

Mechanical characteristics of parts obtained by SLS printing technology

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ABSTRACT

The aim of this paper is to determine the mechanical characteristics of parts obtained by Additive Manufacturing (AM). All specimens were printed on a Fuse 1 (FormLabs, Summerville, MA) 3D printer. This AM technology is SLS (Selective Laser Sintering). With this technology, objects of different shapes and dimensions can be produced at the same time. The only condition is that during printing, the parts must be at least 5 [mm] apart from each other. The thickness of the powder layer during printing was 110 microns. In this paper, one type of specimens are used to determine the mechanical characteristics, the dimensions of which were chosen according to specific standard. This standard is ISO 178 for 3-point bending specimens. The dimensions of the bending specimens are 96x8x4 [mm]. These specimens were produced in four batches, differing in printing orientation (horizontal and vertical) and printing location (printed on the edge and in the middle of the powder bed). The material used for printing the specimens is polyamide (PA 12). The flexural strength of this material is 66 MPa. After printing, specimens were tested on a standard tensile testing machine (SHIMADZU AGS-X 100kN).

In the case of vertical bending specimens printed in the middle, the flexural strength after the test was 65.15 MPa, and for this type of specimens this is the smallest deviation from the value given in the literature. The greatest deviations of the flexural strength values are for vertical specimens printed on the edge, where the flexural strength is 58 MPa, and for horizontal specimens printed in the middle, the flexural strength is 81.7 MPa.