Plc: Based On Automatic Stamping And Labelling Machine

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ABSTRACT:Automation in manufacturing industries has significantly increased efficiency and accuracy. This paper presents a Stamping and Labeling Machine using Programmable Logic Controller (PLC), which automates the process of stamping and labeling products on a conveyor system. The system is designed to enhance productivity, reduce manual intervention, and minimize errors in product identification and tracking.Automation generally improve the profit and productivity, it is very scalable

Keywords: Stamping, Labeling, PLC, Automation, Conveyor belt Industrial control

I. INTRODUCTION

The various modern stamping machining processes getting widely used in the industries are: Pneumatic stamping machine, PLC stamping machine, metal sheet stamping etc. Stamping is process for reproducing text or images using a master form or templates. The process of stamping was manually. It was a human based operation that consist a lot of mistakes and inaccuracy. That operation takes a lot of time a human effort. Development in stamping machine brings that can print stamp logo on a fixed position on paper. Later development brings movable arm stamp machine. Both machines were only for single pages. The important vision of this machine is to fabricate the machine in minimum cost and profitable output. Also, the machine is simple to maintain and easy to operate. In the modern fast world of new and latest technologies, everyone goes for perfection and quickness. The present practice in food packaging industries is that, stamping is manually done by operatives and may require up to seven operatives per line if one need to achieve a higher output. This single action is time consuming, generate higher expenditure and also result to poor finishing by operatives during manual stamping process to meet production target. In order to achieve higher productivity and safe tremendous cost there is need for automatic stamping if small scale industries are to remain competitive while maximizing profit.

DIAGRAM
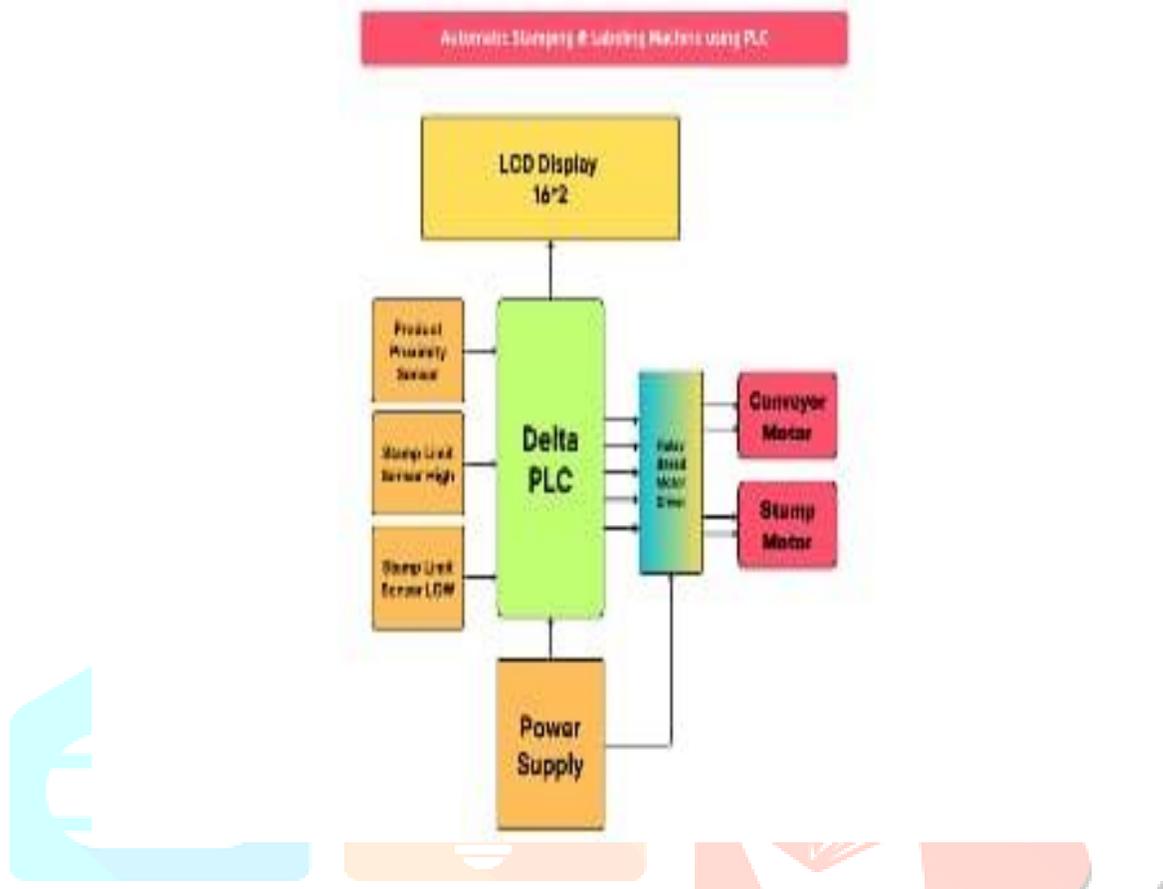
System Design and System Design and Methodology

3.1 Components Used

PLC: Acts as the central control unit. Popular brands like Siemens, Allen-Bradley, or Mitsubishi can be used.

Sensors: Proximity sensors detect products and trigger the stamping and labelling process.

Conveyor Belt: Transports products to the stamping and labelling stations.

Pneumatic Actuators: Used for pressing the stamp onto the product surface.

Labelling Mechanism: Applies adhesive labels to the product.

HMI (Human-Machine Interface): Provides an interface for operators to monitor and control operations.

3.2 Working Principle

1. The conveyor belt transports products to the stamping station.

2. A proximity sensor detects the product and sends a signal to the PLC.

3. The PLC activates the pneumatic actuator to press the stamp onto the product.

4. The product moves to the labelling station, where another sensor triggers the label applicator.

5. The labelled product continues along the conveyor for further processing or packaging.

4. Implementation and Results

The system was implemented using a Siemens S7-1200 PLC and tested in a controlled environment. The system achieved a stamping and labelling accuracy of over 95%, significantly reducing manual errors. The production rate improved by 40% compared to manual processes. The HMI provided real-time monitoring and control, enhancing operator efficiency.

5. Discussion and Future Scope

The PLC-based automatic stamping and labelling system successfully improves efficiency and accuracy in industrial applications. Future enhancements may include:
Integration with IoT for remote monitoring and predictive maintenance.
Implementation of machine vision for quality inspection.
Customization for different product sizes and materials.

RESULT

The machine successfully automated the stamping process, improving productivity by 30%. It reduced manual labour cost and error significantly, enhancing operational efficiency. Overall, the project demonstrated that integrating automatic stamping can substantially benefit respective tasks in terms of speed, accuracy and cost
This research demonstrates the effectiveness of PLC-based automation in stamping and labelling applications. The proposed system enhances productivity, reduces human intervention, and ensures consistency in manufacturing. Future advancements in automation and AI integration can further improve the system's efficiency and adaptability.

Applications

-Food and Beverage Industry (packaging and expiry date stamping)
-Pharmaceutical Industry (drug labeling)
-Automotive Industry (part identification and barcoding)
-Consumer Goods (branding and promotional labeling)

ADVANTAGES

Using a PLC-based stamping and labelling machine offers several advantages, making it a preferred choice in industrial automation. Here are the key benefits:
1. High Precision and Consistency
PLC ensures accurate placement of stamps and labels, reducing human errors.
Uniform pressure and timing prevent misalignment or smudging.
2. Increased Efficiency and Speed
Automates the stamping and labelling process, reducing manual labour.
Faster operations lead to higher production rates.
3. Flexibility and Programmability
Easily adaptable for different product sizes, shapes, and label designs.
Can be reprogrammed for new requirements without major modifications.
4. Integration with Other Systems
Can be integrated with conveyors, barcode scanners, and databases for seamless operation.
Real-time monitoring and control improve efficiency.
5. Reduced Waste and Cost
Minimizes material wastage due to precise control.
Lowers labour costs by reducing manual intervention.

CONCLUSION

In this paper we conclude that "Automatic stamping machine using PLC" It is the reliable printing mechanism this replaces traditional hand stamping on any object. The general purpose of the present invention, which will be described subsequently in greater details, is to provide a portable automatic pneumatic stamping machine which has many advantages of the low power consumption effective performance and many specified features of the system

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