

FDM PRINTING TECHNOLOGY APPLICATIONS IN DENTISTRY

Zorana Golubovic^{1*}, Aleksandra Mitrovic², Aleksa Milovanovic³

¹University of Belgrade, Faculty of Mechanical Engineering, Belgrade, Serbia

²The Academy of Applied Technical Studies Belgrade, Department of Computer-machine engineering,
11000 Belgrade, Serbia

³University of Belgrade, Innovation Centre of the Faculty of Mechanical Engineering, Belgrade, Serbia

*Corresponding author e-mail: zzgolubovic@mas.bg.ac.rs

Abstract

In recent years, 3D printing technology is rapidly developing and constantly leading to new applications. One of the areas which have widely accepted benefits from 3D printing in dentistry, because of its demands to have personalized and customized dental products and appliances. Mostly used 3D printing methods in dentistry include stereolithography (SLA), selective laser sintering (SLS), fused deposition modelling (FDM), and digital light processing (DLP). This paper presents FDM printing technology and its applications in everyday dental practice.

FDM is a widely available technology, easy to be installed, with a relatively reliable quality printed parts. In the fused deposition modelling process, objects are created by layering different types of thermoplastic polymeric filament materials, such as polylactic acid (PLA). The polymer material is extruded through a nozzle device, where a computer controls the temperature and movement of the material. Material is in a semiliquid state, it hardens after the extrusion, and bonds to the previous layer. Parameters for printing that need to be defined are numerous, and dependant on every particular task. Experience from praxis shows that FDM is used for the production and prototyping of pattern of the complete denture, custom bite registrations, basic proof-of-concept models, simple, low-cost prototyping anatomical parts. Disadvantages of this technology are rough surface finish, inhomogeneous density, longer printing time. However, future innovations will alleviate some of the present disadvantages, by, for example, reducing steps that are needed to get the end product.

Keywords

3D printing, dentistry, fused deposition modelling

Acknowledgement

This research is supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia.