

OBJECT SORTING CONVEYOR USING DELTA PLC

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Keywords:

Delta PLC, conveyor belt, motor, sensors , actuators , power supply, relays, and wiring.

Introduction:

The automated object sorting and counting system integrates a Delta PLC, sensors, and actuators to streamline industrial sorting processes. By leveraging sensor-based decision-making, the system detects objects, categorizes them based on predefined criteria, and directs them to appropriate bins using stepper motor or pneumatic pushers. Automation significantly enhances efficiency in production lines by reducing human intervention, minimizing sorting errors, and optimizing workflow speed. Industries that require precise classification—such as manufacturing, packaging, and logistics—benefit from improved productivity and accuracy. The Delta PLC acts as the central controller, processing sensor inputs and executing sorting commands, making the entire system reliable, scalable, and adaptable to various industrial applications.

Industrial automation improves efficiency and accuracy in manufacturing and logistics. Manual sorting is slow, error-prone, and unsuitable for large-scale operations. PLC-based systems enhance speed and reliability by processing sensor data. Delta PLC controls sorting by categorizing objects based on predefined criteria, the conveyor belt moves objects while actuators guide them into correct bins.

Real-time counting ensures accurate tracking and minimizes human intervention. Automated sorting boosts productivity in industries like packaging and warehousing. Future advancements may integrate AI for even smarter and adaptive sorting systems

Objectives:

1. To design and implement an automated object-sorting system using Delta PLC that efficiently classifies objects based on sensor inputs.
2. To minimize human intervention in industrial sorting by integrating sensors and actuators for reliable, continuous operation.
3. To enhance productivity and accuracy in manufacturing and packaging lines through real-time counting and precise object placement.

Methodology:

1. **Sensing Mechanism:** Proximity and photoelectric sensors are used to detect the presence and position of objects moving on the conveyor.
2. **Processing and Control:** The Delta PLC (DVP12SS) receives input signals from sensors, processes them according to programmed logic, and decides the sorting action.
3. **Actuation and Sorting:** Based on PLC output, the stepper driver controls the stepper motor to move objects into their respective bins, while the relay operates the conveyor motor.
4. **System Integration and Flow:** Power is supplied by a 24V DC SMPS, ensuring stable operation of all components; the entire system functions as a synchronized automation setup that performs real-time sorting and counting efficiently

Result and Conclusion:

The automated object sorting conveyor system using Delta PLC successfully improves efficiency and accuracy in industrial sorting processes. By integrating sensors, actuators, and PLC-based control, the system minimizes human intervention, reduces sorting errors, and enables real-time object classification and counting.

This automation enhances productivity, quality control, and scalability across manufacturing, packaging, and logistics industries. The project demonstrates how PLC technology can effectively streamline sorting operations.

The experimental setup of the object sorting conveyor using Delta PLC successfully operates with accurate detection, classification, and automatic sorting of objects, proving the designed system works efficiently and reliably under real industrial conditions.

References:

1. **"Object Sorting Conveyor System using Delta PLC and Sensor Integration"** – A foundational paper on using Delta PLCs to control conveyor belts and sort objects based on sensor inputs.
2. **"Automatic Sorting Machine Using Delta PLC (DVP-SS2 Series)"** – Focuses on the specific implementation of the popular DVP-SS2 model for industrial sorting tasks.
3. **"Sorting of Metal and Non-Metal Objects using Delta PLC and Inductive Sensors"** – Describes a system that distinguishes materials using inductive proximity sensors and pneumatic actuators.
4. **"Design and Implementation of Automatic Sorting System by Height Sensing using Delta PLC"** – references a project where objects are sorted into different bins based on their physical height.
5. **"PLC Based Automated Color Sorting System using Delta PLC and Optical Sensors"** – Covers the integration of color sensors (like TCS3200) with a Delta PLC for color-based segregation.

Future Scope:

The future scope of this project includes:

1. Integration with AI and vision systems
2. IoT-based remote monitoring and control
3. Automation using robotic arms
4. Data analytics and predictive maintenance
5. Scalability for large industrial applications.