**Characterization of Mechanical Properties of 3D Printed Thermoplastic Parts**

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3D printing is a revolutionary manufacturing method that allows the productions of engineering parts almost directly from modeling software on a computer. With 3D printing technology, future manufacturing could become vastly more efficient. However, the procedure used in 3D printing differs substantially from processes used in conventional manufacturing techniques. Therefore, the engineering products produced by 3D printing may also differ in properties than those produced by traditional techniques. The purpose of this paper is to evaluate the mechanical properties of engineering parts made by 3D printing. Specimens made of acrylonitrile butadiene styrene and glass fiber-filled Nylon were printed at various reference angles (0, 30, 60 and 90 degrees) and then tested in tension. The mechanical properties computed from the experiment data indicate that the 3D printing method does not produce parts with greater strength and durability compared to those produced by traditional manufacturing techniques. In fact, the 3D printed part with a 90 degree reference angle, which performed the greatest amongst the 3D printed parts, failed to surpass the mechanical property values of the conventional, compression-molded part. The Young’s modulus of compression-molded part was over 50% greater than the modulus values of the 3D printed parts, while the ultimate strength and failure strain values were also significantly higher. There are also substantial differences in properties among the 3D printed parts. These disparities of the property values indicate that the 3D printed parts lack of homogeneity in microstructure and mechanical properties within the material.