

## Four Way Hacksaw Machine

Yogesh B. Bhure<sup>1</sup> Vishal P. Hadge<sup>2</sup> Taisan K. Hatwar<sup>3</sup> Zikesh D. Madankar<sup>4</sup> Prof. Santosh P. Alone<sup>5</sup>

<sup>1,2,3,4</sup>Student <sup>5</sup>Assistant Professor

<sup>1,2,3,4,5</sup>Department of Electrical Engineering

<sup>1,2,3,4,5</sup>MPCE Bhilewada, Bhandara, India

**Abstract**— It is needed to machine the spherical or sq. rod on totally different completely different machines to form different machine elements like shaft, bolts and screws etc. for a production there's have to be compelled to cut the stuff into variety of items and this can be conventionally perform on an influence hack saw or easy hack saw machine which consume more time. To achieve this process within a less time the Four-way hack saw is developed. This project proposes the model of four means hacksaw machine that is in a position to chop four items (may be of same or totally different material) at the same time with a very less time consumption. The model using ac motor for its operation. Conversion of movement of ac motor into reciprocal motion is obtained by using eccentric cam. This model will perform a cutting operation on four totally dependableness and compatibility.

**Key words:** Hacksaw Machine, Motor, Blades

### I. INTRODUCTION

There square measure several electrically operated power metal saw machines completely different of various configurations and different manufacturers square measure out there for the utilization in workshop. These machines will cut rods of various material exactly at in no time rate however they will cut rods of one material at a time which suggests they can't in a position to cut dissimilar material at a same time. Now in business, it's necessary to chop metal bars with very high rate to attain production necessities. So there's got to move for a replacement technology which provides United States of America a production with less time and fewer energy input. It is not possible to rely on standard hacksaw machine.

By victimization this four means hacksaw machine the four metal bars, pipes or rods will be cut at the same time to realize high speed cutting rate and production for max profit in manufacturing industries. This machine overcomes the drawbacks and limitations of single frame metal saw machines. It will be utilized in alittle workshops and industries because it is obtainable in very low worth and its smaller size and high potency. The setup of four way hack saw machine is very simple, it operates with mechanism of eccentric cam disc arrangement. Disc is rotate with AC motor, move of wheel is regenerate into the mutual motion of the cutlery (hacksaw). This reciprocating motion is used to obtain the linear motion of blades and material is cut. The size and shape of this setup is small. Bed is provided for placing the workpiece to be cut. Length of crank and connecting rod is selected using trial and error method. Motion of hack saw is guided by guiding rods placed over the hack saw frame. The vertically downward motion is occurred due to self-weight of frame, so it can be called as gravity feed hack saw.

### II. LITERATURE REVIEW

Cakir, et. al. (2007) explained in his research paper in a machining operation high temperature in a cutting tool results due to friction between workpiece and cutting tool and cutting tool chip interface. There area unit some effects of this generated heat that area unit higher surface roughness, shorter tool life and lower the dimensional sensitiveness of the work material. This result is more important when there is need to machining harder material which are difficult to cut due to high heat production. There are different methods of protecting cutting tool from heat generation during machining operation. One of the alternative is to select the coated which is expensive an only suitable for machining of material like heat resistance alloy, titanium alloy etc. apply the cutting fluid on tool and workpiece while machining is another approach, which can provide cooling effects and lubrication between cutting tool and work piece and chip during machining operation. Hence effect of generated heat on cutting tool and work piece can be elminatad fully or partially. Use of cutting fluid gives advantages like easy chip flow, longer tool life and highest machining quality in machining process. It is required to select the cutting fluid by considering various parameters so that to get optimum result in machining process. The parameters to be considered are as cutting tool material, workpiece material and method of machining process.

Nitinchandra R. Patel, et al. (2013) explained in his research paper "Material selection and testing of hacksaw blade based on mechanical properties" stated that to obtain better operation, appropriate blade must be selected. To obtain fine cutting choice of teeth per inches of blade is very important. There are four types of blades in the market which are based on the material namely Alloy steel blade, high speed steel blade, high carbon steel blade and alloy steel blade. The best suitable blade out of these four is bimetallic blade on the basis of wear resistance cutting performance and properties of material.

Sreejith K., et.al. (2014) explained the target of this paper was to fabricate, style and by experimentation investigate the operating of Pedal Driven hacksaw (PDH) .a slider crank mechanism is employed PDH for its operating. The experiment on plywood material and PDH was performed. The main parts of PDH were sprocket chain drive, flywheel, reciprocating rod welded to pedal of bicycle and hacksaw. The hacksaw and reciprocating rods were connected together. The reciprocating rods and hacksaw moves to and fro as operator pedals the bicycle. The material to be cut (plywood) is to be placed below hacksaw and plywood cuts without external energy supply like electricity and burning fuel. Since by avoiding electric supply it becomes cheap and best. The results indicate that PDH gives accurate faster and better cuts as compare with hand hack saw

at different cutting speed. Use of PDH reduces the effort of operator for cutting plywood to a great extent.

Vivek Kumar Chauhan (2015) explained project work an effort had been made to develop and design model of Pedal Powered Hacksaw. The pedal powered hack can be used for cutting plastic, metal and wood. The inversion of fur bar chain mechanism which is slider crank mechanism is used as a main part of a PDH. In this mechanism the connecting rod and hacksaw are connected together to obtain the cutting of wooden blocks. When pedal is powered the hack saw moves to and fro. Use of PDH reduces the effort of operator for cutting plywood to a great extent. [6]

K. Prashant, et al. (2015) explained in their paper that, there are many electrically operated power hacksaw machines of different configurations and different manufacturers are available for the use in machine shop. These machines will cut rods of various material exactly at in no time rate however they'll cut rods of one material at a time which suggests they can't in a position to cut dissimilar material at a same time. Now in trade, It is necessary to cut metal bars with very high rate to achieve mass production requirements. So there's have to be compelled to move for a brand new technology which provides United States of America a production with less time and fewer energy input. It is impossible to depend upon conventional hacksaw machine. This study gives guidelines about selection of material for our model in present situation the hydraulically and electrically operated hack saw machines are available but these are require more input as compared to output i.e. it does not gives satisfactory output. Also it can be able to cut only one component at a time a machine cuts four rods at a time gives improved productivity. As PDH uses a slider crank mechanism but we are going to use eccentric cam for obtain reciprocating motion. [7]

H G Chothani, et al. (2015) explained, in Mechanical Workshop/Technical institute, designer always faces the difficulties to select the perfect hack saw blade material for use of trainee as well as students to avoid accidents and reduce failure rates of blade. There are number of methods are available for selection of best suited material for design. Out of two or more material on basis of selection parameters like speed, feed and workpiece material. Finally, paper stated that bimetallic material for blade is most suitable. In this paper Preference Ranking strategies for Evaluations and analytic hierarchy method technique area unit applied to rank out the fabric of hacksaw blade among of five materials. [8]

### III. METHODOLOGY

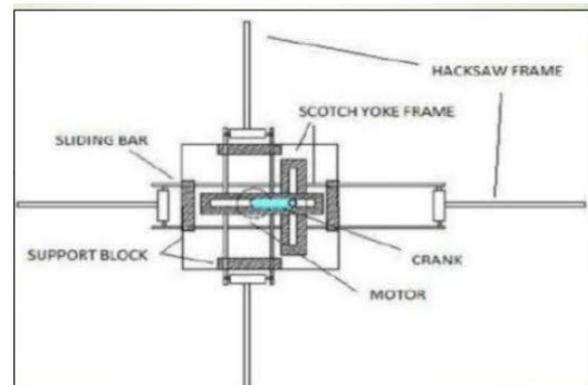


Fig. 1: General diagram of four way hacksaw machine

### IV. WORKING

This project consisting a single phase vertical electric motor rigidly place at the center of metallic foundation. The shaft of motor will rotates with the electric power. The circular disc will be mounting on the shaft of motor with the help of key and key slot arrangement. The eccentric point on the plane of disc will drilled such that the desired cutting stroke will achieved. One end of each connecting rod will pivoted at this eccentric point by the use of suitable bearing. Another end of each rod will be connect to the hacksaw blade fame with the help of universal joint to get vertical and horizontal Degree of Freedom of rotation for the proper cutting operation. The hacksaw frame will slides on the guide ways.

When motor will ON and disc will start rotating, due to the reciprocating motion of hacksaw frame the metal rod will cut which will fix in vise.

### V. HARDWARE DESCRIPTION

#### A. Motor:

Motor is an A.C motor –Single Phase  
Power – 1Hp  
Speed – 1440 RPM  
Pole- 4

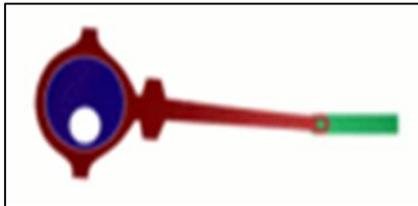


#### B. Eccentric Cam:

In technology, associate eccentric could be a circular disk (eccentric sheave) solidly fastened to a rotating shaft with its center offset from that of the shaft (hence the word "eccentric", out of the centre).

It is most frequently utilized in steam engines and accustomed convert rotary into linear reciprocatory motion so

as to drive a slippy valve or a pump ram. In order {to do} to try to to try associated do} therefore an eccentric sometimes features a groove at its circumference around that is closely fitted a circular collar (eccentric strap) connected to that aneccentric rod is suspended in such some way that its alternative finish will impart the desired reciprocatory motion. A come back crank fulfils an equivalent perform except that it will solely work on the tip of associate shaft or on the surface of a wheel whereas associate eccentric can also be fitted to the body of the shaft between the wheels. Unlike a cam, that conjointly converts rotary into linear motion at nearly any rate of acceleration and fastness, associate eccentric or come back crank will solely impart easy periodic motion.



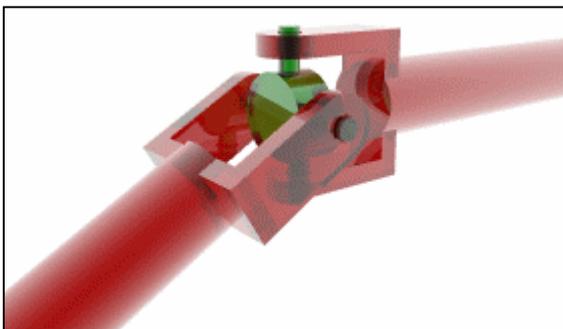
#### C. Hacksaw Blade:

A hacksaw may be a fine-tooth saw, originally and primarily for cutting metal. They can conjointly cut varied different materials, like plastic and wood; for instance, plumbers and electricians typically cut plastic pipe and plastic passage with them. There are hand saw versions and battery-powered versions (power hacksaws). Most hacksaws are hand saws with a C-shaped frame that holds a blade beneath tension. Such hacksaws have a handle, sometimes a gunstock, with pins for attaching a slim disposable blade. The frames may additionally be adjustable to accommodate blades of various sizes.



#### D. Universal Joint:

A universal joint, (universal coupling, U-joint, Cardan joint, Spicer or Hardy Spicer joint, or Hooke's joint) is a joint or coupling in a rigid rod that allows the rod to 'bend' in any direction, and is often employed in shafts that transmit rotation. It consists of a combine of hinges settled approximate, orientated at 90° to every different, connected by a cross shaft. The universal joint is not a constant-velocity joint.



#### E. Connecting Rod:

Connecting rods can also convert rotating motion into mutual motion. Historically, before the event of engines, they were initial employed in this manner. [1]

As a rod is rigid, could it's going to it should} transmit either a push or a pull and then the rod may rotate the crank through each halves of a revolution, i.e. piston pushing and piston pulling. Earlier mechanisms, such as chains, could only pull. In a few two-stroke engines the rod is barely needed to push. [2]

Today, connecting rods square measure best illustrious through their use in combustion piston engines, like automotive engines. These square measure of a clearly completely different style from earlier styles of connecting rods, employed in steam engines and steam locomotives.

#### F. Material Holding Vice:

A bench vise or vice may be a mechanical equipment accustomed secure associate object to permit work to be performed on that. Vises have two parallel jaws, one fastened and therefore the alternative movable, rib in and out by a screw and lever.



### VI. ADVANTAGES

- 1) This machine cutting the four pieces of the jobs at a time
- 2) The production time of this machine is increased by four times
- 3) The fabrication cost of this machine is less
- 4) Maintenance cost is very less
- 5) This machine cut the different –different material at a time

### VII. FUTURE SCOPE

From above discussion we conclude that model of four way hack saw is helpful to overcome the problems of conventional hack saw with high efficiency it's easy to operate and simple in construction. By increasing the motor power and dimensions of eccentric cam the scale of fabric to be cut are often exaggerated. By exploitation limit switches or sensors Automatic feeding mechanism for material are often introduced. Automatic lifting up mechanism for frame once cutting operation are often by exploitation hydraulic piston and cylinder.

REFERENCES

- [1] O. Cakir, A. Yardimen, T. Ozben, "Selection of cutting fluids in machining processes", *Journal of Achievements in Materials and Manufacturing Engineering*, volume 25, Issue 2, December 2007.
- [2] Prof. Nitinchandra R. Patel, Mohammad A. Vasanwala, Balkrushna B. Jani, Ravi Thakkar, Miteshkumar D. Rathwa, "Material selection and testing of hacksaw blade based on mechanical properties", *International Journal of Innovative Research in Science, Engineering and Technology*, ISSN: 2319-8753, volume 2, Issue 6, June 2013.
- [3] D.V. Sabarinanda, V. Siddhartha, B. Sushil Krishnana, T. Mohanraj, "Design and Fabrication of Automated Hacksaw Machine", *International Journal of Innovative Research in Science, Engineering and Technology*, ISSN (Online): 2319-8753, volume 3, April 2014.
- [4] Sreejith K., Aravind K., Danie Davis, Farish K.A., George Johnson, "Experimental Investigation of Pedal Driven Hacksaw", *International Journal of Engineering and Science* Vol.4, Issue 7 (July 2014), PP 01-05
- [5] R. Subhash, C.M. Meenakshi, K. Samuel Jayakaran, C. Venkateswaran, R. Sasidharan, "Fabrication pedal powered hacksaw using dual chain drive", *International Journal of Engineering and Technology*, ISSN: 220-223, volume 3, Issue 2, 2014.
- [6] Vivek Kumar Chauhan, Faheem khan, Chandresh Kumar Joshi, "Design and Development of Pedal Powered Hacksaw", *International Journal of Emerging Trends in Engineering and Development* Issue 5, Vol. 3 (April-May. 2015)
- [7] Prof. K. Prashant R, Rathod Nayan, Rahate Prashant, Halaye Prashant, "Theoretical Analysis of Multi-Way Power Hacksaw Machine", *International Journal of Research in Advent Technology*, Vol.3, No.4, April 2015 E-ISSN: 2321-9637
- [8] H G Chothani, B B Kuchhadiya, J R Solanki, "Selection of Material for Hacksaw Blade using AHP-PROMETHEE Approach", *International Journal of Innovative Research in Advanced Engineering (IJIRAE)* ISSN: 2349-2163 Volume 2 Issue 1 (January 2015)