Design and Fabrication of Semi Automatic Eccentric Hacksaw

Mr.Rajive V[1], Dinesh Kumar G[2], Haridoss T[3], Jayakumar R[4], Rubash S[5]

[1]Assistant Professor, Department of Mechanical Engg, Apollo Engineering College

[2,3,4,5] Students, Department of Mechanical Engg, Apollo Engineering College

Abstract- **The hacksaw is a wood cutting machine tool designed to cut wood by applying pneumatic pressure.The machine is exclusively intended for mass production and they represent fasten and more efficient way to cut a wood. Hacksaws are used to cut thin and soft wood. The operation of the unit is simplified to a few simple operations involving a eccentric movement provided by the ac motor.**

There are numerous types of cutting machines in Engineering field, which are used to fulfill the requirements. In our project metal Feeding mechanism is also attached to this pneumatic hack saw machine so that the machine to be designed to feed the metal.The machine is exclusively intended for mass production and they represent fasten and more efficient way to feed a metal.There are numerous types of cutting machines in Engineering field, which are used to fulfill the requirements. IR sensor unit is used to determine the metal length dimension to be cut. We are interested to introduce eccentric motion for cutting process.

1. INTRODUCTION

Power hacksaws & Shaping Machine are used to cut large sections of metal or plastic shafts and rods. Cutting of solid shafts or rods of diameters more than fifteen millimetres is a very hard work with a normal hand-held hacksaw. Therefore, power hacksaw machine & shaping machine was invented during 1920s in the United States to carry out the difficult and time-consuming work.

This power hacksaw & Shaping are considered as an automatic machine because the operator need not be there to provide the reciprocating motion and downward force on the work-piece in order to cut it. Once the operator has fed the work-piece till the required length in to the machine and starts the machine, then the machine will cut until the work-piece has been completely cut in to two pieces. The fact that the operator has to feed the work-piece to the required length in to the vice is one aspect that

motivated us to automate the feeding of work-piece automatically.

Another one aspect is that after a shaft has been cut for one time, the operator has to unload the work-piece and advance the rest of the work-piece to the required length again and again till the end of the work-piece is reached. The Power hacksaw & Shaping machine though being able to cut the shaft or rod without requiring any human effort to cut, it does require a human intervention to feed the work-piece many times with measurements being taken each time before feeding. Therein, arose a need to completely automate the process of cutting, and here we are with a proposal which will aid in eliminate the effort of the people associated with it.

2. COMPONENTS AND DESCRIPTION

2.1 Components Used

- A.C motor
- Belt drive
- **pulley**
- Shaping tool
- Shaft
- Frame
- Hacksaw

3. DESIGN AND DRAWING

3.1 Motor Specifications

Voltage	-	230 V
Frequency	-	50 HZ
Current	-	2.5 AMPS
Power	-	¼ HP
Watt	-	180W
Speed	-	1440rpm
Phase	-	1ph

3.2 Motor Calculation
Electrical power equation:
Power P=I*V
Where,
I=25amps
V=230v
P=I*V
Power P= 5750 Watts

To find torque of motor:
P=$2\pi NT/60$
T=5750*60/2π*1440
T=38.15 N-m

3.3 Specifications of Components Used
FRAME L-405mm B-405mm H-480mm
SQUARE TUBE   Thickness-25mm
SHAFT   Length-180mm Diameter-15mm
ROLLER BEARING ID-9.5mm   OD-40mm
CRANK DISC   D-120mm T-3mm
LENGTH OF BELT   300mm
THICKNESS OF BELT   5mm
DIAMETER OF SMALL PULLEY 30mm
DIAMETER OF LARGE PULLEY 270mm
TYPE OF BELT V-BELT

3.4 Time Calculation
Time required for cutting wooden job of 50mm base and 25mm thickness manually = 30.2sec.

4. WORKING PRINCIPLE

In the conceptual model of "DESIGN AND FABRICATION OF POWER HACKSAW AND SHAPER USING **CAM** MECHANISM" we are giving supply to the main shaft as we can see that the **cam** mechanism is directly fabricated to the main shaft and have same angular velocity **.**
When the A.C Motor is started the rotational power is transmitted through the belt drive with the help of pulley to the main shaft.The nob which is present in the scotch plate pushes the yoke to transfer the rotational motion into linear motion for shaping and sawing operation at the same instance.In this project our goal is to cut the wood piece by semi automation method. So we provide a base to withstand the weight of the machine. Then eccentric setup is used to provide the up ad down movement for cutting. Here the ac motor is the source for rotating

movement. This rotating movement is transmitted to the disc by the help of belt and pulley setup. Then it will activate the eccentric set up for the up and down movement to cut the wood.

5. OVERALL DIAGRAM

Fig 5.1 **Eccentric Hacksaw**

6. CONSTITUTES

6.1 Advantages
- High torque output is achieved.
- Fewer moving parts.
- Smoother operation.
- Simple in construction.
- Maintenance is easy.
- Reduced friction.
- Easy to operate.
- Reduces time and high production rate.
- Components used for fabrication are easily available.

6.2 Disadvantages
- Uneven forces act on the work piece.
- Only small components can be machined.
- Loading and unloading of work piece done manually.

6.3 Applications
These type of Power Hacksaw and Shaper have wide range of applications in the fields like,
- It can be used in small, medium as well as large scale industries.

- Highly suitable for production industries and workshops.
- It can perform variable operation in a single time.
- Operations such as grinding, shaping, cutting can be done with a single drive.

7. Cost Estimation

Table 7.1 Cost Estimation

Sl. No.	Parts	Qty.	Material	Amount (Rs)
i.	A.C motor	1	Electrical	1200
ii.	Belt drive	1	Rubber	65
iii.	Pulley	1		800
iv.	Shaping tool	1	Mild steel	50
v.	Hacksaw	1		120
vi.	Shaft	1	Mild steel	100
vii.	Frame	1	Mild steel	500

TOTAL =   Rs. 2,835

7.1 Labour Cost
LATHE, DRILLING, WELDING, GRINDING, POWER HACKSAW, GAS CUTTING:
Cost = 1000/-

7.2 Overhead Charges
The overhead charges are arrived by "Manufacturing cost"
Manufacturing Cost=Material Cost + Labour cost
=2835 +1000
=3,835 /-
Overhead Charges=   20% of the manufacturing cost
=   567/-

7.3 Total Cost
Total cost   =   Material Cost + Labour cost + Overhead Charges
=   2835+1000+567
=   Rs. 4,402 /-
Total cost for this project =Rs. 4,402 /-

8. CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries.

We are proud that we have completed the work with the limited time successfully. The "DESIGN AND FABRICATION SEMI AUTOMATIC OF ECCENTRIC HACKSAW" is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work, let us add a few more lines about our impression project work.

Thus we have developed an "DESIGN AND FABRICATION SEMI AUTOMATIC OF ECCENTRIC HACKSAW" which helps to know how to achieve low cost automation. The operating procedure of this system is very simple, so any person can operate. By using more techniques, they can be modified and developed according to the applications.

REFERENCES

[1] W A J Chapman, Workshop Technology (vol.1), 5th ed., Elsevier science, 1972.
[2] V.B. Bhandari, Machine design book, vol(5),ISBN-13:978-0-07-068179-8,pp330333, 2011.
[3] PSG Design Data Book, (vol 5), Kalaikathir Achchagam – Coimbatore, May2010. [4] Ozkan & S.Ayan "Design and application of circular saw machine" Journal of engineering research and applied science , vol(1), pp26-33, June 2012.
[4] Luis Cristovao "Machining properties of wood", vol(1),pp17-21, 2013.
[5] Hameed Shoripour "Development of automatic cutting system ",Journal of agriculture research, vol7(17),pp2683-2687, May 2012.