Design Of A Mechanical Control System For A Rotary-Type Dryer Using An FRN0.75C1S-2A Inverter

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ABSTRACT

This study discusses the design of a rotary dryer system with a mechanical control system based on a three-phase induction motor and a Variable Frequency Drive (VFD) for drying grains such as rice and corn. The background of this study is based on the importance of an efficient post-harvest drying process to maintain the quality of agricultural products and reduce moisture content evenly. A rotary dryer was selected because it features a continuous drying system with a cataracting mechanism capable of improving heat distribution and drying efficiency. The research was conducted through the following stages: literature review, system requirement identification, mechanical design, prototype fabrication, component installation, and performance testing of the equipment. The system was designed using a 1 HP three-phase induction motor, a Fuji Electric FRENIC-Mini VFD inverter, a 3.29:1 gear-chain transmission, a diameter 40 mm hollow shaft, and a rotary cylinder with an internal lifter system. Testing was conducted by measuring the cylinder rotation speed, motor power, and drying performance using test materials consisting of rice and corn. The results of the study show that the rotary dryer system is capable of operating within an optimal speed range of 5–10 rpm to produce an effective cataracting mode. The use of a VFD allows for precise control of the motor speed, resulting in a more stable, efficient, and energy-efficient drying process. This study demonstrates that a VFD-based mechanical control system combined with a gear-chain transmission can improve the performance of rotary dryers for agricultural product drying applications.

Keywords*: Motor Induction 3-phase, Rotary Dryer, Variable Frequency Drive.*