

Title: Addressing Technical Challenges and Workflow Optimization in 3D Prototype Manufacturing with Creality Ender 3 V2 Neo

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Abstract:. This study investigates workflow optimization for desktop Fused Deposition Modeling (FDM) using the Creality Ender 3 V2 Neo in resource-constrained environments. The novelty lies in the integration of hardware resilience (a low-cost inverter system) with systematic parameter optimization. The research addresses recurring challenges such as stringing, interlayer delamination, and surface irregularities, particularly under conditions of frequent power interruptions. Using PLA filament, parameters including layer height, nozzle size, infill style, and temperature were varied across seven planned trials. Prototypes such as a telescope sleeve and headphone stand were tested for strength, dimensional accuracy, surface quality, and print time. Results showed that the optimized setup improved load-bearing performance by 18% and reduced print time by 20% compared to default slicer profiles. The inverter system eliminated mid-print failures during blackouts, demonstrating the feasibility of reliable additive manufacturing in Dhaka-like settings. This work offers a cost-effective, practical workflow for laboratories and educational institutions seeking dependable 3D printing.

Keywords:

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