REVISION	DATE	DESCRIPTION	AUTHOR
A01	04/26/16	Initial Release	VC

> INTRODUCTION

This document is intended to walk the reader through the steps taken to configure their German Rep Rap machine for dual extrusion printing. This configuration is only necessary on the x350, x350 Pro, and the x400 CE/Pro/V3. If done correctly, you will only have to do this once.

> SETUP

In order to use both extruders, we need to first ensure that our nozzles are level to each other. The following steps are our "best practice" steps for doing so:

1. Go to Quick Settings > Preheat PLA.
2. Go to Quick Settings > Home All.
3. Go to Quick Settings > Disable Steppers.
4. Level the left (primary) nozzle to the bed using the 0.2 mm feeler gage provided. You do this by checking the tension on the feeler gage between the bed and the nozzle at the four corners and the center of the bed. You want to have the same tension at all 5 points.
5. Go to Position > Home Z.
6. Move the extruder head to the front of the bed so that the nozzles (and the gap between the plate and the nozzles) are clearly visible to you.
7. Go to Quick Settings > Z Baby Stepping. Turn the knob to the left until there is no gap between the left nozzle and the bed.
8. Using the M2 Hex Wrench provided, loosen the plate on the right extruder and pull down the extruder to where there is no longer a gap between the bed and the nozzle. Tighten that extruder into its place.
9. Go to Position > Home Z.
10. Check the 5 positions again to make sure that the tension is the same at all five points for both nozzles.

> CALIBRATE

Now that our nozzles are level to each other, we have to configure their offset. We are going to do this by printing a 2 cm cube and measuring the offsets by hand, entering them into the configuration of our machine, and storing them into the code.

1. Load filament into both extruders.
2. Using the provided factory files, upload the appropriate g-code (Depending on what printer you have) to an SD card.

3. Print 2cm test cube. This will allow us to properly measure our offset.
4. The top half of the cube, printed by the second extruder, will appear to have a shift from the bottom half, printed by the first extruder. Pay attention to the orientation of the cube and what direction the shift is in. Using a set of calipers, measure that shift in mm.
5. Go to Configuration > Extruder > Select Extruder 2
6. The change in the offset value will be based off the distance measured above. To shift the second extruder to the left, the value needs to become more negative and vice versa if the offset needs to be right adjusted.

> i.e. The top half of the cube, printed by the second extruder, is 0.34 mm off the bottom half on the right side. The current offset value is -33.99. Because I want to move the top half to the left, I set the offset to -34.33.

7. Go to Back > Store to eeprom
8. Print Cube again to ensure there is no offset. Repeat the above steps until the extruders are aligned.