

AUTOMATIC ELECTROMAGNETIC PUNCHING MACHINE

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ABSTRACT

Punching Machine is one of the principle machines in paper cutting industry & sheet metal industry. It is mainly used as the name indicates to cut strips. So we are going to make a machine for "S I INTERPACK " and make it multipurpose & should be used to cut the card board , asbestos sheets, papers, foam, thin plastic sheets. The machine is simple to maintain, easy to operate. Hence we tried our hands on "automatic punching machine."

Automatic punching machine is working on the principle of electromagnetics. This type of punching machine is used to punch basically card board, asbestos, sheets, papers, foam, and thin plastic sheets. Punching is depend on feed rate which done manually.

Keywords: Coils, Current, Electromagnet, Punching Die, Springs.

I. INTRODUCTION

Punching is metal forming process that uses a punch press to force a tool, called punch. This type of punching machine is used to create a hole in thin cork sheet, asbestos, plastic sheet and more material as per the capacity of electromagnet.

Generally in conventional punching process like mechanical, hydraulic and pneumatic force is used to operet the punch in which creates large amount of friction; as well as inaccurecy to perform the micro level operation.

This type of punching machine is based on the magnetic force developed by electromagnetic coils. This machine is manually operated i.e ON/OFF system which helps to reduce friction and also control the power consumption.

This project is designed for small operation. it has low initial cost, low maintainance cost, less capital investment.

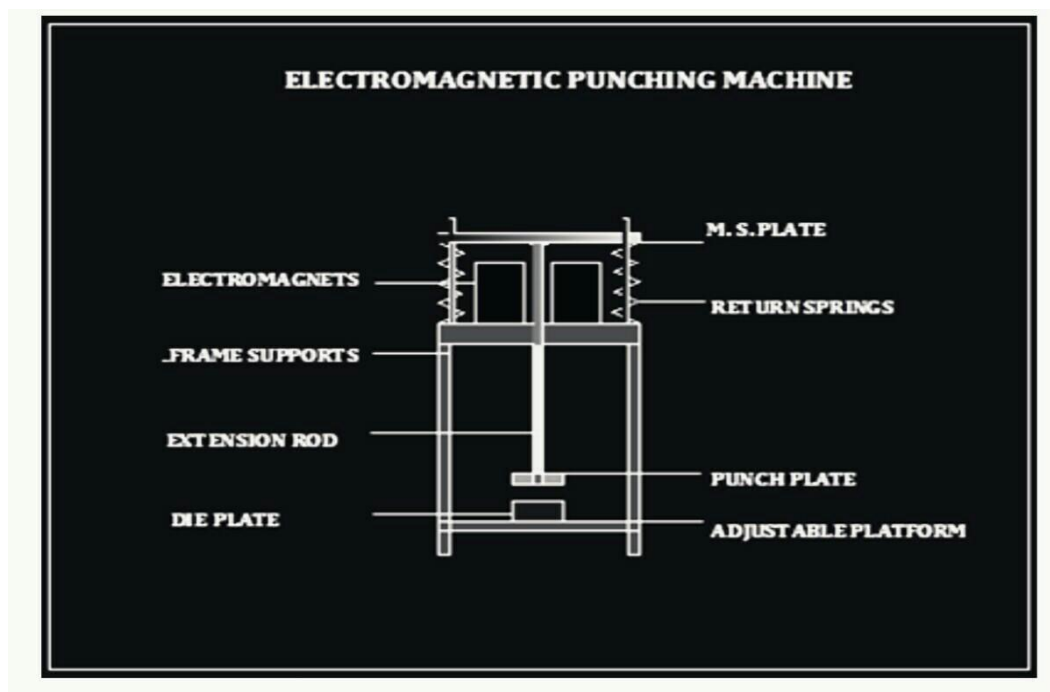
II. NEED OF A ELETROMAGNET

Copper is good conductor of electricity so we have decided to make winding of copper wire for electromagnet. The working principle of electromagnet is based on the faradays left hand rule. The magnetic field produced by the winding, magnetizes the electromagnet. The electromagnet now act as a powerful magnet and it attracts the mild steel plate which is the good magnetic material. Here the 2 electromagnet in series is used because the power of both

the electromagnet are get combined together and we got better result. This force produced is transmitted to the tool for the required punching operation.



III. COMPONENTS OF A PUNCHING MACHINE

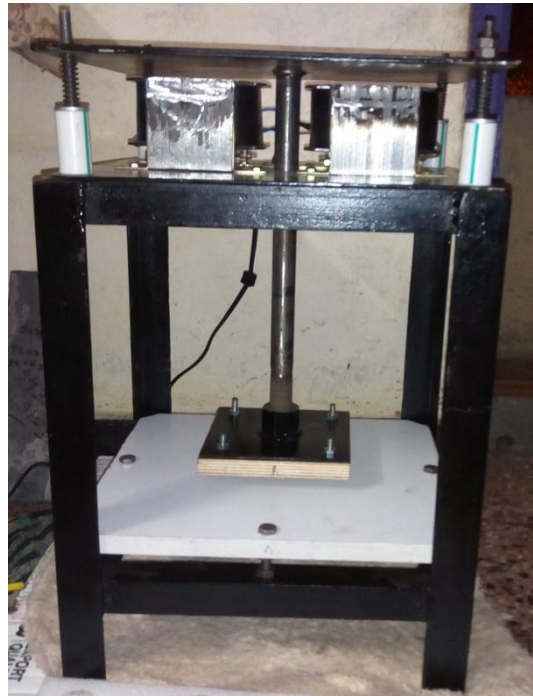


IV. PROBLEM IDENTIFICATION

The punching is the major operation performed in industry, and to perform this operation in mass number the manpower is require which results in to high cost of production, more time require to complete the operation, affect the accuracy of product so for automation in system we are trying to do a work on new system in punching.

V.CONSTRUCTION AND WORKING

The punching machine consists of a punching tool, die, push rod, supporting vertical pin, springs, vertical rod, lock pins and an external support structure. switch is connected between power supply->control panel->



This setup is connected to single phase, 230 volt supply which when get „ON“ the power is supply to the electromagnet and the magnetic field is get generated due to this magnetic field the mild steel plate on the electromagnet is get attracted towards the electromagnet and at the same time the push rod is also get in downward direction which creates the punch on material When the electric supply is cut off, the magnetic field stop to exist and after the electromagnet loses its magnetization, the spring retracts, moving the punching tool away from the work piece and the cycle is completed. The tool and work piece are then separated by means of four return springs. The springs are initially compressed during the forward stroke. The punched work piece is removed from the punching machine and another is loaded on to the die block in its plates. This procedure is repeated in order to obtain subsequent punches.

VI.FABRICATION OF FRAME

The various rectangular components like vertical beam, top cover plate, bottom cover plate and side plates are machined to the required dimensions using a shaper. Then surface grinding is done to finishing of the components. Holes are drilled into the surface by the vertical drilling machine. Finally Black colour painting was done on the rectangular structure

VII. SPRING



The main purpose electrical supply to the electromagnet is get stoped or cut off. The compressed spring now exerts force on the vertical bar and lifts it up, enabling the operator to remove the work piece and load another work piece. Before punching, the spring keeps the vertical bar and punching tool up, so that the work piece can be loaded without obstacle of our spring is twofold. After the punching, the spring is used for a return mechanism to push the punching tool up. Then work piece has got punched successfully.

VIII.VERTICAL PUSH ROD

The material used for the vertical beam is mild steel. When the electromagnet get magnetized the M.S plate get attracted towards the electromagnet and the vertical beam connected to the M.S plate is also go in downward direction and it exert a force.

IX. PUNCHING TOOL

The punching tool is made of High Carbon steel. It is fitted at bottom of the vertical beam. When the force exerted by electromagnet push the rod in downward direction the tool fitted at bottom of rod make a punch on the object.

X. RAW MATERIAL PURCHASE

The first step involved in the fabrication process is the finding of all the required raw materials. Mild Steel is the material used for most of the components. After obtaining all the required raw materials, the various parts are machined.

XI. ADVANTAGES AND APPLICATIONS

Advantages :

1. Friction loss is very minimal due to very little metal-metal contact in the drive system.
2. The force created per punch can be controlled precisely as it is an electrical process.
3. It is a compact device.
4. It is portable.
5. Variety of operations can be performed by just using different dies i.e. it is a flexible setup.

Applications

1. Punching of foam for packaging accessories.
2. Punching card board from 1mm to 5mm.
3. It can be used to punching the asbestos sheet for gasket sheet.
4. It is used to punching a plastic sheets and paper
5. This machine can be used for following application of gasket/card board/plastic sheet/ paper as follows-
 - a. Blanking
 - b. Punching
6. It is used to produce high quality cutting surface.
7. It can be used for forming plastics



XII.CONCLUSION

While concluding this report, we feel quite fulfill in having completed the project assignment well on time, we had enormous practical experience on fulfillment of the manufacturing schedules of the working project model. We are therefore, happy to state that the in calculation of mechanical aptitude proved to be a very useful purpose.

XIII. FUTURE IMPROVEMENTS AND INNOVATIONS

The paper included very simple type of Machine parts requiring very less component than conventional machinery. As work was successful studying & completing the results of this automatic electromagnetic punching m/c with solving other types of conventional punching machine problems associated with machine that can be implemented from higher to lower units cost. Its lowermost requirement of maintenance can again be beneficial for keeping cost down.

This machine runs on electricity only during punching operation. This few out of very large no of rows can project this m/c across the investment.

As per Indian content is concern this machine can be very beneficial for virtually all type of punching units as it has very low capital investment. This machine may form a simple solution for punching in the future. This machine also can be controlled by computer programs.



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