International Journal of Recent Engineering Research and Development (IJRERD)
ISSN: 2455-8761
www.ijrerd.com || Volume 02 – Issue 09 || September 2017 || PP. 24-28

Fabrication of Two Way Hacksaw Cutting Machine

Mani Mohan[1], Sakthivel Maruthupandiyan[2], Muthu Sathish[3], Muthaiyan Ravikumar [4]

[1*] *UG Student, Bannariamman Institute of Technology, Sathyamangalam, Erode 638401 India*
[2] *UG Student, Bannariamman Institute of Technology, Sathyamangalam, Erode 638401 India*
[3] *UG Student, Bannariamman Institute of Technology, Sathyamangalam, Erode 638401 India*
[4] *Professor, Bannariamman Institute of Technology, Sathyamangalam, Erode 638401 India*

Abstract: These instructions provide you guidelines for preparing papers for International Journal of Recent Engineering This paper presents the fabrication and concept of two way hacksaw cutting 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. This project consists of a crank and slider mechanism, linear bushing .Today in this world every task have been made quicker and fast due to technology advancement but this advancement also demands huge investment and expenditure, every industry desires to make high productivity rate maintaining the quality and standard of the product at low average cost. We have developed a prototype model, we have decided to use almost 1/10 th of the scale for the system. 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.

Keywords: Crank and Slider Mechanism, prototype model, Hacksaw Machine, Pipe cutting

1. Introduction

There are many industrial applications where round bar or square bars are required to be operated on different machines to make machine components such as Shafts, Bolts, Screws etc. This needs more and more number of pieces to be cut for mass production of those components. two way hacksaw cutting machine is basically a cutting device, which cut in two directions at a same time [1].A hacksaw is a fine –toothed saw, originally and principally for cutting metal[2] . They can also cut various other materials, such as plastic, wood and steel etc. This paper proposes the prototype model of two-way hacksaw machine which is able to cut two pieces simultaneously without any jerk and minimum vibrations. The prototype model implies conversion of rotary motion into the reciprocating motion for proper working of hacksaw. This prototype model overcomes the limitations of conventional hacksaw machines which can cut single piece at a time. It is able to cut metal bars of different materials at same time and will be helpful in many industries due its compatibility, reliability and efficiency. In present condition many electrically operated power hacksaw machines [3] of different companies with different specifications are available for the use in shop floor. These machines are so precious that they can cut metal bars with minimum time made up of different materials but they have one and major disadvantage that those are able to cut single piece of bar at a time. For industries to achieve the mass production, it is necessary to cut metal bars with high rate. So, it is impossible to depend upon conventional single frame power hacksaw machines and need the improvement in technology and design of such machines. two way hacksaw machines over comes all the limitations and drawback of conventional hacksaw machines. It is also helpful for small scale industries due to its simple working and operating conditions along with its compatibility, efficiency and affordable price.

2. Literature Review

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

The concept of two way hacksaw cutting machine mainly carried out for production based industries [1]. Industries are basically meant for production of useful goods and services at low production cost, Machinery cost and low inventory cost. Knowledge about developed a model of a machine reach would be capable of performing different operation simultaneously, and it should be economically efficient. 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.

A single phase vertical electric motor rigidly placed at the center of metallic foundation provided [2]. The shaft of motor rotates at 90-100 rpm with the power 2HP. The circular disc is mounted on the shaft of motor with the help of key and key slot arrangement.

It consists of pedal powered machine setup which has a simple mechanism operate with chain and sprocket arrangement [3]. The chain is placed on the teeth of the wheel and pinion. The shaft is mounted on pedestal bearings. First mechanical linkage is removed by removing nut and bolts and v belt drive drilling attachment.
It is known that conventional power hacksaw machine can be replaced with automated power Hacksaw machine [4]. Automated power hacksaw machine gives high productivity in short time period in comparison with the conventional power hacksaw machines. The major advantage of this machine is intervention of labor is reduced to maximum level. In this rapid emerging industrial section the use of power Hacksaw machine is wide, time and labor plays a major role in production process.

The 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 [5]. There are four types of blades based on material namely High Carbon steel, Alloy Steel, Bi-metallic strip and high speed steel blades. Out of these four the 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.

3. Components used in 2-way cutting hand powered hacksaw machine

3.1 Hacksaw blade:

Hacksaw blades are metal strips having some teeth like cutting edges on one or both side of the metal strip. Such a blade is attached to the hacksaw frame to enable the cutting action. Blades are available in standardized lengths, 10 or 12 inches (254 or 305 mm) for a standard hand hacksaw. "Junior" hacksaws are 6 inches (152 mm) long. Powered hacksaws may use large blades in a range of sizes, or small machines may use the same hand blades. The pitch of the teeth can be anywhere from fourteen to thirty-two teeth per inch (tpi) for a hand blade, with as few as three tpi for a large power hacksaw blade. Figure 1 shows the hacksaw blade used for the machine

Figure 1: Hacksaw Blade

3.2 Crank:

The crankset is the component of a bicycle drive train that converts the reciprocating motion of the rider's legs into rotational motion used to drive the chain or belt, which in turn drives the rear wheel. It has chain rings or chain wheels attached to the cranks, arms, or crank arms to which the pedals attach. It is connected to the rider by the pedals, to the bicycle frame by the bottom bracket, and to the rear sprocket, cassette or freewheel via the chain. But in this crank set the two cranks, one on each side is mounted in same direction as compared to the conventional crank of mounting 1800 apart; connect the bottom bracket axle to the pedals. Figure 2 shows the crank used for the machine.

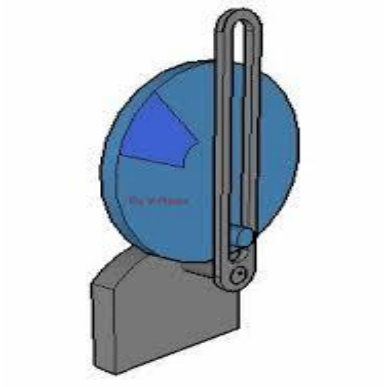

Figure 2: Crank

3.3 Bench vise:

A vice is a job or work piece holding device. It is a mechanical apparatus used to secure an object to allow work to be performed on it. Vises consists two parallel jaws, one fixed and the other movable, threaded in and out by a screw and lever as shown in Figure 3. Vice are generally fixed to the table or bench so as to provide necessary force for holding work piece during machining and also for reducing the vibrations generated due to machining.

Figure 3: Bench vise

3.4 Circular ball bearings:

A ball bearing is a type of rolling-element bearing that uses balls made up of steels or alloys to maintain the separation between the bearing races as shown in Figure 4. The sole purpose of a ball bearing is to reduce rotational friction and support radial and axial loads of the rotating shafts. This is done by using by using at least two races to contain the balls and transmit the loads through the balls.

Figure 4: Circular Ball Bearings

4. Methodology

The single phase vertical electric motor rigidly placed at the center of wooden foundation provided. The shaft of Johnson motor rotates at 60 rpm with the power 12 V. The circular disc is mounted on the shaft of motor with the help of key and key slot arrangement. The eccentric point on the plane of disc is provided such that the desired cutting stroke is achieved (around 4-5 inches). One end of each connecting rod is pivoted at this eccentric point by the use of suitable bearing. Another end of each rod is connected to the hacksaw blade fame with the help of linear bushing to get vertical and horizontal Degree of Freedom of rotation for the proper cutting operation. The hacksaw frame slides on the guide ways provided. When motor is ON and disc starts rotating, due to the reciprocating motion of hacksaw frame the metal rod is cut which is firmly fixed in vise. The automatic feeding of coolant is provided to reduce heat generated due to friction which also avoids the jerk. The Two way Hacksaw cutting machine fabricated is shown in Figure 5.

Figure 5: Two Way Hacksaw cutting machine

References

[1] David Gordon Wilson "UNDERSTANDING PEDAL POWER" ISBN: 0-86619-268-9 [C] 1986, Volunteers in Technical Assistance" Technical paper 51 VITA 1600 Wilson Boulevard USA.

[2] Zoeb khan , " Design and Fabrication of Human Powered Wood Cutting machine" ,International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169 Volume: 3 Issue: 2 072– 074.

[3] Linxu, Weinan Bai, Jingyu Ru,Qiang Li, "Design and Implementation of the Reciprocating Pedal Powered Electricity Generating Device", Advanced Materials Research (Vol.282-283 (2011) pp 735-738

[4] Chaudhary Pravinkumar k, "Understanding pedal power" ISBN: 0-86619268-9 [C] 1986, Volunteers in Technical Assistance" Technical paper 51 VITA 1600 Wilson Boulevard USA.

[5] S.G.Bahaley, Dr.A.U.Awate, S.V.Saharkar, "Performance Analysis of Pedal Powered Multipurpose Machine", International Journal of Engineering Research and Development (IJERD) (Vol.1, Issue.5,e-ISSN:2278-0181) (2012).

[6] Kshirsagar Prashant R "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.

[7] Sreejith K. , "Experimental Investigation of Pedal Driven Hacksaw", Research Inventory: International Journal of Engineering And Science Vol.4, Issue 7 (July 2014), PP 01-05 Issn (e): 2278-4721, Issn (p):2319-6483

[8] Dharwa Chaitanya Kirtikumar, "designed and developed a multipurpose machine which does not require electricity for several operations like cutting, grinding", International Journal for Technological Research in Engineering (Vol.1, Issue.1, ISSN: 2347-4718) (2013).

Authors Profile

Mani Mohan received diploma in mechanical engineering in Laxminarayana Polytechnic College at dharmapuri in 2016 and currently pursuing BE Mechanical Engineering at Bannariamman Institute of Technology.

Sakthivel Maruthupandiyan received diploma in mechanical engineering in Laxminarayana Polytechnic College at dharmapuri in 2016 and currently pursuing BE Mechanical Engineering at Bannariamman Institute of Technology.

Muthu Sathish received diploma in mechanical engineering in Laxminarayana Polytechnic College at dharmapuri in 2016 and currently pursuing BE Mechanical Engineering at Bannariamman Institute of Technology.

Muthaiyan Ravikumar received the B.E. degree in Mechanical Engineering from Coimbatore Institute of Technology in 1996 and M.Tech degree in Energy Engineering from Regional Engineering College in 2000 and PhD degree in Mechanical Engineering from Anna University in 2012. Presently working as a professor, Mechanical Engineering Department, Bannariamman Institute of Technology.