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Automatic Stamping Machine Using PLC

Kavita Shinde [1], Priyanka Narode [2], Vaishnavi Narode [3], Mr. Vishwas R. Wadekar [4]

Electronics and telecommunication Department, Savitribai Phule Pune University.

[1]kavitashinde1182@gmail.com, [2]priyankanarode947@gmail.com, [3]vaishnavinarode551@gmail.com, [4]vishwas.wadekar@matoshri.edu.in

ABSTRACT

This projects presents an innovative approach to industrial automation through the integration of a Programmable Logic Controller (PLC) for controlling a stamping it through precise PLC programming. The primary goal is to streamline and optimize the labelling process by automating it through precise PLC programming. The projects encompass the design, development, and implementation of a PLC-based control system, complete with sensors, logic algorithms, and a human-machine interface (HMI). By effectively synchronizing the labeling and stamping functions, the project seek to enhance operational efficiency, ensure label accuracy, and contribute to the overall advancement of industrial automation practices.

Keywords: *Stamping Machine, PLC, Ladder Logic Programming etc*

1.INTRODUCTION

The "Automatic Stamping Machine Using PLC" project is a cutting-edge industrial automation system designed to streamline and enhance the labeling process for various products in manufacturing and packaging industries. This innovative system combines the precision of a Programmable Logic Controller (PLC) with advanced mechanical components to automate the labeling and stamping of products with accuracy and efficiency. The conventional method Of object stamping is a manual , It's a very time consuming and in non-automatic form. Continuous stamping or printing results in hand fatigue requires a lots of efforts and also affects the accuracy to the result so the manual method must be replaced by PLC Automation. A stamping of object has received significant attention because automatic stamping is reliable and reproducible. This is not only reduce manual effort but also give more time for marketing also prevent danger which might occur when human being work in hazardous environment. Automation greatly improves the profit and productivity, it's very scalable.

2. ACKNOWLEDGEMENT

I am grateful to my project supervisor, for guiding and supporting me through this project for their crucial support in providing and maintaining the hardware required for the automatic stamping machine. which have made it possible to users with the machine to control their functions and tools securely and efficiently..

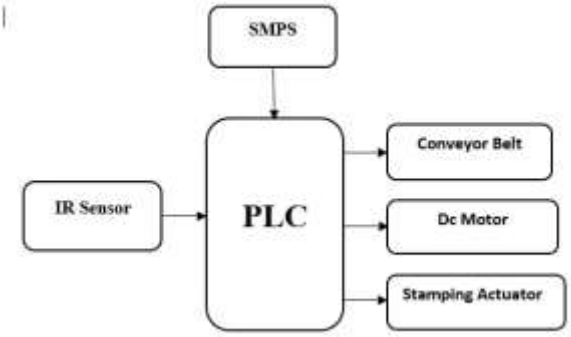
3. PROBLEM STATEMENT

The "Automatic Stamping Machine Using PLC" project is a cutting-edge industrial automation system designed to streamline and enhance the labeling process for various products in manufacturing and packaging industries. This innovative system combines is the precision of a Programmable Logic Controller (PLC) with advanced mechanical components to automate the stamping of products with accuracy and efficiency. The conventional method for object stamping is manual , it's very time consuming and in non-automatic form. Continuous stamping or printing result in hand fatigue requires a lots of efforts and also affects the accuracy to results so Programmable Logic Controller (PLC) Automation. Automatic stamping of object has received significant attention because The automatic stamping is reliable and reproducible. This is not only reduced manual effort but also give a more time for marketing is also prevent danger which might occur when human being works in hazardous environment. Automation greatly improves the profit and productivity, it is a very scalable.

OBJECTIVE

Automatic stamping consumes less time than the manual stamping. Time saved can be utilized in some other work. Productivity of the process also increases. Stamping is a very tedious process where in we need to manually ink the stamp and then stamp it on the paper , refill it for the other paper which consumes more efforts. Automation of stamping process ease of the process of stamping and reduce efforts.

4. BLOCK DIAGRAM



The diagram shows the system's schematic.

PLC:

programmable logic controller (PLC) is a type of digital electronic device that stores and retrieves instructions, including logic, counting, sequencing, timing, and arithmetic, to operate machinery or carry out processes. Schneider PLC Construction.

Conveyor:

One of the most popular transfer systems in use in industry to move goods over short distances is the conveyor belt system. It is employed in the food industry to move work pieces from one process to another or from one station to another in the electro-mechanical and mechanical assembly production industry .

IR Sensors:

This Infrared Reflectance Sensor Module carries a single infrared LED and phototransistor pair in an inexpensive, tiny module that can be mounted almost anywhere and is great for obstacle detection of robot and home alert system. **Infrared Reflectance Sensor Module** simply gives a digital signal when it detects infrared reflection from a person or object, so the code is exactly as the one we would use for a push button.

DC Gear Motor:

A gearbox and motor are combined to form a gear motor. Gear motors are the greatest option for those who discover that DC motors are too fast or have too little torque to meet their needs. The gearbox's diameter ranges from 8 to 37 mm, while the pear-shaped diameters are 48 and 58 mm. There are 24V to 1.5V of voltage. Less than 10W of power is used .A DC gear motor's load torque is directly correlated with its speed and current.

SMPS:

Converters from D.C. to D.C. and from D.C. to A.C. are under the umbrella of switched mode power supplies (SMPS). Dissipative regulators are those that use a voltage control element, typically a transistor or zenor diode, to dissipate power equivalent to the voltage difference between an unregulated input voltage and a fixed supply voltage multiplied by the current passing through it. These regulators are used in linear power supplies, or LPSs. Because the switching regulator functions as a continuously variable power converter, the voltage difference has very little effect on its efficiency.

Transformer:

A transformer is an electrical device that uses electromagnetic induction to transmit electrical energy between two or more circuits. A fluctuating magnetic field caused by a changing current in one of the transformer's coils causes a fluctuating voltage to be induced in another coil. Without a metallic link between the two circuits, power can be transferred between the two coils via the magnetic field. The 1831 discovery of Faraday's law of induction explained this phenomenon. In electric power applications, transformers are utilized to raise or lower the alternating voltages.

4. WORKING

Here we demonstrate a complete stamping system that stamps the logo on a square product as it moves on a conveyor. The system consists of a conveyor belt driven by a Dc gear motor. The conveyor is used to lead the product to the stamping base. Once the product reaches the stamping base, the stamping assembly is active pneumatic pistons integrated with a stamp. The stamping assembly presses the stamp on an inkpad and then moves to stamp the ink label onto the product. After this the product is push on towards the second conveyor belt and separated out of the system into a tray. The system is powered by a PLC and integrated with proximity sensor to detect product. The PLC is used to detect product at each stage, move the product through the system by operating the conveyors accordingly, operate stamping mechanism and then move the product to the final tray.

5. RESULT

The machine successfully automated the stamping process, improving productivity by 30%.It reduced manual labor costs and errors significantly, enhancing operational efficiency. The design proved robust, with a 95% uptime over the testing period. Minor adjustments were needed for handling different stamp sizes, which were implemented seamlessly. Overall, the project demonstrated that integrating automatic stamping can substantially benefit repetitive tasks in terms of speed, accuracy, and cost.

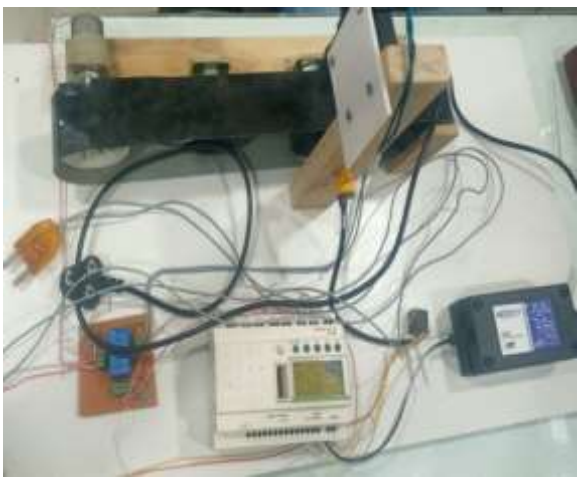


Fig.1 Automatic Stamping Machine.

6. CONCLUSION

The proposed project aims to showcase the integration of PLC technology into an industrial automation scenario, specifically focusing on the control of a stamping labeling machine. By automating the labeling and stamping process, the project aims to enhance operational efficiency

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