

Design Development & Manufacturing of Rice Planting Machine

Mr. Bhushan Pandit¹, Mr. Narsing Shinde², Mr. Sandesh Jadhav³, Mr. Nitish Hande⁴,
Prof. K. B. Kawale⁵

¹ Student, Mechanical, JSPM's RSCOE Tathawade, Maharashtra, India

² Student, Mechanical, JSPM's RSCOE Tathawade, Maharashtra, India

³ Student, Mechanical, JSPM's RSCOE Tathawade, Maharashtra, India

⁴ Student, Mechanical, JSPM's RSCOE Tathawade, Maharashtra, India

⁵ Professor, Mechanical, JSPM's RSCOE Tathawade, Maharashtra, India

ABSTRACT

Agriculture is the most important sector of the Indian economy. This is the main source of employment, as most of the work is done in the country. Most of India's population is engaged in agriculture. This ratio is highest including the rice sector. Rice is the country's staple food. Freeing up jobs in sectors other than agriculture is important to the country's development. Mechanization has played an important role in freeing labor from rice production. Feeding a growing population is a huge challenge. Mechanization of the rice industry leads to higher productivity as workers are freed up in other industries. The objective of this project is to design a mechanism to transplant fields to rice transplanters for smallholder farmers across the country

1. INTRODUCTION

Rice being the important food crop covers about one fourth of the total cropped area and cater food to half of the Indian population. In India, average rice production per hectare is 2.2 ton. Rice is the staple food of more than half of the world. It constitutes 20% of the total daily nutrition need of an average person. More than 3.5 billion people depend on rice for their daily demands. A rice transplanter is an agricultural machine used for transplanting saplings to the field. Agriculture is most important sector of the Indian economy. It is most important source of employment for the majority of the work force in the country. Rice is primary and major crop cultivated in India. As the large workforce is engaged in this sector, Traditional method is costly, time consuming and labor-intensive work. To make the transplanter system several attempts has been made to design and fabricate this machine. This study is focused on design analysis and fabrication of a manually operated rice transplanter for small scale Indian rice cultivators. By achieving the goals like simplifying the mechanism, reduce cost and reduced weight of present rice transplanter. The availability and use of manual rice transplanter in Western Maharashtra is very rare, so design of this project is useful to farmers

1.1 Problem Statement

- To develop an all-new design of Machine from existing design of machine, which uses a smaller number of components in it and the design is efficient.
- For manual transplanting of rice, a greater number of labors is required in rice planting but by mechanical transplanter only single person is required to operate the machine.

1.2 Objectives

- To increase the efficiency of traditional rice planting method without sacrificing its basic purpose .
- To achieve higher productivity, yield and reduce the labour cost.
- To develop an alternate source of income for rural youth through customer services.
- To develop an instrument, which will be cheap to buy, repair and maintain. Avoid use of motorized Machine to reduce fuel cost and maintenance.

1.3 Scope

- Arm can also be modified by replacing the groove with end effector of rubber material which is seen in robotic hand.
- Machine can be modified by changing am picking and planting mechanism according to different crops.
- Machine can be made automatic by adding motor which runs on solar energy (solar panels is to be added).
- We can add hopper for sowing seeds so that we get a added advantage that the machine can sow seeds.

2. LITERATURE REVIEW

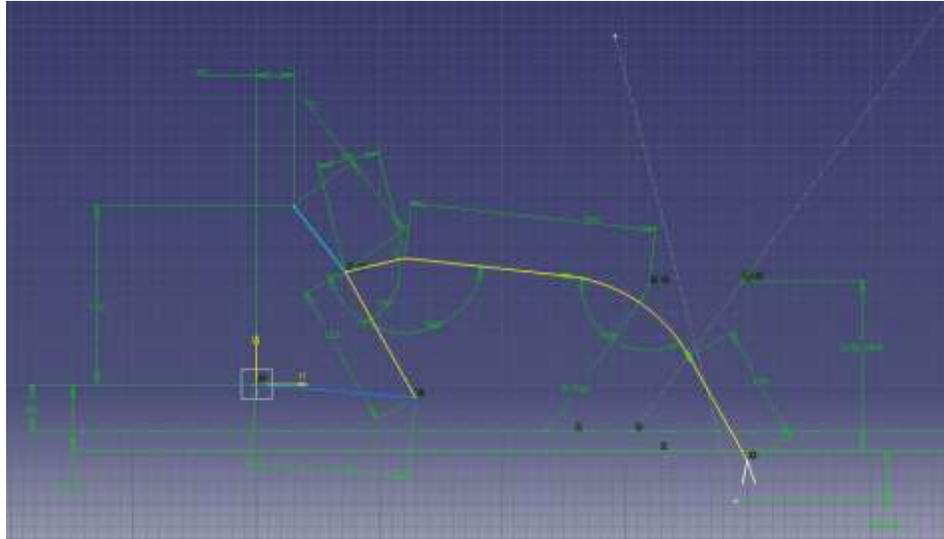
To start this project, we searched for different types of information about the field of transplantation with a literature review of various research articles. Our literature review is divided into different areas of analysis such as the ergonomic analysis of different rice transplant operations, the performance of the self-propelled rice transplanter and its effect on the crop yield. planting, the theoretical development of the rice transplanter. These studies were carried out in order to present the parameters, specifications, problems arising in the existing implants and the methodology for the development and design of the implant. The absence of rice transplanters in the western part of Maharashtra prompted the search for suitable studies in this area and the design of transplanters. Lack of knowledge about the use of this transplanter by driving farmers. Analysis of the design of the rice transplanter Machines can be developed to transplant multiple rows at once. Brief document on rice planting and grain measuring device Therefore, the children studied carefully about grain measuring equipment and rice growing. The conclusion is that the device works independently of the tractor, making it suitable for poor farmers. These saves time as well as labor costs. Research on rice transplanters the basic objective of this paper is to study and understand the research gap between using conventional transplanters and mechanical transplanters for rice transplanting in India. Rice planter design and development They compare existing machines on the market with their developed machines

3. DESIGN AND ARCHITECTURE

Design consists of application of scientific principles, technical information and imagination for development of new or improvised machine or mechanism to perform a specific function with maximum economy & efficiency.

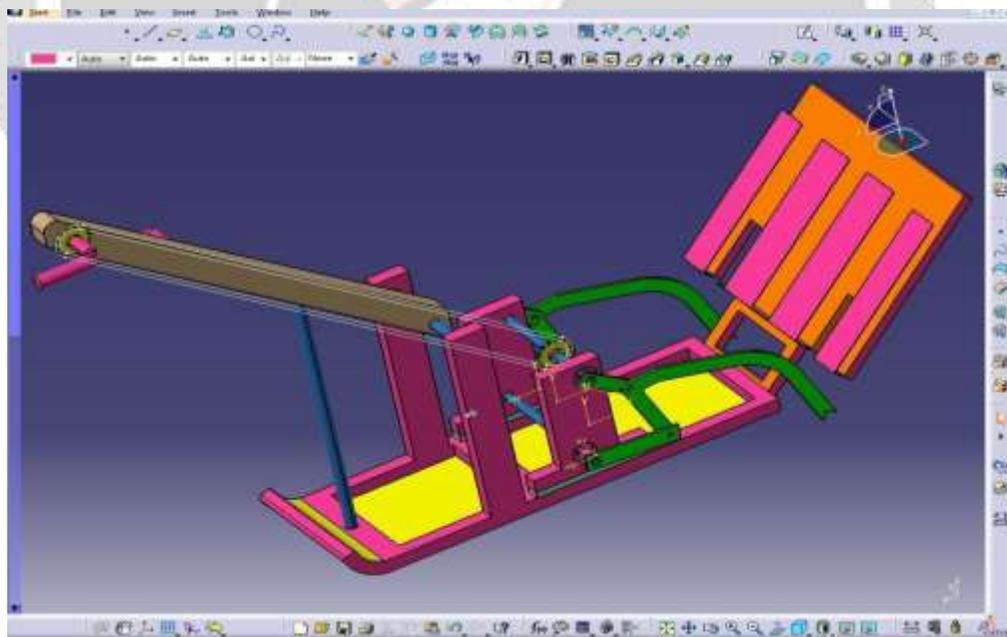
Hence a careful design approach has to be adopted . The total design work , has been split up into two parts;

- System design
- Mechanical Design.



The design of the system is mainly concerned with different physical and ergonomic constraints, space requirements, the layout of different components on the mainframe at the system level, human and machine, number of controls, location of controls, working environment of the machine, risks of failure, safety measures to be taken into account. offered, service support, serviceability, upgradeability, machine weight from the ground, gross machine weight and more. In mechanical design, components are listed and stored on the basis of their supply, design into two categories namely,

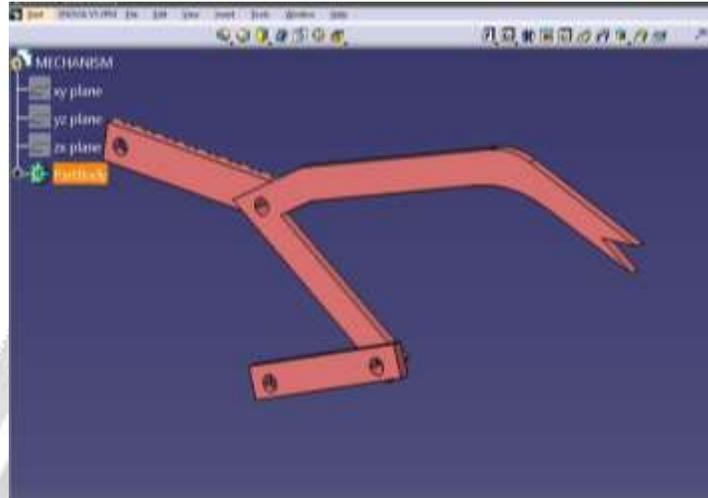
- Designed parts
- Parts to buy



For engineered parts, a detailed design is made and thus a distinction is obtained from the highest size available in the market. This amplifies the editing work as well as post-maintenance. Different tolerances on construction are specified. Process flow diagram is prepared and sent to production stage. Parts to be purchased directly are selected from different categories and designated so that anyone can purchase the same from a retail store with certain specifications.

4. WORKING PRINCIPLE

The rice is kept in a tray and drained by gravity. The fork attached to the shaft lifts the seedlings off the tray and holds them in a horizontal position on the pad. The movement of the wheel and axle is done by hand using a chain and sprocket mechanism. Here, four single rods are used to grow rice in the field. In this mechanism, the fixed link has no movement in the mechanism, the handwheel will have rotational motion. The coupler transmits motion to the control arm. The extension of the coupler used to remove the seedling from the tray is called the fork.



Due to the rotation of the crank, the fork will oscillate up and down. The fork follows a curve when going down. At a certain point along the way, the fork will pick up the seedling from the tray and plant it in the ground while moving downwards. Then the fork will reach its highest position and the process will continue until the rotation stops. The rocker's arm performs an oscillating motion with a limited range of angles. The coupler transmits motion to the controller arm. The extension of the coupler used to remove the seedling from the tray is called the fork. Due to the rotation of the crank, the fork will oscillate up and down. The dismantling arrangement is provided by screwing. The linkage arrangement can be dismantled for later maintenance or cleaning. The input to the shaft is provided by the rotation of the wheel. Due to this arrangement, the rotation of the links depends on the wheel. This is important because it reduces the time required to transplant young plants (compared to manual transplanting), thus allowing more time for harvesting. Therefore, a rice transplanter is a type of machine that transplants rice in the field.

5. CONCLUSIONS

High peak labor demand adversely affects farm punctuality and reduces crop yields. To make up for these problems, mechanical porting is the solution. Mechanization not only changes the structure of work in agriculture, but also affects the nature of the workload. Therefore, mechanization is necessary in the rice cultivation sector. Rice transplanters help us see a bright future. The average farmer in India owns a small amount of land, so mechanical rice transplanters are very useful for rice cultivation. • Transplanters help achieve lower production costs with higher yields and yields. In addition, the quality of the rice produced is also good. • The porting machine not only saves labor costs but also saves time compared to traditional rice cultivation methods. Significant savings in fuel and maintenance costs used in existing machines. With this machine, it takes three days to plant one acre of land and one and a half days to plant 0.5 acre of land. Using this machine requires 1400015000 seedlings per acre. The included disassembly function makes it easy to replace or transport damaged parts.

6. REFERENCES

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