# DESIGN AND FABRICATION OF POTATO PLANTING MACHINE

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**ABSTRACT**

*A potato seed planting machine includes one or more planting units with an endless conveyor. A multiple cups are attached to the conveyor and each cup receives a potato seed as the conveyer travels upwardly between upper and lower sprockets. As the cups pass around the upper sprocket, any extra seeds in cups are removed by centrifugal force, differential velocity and/or a vibration unit. These extra potato seeds are recycled and returned to the seed bowl. The cups then travel through a generally horizontal simulation section and around a third sprocket. The cups are inverted as they pass around the third sprocket and the seeds fall onto the back surface of the next forwardly adjacent cup. A guide structure holds the seeds in the desired position until they reach a discharge area where the individual seeds are discharged into the furrow.*

*The functioning of potato planting machine is based on transport and placement of the seed potatoes by a cup-belt. The capacity of this process is rather low when planting accuracy has to stay at acceptable levels. The main limitations are set by the speed of the cup-belt and the number and positioning of the cups. It was hypothesized that the inaccuracy in planting distance, that is the deviation from uniform planting distances, mainly is created by the construction of the cup-belt planting machine. To determine the origin of the deviations in uniformity of placement of the potatoes a theoretical model was built. The model calculates the time interval between each successive potato touching the ground. Referring to the results of the mode.*

***Keywords:*** *potato planting machine, automation in agriculture, cultivation, digger.*

## I. INTRODUCTION

In India more than sixty percent peoples are dependent on agriculture field. Potato seed being vital input to agriculture, endless efforts are being made to assure availability of quality foods grains to farmers in order to sustain the agricultural development and best vegetables to consumer end. In this situation the demand of quality potatoes are very high and our proposed potato planting In view of above, our project has been formulated with the objective to produce quality potato, with minimum cost.

The paper is designed based on the principles of farmers view and the system is automatic type. By using automation, the productivity of the product can be increase.

## II. PROBLEM STATEMENT

There is a need to develop potato planting machine which is enough to perform following works:-

1.Seed bed preparation by manually is very risk full.

2.Lack of workers t right time and a right place.

3.Manual potato cultivation is time consuming and high skilled labour required.

4.Cost of cultivation comparatively high.

## III. LITERATURE SURVEY

1. Jackson, Michigan et al. Have first mechanical potato planter has been attributed to the Aspin wall Manufacturing Co. in 1878. Because of the invention's success, the company devoted itself solely to creating and building potato equipment in 1883 in.
2. The Aspin wall Co. later built another plant in Ontario, Canada, in keeping with the demand for its products.
3.Fred Bateman et al.Have owner of the Iron Age Co. in Glenoch, New Jersey, developed an assisted-feed planter solving the problem of missed hills. This assistive device placed the seeds on a rotating plate, much like a lazy Susan, before dropping them into the hole. This device ensured that a piece of potato was ready to be fed into the furrow. It also allowed the driver to manually deposit a potato seed into position if necessary.

## IV. CONSTRUCTION

Our potato planting machine consists of mainly

1. Digger/tiller
2. Potato seed container
3. Two sets of roller chain drive mechanisms
4. Two discs
5. Chassis/base
6. Wheels

## V. OBJECTIVES

1. To design and fabrication of potato planting machine.
2. To reduce human efforts and labour cost.
3. To replace traditional methods with efficient methods.
4. To reduce time.
5. To introduce automation in agriculture field.
6. Improve economical condition by using efficient methods.

## VI. WORKING

Firstly dried pieces of potatoes will be loaded into the potato seed container. Here one roller chain drive mechanism will be provided for free moment of wheels carrying heavy load. Another will be provided for carrying seed potatoes from the container and place it into the land.
This chain consists of set of cups attached to the chain. As the tractor pulls or drives the machine then the digger will make the row with required depth. Then chain drive with .cup arrangement will also rotate along with wheels, which carry seed potatoes one by one and place it into the appropriate position made by the digger.
Behind this a set discs will be provided which overlap the soil on the placed potato seed.

## VII. SELECTION OF MATERIAL

The choice of best material in one which serve the ideal target at the base cost. Factors which to be considered for the choosing the material.

1. Availability of material.
2. Sutability of the material for the working condition in administration.
3. The expense of material.

A careful design approach has to be adopted. The total design work has been split up into two parts;

- System design
- Mechanical Design

System design mainly concerns the various physical constraints and ergonomics, space requirements,

arrangement of various components on main frame at system, man + machine interaction, No. of controls, position of controls, working environment of machine, chances of failure, safety, measures to be provided, servicing aids, ease of maintenance, scope of Improvement, weight of machine from ground level, total weight of machine and a lot more.

In mechanical design the components are listed down and stored on the basis of their procurement, design in two categories namely,

- Designed Parts
- Parts to be purchased

For designed parts detached design is done & distinctions thus obtained are compared to next highest dimensions which are readily available in market. This amplifies the assembly as well as postproduction servicing work. The various tolerances on the works are specified. The process charts are prepared and passed on to the manufacturing stage.

The parts which are to be purchased directly are selected from various catalogues & specified so that anybody can purchase the same from the retails shop with given specifications.

**Fig. 6.1 Physical model**

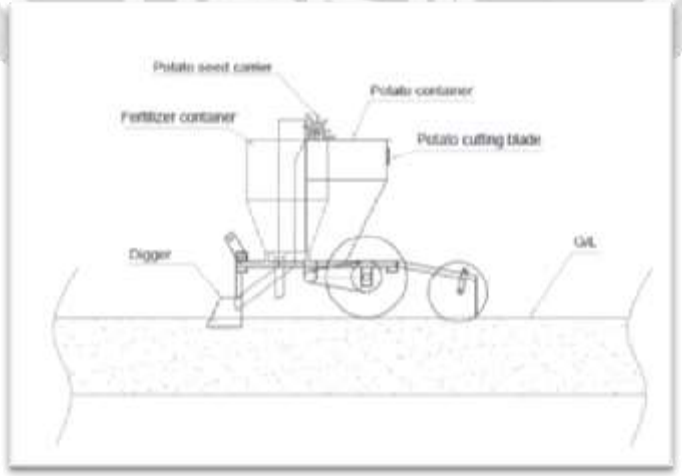



**Fig. 6.2 General Construction Of Potato Planting machine**

## VIII. DESIGN CALCULATIONS

**A)Design of Potato hopper:**

potato seed container is fabricated with the size shown in the fig. 8.1 and it is completely made of M.S. steel with the gauge of 1.5 mm thick. It has a capacity of around 10 kg of seeds. The dimension of this container is 500 mm*400 mm*400mm.

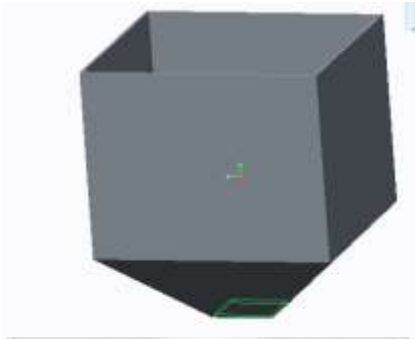


**Fig. 8.1 potato hopper**

**B)Design of Tiller/digger:**

The design of a tiller in such a way that, the tiller will penetrate the soil and allowing the seed to be planted in the way it has formed. M.S. Steel used for fabricating the unit and the design .

**C)Design of Disc Harrow:**

The primary purpose of ploughing is to turn over the upper layer of the soil, bringing fresh nutrients to the surface, while burying weeds, the remains of previous crops, and both crop and weed seeds, allowing them to break down. It also aerates the soil, allows it to hold moisture better and provides a seed-free medium for planting an alternate crop. In modern use, a ploughed field is typically left to dry out, and is then harrowed before planting. Ploughs were initially human powered, but the process became considerably more efficient once animals were pressed into service.

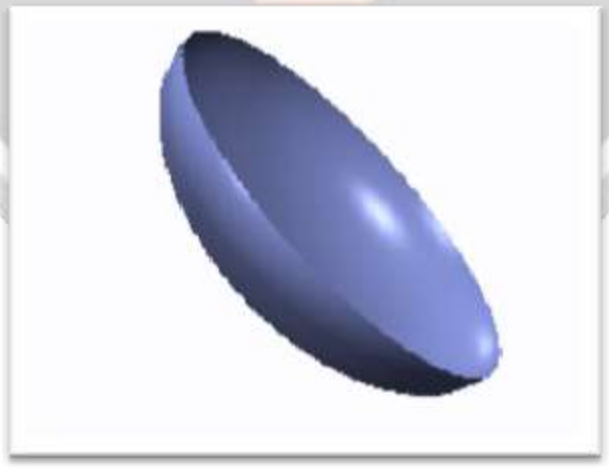
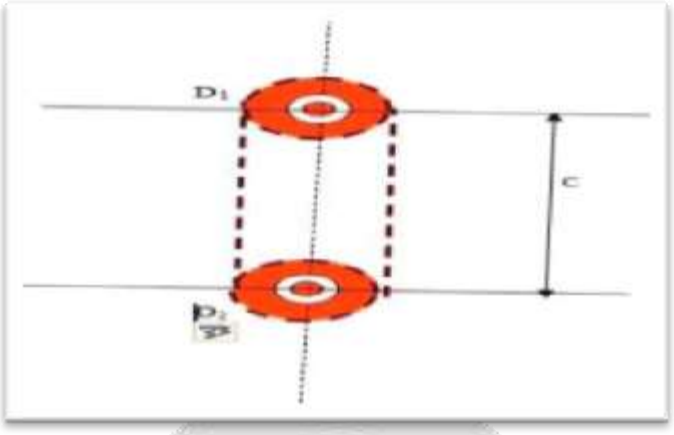


**Fig8.2 side view of disc**

Disc plough implement in our project is fixed type and for measuring the width of cut, the tilt angle shall be set at $15^{o}$ to 25°. For nonadjustable plow disc blades, the tilt angle shall be set at $18^{o}$ to 20° and we have set up at 20°.

**D)design of cup conveyor:**




**Design of Conveyor Chain Drive**

1. Chain length: $L = 2C+1.57(D_1+D_2) + (D_rD_2)_24C$

$= 2(940) +1.57(60+60) + (60-60)_2$

4(940)

=2068mm.

Pitch :-

$P = d. \sin (180/z ) = 60.\sin (180/15) =12.47mm.$

## IX. RESULTS & DISCUSSION

The machine was tested in field to achieve following results:

i. The machine works fine, It was able to planting the potato, The wheel support provide to be sufficient, The machine was handy and achieve the desired result, It will reduce the much manual efforts and saving the time consuming.

ii. Generally for plantation of 1acre farm we required 20-25 labours so that labour cost will be increases and also more time required. Machine design is able to overcome this problem.

## X. CONCLUSION

The paper presents theoretical aspects of the kinematics and dynamics of the potato planting machine. In this work, we have implemented all that is required to sowing and planting of potato seed, which includes tilling, planting, and ditching of soil all process in a single operation. The outlook and prediction of high growth of crop of cultivators are very high because intensive soil cultivation requires consistency and reliability. In the meanwhile, cultivators are also expected to work smoothly and cultivate large areas. Our design competes with all these benefits. They intensively cultivate the soil while destroying annoying clods. The soil thus becomes loose and can be used for crease forming and create the basis for a harvest with a higher yield. Furthermore, our prototype model can be converted to full width cultivators with a few manual actions to planting. The machine which we have invented is working properly and the design and fabrication is matched the requirement. The present work is implemented all the process for single row and machine can only support for one single operation.

methods for mating gears with high transmission Efficiency and an apparatus drive is additionally give when the among driver and devotee is little.

## XI. FUTURE SCOPE

The present work is implemented all the process for single row and machine can only support for one single operation. This can be expanded by placing two, four different tillers, so that, we can sow the seeds in two rows and four rows at a time by increasing the tiller in the same machine. By using the springs it can be made as flexible.

The present work is also implemented for putting fertilization to plants such plants are maize, sugarcane, tomato etc....

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