
DESIGN & FABRICATION OF AUTOMATIC HAMMERING MACHINE

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ABSTRACT

This essay covers the design and construction of an automatic hammering machine. To develop and construct an automatic hammering machine is the aim of this paper. We have also determined the maximum torque and hammering impact velocity for this. For numerous production processes in our project, such as riveting, upset forging, punching, etc., we need torque force. Additionally, since less time is needed for operation, it is advantageous for mass production. Using the computer-aided three-dimensional interactive tool Creo Parametric 2.0, we created a solid model of the project assembly for this project. Every component's snapshots are included in the file's design section. The motor, shaft, hammer, jigs, and fixtures make up the model. We create a conceptual model of an automatic hammering machine using this information. One of the innovative design concepts suggested is the automatic portable hammering machine, which enables quick and accurate hammering processes. It should be risk-free for users to use, and worker manual effort should be simple to use automatically. A laborer used a hammer in the past to drive nails, fit components, break apart, and other things.

Keywords: Creo Parametric 2.01, Automatic2, Cad Modeling3, Impact4, Torque.

I. INTRODUCTION

This paper is primarily concerned with the agitated assembly process and machine of programmed Simple hammering machine. Prototype that can overcome the problem of off-center hammering and odd hammering effects in the manufacturing process. Plan a programmed convenient hammering machine provided mechanical advancements in assembly process method as a potential solution to the problem of moderate hammering speed and anomalous hammering by a work. The possibility of such an idea was investigated in terms of providing specialists with an acceptable and small plan that may be exchanged anywhere with this machine by any employees.

The automatic portable hammering machine can be considered as the basis of any hammering operation in mass production. Its main purpose is to perform hammering work safely and efficiently, including punching, filleting, riveting, and smithy operations, such as upset forging, under all intended operating conditions. This paper discusses the design, construction, and cad modelling of an automatic hammering machine. An essential role in the assembly process (the hammering process) will be played by a self-operating, programmable hammering machine. Hammering machines are used in the production of materials such as instruments, pivots, automobile frames, metal molding, and more. Several unresolved issues related to driving nails were present in the current development of metal pressing and forming machine.

II. WORKING

- When direct current is applied to the motor, the motor starts running.
- As the motor start running, the motor convert the electrical energy into mechanical energy
- Electrical energy runs the motor and small pulley coupled to motor also runs. The small pulley is connected to bigger pulley through a belt.
- Bigger pulley is connected to Cam plate through a shaft, hence as bigger pulley rotates, cam plate also rotates
- Connecting rod with turn buckle attached to cam plate reciprocate as cam plate rotates, rotary action of cam plate is converted into reciprocating action of shaft.

- Leaf spring is provided at the end of lever of hammer and the end of connecting rod with turn buckle to avoid breakdown and allow slight bending to avoid breakage of connecting rod.
- Rotary motion of cam plate is transmitted to the hammer lever with the help of connecting rod.
- Due to this angular motion of lever, hammering operation starts and the hammer applied force on the work piece.

III. MODELING AND ANALYSIS

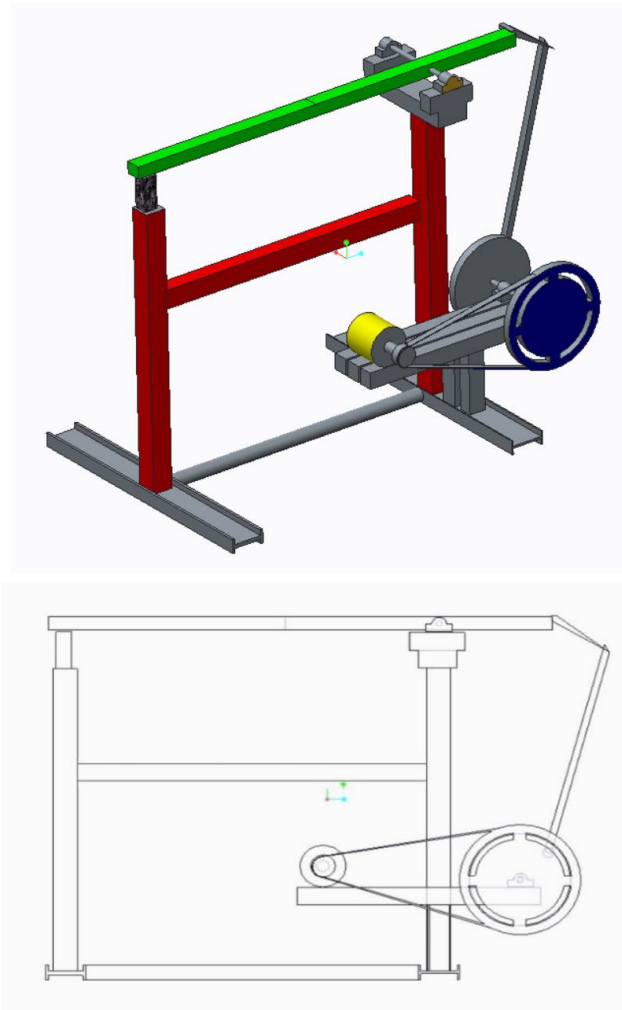


Figure 1: 2D & 3D view of Model.

IV. RESULTS AND DISCUSSION

CALCULATION OF IMPACT FORCE:-

Given:

$$N = 110 \text{ rpm} = 1.83 \text{ rps}$$

$$P = 373 \text{ watt}$$

$$m = 1.25 \text{ kg}$$

$$h = 400 \text{ mm}$$

$$g = 9.81$$

$$R = 1100 \text{ mm}$$

Solution:

Calculated Torque:

$$P = \frac{2\pi NT}{60}$$

$$T = \frac{P}{(2\pi N)}$$

$$= \frac{373}{(2\pi \times 1.3)}$$

$$T = 45.66 \text{ N.m}$$

$$T = 45.66 \times 10^{-3} \text{ N.mm}$$

Calculated Force:

$$T = F \times R$$

$$F = \frac{T}{R}$$

$$= \frac{45.665 \times 10^{-3}}{1100}$$

$$F = 41.51 \times 10^{-6} \text{ N}$$

$$mg = 1.25 \times 9.81$$

$$mg = 12.2625 \text{ N}$$

$$mgh = 1.25 \times 9.81 \times 400$$

$$mgh = 4.905 \times 10^3 \text{ N}$$

Calculated Total Impact Force

$$\text{Total Impact Force} = F + mg + mgh$$

$$= 41.51 \times 10^{-6} + 12.2625 + 4.905 \times 10^3$$

$$= 4.917 \times 10^3 \text{ N}$$

Calculations for different stroke lengths:

Sr. No.	Stroke Length (mm)	Impact Force (N)	Lead Time (Sec for 10 Strokes)
1	400	$4.91 \times 10^3 \text{ N}$	7.5
2	410	$5.08 \times 10^3 \text{ N}$	9.2
3	420	$5.20 \times 10^3 \text{ N}$	10.8

The Automatic Hammering machine was successfully fabricated and was tested.

The machine was used for removing the small bends on the rod and to bend the thin metal sheets

The Automatic Hammering reduce the time required for smithy works

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COST ESTIMATION

Sr. No.	Description	Expenditures	Details
1	Literature Survey	-	All papers were free to access
2	Consultation charges	-	Project Guide
3	Purchase of Consumables/ Standard parts	11050	Motor, Bearings, Shaft, Belt, Hammer, Turnbuckle, Pulley, Nuts and Bolts, M.S. Frame.
4	Hardware/Software	2000	3D Modelling
5	Fabrication Work	4000	Actual assembly of the parts of the project like frame, Hammer etc.
6	Testing/Experimentation	1000	Hammering Impact
7	Printing work	1300	Project synopsis and all project reports and Black book
8	miscellaneous	1000	Travelling and others consumer Products.
Total		Rs. 20350/-	

V. CONCLUSION

In this project hammering effect was generated by using beam engine mechanism. This type of hammering machine is identified to be cheaper than many other alternatives and model has less number of parts and their assembly would cost very less with all the components being available regularly and no model specific part are to be manufactured.

It is observed that the hammer is used in many different industries for different applications. We as being mechanical engineers should discover new ideas which will be helpful for the society.

The idea of making hammering machine came in to existence from roadside people who make knives, axes using a hot red metal and giving it shape but hammering which is manually operated As energy can never be not destroyed, we should create in it such way that it can be used in industry as well as for the roadside people who are working hard just to earn few rupees.

As being an engineer we are not just taught to design cars and other mechanical components but also to help the people in different ways by using our own idea which we can implement we are trying to implement this system for all people who requires in hammering effect.

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