

Manufacturing of Metal Coated Chess Board Using 3D Printer

Gaikwad Varun¹, Dhaigude Nihal², Kamble Manav³

¹Department of Mechanical Engineering, VPKBIET Baramati

²Deptment of Mechanical Engineering, VPKBIET Baramati

³ Department of Mechanical Engineering, VPKBIET Baramati

Abstract - Additive manufacturing has revolutionized product development by enabling rapid prototyping and customized design solutions. This paper presents the design and manufacturing of a metal coated chess board and 32 chess pieces using 3D printing technology. The chess components are fabricated using PLA material through fused deposition modeling (FDM) and further enhanced with electroplating to achieve a premium metallic finish and improved durability. The project integrates CAD modeling, slicing, 3D printing, dimensional inspection, surface preparation, and electroplating processes. Emphasis is placed on dimensional accuracy, surface finish, aesthetic quality, and cost optimization.

Key Words: Additive Manufacturing, 3D Printing, PLA, Electroplating, Chess Board, FDM Technology.

1. INTRODUCTION

This project focuses on the manufacturing of a metal coated chess board using additive manufacturing technology. The chess board (35 cm × 35 cm) and chess pieces are designed with precise dimensions to ensure balance and usability. PLA material is selected due to its ease of printing, dimensional stability, and surface finish quality. After printing, surface preparation and electroplating processes are performed to provide a metallic appearance and improved wear resistance.

2. Body of Paper

LITERATURE REVIEW

Previous studies indicate that 3D printing using PLA material offers sufficient accuracy and surface finish for small mechanical components. Research also suggests that combining additive manufacturing with surface coating techniques such as electroplating significantly enhances aesthetic quality and durability.

OBJECTIVES

- To design a complete chess board and 32 chess pieces using CAD software.

- To manufacture the designed components using 3D printing (FDM technology).
- To apply electroplating for achieving metallic finish and improved durability.
- To ensure dimensional accuracy using inspection and quality control methods.
- To analyze total manufacturing cost and production time.
- To enhance aesthetic appearance and structural stability of the chess set.

DESIGN AND DIMENSIONS

Chess Board: 35 cm × 35 cm

Square Size: 5 cm × 5 cm

Pawn: Height 4 cm, Diameter 2.5 cm

Knight: Height 5.2 cm, Diameter 2.9 cm

Bishop: Height 6 cm

Rook: Height 4.6 cm

Queen: Height 6.4 cm

King: Height 7.5 cm

TIME AND COST ANALYSIS

Total Printing Weight: 774 gm

Total Printing Time: 23 hours

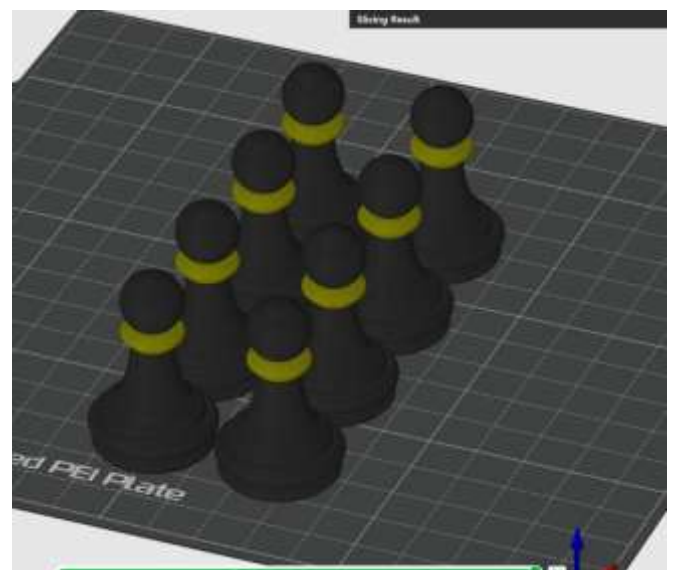
Material Cost: ₹1 per gram

Electricity Cost: ₹16 per hour

Labor Cost: ₹16 per hour

Total Estimated Cost: ₹1200

Fig -1: Design



REFERENCES

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Fig -2: Design



Fig 3: Final Product

CONCLUSION

The chess board and 32 chess pieces were successfully designed and manufactured using 3D printing technology. The addition of electroplating significantly enhanced the visual appeal and durability of the final product. The project demonstrates that hybrid manufacturing combining additive techniques and surface finishing can produce high-quality customized products in a cost-effective manner.

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