

PLC Controlled Automatic Food Packaging Machine

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ABSTRACT

This paper introduces a packaging machine using Programmable Logic Controller (PLC) in automation industry. The main aim of the paper is to design and fabricate a small and a simple packaging system using PLC software. PLC technology have been increasing rapidly and proving its role in automation beneficially. PLC software is used to control and automate the packaging system. The result was made fully automated in the packaging system. In addition to that, this system is able to decrease product time and increase the product rate as compared with traditional manual system. The purpose of this paper is to develop an automation technique using Programmable Logic Controller.

Index terms- PLC, Packaging.

I.INTRODUCTION

The main purpose of this paper is to increase the speed and consume the time. Packaging is a stage that is important because to make product safe and good in condition. PLC is a digital electronic device that uses a programmable memory to store instruction. It scans memory, input and output in determined manner. Packaging machines are machines that complete stages of the packaging process. Food packaging is packaging of food. Filling machines are used for packaging, mainly for food/beverage but for other products as well. This paper will help to try help and improve the packaging system to make the process run systematic and make the product good in condition. This project is to design and construct a food packaging machine using programmable logic controller.

II.LITERATURE SURVEY

Automation is mostly used in various industry for increasing speed, accuracy and effectiveness of the production and also reduce risky hazards. This project is used to check the weight of the object in automation technique. Wires were used

for connecting the input. Separate machines were used for packaging. Usage of separate machines will consume more time. Human workforce is used in filling and packaging industries in the existing system. No automation machines were used. Mohitdevshrivastav[1]. They used PLC for Traffic control. In this work they use load cell for weighting vehicles. Akshaydeshmukh.[2]. They have used and implement fire detection for security purpose in ships using PLC.Darshil[3] developed PLC based elevator system for colour sensing capabilities for material handling in industrial plant. In this system they used PLC foe controlling the elevator and used some sensors to give input to the PLC.

III.PROPOSED SYSTEM

In the proposed system, cables were used for connecting the inputs. A single machine performs all the packaging functions. The system is totally an automated system with the aid of automatic machines. It is mainly used increase the speed and accuracy and there is an elimination of wires.

IV.SYSTEM ARCHITECTURE

The block diagram of food packaging machine is shown.

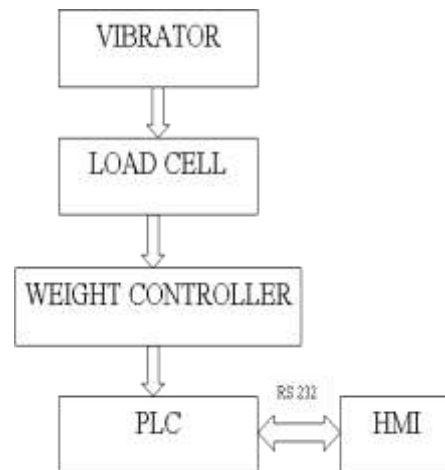


Figure1 Block diagram of food packaging machine

The vibrator is placed at the bottom of the hopper which is used to shake the object. The vibrator output is given to the load cell. The load cell is used to measure the weight of the object. A load cell is a nothing but transducers which is used to create an electrical signal. Weight controller is a load cell controller which is used to measure the accurate weight of the object. PLC is heart of our project. PLC is a digitally operating electronic device which uses programmable memory for the internal storage of instruction by implementing specific function such as logic sequencing, timing, counting and arithmetic to control through digital or analog input/output, various types of machines. HMI is the interaction between the user and the machine at a given task. The PLC and HMI are interfaced by using RS 232 cable.

VIBRATOR

Industrial vibrator uses rotary or linear motion to provide consistent vibration for laboratory and industrial shakers. A vibrator is a mechanical device to generate vibration. The vibration is often generated by an electric motor with an unbalanced mass on its driveshaft. Vibrating hoppers are used extensively in the food industries.

LOAD CELL

Load cell is used to measure the weight of the object. The magnitude of the signal is directly proportional to the force being measured. A load cell is nothing but a transducer which is used to create an electrical signal. The various types of load cells include hydraulic load cell, pneumatic load cell and strain gauge load cell. Digital load cell is fast, precise and reliable. An intelligent load cell is the heart and soul of our packaging, filling and weight check.

WEIGHT CONTROLLER

Weight controller is a microcontroller. It displays the analog signal input from the load cell into values on display. It will have two digital inputs. Load cell output is given to the weight controller. It is used to measure the accurate weight.

PLC

Programmable logic controller is used for control different processes in industry, automotive,

intelligent buildings and other applications. A programmable logic controller is a digital computer used for automation of electromechanical processes. The term logic is use primarily concerned with implementing logic and switching operation. Input devices e.g. switches and output devices e.g. motors, being controlled are connected to the PLC. A PLC works by continually scanning a program. Scan cycle consist of three important steps.

1. Check input status
2. Execute program
3. Update output status

The programming language of PLC is the Ladder logic diagram. It was done by using WPL Soft.

LADDER LOGIC DIAGRAM

Ladder logic was originally a written method to document the design and construction of relay racks as used in manufacturing and process control. It is also known as contact symbology. It is used to develop software for PLC used in industrial control application. Ladder logic is the main programming method used for PLC. Contacts are those which stand between the power supply and coils. Based on opening and closure of the contact the power is allowed to pass through the coils. The normally open (NO) is true when the input or output status bit controlling the contact is 1. The normally closed contact (NC) is true when the input or output status bit controlling the contact is 0.

HMI

It is the interaction between the user and the machine at a given task. These allow control system to be much more interactive. The basic purpose of an HMI is to allow easy graphical interface with a process. It is also known as Man Machine Interface (MMI). HMI is much more specific to manufacturing and process control system. It provides the visual representation of a control system and provides real time data acquisition. It is mainly used in computerized simulation.

RS-232

PLC communications facilities normally provide the serial transmission of information. RS 232 is used in short distance computer communication. It is an asynchronous communication method. RS 232 is simple and universal.

RESULT AND DISCUSSION

In industry the production speed should be high because the demand of the product is more. But when we check weight of the object manually then it will take more time for checking the weight and overall speed will decrease. So by using this food packaging machine we totally overcome the problem. The output will be displayed in the HMI. The first screen is the home page. By touching the home page, the forthcoming pages are displayed. The main menu consists of different components i.e. manual, vibrator, reset door. The delta soft simulator is used. The time is set for components for calculating the working time of packaging machine. The time allocation and consumption are given for vibrator, stability and counting and door time.



Figure 2 Output for screen 1



Figure 3 Output for screen 2



Figure 4 Output for screen 3

CONCLUSION

This paper is about an efficient packaging machine which uses automated machines to control the packaging area of an industry. The proposed system has done by implementing the new technique called HMI for touch screen. Finally the HMI programming is done through DOP Soft.

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