FABRICATION OF 360 DEGREE FLEXIBLE DRILLING MACHINE

[1]Prof. Bhawthankar Amol, [2]Mr. Solapure Shivanand I, [3]Mr. Shivamurti Yuvaraj R, [4] Mr. Khilari Suresh B, [5]Dudhanikar Devaraj B

Lect in Mechanical Engineering Department, SVSMD's KKI Polytechnic, Akkalkot, Solapur, Maharashtra, India[1], Student, Department of Mechanical Engineering SVSMD's KKI Polytechnic, Akkalkot, Solapur, Maharashtra, India[2,3,4,5].

ABSTRACT

Drill machines have been the heart of every industry. Drilling holes in parts, sheets and structures is a regular industrial work. Perfect and well aligned drilling needs fixed and strong drills. Some parts cannot be drilled using fixed drills due to low space between drill bit and drill bed. We need to use hand drills in such cases but hand drills have alignment problems while drilling. So here we propose a flexible drill 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 for easy drilling in even complicated parts and surfaces a supporting structure to design and fabricate a drill for easy drilling operations.

Keywords: 360 Degree, Drilling Machine, Drill Bit, Flexibility.

INTRODUCTION :-

The drilling machine or drill press is one of the most common and useful machine employed in industry for producing forming and finishing holes in a work piece. The unit essentially consists of: A spindle which turns the tool (called drill) which can be advanced in the work piece either automatically or by hand.

A work table which holds the work piece rigidly in position.

The rotating edge of the drill exerts a large force on the work piece and the hole is generated. The removal of metal in a drilling operation is by shearing and extrusion.

NEED OF 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. 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.

DRILLING MACHINE CONSTRUCTION

The fundamental components of a drilling machine are its base, assisting arms, drill head and chuck. The base manufactured from hard fabric might rest on a bench or a ground relying upon its design. Large and heavy machines are grounded on the ground. The arms are placed on the base with the assist of a hinge to make rotation approximately it and supported with the aid of roller. It is correctly machined and the arms can circulate up, down

and rotate approximately x-axis. The drill chuck, an electric powered motor and the mechanism which is meant for using the chuck at extraordinary speeds are positioned at the top of the top arm. Power gets transmitted from the electrical motor to the drill chuck.

PROCESS SCHEMATIC:

Drilling consists of axial and rotational motions between the drill and the job. Usually the drill rotates and advances into the job, but at few times the other might get real. The Chips that are formed during the process of drilling can be removed by flowing through the grooves or flutes and thus the coolant is required for higher rate of cutting , tool life.

STRUCTURE DESIGN:-

1) Base:-

The base acts a support for the whole machine. It's made of mild steel. The base of the drilling machine supports the entire machine and when bolted to the floor, provides for vibration-free operation and best machining accuracy. The top of the base is similar to the worktable and may be equipped with t- slot for mounting work too large for the table.

2) Arm:-

There are two arms:

1. Vertical arm 2. Horizontal arm

The primary arm holds the secondary arm and it is with the help of this arm the 360° of rotation is transferred from the plate to the secondary arm in order to move the drill head at angles. They are made up of stainless steel.

IEJRD
E-ISSN NO:2349-0721

3) Cross Slide:-

We have used a hand drilling machine to be fixed on the cross slide. Our drilling machine can drill holes on concrete, wood and metal. The drill bit can be rotated both clockwise and anticlockwise direction.

4) LEAD SCREW

A **lead screws** also known as an ice screw or translation screw is a screw used as a linkage in a machine, to translate turning motion into linear motion. Because of the large area of sliding contact between their male and female members, screw threads have larger frictional energy losses compared to other linkages. They are not typically used to use high power, but more for intermittent use in low power actuator and positioned

mechanisms. Common applications are linear actuators, machine slides (such as in machine tools), vises, presses, and jacks.

Lead screws are manufactured in the same way as other thread forms (they maybe rolled, cut, or ground). A lead screw is sometimes used with a split nut also called half nut which allows the nut to be disengaged from the threads and moved axially, independently of the screw's rotation, when needed (such as in single-point threading on a manual lathe).

5) DC MOTOR

DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of

DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

E-ISSN NO:2349-0721

6)MS BARS

MS Bar's also known as blank; slug or billet is a common form of raw purified metal, used by industry to manufacture metal parts and products. Bar stock is available in a variety of extrusion shapes and lengths. The most common shapes are round (circular cross-section), rectangular, square and hexagonal or hex. A bar is characterized by an "enclosed invariant convex cross-section", meaning that pipes, angle stock and objectswith varying diameter are not considered bar stock.

Bar stock is commonly processed by a sequence of sawing, turning, milling, drilling and grinding to produce a final product, often vastly different from the original stock. In some cases, the process is partially automated by specialized equipment which feeds the stock into the appropriate processing machine.

7) DRILL BIT

Drill bits are cutting tools used to remove material to create holes, almost always of circular cross-section. Drill bits come in many sizes and shapes and can create different kinds of holes in many different materials. In order to create holes drill bits are usually attached to a drill, which powers them to cut through the work piece, typically by rotation. The drill will grasp the upper end of a bit called the shank in the chuck.
Drill bits come in standard sizes, described in the drill bit sizes article. A comprehensive drill bit and tap size chart lists metric and imperial sized drill bits alongside the required screw tap sizes. There are also certain specialized drill bits that can create holes with a non-circular cross-section.

While the term drill may refer to either a drilling machine or a drill bit for use in a drilling machine, in this article, for clarity, drill bit or bit is used throughout to refer toa bit for use in a drilling machine, and drill refers always to a drilling machine.

8) ALUMINIUM LINKS

Aluminum is a chemical element with symbol Al and atomic number 13. It is a silvery-white, soft, nonmagnetic, ductile metal in the boron group. By mass, aluminum makes up about 8% of the Earth's crust; it is the third most abundant element after oxygen and silicon and the most abundant metal in the crust, though it is less common in the mantle below. The chief ore of aluminum is bauxite. Aluminum metal is so chemically reactive that native specimens are rare and limited to extreme reducing environments. Instead, it is found combined in over 270 different minerals. We used this aluminum bars in scissor jack mechanism for smooth movement.

9) NUT & BOLTS

A **nut** is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten multiple parts together. The two partners are kept together by a combination of their threads' friction (with slight elastic deformation), a slight stretching of the bolt, and compression of the parts to be held together.

In applications where vibration or rotation may work a nut loose, various locking mechanisms may be employed: lock washers, jam nuts, specialist adhesive thread- locking fluid such as Lactate, safety pins (split pins) or lock wire in conjunction with castellated nuts, nylon inserts (nylon, or slightly oval-shaped threads.

Square nuts, as well as bolt heads, were the first shape made and used to be the most common largely because they were much easier to manufacture, especially by hand. While rare today due to the reasons stated below for the preference of hexagonal nuts, they are occasionally used in some situations when a maximum amount of torque and grip is needed for a given size: the greater length of each side allows a spanner to be applied with a larger surface area and more leverage at the nut.

10) Connecting Rod

It connects the two Frames to each other for supports between them to help to move when we required. It consist of metal strip of two sages on of 12 (inch) and another is of 15 (inch) both are of four pieces of equal length.

E-ISSN NO:2349-0721

11) ACRYLITE

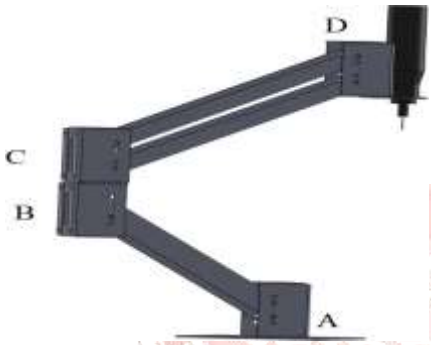
Poly(methyl methacrylate) (PMMA), also known as acrylic or acrylic glass as well as by the trade names Cylix, Plexiglas, Acrolith, Lucite, and Perspex among several others (see below), is a transparent thermoplastic often used in sheet form as a lightweight or shatter-resistant alternative to glass. The same material can be used as a casting resin, in inks and coatings, and has many other uses.

Although not a type of familiar silica-based glass, the substance, like many thermoplastics, is often technically classified as a type of glass (in that it is a non- crystalline vitreous substance) hence it's occasional historical designation as acrylic glass. Chemically, it is the synthetic polymer of methyl methacrylate. The material was

developed in 1928 in several different laboratories by many chemists, such as William Chalmers, Otto Rohm, and Walter Bauer, and was first brought to market in 1933 by the Rohm and Haas Company under the trademark Plexiglas.

PMMA is an economical alternative to polycarbonate (PC) when tensile strength, flexural strength, transparency, polish ability, and UV tolerance are more important than impact strength, chemical resistance and heat resistance.[5]Additionally, PMMA does not contain the potentially harmful biphenyl- A subunits found in polycarbonate. It is often preferred because of its moderate properties, easy handling and processing, and low cost.

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.

FUTURE SCOPE OF THIS MACHINE

1) It might be utilized in industries.
2) It would be used with automation for computerized drilling.
3) In the coming years it can be used in every area wherever drilling is required.
4) We also can use this approach of rotation of arm in different machining operation.
5) Good future in marine and robotics sector.
6) Codings and programmes can be used in this machine.
7) This machine shall get operated through computers and smartphones someday.

CONCLUSION

Effective performance and competitive costs can be guaranteed by this project, as many operations can be done via this machine. Many holes with greater efficiency can be cut by this machine. It works well

and is quite economical compared to other resources available. Considering its use and model price this machine can prove to be quite economical as compared with other machines.

REFFERANCE

[1] 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 , Pages 1262 – 1264.

[2] S. R. Gawande, S. P. Trikal , Development of Multi Spindle Drilling Machine to Enhance the Productivity in Amba Stainless Steel Kitchen Trolley Manufacturer, Amravati , International Journal of Science and Research , Volume 4 , October 2015 Pages 1659 – 1661.

[3] Design Data Hand Book by Mahadevan.

[4] Machine Design by Bandar.

[5] G.Prasanth Kumar, P.Guna Escher , P.Nadeem Khan P.Rajesh ,B.V.Krishnaiah Under Graduate Student Assistant professor Department of Mechanical Engineering Narayana Engineering College, ISSN: 2393-9516 www.ijetajournal.org Page 346 Design & Fabrication of 360° Flexible Drilling Machine Gudur Andhra Pradesh – India

IEJRD
E-ISSN NO:2349-0721