

Design of a Conveyor Control System for Transferring Sugar Sacks Using Outseal PLC

Dr. Ir. Nurul Zainal Fanani, S.ST., M.T. *as a thesis supervisor*

Natasya Suhartina Br Pakpahan
*Mechatronic Engineering Technology Study Program
Engineering Department*

ABSTRACT

Small and medium scale granulated sugar industries commonly load sugar bags onto transportation vehicles manually, a process that requires considerable labor and may reduce operational efficiency. In addition, conventional conveyor systems continue operating even when not in use, resulting in inefficient electrical energy consumption. This study aims to design and implement an automatic conveyor Control system for transporting granulated sugar bags using the Outseal Nano PLC 5.2 as the main Controller. The system utilizes an infrared proximity sensor to detect the presence of sugar bags, a DC gear motor to drive the conveyor, a relay module as an electronic switching device, and an operating interface consisting of push buttons and LED indicators. The research methodology includes problem identification, system design, ladder diagram programming using Outseal Studio, hardware assembly, and system testing. The testing procedures comprise power supply testing, PLC input and output signal verification, infrared proximity sensor testing, ladder diagram program validation, overall system performance testing, bag travel time testing, timer accuracy testing, counter response time testing, and evaluation of the effects of load variations on motor rotational speed, voltage, and conveyor speed. Although the motor rotational speed decreased as the load increased, the DC gear motor was able to operate the conveyor effectively within the tested load range of 0 to 7 kilograms. The results demonstrate that the proposed Outseal PLC-based conveyor Control system operates automatically, accurately, and reliably, thereby improving the efficiency of the granulated sugar bag transportation process.

Keywords: *conveyor, Outseal PLC, proximity sensor, DC gearbox motor, automatic Control system.*