

Design and fabrication of four way hacksaw machine – A design thinking approach

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Abstract

This Paper presents the fabrication and concept of four way hacksaw blade machine mainly carried out for production-based industries. Industries are basically meant for production of useful goods and services at low production cost, machinery cost and low inventory cost. Today in this world every task has been made quicker and fast due to technology advancement but this advancement also demands huge investment and expenditure, every industry desire to make high productivity rate maintaining the quality and standard of the product at low average cost. We have developed a prototype model of a Hacksaw machine. This project consists of a crank and slider mechanism along with linear bushing. These machines can be used in remote places where electricity is regular. It is designed as a portable one which can be used for cutting in various places. It can be used for operating on materials like thin metals, wood. We include Design Thinking process from SNS college of technology to do this experiment. The stages of Design Thinkers are Empathize, Define, Ideate, Prototype & test, Evolve.

Keywords: *Fabrication and Concept, Hacksaw blade, Goods and Services, Technology, Crank and Slider Mechanism, Linear Bushing*

1. EMPATHIZE

By the Design Thinking process the word 'Empathize' means Understanding the challenge, Prepare research, Gather inspiration. On completing this stage, we have identified the existing problem in production industries and the foremost problem to rectify is low production cost without compromising quality.

1.1 INTRODUCTION

There are many business programs in which spherical bar or square bars are required to be operated on unique machines to make device additives such as Shafts, Bolts, Screws and many others. These desires increasingly range of pieces to be reduced for mass manufacturing of those components. 4-way hacksaw blade machine is basically a reducing tool, which cut in 4 guidelines at a same time [1]A hacksaw is a fine –toothed

noticed, originally and mainly for slicing metallic [2] They also can reduce diverse different materials, which include plastic, wood and metallic and many others. This paper proposes the prototype model of 4-manner hacksaw gadget that's capable of reduce four portions simultaneously without any jerk and minimum vibrations. The prototype model implies conversion of rotary movement into the reciprocating movement for correct working of hacksaw. This prototype version overcomes the restrictions of conventional hacksaw machines that can cut unmarried piece at a time. it is able to reduce steel bars of different materials at identical time and might be helpful in lots of industries due its compatibility, reliability and performance. In present condition many electrically operated powers hacksaw machines [3] of various groups with exceptional specs are to be had for the use in shop ground. those machines are so precious that they can cut steel bars with minimal time made up of different materials but they have got one and foremost downside that those are capable of cut unmarried piece of bar at a time. For industries to acquire the mass production, it's miles important to cut metal bars with high charge. So, it's miles not possible to depend upon traditional unmarried frame power hacksaw machines and want the development in generation and design of such machines. 4 manner hacksaw machines over comes all of the obstacles and downside of traditional hacksaw machines. it's also helpful for small scale industries due to its easy operating and working conditions together with its compatibility, performance and cheap rate.

TABLE.1. List of components with materials details

S.No.	COMPONENTS	MATERIAL DEALS
1	Frame Base	Mild steel
2	Electric Motor	Johnson motor (60 rpm)
3	Disc	Acrylic
4	Four Hacksaw Blade	Bi-metallic
5	Four Guide Ways	Mild steel
6	Connecting Rods	Mild steel
7	Bearings High	C-Cr steel

8	Bushing	Mild steel
9	Vice	Mild steel & wood
10	Battery	12v

2. IDEATE

Ideate means Generate ideas & Refine ideas. On this stage 'Review of literatures' & 'Scope and Methodology' are processed. The idea about how to fabricate the hack saw machine is framed in this stage

2.1 REVIEW OF LITERATURE

The sizeable review of literature will assist to recognize the principles, theorems and various factors affecting the overall performance of device.

2.2 DEFINE

By this Design thinking process 'DEFINE' means search for meaning, frame opportunities and customer survey based problem definition. On this stage 'Objective & Hypothesis of work is constructed. We defined our work to fabricate a hack saw machine which is low cost and suitable for medium scale industries

Theoretical Analysis Of Four Way Hacksaw Blade Machine By Rishi Anand, Khomesh, Shrawan Kumar, Alok Verma, April 2016 :-

In this paper offers the idea of four-way hacksaw blade gadget in particular accomplished for production based industries. Industries are essentially intended for manufacturing of beneficial goods and offerings at low production value, machinery cost and occasional inventory cost. know-how approximately evolved a model of a machine reach could be capable of acting distinctive operation simultaneously, and it must be economically green. these machines can be used in remote places wherein power is normal. it is designed as a portable one which can be used for slicing in various locations. it may be used for running on materials like skinny metals, timber.

Theoretical Analysis of Multi-way Power Hacksaw Machine Kshirsagar Prashant R, Rathod Nayan, Rahate Prashant P, Halaye Prashant P, April 2015 :-

In his studies paper stated that it consist of unmarried segment vertical electric powered motor rigidly placed on the center of metal foundation furnished. The shaft of motor rotates at ninety-100 rpm with the energy 2HP. The circular disc is mounted at the shaft of motor with the assist of key and key slot association.

Design & Fabrication of Human Powered MultiPurpose Machine Rakesh Ambade, Amit Sartabe, Meghraj Arekar, Vaibhav Khachane, Prajakta Gawali, April 2015:-

Their paper states that it consist the pedal powered device setup, has an easy mechanism perform with chain and sprocket arrangement. The chain is located on the enamel of the wheel and pinion. The shaft is hooked up on pedestal bearings. First mechanical linkage is eliminated via eliminating nut and bolts and v belt pressure drilling attachment.

Design and Fabrication of Automated Hacksaw Machine, D. V. Sabariananda, V. Siddhartha, B. Sushil Krishnana, T. Mohanraj, April 2014:

It's far recognised that traditional strength hacksaw device can be replaced with automated energy Hacksaw device. automatic strength hacksaw system gives excessive productivity in brief term in contrast with the traditional strength hacksaw machines. The foremost advantage of this gadget is intervention of labour is decreased to maximum degree. on this rapid rising industrial section, the usage of strength Hacksaw machine is extensive, time and labour performs a primary function in manufacturing process.

Material Selection and Testing of Hacksaw Blade Based on mechanical properties Nitinchandra R. Patel, Md. A. Vasanwala, Balkrushna B. Jani, Miteshkumar D. Rathwa, Ravi A. Thakkar, June 2013

In his studies paper "cloth selection and testing of hacksaw blade primarily based on mechanical houses" said that the appropriate noticed blade

must be decided on for better operation and excellent reducing by way of deciding on variety of enamel in line with inch. There are four kinds of blades primarily based on material namely high Carbon metallic, Alloy metal, Bi-metallic strip and high pace metallic blades. Out of those four the nice appropriate for slicing difficult substances like moderate metallic bar and Aluminium is Bi-metal blade on the premise of houses of substances, wear resistance and reducing performance.

3. PROTOTYPE & TEST

It means Make Prototype and Get Feedback. In this stage 'Tools used for implementation & Design calculation' are Processed. The complete experimental set up is completed along with validation of the machine in industry

3.1 WORKING PRINCIPLE

The experimental setup of our undertaking consists of a frame on which the hacksaw blades are mounted. The hacksaw blades are mounted on the 4 sides of the frame. The circular cam plate is established in the centre of the body which is operated by way of a motor. The power to the DC motor is given with the help of a battery. Connecting rods are used to attach the cam wheel and the hacksaw blades. The cam mechanism is used to convert the rotary movement into the reciprocating motion.

Therefore, when the motor is switched on, the electricity from the motor is added to the cam wheel. The cam wheel rotates such that the hack noticed blades reciprocate. The work portions are set up at the gadget vice firmly and the whole machine is switched on. for that reason, the 4 workpieces are cut simultaneously using the motor and the cam mechanism.

The primary objective of our project is to fabricate a motorized excessive pace four way hacksaw system. The goal of this work is to automate and to regulate the traditional strength hacksaw machine which will acquire high productiveness of labor-portions than the energy hacksaw machine using cam mechanism.

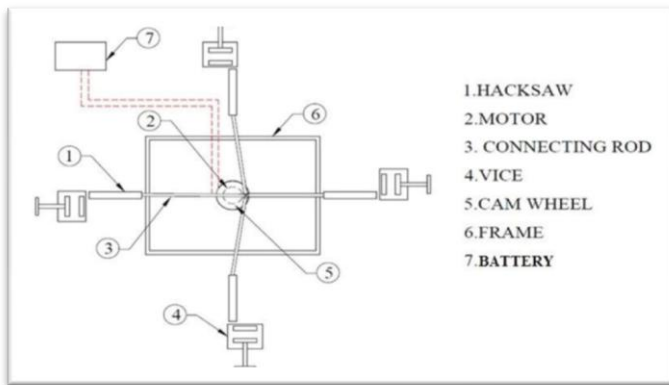


Fig.1. Layout of Four way hacksaw machine

The operator wants no longer measure the duration of the work-piece this is to be cut and to load and unload the paintings-piece from the vice every time after a chunk has been cut. This system is constructed with the 4 hacksaw machines such that all the machines are operated concurrently with the assist of a motor and a cam mechanism. The cam mechanism converts the rotary movement into the reciprocating movement. This idea is used to convert the rotary motion of the motor to the reciprocating motion of the hacksaw blades. all the bitter hacksaw blades are related with the cam mechanism in any such way that when the motor is switched on, all the blades obtain energy and reduce the materials in line with the requirement.

4. ADVANTAGES

- Simple in production.
- Smooth to fabricate.
- The components used for the fabrication of the are without difficulty to be had.
- Repairing and changing is not a tough task.
- Multiple work pieces can be cut simultaneously.
- The time taken for cutting operation is less.
- Increased productivity.

5. DISADVANTAGES

- More number of moving parts.
- Must be handled with care.
- The loading and unloading of the work pieces must be done manually.

6. APPLICATIONS

These types of motorized high speed four-way hack saw machines have a wide range of applications in

the fields like,

- In all industries.
- Small scale industries.
- All manufacturing plants.
- Highly suitable for production industries and workshops.

7. EVOLVE

Evolve means ‘Track learning and Move Forward’. On this basis Conclusion and future scope is processed.

Conclusions

A sturdy multidiscipline group with a terrific engineering base is important for the improvement and refinement of superior pc programming, editing techniques, diagnostic software program, algorithms for the dynamic exchange of informational special stages of hierarchy. This task painting has provided us an superb opportunity and enjoy, to apply our constrained expertise. We won a variety of practical understanding regarding, making plans, buying, assembling and machining even as doing these assignment paintings. We’re proud that we’ve finished the paintings with the restrained time efficaciously. The “FABRICATION OF four manner HACKSAW gadget” is working with nice situations. We’re able to understand the difficulties in maintaining the tolerances and also quality. we have achieved to our ability and ability making most use of available facilities. In conclusion comments of our mission paintings. as a result, we have advanced a “four-wayhack noticed gadget”. by way of the use of extra techniques, they can be changed and evolved in keeping with the packages.

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