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**Abstract**

Multi-Function Operating Machine mainly carried out for production based industries. Industries are basically meant for Production of useful goods and services at low production cost, machinery cost and low inventory cost. Today in this world every task have been made quicker and fast due to technology advancement but this advancement also demands huge investments and expenditure, every industry desires to make high productivity rate maintaining the quality and standard of the product at low average cost. We have developed a conceptual model of a machine which would be capable of performing different operation simultaneously, and it should be economically efficient .In this machine we are actually giving drive to the main shaft to which main bevel gear. On the main shaft we have use bevel gear system for power transmission at three locations. Through bevel gear we will give drive to drilling centre and grinding centre and cutting centre. The model facilitate us to get the operation performed at different working centre simultaneously as it is getting drive from single power source. Objective of this model are conservation of electricity (power supply), reduction in cost associated with power usage, increase in productivity, reduced floor space. In mass Production each operation is carried out step by step manner in a continuous order by transporting the work piece from one machine to another in a sequence. Thus the transferring of work piece from one machine to another consumed time, human effort as well as power consumption for each and every machine. Thus our project is the fabrication of machine which came with the breakup for time consumed for the shifting of work piece as well as the power consumption leading to high productivity, low production cost as well as the decreased capital cost Since the cost of our multipurpose machine is less than the total cost of all the machine purchased separate.

**Index Terms:** *Shaft, Bevel Gear, Ball Bearing, AC Motor, Cutting tool, Grinding machine, Drilling machine, etc.*

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**1. INTRODUCTION**

**Production Engineering** is a combination of manufacturing technology with management science. A production engineer typically has a wide knowledge of engineering practices and is aware of the management challenges related to production. Today in this world, all activities have been made ever faster thanks to technological progress, but this progress also requires huge investments and expenses. Each industry wants to achieve a high productivity rate while maintaining the quality and standard of the product at a low average cost. My Research describes the design of a “Multi-Purpose Mechanical Machine” which is based on the concept of concurrent engineering to perform multi-

operations such as cutting, drilling, grinding. Suppose a work piece requires many operations to be done at the same time but the tools are situated in various locations in the plant layout, a multi-purpose mechanical machine can be devised that does the job effectively and efficiently. For a developing industry these operating performed and the parts or components produced should have its minimum possible production cost, then only the industry runs profitably.

**1.1 Drilling Operation**

Drilling is a cutting process that uses drill bit to cut or enlarge a hole of circular cross-section in solid materials. The drill bit

is a rotary cutting tool, often multipoint. The bit is pressed against the workpiece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the workpiece, cutting off chips (swarf) from the hole as it is drilled.

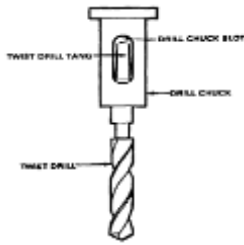


Fig-1: Drilling Tool

### 1.2 Cutting Operation

A circular saw is a power-saw using a toothed or abrasive disc or blade to cut different materials using a rotary motion spinning around an arbor. A circular saw is a tool for cutting many materials such as wood, masonry, plastic, or metal and may be hand-held or mounted to a machine. Circular saw blades are specially designed for each particular material they are intended to cut and in cutting wood are specifically designed for making rip-cut cross-cuts, or a combination of both.



Fig-2: Cutting Tool

### 1.3 Grinding Operation

A grinding machine, often shortened to grinder, is any of various power tools or machine tools used for grinding, which is a type of machining using an abrasive wheel as the cutting tool. Each grain of abrasive on the wheel's surface cuts a small chip from the workpiece via shear deformation. Grinding is used to finish workpieces that must show high surface quality (e.g., low surface roughness) and high accuracy of shape and dimension. As the accuracy in dimensions in grinding is on the order of 0.00025 mm, in most applications it tends to be a finishing operation and removes comparatively little metal, about 0.25 to 0.50 mm depth. However, there are some roughing applications in which grinding removes high volumes of metal quite rapidly. Thus, grinding is a diverse field.



Fig-3: Grinding Tool

## 2. WORKING PRINCIPLE

In this project, we have used single mechanism is a bevel gear arrangement to transfer the power at different work centers. Firstly we start the electric motor, With the help of a a.c. motor power is supplied to the shaft on which a bevel gear is mounted and three more bevel gear, two gears at a right angle to main shaft and one gear opposite to the shaft has been mounted. The other two shafts at right angle are provided with cutting blade and grinding wheel which start operating when the power is supplied to the main shaft. All tools of machine start operating along with main shaft due to meshing between them by means of bevel gear. The shaft opposite to the main shaft is provided with drill bit. This machine is operated by A.C motor. This model of the multi operational mechanical machine may be used in industries and domestic operation which can perform mechanical operation namely drilling, cutting, grinding.

### 2.2 Problem Definition

There is no any such machine is available which can perform all these operation in a single machine. Due to which we purchase the separate machine for all these operation and cost of this individual machine is more and required the separate electric power to run this machine and also the separate operator. Due this problem ultimately increased the production cost and required the more space for installation this machine .

### 2.3 Solution

To solve the above problem we have developed the one single machine on which we can perform the three to four operation simultaneously or individual. These machine perform multipurpose operation at same time with required speed & this machine is automatic which is controlled or operated by motor which is run with the help of current. This machine is based on the of bevel gear mechanism. The model of the multi-purpose mechanical machine is may be used in industries and domestic operation which can performed mechanical operation like drilling, cutting & grinding of metallic as well as wooden material.

### 3. DESIGN AND WORK PLAN



Fig-4: Design of Multi-Purpose Mechanical Machine

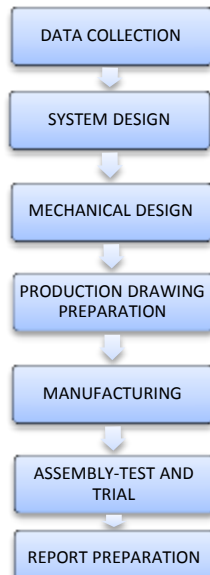


Fig-5: Work Plan Chart

### 4. ADVANTAGES

- This machine performed the four operation simultaneously such as cutting, grinding and drilling.
- It required the only one electric motor
- It saves the cost of the machining
- It can saves the floor space
- It saves the material handling cost

### 5. APPLICATIONS

- This machine can be installed in any mechanical industry.
- This machine can be installed in automobile, gear, steel, agriculture industry.

### 6. CONCLUSION

We know that aim of every production based industry is to minimize the production cost and increase the production rate which can be achieved by utilization of multi operational mechanical machine. This machine reduces the power as well as time consumption by providing different operations at same time.

### ACKNOWLEDGEMENT

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