3D PLATFORM

PRINTING THE HFE300 CALIBRATION CHIP

2018/01/25

Introduction and Purpose

The calibration chip is the first of the standard calibration prints. It is designed to test the first layer height, bed adhesion, and illustrate the importance of the first layer. In FFF printing, ensuring the first layer is correct is critical to successful prints. This training will instruct and prepare the user to successfully validate a first layer and to identify and correct common issues.

Tools and Materials Needed

- Knife or razor scraper
- Calipers
- Print material (PLA material is recommended for calibration prints)
- 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. 0% infill
        iv. 1 bottom layer
        v. 1 perimeter
        vi. 0 top layers
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 beads of filament adhering to the bed?
- Are the beads of filament adhering to each other, or leaving gaps?

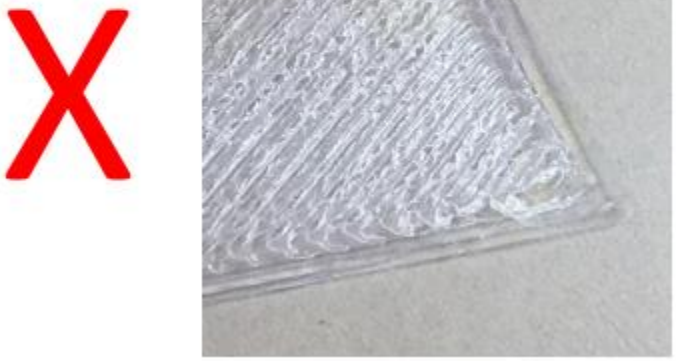
If the beads of material are not connecting during diagonal fill, try babystepping down. When the part completes, wait for the print bed to cool down and the remove it, being careful not to damage the part. Removing a part when warm can warp the part and potentially affect measurements.

Inspecting the Part

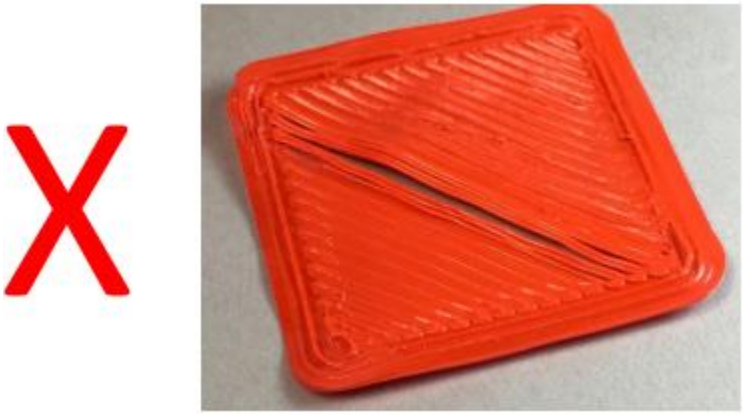
Visual Inspection:

Look at the chip after removal. There are visual and tactile clues to indicate whether the nozzle is at the correct height. There are three possibilities.

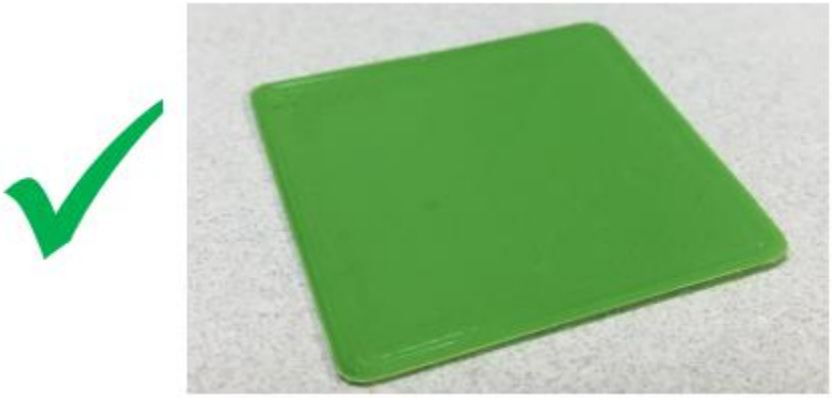
1. Nozzle is too low. The chip sill come off the print bed in one piece, but there will be ridges and gouging which can be felt on the part itself, especially near the edges of the diagonal fill. Because the nozzle is too close to the glass, the material is pushing out and up around the nozzle rather than laying down a flattened bead.



2. Nozzle is too high. The chip may fall apart after removing from the print bed. Diagonal infill lines will not be joined together, and will pull apart like strings. Because the nozzle is too high, the bead of material is not flattening as it should.



3. Nozzle is at correct height. The chip will come off the print bed in one piece, and will be smooth and consistent. There may be minor ridges around the edges of the print, but the center diagonal infill will be smooth, and the lines connected.



Tool Inspection:

Use a set of calipers to measure the thickness of the center portion of the chip. Exact dimensions will depend on the nozzle diameter and layer height the part was sliced at, but will be displayed on the machine control once the print is complete (look for current Z height on the control screen). It may be easier to measure the center of the chip by cutting the chip in half diagonally and measuring alone the edge of the cut, as the perimeter of the print may distort readings. Desired measurement is +/- 0.02mm of nominal thickness.

Correcting the Part

Corrections will depend on what is found during inspection.

1. Nozzle is too low. If the nozzle is too low, either reset the extruder using a larger shim or babystep up.
2. Nozzle is too high. Use the measurement of the part to indicate the adjustment to make. Example: if the desired height is 0.5mm and the measured thickness of the chip is 0.6mm, either lower the nozzle or babystep down 0.1mm.
3. Part did not stick to the bed. If the part did not adhere, try cleaning the glass and re-applying an adhesion agent such as hairspray. Check to ensure you are using the correct material for the slice. Consider adding BuildTak sheets to the bed to promote better adhesion.

If corrections are made to the extruders, either by resetting the extruder or babystepping, the chip process must be repeated, and the new chip inspected.

Wrapping up

The chip print is complete when chips from both extruders adhere to the print surface properly, pass visual inspection, and measure within 0.02mm nominal thickness.

Conclusion

The chip is a simple but powerful tool to validate nozzle height and first layer setting. This print demonstrates the importance of the first layer, and provides a foundation for proper print process settings.

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