Efficiency of a 3D-Printed Pico-Hydroelectric Generation System Using a Fused Deposition Modeling Printer

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Several studies have shown that hydroelectric generation systems using an undershot water wheel can reach an efficiency of around 65%; however, making these generation systems out of Fused Deposition Modeling (FDM) polymers has yet to be accomplished. This paper aims to report if a 3D printed hydroelectric generation system produced on a very small, or pico-, scale is able to be compared to current-day systems made of more traditional materials. This will be tested by first creating a 3D model of all system components, including the water wheel, enclosure, and gearing. During the creation process of the 3D models, previous research done throughout the scientific community will guide the design to theoretically maximize efficiency. After the creation of the models, they will be printed out, assembled, and then tested. If efficiency is the same as systems made of traditional materials, 3D-printed FDM polymers could become a new material that is worthwhile to utilize in pico-hydroelectric generation systems. At the date of submission, several tests have been completed that show an average system efficiency from the tested flow rates range of upwards of 57.6%.

Awards Won:

Missouri University of Science and Technology: $2,000 tuition scholarship (renewable for up to 4 years)