Improving Print Quality, Precision and Repeatability of Open Source MSLA 3D Printer

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Quality of parts made by 3D printers differs significantly. Low precision, repeatability and varying success rate prevents wider usage of 3D printers. This project explores different approaches to increasing the print quality of parts made by an open source MSLA 3D printer that I have developed and build. The influence of print parameters (such as the length of curing, speed of the platform movements, layer height, etc.), calibration mechanism and flatness of the platform was investigated. All components of the 3D printer were carefully observed with the goal to improve the least reliable parts. The precision of dimensional accuracy between parts has been significantly improved. Reliability was further adjusted by using a better step-down converter for powering the Raspberry Pi controller and by improving the vat foil tensioning mechanism. This study showed that quality of parts made by MSLA 3D printers can be greatly enhanced by precisely adjusting the print parameters for each resin, increasing the rigidity of the calibration mechanism and properly carrying out the postcuring procedure. These findings are of great interest also to other developers during development of stereolithography machines with high accuracy and part quality demands.

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