"USING FDM 3D PRINTING TECHNOLOGY TO CREATE LAMPWITH CUSTOM DESIGN"

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Today, several 3D printing technologies are available, each with unique features and application areas. Among the most popular technologies are Stereolithography (SLA), Selective Laser Sintering (SLS), and Fused Deposition Modeling (FDM). Each technology has its strengths and is chosen based on specific project requirements. Fused Deposition Modeling (FDM) technology has significantly impacted the field of product design due to its accessibility, affordability, and ease of use. FDM works by extruding melted thermoplastic filament layer-by-layer to create a three-dimensional object. It allows designers and engineers to quickly prototype, iterate designs, and produce fully functional and customized products, particularly in lighting solutions.

The importance of this research lies in demonstrating the potential of accessible FDM 3D printing technologies for creating interior objects, particularly custom lighting fixtures with unique designs. Such innovations significantly contribute to the development of creative small businesses, enabling them to offer distinctive and personalized products to their customers. The lamp creation process begins with designing a preliminary sketch. In this project, a vector illustration was developed using Adobe Illustrator and saved in two formats – a simple JPEG image and a set of SVG files, each representing individual design components.

Next, the MakerLab website and specifically its "Make My Lithophane" section is utilized, selecting the option with LED strip lighting and single-color printing. The JPEG image is uploaded to create the initial model. Originally, this service was intended specifically for photographic lamp printing with specialized CMYK filament sets. However, since the project requires specific colors beyond the CMYK palette, further modifications are made using Tinkercad—a free, user-friendly software optimized for 3D printing. Tinkercad is ideal for converting vector illustrations into 3D models. For more complex tasks, software like Autodesk Fusion 360 is recommended. Each SVG file is sequentially exported and carefully checked for scale accuracy. Adjustments

to the dimensions are made to highlight certain design elements, such as increasing the prominence of letters by reducing the height of the background and secondary elements. The finalized models are exported in OBJ format. The initial model from MakerLab is imported into a slicer, specialized software designed to translate 3D models into precise printing instructions. The Bambu Lab slicer software is used due to the compatibility with the Bambu Lab printer. The rear frame is retained from the original model, but the custom OBJ file replaces the original design. Once visually satisfied, adjustments to the default slicer settings are made, focusing on significantly enhancing print quality rather than reducing print time and material usage.

Filament colors are loaded into the printer, and the appropriate printing plate is installed. During the printing process, preparations for installing an LED strip are made. A simple and accessible LED strip from IKEA is selected for ease of use. Upon completion of the printing process, the finished parts are carefully removed from the printing plate, the LED strip is attached, and all components are assembled to finalize the lamp.

The successful development of the 3D-printed lamp demonstrates FDM technology's potential in producing functional and aesthetically pleasing interior items. This approach can significantly enhance individual creativity in lamp design, making it highly relevant for designers and small-scale producers looking for cost-effective solutions in customized interior decoration.

References:

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