STUDY & FABRICATION OF ANGULAR DRILLING MACHINE

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ABSTRACT

Now a day, machines are widely controlled by embedded system. To meet the need of exploding population economic and effective control of machines is necessary. Our project even is rotated to easily drill at any direction. So that job setting operation is not complicated as well as reduces the setting time for the operation. It also takes into consideration the most effective method of controlling the drilling machine by manually. Materials like wood, plastic and light metals can be drilled with this. The work piece is fixed on the work table, which is provided with a moving arrangement. The drilling machine is one of the most important machine tools in a workshop. In a drilling machine holes may be drilled quickly and at a low cost. The hole is generated by the rotating edge of a cutting tool known as the drill, which exerts large force on the work clamped on the table. The machine tool used for drilling is called drilling machine. The drilling operation can also be accomplished in a lathe, in which the drill is held in the tailstock and the work is held and rotated by a chuck. This angular drilling is performed for Different Angle Drilling in the working job. Indexing Plate and Up/down mechanism is available in this Angular Drilling Machine.

INTRODUCTION

Drilling machine is one of the most important machine tools in a workshop. It was designed to produce a cylindrical hole of required diameter and depth on metal work pieces. Though holes can be made by different machine tools in a shop, drilling machine is designed specifically to perform the operation of drilling and similar operations. Drilling can be done easily at a low cost in a shorter period of time in a drilling machine. 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. The basic parts of a drilling machine are a base, column, drill head and spindle. The base made of cast iron may rest on a bench, pedestal or floor depending upon the design. Larger and heavy duty machines are grounded on the floor. The column is mounted vertically upon the base. It is accurately machined and the table can be moved up and down on it. The drill spindle, an electric motor and the mechanism meant for driving the spindle at different speeds are mounted on the top of the column. Power is transmitted from the electric motor to the spindle. The working operation of this angular drilling machine is initially started from the universal motor through A.C. Power source. In this, there is one power sources, received from the power supply. After that the indexing mechanism

MATERIALS AND METHODS:

Fig.1: Angular Drilling Machine

Our project even be rotate easily drill at any direction. So that job setting operation is not complicated as well as reduces the setting time for the operation. It also takes into consideration the most effective method of control in the drilling machine by manually. Materials like wood, plastic and light metals can be drilled with this. The work piece is fixed on the work table, which is provided with a moving arrangement. As the machine tool exerts vertical pressure to original a hole it loosely called a "drill press". This Angular Drilling is performed for Different Angle Drilling in the working job. Indexing Plate and Up/down mechanism is available in this angular Drilling Machine.

COMPONENTS USED:

1. Bevel Gears

Fig.2: Bevel gear

2. Leadscrew
3. Adjustable Drill Universal Motor

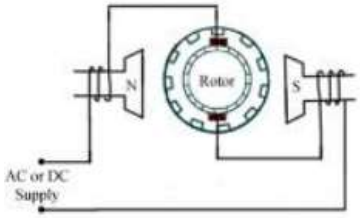

Fig.3: Universal Motor

4. Speed Regulator
5. Indexing Mechanism

Machining and design parameters:

Cutting Speed (v)

It's the peripheral speed of the drill. The cutting speed depends upon the properties of the material being drilled, drill material, drill diameter, rate of speed, coolant used etc.

$$v = \Pi * D * N$$

Where; D= diameter of the drill in mm, N = Speed of rotation in rpm

Feed Rate (f):

It's the movement of drill along the axis (mm/min).

Depth of Cut (d): The distance from the machined surface to the drill axis.

d=D/2mm as the depth of hole increases, the chip ejection becomes more difficult and the fresh cutting fluid is not able to cutting zone. Hence for machining the lengthy hole special type of drill called 'gun drill' is used.

Material Removal Rate: It's the volume of material removed by the drill per unit time.

$$MRR=(\Pi * D2/4) * f * N \ldots\ldots mm3/min$$

Machining Time(T): It depends upon the length (l) of the hole to be drilled, to the Speed (N) and feed (f) of the drill. $t = L / f$ min.

Recommended Tool Speeds for High Speed Tooling:

Higher quality tooling can often allow you to run faster RPM rates and/or more aggressive feed and thrust rates but typically require higher HP for the process as well. A typical drill press often has an RPM limitation of between 2000-3600 RPM. If the speed specifies a higher RPM than your machine is capable of, it should not cause a problem to run at a lower RPM. For instance, many people drill1/16″ holes at less than 10,000 RPM with no problems. The process of drilling holes in metal or similar materials without coolant is possible but not suggested. In most metals, the RPM rate can be decreased to 25% of what is calculated. In stainless steel, the RPM rate must be decreased significantly more as stainless steel does not dissipate heat easily and will almost immediately ruin the tip of your tool. It is often helpful to take a heavier cut in stainless than a lighter one to keep the tip of the tool in "cool" material rather than near the surface that was recently heated up by the last pass of the tool tip.

Working process:

- The working operation of this angular drilling machine is initially started from the universal motor through A.C. Power source.
- In this, there is one power sources, received from the power supply.
- After that the indexing mechanism is controlled, to fix the desired angle.
- A lock nut is attached to the indexing plate to avoid and deviation of angle during drilling.
- According to the requirement of drilling it will tilt very precisely.
- The rotary motion of the indexing plate is given to the bevel gear.
- This rotary motion is given to the shaft and used to rotate the Drill head.
- The depth of cut will be adjusted by the screw in the drill head structure.
- The speed of motor is controlled using Regulator.
- After that motor is started the desire angle and desire speed is fixed then drilling process performed.

- With the help our project we can achieve the angular drill hole very precisely.

Fig. 4: Simple model of angular drilling machine

Advantages:

- This system determines the accurate position.
- This system reduces the manufacturing lead time.
- This system eliminates the geometrical error of the drill hole.
- Highly accurate and more efficient.
- Compact and quick response

Application:

- To put angular and straight holes with high precession on engine heads and blocks and cylindrical shell
- Used in general furniture making angle

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