International Journal of Future Generation Communication and Networking
Vol. 13, No. 2s, (2020), pp. 882–886

Design And Analysis of Semi-Automatic Hacksaw Machine

Atharva Adep[#1], Supriya Khandave[#2], P.P Kharche[#3]

#1,2 Students, #3 Asst. Professor
#1,2,3 Department of Mechanical engineering, Smt Kashibai Navale college of engineering, Pune
#1atharvasantoshadep@gmail.com
#2khandvesupriya2@gmail.com
#3ppkharche@sinhgad.edu

Abstract

We focus on building a machine which is a small prototype of the actual hacksaw machine and with the focus on process optimization and further to reduce the cost of the project and efficient manufacturing. As many hacksaw machine lack safety which is a threat to the worker we focus on making a safe machine. We try to accomplish this by making a chassis and mounting motors and roller on it and will cut a pvc pipe using robotic arm at a predefined distance.This is a small prototype of the actual hacksaw machine in which we can conclude that this is a safe process, worker friendly.

Keywords—Hacksaw,Guide Ways,Rollers,Electric Motors.

I. INTRODUCTION

All power hacksaw machines basically have the same look and they all are precise in their applications. The sawing machine is a machine tool designed to cut material to a desired length or contour. It functions by drawing a blade containing cutting teeth through the workpiece. The sawing machine is faster and easier than hand sawing and is used principally to produce an accurate square or mitered cut on the work piece.Power hacksaws machines 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 & shapingmachine 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.

ISSN: 2233-7857 IJFGCN

Components:

Motor,Chassis,Mounting,Nut,Bolt,Roller,Pipe,Arduino,200rpm Motor.

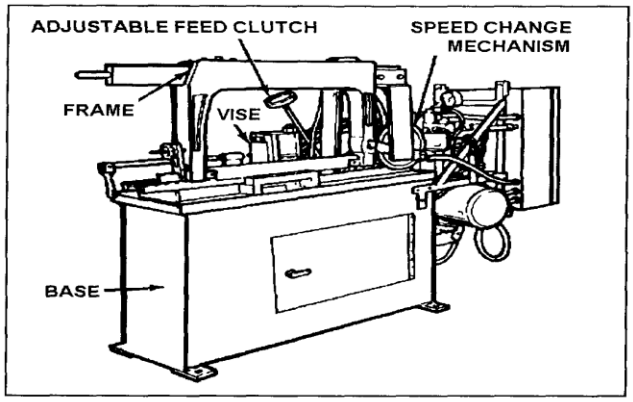

Figure 6-1. Power hacksaw.

Fig.1 Power Hacksaw[1]

II.LITERATURE SURVEY

1.1 Daniel Albrecht, Hans Christian Mohring[1]

Under the concept of "Industry 4.0", production processes will Sawing processes are the focus of process optimization in order to reduce material costs and save energy resources. Bandsawing machines allow fast processes but produce a low surface quality and great cutting losses of raw material up to now. The wear of saw blades is significant due to the cutting conditions as well as the thin and unstable tool design. Electromechanical drives can substitute inefficient hydraulic systems for workpiece clamping and for the prestressing of saw blades, and provide the precondition for autonomous process control. In order to adjust the sawing parameters during the process, the simultaneous identification of process stability is necessary. In this work, influences on the process stability were investigated by experiment and simulation in order to develop a stability criterion as a function of different process parameters. The focus here was on the behaviour of the saw machines allow fast processes but produce a low surface quality and great cutting losses of raw material up to now. The wear of saw blades is significant due to the cutting conditions as well as the thin and unstable tool design. Electromechanical drives can substitute inefficient hydraulic systems for workpiece clamping and for the prestressing of saw blades, and provide the precondition for autonomous process control. In order to adjust the sawing parameters during the process, the simultaneous identification of process stability is necessary. In this work, influences on the process stability were investigated by experiment and simulation in order to develop a stability criterion as a function of different process parameters. The focus here was on the behaviour of the saw.[1]

1.2 TawandaMushiri, Fortune Masarakufa, Charles Mbohwa[2]

This research paper explores the design of an automatic safety brake mechanism on a manual circular table saw machine which stops the blade from rotating when human flesh is detected in the blade proximity. Fatal injuries are occurring, human thumbs and entire hand cutting during operation when operator accidentally touches the spinning blade. It has become a matter of concern to develop the safety mechanism which can be retrofitted on old-model table saw machines used to train students at a university wood workshop. The researchers made use of capacitive proximity sensors to detect human flesh and then automatically activate the brake pawl to the rotating blade, D.C injection brake voltage which abruptly stop the running motor. The design procedure confirmed the quick release of the safety mechanism within 0.25 seconds as revealed from the simulation of circuits in Proteus software. With this design it is possible to stop the spinning blade in 0.25 seconds, before the operator

ISSN: 2233-7857 IJFGCN

touches the spinning blade and also the mechanism is adoptable to all circular saw machines (panel saw, bench saws), thus making a work-safe environment on the circular saws.The vast review of literature will help to understand the concepts, theorems and different factors affecting the performance of machine. R.S.Khurmi, J.K.Gupta in their book "Theory of machines" (Velocities in mechanisms) helps to find Velocity diagrams of slider crank mechanism. [2]

 Prof. KshirsagarPrashant R., RathodNayan J., RahatePrashant P., HalayePrashant P., SurveSachin S. in their research paper "Theoretical Analysis of Multi-Way Power Hacksaw Machine" designed and developed a multi-way power hachsaw machine which converts converts rotary motion into the reciprocating motion for working of model. This machine is able to cut four pieces at same time which overcomes single piece cutting of conventional power hacksaw machine. [9]

 D.V.Sabarinanda, V.Siddhartha, T.Mohanraj in their paper "Design and Fabrication of Automated Hacksaw Machine" (April 2014) gives an idea about the various components required for fabrication of the proposed model. These components will help to get smooth working condition and future automation of different mechanical actions as well as linkages. [9]

 R.Subash, K. Samuel Jayakaran, (2014), In this paper author has designed Pedal operated hacksaw machine which can be used for industrial applications and Household needs in which no specific input energy or power isneeded. This project consists of a sprocket arrangement, the crank and slider mechanism, the chain drive. In the mechanism, chain drive is directly connected to the hacksaw for the processing of cutting the wooden blocks.The objective of the paper is using the conventional mechanical process which plays a vital role. The main aim is to reduce the human effort for machining various materials such as wooden blocks, steel, PVC etc.[9]Current scenario 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 reducing time per unit to increase the production. To minimize the cutting time in conventional machine and increase the rate production rate.The conventional hack saw machine are operated by human operators as mentioned, have the demerit of unloading and loading the work-piece many times. In mechanical industries need to cut no. of ideal parts. It is very difficult for operator to cut the individual parts. It takes more time for cutting. This can be achieve by using proposed machine at the place of conventional machine to cut different metal bar pieces with high rate of and accuracy to minimize an idle time. In present situation electrical as well as hydraulic operated machines are used but the output from them is not satisfactory as it has low cutting rate 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.

ISSN: 2233-7857 IJFGCN

Fig.2.Automatic Hacksaw Machine[11]

Fig.3.Specifications of Hacksaw Machine.[11]

We visited the Power Hacksaw Machine during the literature survey of this project the specifications of the same machine are mentioned in the above image. It gave us the idea about our project and also helped us for selecting materials which are used in our project various materials used in our project are in reference to this machine.

III. ADVANTAGES[10]

- 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.

IV. Methodology

For the technical mechanical drawings and assembling of parts the researcher used Solid Works 2018. Finite element Analysis (FEA) for stress analysis of the critical components using Ansys software. Sensor programming to execute the individual anticipated routines, the researcher used Arduino

ISSN: 2233-7857 IJFGCN

software and for simulating the micro-controller circuit, Proteus software. The researchers also visited local machine suppliers in compilation of price of the machine assembly.

V. Limitations[10]

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

VI. CONCLUSION

We conclude that it is possible to build a safe and small prototype of automatic hacksaw machine. This prototype can perform various functions just on a small scale but it still proves to be safe for the workers. It's also time and energy saving. The prototype built proves to be cost efficient. It's easy to use and is very user friendly. The various softwares used to test it and design it also validate it is a safe design.

ACKNOWLEDGMENT

All the authors wish to acknowledge our guide and SKNCOE's Mechanical Department and other contributors for developing and helping us to complete the study.

REFERENCES

1. Proceedings of the 2016 International Conference on Industrial Engineering and Operations Management Detroit, Michigan, USA, September 23-25, 2016
2. University of Stuttgart - Institute for Machine Tools, Holzgartenstraße 17, 70174 Stuttgart, Germany.
3. Bulk material Handling by Conveyor Belt- R.O. Bailey
4. P.V. Wright, A Review of SAW Resonator Filter Technology, IEEE Ultrasonics Symposium, 1992, page 29~37.
5. Product manuals of Sengenuity, TempTrackr_Wireless_Multipoint_System_Kit-6.
6. Potentials for the optimization of sawing processes using the example of bandsawing machines Daniel Albrechta,*, Hans-Christian Möhringa
7. Design of a bench saw cutting machine for wood with automatic braking system TawandaMushiri
8. Design of Automatic Cooling Power Hacksaw Machine for Multipurpose Applications – ResearchGate
9. A Study of Multiple Hacksaw Machine
10. Design and Fabrication of Semi Automatic Eccentric Hacksaw
11. In College Workshop.

ISSN: 2233-7857 IJFGCN