

“Design and Fabricating Multipurpose Agro Machine Suitable For Medium Scale Groundnut Cultivation”

¹P.Varadharaj, ²B.Logesh, ³K.Raja, ⁴N.Rajkumar, ⁵D.Ramesh Kumar, ⁶K.Suresh

^{1, 2} Assistant Professors, ^{3,4,5,6} U.G Scholars,

^{1,2,3,4,5,6}Department of Mechanical Engineering,

^{1,2,3,4,5,6}Sree Sakthi Engineering College, Coimbatore, India.

Abstract: India is an agricultural country cultivating ground nuts quantity in the village sides of the country. Groundnut is a crop of global importance. It is widely grown in the tropics and subtropics, being important to both small forming and large commercial producers. Groundnut business is a huge market and faces huge profits when they are planted and maintained perfectly. The available planting machines are imported from foreign countries. The imported machines are not only bulk in size but also costing around lakhs. Also planting groundnuts manually consumes lot of time which can be saved by automating the process. In this project an attempt has been made to the design and fabrication of multi agro machine exclusively for small farmers at low cost. The machine is made versatile such that very simple components are employed in the fabrication and this is the reason for the low cost of the machine. The main objective of our project is to carry out the groundnut threshing operation, seed sowing, and fertile spraying simultaneously. The modelled components are fabricated and assembled together to form a complete machine.

Index Terms – Seed sowing, Motor operated, Sprayer, Toggle switch, Battery

I. INTRODUCTION

The production and productivity of ground nuts, corns, etc., were quite low, when India became independent in 1947. The production was not sufficient to feed the Indian population. The country used to import them in large quantities for fulfilling the needs of our people from many countries. The reasons of low production and productivity were unavailability of machines in the cultivation field. In India most of the farming work is done manually when compared with foreign countries. There were no machines for sowing the seeds like groundnuts, corns then and it is done by man power only. The cost spent for man power was more and the speed of the operation was very less. When small farmers with minimal physical resources or financial assets attempt to improve their productivity, they have a limited choice. The only resource they can maximize is knowledge in which they are not poor. It was light weight and can perform up to six agricultural operations. India is a world leader in groundnut farming with 8 million hectare of cultivated area in the year 2003. The sowing time is the most important non-monetary input influencing productivity. Delay in sowing by one week result in considerable yield losses. In order to develop the standard of living of small farmers we should make the machines with low cost. Then only small farmers can implement the recent modern machines for farming purposes. Our proposed groundnut planting machine is used to plant groundnuts. They can be used to plant other seeds such as corns, peanuts, etc. An attempt has been made to provide the groundnut planting machine at low cost and of less weight compared to the machines available in the market.

II. COMPONENTS AND DESCRIPTION

Agro machine consist of bearing is made up of steel material and bearing cap is of mild steel. The bearings are pressed smoothly to fit into the shafts because if hammered the bearing may develop cracks. Frame is made of mild steel material. The whole parts are mounted on this frame structure with a suitable arrangement. To convert electrical energy into mechanical energy. Battery is Isolated system which is away from the grid, batteries are used for storage of excess solar energy converted into electrical energy spur gears, which are designed to transmit motion and power between parallel shafts, are the most economical gears is the power transmission industry. Pawley is a wheel on an axle or shaft or belt along its circumference. Seed feeder, is manual planting method is eliminated and thus the planting operation is automated. Water tank is a small reserve like setup provided in the top of the machine.

III. DESIGN CONCEPT

Computer aided design or CAD has very broad meaning and can be defined as the use of computers in creation, modification, analysis and optimization of a design. CAE (Computer Aided Engineering) is used in computers in engineering analysis like stress/strain, heat transfer, flow analysis. CAD/CAE is said to have more potential to radically increase productivity than any development since electricity. CAD/CAE builds quality form concept to final product. Instead of bringing in quality control during the final inspection it helps to develop a process in which quality is there through the life cycle of the product. CAD/CAE can eliminate the need for prototypes. But it required prototypes can be used to predict performance and other characteristics. CAD/CAE is employed in numerous industries like manufacturing, automotive, aerospace, casting, mould making, plastic, electronics and other general-purpose industries. CAD/CAE systems can be broadly divided into low end, mid end and high-end systems. Software used for modeling the agro machine is Solid works ,Creo,CATIA

Creo Elements/Pro (formerly Pro/ENGINEER), PTC's parametric, integrated 3D CAD/CAM/CAE solution, is used by discrete manufacturers for mechanical engineering, design and manufacturing. Creo Elements/Pro offers a range of tools to enable the generation of a complete digital representation of the product being designed. Tools are also available to support collaborative development. A number of concept design tools that provide up-front Industrial Design concepts can then be used in the downstream process of engineering the product. These range from conceptual Industrial design sketches, reverse engineering with point cloud data and comprehensive free-form surface tools.

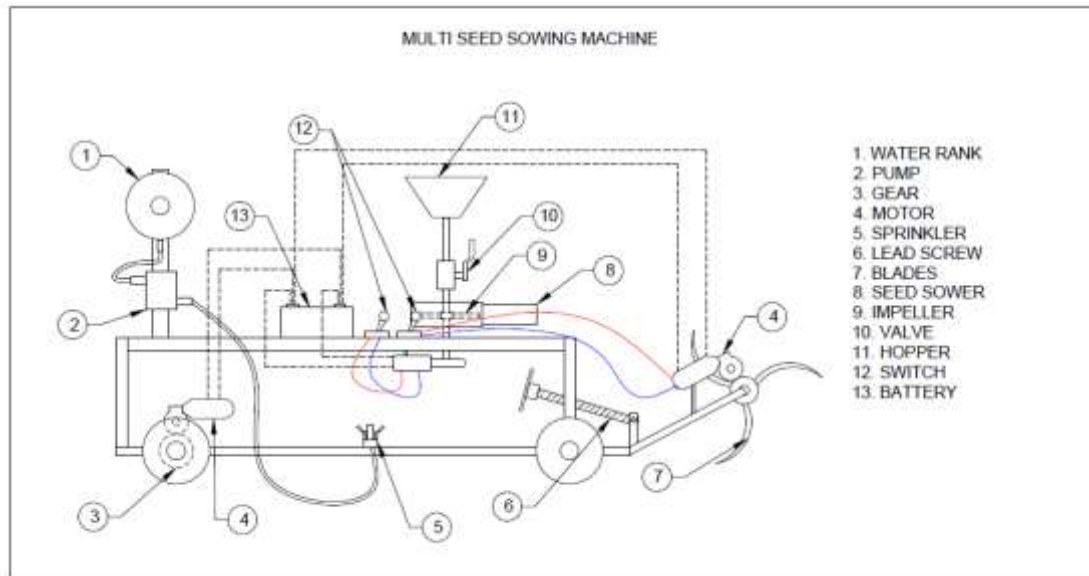


Fig.1. 2D Model of Multi Seed Sowing Machine

IV. MANUFACTURING PROCESS

Manufacturing processes are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during or after the manufacturing, and planning the production process prior to manufacturing. Metal cutting or machining is the process of by removing unwanted material from a block of metal in the form of chips. Cutting processes work by causing fracture of the material that is processed. Usually, the portion that is fractured away is in small sized pieces, called chips.

Common cutting processes include sawing, shaping (or planing), broaching, drilling, grinding, turning and milling. Although the actual machines, tools and processes for cutting look very different from each other, the basic mechanism for causing the fracture can be understood by just a simple model called for orthogonal cutting. In all machining processes, the work piece is a shape that can entirely cover the final part shape. The objective is to cut away the excess material and obtain the final part. This cutting usually requires to be completed in several steps – in each step, the part is held in a fixture, and the exposed portion can be accessed by the tool to machine in that portion. Common fixtures include vise, clamps, 3-jaw or 4-jaw chucks, etc. Each position of holding the part is called a setup. One or more cutting operation may be performed, using one or more cutting tools, in each setup.

To switch from one setup to the next, we must release the part from the previous fixture, change the fixture on the machine, clamp the part in the new position on the new fixture, set the coordinates of the machine tool with respect to the new location of the part, and finally start the machining operations for this setup. Therefore, setup changes are time-consuming and expensive, and so we should try to do the entire cutting process in a minimum number of setups; the task of determining the sequence of the individual operations, grouping them into (a minimum number of) setups, and determination of the fixture used for each setup, is called process planning.

V. WORKING PRINCIPLE

The main objective of this project is to thresh the groundnut seeds, cultivate the land, sow the seeds, and make the land even and to spray the water or fertilizer. These are the aims of our project and they are done in a single operation. A motor is used to run the thresher setup which contains blades so that when the groundnut is fed manually, the motor operates the blades and the ground nut seeds are threshed within few minutes and the motor is powered up by a battery. The pulley and the belt drive are connected to the wheels and the seed sowing setup with the help of a shaft. Also a seed feeder is provided inside a hopper setup such that they feed the seeds to the planting hose. In front of the setup, a cultivator arrangement is made in such a way that they can be loosened and taken off the ground and can be tightened by using a lead screw arrangement. Just behind the delivery end of the hose, a flat plate is provided so that the seeds are planted and the ground is made flat.

First the seeds are fed manually to the hopper and the machine is propelled manually. The pulley and the belt drive delivers power from the wheels to the seed feeder. The seed feeder picks up the seeds as it rotates and feeds the seeds to the planting pipe. The planting pipe delivers the seeds on the grounds thus planting them. Before this operation, the cultivator is tightened so that it

presses against the land. This is done because when the vehicle moves, the land is cultivated automatically. Then the seeds are planted in the cultivated land and finally the land is made even by a flat plate provided at the back of the planting pipe. Near the handle of the machine is provided with the water tank which is connected to the water sprayer. This setup is used to spray the water or the fertilizer that is stored in the tank automatically. Thus when the machine is started, the groundnut can be threshed, the land is cultivated, seeds are sowed, the land is made even and the water is sprayed.



Fig.2. Fabricated Multi Seed Sowing Machine

VI. ADVANTAGES, DISADVANTAGES AND APPLICATIONS

6.1. ADVANTAGES

The developed system used for spraying the fertilizer pesticides, fungicides and insecticide. It is Simple in construction. It is reliable and requires less maintenance and the cost of the system is less, Small in size, hence portable. Light weight, Time taken for planting operation is less, No need of skilled operators for operating the machine. Fully automated process and hence no need of any assistance. It ensures simple and safety operation.

6.2. DISADVANTAGES

More number of moving parts, Must be handles carefully because of more number of moving parts. Suitable only for planting small sized seeds.

6.3. APPLICATIONS

These types of multipurpose agro machine seed sowing with groundnut thrusherferti sprayer have a wide range of applications in the fields like, Mainly used in agricultural purposes, Highly suitable for planting groundnuts, corns, etc.

VII. CONCLUSION

The Design and Fabrication of Multipurpose Agro Machine is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities. Thus we have developed a "Multipurpose Agro Machine" which helps to thresh the groundnut seeds and also corn seeds sometimes by automating the entire planting process with the help of simple mechanisms. Multi agricultural purposes can be carried out simultaneously with the help of this machine and thus the name Multi Agro Machine. So for in future the same project will be remolded and designed to carry out multi functional operation.

REFERENCES

- [1] Nithin P V, Shivaprakash S (2016), "Multipurpose Agricultural Robot" International Journal of Engineering Research.
- [2] Swati D. Sambhare, S.S. Belsare (2015), "Seed Sowing Robotic Technology" International Journal of Scientific Research and Management (IJSRM)
- [3] Vijayakumar N Chalwa, Shilpa S Gundagi (2014), "Mechatronics Based Remote Controlled Agricultural Robot" International Journal of Emerging Trends in Engineering Research.
- [4] P. Usha, V. Maheswari (2016), "Design and Implementation of Seeding Agricultural Robot" Journal of Innovative Research and Solution.
- [5] OMOTADE SEGUN ADEDEJI AND F.N.AJUEBOR "Performance Evaluation of Motorized Groundnut Seller", Journal of agricultural Engineering Vol,39(2): A June,(2002)
- [6] D. Ramesh. H. P. Girishkumar July 2014 "Agriculture seed sowing equipments:A Review" ISSN NO :2278-7798 ,vol. 3
- [7] Roshan v. Marode. P. Gajanan and K. Swapnil, Oct 2013 " Design and implementation of multi seed sowing machine", vol : 2, No.4, ISSN NO :2278-0149, patented.