International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Stamping Machine Automation

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ABSTRACT—

Packaging is the final phase in any manufacturing business since most products need to be packaged, secured, and sent in compliance with customer requests. The majority of small size firms have finished the production process due to the high cost of implementing automated means of stamping cartons, papers, and nylons. Small-scale businesses have grown accustomed to manual stamping procedures with low machine efficiency, lengthy delivery periods, and high labor costs in an effort to satisfy client expectations. Businesses may package and stamp their brand name, product pricing, MRP, and other information with the use of sophisticated stamping equipment. using this equipment, which is simple to operate and reasonably priced for everyone.

Keywords-Arduino uno, pneumatic cylinder, ultrasonic sensor, color sensor, relay, motor.

I. INTRODUCTION

Packaging is one of the most important production phases. In order to identify and attest to important information like the product registration number, the date of manufacturing, and the expiration date that conforms with legal and legislative requirements of the food sectors, the stamping technique is incorporated in the packaging process. The manufacturer frequently uses this value-adding activity to successfully project its brands. The significance of this device, which is prominent in the market and can readily print the names of brands and items. In today's technology, everyone strives for accuracy and speed. In the food packaging industry, stamping is currently done manually by workers and may require more Laboure's to reach a higher output, which takes more time. However, this stamping machine results in greater costs and subpar finishing by workers during manual stamping process to reach output target despite the fact that it decreases time consumption in packing and unpacking detecting and stamping the items in one operation.

Stamping equipment that generates the greatest profit for industries. Automation by definition calls for the use of computer-based, electrical, electronic, and pneumatic control systems to operate industrial equipment and processes while minimizing the need for human intervention.When the machine is fully automated, there is no need for human involvement until the inventory is exhausted, at which point a worker is removed from the machine cell and assigned to a cell that needs one. Since the pneumatics system is less expensive, it would have replaced the manual method in this instance, making the automated equipment more widely accessible to small businesses and more generally more economical. The manual approach also has an impact on the Automation using microcontrollers must take its place. Due to its dependability and reproducibility, automatic stamping of objects has drawn considerable attention. 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 significantly boosts production and profit.

II. LITERATURESURVEY

1.   A computerised stamping device Volume 3, Issue 5, May 2018, by Aniket Patil, Yogesh Risodkar, Mayank Paliwal, and RutambaraGadhave.

In this study, a novel ladder diagram design for a stamping process is proposed. The stamping mechanism may be utilised in both large- and small-scale businesses to increase output and lower labour expenses because it is PLC-controlled. A programmable logic controller and a rubber stamping kit have been physically simulated. Because it has distinct features and a specified symbol, this programming tool was chosen.

2.   Automatic Pneumatic Stamping Machine, Volume No. 2, Mr. Ravipothina, B. Raju, and G. Upendra Kumar (July 2015).

The relevance of pneumatic systems has increased significantly during the past several decades. Its accuracy and price make it important. Semi-skilled personnel may use it with ease. We designed and manufactured this pneumatically controlled equipment as our project as a result of how convenient the pneumatic system is to use. The study is further developed to examine how pneumatics work and behave in various contexts. The ability of this machine to operate at low pressures—even 6 bars will suffice for the operation—is a benefit. The piston is forced out of the cylinder by the pressured air flowing through it. This power is then transferred to the work piece through linkages.The work item is therefore given the necessary proportions and is imprinted. The rapid retrieval mechanism used by the stamping machine works by pressured air working inside of it. A solenoid valve is used to operate the compressed air system. By just modifying its arm, this project may elaborate on other uses as well.

III. METHODOLOGY

Since this project is automated, we completed it with the intention of implementing automation. We also used a simple circuit to ensure that there would be no complications when constructing the project. The block diagram of an automatic stamping machine is shown in the above image. The essential elements of the block diagram above are an Arduino Uno, two ultrasonic sensors, a color sensor, solenoids, and pneumatic cylinders.

The Arduino is turned on by plugging it into a power source. Since the Arduino operates between 7 and 12 volts, the power is sent to it via a transformer (step down transformer), which converts 230 volts to 12 volts and sends it to the Arduino. The regulator of an Arduino receives a 7 volt supply, converts it to 5 volts, and uses it to power its functions. Two ultrasonic sensors and one color sensor are employed. The work piece must be placed on the conveyer, which has one ultrasonic sensor next to a color sensor. The conveyer motor rotates continuously but stops when the ultrasonic sensor detects the object. The ultrasonic sensor sends a signal to the controller whenever it detects the object, and the controller then instructs the motor to stop. The goal of a color sensor is to identify the color of a material or work item so that we can determine whether it is packed or unpacked.
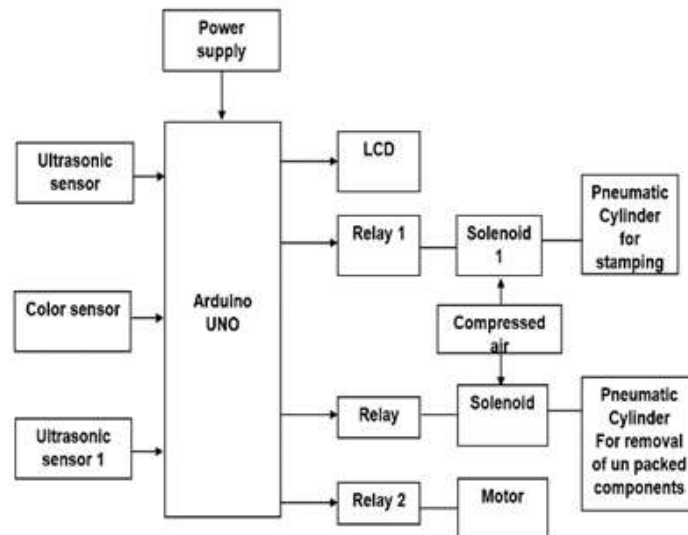
Fig 1: Block Diagram

Fig 2: Flow Chart

The color sensor determines the material's color and transmits that information to the controller, who decides whether to pack or unpack the material in accordance with the program we have pre-programmed. If the material is packed, the device signals the motor to startthe conveyer belt; otherwise, the solenoid is enabled. The pneumatic cylinder is controlled by the solenoid, which allows pressurized air to move through it. The material is pushed by the pneumatic cylinder.

Near the stamp is another ultrasonic sensor. When the ultrasonic sensor is getting ready to stamp, it senses the material and sends a signal to the controller, who then sends a signal to the motor and solenoid to halt and activate them, respectively. Relay circuits have been utilized for motors and solenoids. Relays are electrical switches that may be turned on or off, permitting the passage of power or not. Low voltages, such as the 5V provided by the Arduino pins, can be used to control relays.

We utilized a straightforward circuit consisting of a single motor, two pneumatic cylinders, and a third cylinder in order to prevent problems during project building. Each cylinder has a solenoid valve that is controlled by a controller that is configured in accordance with the requirements. Since manual Laboure is required for regular machines, we have solved this issue by automating it. The air from the compressor is used to power the pneumatic cylinder. The pneumatic cylinder received compressed air delivery through a solenoid-operated valve.

The same values over internet and hence by creating a special channel we can access those values over internet by sittinganywhereacrossworld.Thevaluesofdifferentparametersofmachinesuchasvoltagelevel, amount of liquid, temperature of the transformer can be easily monitored in real time for every two minutes. The supply unit provides 5v and 12v dcsupply for the system to work. The website is also designed for the convince of the company so that they can monitorvarious machine as we have different modules in the websitelike admin in website. As we click on the particular machinewe get the real value of the machine. And we can identifywhy the machine is stopped. If the machine temperature ismoreitwill autooffthe machine.

Fig3showsArduinoboard. Itcomeswitheverythingrequiredto

Fig 3: ArduinoUno Controller

Fig 3 shows Arduino board. It comes with everything required to support the microcontroller; to use it, just plug in a USBcable, an Analog-to-Digital adapter, or a battery to get going. Without too much concern about making a mistake, we can experiment with your Uno.

Fig 4 . relay module

Relay is in Fig. 4. Relay: An electrically operated switch. A set of functional contact terminals plus a set of input terminals for one or more control signals make up this device. Relays are electrical switches that may be turned on or off, permitting the passage of power or not. Low voltages, such as the 5V provided by the Arduino pins, can be used to control relays. It increases the voltage of the microcontroller from 5 volts to 12 volts, matching the power requirements of the solenoid valves and motor. Later on, we'll see that using the Arduino to control a relay module is just as simple as using it to control any other output.

Fig 5: TCS3200 color sensor

A full color detector capable of detecting static colour, Color Sensor is based on TCS3200. A square wave with frequency precisely proportionate to incident light intensity is the sensor's output. Additionally, fill light from onboard LEDs is supported. It has 4 white LEDs and a TAOS TCS3200 RGB sensor chip. When a white light is shone at an item, the light sensor records the color of the light that is reflected. Additionally, the strength of the reflection may be recorded (brightness). The photodiode turns the quantity of light into electricity using red, green, and blue color filters. Applications include, among others, reading test strips, color sorting, calibrating ambient light sensors, and color matching.

Fig 7: Pneumatic cylinder

Pneumatic cylinder is also known as pneumatic actuator .We have used this for stamping and pushing out the object .A pneumatic cylinder operates by allowing pressured air to flow through the valve, which causes the piston to reciprocate. Two different sorts of cylinders exist. First, a single-acting cylinder , second is a double-acting cylinder

Fig 8: Ultrasonic sensor

An ultrasonic sensor is a piece of technology that uses ultrasonic sound waves to detect a target object's distance and then turns the sound that is reflected back into an electrical signal. The speed of audible sound is greater than the speed of ultrasonic waves (i.e. the sound that humans can hear). The transmitter (which generates sound using piezoelectric crystals) and the receiver are the two major parts of an ultrasonic sensor (which encounters the sound after it has travelled to and from the target). Like bats, the ultrasonic sensor employs SONAR to calculate an object's distance. It provides exceptional non-contact range detection from 2 cm to 400 cm or 1 inch to 13 feet in an easy-to-use compact with high accuracy and consistent results.

Fig 6 16*2

Fig 6 shows the LCD Display. This LCD 16*2 parallel display offers an easy to use method of including a 16*2 white on liquid crystal display. White writing on a blue background or backlight that is extremely clear and high contrast is displayed on a 16 character by 2 line screen.

IV. CONCLUSION

In this paper, we come to the conclusion that "Automatic stamping machine" is the trustworthy printing method that takes the place of manual stamping on any object. The main goal of the current invention, which will be explained in more detail later, is to create a portable automatic pneumatic stamping machine that offers numerous benefits due to its efficient performance, low power consumption, and numerous unique system features.

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