

DESIGN AND CONSTRUCTION OF A SYSTEM FOR RECYCLING PET (POLYETHYLENE TEREPHTHALATE) PLASTIC BOTTLE WASTE INTO FILAMENT FOR 3D PRINTERS USING THE PID METHOD

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ABSTRACT

Plastic bottles are inorganic waste that cannot be decomposed in nature and cause severe environmental pollution. One way to reduce this pollution is to process PET plastic bottle waste into 3D printer filaments through the pultrusion process. The system designed in this study is a system used to control the manufacture of 3D filaments using the PID method with its main components being a heating block, and a thermistor as a temperature sensor. PID control has a good response to the system and is able to maintain the temperature stability required to make filaments. Filaments with good quality are melted in a temperature range of 220°C - 250°C. Based on the test results with 10 samples of different input values, the PID control response to the system is quite good with an average overshoot value of 4.79% and the resulting SSE value is also quite small with an average of 0.61%. The PWM value increases maximally when the temperature is far from the input value, and the output voltage is 23.02V and the PWM value is 255. When the temperature is stable, the PWM value ranges from 66-71 with an output voltage of 5.552V at a PWM value of 70. This study has succeeded in making good quality filament from PET plastic bottle waste that can be used directly on 3D printers.

Keywords: *PID Control, Filament, Pultrusion*