A
Project Report on

"AUTOMATIC STAMPING MACHINE"

Submitted
In Partial Fulfilment of the Requirements
For the Degree of

B. Tech. in Robotics and Automation

For the Subject
Electro-Hydraulics and Pneumatics

Submitted by

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Bharati Vidyapeeth

(Deemed to be University)

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(2022-23)

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CERTIFICATE

This is to certify that,

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have carried out the project entitled "**Automatic Stamping Machine** " under my guidance in partial fulfilment of the requirement for the degree of Bachelor of Technology in Robotics and Automation of Bharati Vidyapeeth (Deemed to be University), Pune during the academic year 2022-2023 for the subject Electro-Hydraulics and Pneumatics Project Based Learning (PBL) in the of Semester VI.

Prof. M.K. Beldar (Project Supervisor)

Dr. K. B. Sutar (H.O.D.)

DECLARATION

We, hereby declare that the project titled **"Automatic Stamping Machine"** being submitted by us towards the partial fulfillment of Bachelor of Technology, is a project-based learning work carried by us is our own work.

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ABSTRACT

An automatic stamping machine is a device that is designed to imprint or emboss text, images or graphics onto a variety of surfaces, including paper, cardboard, plastic, and metal. These machines are used in a wide range of industries, such as packaging, printing, and labeling, and can be operated manually or automatically.

The automatic stamping machine uses a combination of mechanical, electrical and digital technology to print high-quality images onto surfaces. It can be programmed to stamp different texts, logos or designs, and can also be customized according to specific requirements. The machine typically includes a stamping head, a feed mechanism, and a control unit that manages the printing process.

The benefits of an automatic stamping machine include increased efficiency, accuracy, and consistency in printing. It can also reduce labor costs and minimize errors and waste. Furthermore, the machine is versatile and can be used in various applications, such as product labeling, branding, and identification.

INDEX

1. INTRODUCTION

1.1 Background

The history of stamping machines can be traced back to the late 19th century when manual stamping machines were first introduced. These machines used manual pressure to imprint a design or text onto a surface, and they were widely used in the printing and packaging industries.

Over time, stamping machines evolved to become more automated and sophisticated, with the introduction of electrical and electronic components. In the 1960s and 70s, the first automated stamping machines were developed, which used pneumatic or hydraulic systems to apply pressure to the stamping head.

With the advent of digital technology, stamping machines have become even more advanced and customizable. The development of computer-controlled stamping machines has enabled precise and consistent stamping of complex designs and graphics.

Today, automatic stamping machines are widely used in industries such as packaging, labeling, and printing. They offer a range of benefits, including increased efficiency, accuracy, and productivity, and are available in a variety of sizes and configurations to meet the needs of different applications. With continued advancements in technology, it is likely that automatic stamping machines will continue to play an important role in the printing and packaging industries in the years to come.

1.2 Automatic Staming Machine

An automatic stamping machine is a device that is used to automatically print or emboss text, images, or graphics onto a variety of surfaces. These machines are commonly used in industries such as packaging, labeling, and printing to increase efficiency, accuracy, and consistency in printing.

The machine typically consists of a stamping head, a feed mechanism, a control unit, an ink system, a sensor system, and a cleaning system. The stamping head applies pressure to the surface to be printed, while the feed mechanism moves the surface under the stamping head. The control unit manages the printing process and can be programmed to adjust the printing

parameters according to specific requirements. The ink system delivers ink to the stamping head, while the sensor system ensures that the printing process is accurate and consistent. The cleaning system removes excess ink and debris from the stamping head.

Automatic stamping machines are available in various sizes and configurations, depending on the type and size of the material to be printed. They can print on a range of surfaces, including paper, cardboard, plastic, and metal, and can be customized according to specific requirements.

Overall, an automatic stamping machine is a valuable tool for businesses looking to improve their printing operations and increase productivity. Its automated and customizable features make it a reliable and efficient solution for printing high-quality images onto a variety of surfaces.

2. PROBLEM STATEMENT

2.1 Problem statement

Businesses that rely on manual stamping methods experience low productivity and accuracy, leading to increased costs and inefficiencies in their printing operations."

This problem statement highlights the challenge faced by businesses that still use manual stamping methods to print text, images, or graphics on various surfaces. Manual stamping methods can be time-consuming, labor-intensive, and prone to errors, resulting in low productivity, poor accuracy, and increased costs.

An automatic stamping machine can be a solution to this problem by providing an automated and customizable solution that can improve efficiency, accuracy, and consistency in printing, while also reducing labor costs and waste.

3. OBJECTIVES

The automatic stamping machine goals are as follows:

1) To design and fabricate a stamping machine that is capable of printing on various types of materials with high precision and consistency.

2) To develop an automated system for the stamping machine that is user-friendly and can be easily integrated with the existing printing operations of businesses.

3) To test the stamping machine under various conditions to evaluate its performance, durability, and efficiency in comparison to manual stamping methods.

4. CURRENT TECHNOLOGY

The current technology available for Automatic stamping machines for date printing may vary depending on the specific requirements of the business or industry. However, some of the common technologies used for date printing in Automatic stamping machines are:

Thermal transfer printing: This technology uses a thermal print head to transfer ink onto the material. It is commonly used in Automatic stamping machines for date printing on packaging materials, labels, and tags.

Inkjet printing: Inkjet printing technology is used in Automatic stamping machines to print dates on materials such as paper, plastics, and metals. It is a versatile and cost-effective method of date printing that can produce high-quality prints with excellent accuracy.

Laser engraving: Laser engraving technology is used in Automatic stamping machines to etch the date onto various materials such as plastics, metals, and glass. It is a permanent and durable printing method that produces high-quality prints with excellent accuracy.

Piezoelectric printing: This technology uses a piezoelectric crystal to produce ink droplets that are then transferred onto the material. It is a reliable and efficient method of printing dates onto materials such as paper, plastics, and metals.

Overall, the choice of technology for Automatic stamping machines for date printing will depend on various factors such as the material to be printed, the level of precision required, the speed of production, and the budget of the business.

5. METHODOLOGY

5.1 Working

The working of an automatic stamping machine can be divided into three major components: mechanical, electrical, and software.

Mechanical Components: The mechanical components of the stamping machine include the stamping bed or fixture, the stamping tool, clamps, and other holding mechanisms. These components hold the material to be stamped in place and apply the stamping force to the material.

Electrical Components: The electrical components of the stamping machine include the motor, sensors, switches, and control circuits. These components are responsible for controlling the stamping force, speed, and position of the stamping tool. The electrical components are also responsible for safety features such as emergency stop buttons and overload protection.

Software Components: The software components of the stamping machine include the user interface, programming, and control software. The user interface allows the operator to input the design or text to be stamped. The programming software converts the design into a stamping pattern and sends it to the control software. The control software controls the movement and position of the stamping tool and ensures the accuracy of the stamping process.

Selection of Components: The selection of components for an automatic stamping machine depends on the stamping requirements such as the type of material, design complexity, and production volume. The stamping bed, stamping tool, and holding mechanisms should be selected based on the size and shape of the material to be stamped. The motor and control circuits should be selected based on the required stamping force and speed. The programming and control software should be selected based on the complexity of the stamping pattern and the level of customization required.

Circuit Diagram and Installation: The circuit diagram of an automatic stamping machine includes the electrical components and their interconnections. The installation of the stamping machine requires the mounting of the mechanical components, wiring of the electrical components, and connection of the software components. The installation should be done by a trained technician or electrician to ensure safety and proper functioning.

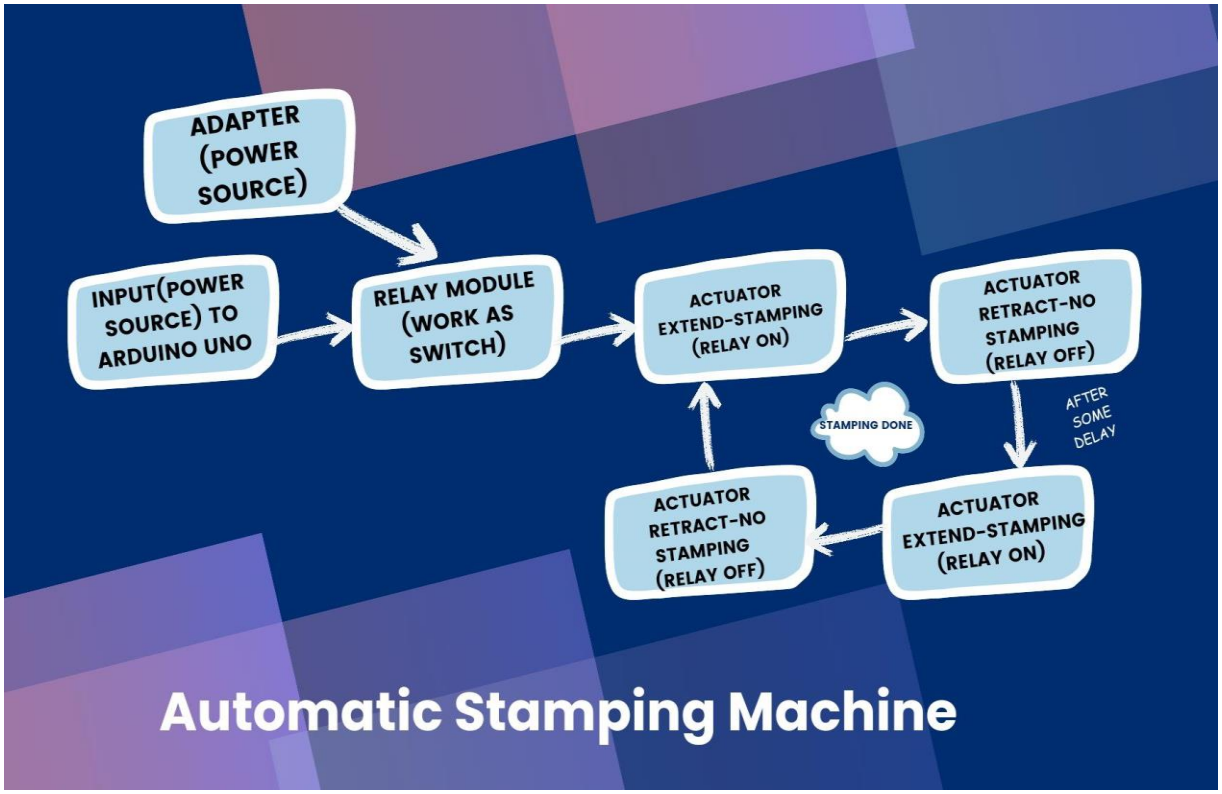
Testing: After the installation, the stamping machine should be tested for its functionality and accuracy. The testing should include stamping on different materials, stamping patterns, and stamping speeds to ensure that the machine can handle the required stamping requirements. The safety features such as emergency stop buttons and overload protection should also be tested.

Programming and Customization: The programming of the stamping machine involves converting the design or text to be stamped into a stamping pattern. The stamping pattern should be customized based on the stamping requirements such as the size and shape of the material to be stamped, the stamping force and speed, and the design complexity. The programming can be done through a computer interface or a manual input device such as a keyboard or touch screen.

Customization of the stamping machine involves modifying the mechanical, electrical, or software components to suit specific stamping requirements. The customization can include adding or removing holding mechanisms, changing the stamping tool, modifying the stamping bed, or customizing the control software. The customization should be done by a trained technician or engineer to ensure safety and proper functioning.

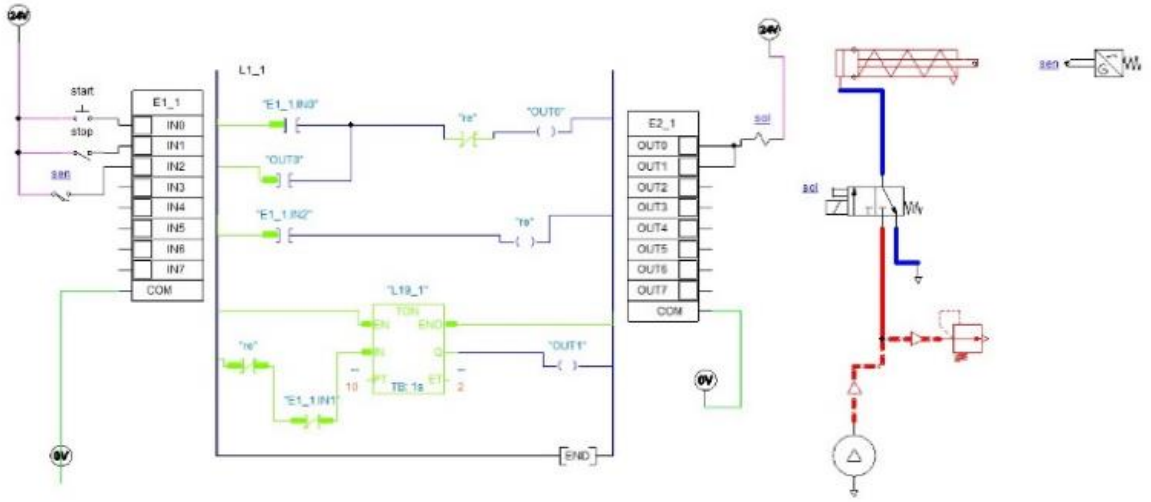
5.2 Flowchart

5.2.1 Automatic Stamping Machine using Arduino Uno and Relay



6. DEVELOPMENT OF PROJECT

6.1 Circuit diagram:



6.2 Components used:

- In an automatic stamping machine, the Arduino Uno can also be connected to a relay module to control the power supply of other components, such as the motor or the ink pad. A relay is an electrically operated switch that can be controlled by a small current, and it can switch a larger current on or off.The relay module can be connected to the Arduino Uno using the digital input/output pins. The Arduino can then send signals to the relay to control the power supply of the connected component. For example, the Arduino can turn on the relay to power the motor and move the stamp up and down, and turn off the relay when the stamp is in the correct position.Using a relay with the Arduino Uno can provide additional safety and protection, as it can isolate the high-voltage power supply of the motor or ink pad from the low-voltage control circuitry of the Arduino.

Fig.6.1 Arduino Uno

- 5/2 Single Solenoid Operated Direction Control Valve With Spring Return: A 5/2 single solenoid operated direction control valve with spring return is a valve used to control the direction of air flow in a pneumatic system. It has five ports and two positions, and is operated by a solenoid. The spring return feature ensures that the valve returns to its default position when the electrical signal is removed, making it a reliable component in pneumatic control systems.

Fig.6.2 5/2 Single Solenoid Operated Direction Control Valve

- 125×16 Double Acting Cylinder: A double-acting cylinder with a 125mm stroke length is a mechanical component used to create linear motion in a system. It has two ports for air to enter and exit, allowing for movement in both directions. The 125mm stroke length refers to the distance the piston can travel inside the cylinder, making it suitable for applications requiring linear motion. It is commonly used in manufacturing equipment, automation systems, and machinery.

Fig.6.3 125×16 Double acting cylinder

- 24V Relay Module: A 24V relay module is an electronic module that allows sensors output signals to control direction control valve. The module consists of a relay and associated circuitry that switches the DCV on or off when a 24V signal is received. They are commonly used in industrial and automation applications to control high-voltage equipment, as well as in home automation systems.

Fig.6.4 Relay

- In an automatic stamping machine, a 12 volt adapter can be used to provide power to both a relay and a solenoid. The relay can be used to control the power supply of the solenoid, which is responsible for moving the stamp up and down.To connect the 12 volt adapter to the relay and solenoid, the positive wire of the adapter can be connected to the input of the relay, while the negative wire is connected directly to the negative input of the solenoid.The output of the relay can be connected to the positive input of the solenoid.The relay can be controlled by an Arduino Uno, which sends signals to turn the relay on or off. When the relay is turned on, it allows current to flow from the 12 volt adapter to the solenoid, which causes the solenoid to move the stamp up or down. When the relay is turned off, the power supply to the solenoid is cut off, causing the solenoid to stop moving.When connecting the relay and solenoid to the 12 volt adapter, it is important to choose components that are compatible with the voltage and current requirements of the connected components. The adapter should provide enough power to both the relay and solenoid, and the relay should be able to handle the current required by the solenoid. Proper safety precautions should also be taken when working with high voltage and high current circuits.

Fig.6.5 Adapter

6.3 Software Used:

Automation Studio:

Automation Studio is a software tool used for designing, simulating, and documenting hydraulic, pneumatic, and electrical control systems. It provides a graphical interface that allows users to create, edit, and test control systems using a variety of components and sensors. The software can be used in various industries such as manufacturing, automotive, aerospace, and more.Some of the features of Automation Studio include:

• Component libraries: The software includes a vast library of pre-built components for hydraulic, pneumatic, and electrical systems that can be easily dragged and dropped into the design.

• Simulation capabilities: Automation Studio allows users to simulate the performance of their control systems, including hydraulic and pneumatic systems, using advanced simulation tools.

• Document generation: The software can automatically generate documentation, such as bills of materials, hydraulic and pneumatic schematics, and wiring diagrams.

• Collaboration: Automation Studio allows users to collaborate on projects with others, share designs, and make modifications in real-time.

• Training resources: The software also offers a wide range of training resources, including tutorials, video demonstrations, and user manuals, to help users get the most out of the software.Overall, Automation Studio is a powerful tool for designing and testing control systems, and it can save time and reduce errors in the design process.

Arduino IDE:

Arduino Integrated Development Environment (IDE) is an open-source software platform used to program Arduino boards. The software is developed by Arduino LLC and is available for free download on their website. The Arduino IDE provides a user-friendly interface to write, compile, and upload code to the Arduino board. It supports a variety of programming languages, including C, C++, and Arduino's own programming language, which is a simplified version of C++.Some of the features of the Arduino IDE include:

• Code editor with syntax highlighting and auto-completion.

• Serial monitor for debugging and communication with the Arduino board.

• Library manager to easily download and manage libraries for your projects.

• Integrated examples and tutorials to help you get started.

• Board manager to add support for different Arduino boards.

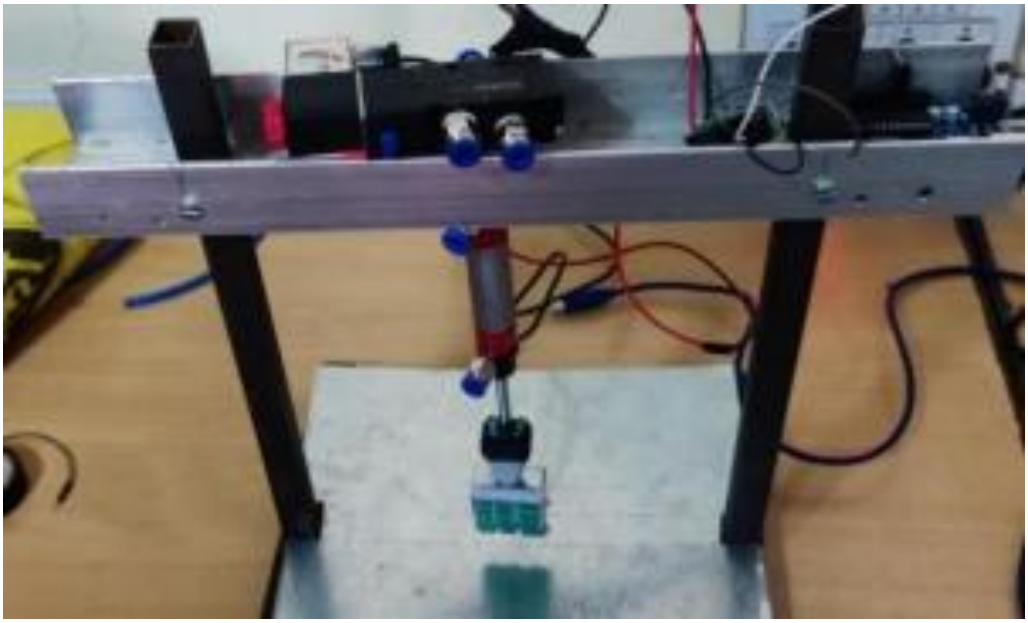
• Sketchbook to organize and save your projects.

• The Arduino IDE is compatible with Windows, macOS, and Linux operating systems. It is a widely used software platform for programming Arduino boards and has a large community of users who contribute to the development of libraries and resources for the platform.

6.4 Code for Arduino Uno

```
const int relayPin=8;

void setup() {

  pinMode(relayPin,OUTPUT);

}

void loop() {

  digitalWrite (relayPin,LOW);

  delay (2000);      //we can change the delay accordingly here it is 2sec delay

  digitalWrite (relayPin,HIGH);

  delay (2000);

}
```

7. FABRICATION OF SETUP



8. COST ESTIMATION

Components	Qty	Cost (Rs.)
Double acting cylinder 16 × 125	1	700
5/2 Single Solenoid Operated Direction Control Valve	1	700
24V Relay Module	1	200
Arduino Uno	1	750
Adapter Power Supply	1	175
PI male connecters	3	75
Exhaust or Silencer	2	40
Pu Tube	2mtr	30
Date Stamp	1	50
Metal Pipes	1	260
Connecting wires		50
Total (Approximate)		Rs. 3050

The total approximate cost estimation of the Automatic Stamping Machine is Rs. 3050 (Three throusand fifty rupees)

9. CONCLUSION

In conclusion, an automatic stamping machine for date stamping can greatly improve the efficiency and productivity of staff in a Professional Learning Environment. With the availability of various technologies such as digital date stamping, thermal transfer printing, inkjet printing, laser printing, and RFID technology, a customized solution can be created to meet the specific requirements of the institution.The objectives of the machine should be to increase efficiency, reduce time and effort, ensure accuracy and consistency, design a user-friendly interface, create a reliable and durable machine, handle various types of paper, comply with safety regulations, and provide a cost-effective solution.By achieving these objectives, the automatic stamping machine can streamline the document stamping process, reduce errors, and improve the overall quality of stamped documents.

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