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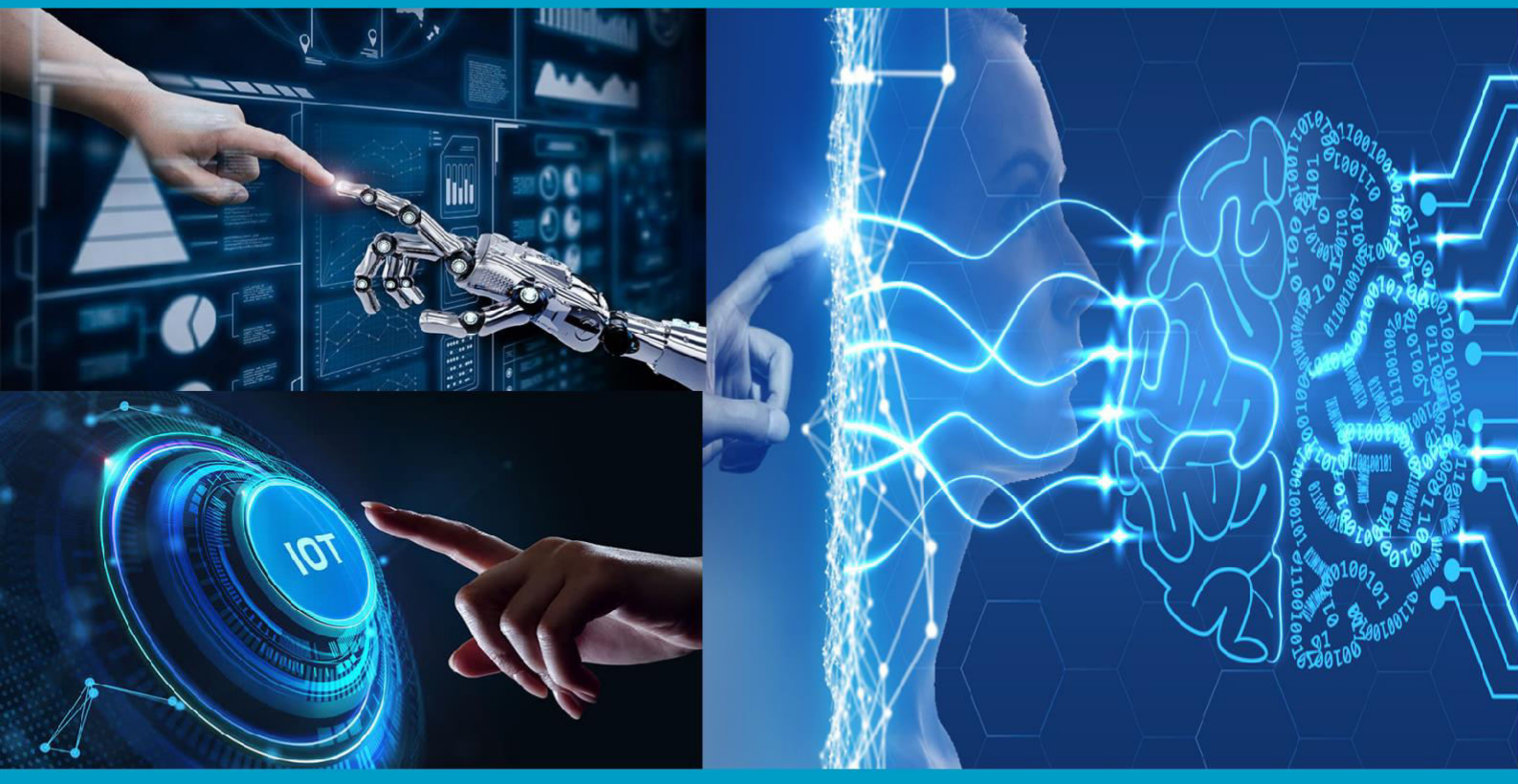

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Designing of Automatic Stamping machine using PLC

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ABSTRACT: This research article presents the design and implementation of an automatic stamping machine using a PLC (Programmable Logic Controller). This study's goal is to create a dependable and effective method for automating the stamping procedure, getting rid of manual labour, and boosting production. The suggested machine combines a number of parts, such as sensors, actuators, and a PLC, to provide stamping operations that are accurate and reliable.
Based on the needs of the machine, such as processing speed, memory capacity, and communication capabilities, an appropriate PLC is chosen throughout the design process. To ensure precise stamp placement and to offer feedback, sensors have been included. To apply the necessary force for stamping, actuators like pneumatic cylinders or electric solenoids are utilised.

I.INTRODUCTION

Introduction:Industrial operations have been revolutionised by the automation of manufacturing processes, which has increased productivity, accuracy, and efficiency. The design and development of automatic stamping machines employing PLCs (Programmable Logic Controllers) is one such area of automation. These devices provide a dependable and effective method for automating the stamping procedure, getting rid of manual labour, and increasing output rates.In many different industries, including automotive, aerospace, electronics, and packaging, stamping processes are frequently used where the application of a mark, logo, or identifying code is crucial. In the past, repeated activities have been carried out by human operators using manual stamping techniques. However, these procedures have shortcomings such variable quality, low throughput, and operator fatigue. PLCs have been used into the automatic stamping design to get around these restrictions.

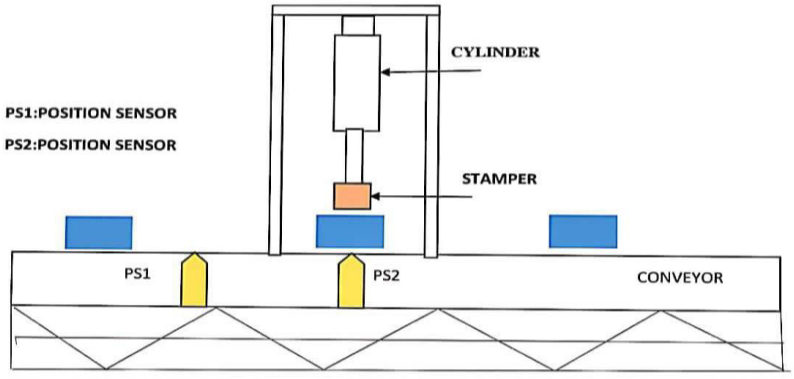

Figure 1: Automatic Stamping Machine

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1) Operator: The person operating the automatic stamping machine.
2) Human-Machine Interface: A user interface that allows the operator to interact with the machine, set parameters, and monitor the status.
3) PLC (Programmable Logic Controller): The central control unit that processes inputs, executes the control program, and controls the outputs based on the programmed logic.
4) Digital Inputs (Sensors): Sensors such as proximity sensors, limit switches, or optical sensors that provide signals to the PLC about the presence or absence of objects, position feedback, or other relevant information.
5) PLC Logic (Program): The program written in the PLC's programming language (usually ladder logic or structured text) that defines the control logic, sequencing, and decision-making processes.
6) Digital Outputs (Actuators): Actuators such as solenoid valves, motors, or pneumatic cylinders that are controlled by the PLC to perform actions like stamping, feeding materials, or moving parts.
7) Stamping Unit: The mechanical part of the machine that actually performs the stamping process.
8) The PLC receives input signals from sensors, processes them according to the logic programmed in the PLC, and generates output signals to control the actuators. This allows the automatic stamping

II.LITERATURE REVIEW

This research paper presents the design, implementation, and performance evaluation of an automatic stamping machine using Programmable Logic Controller (PLC) technology. The objective is to develop a highly efficient and accurate stamping system for industrial applications. The proposed system integrates PLC-based control, advanced sensing technologies, and automation techniques to achieve precise and reliable stamping operations. The paper discusses the hardware and software design, programming techniques, and performance analysis of the automatic stamping machine.T Tamilarasi; C Anbu; Bharathi T S Amirtha; M Jayasri; Amirdesh S Jaya; Devi A Karthika‘‘Automatic Stamping and GroupingMachine’’One of the most common tasks in daily life is punching stamps into documents. Additionally, daily grouping of papers is carried out by dividing them into smaller bunches from larger bundles. In government agencies and many educational institutions, including schools and colleges, the stamping procedure is carried out manually by a single individual. This individual is then involved in counting the number of certificates or applications on which the facsimile is stamped by either a different individual or the same individual.This procedure has a number of downsides, including time consumption, accuracy issues, hand fatigue, and others, in addition to the labour expense. As a result, this suggested methodology offers a solution with a combination of some mechanical and electrical operations. The invention of such an automatic stamping and grouping machine is the subject of this essay.

Relevance to current Research

In this paper, Every manufacturing industry has a final process that involves packaging since the products must be shipped, stored, and protected in accordance with consumer demands. Due to the high expense of adopting automated ways of stamping cartons, papers, and nylons, the majority of small scale enterprises have outsourced the final stage of manufacture. In an effort to meet customer demands, small-scale enterprises have become accustomed to manual stamping techniques with low machine efficiency, extended delivery times, and high labour costs.Small businesses have lost a significant amount of market share to large-scale manufacturing companies as a result of the present trend of stamping issues. This effort was required in order to make the stamping process more economical, use machinery that are simple to maintain, and comply with food regulatory organisations. The design, construction, testing, and use of an automated stamping machine powered by pneumatic systems that includes an air compressor, directional control valves, and an air service unit.
Design and Construction of Automated Stamping Machine for Small Scale Industries;Mauton Gbededo and Olayinka Awopetu.

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Relevance to current Research
This paper serves as an overview of previous research on automatic stamping machines that use PLC modules. The traditional process for stamping objects is laborious, time-consuming, and non-automatic. Continuous stamping or printing causes hand fatigue, needs a lot of work, and reduces accuracy, hence PLC Automation must be used to replace the human

approach. The automatic stamping of objects has drawn a lot of attention since it is dependable and repeatable. This not only reduces manual labour but also frees up more time for marketing and eliminates any potential risks associated with working in potentially dangerous environments. Automation is incredibly scalable and significantly increases production and profit.**"Review Research Paper on Automatic Stamping Machine Using PLC";**Mr. Nayan J. Tongale1 , Mr. Nihal D. Kamble , Mr. Swapnil A. Joshi , Mr. Sourabh S. Jadhav , Prof. Ashish S. Bhaisare.

Pneumatic stamping machines, PLC stamping machines, metal sheet stamping, etc. are some of the various current stamping machining techniques that are becoming widely used in the industries. Using a master form or templates, stamping is a procedure for duplicating text or graphics. Stamping was carried out manually. It was a heavily human-powered business with a large number of inaccuracies and errors. It takes a lot of time and labour to do the task. A stamping machine that can print a stamp logo in a fixed location on paper has been developed.

Inaccuracies and errors. It takes a lot of time and labour to do the task. A stamping machine that can print a stamp logo in a fixed location on paper has been developed. Later innovation results in a mobile stamping device.

No.	Paper Title	Author Name	Key Points	Remark
1	Automatic Stamping and GroupingMachine	T.Tamilarasi; C Anbu; Bharathi.T.S Amirtha; M Jayasri; Amirdesh.S Jaya; Devi.A Karthika	Instead of doing conventional stamping by using automated stamping method is beneficial in many way	This procedure has a number of downsides, including time consumption, accuracy issues, hand fatigue, and others, in addition to the labour expense. As a result, this suggested methodology offers a solution with a combination of some mechanical and electrical operations. The invention of such an automatic stamping and grouping machine is the subject of this essay.
2	Design and Construction of Automated Stamping Machine for Small Scale Industries	Mauton Gbededo and Olayinka Awopetu	Small Scale Industries uses Automated Stamping machine, Packaging, Pneumatic Circuit, Manufacturing industries, so cost of it should be as per that industry level	a modification to the current coding machine and injet printers used in large-scale food packaging companies, which are controlled by Programmable Logic Control and are relatively expensive, to design and manufacture a low cost automated stamping machine.
3	Review Research Paper on Automatic Stamping Machine Using PLC	Mr.Nayan.J. Tongale1 , Mr. Nihal D. Kamble , Mr. Swapnil A. Joshi , Mr.Sourabh S. Jadhav , Prof. Ashish S. Bhaisare.	Due to its dependability and reproducibility, automatic stamping of objects has drawn a lot of interest. This not only cuts down on manual labour but also frees up more time for marketing and safety measures. It could happen if people labour in dangerous environments. Automation is incredibly scalable and significantly increases production and profit.	. Everyone seeks perfection and speed in the modern, technologically advanced, and rapid society. In the food packaging industry, stamping is now done manually by workers; if a larger production is needed, up to seven workers per line may be needed. This In the manual stamping process, a single step takes a long time, costs more money, and leaves workers' completing work unsatisfactory. If small size enterprises need to remain competitive while maximising profit, automation stamping is required to generate increased efficiency and reduce operating cost.

In summary, the work presented in this paper is built on previous research to explore how automatic stamping machine is productive and more precise than the conventional method of stamping. While earlier work was focused on human

intervention, impacts people, we focus on how the stamping process get automated to increase accuracy and reduce human intervention.

III. METHODOLOGY OF PROPOSED SURVEY

Start by stating the automatic stamping machine's requirements in as much detail as possible. Take into account elements like the stamping procedure, stamp sizes, manufacturing volume, accuracy, speed, and any necessary specialised functions.

System Design: Create the overall system architecture for the automatic stamping machine based on the specifications. The stamping unit, sensors, actuators, PLC, and human-machine interface (HMI) are a few examples of the different parts. Establish the relationships and lines of communication between these elements.

PLC Selection: Choose a PLC that is appropriate and fits the needs of the automatic stamping machine. Take into account elements like the quantity of required inputs and outputs, processing speed, communication capability, and supported programming languages.Determine the stamping machine's required sensors, such as limit switches or proximity sensors, in order to detect the presence or absence of items, position feedback, or other pertinent data. Join these sensors to the PLC's digital inputs.Actuator Integration: Choose the right actuators, such as solenoid valves, motors, or pneumatic cylinders, for the stamping operation. Connect these actuators to the PLC's digital outputs to regulate the movement of parts, feeding of material, or stamping.PLC Programming: Create the PLC programme using the programming language of your choice (e.g., structured text, ladder logic). Based on the requirements, specify the control logic, decision-making steps, and sequencing. Include any necessary timers, counters, inputs, outputs, or other functions.

Design and build a human-machine interface (HMI) to enable operator contact with the automatic stamping machine. The HMI should include an easy-to-use interface for configuring parameters, checking on machine status, and displaying pertinent data.Integrate and test each component, including the HMI, PLC, sensors, and actuators. Check the automatic stamping machine's performance and operation. Make sure the stamping machine satisfies the criteria and that the PLC programme performs as anticipated.Deploy the automatic stamping machine in the production environment after it has been tried out and validated. The operators should receive adequate instruction on how to operate and maintain the machine. Create a maintenance schedule to guarantee the machine will run efficiently and last a long time.Continuous Improvement: Track the automatic stamping machine's performance and get operator input. Determine areas for development and put improvements in place to increase productivity, efficiency, and accuracy.

Depending on the complexity and unique requirements of the automatic stamping machine, the specific implementation specifics may change. Throughout the design and implementation phase, it is essential to adhere to best practises for PLC programming, electrical wiring, and safety regulations.

Overview of the Modules

1. PLC Module
2. Conveyer module
3. Object stamping module
4. Sensor module

PLC Module

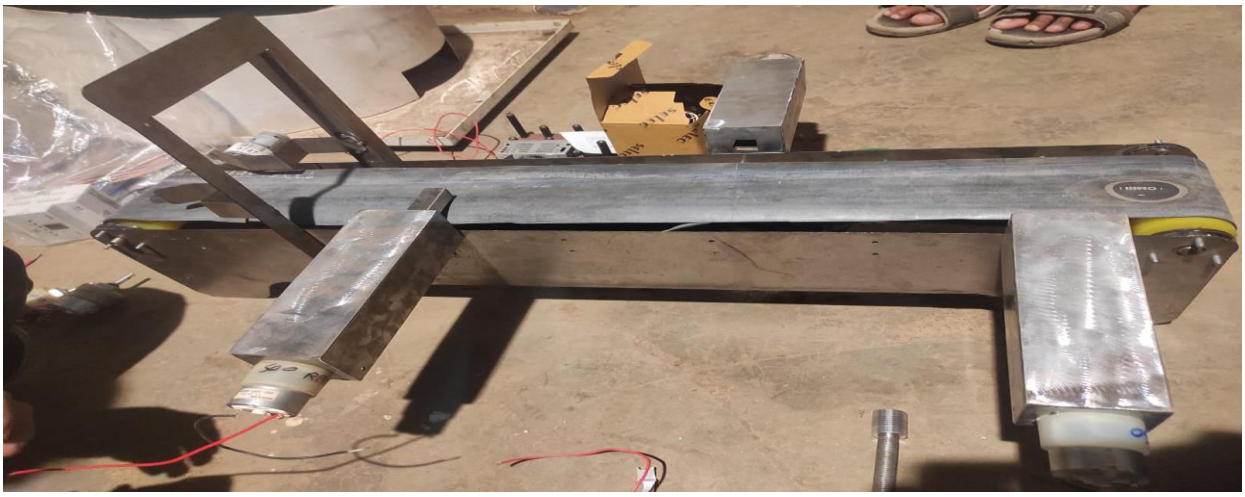
Our PLC module consists of the following

- Selec Mibrix 4M

- 24 V dc power module
- 16 digital I/O module

Components:
1. Stamping Mechanism: This refers to the device that applies the stamp on the object, such as the stamping head
2. Object Positioning System: A method of positioning an object so that it can be stamped in the proper spot. This may involve a robotic arm, conveyor system, or other devices.
3. Sensors: Proximity sensors or vision systems to find the object to be stamped and determine its location.4. Actuators: Motors or solenoids that regulate the stamping mechanism's motion.
Object detection: Utilize sensors to identify objects in the stamping area.

IV. RESULT



V.CONCLUSION AND FUTURE WORK

Conclusion: Using a PLC to design an autonomous stamping machine has a number of benefits, including accurate control, adaptability, and simplicity in programming and maintenance. You can build a dependable and effective machine that satisfies the unique needs of stamping applications by using the above-described methods. The PLC acts as the machine's core control system, coordinating the actions of numerous parts and providing precise and reliable stamping.

Future Work:

1. System integration: Look for ways to connect the automatic stamping machine to other systems, like a barcode scanner for automatic stamp selection or a database for tracking stamped products. The machine's functioning and effectiveness may be improved by this integration.

2. Investigate sophisticated stamping techniques, such as changeable data printing or multicolor stamping.

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