PROTOTYPE OF A SEMI-AUTOMATIC CUP SEALER PRESS MACHINE BASED ON ARDUINO

Abdurrauf Muhyidin
Electrical Engineering Study Program, Faculty of Science and Technology
University of Technology Yogyakarta
Jl. Ringroad Utara Jombor, Sleman, Yogyakarta
E-mail: rauf2187@gmail.com

ABSTRACT

The rapid growth of the packaged beverage industry has created a demand for fast, clean, and efficient packaging systems to meet high market demands. One of the essential devices in this process is the cup sealer press machine, which functions to tightly seal beverage cups using a heat-based mechanism. Traditional machines typically operate manually through physical lever action, which requires more labor and often results in inconsistent sealing quality. This study aims to convert a conventional manual cup sealer into a semi-automatic system by integrating an Arduino-based microcontroller platform. The Arduino serves as the central processing unit, receiving input from a LID cup sensor that detects the presence of a cup at the sealing position and controls a DC motor to automatically operate the pressing mechanism, eliminating the need for manual levers. Experimental results show that the system achieves a pressing time accuracy with an average error of only 0.06549%, equivalent to a 99.93451% accuracy rate. The optimal sealing temperature for plastic cups was determined to be 220°C; at lower temperatures, the plastic adheres poorly, while at 240°C, the plastic melts excessively. However, in terms of sealer image alignment accuracy, only 3 out of 10 sealing attempts achieved correct positioning due to mechanical disturbances, such as actuator vibration, which caused slight misalignments in the plastic seal placement.

Keywords: Arduino, DC Motor, LID Cup Sensor