

# MECHANICAL PROPERTIES OF RAPID MANUFACTURING AND PLASTIC INJECTION MOLDING

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## ABSTRACT

As rapid prototyping technology is beginning to transition to rapid manufacturing, it is important to understand how the performance of a part created using rapid prototyping compares to a part created using traditional methods. This paper compares the results of dimensional accuracy, tensile strength, elongation and elongation at break, shore hardness, and water absorption of an ASTM D638 Type IV test specimen created using plastic injection molding and rapid prototyping.

The plastic injection molded parts were tested in this research while the results of the rapid prototyping tests are from Chen-Yu Liu's thesis at the University of Missouri. Identical procedures and equipment were used for testing the parts created by plastic injection molding and rapid prototyping. Further, the materials used to create the plastic injection molded test specimen were taken from the same rapid prototyping machines used in Liu's research.

The results of this research show that a part created using plastic injection molding performs better than rapid prototyping in dimensional accuracy, tensile strength, elongation and elongation at break, and water absorption. The rapid prototyped test specimen had a higher score on the shore hardness D scale. Analysis of variance was used to prove statistical significance.

This thesis provides insight to the performance of rapid manufacturing compared to plastic injection molding. Going forward, specific areas of improvement for rapid prototyping technologies have been identified that will help the advancement of rapid manufacturing.