

Four Way Hacksaw Machine-A Review

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ABSTRACT

*In this project work and effort has been made to develop a modernized four way hacksaw machine and less stress full operation for cutting wood, metal and plastic materials. The aim of this work is to develop a hacksaw machine that will use a less effort to produce uniform cutting of PVC pipes ,metals ,wood. It is also done to show the performance difference between hand driven, pedal drive and four way hacksaw machine. This model implies a conversion of rotary motion of crank to reciprocating motion of hacksaw blades, which is done by using **Scotch Yoke Mechanism**. This motion is used for hacksaw machine, in this model we can operate four hacksaws at same time. This model will overcome the traditional hacksaw machine which done material cutting of single piece at particular times interval and also fulfills the need of more material cutting accounts to mass production. This machine works significantly with minimum vibrations and jerks. This machine will also done cutting of different materials, hence the purposed model of hacksaw machines will be welcomed by many industries due to compactness and efficiency. To achieve this goal the four way hacksaw machine is developed.*

Keywords:- way Hacksaw Machine, Scotch Yoke Mechanism, Blades

1. Introduction:-

A Hacksaw is a fine tooth saw with a blade under tension in frame used for cutting material such as metal. The demand of hacksaw blade is considerably increasing day by day with the growth of industrialization, engineering sector, real estate, automobile sector etc. It is used in almost every sector for cutting of material like angles, channels, flat plate, rods and such other things, it is also required in auto repairing shop, general repairing workshops, fitting shops, welding shops and technical institutes. Hand held hacksaw consist of a metal frame with a handle and pin for attaching a narrow disposal blade, a screw or other mechanism is used to put the thin blade under tension. Hacksaw blade cutting is a conventional machining process which works on the principle of metal cutting, where harder material which is tooth of the blades cuts the relatively softer material as per need. A power hacksaw is a type of hacksaw that is powered by electric motor. Most power hacksaw are stationary machines but some portable model exist.

The blades which are generally used and complete all the aspects for cutting materials are as follow:-

- 1.High Carbon Steel
- 2.Low Alloy Steel
- 3.Bi-Metalic Steel
- 4.High Speed Steel

In present condition many electrically operated power hacksaw machines of different specifications are available for the use in shop floor. These machines are so precise that they can cut metal bars with minimum times made up of different materials. For industries to achieve the mass production, it is necessary to cut metals bars with high rate. So, it is impossible to depend upon conventional single frame power (electric) hacksaw machine and need the improvement in technology and design of such machines. With the help of this multi way power hacksaw machine the four metal bars can be cut simultaneously to get high cutting rate and to achieve mass production for maximum profit in related company. As the machine overcomes all limitations and drawbacks of conventional hacksaw machine, it is also helpful for small scale industries due to its simple working and operating conditions along with its compatibility, efficiency and affordable price

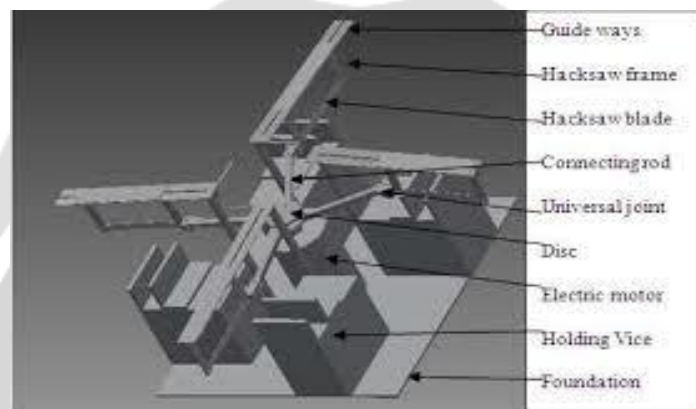


Fig 1.1:- Proposed CAD Model Of Four Way Hacksaw Machine

2. Project Ideation / Benefits of Study:-

In current industrial process, material cutting with single hacksaw blade is done in both pneumatic and electrically operated hacksaw machine. Industry focuses on the high production rate with less consumption of resources. To achieve this we need to minimize idle time per unit. This four way hacksaw machine those factor by reducing time per unit to increase the production. This work is design to overcome the stress attached to hand cutting of engineering material by turning it into less effort to produce uniform cutting.

2.1 Problem Definition:-

To done cutting of different materials with higher rating and improvement in accuracy, efficiency on account of minimization of machine idle time. As the machine overcomes all the limitations and drawbacks of conventional hacksaw machine, it is also helpful for small scale industries. It can operate in four different direction at same time, this model will be helpful in all kinds of limitation of traditional hacksaw machine.

2.2 Objective of Model:-

- (1) The main objective of this project is to reduce the human effort for machining various materials.
- (2) The basic principles of power driven hacksaw or four way hacksaw is **Scotch Yoke Mechanism**.
- (3) The objective of this project is to save man power and time in cutting materials in order to achieve high productivity.
- (4) By using scotch yoke Mechanism we can operate four hacksaw at same time.

2.3 Components:-

- Dual Scotch Yoke
- Hacksaw Frame
- DC Motor
- Hacksaw Blade
- Supporting Blocks
- Connecting Rods
- Material Holding Vice
- Guide Ways

3.Literature Review:-

The vast review of literature will help to understand the concepts, theorems and different factors affecting the performance of machine:-

3.1 Dharwa Chaitanya Kirtikumar:-

In this paper we study about the designed and developed a multipurpose machine which does not require electricity for several operations like cutting, grinding, etc. this is a human powered machine runs on chain drives mainly with human efforts. But if you wanted to operate this machine by electric power this machine can also does that. It has some special attachment so use both human power as well as electric power. The design is idle for use in the developing world because it doesn't require electricity and can be built using metal base, chain, pulley, rubber belt, foot pedal electric motor, chain socket.

3.2 R. Subash, K Samuel Jayakaran (2014) :-

In this paper author has designed pedal operated hacksaw machine which can be used for industrial applications and households needs in which no specific input energy or power is needed. This project consist of sprocket arrangement, crank and slider mechanism, and chain drive. In the mechanism, chain derive is directly connected to the hacksaw for the processing of cutting the wooden blocks. The objective of the paper is using the conventional mechanical process which plays a vital role. The main aim is to reduce the human effort for machining various materials such as wooden blocks, steel, PVC, etc.

3.3 Prof. Nitinchandra, R. Patel, Ravi Thakkar:-

In his paper “**Material Selection And Testing Of hacksaw Blade Based On Mechanical Properties**” stated that the appropriate saw blade must be selected for better operation and fine cutting by selecting number of teeth per inch. There are four blades based on materials namely listed below:-

- **High Carbon Steel**
- **Alloy Steel**
- **Bi-Metallic Strip**
- **High Speed Steel**

Out of this four best suitable for cutting hard materials like mild steel bar and aluminum is bi-metallic blade on the basis of properties of materials, wear resistance and cutting performance.

4. Methodology:-

- **Scotch Yoke Mechanism**
- **DC Motor**
- **Crank And Slider Mechanism**
- **Selection of Cutting Fluids**

4.1 Scotch Yoke Mechanism:-

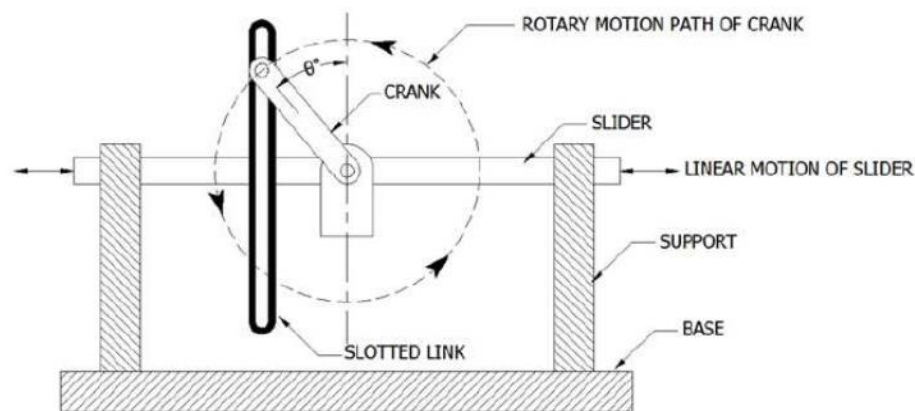
The **Scotch Yoke Mechanism** also known as slotted link mechanism is a reciprocating motion mechanism converting the linear motion of a slider into a rotational motion or vice versa. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating parts. The location of the piston versus time in a sine wave of constant amplitude, and constant frequency given a constant rotational speed. The scotch yoke is a mechanism for converting the rotational motion of crank in linear motion of slider. The reciprocating part is directly coupled to sliding yoke with a slot that engages a pin on the rotating part.

4.2 DC Motor:-

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motor have some internal mechanism, either mechanical or electrical. To periodically change the direction of current flow in part of the motor. Most types produces rotary motion, linear motor directly produces forces and motion in a straight line.

4.3 Crank And Slider Mechanism:-

A crank is an arm attached at right angles to a rotating shaft by which reciprocating motion is imparted to or received from the shaft. It is used to convert circular motion into reciprocating motion or vice versa. The slider crank mechanism is used to transform rotational motion into translational motion by means of rotating driving beam, a connecting rod and sliding body.



4.1 Fig:-Scotch Yoke Mechanism

4.4 Selection of Cutting Fluid:-

Different method have been reported to protect cutting tool from the generated heat during machining operations. Another alternative is to apply cutting fluids in machining operations. They are used to provide lubrication and cooling effects between cutting tool and work piece and chip during machining operation. Hence the influence of generated heat on cutting tool would be prevented.

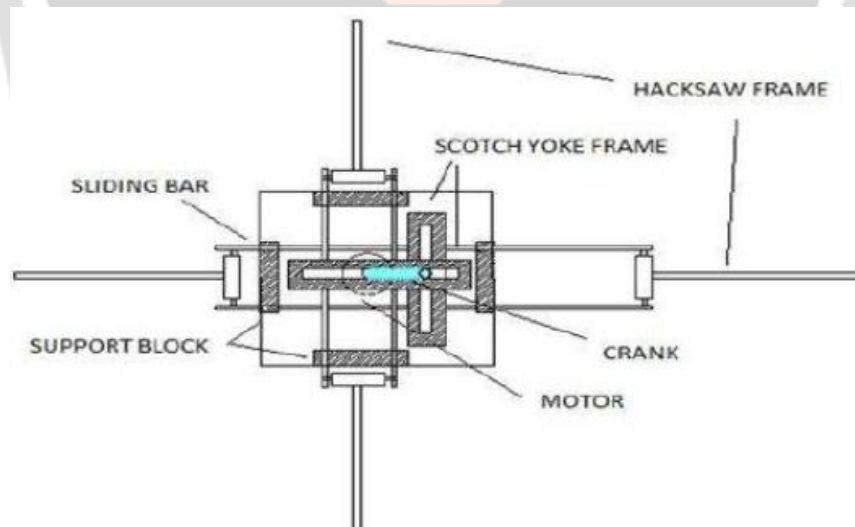
5.Result or Findings:-

As per the above discussion we conclude that to overcome problems in conventional hacksaw machine due to high efficiency, easy to operate. The proposed model of multi way hacksaw is helpful and complete all the expectations needed in the mini industries. As a result benefits would be achieved such as longer tool life, easy chip flow and higher machining quality in the machining process.

The selection of cutting fluid should be carefully carried out to obtain optimum result in machining process. Various factors are affecting the selection of cutting fluid type in machining operation such a type of work piece and the method of machining process.

6.Conclusion:-

On the above discussion we conclude that the purposed machine will aim in the limitations of single piece cutting of material at the instant of time by introducing four way cutting of material simultaneously. It is so compact that will be occupy less space, cost effective so usable in mini and large industries. As in cutting it take less time of cutting per unit of workpiece, so machine idle time is also reduced which also encounters on improved efficiency, reliability. It also works on minimizing vibrations and jerks produced during cutting operation



6.1 Fig:-Complete Elaboration Of Four Way Hacksaw Machine

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Biography



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