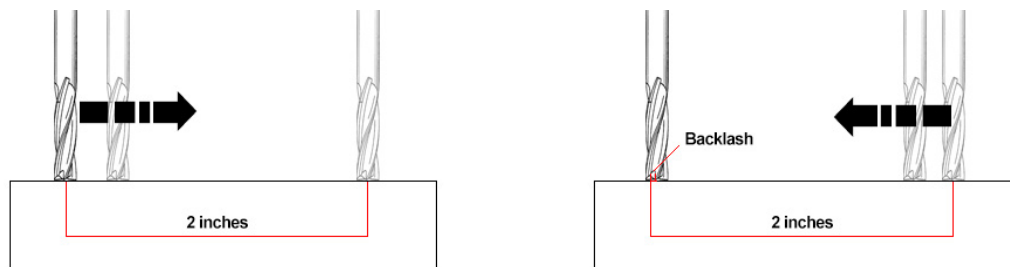


I assume the person it's trying this know how to use the machine and make the proper adjustments to it, I'll try to make the things simple as possible.

What is the "Backlash"?

The backlash is a non-movement when the machine reverses the direction of an axis.

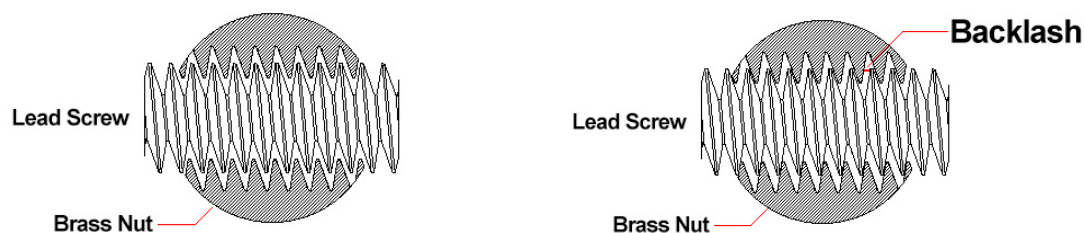
For example, if we put the machine to move 2 inches in a positive X and then move 2 inches in the opposite direction (negative X), if the machine have some backlash then, exactly at the change of direction the machine won't move, and the distance will not be 2 inches exactly on the way back.



The backlash comes notorious when the machine mill circles and you can see when this happens because the circles came out with a distortion depending where you have the backlash.

How this can be fixed?

To avoid the backlash, the machine has to be the most rigid possible, adjusting the gantry, the lead screws and the track rollers following the procedures in the manuals, but there is almost impossible to get rid of all the backlash because there's a minimum play between the lead screw and the brass lead screw nut (less than 0.1mm), this is normal for a screw and a bolt.

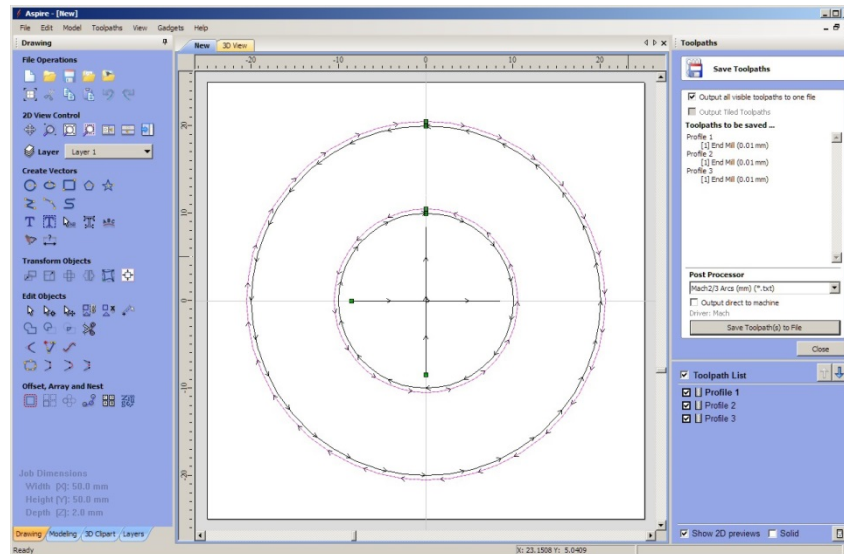


After making all the adjustments, it's time fix this with the software UCCNC. This is a special function that came with most of the CNC softwares, and its called backlash compensation.

What this does it adds the value we input to the axis movement, fixing the backlash. This depends if the axis movement change its direction.

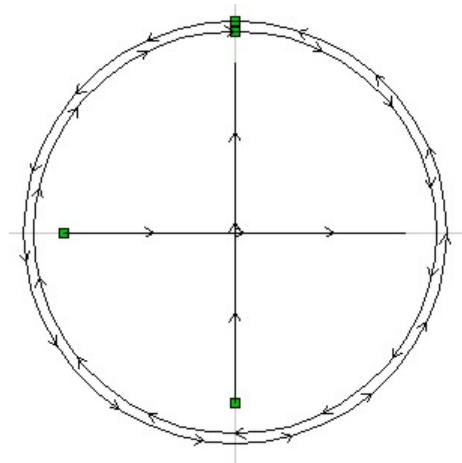
It's a difficult task to try measure the exact amount of backlash because in most cases it's very small (less than 1mm), but it can be done by sight with a very good result.

The first thing we have to do its make a circle pattern to see how much is the amount of backlash that we have.

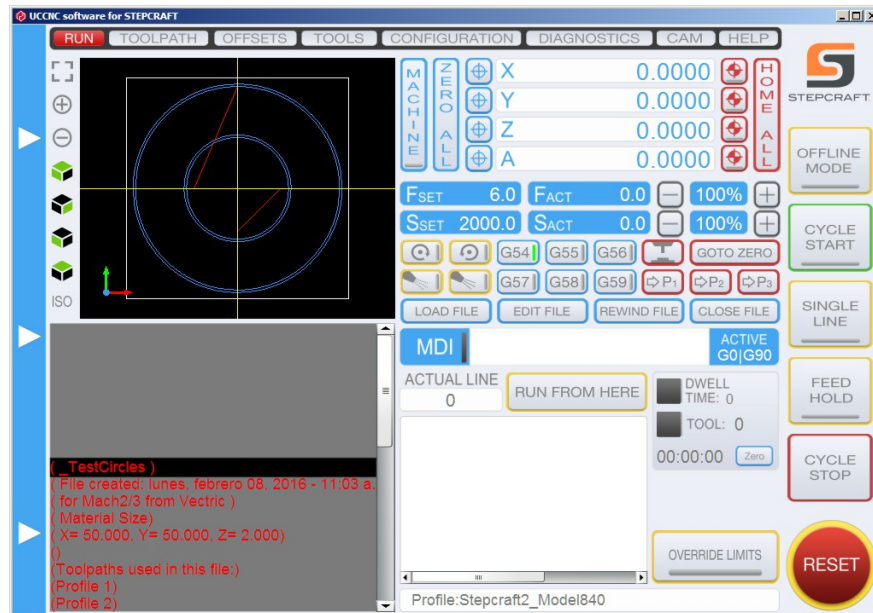


Making a tool path consisting of 4 circles and 2 lines, first circle with 20mm diameter, followed by a 21mm diameter circle, then a 40mm diameter circle and a 41mm diameter circle, all this circles has to be concentric. And 2 reference lines crossing the center and with a length of 17mm one on the X axis and one on the Y axis (just for reference).

To make the tool path, select the outer circles (21 and 41 mm)and make them run ON the vector and select the climb method, then make the profile for the drawing pen. Select the other 2 circles (20 and 40 mm) and change the method for conventional, with this, you will have that one circle its going in the opposite way of the other, and we can see the backlash in all the axis. For the final profile select the 2 lines and make it, this are just references, so it won't matter the method.

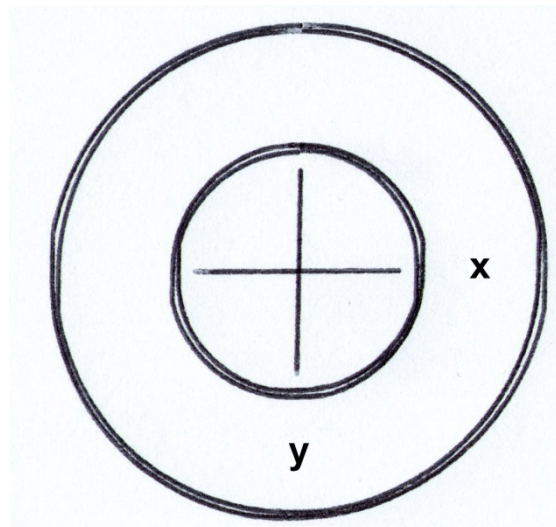


Save all the profiles as 1 single file and load it on UCCNC



Put a blank piece of paper on the machine (with the proper setting of course) and the pen attachment.

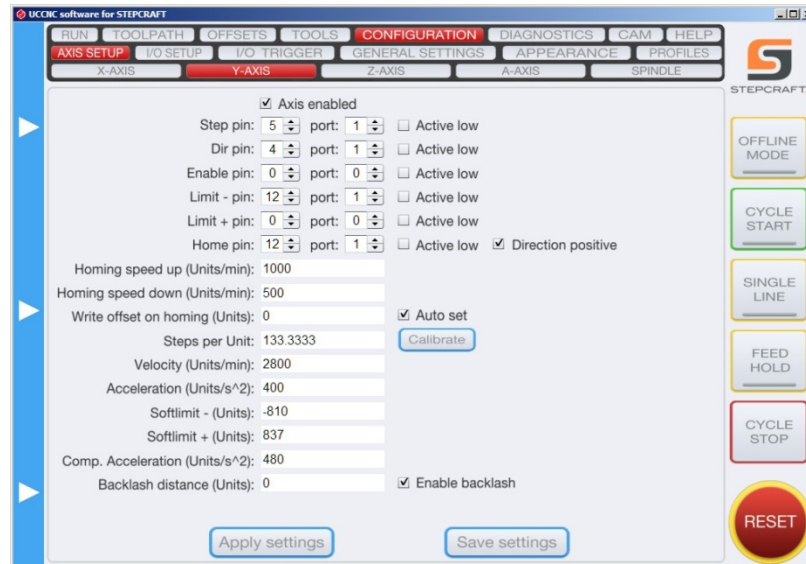
Run the tool path with the Pen attachment and take a look at the results.



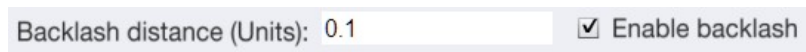
As you can see on the picture, the circles have a some variation between them on both axis. The width of the pen line its about 0.4mm, so, if we are drawing both lines at the center of the circle vector, and the distance between both vectors are 1mm there should be an even separation without touch each other.

Let's put the configuration window on UCCNC, select the axis setup, and then the X axis, go to the bottom where it is the backlash distance option, check the Enable backlash option.

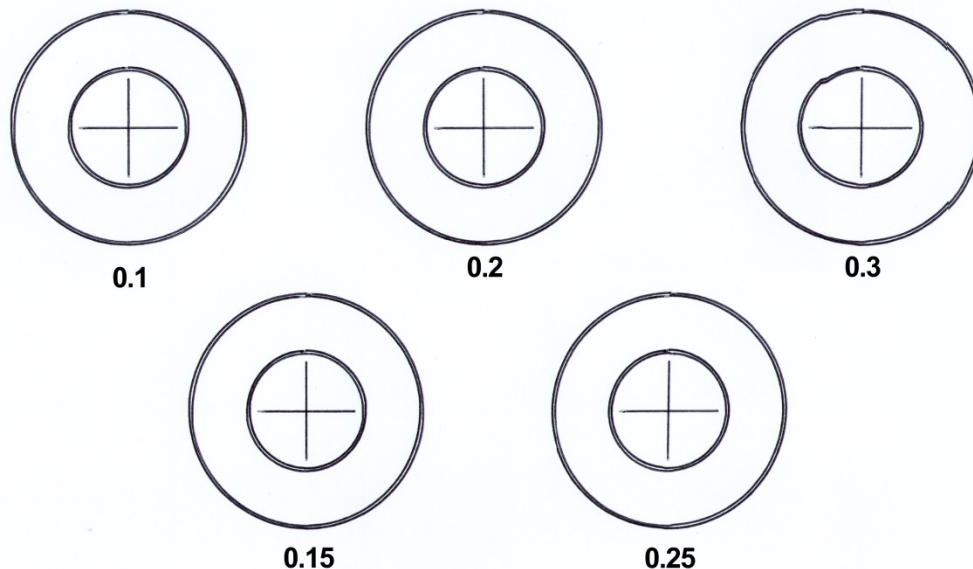
Go to the Y-axis and do the same.



Here comes the trial and error part, the circle lines have a very small separation, but it won't exceed 1mm, so let's try the backlash of .1 for both X and Y axis, put those values on the screen and then apply the settings (don't save them yet).



Run the too Tool path several times (with a different centers) with an increment on the backlash distance of 0.05 making 0.1, 0.15, 0.2, 0.25 and 0.3.

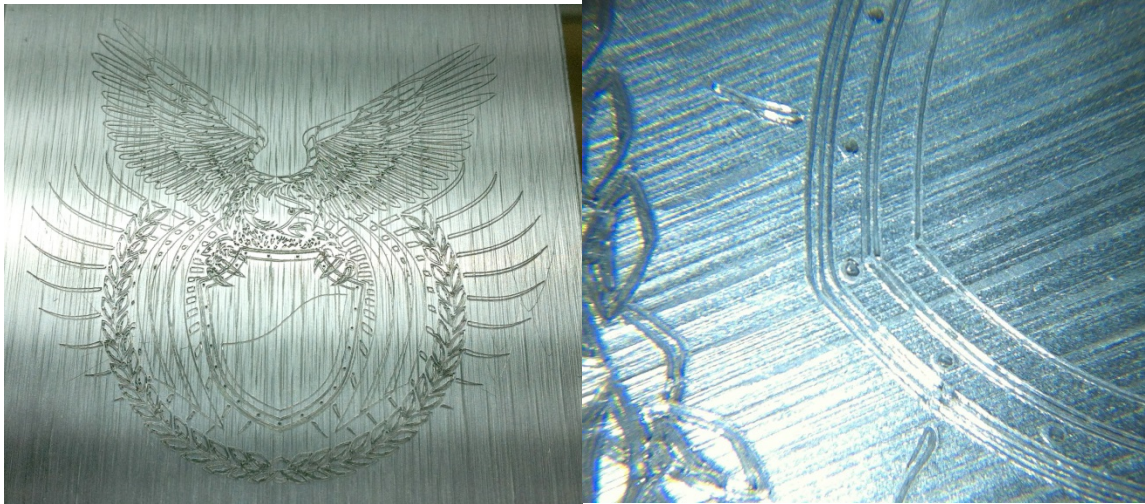


As you can see on the image (looks like a printer test pattern), the 0.1 setting improves the circles space, if you take a look at the 0.3 setting, it becomes clear that it's too much and start to notice the misalignment. But the 0.2 setting looks much better.

So in this case we are going to put a value of 0.2 on the backlash for X and Y, and save the settings.

You can do this with a less increment values to obtain a better backlash correction value; also, if you do this with the engraving point on an aluminum plate you can obtain much better adjustments, because the lines you get from the engraving point are super thin.

You can achieve a very good accuracy with this method



This is a 6cm wide engraving on aluminum with the engraving point; the 3 parallel lines are inside in a 1mm width.

As a final note, you can achieve accurate movements with the Stepcraft and with the aid of the backlash compensation, but it's a MUST that you follow the manual instructions on how to assemble the machine and make it rigid.