



## Motor Operated Coconut Husk Remover Machine

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### ABSTRACT-

The Coconut Husk Remover Machine is a mechanical device designed to efficiently remove the husk from coconuts, leaving the inner shell intact. The machine simplifies the process of husking coconuts, reducing labour and increasing productivity. The Compact Coconut Husk Remover Machine is a cost-effective, efficient solution for small-scale coconut processing. Powered by a 0.5 HP motor, CHRM automatically removes coconut husks, reducing labour costs and increasing productivity. Its compact design and adjustable settings accommodate various coconut sizes, ensuring optimal husking. The Coconut Husk Remover Machine (CHRM) is an innovative solution designed to efficiently remove coconut husks, streamlining coconut processing operations. This machine aims to reduce labour costs, increase productivity, and enhance product quality. CHRM features an automatic husking mechanism, adjustable settings for varying coconut sizes, and safety features ensuring operator protection. The coconut industry continues to face challenges in terms of manual husk removal due to labour shortages, physical strain, and inconsistent quality. This project presents the development and fabrication of a motor and gearbox-operated coconut husk remover. The system is powered by a 0.5 HP motor with an A162 gearbox, featuring an input shaft of 15 mm and output shaft of 19 mm. The frame structure is designed with high-grade stainless steel to resist corrosion and ensure long-term use. Safety, efficiency, and simplicity are the core principles of the design. This report outlines the research, design methodologies, fabrication process, peer feedback, improvements implemented, and concluding remarks, along with appendices and references.

**Keywords-** Coconut Husk Remover, Coconut Processing, Automation, Efficiency.

## I. INTRODUCTION

### 1.1 Background:

The Motor Operated Coconut Husk Remover Machine is a project developed as part of the Mechanical Engineering Diploma curriculum. This machine is designed to simplify and enhance the process of removing husks from coconuts, which is traditionally a labour-intensive task. The coconut husk, which is an essential byproduct, requires careful handling to avoid damage to the nut or its fibres. The machine operates using an electric motor, which powers various mechanical components, making the husk removal process faster, safer, and more efficient compared to manual methods.

This project is aimed at increasing productivity and reducing the physical strain on workers in industries that deal with coconuts, such as coconut processing units. By automating the husk removal process, the machine also ensures consistency in quality and efficiency, which can lead to cost savings. It incorporates practical mechanical design principles such as gear mechanisms, motor controls, and safety features, making it an ideal learning tool for mechanical engineering students. This project exemplifies the application of theoretical knowledge in solving real-world problems in agricultural and processing industries.

### 1.2 Problem Statement:

The process of removing coconut husks manually is time-consuming, labour-intensive, and requires significant physical effort, which can lead to inefficiency and worker fatigue. This traditional method also poses challenges in terms of consistency and safety, especially in small-scale farming or processing units where labour is limited. Moreover, with increasing demand for coconut-based products, it is essential to streamline the process to enhance productivity.

To address these challenges, there is a need for an automated machine that can efficiently remove the husks from coconuts with minimal human intervention. A motor-operated coconut husk remover machine would automate the husking process, reducing the physical strain on workers, speeding up production, and improving the consistency of the output. The machine should be designed to handle coconuts of varying sizes, be durable, and consume less power. It will also ensure safety by minimizing the risk of injury associated with manual husking methods.

This project aims to design and develop a motor-operated coconut husk remover machine that addresses these issues while promoting efficiency and safety in the coconut processing industry.

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## II. LITRATURE REVIEW

### 1) Vijay Kumar (2017)-

This pneumatic coconut De-Husking machine is designed to efficiently remove the thick, fibrous shell of coconuts, replacing traditional, labour-intensive methods that use a cleaver. It aims to improve safety, reduce manual effort, and accommodate coconuts of various sizes from around the world. By automating the de-husking process, this machine provides an affordable, efficient solution for the coconut industry, leveraging coconuts' versatility in producing oil, charcoal, and coir.

### 2) Miss. H. AZMI (2015)-

developed a small-scale coconut de-husking machine with spiked rollers, a chain drive, presser, and belt system, designed for rural production. Powered by a 2hp electric motor, it reduces motor speed from 1500 rpm to 21 rpm using worm gears, ensuring efficient de-husking without damaging the edible part. The machine achieves 90.42% efficiency and processes 222 coconuts per hour. Compact and low-noise, it's ideal for small and medium enterprises (SMEs) with limited space, providing a cost-effective and productive solution.

### 3) K.P. Kolhe et al.

highlighted that all parts of a coconut are valuable, but de-husking is often labour-intensive, requiring skill or specialized tools. Manual methods, like cleavers or spikes, demand skilled labour, which is now scarce. Mechanized de-husking tools have been developed to reduce the limitations of manual labour, yet many existing machines fail due to issues like coconut shell breakage, wasted coir, and inefficiency. Their work aims to design a semi-automatic de-husking machine with dual rollers equipped with tines to effectively tear the husk from the shell. The machine includes adjustable roller spacing and replaceable tines for optimal de-husking across varying coconut sizes.

### 4) Shrinivasan R (2012)-

developed a fully automated coconut de-husking machine that also removes the crown, aiming to eliminate manual labour. Unlike previous semi-automated machines, this machine requires only manual loading and unloading, increasing productivity. Designed to handle coconuts of various sizes, it accommodates different coconut varieties found globally. The machine maximizes output by efficiently processing coconuts at all stages of their lifecycle.

### 5) Rahul Sabale (2015)-

highlight that coconut de-husking is a challenging post-harvest task, traditionally done with hand tools that require skill and training. Mechanized tools have been developed to address these challenges, but only a few have gained popularity due to limitations. This work reviews various manual and mechanized tools created worldwide for de-husking, focusing on those that have successfully improved efficiency and reduced labour demands.

### 6) Sharanbasappa (2017)-

discuss traditional coconut de-husking methods using a cleaver or spike, which are labour-intensive and require skilled workers. Efforts to develop de-husking tools have only partially succeeded, failing to fully replace manual methods. Key issues with these tools include incomplete de-husking, damage to the coconut shell, loss of valuable coir, and the need for greater effort than manual techniques.

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## III. DEVELOPMENT OF MODEL

### Development of Model of Motor Operated Coconut Husk Remover Machine:

The motor-operated coconut husk remover machine is built using a combination of key mechanical components to ensure efficient and reliable performance in husking coconuts. The machine is powered by a **0.5 hp motor**, which provides sufficient torque for the husking process while ensuring energy efficiency. This motor is connected to a **gearbox** with an **A162 size input shaft of 15mm** and an **output shaft of 19mm**. The gearbox serves to reduce the motor's rotational speed while increasing the torque, providing the necessary mechanical advantage for the husking tool. This helps to drive the husking mechanism effectively without overloading the motor, ensuring smooth operation during continuous use. The **custom-made coconut de-husking tool** is the heart of the machine, designed specifically to strip the coconut husk with minimal damage to the coconut itself. This tool is designed to operate smoothly utilizes a sharp tool optimal speed for husk removal. To support the motor and gearbox, the machine features an **L-shaped base** which provides stability and balance during operation. The base is fabricated from strong materials, such as mild steel, to ensure the structure is robust and can withstand the forces generated during the husking process. The machine's movement and operation are controlled by a **pulley and belt drive system**, which connects the motor's output shaft to the husking tool. The pulley system allows for the transmission of rotary motion from the motor to the husking tool, ensuring that the tool operates at the correct speed for efficient husking. This belt drive system is designed to be adjustable, allowing for the fine-tuning of speed to suit different coconut sizes and husk removal requirements. these components form a comprehensive machine that automates the coconut husking process, improving efficiency, safety, and reducing the labour-intensive effort traditionally required for manual husking.

The overall machine design ensures ease of maintenance, with accessible parts for routine checks and adjustments, and is durable enough for use in both small-scale and large-scale coconut processing environments.



Image of Actual Project

#### IV. BUDGETING AND INSTRUMENT USED

##### BUDGETING OF PROJECT

Sr.no.	Components used	Cost of components
1	Motor (0.5 HP)	4110
2	Gearbox	5605
3	Pulley and Belt	1591
4	Chain	210
5	Spring	50
6	De-husking Tool	300
7	Nut and Bolts	501
8	Base Material (MS/SS)	800
9	Plate	80
10	Welding Rods	120
	TOTAL	13367 /-

##### INSTRUMENTS USED

###### 1. Spanner (for Assembly and Maintenance):

A spanner is one of the most essential tools in the assembly, maintenance, and adjustment of the motor-operated coconut de-husking machine. During the construction and final assembly stages, spanners are used to tighten bolts and nuts securing various components such as the motor, gearbox, and other parts of the machine. They help ensure that all connections are secure and that the parts are aligned properly. Spanners come in various sizes, and their use is critical to maintaining the integrity of the machine, preventing any part from loosening due to vibration or operational stress. In the maintenance phase, spanners are often used to replace worn-out parts or to make adjustments to the machine to maintain optimal performance, ensuring the machine runs smoothly over time.

###### 2. Milling Machine (Boring Operation):

A milling machine plays a pivotal role in the manufacturing process of the motor-operated coconut de-husking machine, specifically in the boring operation. Boring is a precision machining process used to enlarge and refine holes in metal components such as the motor mounts, pulley inner diameter and other structural parts of the machine. Using the milling machine, holes can be made with high accuracy, ensuring that components fit together perfectly. The boring operation ensures that the parts are aligned correctly, reducing friction and enhancing the overall efficiency of the machine. By employing a milling machine with a boring function, manufacturers can achieve the required tolerances

for motor shaft installations and gearbox assemblies, contributing to the machine's stability and durability. The milling machine is vital for producing the machine components with precise dimensions, which is essential for the proper functioning of the coconut de-husking machine.

### 3. **Welding Operation (For Structural Integrity):**

Welding operations are integral to the construction of the motor-operated coconut de-husking machine, as they provide the necessary strength and structural integrity for the machine's frame and critical components. The frame of the machine, which supports the motor, gearbox and other mechanisms, is usually made of metal and requires welding to assemble various parts. Welding ensures that joints are robust, stable, and capable of withstanding the operational stresses that the machine experiences during its lifecycle. Technique used in this operation is SMAW (Shielded Metal Arc Welding) is used. Proper welding also ensures that the components are aligned and securely fastened, which helps maintain the overall performance and longevity of the machine. Moreover, welding is used to fabricate custom parts or reinforce specific sections of the machine that require additional strength due to the mechanical forces applied during the husking operation.

### 4. **Cutter (For Shaping and Sizing Components):**

A cutter is an essential tool used for shaping and sizing different components in the manufacturing of the motor-operated coconut de-husking machine. Cutters are used to cut metal parts, including the rotating drum, the base of the machine, and other structural elements. In the case of the de-husking machine, the cutter helps create the necessary grooves, shapes, and slots in metal components to fit them precisely into the machine. For instance, cutters are used to form slots in the rotating drum for attaching blades or to cut sections of the frame to the desired dimensions. The precision of the cutting process is critical for ensuring that the parts fit together properly, which in turn guarantees the machine's efficient operation.

### 5. **Drilling Operation (For Creating Holes and Mounting Components):**

The drilling operation is used extensively to create precise holes in components for mounting purposes in the motor-operated coconut de-husking machine. Drilling is performed to make holes for bolts, screws, or pins those secure parts like the motor, gearbox, and rotating drum to the frame. The drilling operation ensures that holes are accurately placed and sized, which is essential for the alignment of the machine's components. Using a drilling machine, operators can create holes with the required depth and diameter, allowing for easy and secure assembly. This operation is vital for assembling the motor and gearbox, ensuring that all parts are positioned correctly, thereby minimizing vibration and improving overall performance.

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## V. CONCLUSION

The **Motor Operated Coconut De-Husking Machine** is a significant innovation in the automation of coconut processing. This machine integrates several key components, including a **motor**, **gearbox**, and a **custom-made de-husking tool** with a spear-like shape, which together make the husking process faster, more efficient, and safer. The motor serves as the driving force, powering the machine and ensuring smooth operation. The gearbox, with its capacity to adjust torque and speed, allows for the precise control needed to handle coconuts without damaging the shell, ensuring a high-quality end product. The custom-made spear-like de-husking tool is a critical part of the system. Its unique design enables it to efficiently pierce and separate the husk from the coconut, making the entire de-husking process both effective and consistent. This tool is designed to withstand the force necessary to remove the husk while minimizing wear and tear, contributing to the machine's longevity. The motor-operated system significantly reduces the need for manual labour, decreasing the risk of injury while improving productivity. By automating the de-husking process, the machine increases efficiency, consistency, and speed in coconut processing. The overall design of the machine, along with its key components, demonstrates the application of mechanical engineering principles such as torque transmission, material strength, and precision in operation, ensuring that this machine is a valuable asset in industries focused on coconut processing.

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## VI. REFERENCE

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