3D PLATFORM

TRAINING INSTRUCTION

PRINTING THE TWO-COLOR ALIGNMENT TEST

3DPTI-0006

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APPROVALS			
Name	**Title**	**Signature**	**Date (YYYY-MM-DD)**
J. Patrick	Author		**2017-06-20**
	Engineering		
	Service Manager		
	Manufacturing		

APPLICABLE MODELS	
Legacy	**Work Series**
☒ X1000	☒ 100
☒ X1000 CE	☒ 200
☒ WorkBench	☒ 300
`	☒ 400

CONTROL STATUS
☐ Confidential
☐ Internal use only
☒ Uncontrolled

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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.

Tools & Materials Needed:

- Knife or razor scraper to remove completed prints.
- Calipers or micrometer.
- Print material (PLA material is recommended for calibration prints).
- Dual Color Calibration gcode file
- SD card or network connection to the web interface (WorkSeries and later) to load print files.

Process

Printing the part

Prepare the printer

1. Prepare print bed. Clean the print area and apply adhesion agent if used.
2. Load material. Load print material and ensure extruder is extruding material properly.

Prepare the part

1. Prepare gcode file. Use supplied gcode if available. If using alternate nozzle sizes, slice the file using just a single perimeter and bottom layer, no infill.
2. Load file using SD card or web interface.

Start print

Print the gcode file and observe during the print. Ask these questions during the print.

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

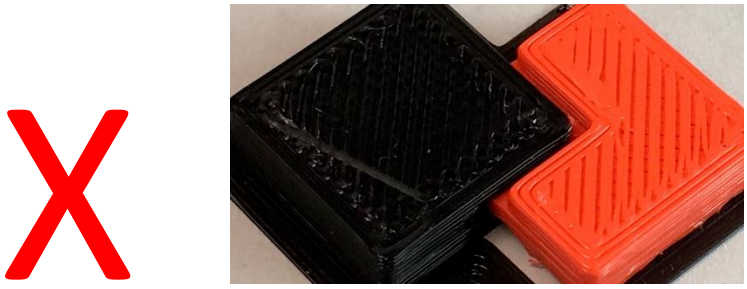
If the extruders are not aligned, the prints will intersect and bleed over into the other part or leave a gap between the two parts. If the tool changes are not occurring properly, the material may not flow and leave voids in the part.

Inspecting the part

Visual inspection:

Look at the Two-Color test after removal. There are visual and tactile clues to indicate whether the offsets are calibrated correctly.

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.

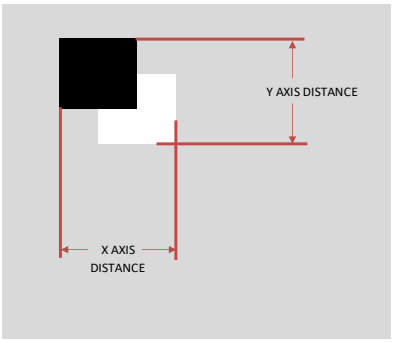


2. The tool changes are not in sequence: The plastic shows variable flow characteristics. One section looks good, another has voids in the print. The tool change retracts should be examined.

X

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 near 30 mm in both X and Y.

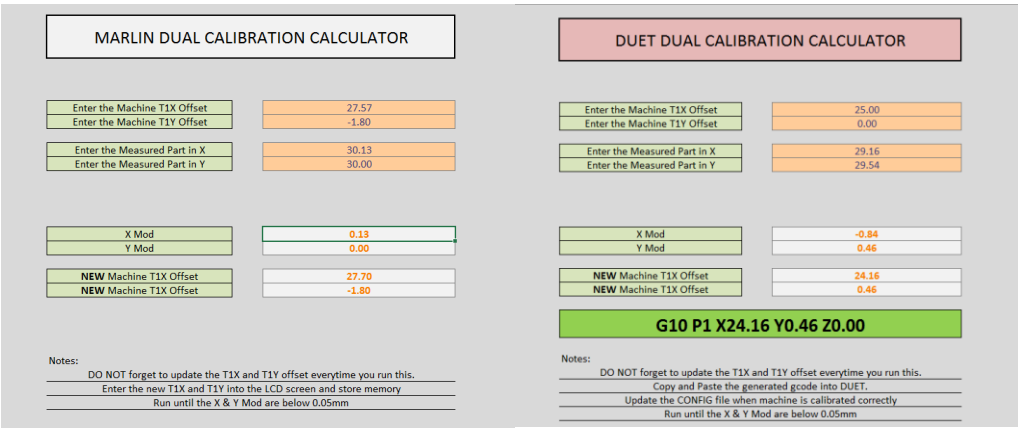


Note: It is important to remember the orientation the part was printed in, as this affects the direction the part will be adjusted in.

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 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 0.05 mm in both axes.



MARLIN DUAL CALIBRATION CALCULATOR

Enter the Machine T1X Offset	27.57
Enter the Machine T1Y Offset	-1.80
Enter the Measured Part in X	30.13
Enter the Measured Part in Y	30.00
X Mod	0.13
Y Mod	0.00
NEW Machine T1X Offset	27.70
NEW Machine T1X Offset	-1.80

Notes:
DO NOT forget to update the T1X and T1Y offset everytime you run this.
Enter the new T1X and T1Y into the LCD screen and store memory
Run until the X & Y Mod are below 0.05mm

DUET DUAL CALIBRATION CALCULATOR

Enter the Machine T1X Offset	25.00
Enter the Machine T1Y Offset	0.00
Enter the Measured Part in X	29.16
Enter the Measured Part in Y	29.54
X Mod	-0.84
Y Mod	0.46
NEW Machine T1X Offset	24.16
NEW Machine T1X Offset	0.46

G10 P1 X24.16 Y0.46 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 retract distance will affect the start and stop of the material flow. Too far of a tool change retract can cause the print to stop printing for a period of time and leave voids in the print.

If corrections are made to the print, repeat the process until the desired offsets are achieved.

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 tool changes. This print demonstrates the importance of calibrating the offsets correctly when dual color or material printing.