

## Grass Cutting and Collecting Machine

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**Abstract:** A grass cutter is a machine that is used to cut grass in a lawn. The blades of the grass cutter are generally powered by pushing the mower forward. In current days, grass cutter machines are operated by fuel and electrical energy which are costly and requires high maintenance. Hence, in this study, a hand-held operated machine for grass cutting will be designed and fabricated by using economically available materials. Important aspects such as durability, strength, and light weight were taken into design considerations for better performance characteristics. The entire configuration set up will be mounted on a roller which will be attached together with a frame and a set of wheel arrangement. This portable grass cutter can be used to maintain and trim grass in gardens, home, schools or yards.

**Keywords:** Grass Cutting Machine, hand-held and Manual Operator

### I. INTRODUCTION

Grass cutter machines have become very essential to our daily living in maintaining the yards. Furthermore, environmental awareness on usage of grass cutting machines has caught a great interest among consumers. As a result, consumers are searching for ways to reduce and solve their own carbon footprints. Moreover, environmental pollution keeps increasing and it can be experienced in our daily life, particularly in our homes. Thus, high maintenance is needed in order to maintain a grass cutter. For instance, one should change the fuel or oil regularly so that the grass cutter works efficiently during the process of grass cutting. Furthermore, this will incur extra variable cost since the fuel price has been increased lately.

In order to overcome these issues, an eco-friendly grass cutter needs to be designed and fabricated in order to support the green technology initiatives. Besides that, the grass cutting machine was fabricated at low cost by taking consideration on important aspects such as lightweight, durable, and environmentally friendly. A grass cutter is a machine that uses cutting blades or strings which is used to cut the grass in gardens or yards at an even length. Grass cutting machine is a type of machine that uses one or more than one blades for cutting a grass surface to a uniform height. The height of the cut grass is fixed by the design of this machine but mostly it can be adjusted by the operator either by a single master lever or by a lever or nut including the bolt-on every machine wheels. In agricultural fields or in nursery or even in house hold growing grass is commonly found problem. Removal of the grass is also a tedious job involving lot of human efforts. In the modern world as time for carrying out anything has reduced drastically so as to be done the removal of grass involving use of a machine. Grass is a plant which grows on farm land or other ground surfaces, this grass has to be cut frequently as it grows to maintain the ground surface clean or for aesthetic beauty.

To do this task, we make use of grass cutter. Grass mower is a machine that uses one or more rotating blades to cut the grass to an even height. Cutting blades are powered either by hand through pushing the mower forward to operate the mechanical blades. Grass mowers using a single blade that rotates about a vertical axis are known as rotary mowers, while those using a multiple blade assembly that rotates about a horizontal axis are known as cylinder or reel mowers. Grass Cutter works on the principle that, when the blade rotates, it imparts impact and shearing stress on grass, due to this grass is cut. Blades are made of carbon or stainless steel and cutting edges of it are hardened and tempered to suitable hardness for longer service life.

Grass cutter machines have become very popular today. In a time where technology is merging with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is man-made and can be seen in our own daily lives, more specifically in our own homes. Grass cutting machine is a machine which is going to perform the grass cutting operation manually. This model reduces both environment and noise pollution.

## II. LITERATURE SURVEY

**Akshay Ramteke et al. [1]**, this paper summarizes and reviews technological development for making efficient and cost effective grass cutter. Our aim is to study the various developments in the grass cutter machines and their performance. Current technology commonly used for cutting the grass by the manually handled device from the survey we found that various types of grass cutter available in market which are run by means of solar, electric and internal combustion engine. We are going to fabricate the grass cutting machine for the use cutting lawn grass.

**Mohammed Afan Ashraf, et al. [2]**, in current days, grass cutter machines are operated by fuel and electrical energy which are costly and requires high maintenance. Hence, in this study, a hand-held operated machine for grass cutting was designed and fabricated by using locally available materials. Important aspects such as durability, strength, and light weight were taken into design considerations for better performance characteristics. The lawn mower was powered by a 12V/1.35A rechargeable battery which drives the DC motor up to a rotational speed of 19,300 RPM. As a result, the generated torque will be transferred to the cutting head mechanism for efficient grass cutting. The entire configuration set up was mounted on a wooden base which attached together with a bicycle frame and a set of wheel arrangement. This portable lawn mower can be used to maintain and trim grass in gardens, home, schools or yards.

**Chetan k chavanet al. [3]**, now a day's grass cutters are important stage in agriculture field. Currently in India farmers used conventional method for the grass cutting purpose. i.e., manually cutting using labour but this method is lengthy and time consuming. This project aim is to design and analysis of these small field grass cutter machine for small height grass. This project is to analysis cutting roller and horizontal cutting blade by using ANSYS software. The machine consists of horizontal cutting blade to operate cutting roller. This manual grass cutting machine has a capacity to cut the grass in faster and economically low of cost. This machine is helpful for both the small farm as well as gardens.

**Aditya S. Rajmani et al. [4]**, due to the continuous increase in the cost of fuel and the effect of emission of gases from the burnt fuel into the atmosphere, this necessitated the use of the abundant solar energy from the sun as a source of power to drive a lawn mower. A solar powered lawn mower was designed and developed, based on the general principle of mowing. The designed solar powered lawnmower comprises of direct current (D.C) motor, a rechargeable battery, solar panel, a stainless-steel blade and control switch. Mowing is achieved by the D.C motor which provides the required torque needed to drive the stainless-steel blade which is directly coupled to the shaft of the D.C motor. The solar powered lawnmower is operated by the switch on the board which closes the circuit and allows the flow of current to the motor which in turn drive the blade used for mowing. The battery recharges through the solar charging controller. Performance evaluation of the developed machine was carried out with different types of grasses.

**S.O. Nkakini, et al. [5]**, a manually operated apparatus for cutting grass was Design, fabricated and tested. The apparatus was Design with an internal spur gear system which transfers the torque to the mower spiral mechanism. The cutting mechanism is made of a flat blade rigidly fixed to the frame behind the spiral arrangement which is configured to contact at least one reel bar of the spiral blades during the rotation of the spiral mechanism. The machine's performance evaluation was conducted in the RSUST research farm. The field capacity of 0.115 ha/hr. and field efficiency of 63.2%, were obtained. The cutting effectiveness was achieved with a total power of 934.3watts at a rotary speed of 1500rpm of shaft. Its friendly to the environment, because it does not emit carbon monoxide into the environment and the noise level is drastically reduced. The machine is more efficient in a soil with low moisture content.

## III. OBJECTIVES AND METHODOLOGY

### 3.1 Objectives

The objective of the project is to design the manually operated grass cutter. The purpose is to avoid fuel consumption and reduce the human effort, operating cost and maintenance cost. Also, this grass cutters are environmentally friendly it is used for various applications. The whole machine operates manually.

The main objectives of this proposed machine are as follows:

- To integrate mower and trimmer that can be used simultaneously.
- To reduce the cost of the grass cutter.
- It can be operated by unskilled labours.
- To make it environment friendly.
- Design should be 'Simple' to operate and 'Safe'.
- The design should be Robust and Reliable.

### 3.2 Methodology

The Grass cutter works on the principle of slicing action of the blades. The grass was cut above the ground surface without damaging the blades when it strikes on immovable object such as rock, stone. The grass cutting takes place due to impact and shearing action also.

There are few advantages of this newly designed Grass Cutter. Firstly, the Grass cutter has two wheels which allows the user to maneuver the cutter freely. Moreover, the weight of the Grass cutter will be supported by the training wheels and hence less effort or workforce is required by the user. Besides that, since the cutting head will be installed in front of the base, therefore the lawn mower will be able to operate around acute areas such as trees or fences. With this simple design concept, the weight of the Grass cutter can be reduced immensely.

## IV. WORKING PRINCIPLE

A Manual Grass Cutter is shown in the Fig. 5 is an efficient cutter in which the blades spin vertically and use a scissoring action to cut the blades of grass. After all, your physical action moves a manual mower across the lawn and also powers the blades. A Grass Cutter is a perfect machine utilizing revolving blades to cut a grass surface to an even height. The height of the cut grass may be fixed by this design of the grass cutter, but generally is adjustable by the operator. Instead of splitting and chopping your grass, a manual grass cutter cuts your grass just like a pair of scissors. This will help you to maintain and clean the garden area. It assists to cut the excess growth of the grass; it is light weight, easy to operate with no maintenance. It is perfect for the small as well as big lawns.

### 4.1 Components

The project work required better frame for better support and stability. The frame material was initially collected and fabricated depending on the size required. The overall fabrication of the project model was done starting from frame to end project. The various steps involved in the fabrication of the project are measurement, marking, cutting, welding, cleaning, painting, and implementation. The Components Used for Grass Cutter and Collecting Machine are Shown in the Fig. 1, Fig. 2, Fig.3 and Fig. 4.

1. Cutting unit
2. Supporting frame
3. Handle
4. Transportation wheel

## V. FIGURES



Fig: 1 Cutting Unit



Fig: 2 Supporting Frame



Fig: 3 Handle



Fig: 4 Transportation Wheel



Fig: 5 Grass Cutting and Collecting Machine

## VI. CONCLUSION

### 6.1 Conclusion

This Project will help people to understand the relevance of mechanized grass cutter, which is not a huge time consuming and significantly improves grass cutting efficiency as well as the quality. In the world today, all machines are designed with the aim of reducing or eliminating greenhouse gas emissions which is the major causes of climate change. This grass cutter will meet the challenge of environmental production and low cost of operation since there is no cost for fueling. A grass cutter has been developed for the use of residences and establishments that have lawns where tractor driven mowers could not be used. It has been observed that literature pertaining to grass cutter design and development is comparatively lesser. In the present studies, different aspects of solar powered, plug on electric, guided grass cutter have been presented. With this background, the present studies direct design and development of a low-cost manual grass cutter. It has also been observed that the technological variations of commercially available grass cutter are not abundant.

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