

REVIEWER'S REPORT

Manuscript No.: IJAR-59451

Title: ROBUST SPEED CONTROL OF A TWO-CONVEYOR WHEAT MIXING SYSTEM USING CONVENTIONAL PID AND PSO-OPTIMIZED PID UNDER MOTOR PARAMETER UNCERTAINTIES

Recommendation:

Accept

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality		Yes		
Clarity	Yes			
Significance		Yes		

Reviewer's ID: JPR- 015

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comment are mentioned below suitable for the paper titled "ROBUST SPEED CONTROL OF A TWO-CONVEYOR WHEAT MIXING SYSTEM USING CONVENTIONAL PID AND PSO-OPTIMIZED PID UNDER MOTOR PARAMETER UNCERTAINTIES"

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction

The introduction should establish the importance of precise speed control in industrial conveying and agricultural material-mixing operations. The challenges associated with maintaining consistent wheat flow and mixing ratios under changing motor parameters and load conditions should be clearly explained. The limitations of conventional PID controllers in handling parameter uncertainties and nonlinear operating conditions should also be highlighted. The potential of PSO-based optimisation to improve control performance and robustness should be introduced. The research objectives and principal contributions of the proposed integrated control framework should be clearly stated.

2. Literature Review

The literature review should discuss existing research on induction motor speed control, indirect field-oriented control, and PID-based industrial automation. Relevant studies applying PSO and other metaheuristic optimisation techniques to PID controller tuning should be reviewed. Previous investigations of conveyor systems, agricultural material handling, and automated mixing-ratio regulation should also be considered. The strengths and limitations of conventional PID and optimisation-based control strategies should be comparatively discussed. The review should establish the research gap

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concerning robust, energy-efficient speed control of multi-conveyor wheat mixing systems under motor parameter uncertainties.

3. Solution Approach / Methodology

The proposed methodology provides an integrated representation of the induction motor, field-oriented control, conveyor dynamics, wheat mass flow, and mixing-ratio regulation. The comparison of uncontrolled operation, conventionally tuned PID, and PSO-optimised PID offers a suitable framework for evaluating controller performance. The systematic variation of stator resistance, rotor resistance, mutual inductance, mechanical inertia, and load torque strengthens the robustness assessment. The evaluation across 50/50, 60/40, and 70/30 mixing ratios enhances the applicability of the model to different production requirements. The selected performance indicators provide a comprehensive basis for assessing tracking accuracy, recovery behaviour, and energy consumption.

4. Results and Discussion

The comparative assessment of conventional and PSO-optimised PID controllers provides useful insights into speed regulation, material-flow consistency, and mixing-ratio accuracy. The inclusion of root mean square error, integral absolute error, recovery time, and energy-consumption metrics supports a multidimensional evaluation of controller performance. The sensitivity analysis is particularly valuable for identifying motor parameters that significantly affect system stability and operational performance. The investigation of multiple mixing ratios further demonstrates the framework's relevance to varying industrial production requirements. Overall, the results and comparative analysis provide a useful basis for evaluating the effectiveness of optimisation-based control in wheat conveying and mixing operations.

5. Conclusion

The manuscript presents a relevant contribution to intelligent control and industrial process optimisation through the integration of PSO-based PID tuning with induction motor-driven wheat conveying and mixing. The proposed framework considers both electrical and mechanical uncertainties, providing a broader assessment of controller robustness. Its combined evaluation of speed tracking, mixing accuracy, recovery time, and energy performance is valuable for industrial applications. The study offers a foundation for developing more reliable and flexible automated agricultural processing systems. Future research may extend the framework through experimental validation, real-time implementation, and evaluation under varying wheat properties and actual industrial operating conditions.