HFE300 PRINTING THE TOP LAYER TEST

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Introduction & Purpose

The top layer box is designed to test the dimensional accuracy of the print, and illustrate the importance of the top layer. Ensuring dimensional accuracy and consistent top layers is critical for high quality prints. This training instruction will instruct and prepare the user to successfully validate the top layer of a print and to identify and correct common issues.

Tools & Materials

- Knife or razor scraper
- Calipers
- Print material (PLA material is recommended for calibration prints)

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. 10% infill
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 outer perimeters bonding during the print?
- Are the top layers covering the infill properly?

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 solid box for any indications whether the box printed correctly or not. Problems to look for are listed below.

1. Not enough top layers. There may be holes in the top layers either around the edges of the part or in the middle of the top layers. Another indication of too few top layers is an uneven top, if there are raised areas, or areas that sag down into the part.

2. Inconsistent material extrusion. If the extrusion is not enough, the material will be stringy, and the beads will not be connected completely. If the extrusion is too high, the bead will bulge up around the nozzle creating ridges in the top layer.

Sufficient top layers and extrusion will result in a top surface that is flat and smooth with no gaps, bulges, or holes.

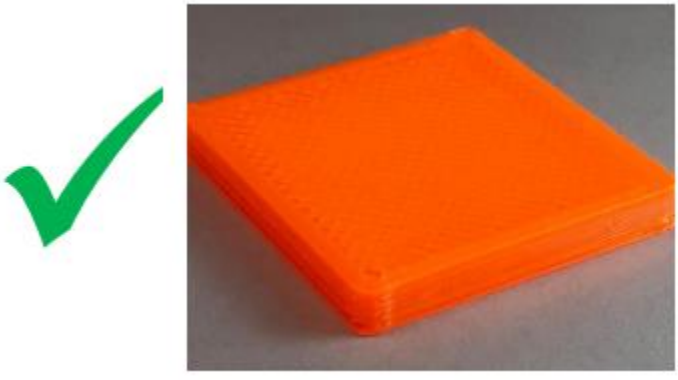
Tool inspection:

Using a set of calipers, measure the outer dimensions of the box. The X and Y measurements are 5 inches +/- 0.020 inches or 127mm +/- 0.5mm. The overall height or Z dimension is .591 inches +/- 0.020 inches or 15mm +/-0.5mm.

Correcting the print

Corrections will depend of the issue found during inspection of the part.

1. Not enough top layers, can be corrected by increasing the number of top layers in the slicing software. Increasing the infill percentage is another fix to gaps and holes appearing in the top layers.
2. Inconsistent material extrusion can be fixed by adjusting the extrusion multiplier when slicing the part in increments of 5% until the top layers are printed more consistently.
3. It is normal for a PLA part to measure a little smaller that the model shows due to the plastic shrinking. If the dimensions of the solid box are out of tolerance, double check the input file to ensure it is the proper size.



Adjust the slice, reprint, and inspect the new print as necessary.

Wrapping up

This training exercise is complete when a solid box is printed with all layers adhering the each other and the print bed properly, the print passes visual inspection, and all dimensions are within tolerance.

Conclusion

The solid box is a simple but powerful tool to validate extrusion and top layer settings. This print demonstrates the importance of the top layer and provides a foundation for print process setting changes.

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