# ENGINE PROPELLED GRASS CUTTER ON VARIABLE FUEL

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**ABSTRACT -** A brief history of the grass cutter and the different innovations that developed over the years will be researched and discussed. This discussion will include the functionality of the different styles over the ages, especially the abilities of the powerful cutters. The research work was done on two different 4- stroke petrol engine based grass cutters those are used to cut the grass of different sizes of the lawn to find out the efficiency of engine in the terms of area of lawn cut with respect to different fuel like normal petrol, low density polythene fuel and high density polythene fuel after conducting the test we found that the 4-stroke petrol engine of kinetic k 4 100 based grass cutter cuts the 7cm height grass of 1000 sq.ft. with the consumption of 1liter petrol after taken a time period of 135 minutes. Instead of that when same engine is run with the help of low density polythene fuel it cuts the grass of 1035 sq. ft. from the lawn with in 140 minute when runs uniformly. On the other hands small size engine used for agriculture sprayer is used as a lawn grass cutter which cuts the grass of 1120 sq.ft of same size from the lawn with in 148 minute after consuming 1liter petrol .Further on same engine is runs on low density polythene fuel it cuts the grass of 7cm of 1180 sq.ft from the lawn within 162 minutes. After performing all the test on both engine we found that the k -4 street engine cuts more grass in less time when petrol is used as a fuel where as when engine runs with the help of low density polythene fuel it consume more time as compare when run by petrol but it gives the more mileage then to petrol engine.

**Key Words:** Grass Cutter,. LDPEF, Mechanical Efficiency, Time Consumtion ,Exhaust Gases, Performance.

## INTRODUCTION

A lawn mower is a machine that uses one or more revolving blades to cut a lawn to an even height. The blades may be powered either by hand; pushing the mower forward to operate the mechanical blade(s), or may have an electric motor or an internal combustion engine to spin their blades. Some mowers also include other abilities, like mulching or collecting their clippings.

Two main styles of blades are used in lawn mowers. Lawn mowers employing a single blade that rotates about a single vertical axis are known as rotary mowers, while those employing a multiple blade assembly that rotates about a single horizontal axis are known as cylinder or reel mowers.

There are several types of mowers, each suited to a particular scale and purpose. The smallest types are pushed by a human user and are suitable for small residential lawns and gardens. Riding mowers are larger than push mowers and are suitable for large lawns. The largest multi-gang mowers are mounted to tractors and are designed for large expanses of grass such as golf courses and municipal parks.

A transition from traditional hand-guided or ride-on mowers to automatic electric mowers is beginning to take place, with the growth in robotic lawn mower sales of 2012 being 15 times the growth in sales of the traditional styles. At current rates of growth automated lawn mowers are set to soon reach the point of outselling traditional mowers in some regions. Product lifecycle is being reduced drastically due to rapid changes in technology and customers requirements. The global marketplace is changing so rapidly that industrialist needs to adopt new strategies to respond customer's requirement and in order to satisfy the market needs more efficiently and quickly. Many companies especially in Japan, USA and Europe have already started to implement techniques and tools that would enable them to respond more quickly to consumer's demand in delivering high quality product at reasonable costs. The delay in time-to-market can be interpreted as a loss in profit (Alan F & Jan Chal, 1994). Currently, the implementation of Design for Manufacturing and Assembly (DFMA) methodology are applied either manually or computer-aided. Most of the applied interested in implementing DFMA are hindered by lack of clear guidelines or procedures and no integration of isolated design and manufacturing teams. The advantages of the integration are to decrease the number of part design and indirectly to reduce cost and time. At the same time, it fulfills customer's requirement. In this project, DFMA has been applied in design and development the grass cutting machine. The design also must be concerned to the requirement of the DFMA methodology in order to achieve high rank of market selling.

Figure: 1.Propeled rotator grass cutter

## LITERATURE REVIEW:-

## Introduction

To develop this project, the case study is to apply the Design for Manufacturing and Assembly (DFMA). There are certain important DFMA tools that have been applied such as Design for Assembly (DFA) and Design for Manufacture (DFM). These two important DFMA tools are very useful especially to the industry. This chapter described about the definition of Design for Manufacturing and Assembly (DFMA), Boothroyd Dewhurst DFA method, the Lucas DFA method, the application of DFMA in industry and application of engineering software called TeamSET.

### Design for Manufacturing and Assembly (DFMA)

Design for Manufacturing and Assembly (DFMA) is a design philosophy used by designers when a reduction in part counts, a reduction in assembly time, or a simplification of subassemblies is desired. It can be used in any environment regardless of how complex the part is or how technologically advanced this environment may be. DFMA encourages concurrent engineering during product design so that the product qualities reside with both designers and the other members of the developing team (DESPAT,2007).

According to Geoffrey Boothroyd, Professor of Industrial and Manufacturing at the University of Rhode Island, the practices now known as Design for Assembly (DFA), and Design for Manufacture (DFM) had their start in the late 1970's at the University of Massachusetts. Of all the issues to consider, industry was most interested in Design for Assembly. When developing a product, the maximum potential cannot be achieved without considering all phases of the design and manufacturing cycle. DFMA meets this demand by addressing key assembly factors before the product goes on to the prototype stage. These key factors are the product appearance, type, the number of parts required in the product, and the required assembly motions and processes (D-ESPAT, 2007). The Term "DFMA" comes with the combination of DFA (Design for Assembly) and DFM (Design of Manufacturing). The basic concept of it is that the design engineers apply the DFMA paradigm or software to analyze the manufacturing and assembly problems at the early design stage. By this means, all of considerations about the factors that affect the final outputs occur as early as possible in the design cycle. The extra time spent in the early design stage is much less the time that will be spent in the repeatedly redesign. And meanwhile, the cost will be reduced. DFM is that by considering the limitations related to the manufacturing at the early stage of the design; the design engineer can make selection among the deferent materials, different technologies, estimate the manufacturing time the product cost quantitatively and rapidly among the different schemes. They compare all kinds of the design plans and technology plans, and then the design team will make revises as soon as possible at the early stage of the design period according this feedback information and determine the most satisfied design and technology plan.

## METHODOLOGY

**Working principle of grass cuter**: The rotating blades continuously cut the grass as the mower is propelled forward 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. The cuter blades were made of spring steel and the edges were hardened and tampered to the suitable hardness for longer service life.

Figure: 2.Propeled rotator grass cutter

## RESULT AND CONCLUSIONS

Lawn mowers are an important part to many different places throughout the world. The role they play in agriculture and aesthetics of so many different types of lawns is much more important than people realize. Even a seemingly small industry, like lawn mowing, has so much development and designing that it becomes a prestigious art to some. Many people do not understand how much work and thought is put in to the smallest of things. If we use plastic fuel in the k 4 street 100 engine of the grass cutter then the efficiency for cutting the grass is increases with ten percentages with the comparison of normal petrol in the same engine but the drawback is also developed in the grass cutter due to plastic fuel which are as follows (i) It produces more noise and vibration. (ii) Exhaust gases are more toxic as compare to exhaust gases came from the Silencer of the engine when run over normal petrol. (iii) Time to cut the grass is increases.

But in case of hand grass cutter of small petrol engine (which is used in agriculture power sprayer to spray pesticides) provides lesser efficiency in plastic fuel and better due to normal petrol but it consume more time then to k 4 street 100 engine of the grass cutter.

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