The Effects of Build Direction and Raster Orientation on the Tensile Properties of Fused Deposition Modeled ABS Plastic Specimens

Anderson, Samuel

Rapid-prototyping technologies provide individually efficient alternative methods to the design and manufacturing process. With the rise of the rapid-prototyping technology of 3D printing comes a completely new set of material properties that remain widely untested due to its recent but quick adoption into consumer manufacturing. This research focuses on the structural improvement of Fused Deposition Modeled ABS plastic specimens by varying their setup parameters and testing for a change in their tensile properties. Specimens were designed by varying raster orientation between [0°, 90°] and [45°, -45°] and build direction among horizontal, 45° angle, and vertical positions. Each specimen was tested in a tensile tester, which applied force while measuring extension, in order to create a stress vs. strain analysis. This research will provide valuable information to the rising community of researchers, designers, and even consumers on how to make simple changes to the build parameters in order to maximize strength in a desired direction.

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