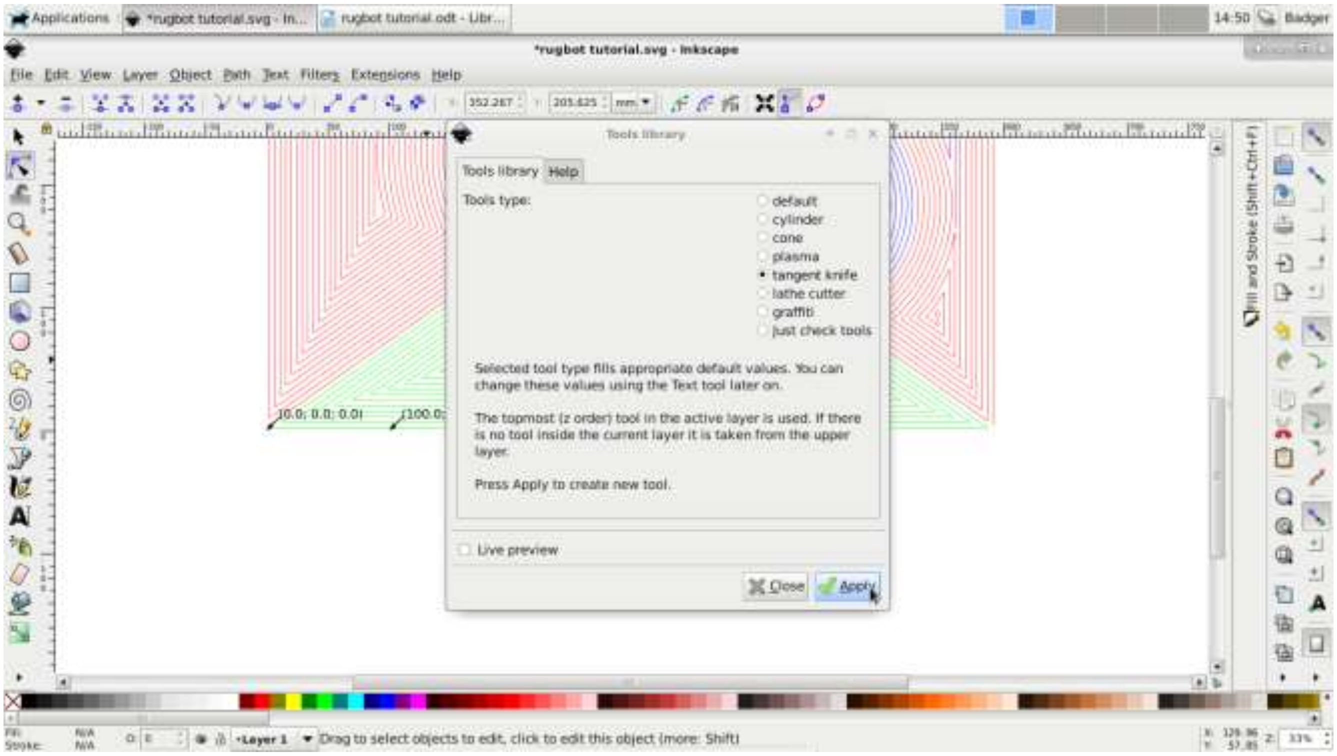
In most cases you can accept the defaults. In my process I don’t actually use any Z moves or code, but I don’t bother to delete or alter them since they have no impact on my work.


Applications
*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
14:48
Badger
*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
352.267
205.625
mm
Fill and Stroke (Shift+Ctrl+F)
(0.0; 0.0; 0.0)
(100.0; 0.0; -1.0)
Layer 1
Drag to select objects to edit
94%

The orientation points are actually text that can be moved or edited as needed (I don't) but doing so may have impact on what your machine does later.



Next you need to set what tool you want Gcodetools to use when generating the Gcode.


*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
Tools library

Tools library | Help

Tools type:

○ default
○ cylinder
○ cone
○ plasma
● tangent knife
○ lathe cutter
○ graffiti
○ just check tools

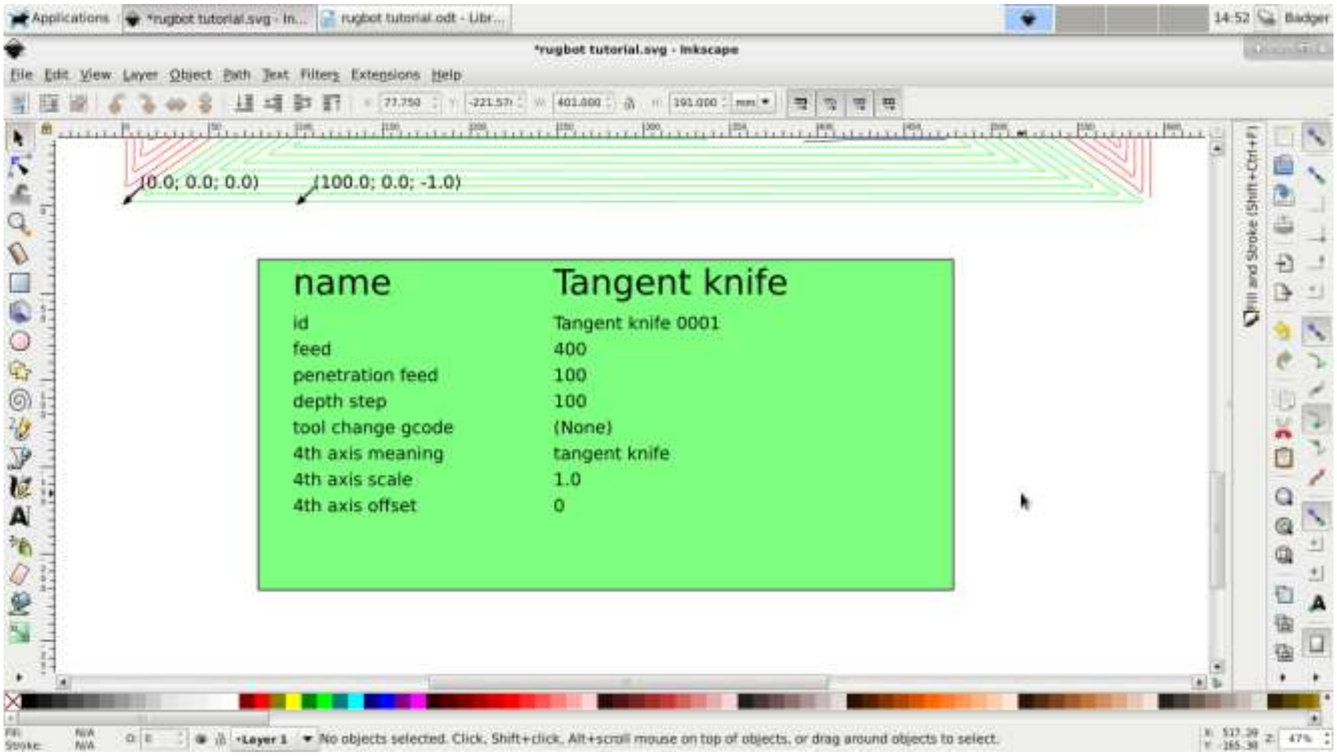
Selected tool type fills appropriate default values. You can change these values using the Text tool later on.

The topmost (z order) tool in the active layer is used. If there is no tool inside the current layer it is taken from the upper layer.

Press Apply to create new tool.

□ Live preview

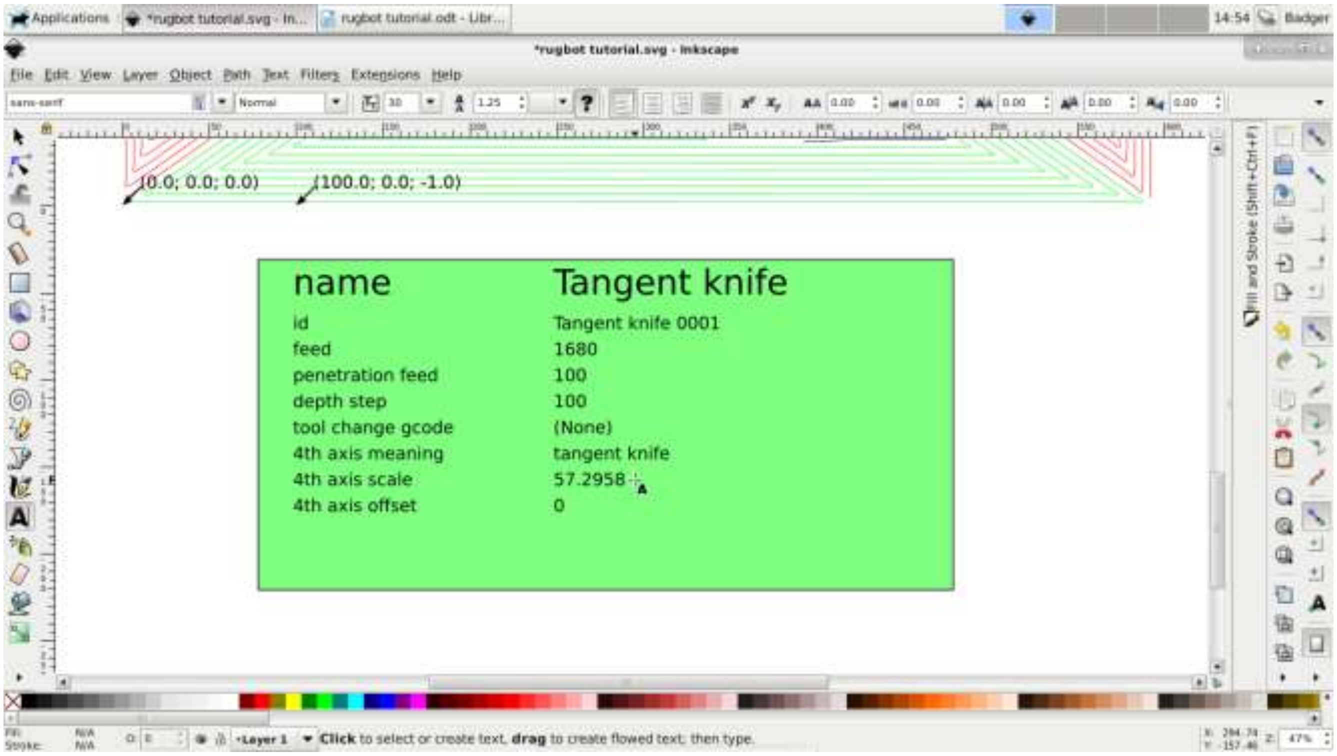
In our case we want to select “tangent knife” and apply.


Applications
*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
14:52
Badger
*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
(0.0; 0.0; 0.0)
(100.0; 0.0; -1.0)
Fill and Stroke (Shift+Ctrl+F)
Layer 1

name	Tangent knife
id	Tangent knife 0001
feed	400
penetration feed	100
depth step	100
tool change gcode	(None)
4th axis meaning	tangent knife
4th axis scale	1.0
4th axis offset	0

No objects selected. Click, Shift+click, Alt+scroll mouse on top of objects, or drag around objects to select.

Somewhere on your Inkscape document this green box will appear. You may need to zoom out to find it or need to select it and move it off your drawing.



Applications
*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
14:54
Badger
*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
(0.0; 0.0; 0.0)
(100.0; 0.0; -1.0)
Fill and Stroke (Shift+Ctrl+F)
Layer 1

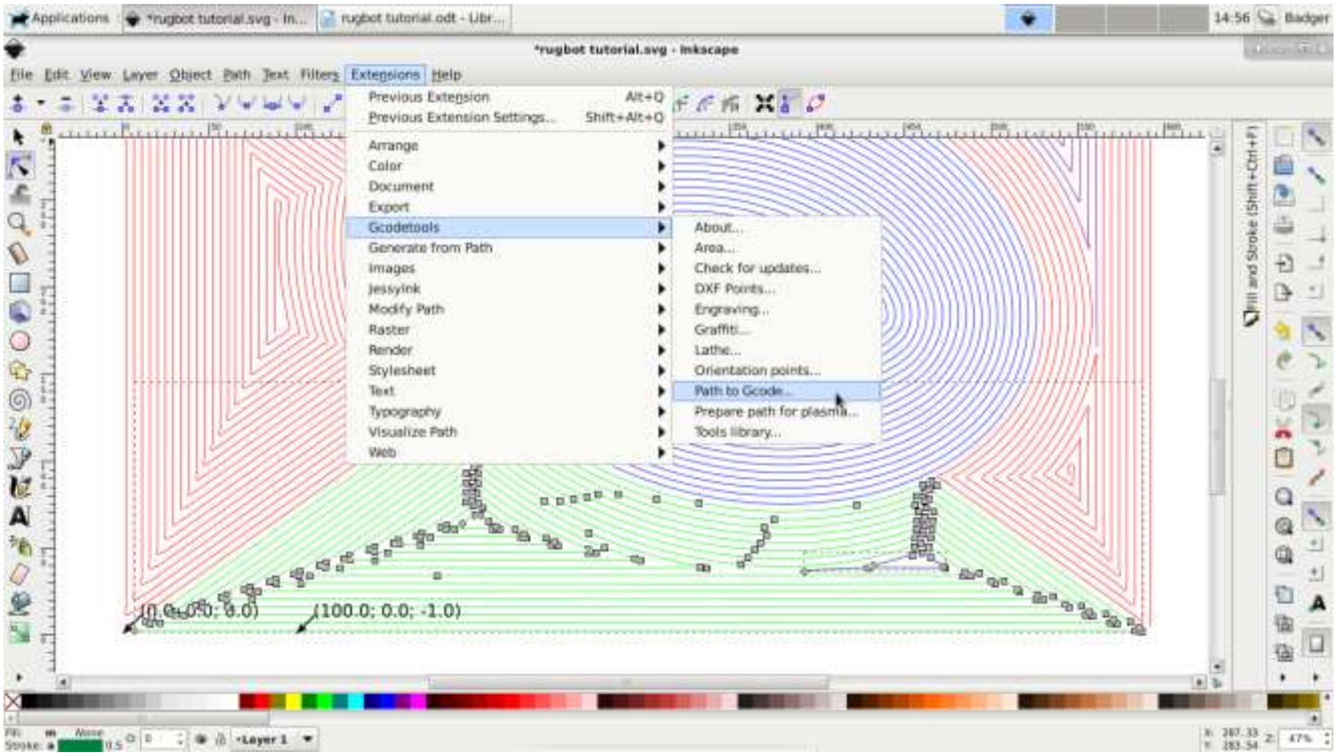
name	Tangent knife
id	Tangent knife 0001
feed	1680
penetration feed	100
depth step	100
tool change gcode	(None)
4th axis meaning	tangent knife
4th axis scale	57.2958
4th axis offset	0

Click to select or create text, **drag** to create flowed text; then type.

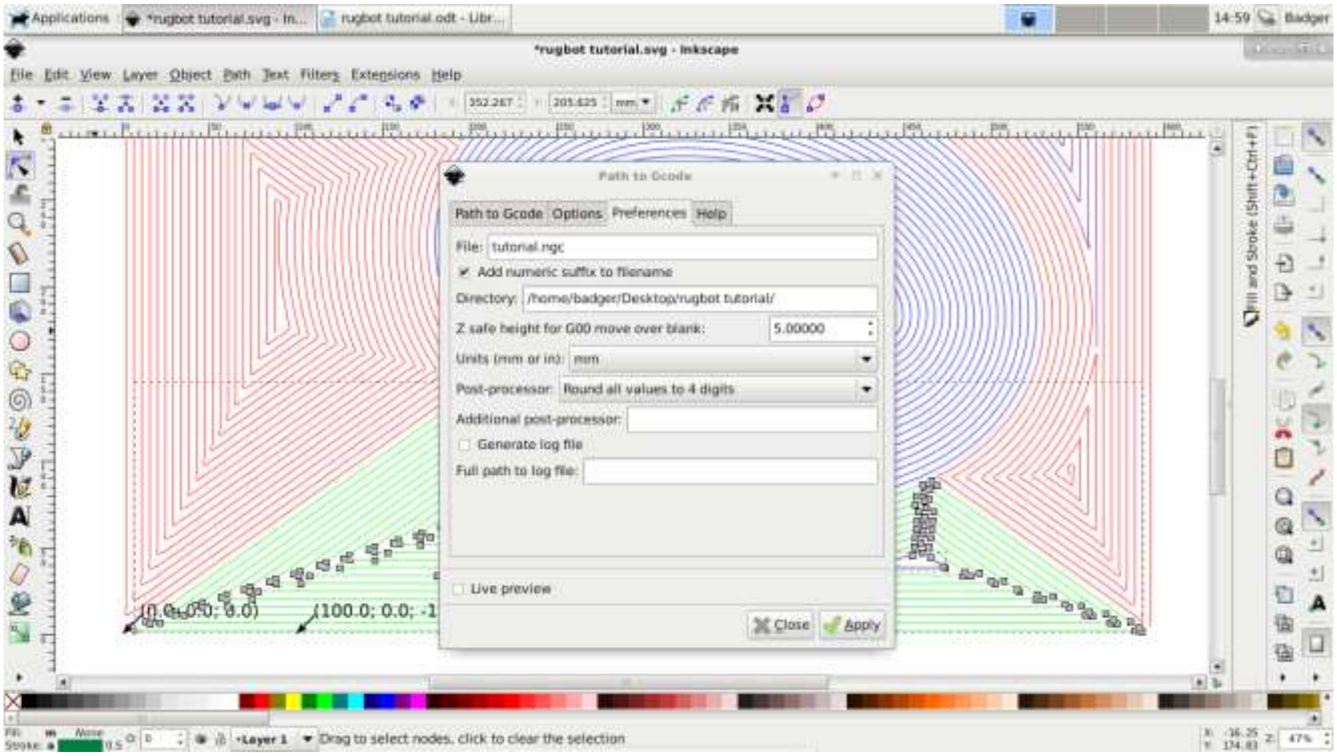
The information in the green box can be edited with the Inkscape text tool. If you make an Inkscape template with the changes to the green box, and open new projects from the template, you don’t have to edit the green box every time. The first item you need to edit is to change the “4th axis scale” from “1” to “57.2958”. Gcodetools calculates in Radians, and most CNC programs want degrees, so 57.2958 does the conversion. You can change the other settings and my usual machine travel speed is 1680 mm/min, so I change “feed” to that. The other settings are not significant to me, so I leave them alone.

You can also change these settings in the file “gcodetools.py” so that they are always what you want. On my PC the file is found at: This PC > Local Disk (C:) > Program Files > Inkscape > share > extensions. Search around in there and make changes as needed to the tangent knife settings. The parts you want to change are just text files, so you don’t really need to know Python or coding. Just look for what looks like what you need, change it, and then see what happens. You may want to take notes of what you changed, where it was, and what it was before you changed it. Some of the other “tools”, such as “plasma” in Gcodetools have settings for such things as “gcode before path” or “gcode after path” that may be useful, but for some reason aren’t options for the Tangent knife tool. In gcodetools.py you can snoop around at the other tool settings and then copy the settings you want into a similar place in the section for Tangent knife and add the code you need. If I can do it, you probably can too.

One other anomaly that I experienced in the past was that some of the gcode that was generated would occasionally be in some sort of exponential expression that my machine would reject. If this happens to you, you can search in the gcodetools.py file for any instances of A%s and change them all to A%f. I don’t know what any of this means but it works.



To write the gcode open Extensions > Gcodetools > Path to Gcode.



Applications
*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
14:59
Badger
*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
(0.0; 0.0; 0.0)
(100.0; 0.0; -1
Fill and Stroke (Shift+Ctrl+F)
Layer 1
Drag to select nodes, click to clear the selection

Path to Gcode

Path to Gcode | Options | Preferences | Help

File: tutorial.ngc

☑ Add numeric suffix to filename

Directory: /home/badger/Desktop/rugbot tutorial/

Z safe height for G00 move over blank: 5.00000

Units (mm or in): mm

Post-processor: Round all values to 4 digits

Additional post-processor:

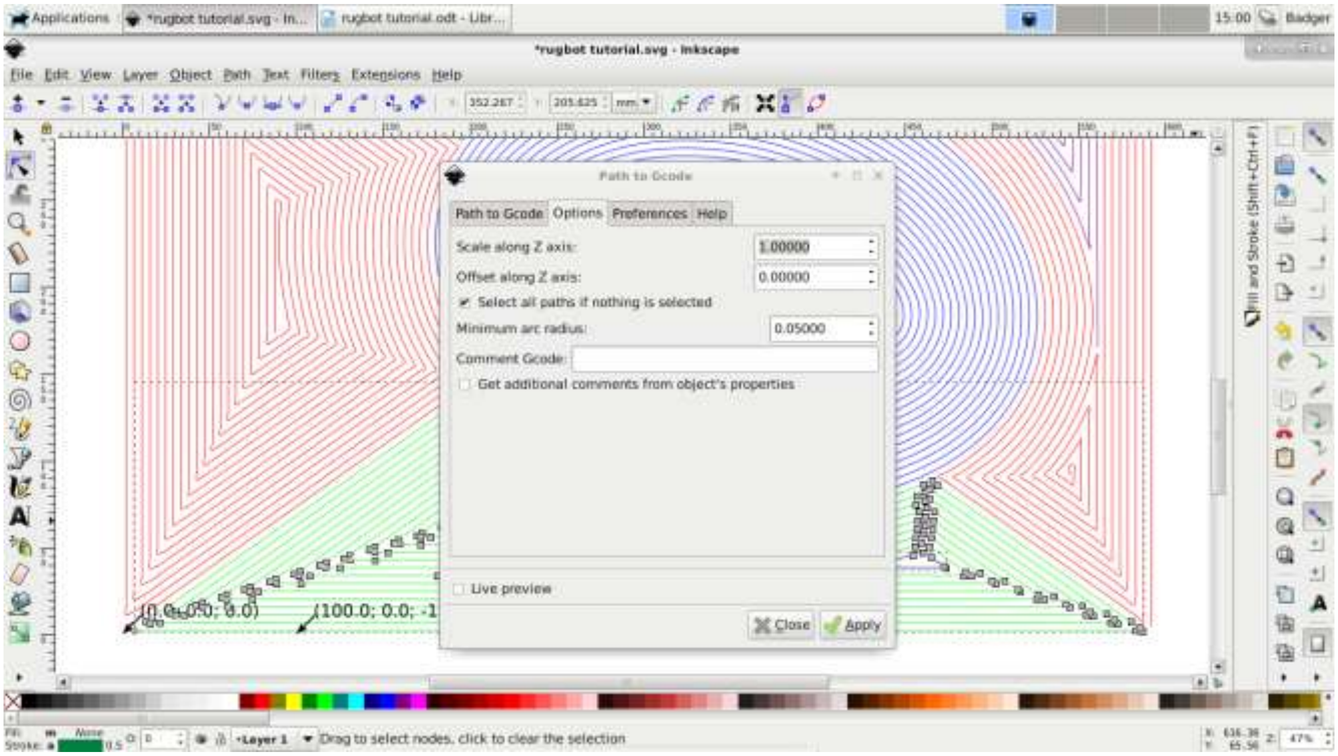
☐ Generate log file

Full path to log file:

☐ Live preview

Close Apply

Start with the "preferences" tab. In "File:" enter what you want to call the file and be sure to include the appropriate file type. For LinuxCNC which I use it is ".ngc". Other software may require different file type names. It is my understanding that this doesn't change the generated gcode in any manner but just effects the file name it is saved as so you can rename your files later if needed. The "add numeric suffix to file name" is nice in that you will get files listed as tutorial_001.ngc for the first file and then tutorial_002.ngc for the next file written etc. I don't use Z axis moves so I don't care what the safe height is, but it may be important to you. Make sure the units are what you want for your machine. I use "Round all values to 4 digits" just to make the files easier to read but you may want to try other settings for some reason.



Applications
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rugbot tutorial.odt - Libr...
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Badger
*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
mm
Path to Gcode
Path to Gcode
Options
Preferences
Help
(0.0; 0.0; 0.0)
(100.0; 0.0; -1
Close
Apply
Fill and Stroke (Shift+Ctrl+F)
Layer 1

Scale along Z axis: 1.00000

Offset along Z axis: 0.00000

☑ Select all paths if nothing is selected

Minimum arc radius: 0.05000

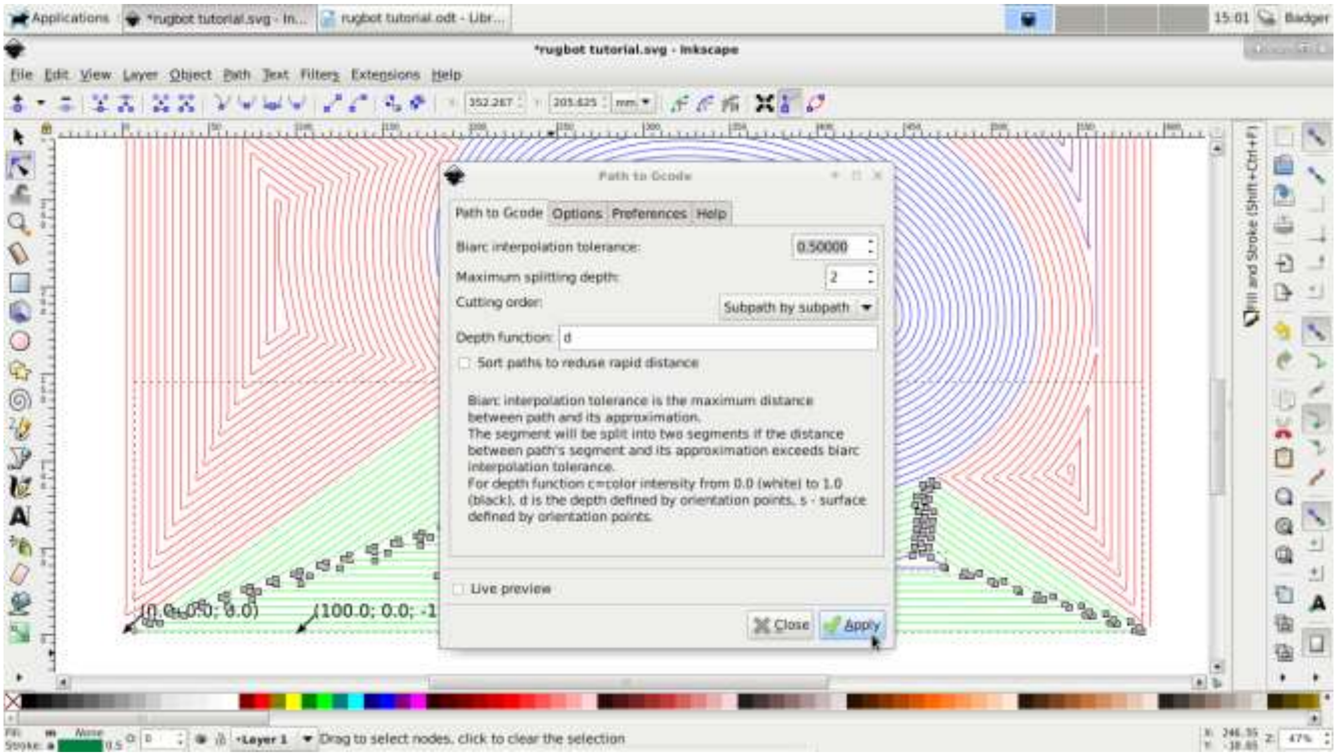
Comment Gcode:

☐ Get additional comments from object's properties

☐ Live preview

Drag to select nodes, click to clear the selection

I don’t use Z axis so I don’t change the scale. “Minimum arc radius” is a bit of a mystery but I find 0.05000 works for me. It seems that changes in this setting may contribute to some problems including causing “Radius Format Arcs” being mixed in with the preferred “Center Format Arcs”. I don’t understand this but I need gcode like “G02 X ##### Y ##### Z ##### I ##### J ##### A ####”, and if it looks like “G02 X ##### Y##### Z ##### R ###### A ####” and it doesn’t run, then “minimum arc radius” may need to be adjusted. It may also be that nodes are too close together and the “simplify” step may also help. I don’t really know but it seems to work.


Applications
*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
15:01
Badger
*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
352.267
205.625
mm
Fill and Stroke (Shift+Ctrl+F)
(0.0; 0.0; 0.0)
(100.0; 0.0; -1
Path to Gcode
Path to Gcode
Options
Preferences
Help
Close
Apply
•Layer 1
Drag to select nodes, click to clear the selection
47%

Biarc interpolation tolerance: 0.50000

Maximum splitting depth: 2

Cutting order: Subpath by subpath

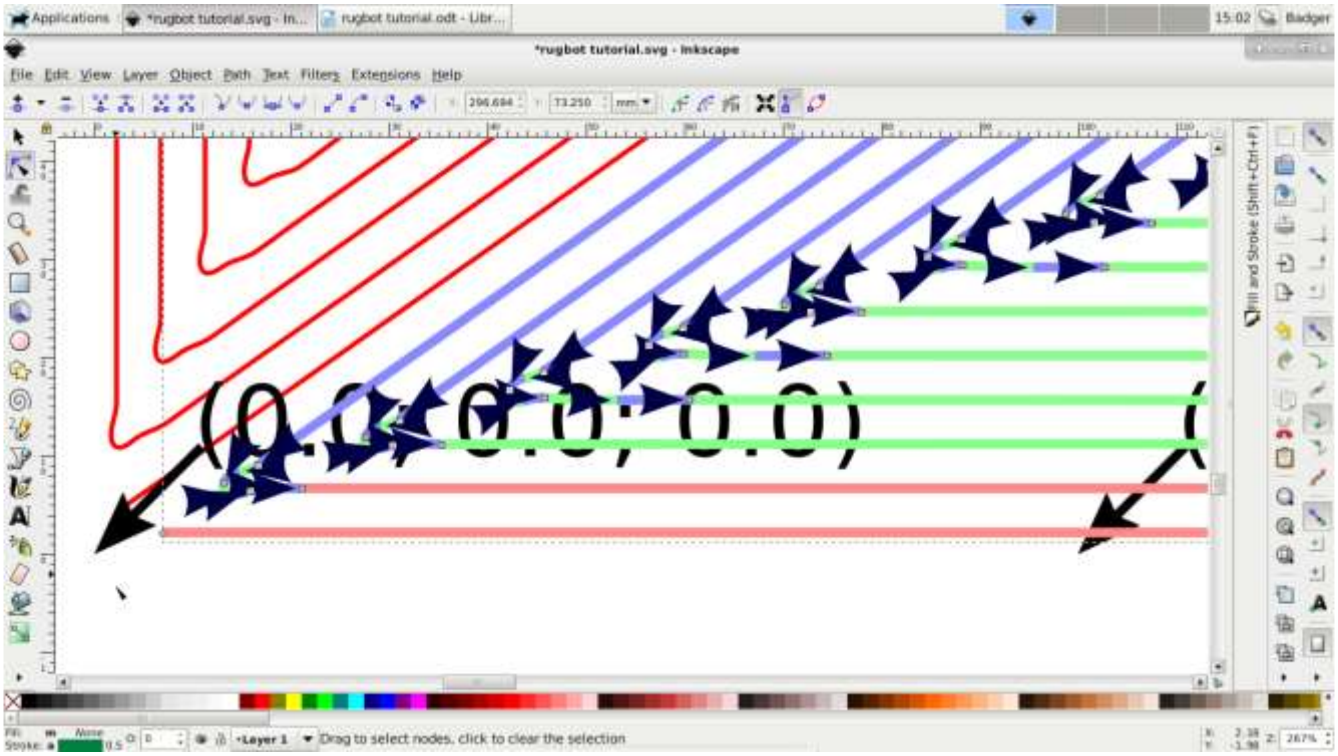
Depth function: d

☐ Sort paths to reduse rapid distance

Biarc interpolation tolerance is the maximum distance between path and its approximation.
The segment will be split into two segments if the distance between path's segment and its approximation exceeds biarc interpolation tolerance.
For depth function c=color intensity from 0.0 (white) to 1.0 (black), d is the depth defined by orientation points, s - surface defined by orientation points.

☐ Live preview

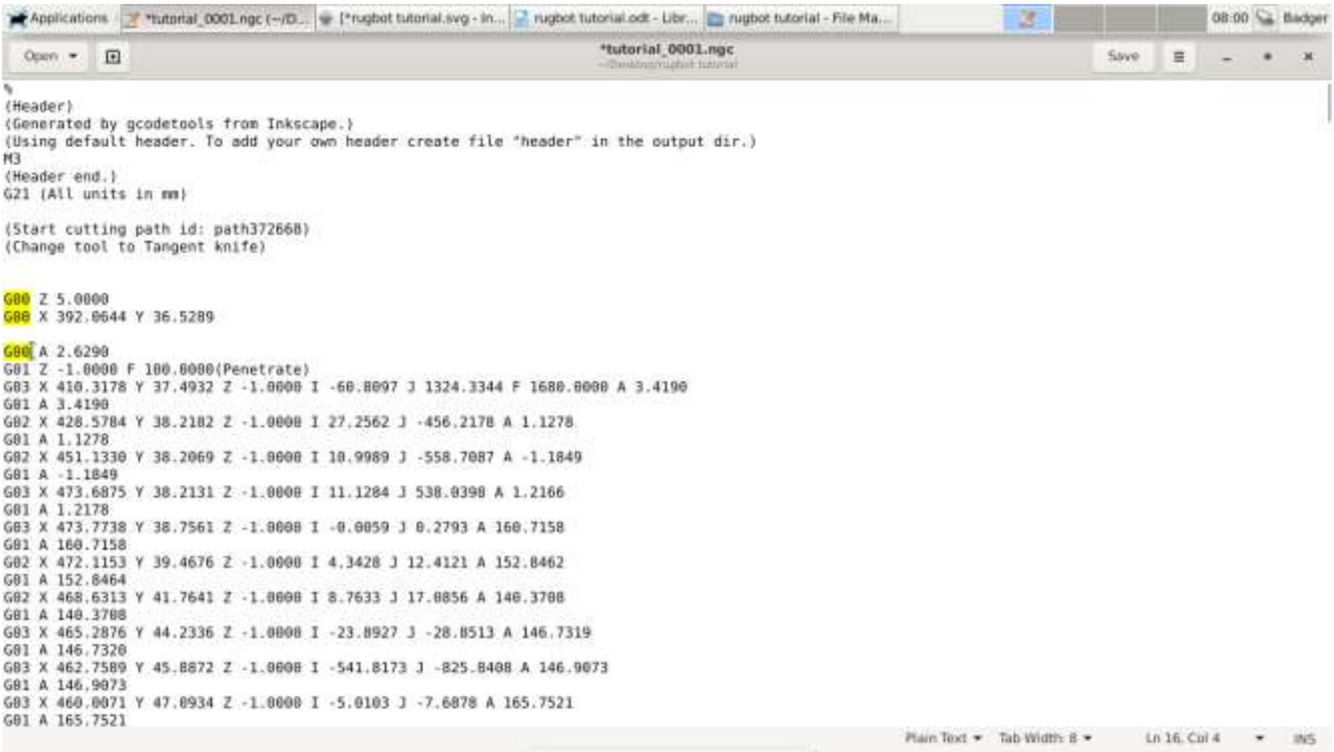
With the paths you want to write gcode for selected, open the “Path to Gcode” tab. You must be in this tab to write gcode, if you select “Apply” in any of the other tabs it will throw and error and tell you to go to the Path to Gcode tab. Basic interpolation tolerance refers to how closely the generated Gcode will follow the path of your drawing. Making rugs does not require really tight tolerance and I think having it a little loose in my case makes for more rounded corners which run smoother and fasters. For other applications you may want to adjust this if your corners are getting rounded off too much. If you zoom in on the Inkscape drawing after the next step, you can accurately see the drawing path and the tool path and evaluate if the tolerance meets your needs. I don’t think “live preview” does anything other than maybe slowing down the computer. Press apply and wait for something to happen.


Applications
*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
15:02
Badger
*rugbot tutorial.svg - Inkscape
File Edit View Layer Object Path Text Filters Extensions Help
296.684
73.250
mm
(0.0; 0.0)
(
Fill and Stroke (Shift+Ctrl+F)
Fill:
Stroke:
None
0.5
•Layer 1
X: 2.18
Y: -1.98
Z: 267%

Drag to select nodes, click to clear the selection

Gcodetools adds the path of the Gcode onto the top of the Inkscape drawing. Purple and green colors are arcs and the pink color represent straight segments. The arrows show the direction of movement. If the direction is not what you want, you can delete the gcode markers by selecting the line with the Inkscape selection tool and deleting it. You should go to the file folder where the gcode file you don’t want is and delete it too. Go back into Inkscape, select the line you want to change the direction of and under the Path tab select “Reverse”. When you use Gcodetools to generate the path again you will see the arrows pointing in the correct direction.

To know which way the path is going to be going before generating Gcode you can add end markers to the line in the Fill and Stroke section of Inkscape. The markers do not end up in the gcode file in any way, so you can leave them in the drawing if you like.

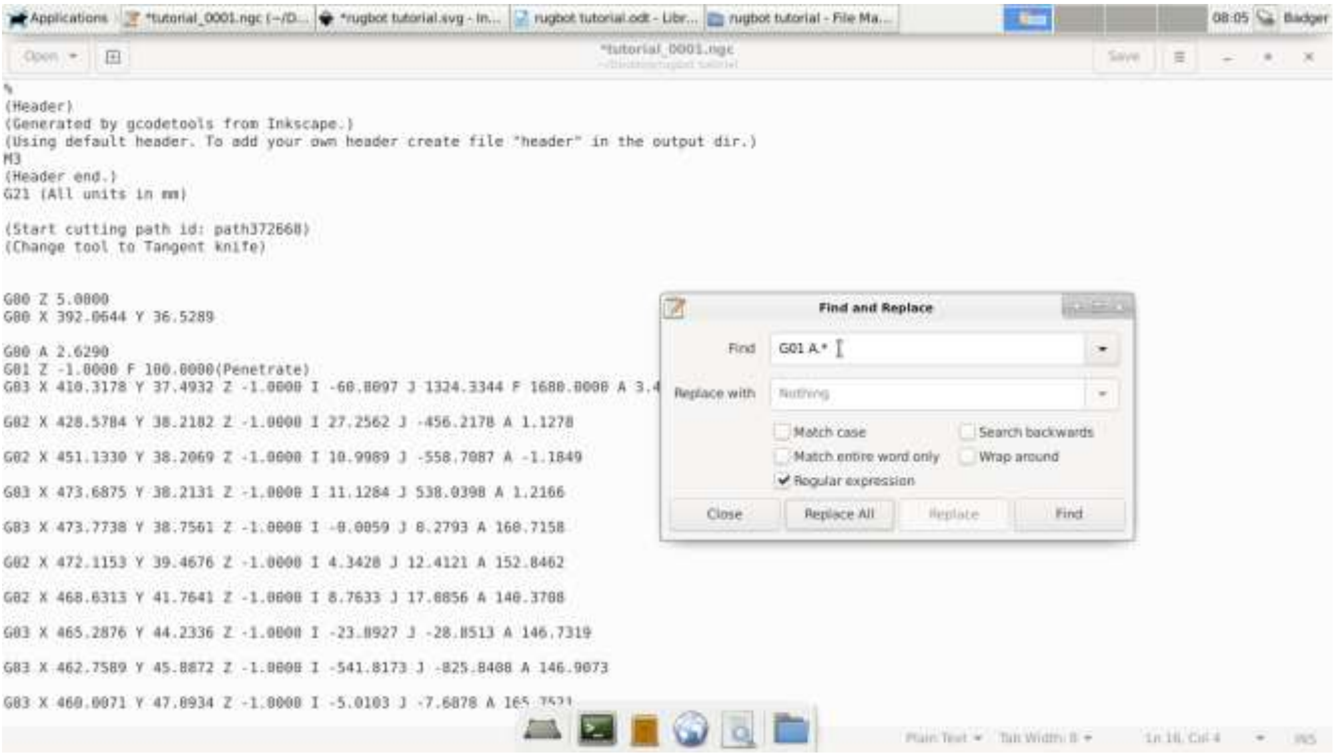

Applications
*tutorial_0001.ngc (~/D...
[*rugbot tutorial.svg - In...
rugbot tutorial.odt - Libr...
rugbot tutorial - File Ma...
08:00
Badger
Open
*tutorial_0001.ngc
Save
Plain Text
Tab Width: 8
Ln 16, Col 4
INS

```
%
(Header)
(Generated by gcodetools from Inkscape.)
(Using default header. To add your own header create file "header" in the output dir.)
M3
(Header end.)
G21 (All units in mm)

(Start cutting path id: path372668)
(Change tool to Tangent knife)


G00 Z 5.0000
G00 X 392.0644 Y 36.5289

G00 A 2.6290
G01 Z -1.0000 F 100.0000(Penetrate)
G03 X 410.3178 Y 37.4932 Z -1.0000 I -60.8097 J 1324.3344 F 1680.0000 A 3.4190
G01 A 3.4190
G02 X 428.5784 Y 38.2182 Z -1.0000 I 27.2562 J -456.2178 A 1.1278
G01 A 1.1278
G02 X 451.1330 Y 38.2069 Z -1.0000 I 10.9989 J -558.7087 A -1.1849
G01 A -1.1849
G03 X 473.6875 Y 38.2131 Z -1.0000 I 11.1284 J 538.0398 A 1.2166
G01 A 1.2178
G03 X 473.7738 Y 38.7561 Z -1.0000 I -0.0059 J 0.2793 A 160.7158
G01 A 160.7158
G02 X 472.1153 Y 39.4676 Z -1.0000 I 4.3428 J 12.4121 A 152.8462
G01 A 152.8464
G02 X 468.6313 Y 41.7641 Z -1.0000 I 8.7633 J 17.0856 A 140.3708
G01 A 140.3708
G03 X 465.2876 Y 44.2336 Z -1.0000 I -23.0927 J -28.0513 A 146.7319
G01 A 146.7320
G03 X 462.7589 Y 45.8872 Z -1.0000 I -541.8173 J -825.8408 A 146.9073
G01 A 146.9073
G03 X 460.0071 Y 47.0934 Z -1.0000 I -5.0103 J -7.6878 A 165.7521
G01 A 165.7521
```

You have Gcode! Use a plain text editor to make any changes you need to the resulting Gcode file. Do not use a word processing program for this or bad things will happen. I like Notepad++ on the PC and Gedit seems good on Linux. At the beginning and end of the file you will find a little note that the “Header” and “Footer” were generated by Gcodetools and that you can add your own by including files in the output directory. This seems odd to me, but it actually works. For my RugBot I needed certain thing to happen before and after the file ran. I needed the needle mechanism to be fully retracted against a sensor before any XY moves and other details, so I wrote out the header gcode and saved it as a file named “header” and put it in the same folder that I listed in the Preference tab in the Path to Gcode extension. I did the same with the little bit of Gcode I needed to be in the footer and saved it as a file named “footer”. I don’t think you need a .txt file type for this, but I could be mistaken.

Remember that if you want special Gcode before or after sub-paths you will need to add that to the green box by going into the gcodetools.py folder in the program and altering it.

For my use I also need to edit each file to smooth it out for my machine. The first thing I do is change the first G01 A #### move of each sub-path to G00 A ####. This rotates my toolhead into position at a rapid speed, instead of a travel speed, which saves time, and also makes the next step possible.



```
%
(Header)
(Generated by gcodetools from Inkscape.)
(Using default header. To add your own header create file "header" in the output dir.)
M3
(Header end.)
G21 (All units in mm)

(Start cutting path id: path372668)
(Change tool to Tangent knife)


G00 Z 5.0000
G00 X 392.0644 Y 36.5289

G00 A 2.6290
G01 Z -1.0000 F 100.0000(Penetrate)
G03 X 410.3178 Y 37.4932 Z -1.0000 I -60.8097 J 1324.3344 F 1600.0000 A 3.4

G02 X 428.5784 Y 38.2182 Z -1.0000 I 27.2562 J -456.2178 A 1.1278

G02 X 451.1330 Y 38.2069 Z -1.0000 I 10.9989 J -558.7087 A -1.1849

G03 X 473.6875 Y 38.2131 Z -1.0000 I 11.1284 J 538.0398 A 1.2166

G03 X 473.7738 Y 38.7561 Z -1.0000 I -0.0059 J 0.2793 A 160.7158

G02 X 472.1153 Y 39.4676 Z -1.0000 I 4.3428 J 12.4121 A 152.8462

G02 X 468.6313 Y 41.7641 Z -1.0000 I 8.7633 J 17.0856 A 140.3708

G03 X 465.2876 Y 44.2336 Z -1.0000 I -23.0927 J -28.0513 A 146.7319

G03 X 462.7589 Y 45.8872 Z -1.0000 I -541.8173 J -825.8408 A 146.9073

G03 X 460.0071 Y 47.0934 Z -1.0000 I -5.0103 J -7.6878 A 165.7521
```

Find: G01 A.*
Replace with: Nothing
□ Match case
□ Search backwards
□ Match entire word only
□ Wrap around
☑ Regular expression

Gcodetools generates an A-axis movement that follows the arc when in motion, and then generates an A-axis move between segments to position the knife for the next segment. There are also some “lift-knife” settings that may or may not work usefully for an actual knife, but I don’t need that feature. Having the separate A-axis gcode lines can also cause some slow downs on the RugBot so I remove them for doing “Find and Replace” by searching for “G01 A.*” which is a regex, so I have “Regular expression” checked when using Gedit. Notepad++ doesn’t seem to need this distinction. This finds all the instances of lines that start with G01 A and deletes them. There is probably some way to get it to remove the blank lines, but they don’t seem to effect anything so I haven’t looked for a solution to the non-problem.

This should give you enough information to maybe figure out something that works for you if you need to generate Gcode for a tool that needs to tangentially follow the direction of travel, such as a tufting head on a RugBot. It works for me. All the conversations about the development of Gcodetools is available at the location listed under the “About” heading when you first select Gcodetools in Extensions. Some of the other areas such as “Area” can be useful if you need them, which I don’t. Nick did a great job in getting Gcodetools figured out and working as well as it does and helped me out numerous times. The forum is no longer being actively monitored but there may be some answers there if you look. If you read Russian, there may be even more info on the non-English part of the site. Remember that if you start off with a clean installation of an older version of Inkscape, no more recent than .92.4 you will probably have less issues.

There are some videos of mine on the YouTube under the username of BadgeBond that may be of interest, but they are all obsolete to me and undocumented improvements have been made.

There are some conversations about details in the forum section of LinuxCNC.org that include the files from my Linuxcnc system that may offer clues how to synchronize stitch length/speed to the movement of the machine. There may be other discussions out there, maybe in OpenBuilds and I usually try to reference things under RugBot. There are also commercially available machines and software that probably work really swell but I am cheap and just a hobbyist.

Good luck!