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Implementation and Functioning of Contemporary Multi-Way Hacksaw Machine

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ABSTRACT:

In this paper we reviewed generally conventional hacksaw machine is use for the cutting of rods, plates or any circular parts. But the conventional hacksaw machine takes more time to cut each individual part. And for reason we take changes in conventional hack saw machine into multi way hacksaw machine. This machine is able to cut multiple elements at a time with different strength. Due to optimization we take it to improving quality and its performance in optimum sources. This machine very efficient to increase the rate cutting and reduce time required in conventional hacksaw machine. In small scale industries the raw materials such as PVC pipes, wooden blocks, metal pieces need to cut into pieces foe various applications. At a time four work-pieces can be mounted on the machine. We have used a D.C. motor for rotating the Cam using Scotch- Yoke mechanism which is linked with the ConnectingRods.Themotorisusedtorotatethelinkageson which the hack-saw is mounted. This mechanism helps in reducing time of cutting the work-piece and also gives a better efficiency and provides safety. This results in decreasing the efficiency of the industry, as labors are not able to work all day in any industry

Key Words: Multi-Way Hacksaw Machine, Cutting process, Scotch-Yoke Mechanism**.**

1.Introduction:

The main aim of our project is to perform multiple cutting operations with the help of motor. For a developing industry the operation performed and the parts (or) components produced should have it minimum possible production cost, and then only industry runs profitability. In small-scale industry and

some workshops, this increases the initial cost required, large area requirements and large number of machine is required. In this project the rod cutting operation is carried out by small arrangements and easy operations. There will be need to cut similar length of rods in industries such as construction, manufacturing etc. for these purpose industries employ two or more persons to measure the length and then cut the rod. Our project gives a solution for this there is no need to measure each and every rod for cutting. Today almost all the manufacturing is being atomized in order to achieve the high level of productivity. To achieve mass production , to reduce man power, To reduce the production time, To reduce the material handling ,To reduce the fatigue of workers.

Project Rumination:

Current situation of industry focuses on the high production rate with less consumption of resources. To achieve this we need to minimize idle time and machine time per unit. The multi-way power hacksaw improves those factors by making multiple operations and reducing time per unit to increase the production.

Project Description:

To minimize the machining time and cut different work pieces with high rate and accuracy within a less period of time.

Components Required:

Gear box

Hacksaw blade

Connecting rods

Material holding vice

Bearings

Drive spindle

Electric motor

Hacksaw Frame

2.Methodology:-

Scotch Yoke Mechanism

Dc Motor

Crank and Slider

Mechanism Selection of Cutting Fluids

5.1. 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 mo t ion of slider. The reciprocating part is directly coupled to sliding yoke with a slot that engages a pin on the rotating part

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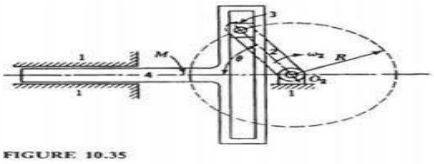
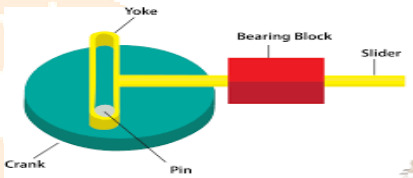


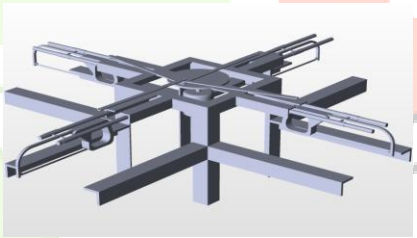
FIGURE 10.35

Crank and Slider Mechanism:-

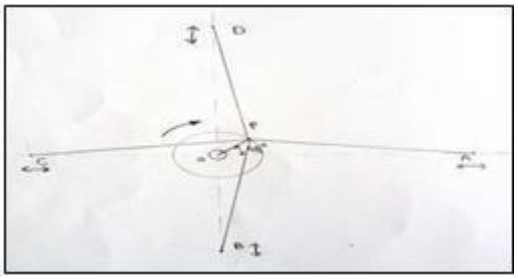
A crank is an arm attached at right angles to a rotating shaft by which reciprocating motion is imparted to or received from the shaft. It is used to convert circular motion into reciprocating motion or vice versa. The slider crank mechanism is used to transform rotational motion into transitional motion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



CATIA Model of the Machine:



3. Design Calculations:



FBD of 4-way Hacksaw machine considering cutting stroke length, L = 4.5 inches (115 mm)

We know that,L = 2r

Where r = crank radius Therefore, r = 57.5 mm

Connecting rod length = 300 mm Speed, N = 100 rpm

$\omega = 2\pi N/60$ —

$\omega = 10.46$ rad/sec

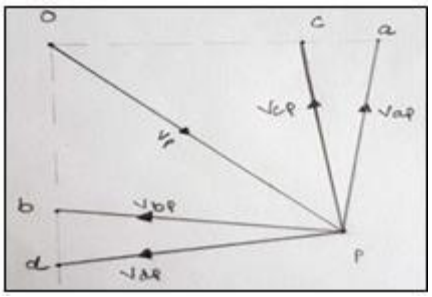


Fig. 3: Velocity Diagram Therefore, velocity of "p" with respect to "o" Vp = 0.601 m/sec

The velocity of sliders can be obtained from velocity diagram as shown in above figure, Vap = 0.433 m/sec Vbp = 0.429 m/sec Vcp = 0.433 m/sec Vdp = 0.429 m/sec

With the given power and speed of D.C. motor, we will calculate the torque given out by the motor.P = Where, $\frac{2*\pi*N*T}{60}$

Power,P=100 watts Speed, N = 100 rpm Torque, T =?

$100 = \frac{2*\pi*100*T}{60}$

$\mathbf{T} = \frac{360000}{328}$

T = 573.24 Nm/sec

3.1 **Time Calculations:-**

Time required for cutting a wooden job of 50 mm base and 25 mm thickness manually = 30.2 sec. Time required for cutting the same job on single hack-saw blade of the machine = 27.8 sec.

Consequence or Outcome:

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 longertool 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.



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 multi 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 work piece, 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.

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