

360 Degree Flexible Drilling Machine

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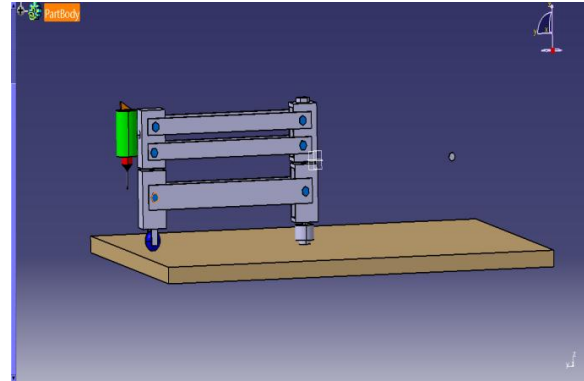
Abstract- Directional drilling machine which can be used based on drilling holes in various location and movement and easily operation done with high accuracy. Productivity can be improved by reducing total machining time and reduced human effort and reduced manufacturing cycle time.

Drill machines have been the heart of every industry. Drilling holes in sheets and structures is a regular industrial work. Perfect and well aligned drilling needs. 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 360 degree 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. Thus we use rotating hinges and connectors with motor mount and supporting structure to design and model of a mini 360 degree drill for easy drilling operations.

Index Terms- Drilling, Marching Time, Industrial, Bit, Motor, Design.

INTRODUCTION

Drilling can be called as the operation of producing a cylindrical hole of required diameter and depth by removing metal by the rotating edges of a drill. The cutting tool known as drill is fitted into the spindle of the drilling machine. A mark of indentation is made at the required location with a center punch. The rotating drill is pressed at the location and is fed into the work. The hole can be made up to a required depth. Drilled holes are characterized by their sharp edge on the entrance side and the presence of burrs on the exit side (unless they have been removed). Also, the inside of the hole usually has helical feed marks. Drilling may affect the mechanical properties of the work piece by creating low residual stresses around the whole opening and a very thin layer of highly stressed and disturbed material on the newly formed surface.



Drilling Machine Construction:-

The basic parts of a drilling machine are its base, supporting arms, drill head and chuck. The base made of hard material may rest on a bench, floor depending upon the design. Larger and heavy duty machines are grounded on the floor. The arms are mounted on base with the help of hinge to rotate about it and supported by roller. It is accurately machined and the arms can move up, down and rotate about x-axis. The drill chuck, an electric motor and the mechanism meant for driving the chuck at different speeds are mounted on the top of the upper arm. Power is transmitted from the electric motor to the drill chuck.



COMPONENTS

- **Motor :-**
It is an electrical device which converts electrical energy to mechanical energy. It rotates shaft which support by bush in it when power is supply through rectifier. This shaft connect with drill bit through chuck to rotate drill bit and make hole on workpiece when it is required. Most electric motors operate through the interaction between an electric motor's

magnetic field and winding currents to generate force.



- **Connecting Rod :-**

It connects the two Frames to each other for supports between them to help to move when we required. It consists of metal strips of two sizes one of 12" (inch) and another is of 15" (inch). One is the four pieces of equal length and other is two pieces of equal length. A hinge is a mechanical bearing that connects two solid objects, typically allowing only a limited angle of rotation between them. Two objects connected by an ideal hinge rotate relative to each other about a fixed axis of rotation: all other translations or rotations being prevented, and thus a hinge have one degree of freedom. In a many joints function as hinges like the elbow joint. In Hinges appear in large structures such as elevated freeway and railroad viaducts. These are included to reduce or eliminate the transfer of bending stresses between structural components, typically in an effort to reduce sensitivity to earthquakes. The primary reason for using a hinge, rather than a simpler device such as a slide, is to prevent the separation of adjacent components. When no bending stresses are transmitted across the hinge it is called a zero moment hinge.

- **Bearing :-**

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts. Rotary bearings hold rotating components such as shafts or axles within mechanical systems, and transfer axial and radial

loads from the source of the load to the structure supporting it.



- **Nuts & Bolts :-**

A Nuts & Bolts joint is a one-degree of freedom kinematic pair used in mechanisms. Nuts & Bolts joints provide single-axis translation by utilizing the threads of the threaded rod to provide such translation. This type of joint is used primarily on most types of linear actuators and certain types of Cartesian robots. A Nuts & Bolts joint is sometimes considered as a separate type but it is actually a variation of bolted joint. The difference is that a bolt is used, thus requiring an internal thread in one of the jointed parts. This can save space, however, continuous reuse of the thread would probably damage the coils, making the whole part unsuitable. Some nuts threads are designed to mate with a complementary thread, known as a female thread (internal thread), often in the form of a nut or an object that has the internal thread formed into it. Other nuts threads are designed to cut a helical groove in a softer material as the bolt is inserted. The most common uses of nut & bolt are to hold objects together and to position objects.



- **Drill Chuck :-**

A drill chuck is a specialized clamp designed to hold drill bits in place while they are being rotated by the drill. The chucks nearly always have three or four jaws that press down on the drill bit so that it won't slip when it pressed against a surface that it needs to penetrate. They can also be used to hold bits and tools heads of other rotary tools. Once a bit is inserted into the chuck, the jaws are tightened on the bit by rotating a threaded screw. The screw threads

and the threads on the backs of the jaw pieces are on an angled surface. By turning the screw to the right, the screw moves down the tapered surface to the thicker area, this causes the jaws to press against the bit.



• Drill Bit :-

In which drill bit are used of twisted type drill. It is of material Carbon Steel. Its diameter is of 2mm. This is used to make drill on wood, plastic and light metals. 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 the drill bit is usually between 1:1 and 1:10. Much higher ratios are possible (e.g., "aircraft-length" twist bits, pressured-oil gun drill bits, etc.), but the higher the ratio, the greater the technical challenge of producing good work



• Battery

The 12 volt battery is more common than most people know. In fact, the majority of people do not even know what 12 volt is. It's funny when a person finds out that their car or truck is a live operating 12v dc system. Truckers and Motor Home owners will most likely be aware of their battery bank situation. Most of these vehicles carry a pack of 6 volt or 12 volt deep cycle batteries on board. If 6 volt batteries are in use in a 12 volt system there is a special wiring technique that is used to turn two 6 volt batteries into a single very deep capacity 12 volt battery.



• Roller :-

It's a support the arm or connecting rod for proper movement of drilling machine.

WORKING

- In which all the component is mounted on base of model. This support the arm to move freely.
- Arm rotates manually when where it is required.
- Motor are mounted on Arm which moves where drilling work want to be done on workpiece.
- Put drill bit point on workpiece area where drill is required.
- Switch on the motor head which is require to ON for starting the motor.
- This rotates motor and also bit rotates.
- After make hole where on work piece is required.
- Then OFF the switch and motor stop.

Advantage:-

1. EFFICIENT DRILLING
2. 360 DEGREE ROTATION
3. FLEXIBLE
4. EASY TO USE
5. LOW COST
6. REDUCE HANDLING COST
7. REDUCE TIME
8. REDUCE OVERALL MANUFACTURING COST
9. INCREASE PRODUCTIVITY

Application:-

1. To put holes with high precision on engine heads, blocks and cylindrical shell.
2. Used in furniture making.

CONCLUSION

This project is an efficient operation and competitive cost. Since a number of operation and hole can be performed in a simple unit. It is efficient and economical. Considering its uses and cost of project, it becomes relatively cheap when compared to other units

Future Scope

1. It is used in industries.
2. It is used with automation for automatic drilling.
3. In future it is used in every field where drilling is required.
4. Also use this method of rotation of arm in other machining operation.

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