

Project Title: Extruder for Production of 3-D Printing Filament

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Area: Mechanical Engineering

Budget: \$1000

Sponsor: Purdue University Fort Wayne Civil and Mechanical Engineering Department

Project Description and Scope:

The Civil and Mechanical Engineering Department at Purdue University Fort Wayne houses multiple 3-D printers for student and faculty use. Inevitably, waste is generated in the form of 3-D printed objects due to a variety of reasons, including: overall changes in design rendering past parts incompatible with the new design, the physical part not integrating into an assembly or performing as well as was expected in the model, or simply due to the print not reaching the desired quality. Rather than allowing this material to go to waste, the Purdue University Fort Wayne CME Department would like to introduce a method of recycling the used filament in order to incorporate more sustainable, eco-friendly practices within the department while simultaneously reducing material costs. The objective of this project is to create an extrusion device capable of melting discarded prints that have already been subjected to a granulizing process, drawing the molten plastic through a nozzle consisting of tightly controlled geometry, and finally cooling the drawn filament before being spooled. This process is depicted by Figure 1.

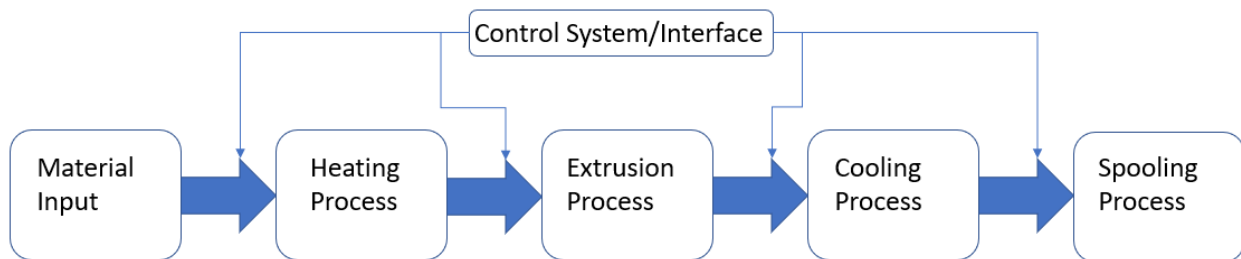


Figure 1: Black box diagram of extrusion device.

The extruder should be capable of accepting a wide variety of material inputs, with emphasis on its compatibility with PLA and ABS. The desired diameter of the filament output is 1.75 mm with a tolerance of ± 0.05 mm. Safety measures against injury to the user are also of high importance. Additionally, the entire assembly must be compact enough to easily set on a lab bench measuring 72" x 30" and weigh under 50 pounds, allowing for a single person to easily transport the device.