

AUTOMATED PUNCHING MACHINE

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Abstract: *The objective of this project is to make automatic punching machine for the industries and the automobile with the help of DC motor, bearing, punching tool. Punching or pressing process is one of the most important and necessary processing step in sheet metal industry. By automating this process one can have a greater control over the process. It is very useful in industries for manufacturing units in order to save the time and manpower. But in future hope we will take this to advance type.*

Key Words: *Transformer, DC motor, ball bearing, shaft, MS plate.*

1. INTRODUCTION:

A press or a machine press is a tool used to work in paper to consider hole. A punch machine is a type of machine press used to consider holes in paper and sheet metal. The press is the punching machine tool designed to punch blank of sheet by applying mechanical force or pressure. It can be small and manually operated and hold. Most punch machine are large but we consider small equipment for this project. But in future hope we will take this to advance type. In order to deliver the products at a faster rate all manufacturing process are atomized. The capacity for this punching machine will be 1200 per hr. By advancing the features of punching machine we can improve production of hole.

2. MATERIALS: METAL:

- A hollow structural section (HSS) is a type of metal profile with a hollow tubular cross section.
- HSS is sometimes mistakenly referenced as hollow structural steel.
- Rectangular and square HSS are also commonly called tube steel or structural tubing.

ELECTRIC MOTOR:

- An electric motor is an electrical machine that converts electrical energy into mechanical energy. The reverse of this is the conversion of mechanical energy into electrical energy and is done by an electric generator, which has much in common with a motor.
- Most electric motors operate through the interaction between an electric motors magnetic field and winding currents to generate force.

BEARINGS:

- A bearing is machine element that constrains relative motion to only the desired motion and reduces friction between moving parts.
- The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis or it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts.

CHAIN:

- A chain is a serial assembly of connected pieces, called links, typically made of metal, with an overall character similar to that of a rope in that it is flexible and curved in compression but linear, rigid, and load-bearing in tension.

DISC:

- A round thin steel plate, usually dished, that is sometimes used instead of plow shovel or mouldboard.
- To cultivate or harrow with an implement that uses disks instead of teeth or shovels.

SHAFT:

- A **shaft** is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power.
- The various members such as pulleys and gears are mounted on it.

SPROCKET:

- **Sprockets** used for power transmission from one shaft to another where slippage is not admissible, sprocket chains being used instead of belts or ropes and sprocket-wheels instead of pulleys.
- They can be run at high speed and some forms of chain are so constructed as to be noiseless even at high speed.

There are four types of sprocket;

- Type A: Plain Plate sprockets
- Type B: Hub on one side
- Type C: Hub on both sides
- Type D: Detachable hub

3. METHOD:

The press is the punching machine tool designed to punch blank of sheet by applying mechanical force or pressure. It is **quick return mechanism**. For mass production the presses are used and they are faster and efficient way to form a finished product .In normal or conventional methods of pressing the disadvantages may be -.

- Angular misalignment of the sheet
- Higher material handling time and manufacturing lead times
- Reduced safety for the worker

4. DISCUSSION:

When ac supply given to transformer it will converts ac into dc supply and transfer power to motor and it will be in operating condition. Then it will help to rotate shaft through chain drive by means of ball bearing and attached to frame. The disc will connected to one end of shaft and other end will be free. By using the surface of the disc we have to connect the tool by using supporting rod. The press is the punching machine tool designed to punch blank of paer by giving supply to motor.

5. OBJECTIVES:

- 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

6. ANALYSIS AND FINDINGS:

SHEAR STRENGTH (KN/mm²):

Aluminum	Brass	Low Carbon Steel	Stainless Steel
0.1724	0.2413	0.3447	0.5171

Table 1.0- Shear strength of materials

Metal Selection: Aluminium

Metal Thickness: 2mm

Perimeter: 2500mm

Shear Strength: 0.1724 (kN/mm²)

PUNCHING FORCE CALCULATION FORMULA:

Punching Force (kN) = Perimeter (mm) * Plate Thickness (mm)* Shear Strength (kN/mm²)

- Perimeter = 2*(800+450)
- Thickness = 2mm
- Shear Strength = 0.1724 kN/mm²

PUNCH FORCE =87869 kg

PUNCH TOOL:

Punch tool is made up of stainless steel and used to create hole in workpiece.

APPLICATIONS:

1. It is used to punch sheet metal as well as paper.
2. It is used for small scale industries which do not require pneumatic or hydraulic punching machine.
3. It used in printing press for punching bunch of papers.
4. Used for punching which are not able to punch by manually punching machine.

SPECIFICATIONS FOR MATERIALS:

METAL:

1. **Total length of metal:-** 800mm
2. **Metal Thickness:** 2mm
3. **Height of metal after framed:-** 540mm

ELECTRIC MOTOR: 200V input

Items	Specification
Moment of Inertia	0.014 kg-m ² ×10 ⁻⁴
Load Inertia	Up to 30 times Motor Inertia kg-m ² ×10 ⁻⁴
Rated Power Rate	18.1 kW/sec
Speed Positioning Detector	17bit/rev incremental encoder (Serial Output)

Table 1.1

CHAIN:

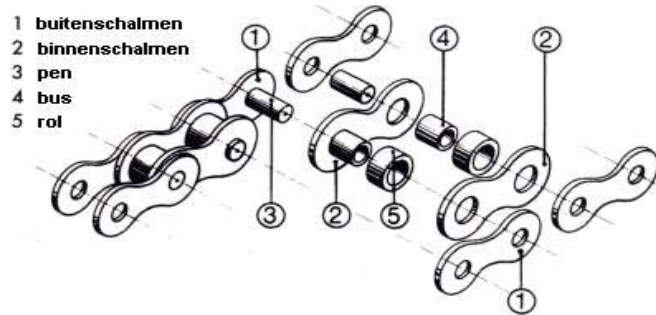


FIGURE 1.1

Chains come in $\frac{3}{32}$ in (2.4 mm), $\frac{1}{8}$ in (3.2 mm), $\frac{5}{32}$ in (4.0 mm), or $\frac{3}{16}$ in (4.8 mm) roller widths, the internal width between the inner plates. $\frac{1}{8}$ in (3.2 mm)

DISC:

1. Diameter of disc: 150mm

SHAFT:

1. Diameter of shaft: 32mm
2. Length of shaft: 450mm

SPROCKET:

1. The dimensions of a sprocket can be calculated as follows, where P is the pitch of the chain, and N is the number of teeth on the sprocket
2. Pitch Diameter = $P \div \sin (180^\circ \div N)$
3. Outside Diameter = $P \times (0.6 + \cot (180^\circ \div N))$
4. Sprocket thickness = $0.93 \times \text{Roller Width} - 0.006$ "

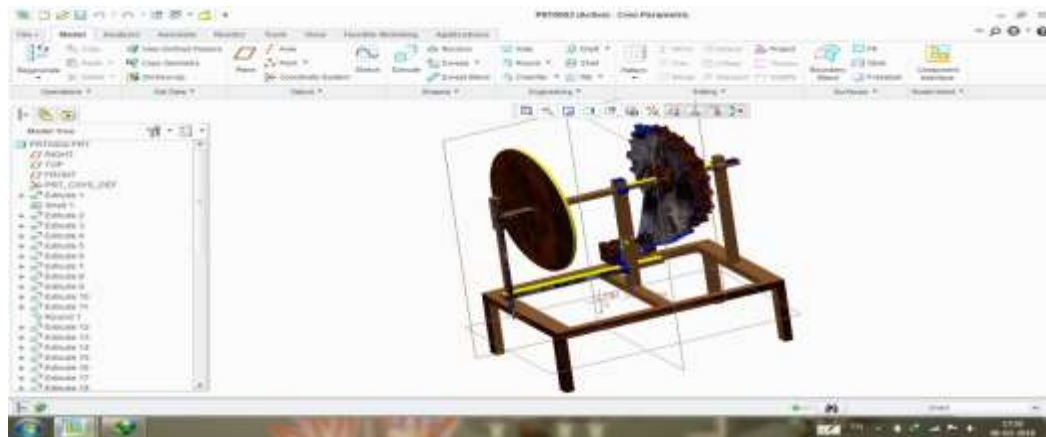
Chain NO.	Pitch	Roller Diameter	Roller Width	Sprocket thickness
Bicycle, with Derailleur	1/2'	5/6'	1/8'	0.110'
Bicycle, without Derailleur	1/2'	5/6'	3/32'	0.084'

Table 1.2

FABRICATION:



DESIGN:



7. RESULT:

From this we justified that most of industries getting suffer to create a hole using punching machine in mass production and considering production cost and timing. But by using this they can get clear solution from this and they can improve production by making more targets by keeping customer demand in our mind. They also create hole in required shape and in required diameter. Most of the punch machine are large but we consider small equipment for this project. We can also create hole in sheet metal by changing tool or default tool.

8. RECOMMENDATIONS:

- We hope that we can take this to advance by creating holes in whatever material that we need to consider hole.
- By providing solar panels we can reduce power problems.
- Reducing misalignment of paper while creating hole by fixing some strong apparatus in the design.

9. CONCLUSION:

The operation of the punching machine is discussed in this paper. By using servo motor as controller of a system, good control over the system can be achieved, manufacturing lead time of system can be reduced by developing automatic feeding mechanism and worker safety can be increased by reducing the human participation in the process. **THE CAPACITY OF PUNCHING MACHINE TO CREATE HOLE PER HOUR: 1200 per hr.** By advancing the features we can improve the creation of hole.

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