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Design and Fabrication of Sensor Based auto Punching Conveyor Machine

Madhanmohan. K[1], Mohan Kumar.V[2], Biju.B[3], Lokesh. K[4]
Facultie[1, 2], Student[3, 4]
Department of Mechatronics Engineering
Akshaya College of Engineering and Technology, India

Abstract:
The pneumatic has gained a large amount of importance in last few decades. This importance is due to its accuracy and cost. The pneumatic punching machine has an advantage of working in low pressure. The press is the punching machine tool designed to punch by applying mechanical force or pressure. The metal is punched to the desired requirement. The compressed air from the compressor is control by the Microcontroller to switch on the pneumatic system. After a few seconds delay the controller will off the compressor, so that the pneumatic cylinder moves upwards, the materials are kept between the punch and work table. Now the material is fed and the next stroke of the pneumatic is made ready. When the material is correctly positioned then this machine is again actuated.

Keywords: PIC Controller, Pneumatic cylinder, Punching Machine

I. INTRODUCTION:

Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, pneumatics form an attractive medium for low cost automation. The main advantages of all pneumatic systems are economy and simplicity. Automation plays an important role in mass production. Nowadays almost all the manufacturing process is being atomized in order to deliver the products at a faster rate. The manufacturing operation is being atomized for the following reasons.

- To achieve mass production
- To reduce man power
- To increase the efficiency of the plant
- To reduce the work load
- To reduce the production cost
- To reduce the production time
- To reduce the material handling
- To reduce the fatigue of workers
- To achieve good product quality
- Less maintenance

II. SYSTEM DESCRIPTION PNEUMATICS

The word 'pneuma'comes from greek and means breather wind. The word pneumatics is the study of air movement and its phenomena is derived from the word pneuma. today pneumatics is mainly understood to means the application of air as a working medium in industry especially the driving and controlling of machines and equipment. Pneumatics has for some considerable time between used for carrying out the simplest mechanical tasks in more recent times has Played a more important role in the development of pneumatic technology for automation. Pneumatic systems operate on a supply of compressed air which must be made available in sufficient quantity and at a pressure to suit the capacity of the system. When the pneumatic system is being adopted for the first time, however it wills indeed the necessary to deal with the question of compressed air supply. The key part of any facility for supply of compressed air is by means using reciprocating compressor. A compressor is a machine that takes in air, gas at a certain pressure and delivered the air at a high pressure. Compressor capacity is the actual quantity of air compressed and delivered and the volume expressed is that of that of the air at intake conditions namely at atmosphere pressure and normal ambient temperature. The compressibility of the air was first investigated by Robot Boyle in 1962 and that found that the product of pressure and volumes of particular quantity of gas.

The usual written as

$PV = C$ (or) $P_iV_i = P_2V_2$

In this equation the pressure is the absolute pressured which for free is about 14.7Psi and is of courage capable of maintaining a column of mercury, nearly 30 inches high in an ordinary barometer. Any gas can be used in pneumatic system but air is the mostly used system now a days.

III. PIC CONTROLLER

Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions. The hardware capabilities of PIC devices range from 6-pin SMD, 8-pin DIP chips up to 144-pin SMD chips, with discrete I/O pins, ADC and DAC modules, and communications ports such

as UART, I2C, CAN, and even USB. Low-power and high-speed variations exist for many types. The manufacturer supplies computer software for development known as MPLAB X, assemblers and C/C++ compilers, and programmer/debugger hardware under the MPLAB and PICKit series. Third party and some open-source tools are also available. Some parts have in-circuit programming capability; low-cost development programmers are available as well as high-production programmers. PIC devices are popular with both industrial developers and hobbyists due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, serial programming, and re-programmable flash-memory capability.

Figure.1.

SMPS

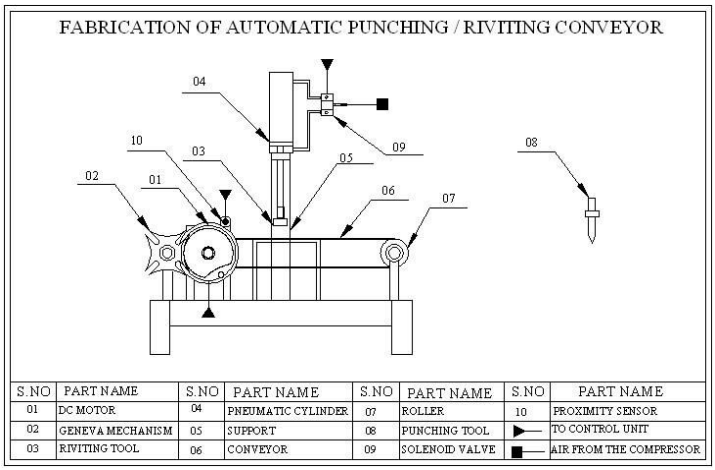
A switched-mode power supply (switching-mode power supply switch-mode power supply, switched power supply, SMPS, or switcher) is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently. Like other power supplies, an SMPS transfers power from a DC or AC source (often mains power) to DC loads, such as a personal computer, while converting voltage and current characteristics. Unlike a linear power supply, the pass transistor of a switching-mode supply continually switches between low-dissipation, full-on and full-off states, and spends very little time in the high dissipation transitions, which minimizes wasted energy. Ideally, a switched-mode power supply dissipates no power. Voltage regulation is achieved by varying the ratio of on-to-off time. In contrast, a linear power supply regulates the output voltage by continually dissipating power in the pass transistor. This higher power conversion efficiency is an important advantage of a switched-mode power supply. Switched-mode power supplies may also be substantially smaller and lighter than a linear supply due to the smaller transformer size and weight. Switching regulators are used as replacements for linear regulators when higher efficiency, smaller size or lighter weight are required. They are, however, more complicated; their switching currents can cause electrical noise problems if not carefully suppressed, and simple designs may have a poor power factor. Like other power supplies, an SMPS transfers power from a DC or AC source (often mains power) to DC loads, such as a personal computer, while converting voltage and current characteristics.

Figure.2.

MOTOR

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization). Every DC motor has six basic parts -- axle, rotor (armature), stator, commentator, field magnet(s), and brushes. In most common DC motors, the external magnetic field is produced by high-strength permanent magnets.

DRAWING FOR AUTO PUNCHING CONVEYOR MACHINE



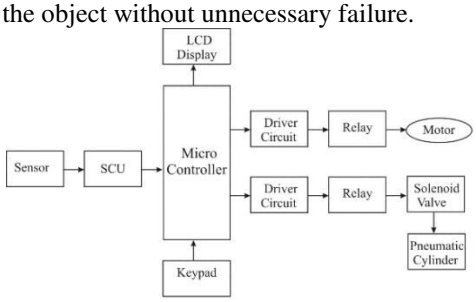
S.NO	PART NAME	S.NO	PART NAME	S.NO	PART NAME	S.NO	PART NAME
01	DC MOTOR	04	PNEUMATIC CYLINDER	07	ROLLER	10	PROXIMITY SENSOR
02	GENEVA MECHANISM	05	SUPPORT	08	PUNCHING TOOL	▶	TO CONTROL UNIT
03	RIVITING TOOL	06	CONVEYOR	09	SOLENOID VALVE	■	AIR FROM THE COMPRESSOR

Figure.3.

IV. WORKING PRINCIPLE

Here we use object sensor for auto punching process with the help of air compressor and the conveyor. When the compressed air is allowed to flow from the compressor first it is passed to the rear side of the pneumatic cylinder which leads to the piston movement in front. When the air is allowed to pass to the front side of the cylinder the piston comes back to its old position. During this process the Geneva conveyor starts to rotate the belt with the help of motor. Since both the works are done simultaneously the work piece is moved to a particular area and the respective process takes place. The work piece is stopped at the particular place when it is sensed by the object senor. The proximity sensor is used to count the rotation of the Geneva and it will stop after particular rotation. After the punching process completed the Geneva conveyor starts to move again.The Sensor detects the object on the belt while moving to the tool. It sends the signal to the Signal conditional unit, where it modify the signal and passes to the controller. It sends signals to the motor and the cylinder. The controller sets time for the work. The motor rotates the belt with the help of conveyor. The hydraulic cylinder uses to punch holes in the object. The Microcontroller

synchronize both the relay of the motor and cylinder to punch the object without unnecessary failure.



FACTORS DETERMINING THE CHOICE OF MATERIALS

The various factors which determine the choice of material are discussed below:

1. Properties:

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied.Can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc. The following four types of principle properties of materials decisively affect their selection

a. Physical
b. Mechanical
c. From manufacturing point of view
d. Chemical

The various physical properties concerned are melting point, thermal Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc. The various Mechanical properties Concerned are strength in tensile, Compressive shear, bending, torsional and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties. The various properties concerned from the manufacturing point of view are,

- Cast ability
- Weld ability
- Forge ability
- Surface properties
- Shrinkage
- Deep drawing etc.

2. Manufacturing case:

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

3. Quality Required:

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

4. Availability of Material:

Some materials may be scarce or in short supply, it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery of materials and the delivery date of product should also be kept in mind.

5. Space consideration:

Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there.

6. Cost:

As in any other problem, in selection of material the cost of material plays an important part and should not be ignored. Sometimes factors like scrap utilization, appearance, and non-maintenance of the designed part are involved in the selection of proper materials.

V. CONCLUSION

The project is fully automatic punching machine. It helps to reduce the overall work for the employees and the companies. It is pressurized, so it is quicker and accurate operation. Pneumatically operated punching machine is suitable for small scale and medium size industries. It is very usefully for the workers to carry out a number of operations in a single machine. This reduce the cost of the concern. This technique allows the operation near the minimum pressure drop line in the state diagram and a significant reduction in the power consumption for the same solids charge, when compared with a non-controlled system operating at fixed nominal conditions.

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