

The Printing Parameter's Effects on the Dimensional Accuracy of the Parts Made of Photosensitive Resin

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Abstract.

LCD is a resin additive manufacturing process used in the dental, jewellery, engineering industries or hobby, in applications where surface quality, level of details and dimensional accuracy are the main requirements. Resin monomer with photo-initiator ensure a short curing time under the influence of UV light, which allows to achieve fast print speeds and adequate details (as from 0.01 mm layer height). The print quality of an LCD printer mainly depends on its LCD density and on the printing parameters, such as layer height and exposure time.

This paper identifies and explains issues concerning printing accuracy, which were experimentally identified using printed samples made from dedicated photosensitive resin material and MiniTab statistical software to determinate the optimal printing parameters. For performing the tests, a series of identical parameters were used and different variations of layer height (0.01 mm, 0.1 mm and 0.2 mm) and exposure time (6 s, 13 s and 20s).

The final results provided by the statistical software sustained in detailed, by graphs and tables, showed that when it comes to the linear dimensional accuracy, along X and Z-axis the best results were provided by samples printed with 0,1 mm layer height and 6 s exposer time. For the linear dimension alongside the Y-axis, the smallest deviation was found in the case of the sample printed with 0,2 mm layer height and 6 s exposer time.