A Review on Hacksaw

Ashwini Kumar, Assistant Professor

School of Engineering & IT,

Arka Jain University, Jamshedpur, Jharkhand, India

ABSTRACT: ***Material cutting is a key machining parameter for the creation of various manufactured models such as shafts, bolts, and screws. The material should be cut in various ways or habits simultaneously for mass assembling, and this should be finished utilizing a power hack saw or different ways hack saw machine, which takes less time. This article proposes plan contemplations and advancement of a four-way hacksaw machine that can cut four bits of the equivalent or different material simultaneously while consuming next to no time. The engine fills in as a generator of power. The unconventional cam is utilized to change over the rotational movement of the engine shaft into responding movement. As a result of its effectiveness, trustworthiness, and similarity, this machine can execute cutting procedure on four separate parts in four distinct ways on various materials simultaneously, making it exceptionally significant in industry. This machine outflanks exemplary hack saw machines, what cut a solitary work piece at a set time stretch and doesn't meet the present large scale manufacturing needs.***

KEYWORDS: ***Cutting Material, Hacksaw, Reciprocating Motion, Rotary Motion, Scotch Yoke Mechanism.***

1. INTRODUCTION

Since the industrial revolution[1], mass manufacturing has been a top priority for every manufacturer. Small-scale enterprises saw a significant increase in production as a result of this development[2]. These small-scale businesses used traditional manufacturing techniques. However, the situation has entirely altered today. It has been discovered that traditional techniques consume the most energy, take the longest time, and result in lower output production. These industries have adopted technologically driven approaches in light of these issues. A Hacksaw Machine is one of the greatest instances of how traditional techniques have been superseded. Using a single Hacksaw was a traditional approach that not only consumed all of the energy but also strained the user's hands. This Hacksaw Machine[3] is based on the power hacksaw idea and is powered by a D.C motor[4]. The word "Hacksaw" refers to the placement of several hacksaws in different directions. As a result, more than one task is eliminated at a time, boosting efficiency. Converting rotational motion to reciprocating motion[5] is the mechanical principle employed. This can be accomplished by the use of a slider-crank mechanism, pedal operation, and other methods. This is the most popular slider crank mechanism[6]. Because mild steel is easily accessible at a reasonable cost, it was chosen for the hacksaw and basic frame construction, linkages. The motor is utilized to achieve the necessary speed. The cutting speed may be adjusted depending on the kind of task (for example, wood, PVC pipes, etc.). Small-scale companies, factories, and workshops can benefit from such devices to boost output. This hacksaw machine has broken through all of the boundaries that a single traditional hacksaw machine had erected.

2. DISCUSSION

2.1 Definition:

We give an assortment of hacksaw machines for metal cutting, going from little convenient models to enormous modern machines [7]. These hacksaw machines work precipitously for helping the specialist in continually completing his undertaking with most extreme capability because of their smooth and speedy working characteristics. A sewing machine is a machine instrument that is utilized to slice texture to a particular length or shape [8]. It works by drawing a sharp edge through the work piece with cutting teeth. Sewing machines are quicker and more straightforward to work than hand saws, and they are for the most part used to make a definite square or mitered cut on the work piece.

2.2 Scotch Yoke Mechanism:

A Scotch yoke[9] is a device that converts a slider's linear motion into rotating motion or vice versa. A sliding burden with an opening contacts a pin on the pivoting part is straightforwardly associated with the cylinder or other responding part. Given a consistent rotational speed, the type of the cylinder's movement is an unadulterated sine wave over the long run [10]. The Scotch burden (otherwise called the opened connection instrument) is a responding movement component that changes over a slider's straight movement into pivoting

movement or the other way around. A sliding burden with an opening contacts a pin on the pivoting part is straightforwardly associated with the cylinder or other responding part [11]. Given a consistent pivoting speed, the place of the cylinder versus time is a sine wave of steady plentifulness and recurrence. Machines are mechanical gadgets that are utilized to perform undertakings.

A machine's instrument is its pulsating heart. The piece of the machine moves movement and powers from a power source to a result [12]. An instrument is a bunch of solid parts (linkages) that are organized and associated with a particular goal in mind to move movement. This arrangement is most frequently found in high-pressure oil and gas pipeline control valve actuators [13]. Scotch burdens might be utilized by crude shapers, notwithstanding the way that they are at this point not a well-known metalworking machine. Pretty much all of them has a Whitworth linkage, which takes into consideration a slower forward cutting stroke and a speedier return. It's been used in an assortment of gas powered motors, including the Bourke and SYTech motors, as well as various hot air and steam motors. At the point when the opening in the burden is not exactly the distance across of the circle shaped by the wrench pin, the name scotch burden is as yet utilized. Scotch burdens, for instance, might be utilized on a train's side poles to permit vertical versatility of middle of the road drive axles displayed in Figure 1.

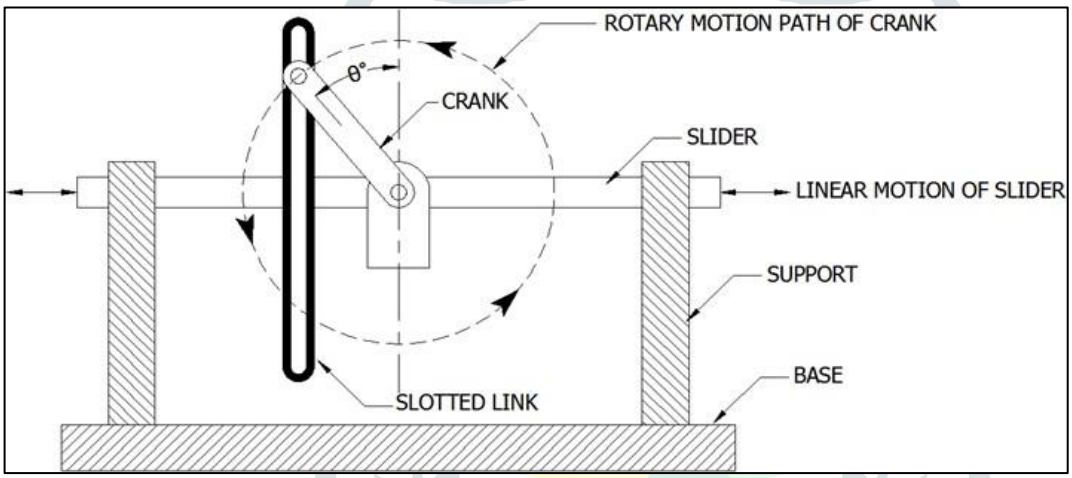

Figure 1: Scotch Yoke Mechanism.

2.3 Hacksaw Machine:

2.3.1 Kinds of Hacksaw Machine:

- Light duty hacksaw machine.
- Circular band hacksaw machine.
- Horizontal swing type band saw machine.
- Hydraulic hacksaw machine.
- Jigsaw machine.
- Universal type circular hacksaw machine.
- Power hacksaw machine.
- Band hacksaw machine.

2.4 Working principles of hacksaw machine:

A hacksaw machine operates on the SCOTCH YOKE MECHANISM, which converts the rotational motion of the shaft into the reciprocating motion of the hacksaw frame. The hacksaw machine operates on a fairly basic premise [14]. First, the hacksaw machine is placed on the ground, and any metal, wood, or pvc that has to be cut is clamped to a vice at the desired length, following which the electric motor is connected to the power source. Start the electric motor, which will cause the shaft of the motor and the hollow disc to revolve, as well as the eccentric centre and the link that connects to it [15]. The hacksaw frame reciprocates on the metal due to the rotation of the links, and the metal is sliced.

2.5 Construction:

Iron bars are used to build the scotch yoke mechanism. The crank is constructed of a certain length of material, and the yoke is likewise composed of the same material. It should be emphasised that the yoke should be at least twice as long as the crank. A pin connects the crank with the yoke. Both sides of the yoke are riveted with iron bars.

2.5.1 Assembly of Hacksaw Machine:

To assemble the hacksaw machine, first mount the electric motor vertically on the base plate. Then, on the shaft, fit a hollow disc with an internal circle radius equal to the radius of the motor's shaft. The disc also has an eccentric centre, which is welded with a metal bar. The links have one end that connects to the hacksaw frame's end and the other end that connects to the eccentric center's metal bar. The buckle type parts connect at the hacksaw frame's end, and the link connects in this buckle, while the pipe supports the hacksaw frame and connects to the base. Vice is also mounted on a pipe that connects to the base.

2.6. Design Constraints:

The fundamental plan process comprises of different plan boundaries like utilization of logical standards, specialized data and creative mind for advancement of new or ad libbed machine with most extreme economy and effectiveness. Consequently it is important to embrace cautious and safe plan approach. The whole plan of machine comprise of two sections

- System plan
- Mechanical Design.

Framework configuration for the most part center around different actual limitations and ergonomics like space prerequisites, game plans of different parts on fundamental casing of machine, man machine communications, number of controls and its positions, wellbeing measures, simplicity of support, scope for development, complete load of machine and some more.

A. System Collection Based on Physical Constraints:

It is necessary to determine whether a machine will be placed and operated in a small or large scale enterprise before making a purchase. Because this machine is intended for small-scale production, space is a considerable restriction. The system must be small enough to be positioned in a room corner and operate easily. For the system design, there are direct norms in mechanical design. As a result, the most important task is to keep track of the numerous physical factors so that the numbers of distinctions got after mechanical design may be accurately predicted.

B. Course of action of Various Components:

The various pieces of the machine should be put out with the goal that they may be easily disposed of or redesignd. Each part should be recognizable to the machine executive, and none should be concealed. As a result of the space prerequisite, each available district is utilized while coordinating parts.

C. Parts of System:

Parts of framework ought to be conservative enough with the goal that it very well may be effortlessly collected and set inside the machine. Every one of the moving pieces of machine ought to be all around shut and conservative.

D. Tallness of Machine from Ground:

Tallness of the machine is vital plan thought for simple working and solace of administrator. The tallness of the machine ought to be appropriately settled with the goal that administrator may not get worn out during activity. The machine ought to be marginally higher than the midsection level of administrator and furthermore appropriate freedom ought to be given from ground level to cleaning inspiration.

E.Weight of Machine:

High weighted machine isn't attractive as a result of transportation and breakdown issues. The whole weight of machine relies upon determination of material for parts and its aspects. So it is vital to choose parts of lighter material accessible according to plan determination.

2.7 Mechanical Design:

Mechanical plan is vital stage according to configuration perspective, Designer ought to have the option to distinguish the different outside and interior powers following up on machine partsIt is expected to appraise these powers precisely by utilizing appropriate plan conditions. Determination of component of wellbeing is vital stage in plan of working components of machine components. The necessary rectification in hypothetical pressure esteems should be made relying on sort of burdens, state of parts, and administration prerequisites. Determination of different materials for machine ought to be made by the state of stacking, states of items, climate conditions and advantageous properties of material.

3. CONCLUSION

In the above conversation we presume that the purposed machine will point in the restrictions of single piece cutting of material at the moment of time by presenting four different ways cutting of material all the while. It is conservative to such an extent that will be consume less space, financially savvy so usable in miniand enormous enterprises. As in cutting it require less investment of cutting per unit of work piece, so machine inactive time is additionally diminished which likewise experiences on superior effectiveness, unwavering quality. It additionally chips away at limiting vibrations and jerks delivered during cutting activity

By expanding the engine power and aspects of unconventional cam the size of material to be cut can be expanded. By involving limit switches or sensors automatic taking care of instrument for material can be presented. Programmed lifting up instrument for outline while cutting activity can be by utilizing pressure driven cylinder and chamber.

REFERENCE:

[1] G. Clark, “The Industrial Revolution,” in *Handbook of Economic Growth*, 2014. doi: 10.1016/B978-0-444-53538-2.00005-8.

[2] B. Squire, S. Brown, J. Readman, and J. Bessant, “The impact of mass customisation on manufacturing trade-offs,” *Production and Operations Management*. 2006. doi: 10.1111/j.1937-5956.2006.tb00032.x.

[3] S. Krishna, D. V Sabariananda, V. Siddhartha, B. Sushil Krishnana, and T. Mohanraj, “Design and Fabrication of Automated Hacksaw Machine,” *Int. J. Innov. Res. Sci. Eng. Technol. An ISO*, 2007.

[4] Anthoinete P.Y.Waroh, “Analysis and Simulation of Dc Motor Control System,” *J. Ilm. Sains*, 2014.

[5] E. Pedullà, N. M. Grande, G. Plotino, G. Gambarini, and E. Rapisarda, “Influence of continuous or reciprocating motion on cyclic fatigue resistance of 4 different nickel-titanium rotary instruments,” *J. Endod.*, 2013, doi: 10.1016/j.joen.2012.10.025.

[6] I. Khemili and L. Romdhane, “Dynamic analysis of a flexible slider-crank mechanism with clearance,” *Eur. J. Mech. A/Solids*, 2008, doi: 10.1016/j.euromechsol.2007.12.004.

[7] R. Vaddi, S. Dasgupta, and R. P. Agarwal, “Robustness comparison of DG FinFETs with symmetric, asymmetric, tied and independent gate options with circuit co-design for ultra low power subthreshold logic,” *Microelectronics J.*, 2010, doi: 10.1016/j.mejo.2010.02.003.

[8] J. Kaur, A. Kumar, D. V. Rai, and S. K. Tripathi, “Electrical study of ultra high molecular weight polyethylene/multi wall carbon nanotubes (UHMWPE/MWCNT) nanocomposite,” 2011. doi: 10.1063/1.3653706.

[9] V. Arakelian, J.-P. Le Baron, and M. Mkrtchyan, “Design of Scotch yoke mechanisms with improved driving dynamics,” *Proc. Inst. Mech. Eng. Part K J. Multi-body Dyn.*, 2016, doi: 10.1177/1464419315614431.

[10] A. Gupta, P. Singh, N. Trivedi, K. K. Jha, S. Kumar, and B. Singh, “A review on pharmacognostical and pharmacological activities of plant nicandra physalodes,” *Pharma Res.*, 2014.

[11] R. Khatoon, N. Jahan, S. Ahmad, and A. Shahzad, “In vitro evaluation of antifungal activity of aerial parts of medicinal plants Balanites aegyptiaca Del. and Spilanthes acmella Murr.,” *J. Appl. Pharm. Sci.*, 2014, doi: 10.7324/JAPS.2014.40121.

[12] N. Jahan, R. Khatoon, S. Ahmad, and A. Shahzad, “Evaluation of antibacterial potential of medicinal plant Spilanthes acmella Murr. And its in vitro raised callus against resistant organisms especially those harbouring bla genes,” *J. Appl. Pharm. Sci.*, 2013, doi: 10.7324/JAPS.2013.31021.

[13] Pryianka, S. Partap, M. Verma, and K. K. Jha, “In vitro antioxidant activity of plant extract of Cressa Cretica,” *Der Pharm. Lett.*, 2015.

[14] H. Sharma, G. Y. Yunus, R. Agrawal, M. Kalra, S. Verma, and S. Bhattar, “Antifungal efficacy of three medicinal plants Glycyrrhiza glabra, Ficus religiosa, and Plantago major against oral Candida albicans: A comparative analysis,” *Indian J. Dent. Res.*, 2016, doi: 10.4103/0970-9290.191895.

[15] N. Jahan, R. Khatoon, and S. Ahmad, “In vitro evaluation of antibacterial potential of Stevia rebaudiana Bertoni against various bacterial pathogens including resistant isolates with bla genes,” *Med. Plants*, 2014, doi: 10.5958/0975-6892.2014.00479.1.