Università
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Faculty
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Computational Fabrication (Spring 2024)

Assignment 2: Testing 3D Printer Capabilities

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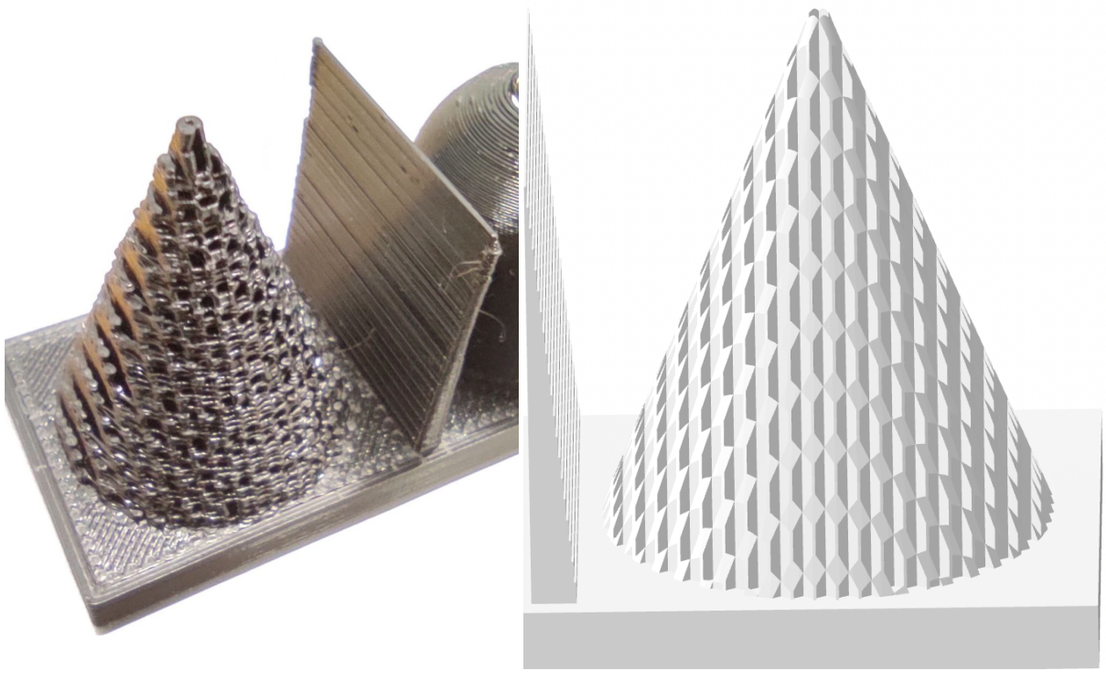
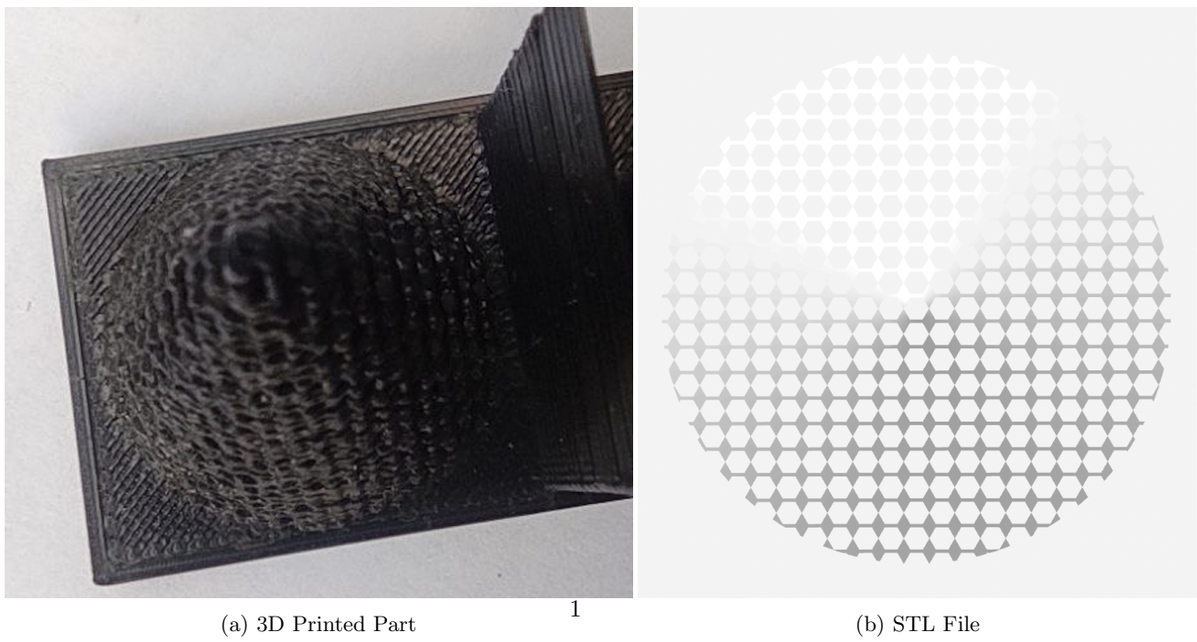
1 Complex Geometry



(a) 3D Printed Part (b) STL File

Figure 1: Complex Geometry

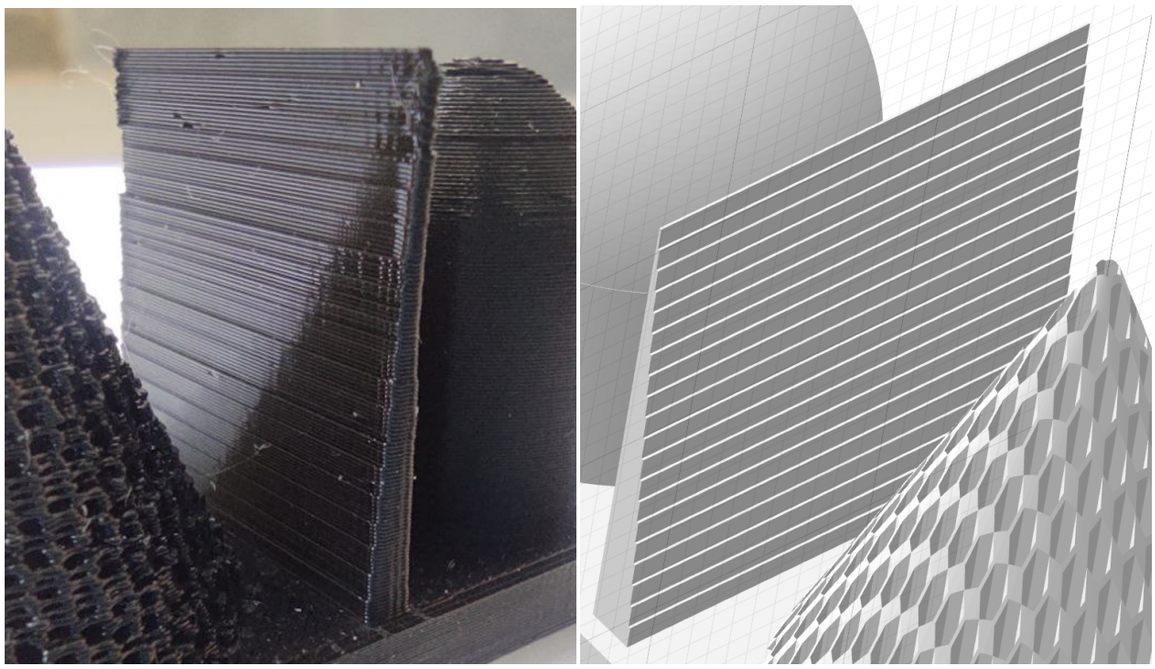


(a) 3D Printed Part (b) STL File

Figure 2: Complex Geometry

The image depicts a 3D printed part (right) and its corresponding STL file (left). The 3D printer's limitations are evident when tasked with printing complex geometries, exemplified by its inability to successfully create hexagonal holes within the cone structure, from the top to the bottom. The printed part has distorted and inaccurate hexagonal faces, which significantly different from the hexagonal shapes in the STL file. This indicates that the 3D printer may not be suitable for applications requiring high precision and accurate reproduction of complex geometries as in STL file.

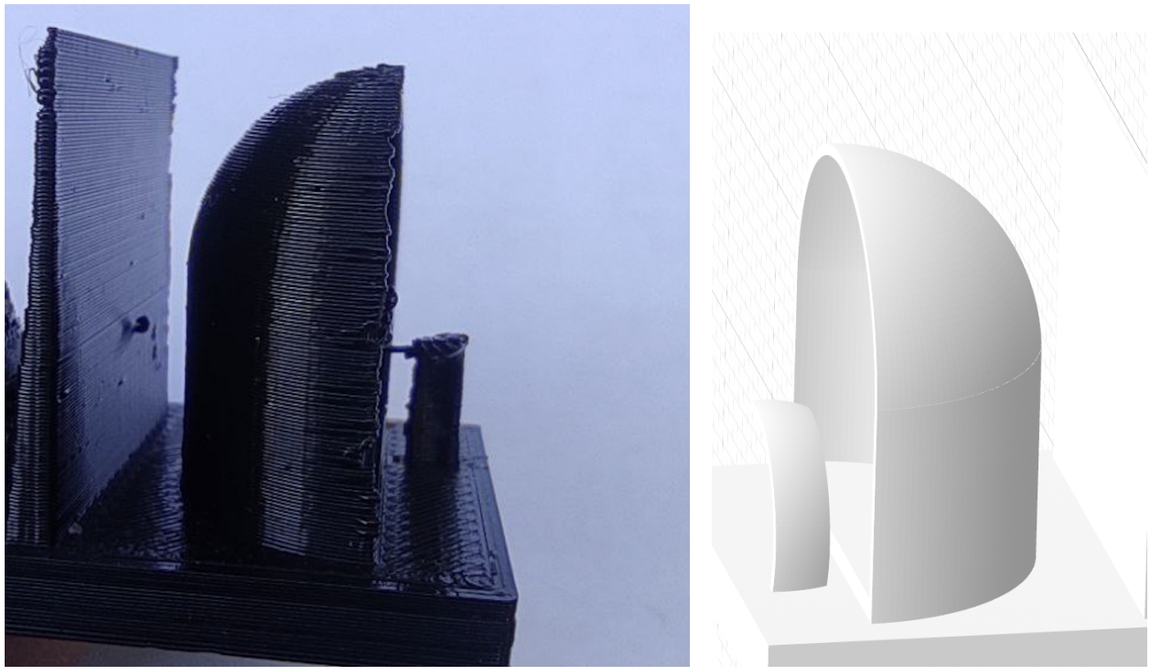
2 Sharp Edges & Tall Structures



(a) 3D Printed Part (b) STL File

Figure 3: Tall Structures

The STL file has edges in decreasing order, which shows the printer struggled with sharp features. The STL file reportedly has 20 steps decreasing. The printer is not be able to resolve details smaller than a certain size when the hright is increasing, resulting in error in edges thickness instead of keep reducing the sharpness as certain heights.



(a) 3D Printed Part (b) STL File

Figure 4: Sharp Edges

The 3D printer has demonstrated a clear incapability in printing sharp fine edges, as shown in the image.

The printed part has rounded edges and corners, which significantly different from the sharp and precise edges in the STL file. This diffenrece indicates that the 3D printer may not be suitable for applications requiring high precision and sharpness in the printed parts, especially when it comes to fine edges.

3 Smooth Features

(a) 3D Printed Part (b) STL File

Figure 5: Smooth Features

The 3D printer had limitations in accurately printing parts with cylindrical tops and rounded edges, as seeen in the above picture, by the presence of holes and imperfections on the printed object. Despite attempts to print such features, the printer's limitations result in a lack of smoothness and precision, contributing to imperfections in the final print.

The 3D printer also demonstrates an inability to produce walls (Figure 4) that are smooth and flawless, revealing limitations in its printing capabilities. The printed walls exhibit irregularities and imperfections, indicating challenges in maintaining consistent surface quality.

4 Overhangs

(a) 3D Printed Part (b) STL File

Figure 6: Overhang

While the 3D printer encountered difficulties with certain features, such as smooth walls and complex geometries, etc., it demonstrated capability in printing overhanging parts above 90 degrees successfully. This accomplishment highlights the printer's versatility and ability to overcome some printing challenges, suggesting that while it may struggle with certain aspects, it excels in others. Understanding these strengths and weaknesses can inform future printing projects and guide optimization efforts to maximize the printer's performance across various printing tasks.