APPLICATION OF ELECTROMAGNETIC MACHINE FOR INDUSTRIAL AND RURAL DEVELOPMENT

[1]Mr. Shyam H. Ingle, [2]Dr. Shrikant S. Dandge, [3]Mr. Sumit S. Kalmegh
Assistant Professor, Mechanical Engineering Department, Sipna COET, Amravati, Maharashtra, India[1],
Associate Professor, Mechanical Engineering Department, COET, Akola, Maharashtra, India[2] , Assistant Professor, Mechanical Engineering Department, Sipna COET, Amravati, Maharashtra, India[3]

ABSTRACT

As industrial is coming up across the globe various invention and innovations are being carried by human to fasten various processes associated with manufacturing and align things. One such thing is industrial automation unit. In these automation units various machines those can be adopted easily are also getting developed. Considering the example of any industry (manufacturing) where jobs are needed to be punch, punching machines are used. There can be various types of machines depending on parts to be cut process of cutting, requirement of cutting dimension, etc. now a day's hydraulic punching machine, pneumatic punching machine and mechanical type punching machine are popular type of such machines used in above industries. These machines are certainly good at work but as with almost all types of machines there are certainly pros and prone association with them to for the purpose various work is being carried out to solve the dilemma. In this paper punching machine of a new type i.e. electromagnetic punching machine is decided to be fabricated. Along with it has also been decided to develop for the same so that machine can easily be adopted in today's automated plants for industrial and rural development.

Keyword: - Electromagnet, Automation, Punching

1. INTRODUCTION

Today's world is going fast at an amazing rate to cope with this fast changing environment the technological manufacturing process needs to be speed up and efficient. This leads to developed various new types of machines that are efficient, economical and easy on maintenance. Punching is process of metal forming that utilizes a punch press to force the tool, called a punch, through the work piece to create a hole through shearing. The punching is the most cost effective process to make holes in sheet or strip metal for average to high amount of material fabrication. It is able to create multiple geometric holes. The punches and dies are usually fabricated from the conventional tool steel or the carbides develop a burnished region roll-over, and the die break on sidewall of the resulting hole. Sheet metal is simply metal formed into thin and flat pieces. It is one of the fundamental forms utilized in metalworking, and can be able to cut and bent into the variety of different geometric shapes. Number of objects is constructed of the material every day. Thicknesses may be vary significantly, although extremely thin thicknesses can be considered as foil or leaf, and the pieces are thicker than 6 mm (0.25 in) are considered as plate. Punching is a metal forming process that uses a punch press to force a tool, called a punch, through the work piece to create a hole via shearing. The punch often passes through the work into a die. A scrap slug from the hole is deposited into the die in the process. Depending on the material being punched this slug may be recycle and reused or discarded. Punching is the cheapest method for creating holes in a sheet metal for medium to high production rates. In forging applications the work is often punched while hot, and this is called hot punching. A punch is often made of hardened steel or carbides. A die is located on opposite side of the work piece and helps to localize the shearing force for a cleaner edge. There is a small amount of clearance between the punch and the die to prevent the punch from sticking on to the die.

2. DESIGN METHODOLOGY

The Electromagnetic punching machine consists of a punching tool, die, push rods, and transverse beam, return springs and an external support structure. A switch is connected between AC power supply and the windings of an electromagnet. When the setup is connected to 230 volts, AC supplies. The coils are supplied with electricity and the magnetic field is developed around the coil. The electromagnetic core which is within the magnetic field gets magnetized and in turn it exerts a force proportional to the electricity and attracts the transverse beam. The mild steel plate is connected to the ends of a punching tool through two push rods. Thus when the plate move towards the core, the push rods transmits the motion to the punching tool with the same force developed by the electromagnet. The punching tool moves towards the die block and punches the surface of the work piece. The tool and work piece then separated by means of two returns springs. The springs are initially compressed during the forward stroke. When the electric supply is cut off, the magnetic field ceases 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.

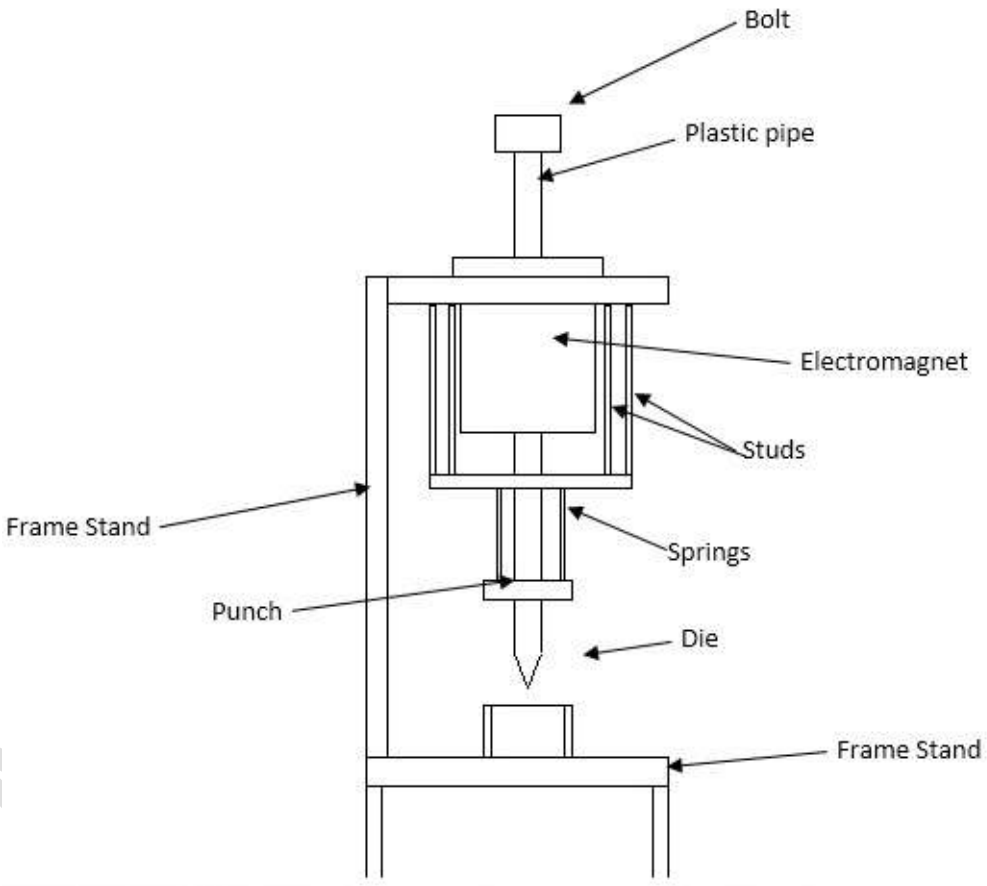

Figure-1: Electromagnetic Punching Machine

3. FABRICATION

The base platform, middle plate and top plate are designed and drown an MDF sheet with other types of components such as motion limiter and blade holder etc. This material is then cut with power saw. These plates are arranged or attached at fixed position with the help of studs, nuts and bolts. The electromagnet drafted ground a plastic core diameter 40 mm. A twenty gauge copper insulator wire is used for manufacturing electromagnet. In all thousand tones are made towards completion of electromagnet. The iron core which in practical is 1" dia and 4" in length is forcefully fitted in plastic pipe. At the same end a motion limiter in the form as ring cutout of Medium Density Fiber Board (MDF) sheet attached along with high density core ring. At the other end of this plunger is made to pass through electromagnet where another motion limiter ring carries the

purpose of guide. At the free end of plunger a 'y' shaped subassembly cut out of MDF is attached. This assembly is made to hold the cutter plate at certain inclination just above this led holder assembly there lines a MDF which guides a plunger with the help of studs aside. The blade is drafted out of high carbon hard steel and the edges are sharpening more. For holding the pipes to be cut at a fixed position is very important to cut them properly for the purpose guide is supplied on either side of plane of cutting. One guide firms the inlet of the pipe, another one point's outlet for the same. These fluids are drafted out of all pipe of 10 or 11mm dia. These pipes are again hold at same distance and sides with the help of MDF structural. The plunger assembly is sustained with the help of rubber stand in such a way that only lower inch portion allowed inside electromagnet wherever dead. Whenever electromagnet gets live, it sucks the iron core into the flux very rapidly and very efficiently with the help of as described here before. The rubber strap also required to retract the blade also stroke is complete.

4. APPLICATIONS

- Punching of Foam for Packaging Accessories.
- Punching Card Board from 1mm to 5mm.
- It Can Be Used To Punching The Asbestos Sheet For Gasket Sheet.
- It Is Used to Punching A Plastic Sheets And Paper.
- It is capable to punch copper sheet up to 0.02mm

5. CONCLUSION

The project work & testing shows that this machine combines some probes from various types of punching machines there by exhibiting a good integrated result. This machines can be fixed in less place, low maintenance, does not require skilled labors has high rate of action, has longer span of time, require less capital investment, has low running cost, hence can be implemented in the industry to help to lower down the production cost which is beneficial to promotes rural industrial development. Automation to this unit may give a unique advantage of interfacing in industry. For more fast production rate & unique ability this machines exhibits can put itself at remarkable less in the industry.

6. FUTURE SCOPE

Electromagnetic punching machine uses electricity only during punching operation. This machine may form a simple solution for punching with automation in the future which helps to create employment in rural areas as it is simple in construction, less in cost and didn't requires skilled labours. Thus automatic machine can result into more accuracy.

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