3D PLATFORM

TRAINING INSTRUCTION

PRINTING THE THIN-WALL BOX

3DPT-0002

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

CONTROL STATUS
☐ Confidential
☐ Internal use only
☒ Uncontrolled

Table of Contents

Introduction & Purpose

The thin-wall box is a standard calibration print that ensures layer-to layer adhesion strength.

This training instruction will guide the user through printing the thin-wall box calibration print. It will illustrate what a successful thin-wall box print looks like, and what can be learned from printing the thin-wall box.

Tools & Materials Needed:

- Knife or razor scraper to remove completed prints.
- Calipers or micrometer.
- Print material (PLA material is recommended for calibration prints).
- Calibration thinwall 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 beads of filament adhering to each other on the thin wall?
- Is the printer moving too quickly?

If the beads of material are not adhering through the thin wall, try slowing the print speed down and observe the part. When the part completes, wait for print bed to cool down and then remove it, being careful not to damage the part. Removing a part when warm can warp the part and potentially affect measurements.

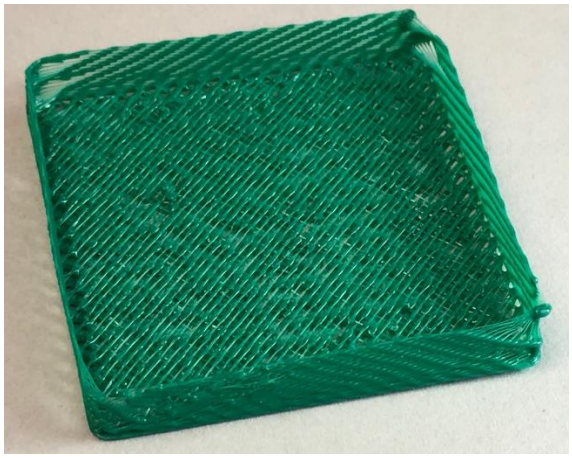
Inspecting the part

Visual inspection:

Look at the thin-wall box after removal. There are visual and tactile clues to indicate whether the nozzle is at the correct height. There are three possibilities:

1. The material is under extruded. The thin-wall box will come off the print bed but may break. The layers will appear thin or like they are missing material.

X



2. The extruder is moving too quickly. The beads are not bonded together and appear stretched and messy. Possibly missing some material or material has fallen into the middle of the box.

X

3. The filament feed and extruder speed are correct. The feed rate of the material and extrusion multiplier match the speed of the machine. The material bonds well together.

Tool inspection:

1. Use a set of calipers or a micrometer to measure the thickness of the thinwalls. Exact dimension will depend on which gcode file is printed. When printing with a 0.6mm nozzle, the thickness should be between 0.70 - 0.74mm thick. This process should be completed for all extruders equipped on the machine. If your part measures the correct thickness, congratulations your machine is calibrated and functioning properly. If your print did not measure the correct dimensions, move to *correcting the part*.

Correcting the part

Corrections will depend on what is found during inspection.

1. **The material is under extruded.** If the material is under extruded, revisit the slicer. Be sure that the nozzle size is correct and the material extrusion is at 100%. Check the filament to make sure it is feeding smoothly and the extruder is not skipping steps.
2. **Extruder is moving too quickly.** If the material appears messy and does not bond well, adjust the printing speed. Slow the extruder's printing movements down and observe the part. The layers will begin to bond together properly.
3. **Thin walls do not measure accurately.** If the thin walls measure too thick, reduce the extrusion multiplier to 95% and reprint the thin-wall box. If the thin walls measure too thin, increase the extrusion multiplier to 105% and reprint the thin-wall box. Measure and evaluate changes to the thin wall dimensions.

If corrections are made to the slice, reprint the part until the desired results are achieved.

Wrapping up

The thin-wall box print is complete when the box from all nozzles adhere to bed properly, pass visual inspection, and measure within .02mm of nominal thickness on the thin walls.

Conclusion

The thin-wall box is a simple but powerful tool to validate the print layer to layer adhesion. This print demonstrates the importance of the print speeds, cooling and layer to layer adhesion.