

# Design and Fabrication of Multioperational Machine

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**Abstract:** This project work deals with the design and fabrication of Multioperational machine which is user friendly, easy to do exercise, save & stores the energy of the users muscle efforts. The aim of this work is to develop a modernized and less stressful operation for cutting wood, metals and plastic materials, punching of thin fiber sheets and use the power of wheel for battery charging. It is very useful for cutting PVC materials (pipes) and can be used widely in lather and in furniture making industries. This work can also serve as an exercising machine for fitness while cutting; it uses the principle of a slider crank mechanism which converts the rotary motion of the flywheel to the reciprocating motion of the hacksaw during pedaling. This project also deals with punching operation. At the same time the attached alternator operates and the mechanical energy is converted in to electrical energy, the generated electrical energy is stored in battery with the help of wires. The stored electrical energy is used when we are needed.

**Keywords:** Pedal power, Hacksaw, Punching, Reciprocating motion, Battery Charging.

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## 1. INTRODUCTION

The body fitness equipment's had major roll in routine life of city populates. Body fitness equipment's burns the fat and helps stay fit. There is high demand & use of body fitness equipment's due to lack of adequate space to work out. In present scenario of fitness industry, lot of research & development is carried out to bring fitness technology to door steps. There are incredible verity of instruments is available in market with verity of features. Multioperation performing machine is also such a fitness devise used to burn body calories, by means of pedaling the dummy wheel. By this, it could highlight that work out with machine has certain disadvantages, such as loss of human muscle power. Multioperation performing machine will convert the pedal power into brake power which is used for cutting and punching and the wheel power is used for charging the battery which is attached by alternator. So to overcome these barriers, the machine is needed to be employed for use full work. There are few solutions to operating Multioperation performing machine for useful work, such as cutting, punching, grinding and electricity generator. But there are no such satisfactory solutions with a low cost installation. The engineering solution is to adopt mechanically operate Multioperation performing machine an affordable cost and maximum flexibility with minimum maintenance.

Man invented most of the things for his comfort and convenience. Electricity is one of them. Now a day's electricity is produces from power plants (i.e. hydraulic power plant, thermal power plant) and those produces pollution but the Multioperation performing machine is pollution free electricity generating source.

## 2. PROJECT IDEATION

Current scenario of world is how to save electricity so the Multioperation performing machine is the machine which done many operation (i.e. cutting, punching, grinding) with using pedal power and save electricity and also produces some electricity.

### List of components with materials:

Following are the important parts of Multioperation Performing Machine.

NO.	COMPONENTS	MATERIAL	COST(in RS)
1	Frame	Mild Steel	1000
2	Material Holding Vise	Mild Steel	350
3	Hacksaw	Mild Steel	120
4	Flywheels	Mild Steel	220
5	Connecting Rods	Mild Steel	100
6	Punching Machine	Mild Steel	100
7	Alternator	Mild Steel	1200
8	Battery	-	300
9	Shaft	Mild steel	200
10	Miscellaneous		1000

### 3. LITRETURE REVIEW

#### 3.1) Cutting:

Cutting is the process of using cutting tool to cut the work piece with the help of hacksaw. The continuous cutting produce burs during the process. Lubricant or coolant can be used for ease Cutting and to cool the heat which is produced in work piece and the tool life can also be increased. Cutting can also be done in woods, metals, hard materials, etc.

#### 3.2) Punching:

Punching is a metal forming process that uses a punch press to force a tool, called a punch, through the work piece to create a hole via shearing. The punch often passes through the work into a die. A scrap slug from the hole is deposited into the die in the process. Depending on the material being punched this slug may be recycled and reused or discarded. Punching is often the cheapest method for creating holes in sheet metal in medium to high production volumes.

#### 3.3) Charging Mechanism:

An alternator is connected with rim with the help of belt drive, which convert mechanical energy into electrical energy and utilize it for charging the battery and storing the energy in it.

### 4. CONSTRUCTION AND WORKING

The cycle frame is fixed with the base mild steel by the process of welding the chain sprocket is connected to the cycle frame and it is connected to the pedals. We use two sprocket one sprocket is connected to the small sprocket which is mounted on the shaft and the shaft have mounted two flywheels one is for cutting operation and second is for punching operation and shaft also have mounted grinding wheel for grinding. The shaft is mounted by the help of pedestal bearing which is mounted on stand and the first flywheel have a connecting rod and one more connecting rod and which one end is connected with hacksaw and other is connected with first connecting rod. Flywheel is used for because it converts rotary motion into reciprocating motion which is use for cutting. At below the Hacksaw vise is mounted for holding cutting material .The second flywheel is content some load which is used for punching. Punching machine is mounted below the load. The another sprocket is connected to the rear wheel sprocket and the rear wheels is connected to alternator by rope drive and alternator is connected to the battery by the alternator cable which is used for mobile charging and other small power consuming works.

### 5. CALCULATION

Velocity Ratio (r)= 2.13

Angular velocity of front sprocket ( $\omega_{in}$ ) = 11.5rad/sec

Angular velocity of rear sprocket (flywheel velocity  $\omega_{out}$ ) = 24.60rad/sec

Linear velocity of flywheel (v) =2.46m/s

Centrifugal force (Fc)= .907KN

Power developed (P)= 2.23Kw

Torque(T) = 0.0907KN-m



## **6. APPLICATIONS OF MACHINES**

1. It is used for cutting PVC, metal or wood cutting.
2. It is also used for punching of thin fiber sheets.
3. It is used for battery charging.
4. Use the machine at home for exercise.

## **7. ADVANTAGES OF MACHINE**

1. You are doing exercise meanwhile battery is getting charged.
2. Saving of electricity.
3. Manufacturing cost is low.
4. Various modes of operation.

## **8. LIMITATIONS**

1. Not fit for heavy production
2. It is totally manually operated
3. Time consuming as compared to electrical powered hacksaw machines.
4. Without human effort it cannot be operated.

## **9. RESULTS AND CONCLUSION**

Thus the Multioperation Performing machine is designed tested successfully. The output is verified by cutting the metal pipes, plastics in the hacksaw by pedaling action, punching of thin fiber sheets and charging of battery. The following advantages were seen such as it is more convenient and easier. It is more eco-friendly. Power is not required.

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