

# Automatic Seed Sowing Machine Supported By Rocker Bogie

Shubhangi.S.Shetake<sup>1</sup>

<sup>1</sup>Professor(Dept of Mechanical Engineering, RMD Sinhgad School Of Engineering, Pune, Maharashtra,India)

Nikhil Kolte<sup>2</sup>, Paras Khanvilkar<sup>3</sup>, Rushikesh Kattimani<sup>4</sup>, Nayan Shewalw<sup>5</sup>

<sup>2-5</sup>Student((Dept of Mechanical Engineering, RMD Sinhad School Of Engineering, Pune, Maharashtra, India)

**Abstract** - The need to develop a highly stable suspension system capable of operating in multi terrain surfaces while keeping all the wheels in contact with the ground. To design a mechanism that can traverse terrains where the left and right rockers individually climb different obstacles. To sustain a tilt of over 50degree without tipping over the sideways. Rocker bogie are important for conducting scientific analysis of objectives that are separated by many meters to tens of kilometers. Current mobility designs are complex, using many wheels or legs. They are open to mechanical failure caused by the harsh environment on Mars. A six wheeled rover capable of traversing rough terrain using an efficient high degree of mobility suspension system. Six motors are located inside the body where thermal variation is kept to a minimum, increasing reliability and efficiency. Six wheels are used because there are few obstacles on natural terrain that require both front wheels of the rover to climb simultaneously. A series of mobility experiments in the agriculture land, rough roads, inclined, stairs and obstacles surfaces concluded that rocker bogie can achieve some distance traverses on field.

**Key Words:** Rocker bogie, All Terrain Rover, Stair climbing, Rover, Digger, etc.

## 1. INTRODUCTION

In order to go over a vertical obstacle face, the front wheels are forced against the obstacle by the center and rear wheels. The rotation of the front wheel then lifts the front of the vehicle up and over the obstacle. The middle wheel is then pressed against the obstacle by the rear wheels and pulled against the obstacle by the front until it is lifted up and over. Finally, the rear wheel is pulled over the obstacle .

The rocker rover is designed as an all-terrain vehicle without the use of suspension which is great in terms of making a rover in the field of agriculture low

maintenance as well as more cost-efficient device hence more affordable. The rover that will be used for the farming purpose will be a driverless vehicle will save energy and labour cost required in the process of distribution of the seeds throughout the fields. The rocker rover is also provided with solar panels and rechargeable batteries rather than the use of convention sources like diesel which is obtained from fossil fuels which leads to large scale production of carbon footprints which can be experienced in the case of tractors and other driven machinery used in the agricultural fields.

## 1.1 PROBLEM STATEMENT

In Traditional Seed Sowing Machine Time consume for sowing is on large due to this output is less. Also traditional seed sowing machine are costly economically weak farmers cannot afford it, in land there are lot of irregularities which causes slower operation and lot of effort are need to be applied by farmer.to overcome above problems seed sowing machine is designed in such way that it is cost effective and also able to reduce man power . This machine is supported by rocker bogie mechanism to reduce effort.

## 1.2 OBJECTIVES

- ❖ Automatic seed sowing to reduce work load.
- ❖ To improve production in greenhouse.
- ❖ Automation in seed sowing process.
- ❖ Increasing design scope towards sowing equipment's.
- ❖ Use of modern & efficient technologies.

## 2. METHODOLOGY

- Problem identification of rovers
- Selecting parameters to overcome the problem
- Analysis of selected parameter
- Getting information from research paper

- Designing
- Fabrication of selected parameter

## 2.1 MATERIAL SELECTION

### 2.1.1 FRAME

The frame is created using steel material, as steel is easily available in market and it cost effective to us. It has good mechanical properties like high toughness a plasticity.it has carbon content starting from .15% to .25%. And final strength and compressive of this steel will increase within the carbon content.

### 2.1.2 CULTIVATOR

The cultivator is made of standard material mild steel which has good strength and toughness.

### 2.1.3 STORAGE TANK

It is also made of mild steel. Partition in storage tank is made up of acrylic material.

### 2.1.4 WHEELS

Standard wheels available in market are used. Which provide great flexibility.

## 2.2 DESIGN CALCULATIONS

### ➤ Motor Specification :-

DC Motor 12 Volt

1Rotation Per Minute = 180 (7 Motors)

Rotation Per Minute= 120(1Motor)

$T^1 = 1.5$  (Kg.cm)....(Standard Value)

$T^1 = 9.81 * 1.5 * 10^{-2}$

**$T^1 = 1.45$  N.M**

Seven motors having 1.45 NM \*7 of torque are used.

- Power =  $T * W = 9.19$  Watt.
- **$P_{out} = 9.81 * 7 = 65$  Watt.**

### ➤ Battery Specifications

Standard Battery 12 Volts

Velocity =  $R * W$

$W = (2 * \pi * N) / 60$

$W = 18.84$  rad/s<sup>2</sup>

$V = R * W$

$V = 0.05 * 18.85$

**$V = 3.5$  Km/hr**

### ➤ Area Covered In One Hour

Area= 3.5\*Area between 2 row of ploughing

Blade \*2

Area = 3.5\*1000\*2\*0.2

**Area= 1400 m<sup>2</sup>/hr.**

### ➤ One Acre = 4046 m<sup>2</sup>

4046/1400 = 2.80 = **3.20 Hour for one hour**

### ➤ Distance Between Two Seed

As radius of wheel 50mm for one revolution of rear wheel Distance travelled by

$D = 2 * \pi * \text{radius of wheel}$

$D = 2 * \pi * 50$

**$D = 320$  mm**

### ➤ For seed sowing standard cultivator is used

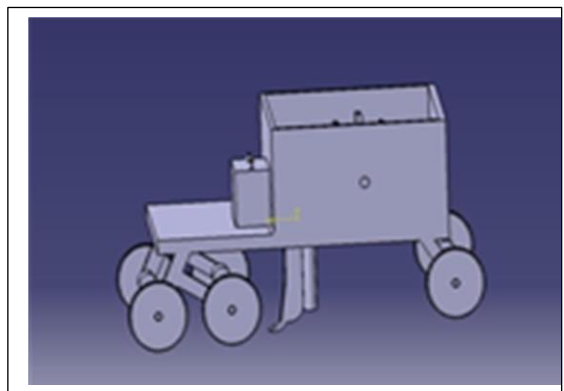
Wheel which is transport the seed

$V = (\pi * D * N) / 60$

$0.4 = (\pi * 1 * N) / 6$

**$N = 120$  rpm**

## 3. CAD MODEL



**Fig 3.1**

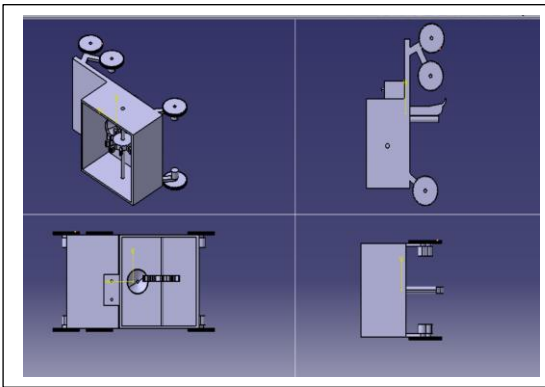


Fig 3.3

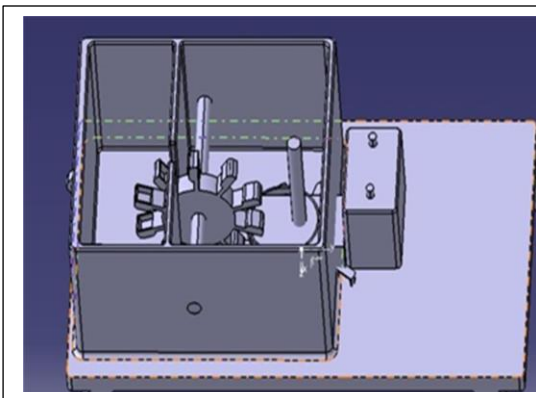


Fig 3.3

## 4. COMPONENTS

### 4.1 DC MOTOR

DC motor is mechanical device which consist of a coil, electrical switch and shaft which is supported between brushesh.there is magnetic field created around shaft when electric current is supplied. It is used to convert one form energy into another like electrical energy is converted into mechanical one

- RPM = 180 at 12 Volt
- Total length = 92 mm
- Gear Held Length = 21mm
- Output Shaft = Centered
- Shaft Dia = 6 mm
- Shaft Length = 20 mm

- Motor Weight = 500 gms
- N.O.S = 6



Fig 4.1

### 4.2 CULTICATER

Standrad cultivater available in Market is used .



Fig 4.2

Cultivater is is device which is used for the purpose of ploughing . Die to its high strength it can easily plough soil.

### 4.3 BATTERY

Battery is Used to power motors



Fig 4.3

- Voltage = 12 Volt
- Good Temp control
- Dimensions = (74\*34\*34)mm

### 4.4 Storage Tank



Fig 4.4

Storage tank is used to store seed to sow.it also has an partition which used to increase working efficiency and also sowing mechanism is installed in this box

### 4.5 TUBE



Fig 4.5

Tube is used for th purpose of transportation of seed from storage tank to soil.it is made of polymer material hence provide greater flexibility.

### 4.6 SUSPENSION MECHANISM(ROCKER)

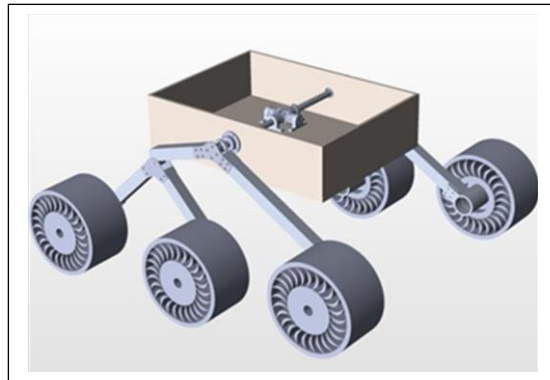


Fig 4.6

Rocker bogie mechanism is used to support seed sowing mechanism it provides greater damping and also easily overcome surface terrain in agriculture land.

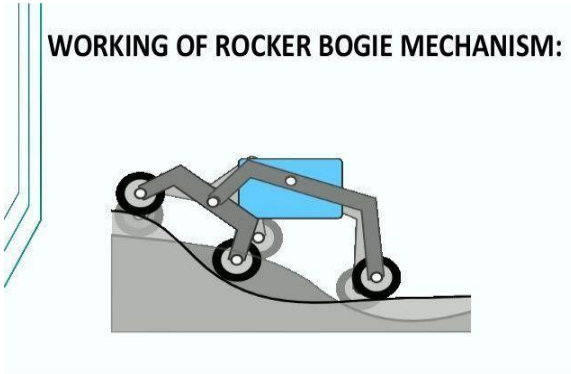
## 5. WORKING PRINCIPLE

Automatic seed sowing machine is based on crank mechanism. There are three metal disk, 5 motors, 2 links, metal box, 1 pipe with nozzle and 1 digging tool. In which two disk are permanent one is fixed with motor which has torque of 2kg and 60 RPM. And another metal disk is fixed to the metal box which is internally link with another metal disk which has a notch. Both metal disk are connected with first linear links. And second link is connected to the metal disk which is fixed with motor. And at the end of the second link a digging tool is connected. The 4 motors which are connected to the wheel and are attach to the chassis by 4 clamps. The whole mechanism is supported by a metal frame. Two switches are given, one for mechanism and other to drive the robot.

When we switch on the first button the motor attached with the mechanism starts, ultimately starting the mechanism. The disk is then connected with two links, first link transfers energy to another disk which rotates in semi-rotary form, which is also internally connected with other disk having notch. The second link is connected with the digging tool, and as the motor rotates the digging tool moves in linear form and digs

hole into the soil. The seed which is dropped into the funnel, passes through the pipe and drops into the hole. This process runs simultaneously, i.e. When the digging tool digs the hole at the same time the disk with notch picks up the seed and drops into the hole.

#### WORKING OF ROCKER BOGIE MECHANISM:



**Fig 5.1**

## 6. CONCLUSION

This work shows how rocker bogie system works on different surfaces. As per the different weight acting on link determines torque applied on it. By assuming accurate stair dimensions, accurately dimensioned rocker bogie can climb the stair with great stability. The design and manufactured model can climb the angle up to 45°.

## 6. REFERENCES

- [1] "A Seed Sowing Machine: A Review" Mahesh R. Pundkarijess Volume 3, Issue 3. Issn: 2249-9482, International Journal Of Engineering And Social Science.
- [2] Frontline Demonstration On Bullock-Drawn Planter Enhances Yield Of Soya Bean Crop. P.P. Shelke . International Journal Of Farm Science
- [3] . "Effects Of Sowing Method And Seed Rate On Growth And Yield Of Wheat", Umedalisoomro World Journal Of Agricultural Sciences, Vol. 5, No. 2, Pp. 159162.
- [4] "Design And Development Of Automatic Seed Sowing Machine" Ssrg International Journal Of Electronics And Communication Engineering - (Icrtestm) - Special Issue - April 2017.
- [5] Seed Sowing Robot" International Journal Of Computer Science Trends And Technology (Ijcst) - Volume 5 Issue 2, Mar - Apr 2017.
- [6] "Design And Development Of Automatic Seed Sowing Machine" Ijecr Issn2348-8549, Dr.Jayshree Awati (E&Tc R.I.T. College).
- [7] "Design And Manufacturing Of Seed Sowing Machine" Ijariit Vol3 Issue 2 2017, Nagesh B Adalinge Issn2454-132x.