

# DESIGN AND FABRICATION OF MULTI-FUNCTIONAL MECHANICAL MACHINE

Dr O P Upadhyay

Department of Mechanical Engineering  
IET, MJP Rohilkhand University, Bareilly

## ABSTRACT

*This paper deals with design, development and fabrication of “MULTI-FUNCTIONAL MECHANICAL MACHINE”. This machine is designed for the purpose of multi operations viz. DRILLING, CUTTING and GRINDING. This machine performs the multipurpose operation at a same time with the required speed. This machine is automatic and is controlled or operated by motor which is runs with the help of current. This model of the multi operational machine may be used in industries and domestic operation which can perform mechanical operation like drilling, cutting and shaping of a thin metallic as well as wooden model or body.*

*Keywords: Drilling, cutting, grinding, multifunctional*

## 1. INTRODUCTION

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. In an industry a considerable portion of investment is being made for machinery installation. So in this paper we have a proposed a machine which can perform operations like drilling, sawing, shaping, some lathe operations at different working centers simultaneously which implies that industrialist have not to pay for machine performing above tasks individually for performing operations simultaneously. Economics of manufacturing: According to some economists, manufacturing is a wealth-producing sector of an economy, whereas a service sector tends to be wealth-consuming. Emerging technologies have provided some new growth in advanced manufacturing employment opportunities in the Manufacturing Belt in the United States. Manufacturing provides important material support for national infrastructure and for national defense. This multifunction mechanical machine performs three operations at a time and we can also perform a single operation at a time by disconnecting the other two. The three operation performed are-

1. Drilling
2. Grinding
3. Cutting

This machine has been got fabricated by our B.Tech Final year students of Mechanical Engineering.

### 1.1 WORKING OF THE MODEL

In the conceptual model of “Multi-Function mechanical machine” we are giving supply to the main shaft, as we move along the axis of shaft, we have mounted a pair of pulley, through the pinion shaft we are giving drive to drill shaft through belt-pulley arrangement, we have installed the stepped pulley in the arrangement therefore we can make the speed variation. Now again as we move along the axis of main-shaft further we have again used the pulley arrangement to give the drive to grinding shaft. Power is transmitted from a 10 volt dc motor. Power is transmitted from the main shaft pulley to the drilling, grinding and cutting shaft pulley. We have used a light weight flat belt to transfer the power. Nut and bolts are used to fix the parts.

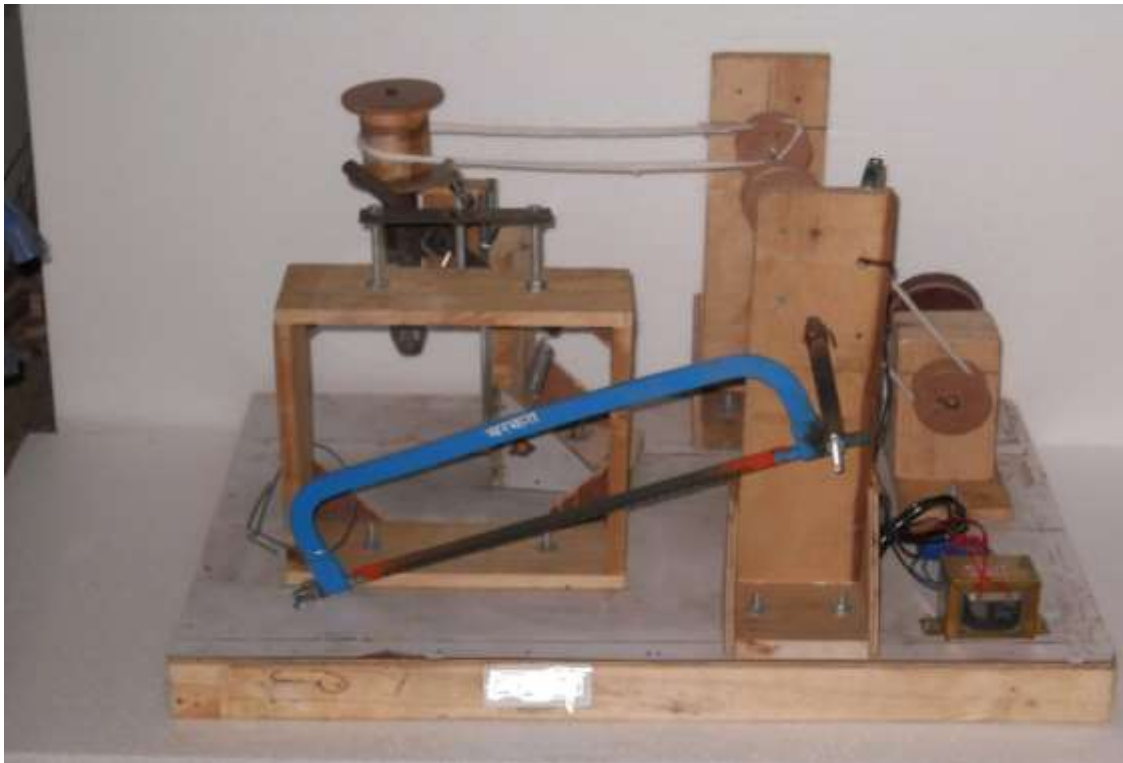


Fig. 1. Model of machine



Fig. 2. Set up of the machine



Fig. 3. Cutting operation by the machine

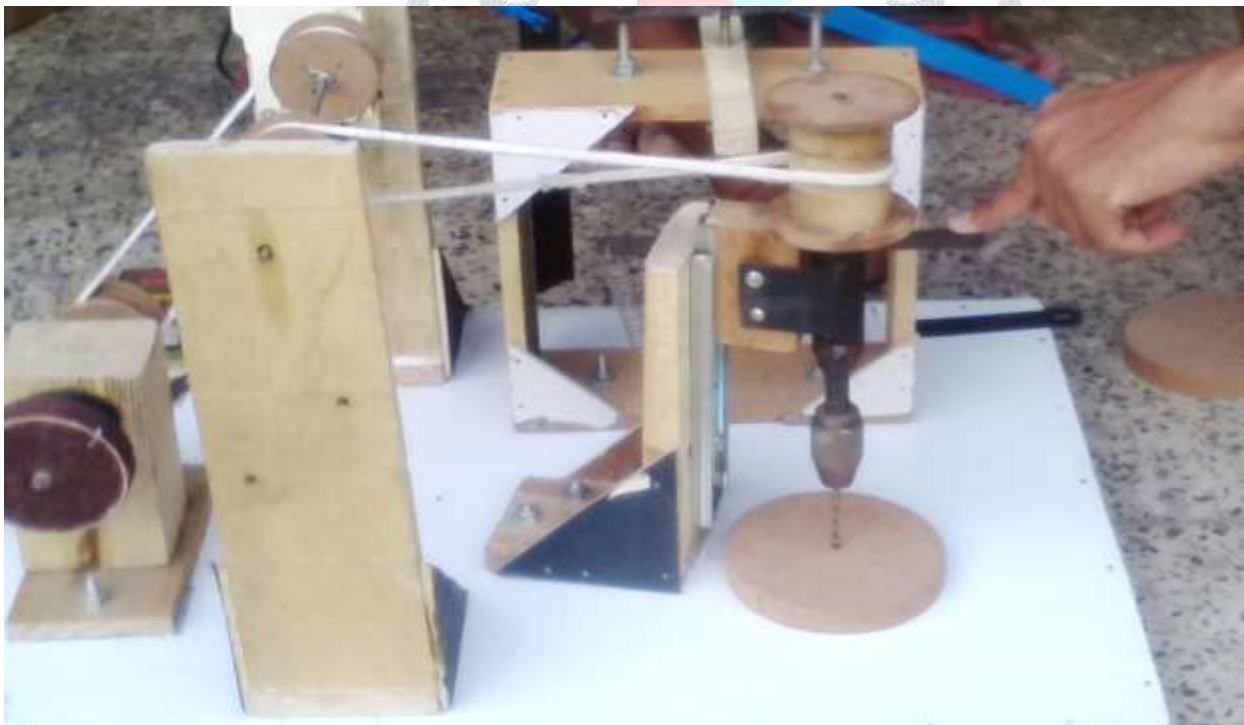


Fig. 4. Drilling operation by the machine





Fig. 5. Grinding operation by the machine

## 2.2. COMPONENTS OF THE MACHINE

- |                   |                  |                        |                  |              |
|-------------------|------------------|------------------------|------------------|--------------|
| 1. FRAME          | 2. MOTOR         | 3. PULLEY              | 4. HACKSAW BLADE | 5. TOOL POST |
| 6. DRILLING CHUCK | 7. DRILL TOOL    | 8. SINGLE CUTTING TOOL |                  |              |
| 9. TABLE          | 10. NUT AND BOLT | 11. BELT               |                  |              |

### 2.3. SPECIFICATIONS OF THE MACHINE

Length of machine-	59cm	Width of machine	44.5cm
Height of machine	37cm	Diameter of main shaft	0.445cm
Diameter of drilling pulley	4.65cm	Diameter of pulleys	4.14cm
Diameter of grinding wheel	7.48cm	Diameter of grinding shaft	0.64cm
Diameter of drill	0.29cm	Length of main shaft	32.6cm
Length of drill belt	63.8cm	Width of belts	0.5cm
Length of grinding belt	54cm	DC Motor	12 V
Transformer	0120		

### 2.4. SCOPE OF THE MACHINE

1. We can perform shaping operation also.
2. We can perform various operations like cutting, drilling or grinding individually by introducing coupling between them.
3. We can perform boring operation by introducing a boring tool by replacing drilling tool.
4. We can change the speed of motor by regulator.

### 2.5. ADVANTAGES OF THE MACHINE

1. Multi operations are performed at a time.
2. All operations are performed by only one motor.
3. Time saving
4. Less manpower is required.
5. Low manufacturing and maintenance cost.
6. Productivity increased.

### 2.6. COMPARASION BETWEEN SINGLE FUNCTION MACHINE AND MULTI-FUNCTION MACHINE

SINGLE-FUNCTION MACHINE	MULTI-FUNCTION MACHINE
1. Time consumption is more	Time consumption is less
2. Set-up cost is high	Set up cost is low
3. More power consuming	Less power consuming
4. Idle time is more	Idle time is less

### 3 CONCLUSIONS

We can see that all the production based industries need low production cost and high work rate which is possible through the utilization of multi-function operating machine, which will consume less power as well as less time, since this machine provides working at different centre it really reduces the time consumption up to appreciable limit. In any industry, a considerable portion of investment is being made for machinery installation. So in this paper we have proposed a machine which can perform operations like drilling, cutting, grinding at different working centers simultaneously. This implies that industrialist will not have to pay for separate machine for performing above tasks individually. One such multi functional machine is sufficient for different operations and thus will reduce the financial burden of purchasing separate machines. It is a machine which will consumes less time and operates three function drilling, grinding and cutting at the same time hence productivity will be increased with the help of this machine along with the reduction in the cost of production.

### References

1. Sharad Srivastava "Multi-function operating machine: A conceptual model", IOSR-JMCE May-June 2014.
2. Dr. Toshimichi Moriwaki "Trends in recent machine tool technologies", NTN 2006.

3. Heinrich Arnoldl”The recent history of the machine tool industry and the effects of technological change “University of Munich, Institute for Innovation Research and Technology Management, November 2001.
4. Frankfurt am Main “Multi-purpose machines ensure enhanced “, 1 January 2011.
5. V.B. Bhandari, Machine design book, vol (5),ISBN13:978-0-07-068179-8,pp330- 333, 2011.
6. PSG Design Data Book, (vol 5), Kalaikathir Achchagam – Coimbatore, May 2010.
7. www.wikipedia.com
8. www.Scribd.com

