

***DEVELOPMENT OF AN AUTOMATION SYSTEM FOR SHOPPING
CHOPPED TOBACCO LEAVES WITH A LEAD SCREW MECHANISM
BASED ON OUTSEAL PLC***

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ABSTRACT

The arrangement process of shredded tobacco leaves on drying racks (rigen) is still commonly performed manually, requiring a large workforce and increasing production costs. This study focuses on the design and testing of an Automated Tobacco Shredding Arrangement System using an Outseal Nano V5.2 Programmable Logic Controller (PLC) and a T8 lead screw drive mechanism. The system integrates proximity sensors, limit switches, a TB6600 driver, a Nema 23 stepper motor, a DC wiper motor, and an AC cutting motor to automate the tobacco arrangement process. The test results showed that the lead screw mechanism provided high positioning accuracy with a displacement error of 2.5% and a movement speed of 22.86 mm/s. The highest arrangement success rate was achieved at a load of 100 grams, reaching 79%, while a load of 400 grams achieved a success rate of 60.5%. The implementation of a stopper mechanism using an MG996 servo motor and ESP32 controller produced a more organized, uniform, and consistent distribution of shredded tobacco. Furthermore, the automated system increased labor efficiency by 80%, reducing the workforce requirement from 15 workers to only 3 operators. The findings indicate that the developed system can support the tobacco leaf arrangement process more effectively and efficiently.

Keywords: *Chopped Tobacco, Outseal PLC, Lead Screw, Automation, Labor Efficiency.*