

ABSTRACT

The injection molding process by an injection machine must be controlled in such a way that no errors occur during the injection into the molding. If the plastic material charging time is longer than the plastic mold cooling time, it results in plastic material spillage from the nozzle when the mold is open in the subsequent process. In the world of DIY or small-scale projects, the use of plastic equipment has become commonplace in Indonesia. This is because plastic components tend to be inexpensive, but if they are produced on a mass scale, they need to be made using the injection molding method. Unfortunately, even for small-scale injection molding, the cost is still relatively high, making it challenging for individuals or small businesses (UMKM) to afford.

From the mentioned issues, three proposed solutions are considered. The first solution is an injection tool operated manually using a lever. The second solution involves an injection tool driven by a DC motor-powered extruder screw. The third solution is an injection tool utilizing a linear actuator as the injection system. Among these three solutions, the chosen one is the third solution, which utilizes the linear actuator. The parameters considered in selecting this solution are its lightweight, dimensions, heating material type, pressure type, safety features, and price.

During the subsystem testing, the time required for the heater to reach the maximum setpoint of 300°C is 17 minutes, with a thermocouple reading sensitivity of 48.4%. The average speed of the injection subsystem testing is 1.2 cm/s, with a maximum capacity of 51.5 cc. In the molding subsystem testing, it was found that the results of the first to fourth experiments still had shrinkage and defects. However, in the fifth experiment, there were no indications of defects and shrinkage. This outcome was influenced by temperature parameters, pressing time, and mold density. After conducting the testing, it can be concluded that the designed tool can be a viable option for UMKM and academics to produce plastic-based objects, in addition to the 3D printing method. Nevertheless, the tool still has some drawbacks, one of which is the lack of an automatic eject system.

Keywords: *Molding, heater, injection, plastic*