



Design, Development and Fabrication of Lawn mover with auto collecting lawn

Guided By:

Prof.M.P.Rajpara

Team ID:28517

Chauhan Mayursinh M.(110780119043)

Modi Nishit K.(110780119052)

Patel HamidAli A.(110780119053)

Patel Khushbu K.(120783119029)

Group Number: 9

Contents

- Introduction
- History
- Definition
- Types of Lawn Mowers
- Overview
- Vibration Isolation
- Isolation Material
- Project Strategy
- Creo Model
- Effective Handle Design
- Various Design of Cutter
- Types of Blade
- Observation table
- Methodology
- Work Table
- Snap Shots
- Literature review
- References

Introduction

- The aesthetic value of his environment is as important as food and shelter to the modern man. In general, grasses are found to survive in a variety of conditions and thus the need to curtail their growth in order to enhance the beauty of our habitat environment.
- Conventional Grass cutting Machines produces number of unpleasant effects on human as well as environment.
- Running and maintenance cost of traditional grass cutting machines are high.
- Looking in to all these problems it was decided to develop a good machine with ease in operation and with low cost.

History

- The first actual mower was invented in 1830 by Edwin Beard Budding. Budding was an engineer from England who first discovered the idea of a mower from a cylindrical machine used for cutting in a mill.
- The mower that he developed was composed of a large roller which provided power to the cutting cylinder using gears. The cutting cylinder contained several blades connected in series around the cylinder.
- His innovation opened the door for numerous advancements in lawn cutting.

Definition

- A lawn mower is a machine used for cutting grass or lawns. A lawn is any area of grass; mostly tough grass which is neatly cut like in a private garden or a public park.



What is Lawn Mower?

- In early years, sheep and other animals were used to keep the lawn or yard trimmed.
- The animals used to graze the grass however in today's modern time a machine with rotating blades is used for cutting grass of lawns.
- These machines are called lawn mowers and they can be manual (hand-operated) or motor-driven.
- Some mower blades may be push forward and some may cut the grass to an even height with spinning of blades.

Conti...

- All the mowers have some what similar structure which includes a motor, rotating blade(s), moving around options and grass clippings dispenser.
- While searching for a lawn mower, please make sure that paying a high price here wouldn't really mean higher quality results. There are other factors to consider.



Types Of Lawn Mowers

- There are three types of lawn mower nowadays used in general.

They are as follow:

- Walk-Behind Mower
- Riding Mower
- Tow-Behind Mower

Walk-Behind Mower



Types of Walk behind lawn mower

1. Gas Powered Lawn Mowers
2. Electric Lawn Mowers
3. Manual Reel Lawn Mowers

Electric Lawn Mower

- The electrical powered mowers are suitable for land under 1/3 acres. They offer similar features to that of gas powered mowers including 3-in-1 feature, push or self-propel, wide cutting etc. but they save you fuel and maintenance cost.
- Moreover they have relatively quieter operation. These machines are environment-friendly with no carbon emissions.

- There are corded and cordless electrical mowers available and usually have a motor power between 6-12 amp. Cordless mowers operate on battery giving you ease of mowing around.
- These are most suitable for flat surfaces.

Riding Mower



- As opposed to walk-behind lawn mowers, the riding lawn mowers have a seat to ride on for mowing.
- It includes various controls that enable you to mow your lawn while being seated on this mower.
- These are suitable for larger lawns and are often termed as small farm tractor.
- These machines have powerful engines and cutting decks as compared to push mowers.

Tow-Behind Mower



- Tow-behind mowers are used for much larger areas, like massive fields, and are used much more in agriculture and road sides.
- Tractors or powerful vehicles must tow these devices. Most are mechanical, much like some of the first lawn mowers ever invented.
- They use the rotation and energy from being pulled over ground to rotate and cut grass, sod or whatever needs to be cut.

Overview

- To sort out problems regarding the traditional grass cutter is concern it is required to redesign the equipment.
- To enhance the performance of the equipment, it is essential to redesign the same.

Easy to Use Mower

- Lawn mower handle height should be adjustable.
- Hand grip should be comfortable (padded).
- Lawn mower should be light weight and easy to carry especially if you have steps to cross through your lawn.

Conti.....

- Clean and tidy trimmed lawn with neat cut of grass and weeds at an adjusted height.
- Lawn mowers reviews reveal that they have mulching, rear bagging and side discharge feature.
- Large wheels and a balanced control of lawn mower make lawn mowing easier and faster.

Additional Features

- Weight of machine is less.
- Compact and easy to store machine.
- Mower with mulching feature that gives back grass pieces to your lawn and it works as a natural fertilizer. You would be at ease and wouldn't need to pick up these clippings from your lawn.
- Grass collector (bigger capacity collector would need to be emptied less often during mowing process).
- Rear rolling option that gives you clean finished lawn mowing.
- Packed cables with corded mowers for easy handling.

Vibration Isolation

- Vibration isolation is essential practice in the lawn mower.
- It can be achieved by using a Vibration Isolator at an appropriate spot.
- It may be rubber, synthetic materials, polymer materials.

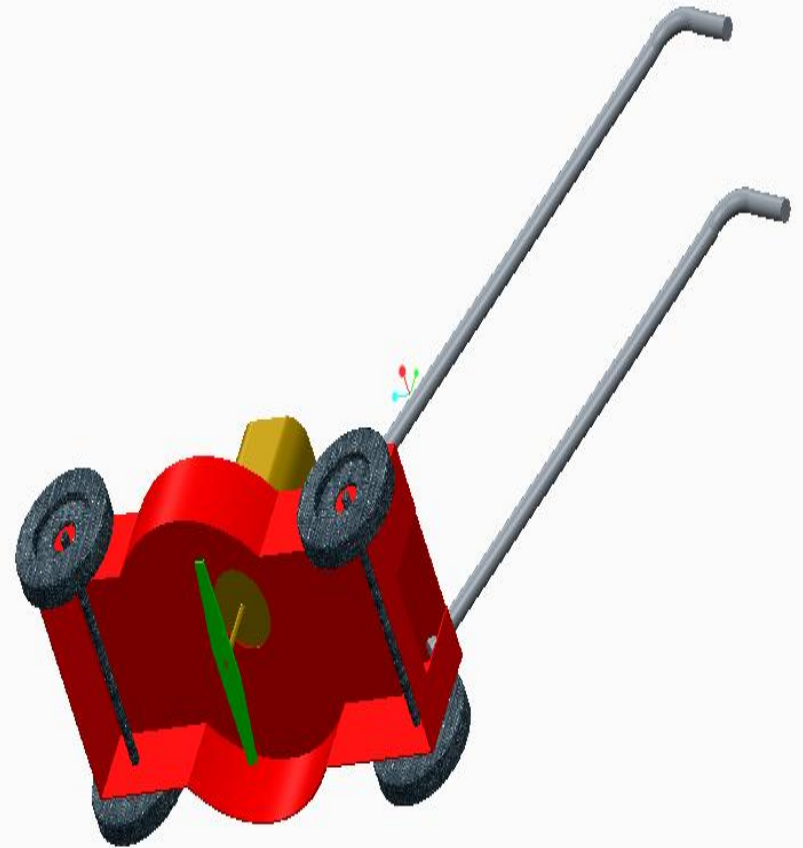
Isolation Materials

- There are mainly two kind of isolation material:
 1. Natural Isolation Material
 2. Synthetic Isolation Material

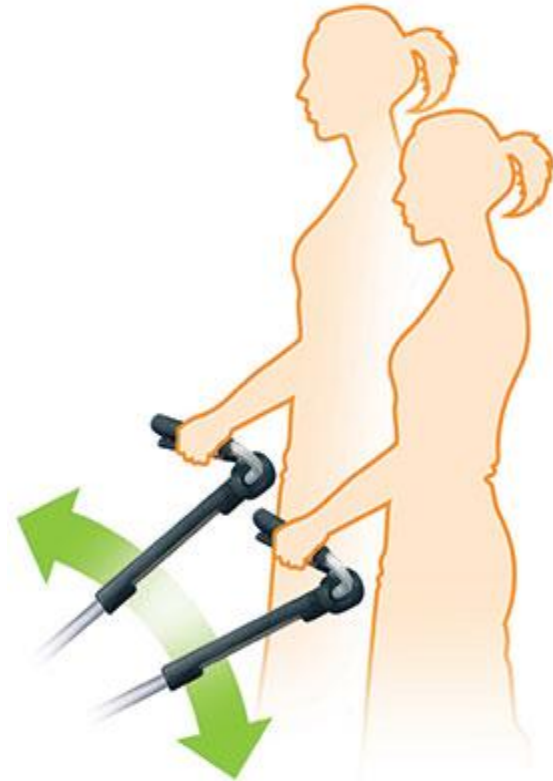
Project Strategy

- We had replaced conventional I.C. Engine from the lawn mower.
- We had upgraded the lawn mower by implementing the vacuum system on the rotary blade assembly.
- We don't need vibration isolation in order to damp the vibration due to cutting action of lawn mower because we fabricated balanced lawn mower.

Creo Model

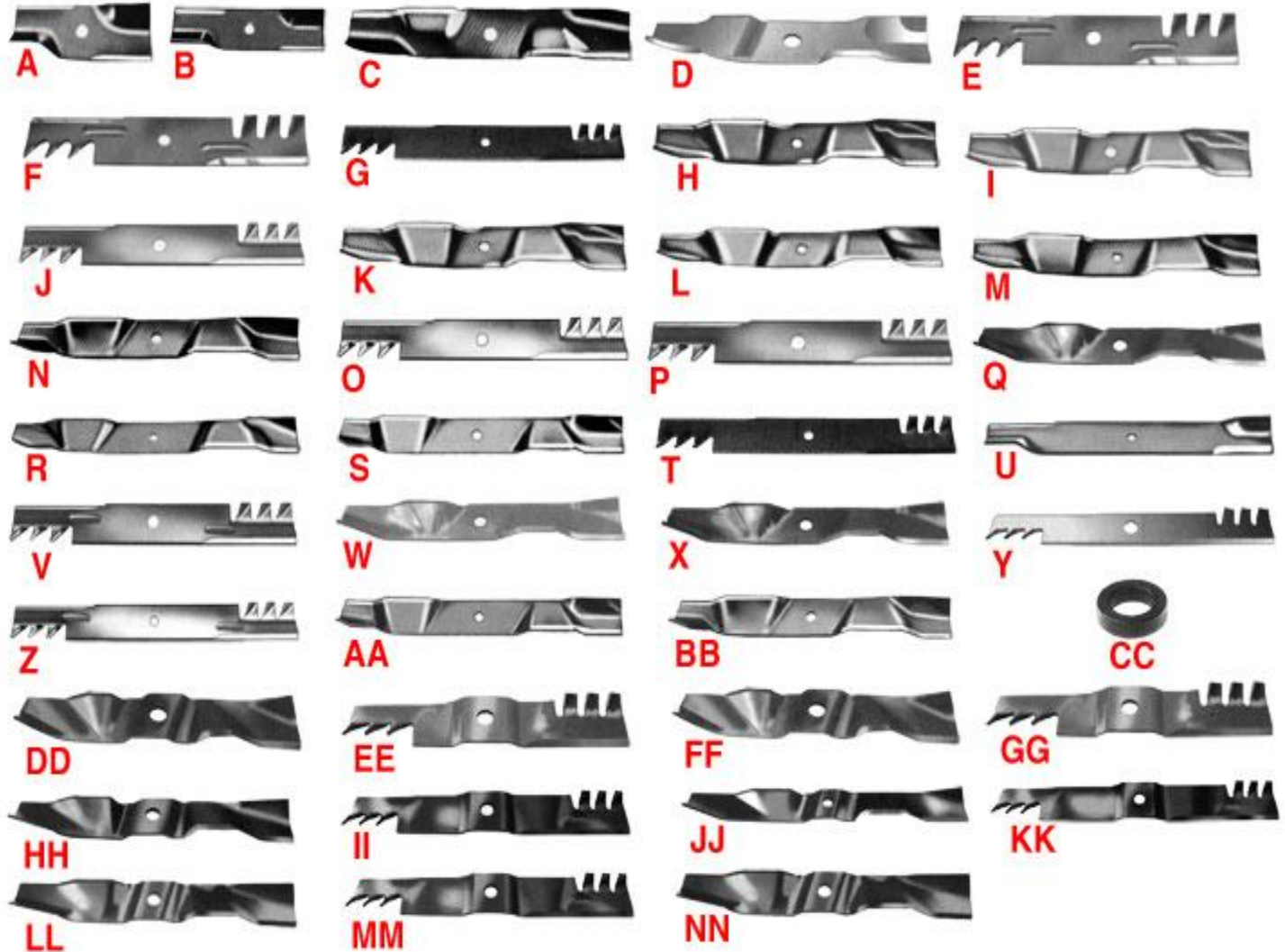


Effective Handle Design



- Adjustable handle which reduces fatigue and improves control as it fits to your comfort level.
- It is easy to adjust and there are no tools required.
- It reduces the human effort while driving the lawn mower.
- Using the handle showed 2nd figure instead of handle showed in 1st figure is desirable to reduce the human effort.
- It improves the comfort level of worker and that of worker can work for long duration.

Various Design Of Cutter



Types Of Blade

1. Taper Shaped Blade:-



2. Straight Shaped Blade:-



3. Larger Blade:-

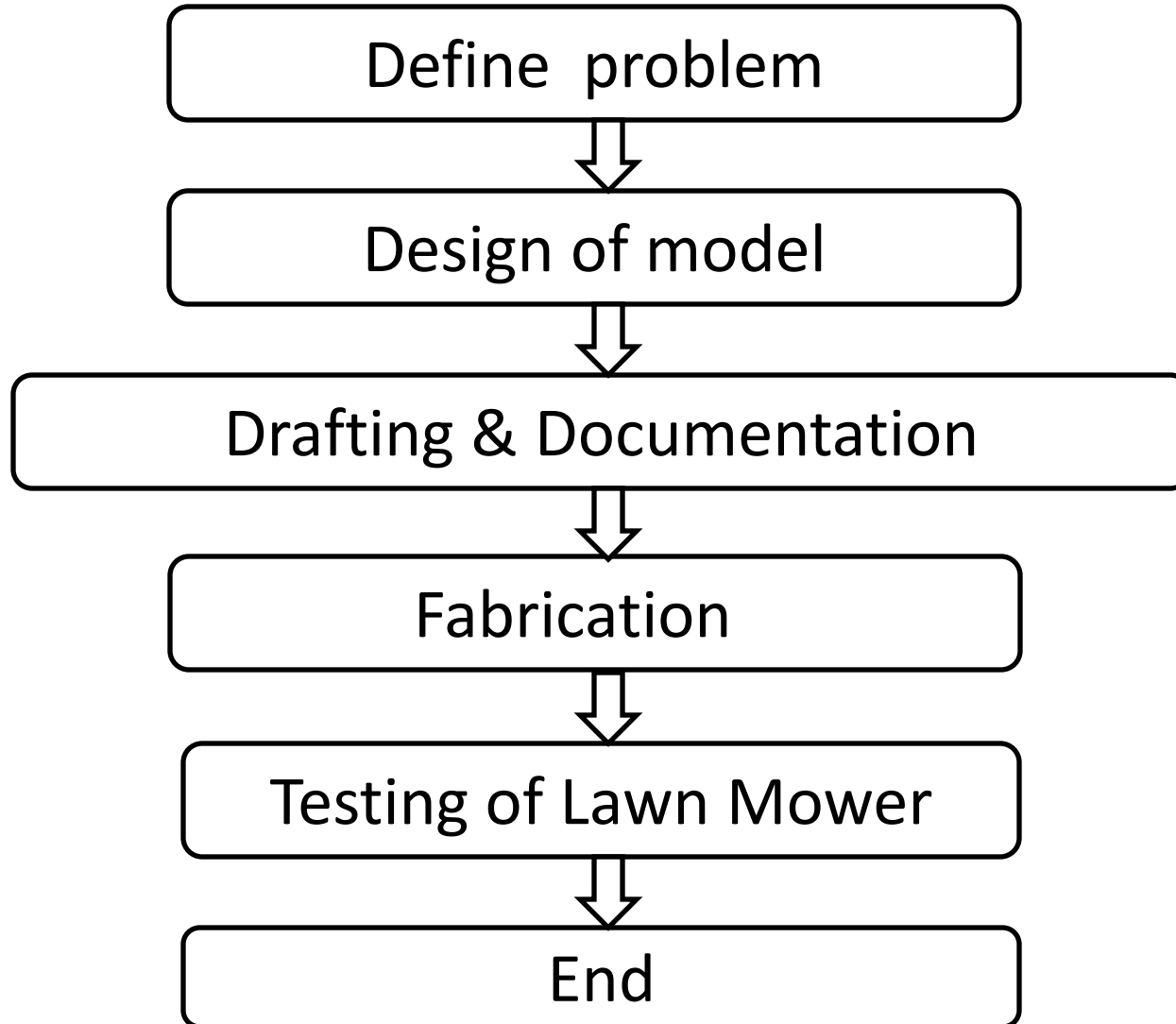


Observation Table

Number Of Blades and Name of Blades	Diameter of Blades	Rotation speed (rpm)	Height from the ground level	Weight of collected waste	Time run	Distance travel
1. [Taper Blade]	300 mm	2800 rpm	50 mm	70 gram	40 sec	230 cm
2. [Straight Blade]	300 mm	2800 rpm	50 mm	30 gram	40 sec	230 cm
3. [Larger Blade]	440 mm	2800 rpm	50 mm	40 gram	40 sec	230 cm

- We observed that the taper blade is cut more grass compare to straight blade and larger blade.
- Because of the taper blade have less material than the other blade and due to this the taper blade is optimum out of three blades.

Methodology



Conclusion

- From above analysis we concluded that conventional lawn mower occurring more vibration. So we need to damp by using vibration isolation materials and by locating the place where to damp or fabricate the mower fully balanced.
- Further we also concluded that waste collecting is difficult while operating the lawn mower.
- So we had provided vacuum cleaner for auto collecting waste. So it reduces the operating time.

Snap shots





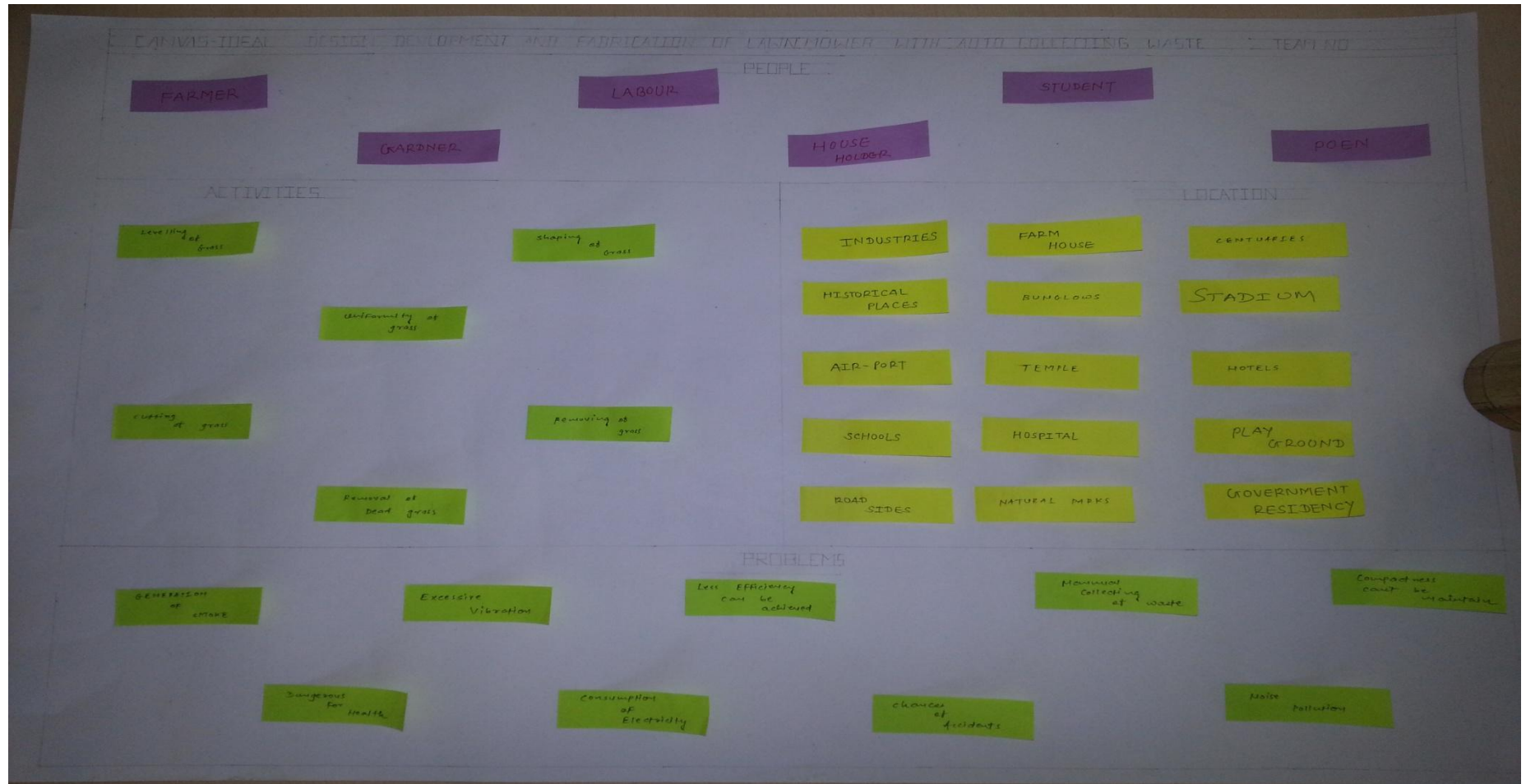
Literature review

Research Paper	Conclusion
Design, Development and Testing of Low Capital and Operational Cost Shrub Cutting Machine(2010)	The machine is fabricated as per dimensions. Design of blade and force analysis is done. The fabricated machine is economical. Fabricated machine is easy to use and fulfills all the objective
Optimization of the operating parameters of a grass trimming machine(2009)	For optimum operating parameters under investigation material of the handle produces maximum contribution to the output performance (minimum HAV) followed by engine speed and length of nylon cutting thread.
Tuned vibration absorber for suppression of hand-arm vibration in electric grass trimmer(2011)	TVA installed in the optimum location is effective in reducing acceleration level of vibration.
Simple Design of Self-Powered Lawn Mower (2013)	Below 40 degrees the mower handle becomes very uncomfortable to handle and pushing the mower becomes quite difficult. At an angle of 45 degrees, the handle is found most convenient in terms of freedom in moving the mower.

References

- Optimization of the operating parameters of a grass trimming machine, Zulquernain Mallick*, Department of Mechanical Engineering, Jamia Millia Islamia, Jamia Nagar, New-Delhi-110025, India
- Simple Design of Self-Powered Lawn Mower , Basil Okafor , Department of Mechanical Engineering, Federal. University of Technology Owerri, Imo State, Nigeria.
- Design, Development and Testing of Low Capital and
- Operational Cost Shrub Cutting Machine, R. K. Mandloi^A, Rajesh Gupta^B and A. Rehman^C, A,B,C Mechanical Engineering Department, Maulana Azad National Institute of Technology, Bhopal
- Tuned vibration absorber for suppression of hand-arm vibration in electric, grass trimmer, Ko Ying Hao, Lee Xin Mei, Zaidi Mohd Ripin

Canvas Ideal



Thank You