

ABSTRACT

The main issue currently faced by the plastic product manufacturing industry is the high cost of injection molding machines and the raw materials required to make plastic products, as well as the relatively large size of these machines. This condition makes it difficult for household and small-scale industries to access this technology due to high costs and limited space. Therefore, this study aims to develop a compact and low-cost injection molding machine. The proposed solution involves the use of recycled Polyethylene Terephthalate (PET) bottles as the primary raw material, which not only helps to reduce production costs but also significantly contributes to recycling plastic waste that is a source of environmental pollution.

The method used in this study includes the design of the machine using Autodesk Fusion 360 software and the fabrication of components from hollow iron for the frame and scrap metal plates for the wiring box. The design process focused on determining the dimensions and specifications of components that meet the needs, with the machine size being smaller than 35 cm x 55 cm x 75 cm. The test results showed that the heater of this machine could reach the melting point of PET plastic (250°C) in 17 minutes and PLA (180°C) in 7 minutes. In the fifth trial, PET plastic processed at 260°C with 20 minutes of heating and 180 minutes of cooling produced a mold with even color and minimal cracks, indicating that this machine is effective in processing plastic waste into useful products. This machine is also equipped with an IoT-based remote monitoring system, which makes it easier for users to monitor the production process. Thus, this machine is expected to be a solution for household industries in processing plastic waste efficiently and economically, as well as contributing to reducing environmental pollution. The test results show that this machine can be implemented on a small industrial scale, providing an economical solution while supporting environmental preservation.

Keywords : Injection Molding Machine, Polyethylene Terephthalate (PET), Recycled Plastic, household industries, Monitoring system, Plastic Waste Management.