SURFACE PROPERTIES ANALYSIS OF METALLIC ADDITIVE MANUFACTURING MATERIALS

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Abstract

This research covers the surface roughness analysis of metallic materials obtained through Additive Manufacturing. The analysis was performed on five different parts, which were made from 17-4 PH stainless steel. Parts differ in geometry and the target surfaces for this analysis are: support surface for the part 1, bottom raft surface for parts 2- 4 and the top surface of the manufactured part 5. This particular stainless steel material properties are high strength, corrosion resistance and hardness compared to other metallic materials allowing this material to have a wide range of applications. The surface roughness of the parts are obtained in three ways: along the printing direction, transverse to the printing direction and also the layer roughness was estimated on lateral surfaces.

Surface roughness measuring device used for this research is MarSurf SD26 (Mahr GmbH, Gottingen, Germany). Measuring length of the device is 26 mm with speed range from 0.1 to 1 mm/s. In this research the lowest measuring speed is used. Surface roughness device outputs are mean and maximum roughness depth, R_z and R_{max} respectively. The results for part 5 layer roughness values R_z and R_{max} match, showing that the part was printed with exceptionally high accuracy along the vertical i.e., Z direction. Measurements made in the transverse direction to the printing path show that the R_z value in part 2 has twofold higher values compared to part 5, leading to the conclusion that printed parts have smoother surfaces than printed rafts.

Keywords

Roughness, 17-4 PH, MarSurf SD26, R_z, R_{max}

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