

Study of Water-based Coatings For 3D Printed Parts

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ABSTRACT

3D printing has attracted tremendous attentions lately and has been used in many fields including architectural or fashion design, aerospace, military, and medical industries, etc. It turns a 3D digital model into a 3D object, allowing end users to hold it, touch it, and feel it. Since 3D printed parts are built through layer-by-layer deposition, they exhibit limiting surface quality and part performance. By applying water-based coatings onto 3D printed parts, it improves surface quality by reducing surface roughness and by sealing surface gaps without deforming the 3D printed parts. To study water-based coatings for 3D printed parts, a computer controlled dip-coater was used. Surface profiles of 3D printed parts before and after coating were measured using a stylus profilometer and were examined with an optical microscope. Two commercial water-based coatings with different rheological properties were evaluated and the effects of varied coating speeds, drying conditions, and number of coated layers on surfaces of 3D printed parts were compared. 3D parts printed with different print tips and in different orientations were also compared before and after coatings.