"Automated Four way Hacksaw Machine"

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Abstract - *This project is on the design and construction of an automatic power hacksaw machine for cutting of metal to different size and length with the help of hacksaw. The objective of this project is to save man power and time in cutting metals in order to achieve high productivity. Automation plays a dominant role in the world economy these days and in daily application in industries. As for these days, the twenty first century engineers are increasing their research to combine automation with new systems to facilitate new complex systems which has wide applications.*

In automatic hacksaw machine the crank and slotted lever type mechanism is used in two pair and we arrange it with hacksaw. Whole, mechanism connect with the microcontroller which will cut the work piece in number of cycles as per calculate the width of the work piece and after cutting it will stop automatically. This hacksaw machine has four hacksaw blades which is cut four work pieces with in one time and in accurate number of cycles.

So, it will helpful to increase productivity, it save time to stop it and run it again, less human effort required. Also, we try to attach automatic small pneumatic feeding system to cut work piece in lower price for this machine.

***Key Words*: (hacksaw blades, Mechanism, control system, chain and spocket, motor)**

1. INTRODUCTION

We know that about band saw machine, power hacksaw machine, circular saw machine but, As this machine overcomes all the limitations and drawbacks 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 of machine. In this machine the microcontroller is use to control the motion of the mechanics or motor to cut the workspace in minimum number of cycle as per the width of the work piece and after cutting operation is done it will stop automatically. And we have to use as conceptually the feeding system of hacksaw to cut the device by pneumatic feeding system so, it can be cum return to its position after cutting work piece. And it will give feed automatically with the starting of machine so; we have to fix it only at some position.

1.1 Advantages

- *It save human effort.*
- *It is safe for cutting operation.*
- *It is accurate compare to human works.*
- *It operate automatically.*
- *Increase efficiency.*
- *Time save.*
- *It is compact and less costly.*

1.2 Disadvantages

- *It will stop if one hacksaw arm is face problem.*
- *Whole four operation stop due to one problem.*
- *Due to less human effort, unemployment is increase.*

2. Methodology

Mechanisms are a simplified model, usually in the form of a line diagram, which is used to reproduce exactly the motion occurring in a machine. The purpose if his reproduction is to enable the nature of the motion to be investigated without the

encumbrance of the various solid bodies which forms the machine elements.

For working of this machine we have to survey about all reciprocating mechanism which is give us more effort in less power and also it work both side arranging the saw blades so, crank and slotted lever mechanism is we use in this project or also we can said whit worth's quick return mechanism

Table -1: observation table

θ	x	θ	x	θ	x	θ	x
Degrees	mm	Degrees	mm	Degrees	mm	Degrees	mm
0	60	100	114	200	37	300	19.5
10	68	110	113.5	210	27	310	24.5
20	76	120	112	220	19	320	31
30	82	130	107	230	13.5	330	37.5
40	89	140	101	240	9	340	45
50	96	150	95	250	7	350	52
60	101	160	83	260	6.5	360	69.5
70	106	170	72	270	6.5		
80	110	180	60	280	10.5		
90	113	190	49	290	14.5		

2.1 Crank and Slotted Lever Mechanism

This mechanism is mostly used in shaping machines, slotting machines and in rotary internal combustion engines. In this mechanism, the link AC (i.e. link 3) forming the turning pair is fixed, as shown in Fig. The link 3 corresponds to the connecting rod of a reciprocating steam engine. The driving crank CB revolves with uniform angular speed about the fixed centre C. A sliding block is attached to the crank pin at B slides along the slotted bar AP and thus causes AP to oscillate about the pivoted point A. A short link PR transmits the motion from AP to the ram which carries the tool and reciprocates along the line of stroke R1R2. The line of stroke of the ram (i.e. R1R2) is perpendicular to AC produced. In the extreme positions, AP1 and AP2 are tangential to the circle and the cutting tool is at the end of the stroke. The forward or cutting stroke occurs when the crank rotates from the position CB1 to CB2 (or through an angle β) in the clockwise direction. The return stroke occurs when the crank rotates from the position CB2 to CB1 (or through angle α) in the clockwise direction.

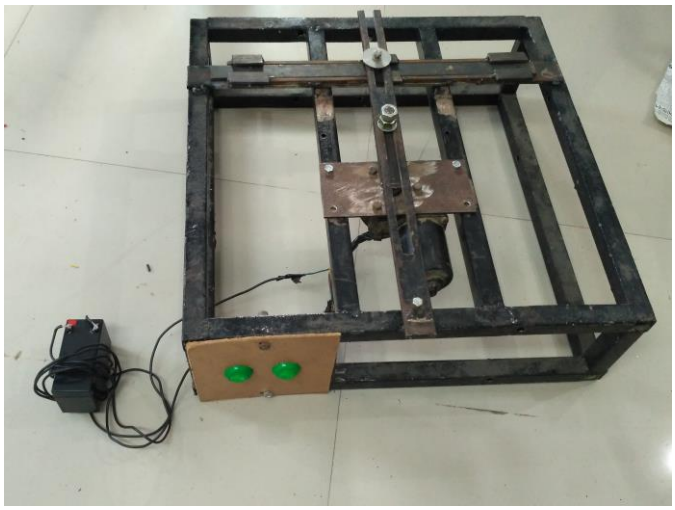
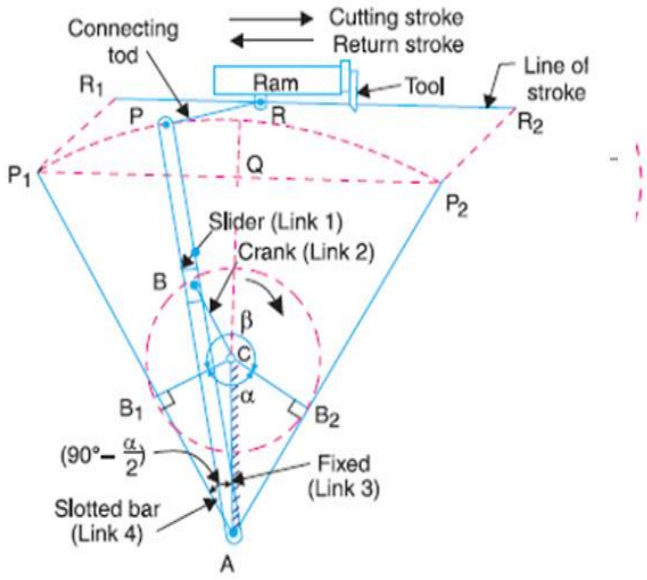


Chart -1: Crank and slotted lever mechanism



Since the crank has uniform angular speed.

Therefore,

$$\frac{\text{Time of cutting stroke}}{\text{Time of return stroke}} = \frac{\beta}{\alpha}$$

$$= \frac{\beta}{360° - \beta} \text{ or } \frac{360° - \beta}{\beta}$$

Since the tool travels a distance of R1R2 during cutting and return stroke, therefore travel of the tool or length of stroke,

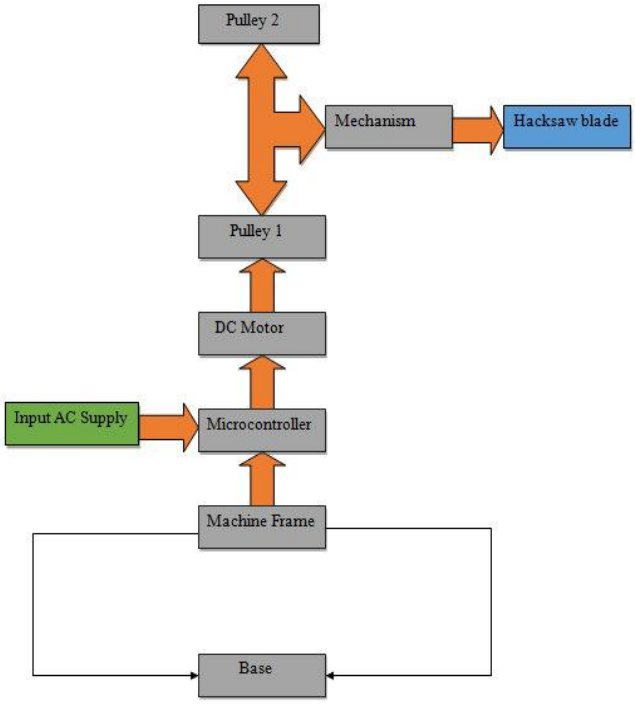
$$= R1R2 = P1P2 = 2P1Q = 2AP1 \sin \angle P1AQ$$

$$= 2AP1 \sin (90° - \frac{\alpha}{2}) = 2AP \cos \frac{\alpha}{2}$$

$$= 2AP \times \frac{CB}{AC}$$

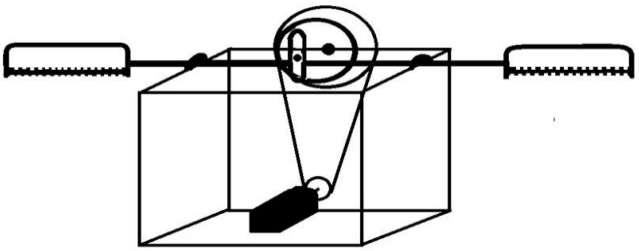
Here, as above fig. We see that the angle β made by the forward or cutting stroke is greater than the angle α described by the return stroke. Since the crank rotates with uniform angular speed therefore the return stroke is completed within shorter time.

2.2 Component arrangment



3. CONCLUSIONS

It is known that conventional hacksaw machine can be replaced with automatic power hacksaw machine. Automatic power hacksaw machine gives high productivity in short time period in comparison with the conventional hacksaw machines. The major advantage of this machine is that intervention of labour is reduced to maximum level. In this rapid emerging industrial era, the use of power Hacksaw machine is wide. Time and labour plays a major role in production process this can be overcome by using this type of automatic machines. The automatic hacksaw machine can be made use of at any of the industries like pump manufacturing industries that involve bulk amount of shafts that have to be cut frequently. The range of size of work-pieces that can be cut using the automatic hacksaw machine can be varied by changing the blade size. Currently, the machine uses 10 inch blade for cutting.



3 Literature Review

O. Cakir, et. Al. (2007) *explained in his research paper in a macining operation igh temperature in a cutting tool results due to friction between workpiece and cutting tool and cutting tool chip interface. There are some effects of this generated heat which are higher surface roughness, shorter tool life and lower the dimensional sensitiveness of the work material. Tis result in more important when there is need to machining harder material which are difficult to cut due to high heat production.*

Nitinchandra R. Patel, et al. (2013) *explained in his researh 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 selection of teeth per inches of blade is 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.*

Sreejith K., et. Al.(2014) *explained the objective of this paper was to fabricate, design and experimentally investigate the working of Pedal Driven Hacksaw (PDH). A slider crank mechanism is uded PDH for its working. The experiment on plywood material and PDH was performed. The main parts of PDH were sprocket chain drive, slywheel, reciprocating rod welded to pedal of bicycle and hacksaw. The hacksaw and reciprocating rods were connected together. The reciprocating rods and hacksaw moves to operator pedals the bicycle.*

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