

How to Cite:

Niranjan, R., Kanmani, D., & Kumar, S. (2022). Design and fabrication of multi cutting hack saw machine. *International Journal of Health Sciences*, 6(S3), 10294–10297.
<https://doi.org/10.53730/ijhs.v6nS3.9423>

Design and fabrication of multi cutting hack saw machine

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Abstract---The growth of Indian manufacturing sector depends largely on its productivity & quality. Productivity depends up on many factors one of the major factors being manufacturing efficiency with which the operation/activities are carried out in the organization. productivity can be improved by reducing the total machining time, combining the operations etc. In the case of mass production where variety of jobs is less and quantity to be produced is huge, it is very essential to produce the job faster rate. This is not possible if we carry out the production by using general purpose machines. The best way to improve the production rate (productivity) along with quality is by the use of special purpose machine. Usefulness and performance of the existing radial cutter machine will be increased by designing and manufacturing of multi cutter head attachment. This paper details with design and development of multi cutter head for cycle time optimization of the component.

Keywords---blades, multiway, hacksaw machine, scotch yoke mechanism, power hack saw.

Introduction

For industries to achieve the mass production, needs more and more number of pieces to be cut for mass production of those components. Metal machine is basically a cutting device, which cut in one direction many work pieces at a same time. A cutter is a fine –toothed saw, originally and principally for cutting metal 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. This paper proposes the prototype model of four-way hacksaw machine which is able to cut four 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. They can also cut various other materials, such as plastic, wood and steel etc. 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. 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 of different companies with different specifications are available for the use in shop floor.

Literature Review

Dr.Toshimichi Moriwakilil -Multi Function Operating Machine a Conceptual Model (www.iosrjournals.org). Toshimichi Moriwaki: -Recent trends in the machine too technologies are surveyed from the viewpoint of high speed and highperformance machine too combined multi-functional machine tools, ultra-precision machine tools and advanced and intelligent control technologist. 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. Frankfur-tam Main, 10 January 2011: - The crisis is over, but selling machinery remains a tough business. Machine tools are now able to "jack of all trades", to be able to handle all types of materials, to be able to adapting to new job profiles with maximized flexibility.

Prof. Nitinchandra R. Patel, Ravi Thakkar, Miteshkumar Rathwa in his research paper –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. 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 Aluminium is Bi-metallic blade on the basis of Properties of materials, Wear resistance and Cutting performance. 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. There are number of methods are available for selection of best suited material for design. Out of two or more material on basis of selection parameters like speed, feed and work piece material. Finally paper stated that bimetallic material for blade is most suitable. In this paper Preference Ranking Methods for Evaluations and analytic hierarchy process

method are applied to rank out the material of hacksaw blade among of five materials.

Working process

Manufacturing processes are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during or after the manufacturing, and planning the production process prior to manufacturing.

Metal Cutting

Metal cutting or machining is the process of by removing unwanted material from a block of metal in the form of chips. Cutting processes work by causing fracture of the material that is processed. Usually, the portion that is fractured away is in small sized pieces, called chips. Common cutting processes include sawing, shaping (or planning), broaching, drilling, grinding, turning and milling. Although the actual machines, tools and processes for cutting look very different from each other, the basic mechanism for causing the fracture can be understood by just a simple model called for orthogonal cutting. In all machining processes, the work piece is a shape that can entirely cover the final part shape. The objective is to cut away the excess material and obtain the final part. This cutting usually requires to be completed in several steps – in each step, the part is held in a fixture, and the exposed portion can be accessed by the tool to machine in that portion. Each position of holding the part is called a setup. One or more cutting operation may be performed, using one or more cutting tools, in each setup. To switch from one setup to the next, we must release the part from the previous fixture, change the fixture on the machine, clamp the part in the new position on the new fixture, set the coordinates of the machine tool with respect to the new location of the part, and finally start the machining operations for this setup.

Conclusions

A strong multidiscipline team with a good engineering base is necessary for the Development and refinement of advanced computer programming, editing techniques, diagnostic Software, algorithms for the dynamic exchange of informational different levels of manufacturing work. In 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 four ways cutting of material simultaneously. It is so compact that will be occupy less space, cost effective so usable in miniand 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. By increasing the motor power and dimensions of eccentric cam the size of material to be cut can be increased. By using limit switches or sensors Automatic feeding mechanism for

material can be introduced. Automatic lifting up mechanism for frame when cutting operation can be by using hydraulic piston and cylinder.

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