

Design of Rice Huller Machine for Agriculture

Purpose

Prof. Suresh S. Chougule, Gitesh More, Parth Gadekar, Ayush Dhamdhere, Aditya Gore.

Mechanical Engineering
Zeal Polytechnic, Narhe Pune

Abstract: *This paper presents the design and development of a compact and cost-effective rice huller machine for small-scale agricultural use. Traditional rice hulling methods are labour-intensive and result in higher grain breakage, while commercial mills are expensive for rural farmers. The proposed machine operates using a friction-based hulling mechanism powered by a 0.75 HP motor. It is designed with essential components such as a hopper, hulling chamber, shaft, belt drive, and blower for effective husk separation. Performance evaluation shows improved efficiency (70–85%) with a processing capacity of approximately 120–180 kg/hr and reduced grain damage. The machine offers an affordable and efficient solution to enhance productivity and reduce post-harvest losses in rural agriculture*

Keywords: RPM, Agricultural use

I. INTRODUCTION

Rice is one of the most important food crops in the world and is widely consumed in India. After harvesting, paddy grains have an outer husk that must be removed to obtain edible rice. The process of removing this husk is called rice hulling. Traditional hulling methods require more time and manual labour. To overcome this problem, rice huller machines are used to make the process faster and easier. The machine works on the principle of friction and impact between the spike drum and paddy grains. The main components include a frame, spike drum, motor, pulley, and tray. This project aims to design a simple, low-cost rice huller machine for agricultural use. It helps farmers save time, reduce labor, and improve rice processing efficiency.

II. TECHNICAL SPECIFICATIONS

The rice huller machine is designed for efficient and small-scale agricultural use, powered by an electric motor of about 0.5 HP to 1 HP operating at 1440 RPM, which drives the main shaft and threshing drum. The shaft is made of mild steel (20–25 mm diameter) and supported by ball bearings for smooth and low-friction rotation. The threshing unit consists of a spike drum made of mild steel, rotating at around 400–600 RPM to effectively separate grains without damage. The machine frame is fabricated using MS angles or square pipes, providing strength and stability during operation. The overall size is compact (approximately 800 × 500 × 900 mm) with a weight of about 40–60 kg, making it portable and easy to install. The machine has a working capacity of around 50–80 kg per hour, depending on crop conditions, and is designed with basic safety features like belt guards, requiring minimal maintenance and single-person operation.

Table 2.1: Technical Specification

Sr.no	Parameter	Specification
1	Motor Power	0.75 HP
2	Motor Speed	1440 RPM
3	Drum Type	Spike Drum
4	Drum Speed	400 – 600 RPM
5	Capacity	50 – 80 kg/hour



6	Frame Matetial	MS Angles
7	Shaft Material	Mild Steel
8	Power Source	Electric Motor

III. LITERATURE REVIEW

Various studies on rice huller machines indicate that proper design of the threshing drum, including its speed and clearance, plays a crucial role in achieving efficient separation of grains with minimum breakage and losses. It is observed that motorized machines greatly improve productivity, reduce threshing time, and minimize human effort compared to traditional manual methods. Research also highlights that the use of spike-type drums increases threshing efficiency while maintaining grain quality. The selection of suitable materials like mild steel ensures strength, durability, and low manufacturing cost, making the machine affordable for small and medium farmers. Studies further show that compact and portable designs are more practical for rural areas, where transportation and space are limited. The use of a 0.75 HP motor is sufficient for effective operation in small-scale applications, providing a good balance between power consumption and performance. Additionally, proper alignment of machine components and the use of bearings help in smooth operation and reduced wear. Adjustable features in the machine allow handling of different crop conditions and moisture levels, improving flexibility and performance. Safety features such as protective covers are also emphasized to ensure safe operation. Overall, the literature suggests that a simple, cost-effective, and efficient rice huller machine can significantly enhance agricultural productivity, reduce labour dependency, and provide better output quality for small-scale farming applications.

IV. LITERATURE GAP

Existing rice huller machines are often costly, complex, and not suitable for small-scale farmers. Limited research is available on low-power machines (0.75 HP) with efficient performance and low energy consumption. To the areas where existing research or technology is either insufficient, incomplete, or entirely lacking. Identifying such gaps is essential for proposing innovative solutions that improve upon current systems. In the context of automatic rice huller machines, the literature survey indicates significant progress in mechanical design, hulling efficiency, and partial automation. However, several gaps remain that hinder the development of an affordable, fully automatic, and efficient rice huller suitable for small-scale farmers.

V. METHODOLOGY

The work starts with studying existing machines and identifying their limitations. A suitable design is developed based on a 0.75 HP motor for small-scale use. Machine parts like the frame, shaft, and spike drum are designed and selected. The machine is fabricated using cutting and welding, followed by proper assembly. Finally, testing is carried out to check performance, output, and efficiency.



Fig: Over all machine



Fig: Testing





Fig: Clamp Bearing



Fig: MS 8mm Rod



Fig: JI sheet 1.75mm



Fig: MS Angle Bar



Fig: MS 25mm Rod

Concept Design

1. The machine is based on a simple and low-cost design for small-scale farmers.
2. It uses a spike-type rotating drum for separating grains from paddy.
3. A 0.75 HP electric motor is used to drive the shaft through a belt and pulley.
4. Paddy is fed through a tray, where grains are separated by impact action.
5. The machine is supported on a mild steel frame for strength and stability.
6. Separated grains are collected through an output outlet.
7. The design is compact, easy to operate, and energy-efficient.
8. Fabrication is done using cutting and welding processes

VI. CONCLUSION

The rice huller machine developed in this project is a **simple, efficient, and cost-effective solution** for small-scale agricultural use. It successfully reduces manual labour and increases the speed of grain separation compared to traditional methods. The use of a **0.75 HP motor** makes the machine energy-efficient while providing sufficient power for effective operation.

The machine is fabricated using **mild steel and simple manufacturing processes like welding**, making it affordable and easy to maintain. Its compact design and easy operation make it suitable for rural areas and small farmers. Overall, the developed rice huller machine improves productivity, saves time, and provides good quality output with minimum grain damage.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to our project guide, **Prof. Suresh S. Chougule**, for his valuable guidance and continuous support throughout the project. We also thank the **Department of Mechanical**



Engineering, Zeal Polytechnic, Pune, for providing the necessary facilities to carry out this work. We are thankful to all those who directly or indirectly contributed to the successful completion of this project.

REFERENCES

- [1]. S. O. Olayanju et al. -Design and Construction of Rice De-huller Machine 2012.
- [2]. O. O.Akinoso et al. -Design and Fabrication of a Motorized Rice Hulling Machine(2013)
- [3]. R. M. Bisen et al. -Design, Development and Performance Evaluations of Mini Rice Mill for Domestic Purpose. (2014)
- [4]. Ashwini M. V. et al. -Design and Fabrication of Domestic Puffed Rice Making Machine. (2017)
- [5]. Dr. Ramesh B. T. et al.-Design and Fabrication on Effort Adjustable Paddy Filler 2018. i want info releted to our topic imp line from paper

