

Study & Analysis of Multi-Function Drill Press

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Abstract – This paper present the study of Multi-Function Drill Press in different locations. All countries are using the drill press but have limited functions related to drilling only. So we have made a system that can perform the functions of multiple machines in a single unit a single power source. This system can be used at homes, colleges, and, small workshops where space and money are limited. Since the utilization of space is very much relevant and important for homes, college's small workshops, etc. It is a simple and compact system when compared to existing systems.

Key Words: Multi-Function, Single source, Compact, Portable, Spindle

1. INTRODUCTION

The drilling machine or drill press is one of the most common and useful machine tools in a workshop. Drilling is the most common machining process; one estimate is that 75% of all metal cutting material removed comes from the drilling operation. Apart from drilling we have required many other operations and for that, we use other machines but that comes with an additional cost, space, etc. So to reduce these factors, we overcome with an idea of a multi-function drill press that can perform many functions using a single rotary device with the help of different modes and accessories.

1.1 Needs of Multi-Function Drill Press

The drill press available in the market is limited for its uses but in a workshop, we have to perform many operations for which we use multiple machines while those machines are not used to their full extent since the small workshop, home colleges have a limitation of work and space. For such cases, we found that our project is most suitable as being a single unit it can perform functions or operations which are performed by various machines. It can be needed for drilling holes, woodworking, workshops, and home.

1.2 Functioning

The drill press function on a simple principle that when the power is supplied to the motor it starts rotating which made the spindle to rotate thus the chuck rotates and then the drill tool rotates which has a sharp edge which when rotating and pressure is applied to the workpiece through the drill the edge starts removing material from the workpiece in the form of chips thus the required hole is made up to the required depth.

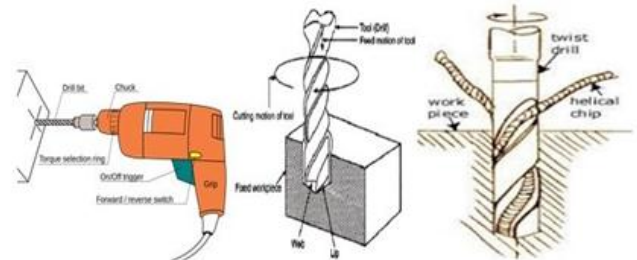


Fig -1: Basic Functioning

2. STUDY AND ANALYSIS

The cutting speed and feed in drilling, as in the case of other machines, depending upon many factors like material to be cut, the material of the tool, type of finish required, and type of coolant used, the capacity of the machine, and the tool life, etc. The amount of feed per revolution usually varies between 0.05 mm to 0.38 mm for drills up to 25 mm dia.

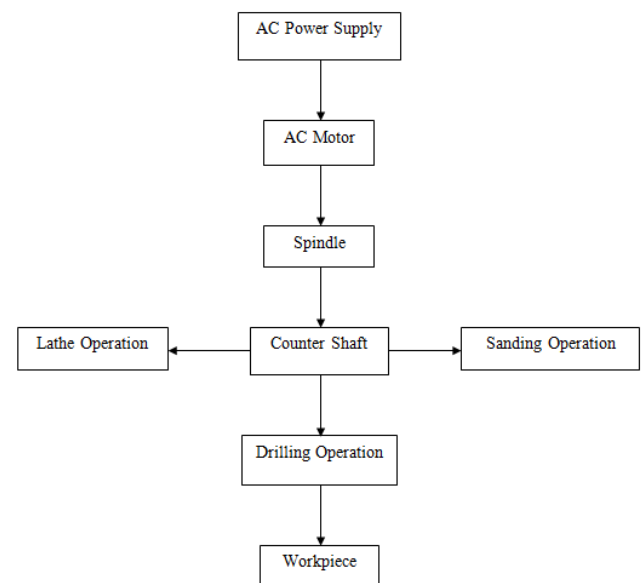


Chart -1: Block Diagram

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, the coolant used, etc...

$$\text{Cutting Speed} = 1000 / \pi DN \text{ where}$$

D = Drill diameter in mm, and

N = Spindle speed in rpm.

Feed Rate (f):- It is the distance a drill moves, parallel to its axis, into the work in each revolution of the spindle. It is expressed in mm per revolution. If the total distance moved by the drill into the work, parallel to its axis, in one minute is considered, it can be expressed as feed-in mm per minute. Now, if N be the No. of revolutions made per minute by the drill, then

$$\text{Feed in mm/min} = \text{feed-in mm/rev} \times N$$

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

$$\text{MRR} = (\pi D^2 / 4) * f * N \text{ mm}^3 / \text{min}$$

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

$$T = L / f N \text{ min}$$

3. CONCLUSIONS

With the idea of view, we have completed the project titled "MULTI-FUNCTION DRILL PRESS" By this machine various operations can be performed using the same power. So this device is used for various operations with less amount of investment. It saves space, labor, and suitable for small workshops. This is one of the most reliable and simple machines in the machine shop in which many operations can be done.

It is to be presented for increasing their productivity as well as the quality of the job. It also gives a description of the machine mechanism and its different main parts of the machine. In this we are defining different process parameters like spindle speed (rpm), cutting feed rate, cutting force, torque, and power for their efficient working of operation.

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