

# Seed Sowing Machine Using CAM and Follower Mechanism

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**Abstract:** *The aim is to develop an automated seed sowing machine so as to make farming easier using cam and follower mechanism. The cam is driven by the pulley which is attached to the front axle. This is eliminating the need of electricity and fossil fuels. This aims towards pollution free farming equipment. By incorporating a cam and follower mechanism, an automatic seed sowing machine is developed by which one can overcome the disadvantages of conventional seed sowing methods. The seeds are stored in a hopper and for one complete rotation of the cam and the follower hits the diaphragm on which the seeds rest and a single seed is let into the pit, the seed plantation process can take place without wastage of seeds. Attachments are provided for ploughing and compaction.*

**Keywords:** Seed, Sowing, Planting, agriculture, efficiency

## 1. Introduction

Cropping is important and tedious activity for any farmer, and for large scale this activity is so lengthy also it needs more workers. Thus agriculture machines were developed to simplify the human efforts. In manual method of seed planting, we get results such as low seed placement, less spacing efficiencies and serious back ache for the farmer. This also limited the size of field that can be planted. Hence for achieving best performance from a seed planter, the above limits should be optimized. Thus we need to make proper design of the agriculture machine and also selection of the components is also required on the machine to suit the needs of crops. The agriculture is the backbone of India. And for sustainable growth of India development of agriculture plays vital role. The India has huge population and day by day it is growing thus demand of food is also increasing. In agriculture we saw various machines. Also there traditional methods are there. Since long ago in India traditional method is used. Also India has huge man power. This manual planting is popular in villages of india. But for large scale this method is very troublesome. The farmer has to spend his more time in planting. But time available is less for him. Thus it requires more man power to complete the task within stipulated time which is costlier. Also more wastage happens during manual planting. Hence there is need of developing such a machine which will help the farmer to reduce his efforts while planting. This process of using machines is called as mechanization.

## 2. Problem Identification

Mechanical factors, which affect seed germination and emergence are:

- Its depth should be uniform with regard to placement of seed.
- It should be distributed uniformly along the rows.
- Its transverse displacement with regard to row also considered.
- Loose soil getting is also prevented.
- Soil is covered uniformly over the seed.
- Fertilizer is mixed with seed during placement in the furrow.

By fulfilling above factors we get best performance of the seed drill or planter. To improve the performance we need to optimize the above factors also so that we get desired efficacy from the system in economical way. Its design is simplified and components are selected to suit the need of the crops. In the working of the robot seed drill or planter also plays vital role in manipulating the physical environment. The metering system allows the metered or required quantity of the seed in the farm. This system also serves the seed so that seed should not be damaged while working.

## 3. Proposed Methodology

This machine has very less cost. This sowing machine is very simple to use hence, unskilled farmer is also able to handle this machine. We simplified the design also made it cheaper and affordable to every rural farmer. We made various adjustments and simplified it from controlling and maintaining point of view. In this design we connected drive shaft to the attachments of cam and belt drive mechanism which eliminates gears system. A cam and a follower is assigned such that the seeds are subjected to fall into the pit by eliminating the wastage of seeds and provides smooth process.

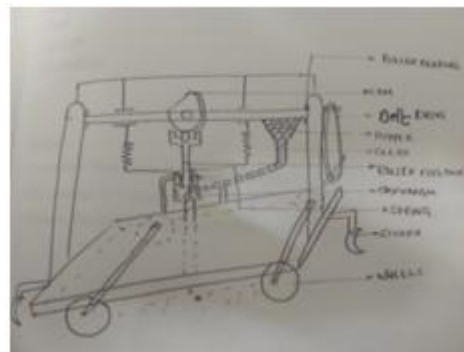


Figure 1: Proposed design for seed sowing machine

## 4. Design of Seed Sowing Machine

Following figure shows the complete drawing of the sowing machine. While designing the mechanism physical

conditions as well as the requirements both are considered. Hence this machine is able to plant the seeds in the required way.

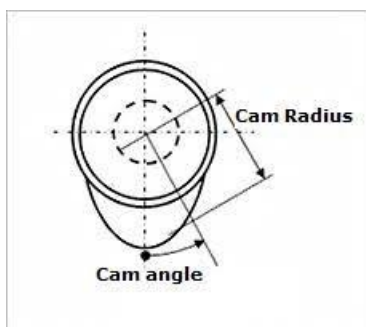
Following are the major parts which are used in this machine.

- 1) Structural Frame
- 2) cam
- 3) Bearings
- 4) Hopper
- 5) Pulley
- 6) Belt Drive
- 7) Diaphragm
- 8) Wheels

**Structural Frame:** Structural steel is a category of steel used for making construction materials in a variety of shapes. ... Most structural steel shapes, such as I-beams, have high second moments of area, which means they are very stiff in respect to their cross-sectional area and thus can support a high load without excessive sagging.



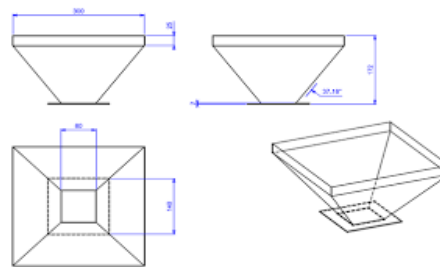
**Cam:** A projection on a rotating part in machinery, designed to make sliding contact with another part while rotating and impart reciprocal or variable motion to it.



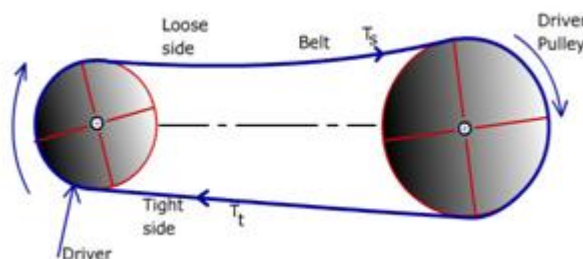
**Bearing:** A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts.



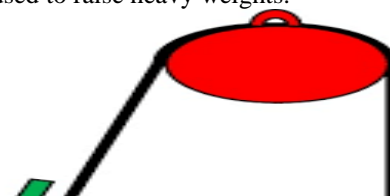
**Hopper:** A container for a loose bulk material such as grain, rock, or rubbish, typically one that tapers downward and is able to discharge its contents at the bottom.



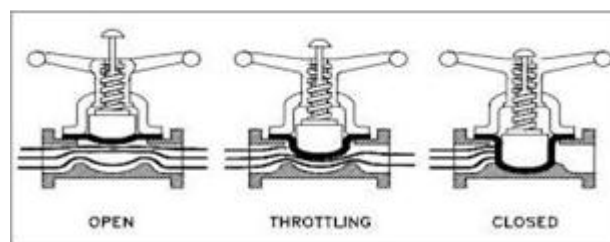
**Belt Drive:** A mechanism in which power is transmitted by the movement of a continuous flexible belt.



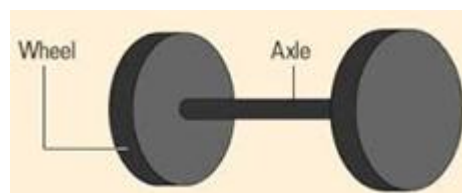
**Pulley:** A wheel with a grooved rim around which a cord passes, which acts to change the direction of a force applied to the cord and is used to raise heavy weights.



**Diaphragm:** In structural engineering, a diaphragm is a structural element that transmits lateral loads to the vertical resisting elements of a structure (such as shear walls or frames).



**Wheels:** A circular frame of hard material that may be solid, partly solid, or spoked and that is capable of turning on an axle.



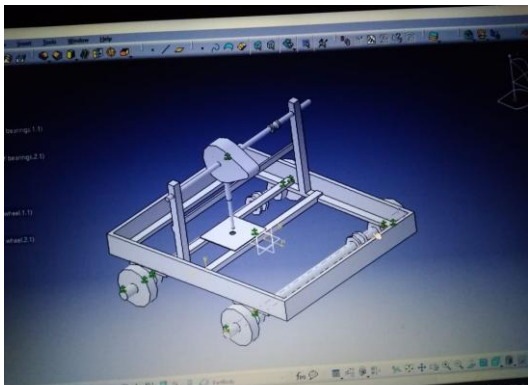


Figure 2: Catia design of sowing machine

## 5. Working of the Machine

The working of the seed sowing machine is described as follows: When the force applied by the farmer on the handle of the seed sowing machine then the wheels are move towards forward direction. The wheels start to rotate with some specific rotation. Wheels are mounted on the metallic rod which is also rotates in the direction of wheels. Also the pulleys are mounted on the metallic rod which transmit the rotating motion of the wheel to the shaft of the cam and follower. Here, the belt drive is used to smooth transmission of the motion of the wheel to the pulleys. pulleys are used for the transmission of motion in parallel axis. For these pulleys are connected parallel to each other. The function of the pulley is to transmit motion in parallel direction with same speed. On the shaft of the second pulley cam and follower mechanism is mounted to transmits linear motion to the diaphragm strip which controls the seed rate by opening and closing the hopper outlets. Diaphragm is to reciprocate with constant stroke by this mechanism. The seeds are stored in the hopper as per requirement. The flow of these seeds in the downward direction takes place due to gravity. When the diaphragm strip reciprocates with constant intervals the holes of the strip and the hopper gets matches and seeds flow through the holes. These flowing seed moves in the flexible pipes and after that it comes in the back side of the dibber and sows in the soil. After that seeds are covered by sand covering plate which is mounted back side of the dibber hole.



Figure 3: Working Model of sowing Machine

## 6. Advantages f Machine

Following are the advantages of manual seed sowing machine are

- Improved efficiency in planting.
- Increased yielding and reliability in crop. Increased cropping frequency.

- Increased speed of seed planting.
- Seed planting accuracy.
- Durable and cheap as low cost materials are used.
- Less maintenance cost.
- Since seed can be poured at any required depth, the plant germination is improved.
- Uniform placement of seeds in row with required distance.
- Proper compaction over the seeds is provided.

## 7. Conclusions

We have developed a seed sowing machine which will meet the farmer requirements using the determined engineering specifications. The following is a final summary of what we did and how we went about it. Stability, comfort and hand control were determined to be the most important requirements. All these requirements have been used in developing our concepts and have been implemented in our model. We developed and followed through with a fabrication plan that produced a working product. This plan gave a detailed description of the process needed if our work is to be replicated. The final design has been broken down into five subsections: Frame, bearing, Hopper, transmission system and cam and follower mechanism. We created each of these sub sections separate in the machine shop and fabricated these. We then assembled these sections together and created our final model.

## 8. Future Scope

It is necessary to give top priority for safety operation, Cost reduction. It is necessary improve the strength of the machine members such as bearing. Presently, full focus is given only to design modification in seed metering mechanism which is beneficial to the small farmers. At present, seed metering mechanism is used for sowing different types of seeds with single metering mechanism. In future further study is needed to use separate metering mechanism for every seeds. Thus, we can increase the value of the machine in future. By using electrical drive, the machine can be made automatic just like an automobile which can faster the work of seed planting. It can be also used for planting as well as fertilizer sowing. In future, it is possible to use the electronic operated solenoid valve to maintain the seed flow rate. It is time operated valve. Also we will use level sensors to know the level of seeds and maintain it.

## References

- [1] Kalay Khan, Dr. S. C. Moses, The Design and Fabrication of a Manually Operated Single Row Multi - Crops Planter, IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) Volume 8, Issue 10 Ver. II PP 147-158, Oct. 2015
- [2] A. R. Kyada and D. B. Patel, Design And Development Of Manually Operated Seed Planter Machine, 5th International & 26th All India Manufacturing Technology, Design and Research Conference (AIMTDR 2014)2014, IIT Guwahati, Assam, India, Dec 2014.

- [3] Roshan V. Marode, Gajanan P .Tayade, Design And Implementation Of Multi Seed Sowing Machine, IJMERR, Vol. 2, No. 4, October 2013
- [4] D.Ramesh and H.P. Girishkumar, Agriculture Seed Sowing Equipments: A Review, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 3, Issue 7, July 2014
- [5] Nilesh N. Jadhav, Harshal R. Aher et. al. Design and Fabrication of Onion Seed Sowing Machine, International Journal on Recent Technologies in Mechanical and Automobile Engineering (IJRMAE) Volume: 2 Issue: 6, June 2015
- [6] V.M. Martin Vimal<sup>1</sup>, A. Madesh<sup>1</sup>, S.Karthick<sup>1</sup>, A.Kannan<sup>2</sup>, “Design and Fabrication of Multipurpose Sowing Machine”, International Journal of Scientific Engineering and Applied Science (IJSEAS), ISSN: 23953470, Volume-1, Issue-5, August 2015.