3D PLATFORM

PRINTING THE HFE300 TWO-COLOR ALIGNMENT TEST

2018/01/23

Introduction

This training instruction will guide the user through printing the dual extruder calibration print. This is essential for calibrating the tool offsets for the machine. Having the tool offsets calibrated allows the machine to successfully print with both extruders within the same print.

It is important to keep in mind that purpose of this print when the part comes off the print bed. If there are gaps or build ups of filament on the walls or infill this will be addressed in a different calibration print. *This print is designed to calibrate the X and Y offset of the extruders only.*

Tools & Materials Needed

- Scraper to remove completed parts.
- 6-inch Calipers
- Print material (PLA filament is recommended for all calibration prints)
- HFE300 Two-Color Alignment Test G-Code
- SD card or network connection to the web interface to load print files

Process

Prepare the printer:

1. Prepare the print bed.
    a. Clean the print area and apply adhesion agent, as needed.
2. Load material.
    a. Load print material and ensure extruder is extruding material properly.

Prepare the g-code file:

1. Slice the supplied STL for the nozzle diameter being used.
    a. Standard print settings for 1mm nozzle:
        i. 0.5mm layer height
        ii. 128mm/s print speed
        iii. 5% infill
        iv. 3 bottom layers
        v. 1 perimeter
        vi. 0 top layers
        vii. Tool Change Retraction Distance: 2.00 mm
        viii. Tool Change Extra Restart Distance: 0.2 mm
        ix. Tool Change Retraction Speed: 30.0 mm/s
2. Save the g-code to a SD card or to the machine through the web interface.

Start the print:

Print the g-code file and observe during the print. Ask these questions during the print.

- Are the extruders aligned?
- Are the tool changes occurring properly?

if the extruders ae not aligned, the prints will intersect and bleed over into the other part, or leave a gap between the two parts. if the tool changes are not occurring properly, the material may not flow and leave voids in the part.

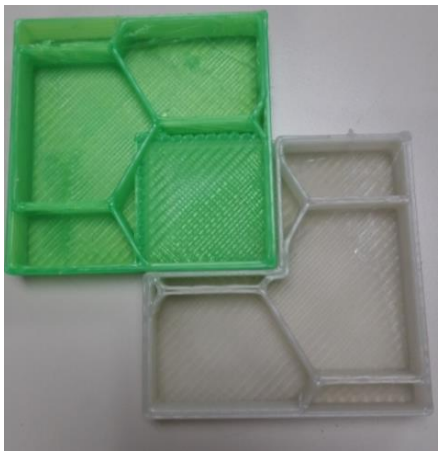
When the part is done, wait for the print bed to cool down to room temperature and then remove the part. If the print bed is not cooled sufficiently before attempting to remove the part, the part may be damaged and will throw off any measurements.

Inspecting the part

Visual inspection:

Look at the print after removal. There are visual and tactile clues to indicate if the printer is working correctly and the slice is good.

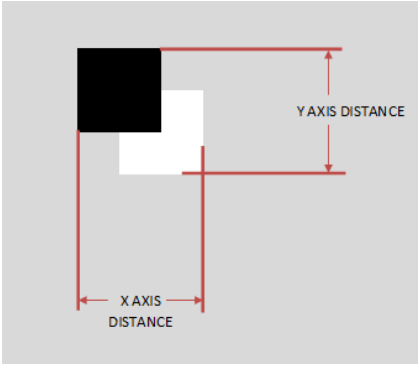
1. The X and Y offsets are incorrect: X and Y offset should be recalibrated. Colors will not be aligned unless the calibration process is completed.



2. The tool changes are not in sequence: The plastic shows variable flow characteristics. One section looks good, the other has voids in the print. The tool change retractions should be examined.

Tool Inspection:

Once the print has finished, use a set of calipers to measure the outer dimensions of the printed part. The part should measure new 114mm in both X and Y.



Notes:

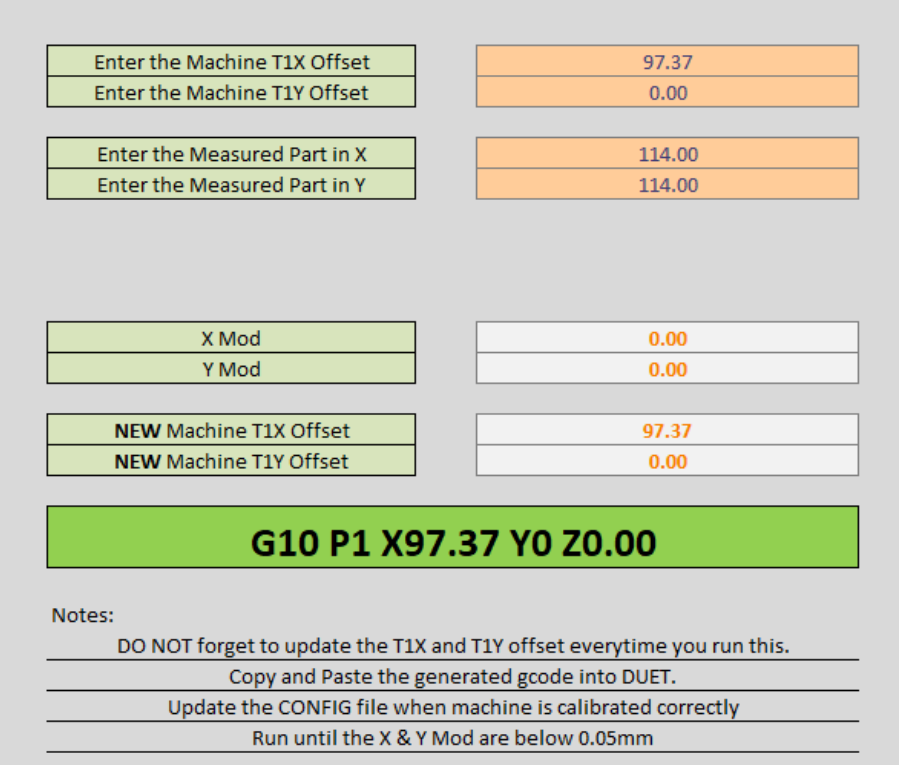
1. **It is important to remember the orientation the part was printed in, as this affects the direction of the part will be adjusted.**

2. **It is important to ensure the surface that the calipers are in contact with is smooth and has no burrs or strings from the tool change process.**

Correcting the Part

Corrections will depend on what is found during inspection.

1. **X and Y offsets are incorrect.** If the X and Y offsets are incorrect, recalibrate the X and Y tool offsets using the HFE Dual Color Alignment Calculator. This will calculate the necessary adjustment, and display the new values to you. Program the new values into the machine and repeat the above process until the part measures with 0.05mm in both axes.



Enter the Machine T1X Offset	97.37
Enter the Machine T1Y Offset	0.00
Enter the Measured Part in X	114.00
Enter the Measured Part in Y	114.00
X Mod	0.00
Y Mod	0.00
NEW Machine T1X Offset	97.37
NEW Machine T1Y Offset	0.00

G10 P1 X97.37 Y0 Z0.00

Notes:

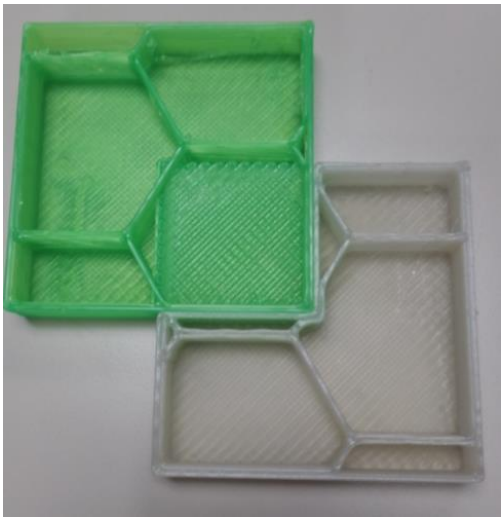
DO NOT forget to update the T1X and T1Y offset everytime you run this.

Copy and Paste the generated gcode into DUET.

Update the CONFIG file when machine is calibrated correctly

Run until the X & Y Mod are below 0.05mm

2. **The tool changes are not in sequence.** Revisit the slicer. The tool change retraction and restart distance will affect the start and stop of the flow of material. Too far of a tool change retract will cause the print to stop printing for a period of time and leave voids in the print. If the extra restart distance is too high, there will be large marks on the outside of the print. If the extra restart distance is too low, there will be voids at the beginning of each layer.



Wrapping Up

The Two-Color Alignment test is complete when the tool offsets are within 0.05mm.

Conclusion

The Two-Color Alignment Test is a simple but powerful tool to validate the tool offsets and extruder retracts during the tool changes. This print demonstrates the importance of calibrating the offsets correctly when dual color or material printing.

Please contact the 3D Platform support team at support.3dplatform.com with any further questions about your HFE extruders.

We appreciate all feedback as it helps improve the user experience for all 3D Platform WorkSeries users.

The 3D Platform Team