Sakari Matias Kapanen sakari.m.kapanen@student.jyu.fi

FYSS430 A computer tomographic study of the infill ratio of a 3D printed object

Measurement date: January 25, 2017
Supervisor: Arttu Miettinen

Abstract

TODO

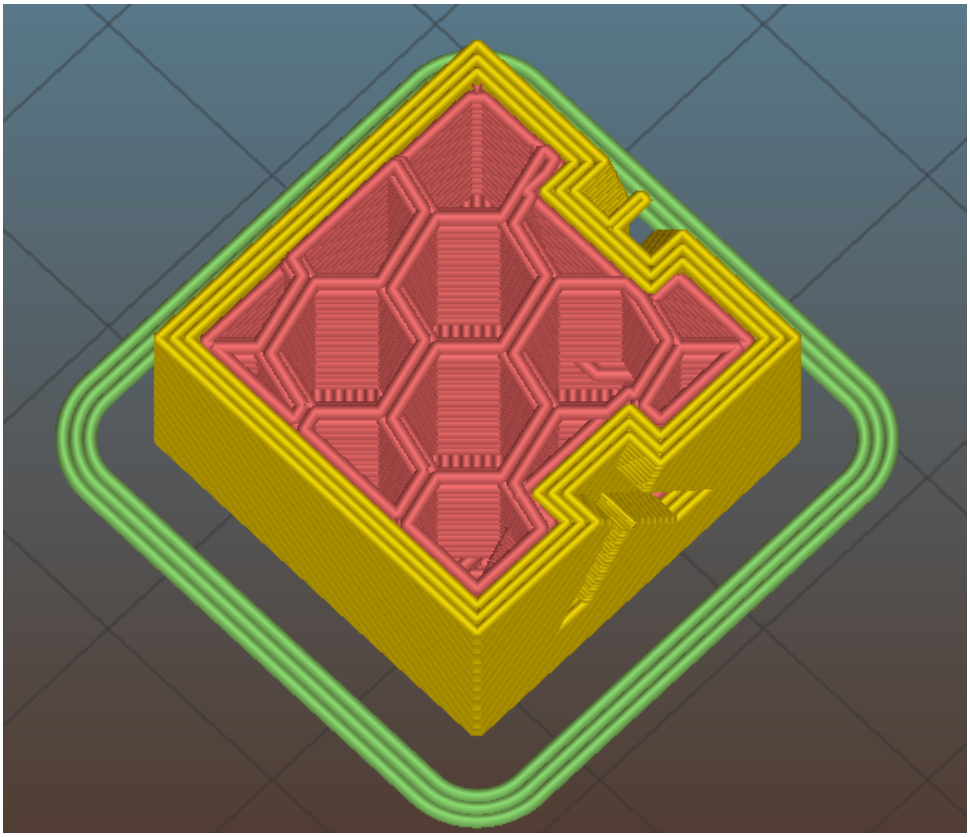

Figure 1: A section of a three-dimensional cube model [1] sliced by Slic3r [2]. A honeycomb infill pattern of 20 % ratio has been generated inside.

1 Introduction

Three-dimensional printing is an additive manufacturing method where plastic is extruded layer by layer to produce a three-dimensional object. A solid 3D CAD model is prepared for printing by a "slicer" software which generates the tool paths for the nozzle.

It does not often make sense to fill the whole solid model with plastic. Therefore a sparse "infill" pattern is generated instead as shown in image 1.

The volumetric ratio of the infill material inside the cube was chosen as the research subject of this computer tomography project work. Tomographic imaging makes it possible to acquire a volume image of the 3D printed cube which can be then analyzed by traditional image analysis methods.

2 Theoretical background

2.1 X-ray computer tomography and reconstruction

2.2 Image analysis

3 Experimental methods

3.1 SkyScan 1172 CT scanner

3.2 Image analysis software

4 Results

5 Conclusions

References

[1] XYZ 20mm Calibration Cube. iDig3Dprinting. http://www.thingiverse.com/thing:1278865/#files. Referenced March 7, 2017.

[2] Slic3r, G-code generator for 3D printers. http://slic3r.org/. Referenced March 7, 2017.