

Multilevel Object Sorting Using PLC

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Abstract:

In many industries is need of sorting. It is highly desirable in approximately every industry. the main objective of this project is to reduce the human efforts as well as time which can ultimately raise its efficiency. it becomes important to ensure that the sorting process is precise and free from human errors.

This model consists of two parts, first is the software and Second is the hardware part which consists of conveyors used to transport the objects, sensors used to sense the objects for sorting. Electronic part used to sort the objects with the help of motors to drive the conveyors.

Keywords:

PLC, Conveyor belt, Sorting, Object, Human, Sensor, Drive, Motor.

Introduction:

Our main aim is in this project is to reduce workers' efforts and minimize the time spent in the examination of the components, during their manufacturing.

automatic sorting systems is uses the depend on its application like agriculture and consumer products etc.

An automatic sorting machine to take a task of sorting objects according to their sizes and materials and it can be done individually as well as simultaneously with or without human interaction depending upon its application. There are three main objectives of this paper. First task is to distinguish among the three types of material proximity sensors. Second task is sort the objects

with their heights at three different levels and send it to their specific compartment by using pushing mechanism (conveyer belt, pneumatic cylinder PLC). And third task is to maintain small time interval between input materials. The most apparent reasons that are associated with installing automatic systems in the industry are,

- i. Saving Man Power.
- ii. Improved Quality and Efficiency.
- iii. Increase consistency and Flexibility,

Construction Details:

1. This model consists of the conveyor belt which is operated by an electric motor.
2. The conveyor belt is mounted on the M.S Steel frame which is manufactured using the angles and channels.
- 3 At the two ends of the manufactured frame, using bearings, two drum pulleys are tied over which the belt runs.
4. For driving, an electric motor is used. For speed reduction, the subframe is mounted which has middle shafts.
5. The speed reduction system has two stages which consist of reduction using belt pulley assemblies.
6. For idle, the metal sheet is used which also works as a scrubber to reduce the dust on the belt.
7. Then sensors are placed on the conveyor belt.
8. For wirings and electronic assemblies, the separate sheet metal block is tied on the frame.

9. For the pushing and sorting, the pushing mechanisms are mounted on the frame.

10. Pneumatic cylinders are used in this mechanism which is operated by a solenoid valve.

COMPONENTS REQUIRED

1 PLC

PLC is an industrial digital computer which has been designed and built for the control of manufacturing processes, such as robotic devices, or any activity that requires higher reliability control of programming and process fault diagnosis. The program is stored in the PLC either in battery-back-up RAM or some other non-volatile memory.

2 Conveyor Belt

A conveyor belt works by using two motorized pulleys that loop over a long stretch of thick, durable material. When motors in the pulleys operate at the same speed and spin in the same direction, the belt moves between the two. The essential properties of a belt are flexibility, transverse rigidity, low mass per unit length, high strength.

3 Pneumatic Double Acting Actuator

Pneumatic cylinders are mechanical devices. They use the power of compressed gas to produce a force in a reciprocating linear motion.

The double acting cylinders have two ports to allow air in, first for outstroke and second for instroke.

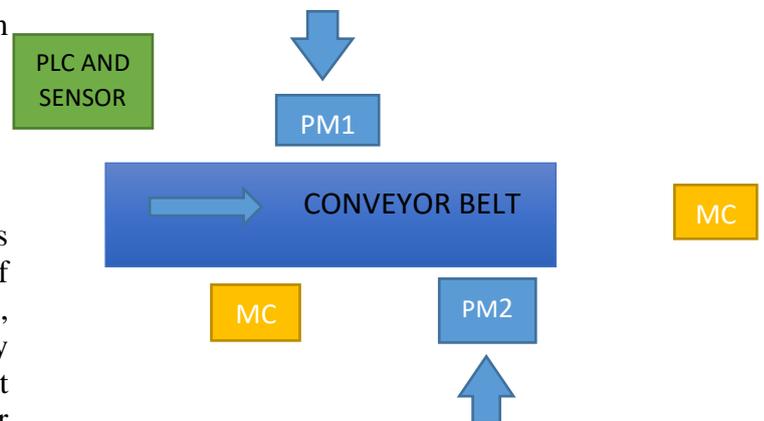
4 Solenoid Valve

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid: it has two main parts: one is solenoid and second valve.

6 DC Motor and Gear Box:

We used a DC motor with gear box for speed reduction purpose. DC Gear Motor Specifications are: Model: 60RPM, 12VDC Power Supply Load carrying capacity: 3-5kg @ 60RPM.

BLOCK DIAGRAM:



RESULTS:

The operation of the system has been done and got the sorting results as follows.

1. When sensor I is activated then cylinder I is operated which pushes the object away from the conveyor belt.
2. When sensor II is activated then cylinder II is operated which pushes the object away from the conveyor belt.

CONCLUSION:

The research and development of PLC Controlled Multilevel Object Sorting System have been successfully implemented. This system is time effective and has reduced labor work, increased the speed of production and increased accuracy resulting in automation.

Thus, the completion of project work takes in better results and lets us study the PLC system and also the various parts of the hardware used.

REFERENCES:

1. Automatic Sorting at Process Industries using PLC by P. Thirumurugan , R. Aravind , M. Arun Kumar, S. Manjunath R. Kalaiselvan GRD Journals- Global Research and Development Journal for Engineering | Volume 3 | Issue 3 | February

2. Conveyor loading control system & object sorting by using PLC by Diksha Deote, Varsha Sirsat and Swarali Khule (April 2017) International Journal For Technological Research In Engineering Volume 4, Issue 8.

3. Automatic sorting machine by Prof. V.W. Patil, Gaikwad Sachin, Babar Nikhil, Shevante Pramod, Gaikwad Ganesh (June 2017) Vol-3 Issue-3

4. Automatic detection and sorting of material by Akshay varpe, snehal Marne, manasi more, dr. Manish jadhav (2017) international journal of innovations in engineering research and technology.

Proceedings of TECHNO-2K17 (Technical Symposium).

5. PLC Based on Object Sorting and Low Cost Automation by Prof. Nilima Bargal, Aditya Deshpande, Ruchita Kulkarni, Rucha Mothghe. International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 07 | July-2016