Design and Fabrication of a PCB Holder Using FDM 3D Printing , Followed By Compression Test

AVULA NITHEESH (EE24MT032)
BHUTTO (EE24MT023)

Department of EECE, IIT Dharwad

Contents

Introduction

- The project focuses on designing and fabricating a simple PCB holder using FDM 3D printing.
- Compression testing is vital to evaluate mechanical strength and deformation behavior of 3D Printed component.
- This study evaluates the compression capability of 3D-printed PLA to assess its suitability for engineering applications.

Material Selection

PLA (Polylactic Acid):

- Biodegradable
- Eco-friendly
- Easy to print

Figure: PLA

Geometry Selection

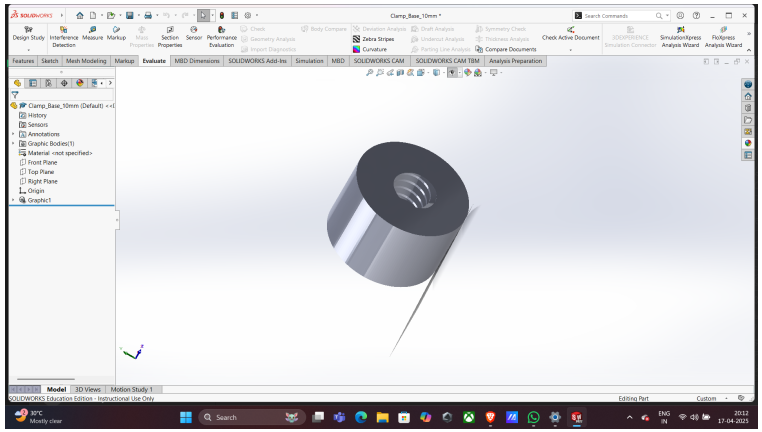


Figure: SolidWorks model of bottom part

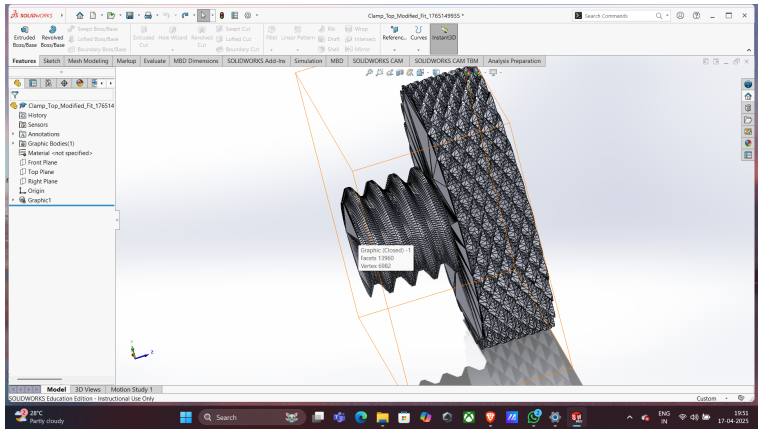


Figure: SolidWorks model of top part

Slicing Software

Anycubic slicer was used to prepare the STL files for printing.

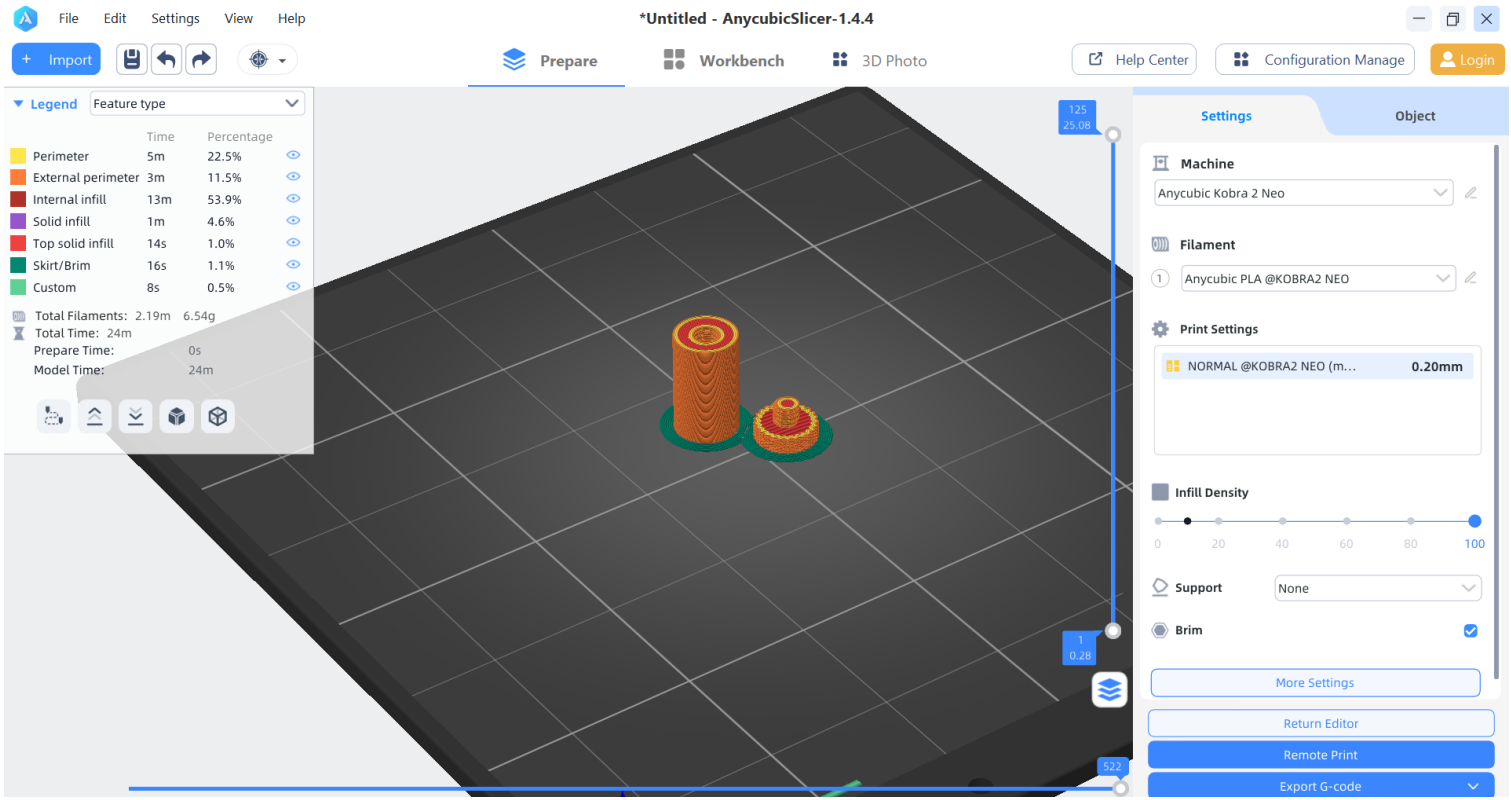


Figure: slicing

Process Parameters

Material	Infill (%)	Layer Thickness (mm)	Nozzle Speed (m/s)	Bed Temp (°C)	Nozzle Temp (°C)
PLA	100	0.4	100	60	160
PLA	80	0.4	100	60	160
PLA	60	0.4	100	60	160

Table: Slicing Parameters for PLA

Additive Manufacturing Methodology

Printer: Anycubic Kobra 2 Neo

Samples were printed at various infill densities.

Experimental Procedure

Compression testing performed using a **Universal Testing Machine (UTM)**.

Samples were tested to evaluate deformation and failure characteristics.

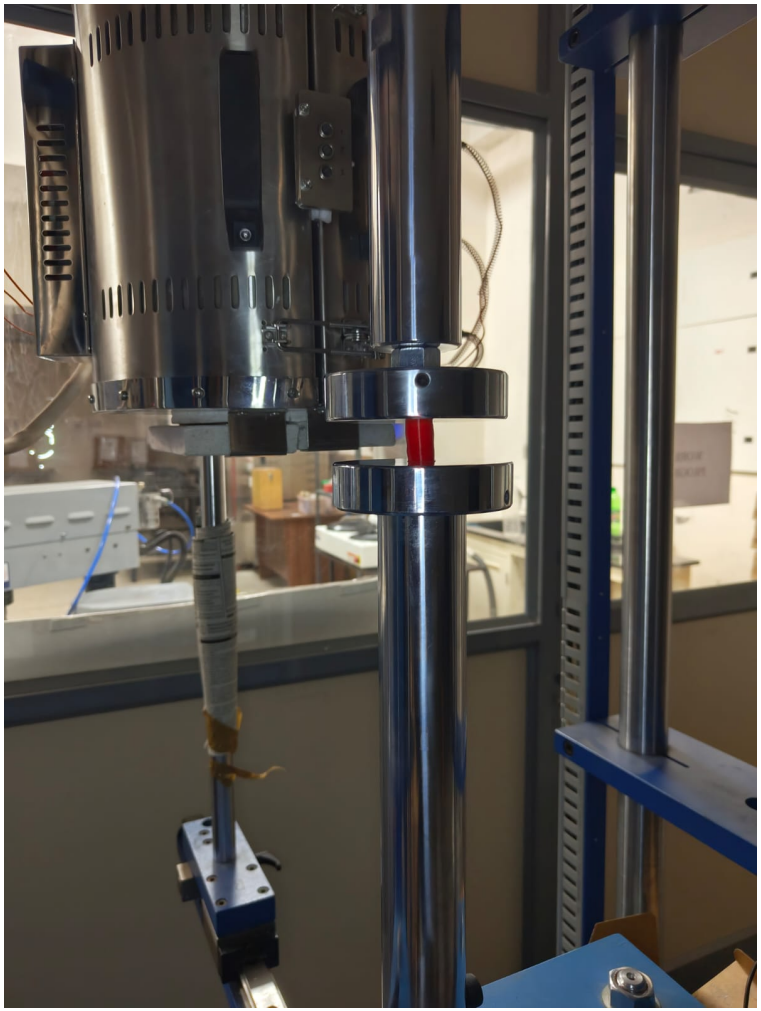
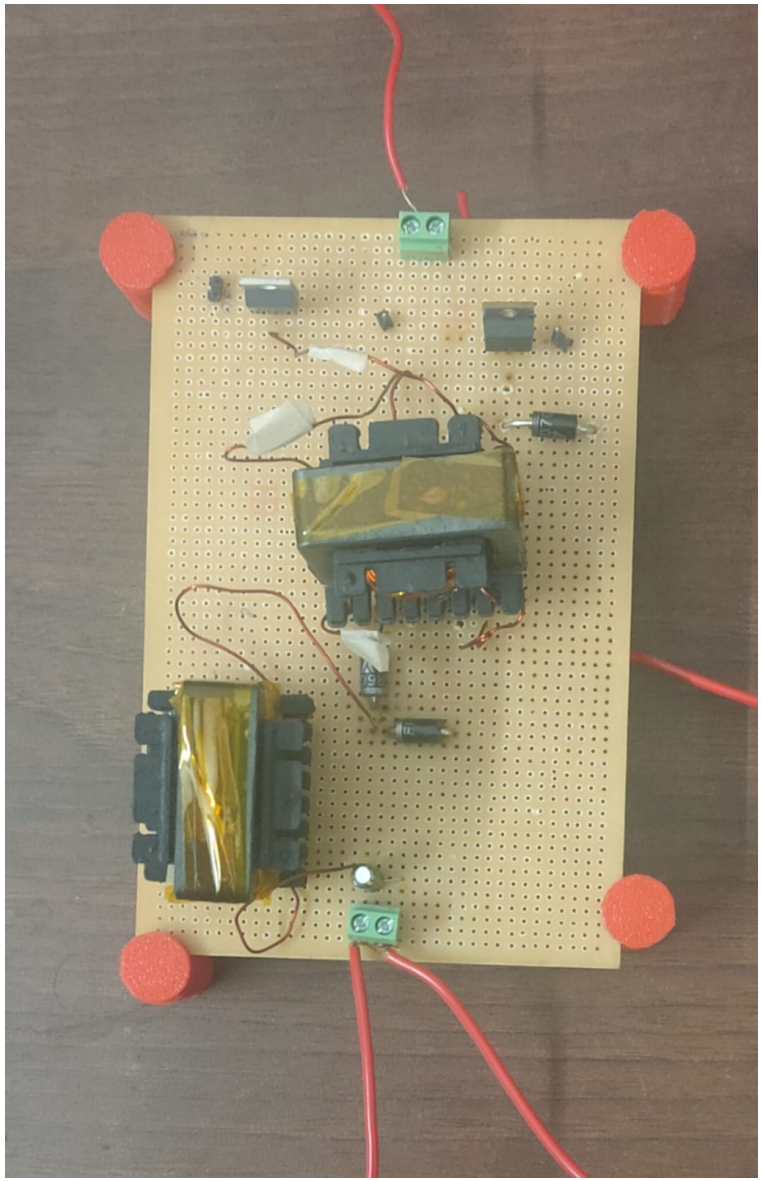
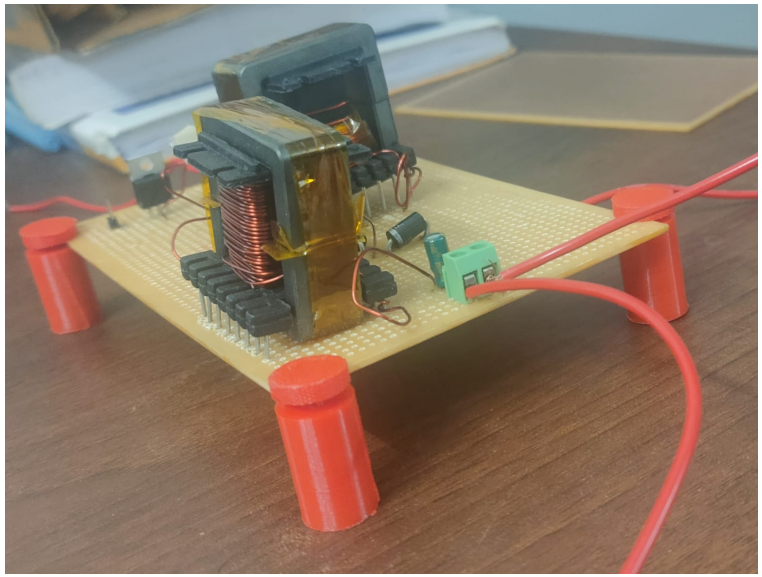


Figure: Universal Testing Machine during compression test

Final Product





Comparison of Results (1/2)

- Visual and mechanical comparison of PLA at different infill densities.
- PLA showed higher strength at all infill levels.

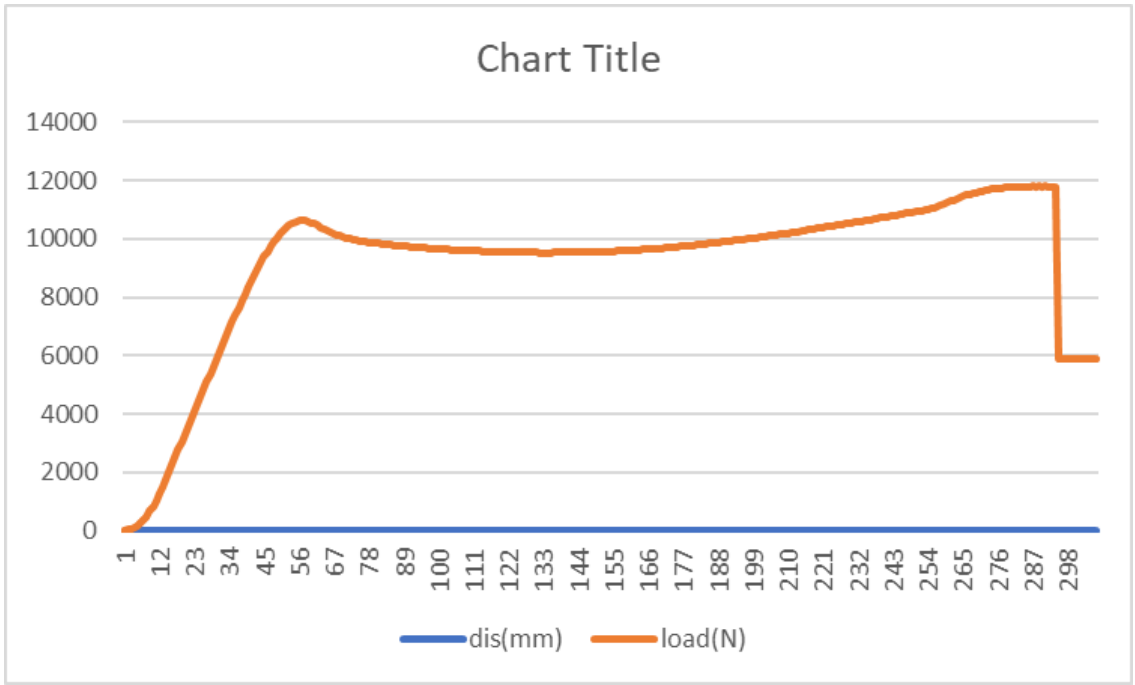


Figure: Infill Density 100%

Comparison of Results (2/2)

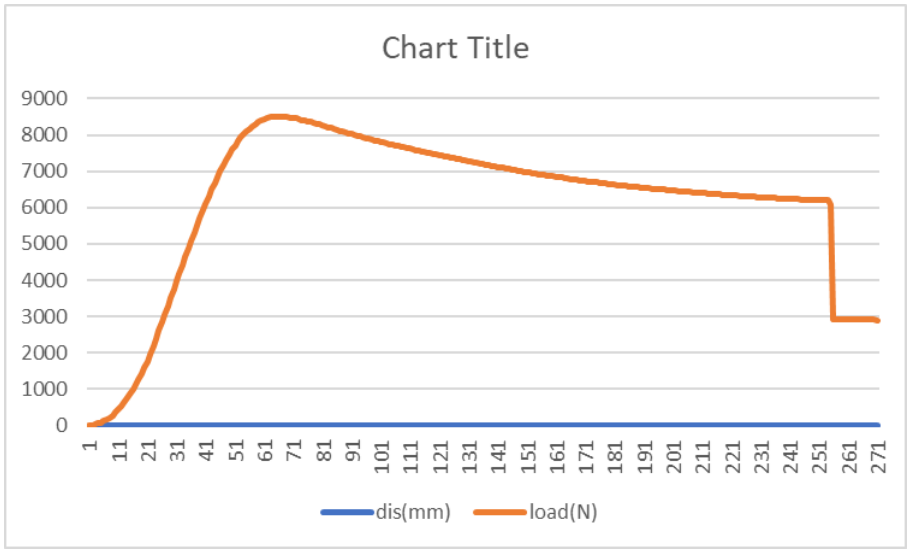


Figure: Infill Density 80%

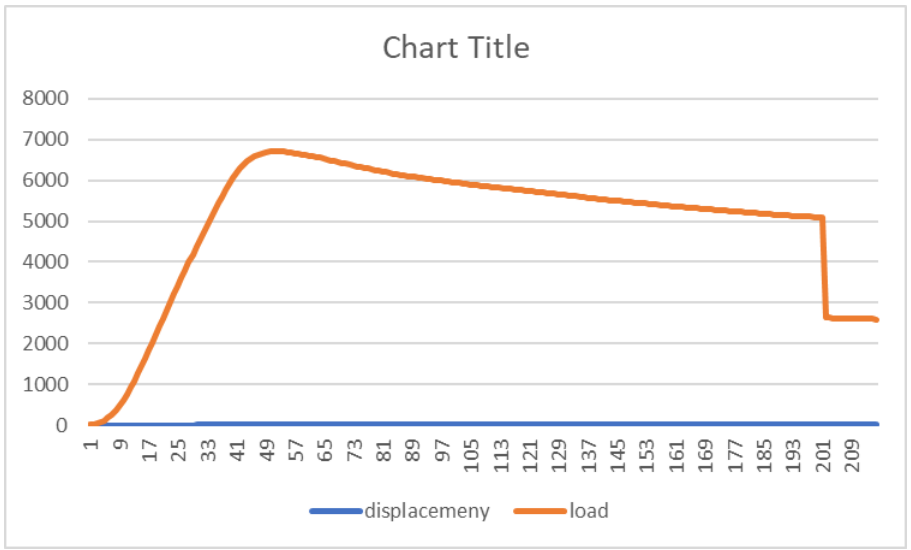


Figure: Infill Density 60%

Conclusion

- Increased infill ratio improves mechanical strength.
- The final product facilitates the process of soldering components onto PCBs for electrical engineers.

References

- https://www.3ding.in/blog/pla-vs-abs-vs-petg-when-to-choose-which-3d-printing-filament
- Özsoy, K., Erçetin, A., Çevik, Z. A. *Comparison of Mechanical Properties of PLA and ABS Based Structures Produced by FDM AM*, European Journal of Science and Technology, No. 27, pp. 802-809, Nov 2021.

Thank You!