A Review on 360° DRILLING MACHINE

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Abstract

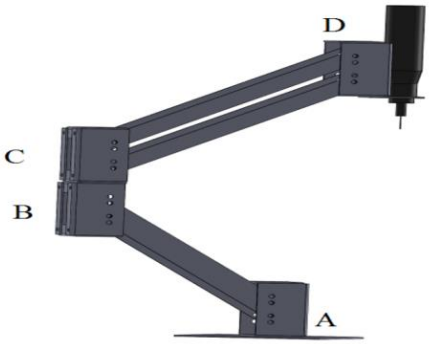
The growth of Indian manufacturing sector depends largely on its productivity & quality. Productivity depends upon many factors, one of the major factors being manufacturing efficiency with which the operation /activities are carried out organization. Productivity can be improved by reducing the total machining time, combining the operations etc. In 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 at a 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 use of special purpose machine. In previous drilling machine many of the problems arise during drilling. Some parts cannot drill due to small work space between drill bit and work piece. So we use hand drills in this cases but it cause alignment problems. So here I propose a 360 degree Drill machine that can be mounted on a table or wall and can be used to drill holes horizontally, vertically or even upside down. So this makes it possible foe easy drilling in even complicated parts and surfaces

1. Introduction

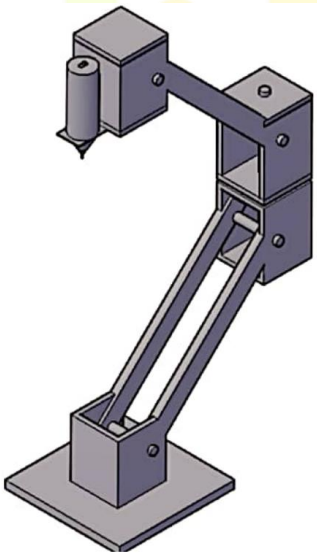
Drilling is a cutting and removal of material process in which holes are made or enlarged with the help of a multipoint sharp cutting tool. Other machining techniques that include drilling are, Reaming, trepanning, counter boring and boring. All of these techniques when paired with a linear feed gets to have the same movement. The two different types of drilling are short hole and deep hole drills. The drilling process can be associated to turning in number of ways but the requirements for chip breakage and chip extraction are increasing. In drilling, this is important. The hole dimensions, as well as the size of the hole puts a limit to the amount of machining that needs to be done. The deeper the hole, the harder it is to maintain process control. Along with high quality, another important aspect to be considered is a high material removal rate. The main aim of our project is to study about this 360 degree drilling machine that can drill holes in horizontal, vertical and upside down direction, providing us ease in drilling complicated parts. Connecting arms play a crucial role as with the help of them, we may be able to drill in any axis and any degree as per the requirement. Due to this setup, we can get more accuracy of drilling in the workpiece and eliminate the different needs of different drilling machines. Proper selection of material plays a very important role. The material chosen should be such that it is able to sustain the force and vibrations that are caused by the drilling operations. The materials and components which we would be selecting for our project would resist any kind of vibrations and would make the setup rigid to make accurate drilling. The cost of handling and manufacturing cost is low in this machine compared to the old and traditional drilling machines. This 360 drilling machine is not needed by skilled laborers as it is easy to handle and operate the drilling machine. Another highlight of this drilling machine is that it has its own swivel wheels which makes it portable and the wheels can provide the motion to the table. Due to occupying minimum space and being quite efficient it can prove to be quite helpful to the industries that use drilling operations. Drilled holes can be characterized by their sharp edge on the entrance side and the presence of burrs on the exit side (unless removed). As the inside of the hole contains helical feed marks, thus we can easily identify the hole.

2. Need to Study

From early times we have seen that every industry has relied on drill machines for functioning. It is quite common in the industries now to drill holes in parts, sheets, and structures. To have a perfectly aligned



drilling its crucial to make use of powerful and fixed drills. As the distance between the drill bit and the drill bed is quite small, thus some sections cannot be drilled using fixed drills which are being produced continuously in nature and are in exhaustible are called nonconventional energy (or) renewable sources of energy. Making use of hand drills is also not worth here since they have their own shortcomings like alignment issues during drilling. In order to overcome these shortcomings we decided to work on a machine that could remove all the above shortcomings which is a 360 degree flexible drill machine that can be mounted on a table and used to drill holes horizontally, vertically, or even upside down. Due to this property, even complicated pieces and surfaces can be now easily drilled. Thus, we design and build a 360 degree flexible drill for convenient drilling operations by taking help of rotating hinges and connectors, as well as a motor mount and supporting framework.



3. Working

- From the diagram we can see that Box A is mounted on a plate. The whole mechanism can rotate at 360 degree angle at the vertical axis of box A.
- Box B is now attached with Box A by the help of two slant links, thus make an angle of forty five degree angle among each of the two boxes. Now this box B can now rotate at 360 degree angle on the vertical axis of box A.
- Box C is mounted on Box B in the sort of manner that it could rotate at 360 degree angle on its vertical axis.
- Box D is hooked up to box C with the help of four movable links, as a result reaching a vertical movement of box D. Therefore the box D can now rotate at 360 degree angle at vertical axis of box C drilling machine and special purpose machine

4. Literature Review

[1] Mr. K. I. Nargatti, Mr. s. v. Patil, Mr.G. N. Rakate (2016)- This project tries to focus on improving the design & Fabrication of Multiple Spindle Drilling Head for cycle time optimisation of the part. They developed a model that may drill two holes at a time with varying center distance between two drilling spindles.

[2]R.Anandhan,P.Gunasekaran,D. reenevasan, D.Rajamaruthu(2016)- This paper's focus was to make the drill rotate in any direction with ease, so that the job setting is no more complicated and the setting time shall reduce. This method can be considered as a useful method that can control the drilling machine manually. The wood, soft synthetic material, and lightmetals can be easily drilled using this system.

[3]. Mr. Jay M. Patel, Mr. Akhil P. Nair, Prof. Hiral U. Chauhan(2015)-The project is based on 3-Directional drilling machine that focuses on drilling holes based on their various location and movements. Due to this machine the operation can be done with less effort, high precision and accuracy. This method helps to improve the Productivity by reducing the total machining time , human effort and manufacturing cycle time.

[4]. Lookesh kumar sahu, Pranesh kumar sahu, Pranesh Mohan Mishra, Deepak kumar singh, Vijay kumar Yadu(2018)- In this research paper, the author tries to focus on a 360 degree drilling machine which may drill in horizontally, vertically and even upside down direction. The paper involves the use of drill bit that is made from carbon steel.

[5]. Nandewalia Prajal, Malaviya Krunal, Prof. Chauhan Hiral, Prof. vipul Goti(2018)-In this project , the author investigates about the Graphical Drilling Machine, and the author proposes that the drill used here can rotate about two axis which can be the x- axis & z-axis. These drilling machine may be used to drill on materials like wood and metal. And the main purpose of the project was to reduce time and vibration in machine.

[6]. Prof. A.A. Shingavi, Dr. A.D. Dongare, Prof. S.N. Nimbalkar(2015)- In this research paper, the authors discusses the case study and makes comparison of productivity of parts using conventional radial drilling machine and special purpose machine.

5. Materials & Methods

The material selection is an important factor which can be able to influence the performance factor of a 360 degree flexible drilling machine. Given below are some of the factors through which we can improve the performance of this machine.

5.1 PHYSICAL PROPERTIES

- High Wear resistance and high cutting ability.
- Maintains high hardness upto a temperature of about 550°C due to which it may be able to cut metals and woods at a high speed.

5.2 MECHANICAL PROPERTIES

- High Tensile Strength
- High fatigue strength
- High fracture toughness and impact strength in order to restrict quick fracture.

5.3 RESISTANCE TO CORROSION

- Low corrosion rate which might increase the life of this machine.

5.4 MANUFACTURING EASE

- The conventional drilling machines used to have heavy metals and complex locomotive mechanisms for the drill machine movements.
- But this flexible drilling machine has a reasonable initial cost, low maintenance cost and has low production cost.

6. Methodology

Data collection
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Dimension assumptions
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Material selection
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Calculations
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Design
↓
Analysist
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Operation on raw materials
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Assembly of parts
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Point on require parts

7. Reference

[1] R.Anandhan, P.Gunasekaran. 2016, Design and Fabrication of Angular Drilling Machine, International Journal of Innovative Research in Science, Engineering and Technology.

[2] Mr. Jay M. Patel , Mr. Akhil P. Nair , Prof. Hiral U.Chauhan , 3-Directional Flexible Drilling Machine, International Journal for Scientific Research & Development , Vol. 3, January 2015.

[3] Praveenkumar, B. S., Niranjan Hugar, Ajithkumar, A. , DESIGN OF ROD GROOVING MULTISPINDLE DRILLING UNIT, Asian Journal of Science and Technology , Vol.07, March,2016.

[4] Prof. Gadhia Utsav D, Shah Harsh A, Patel Viral A, Patel Kushang P, Amin Harsh J , DESIGN & DEVELOPMENT OF UNIVERSAL PNEUMATIC DRILLING MACHINE: A REVIEW STUDY, International Journal For Technological Research In Engineering Volume 3, April-2016.

[5] Prof. P.R. Sawant, Mr. R. A.Barawade , DESIGN AND DEVELOPMENT OF SPM-A CASE STUDY IN MULTI DRILLING AND TAPPING MACHINE, International Journal of Advanced Engineering Research and Studies, Vol. 1, January-March, 2012 , Pages 55-57.

[6] Mr. Sakate P.R. , Mr. Jadhav A.S. , Prof. Bamankar P.B. , Miss. Jagadale A.A. , Miss. Bhosale P.S. , A Review on Multi Spindle Drilling Special Purpose Machine with Respect to Productivity , International Journal for Scientific Research & Development , Vol. 3, 2015 , Pages 560 – 562.

[7] Prof. Ms.A.A.Shingavi, Dr.A.D Dongare, Prof. S.N.Nimbalkar, 2015, Design of Multiple Spindle Drilling Machine, International Journal of Research in Advent Technology.

[8] U. Hema Nikhitha, 2019, Design of 360 Degree Flexible Drilling Machine, International Journal of Engineering Research & Technology (IJERT).

[9] 360 Degree Flexible Drilling Machine Prof. Arpit G. Mahure , Mr. Sumit S. Bijwe , Mr. Praful R. Bangade , Mr. Ayush G. Borade, International Journal of Engineering Research & Technology (IJERT)

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