Automatic Hacksaw Machine

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Abstract – This project is on the design and construction of an automatic hacksaw machine for cutting of wooden material to different size and length with the help of hacksaw. The objective of this project is to save manpower and time in cutting the material in order to achieve high productivity. When we switch on the button the electric direct current (DC) will pass to the invertor. Invertor will convert the direct current into alternating current. Alternating current (AC) is supplied to the motor and then the motor will reciprocate the hacksaw frame and material will be cut.

It is a cutting Machine with teeth on its blade used for cutting wood and metal material. The power to the hacksaw is provided by the invertor. Rotary motion of the shaft is converted into reciprocating motion of the hacksaw with the help of crank and connecting square plate. Work piece of desired length can be cut by feeding it to hacksaw by holding it into vice. The various component of the machine were designed and constructed. Test was carried out on the machine using different wood and metal.

Key Words: Automatic, productivity, Alternative Current, Direct Current, Wood, Metal, Square plate, Crank.

1.INTRODUCTION

A hacksaw is a handheld tool used to cut through wooden and metal material. Its cutting mechanism is provided by blades which feature sharp teeth along their outerage. In most cases, a hacksaw consist of a MS frame that resembles a downward facing. A handle of metal is typically affixed to one end of the frame. The frames end feature have adjustable pegs that can be tightened to secure a blade in place, and loosed to remove it. Hacksaw blades are long, thin strips of hardened steel that feature a row of teeth along their cutting edge. Each end of the blade is punched with a small hole that fits on to the saw frames pegs.

2. Body of Paper

In section 2.1 contain a description of problem statement. Section 2.2 contains objectives of project. Section 2.3 contains Solution. In Section 2.4 we showed scope of the project. In section 2.5 Methodology is showed. Section 2.6 contains description of literature Survey. 2.7 section contains design with description. Section 2.8 contains description of construction & working. Section 2.9 contains advantages and applications.

Section 2.1 Problem Statement

To reduce the efforts of labours and to increase efficiency of cutting the material by means of hacksaw blade this project will be very much friendly to operate. When we cut the object manually at that time the cut will not get properly it will goes incline. Manual process will not get accurate, proper finishing and continuity.

Section 2.2 Objectives

1. To cater to the issue of competition in mechanical industry the need for automation is assess by all the industry.
2. To identify the key policy avenues considered to be appropriate to meet the sustainable manufacturing.
3. To provide alternative for industries aiming towards reducing human effort and improvement in material handling system by implementing automation.
4. Sustainable and practical automation solutions for the future industrial environment.

Section 2.3 Solution

If you can get one that takes standard hacksaw blades then you'll have a tremendous range of blades to choose from and will be able to cut most anything. Hacksaws are more tolerant to tensioning Maladjustment and runoff. A major advantage of a

power hacksawing is the relatively low capital investment required.

Section 2.4 Scope

The machine can solve the problem of time consumption. Waste of resources in face of labour cost is reduced. The machine can be used in the industry where it is manufactured, at the production sector. It is used as hardware in large quantity like in fabrication of machine. It provide alternative for industries aiming toward reducing human effort. It generates sustainable and practical automation solutions

for the future industrial development. It will ramp up the speed of production when used in small scale industries. Dynamic analysis is one of the very important phase in design the systems. There is a much scope in development of an accurate mathematical model and simulation for the kinematics, dynamics, and motion analysis of the machine for the precise application. Future advancements and modifications can be done as per the requirements as well as scale of the use. Use different types of advanced process or method to modify the Automatic hacksaw machine.

Section 2.5 Methodology

There are proposed methodology of solving identify problems are as follows:

Analysis the various problems. Select the one.

Design the Automatic hacksaw machine.

Most Commonly used materials which are to be cut are: wood and metal.

To fabricate a simple and easy to use automatic hacksaw machine involving low cost of construction and easily cutting processes.

To reduce the efforts of labours and to increase efficiency of cutting the material by means of hacksaw blade this project will be very much friendly to operate.

The machine will be fabricated for all the sizes to cut the required material. The slider crank mechanism which is operated by motor and invertor is used to reciprocate the hacksaw blade.

Motor with 12V capacity.

Section 2.6 Literature Survey The problem of cutting-off material to size is common to practically every industry. Often, sawing is the first operation carried out on bar stock. Therefore, it is surprising that so little work has been done to understand the problems of those common operation . Many reasons have been given for this such as lack of interest, it is a routine operation and that there is no need to consider better methods. Often the Foreman will assign a new trainee to a sawing task, on the princi ple that it is easy to learn and difficult to foul up.

Further more cut off machines are frequently housed in stores away from the main production areas and the operation of the sawing machines appears to be simple. The fact remains that cutting off operations can account for a significant part of the cost per piece (Remmerswaa and Mathysen, 1961).

From the research papers of many researchers, we have found the following findings:

International Journal of Engeenering Science and Technology Letters Automatic Hacksaw by Mr. Naveen Virmani, Ravindra Gupta, Mukesh Verma, Sachin Kumar, Raj Kamal Singh, MD Afzal Alam Siddiqui.

The objective of this work is to automate the conventional power hacksaw machine in order to achieve high productivity of work piece than the power hacksaw machine using double hacksaw blade. The operator need not to measure the length to the workpiece that is to be cut. The machine feeds the work piece with the help of a shaft which is driven by DC motor. A DC motor is used to bring about the reciprocating motion required for cutting the workpieces.

Design and Fabrication of hacksaw machine using sliding crank mechanism by Pankaj Vidhate, Sagar Vyavhare, Sandip Wagh, Vaibhav Bajaj, Ratnadeep Angale, Nitesh Khatar. The objective of this work is to automate the conventional power hacksaw machine in order to achieve high productivity of workpieces than the power of hacksaw machine using single hacksaw blade.

The operator need not measure the length of the that is to be cut. khurmi R. S and Gupta J. K (2012) machine design. S Chand publication (page no 730). Kurmi R. Sand Gupta J.K (2012). Machine design, S. Chand publication (Page no 998).Kurvinen, E, Sopanen, & Mikkola, A (2015). Ball bearing model performance on various sized rotors with and

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Section 2.7 Design

Square plate:

It is used to give vertical height and it is attachment to rectangular hollow bar with the help of arc welding, it's dimensions is (4&6) inch. We have joined four square plates, and in between them we have a circular pipe which have joined by the nut bolts.

We selected 4 inch plate because to adjust the hacksaw blade. And we select another two of 6 inch because to balance the hacksaw blade if we keep the both end of same measurement than it will become imbalance and due to this hacksaw blade will nit be in control it will move any were.

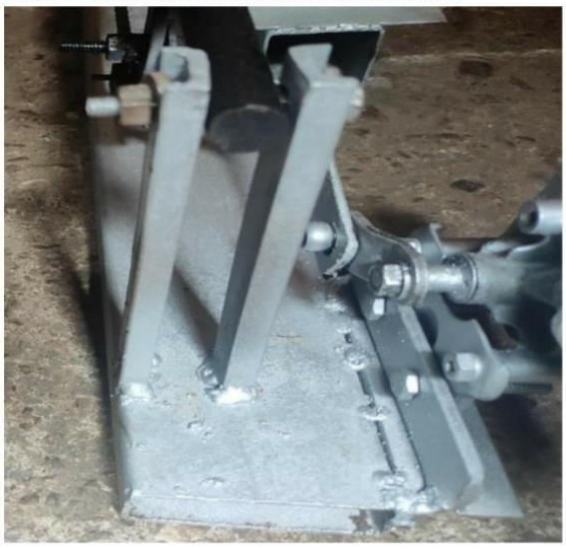


Fig 1. Square plate.

L Channel and Vice:

L channel means the two plates are joined in L shaped. Like this we have used to L channels to hold the cutting material.

It is mounted on small rectangular hollow bar. Total 4 channels are used in this project. Two are used in the vice to hold object. Another two is used to hold the motor.

We have not set the ready made vice we prepare it in our lab because if we attached that vice it will become heavy it will attachment that vice it will become heavy it will not suitable for us. So we prepared this vice with attachment of L channels.

Fig 2. L Channel.

Hacksaw:

We have used heavy hacksaw because it has strong tooth which can easily cut the material and also if we make welding it will ok with that weld. If in case we have used light weight hacksaw it will not adjust with welding so we selected this heavy type hacksaw. A hacksaw is a fine tooth saw with a blade under tension in a frame, used for cutting materials such as wood, metal. Handheld hacksaw consist of a metal frame with a handle and pins for attaching a narrow disposable blade. A screw or other mechanism is used to put the thin blade under tension.

A power hacksaw (or electric hacksaw) is a type of hacksaw that is powered by electric motor. Most power hacksaw are stationary machines but some portable models do exist stationary models usually have a mechanism to lift up the saw blade on the return stroke and some have a coolant pump to prevent the stop blade from overheating.

Fig 3. Hacksaw

Motor:

AC motor is an electric motor driven by an alternating current (AC). The reciprocating motion of the hacksaw blade, because of which the cutting process takes place, is produced with the help of an AC motor, which operates by a simple crank mechanism to convert rotary motion of crank into reciprocating motion of the hacksaw blade. It convert electrical energy into mechanical energy.

Fig 4. Motor

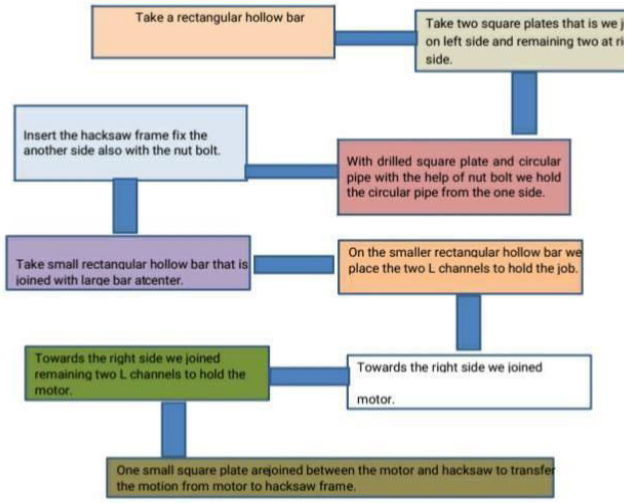
Invertors:

Invertors are used to convert the direct current (DC) into alternating current (AC). It takes the direct current from the electric board and convert it into the alternating current to the motor. It is of 12 volts and 3 AMP.

Fig 5. Invertor

Section 2.8 Working and Construction

When we switch on the button the electric direct current (DC) from the electric board will pass to the invertor. Invertor will convert the direct current into alternating current (AC). AC current is supplied to the motor then the motor will reciprocate the hacksaw frame and material will be cut. Rotary motion of the shaft is converted into reciprocating motion of the hacksaw with help of crank and connecting square plate. Work piece of desired length can be cut by feeding eat to hacksaw by holding it into vice.



Section 2.9 Advantages and Applications

Advantages:

Greater production over a given period. Less costly. More constant flow of production improvement in accuracy more affordable.

Applications:

Auto repairing shops, General repairing workshops, fitting shops, welding shops technical institutes.

Table 1. Cost Analysis

Element	Cost
Square plate	600
Rectangular	900
Rods	500
Motor	750
Invertor	600
Colour	200
Wire	120
Nut bolt	100
Total	3770

Table 2 for tabular information about experiment

Sr. No	Names of Members	Manual Readings	Machine Readings
1	Deepti Patil	13	10.05
2	Akanksha Shelake	18.08	13.08
3	Shraddha Kushire	20.05	16.02
4	Sakshi Shinde	14.07	09.02

Experimentation

As per mentioned below in conclusion our machine has high productivity for that we make one experiment that is :

We four members took four different sample material:

- Deepti had taken metal pipe.
- Akanksha had taken metal bar.
- Shraddha had taken wooden cube.
- Sakshi had taken wooden bar.
- Here we have calculated the time taken by human and time taken by machine.
- While manually cutting:
- Deepti had taken 13 minutes to cut the metal pipe.
- Akanksha had taken 18.08 minutes to cut the metal bar.
- Shraddha had taken 20.5 minutes to cut the wooden cube.
- Sakshi had taken 14.7 minutes to cut the wooden bar.
- While cutting on machine:
- Deepti has taken 10.5 minutes to cut the metal pipe.
- Akanksha has taken 13.8 minutes to cut the metal bar.
- Shraddha had taken 16.2 minutes to cut the wooden cube. Sakshi has taken 9.2 minutes to cut the wooden bar.

CONCLUSION

It is known that conventional hacksaw machine can be replaced with automatic power hacksaw machine. Automatic power hacksaw machine gives high productivity in short time period in comparison with the convectional hacksaw machines. The major advantage of this machine is that intervention of labour is reduced to maximum level. In this rapid emerging industrial era, the use of power hacksaw machine is wide. Time and labour plays a major role in production process this can be overcome by using this type automatic machines.