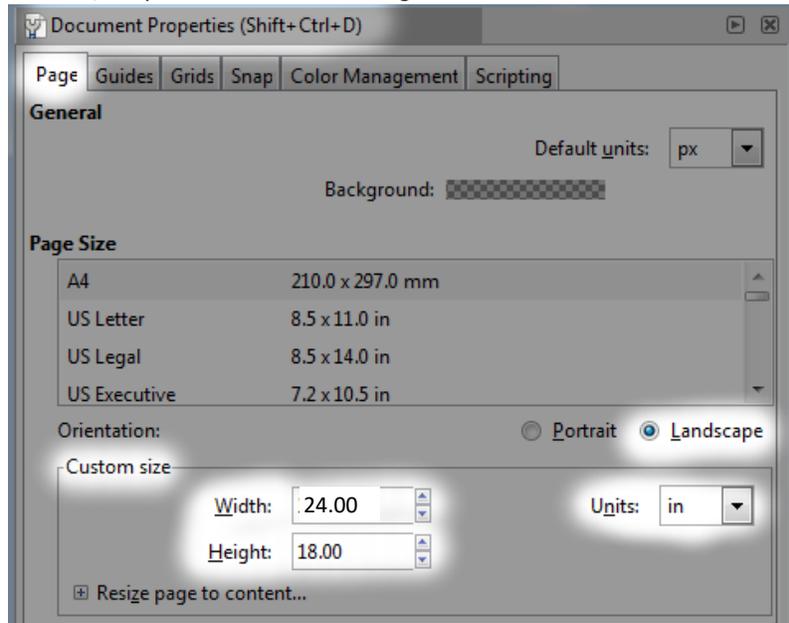
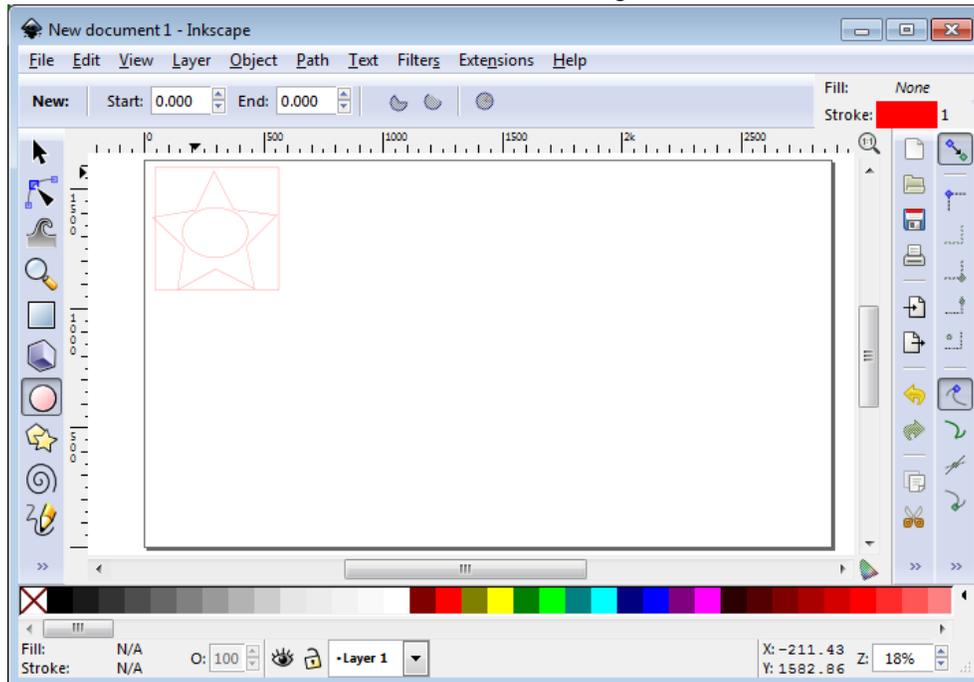


## Designing Objects in Inkscape

- Set the File/Document Properties "Custom size" units to inches, set the Width to 24" and the Height to 18" to match the size/shape of the lasers' cutting area.



- Place your drawing in the top-left corner of that region - to correspond to the far-left corner of the cutter's work area.
- Keep the drawing at least 1/8" (3mm) away from the edge of the work area because sometimes the laser is out of calibration and won't cut that close to the edge.

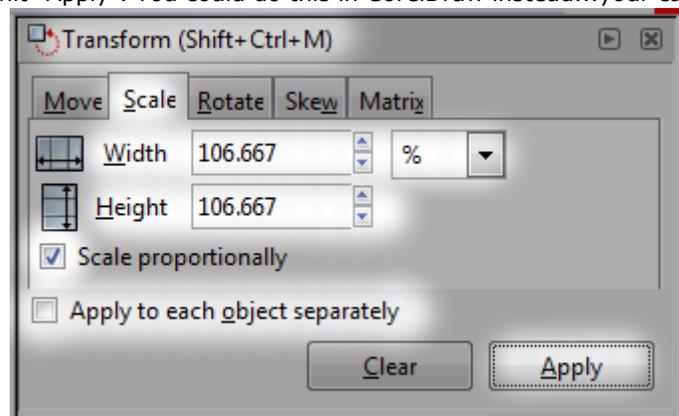


- Draw your 'cut' lines in red, and 'etch' lines in blue or green. Anything you want to raster should be in monochrome/greyscale. (Advanced users can use more colors for more things...but if you know enough to do this, then you don't need me to tell you how!)
- Beware of Inkscape filters. These are not a standard part of SVG and are ignored by CorelDraw. Either the filter will get dropped when exporting to a non-Inkscape SVG or the filtered object will be rasterized on export - neither is likely to be what you wanted. If you're getting Inkscape files from elsewhere, you might want to use "Edit/Select All" and then "Filters/Remove Filters" to be sure you got rid of them.

## Exporting to SVG

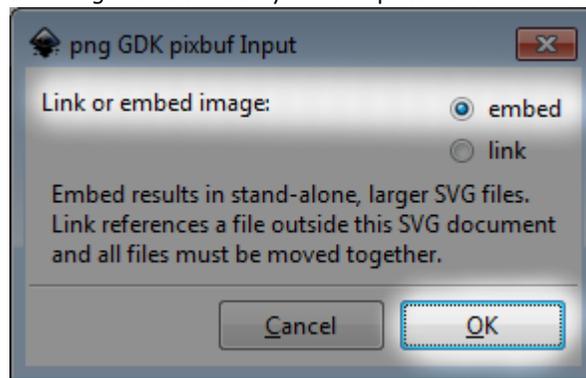
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- Within Inkscape, you can work in any units you like (inches, centimeters, etc). However, the SVG standard requires that dimensions, positions, etc are stored in abstract units ("pixels") - not real-world units like inches or centimeters. In order to allow you to work in real-world units, programs have to assume some arbitrary number of pixels-per-inch (PPI) for the device you are using. Unfortunately, Inkscape uses 90 ppi and CorelDraw uses 96 ppi. So if you draw a 1 inch long line in Inkscape - it'll be stored as a 90 pixel line in SVG, which CorelDraw will convert to 0.9375" (90 pixels/96 ppi) as it loads it. Hence everything that you draw in Inkscape comes out about 6% too small in CorelDraw. To fix this (when exact dimensions matter), you have to scale everything by the ratio of the two PPIs - scaling everything up by 106.667%. The simplest way to do this in Inkscape is to use "Edit/SelectAll" then "Object/Transform..." select the "Scale" tab, set the units to be "%" then enter 106.667 as the scale factor. Check the "Scale proportionately" box and make sure that "Apply to each object separately" is **NOT** set. Then hit "Apply". You could do this in CorelDraw instead...your call.

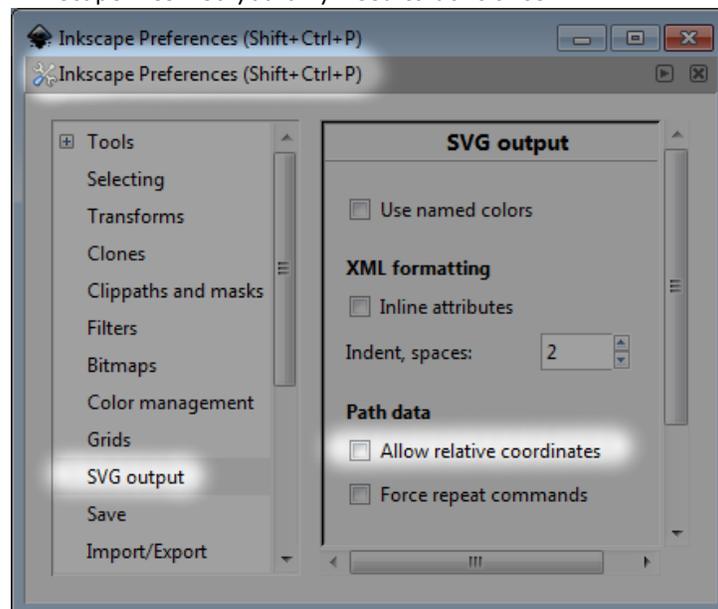


- Note that when you rescale, the 'page boundary' size that you set up earlier will be about 6% too small - you can fix that by resetting the document size to 34.13" by 19.20" - but you really needn't bother because CorelDraw ignores the page size stuff on import anyway. Line widths also get ~6% thinner - but that doesn't matter for Laser cutting where anything under 0.001" is 'good enough'.

- If you have raster images in your design, check the "embed" option when you save the file - that way the raster image is stored inside the SVG file rather than being linked to as an external file - you don't **have** to do that (and it does make for much larger SVG files) - but it makes life a lot easier and less error-prone when shuffling files between your computer and the one that drives the laser cutter.



- Sometimes raster images fail to resize correctly - especially if the aspect ratio is not preserved in the resizing. If this is a problem, the only work-around I have is to rescale the image in a paint program (GIMP/Photoshop/whatever) and re-import the image so that I don't have to rescale it. This sucks - but it's not unique to Corel Draw - I've seen similar issues in both Firefox and Chrome web browsers.
- The version of PhotoLaser Plus that we use treats all <path> commands as being in "absolute" coordinates. Since Inkscape outputs data using "relative" coordinates by default, this means that some designs that look just fine when viewed in Inkscape, Firefox, Chrome, etc, come out totally messed up in PhotoLaser Plus. To work around this bug, go into File/Inkscape Preferences - select "SVG output" from the list on the left and make sure that "Allow relative coordinates" is **NOT** checked. This becomes the default for all Inkscape files - so you only need to do it once.

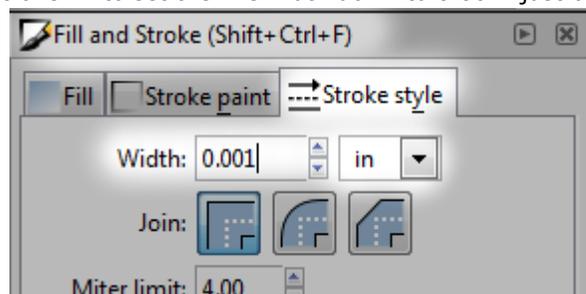


- There is an issue in Inkscape that when you change your SVG output settings, that change does not affect existing files - so if you save a file with the "wrong" settings, then change Inkscape's settings and load up the file - then re-save it, the change to the settings has no effect. I find that I have to select the entire drawing, move it a little - then move it back again (not using "Undo") and THEN re-save it for the SVG output settings to have an effect. This isn't a problem when using Inkscape on your own machine because once you change the settings, they are changed forever. However, on the Makerspace machines (notably, the one that's driving the laser cutter), the settings are reset every time the machine is rebooted - so you have to change them all over again. Argh!
- I have seen (rarely) problems with grouped objects. It's possible in Inkscape to group a set of objects that have different colors (or other properties) and then select the entire group and use the Fill & Stroke dialog to set (for example) just the line width or just the opacity. When you do that, Inkscape attaches the altered property to the group (<g>) record inside the SVG file instead of to each individual path (<path>) record. Having fill and stroke properties in both the group and path records seems to confuse PhotoLaser Plus and can cause some issues. Almost all of the time, it gets it right - but once in a long while I see problems. Hence, if you have problems with the Inkscape-to-PhotoLaser Plus step - then just do an "Edit:Select All" in Inkscape, then hit the "Object:Ungroup" menu item a bunch of times. That's fixed a few issues for me in the past.

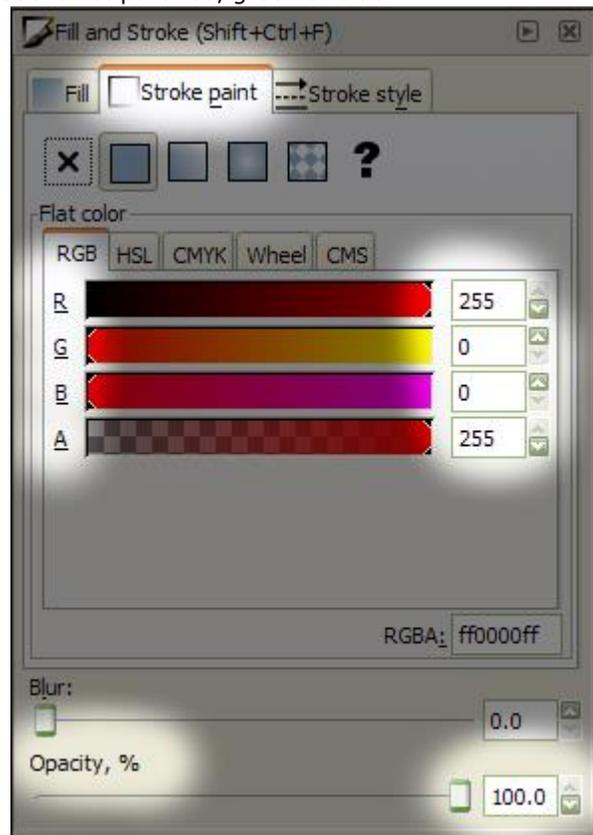
## Design "gotchas"

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- The laser cutter tries to draw all lines that are wider than about 0.001" by repeatedly over-drawing the line to get it wide enough. This is almost never what you want, and in extreme cases could set fire to the material you're cutting(!) - so be sure to EITHER:
  - Set the line width to 0.001" in Inkscape...OR...
  - After importing the image into PhotoLaser, select the object properties tab and set the width to "Hairline".
- (NOTE: When editing with 0.001" lines, they are drawn very faintly in Inkscape and web browsers. Hence, it may be easier to use (say) 1 pixel-wide lines while editing and then do an "Edit/SelectAll" and "Object/Fill And Stroke..." to set the line width down to 0.001" just before you export.



- It is very easy to accidentally nudge the "Opacity" slider or the "A" (alpha) slider in Inkscape's "Fill and Stroke" menu and wind up with lines that are only 99.89% opaque. This is annoying because those lines look solid in PhotoLaser - but the laser cutter drivers ignore lines that aren't absolutely 100% opaque.
- It is also quite easy to accidentally select colors that are not 255 units of Red, Green or Blue. A line that's only 254 red - or which is 255 red plus 1 unit of blue or green, is treated as black(!) by the laser cutters' drivers - which means that it'll get rastered instead of properly vector rendered. If you see this happening - then go back to Inkscape and carefully set those colors to 255/0/0. Don't set colors in HSL, CMYK, Wheel or CMS modes because those get converted into RGB and teeny-tiny round-off errors can result in colors that are not pure red, green or blue.



## Transferring files from your computer into the Laser Cutter computer.

- It's really easy to forget whether you already fixed up your design for export to Corel - so I recommend saving the original file from Inkscape (eg 'myDesign.svg'), then rescaling it by 106.667% and setting the line widths to 0.001" - then saving it again under 'myDesign\_COREL.svg' to export to Corel.
- Upload your file to your Google Drive. Go to the Dell laptop connected to the Helix Laser and download it. Import it into PhotoLaser Plus.