

COCONUT DEHUSKING MACHINE

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Abstract - After the Philippines and Indonesia, India is the third-largest producer of coconut in the world. Over 70% of the world's coir and coir product output is produced by India alone. Three percent of the world's population uses it. Before being used for any of its functions, the coconut must first be de-husked. Each component of the coconut, including the husk, shell, copra, and water, has a purpose. The husk of the coconut, the shell, copra, and coconut water are all used in the production of coir. There are several ways to remove the coconut's husk. Farmers generally use the traditional method of manual dehusking. Dehusking with a conventional hand implement, such as a spike or machete, requires training and a skilled worker. There is a shortage of such skilled individuals today. By using machines more frequently, the time and labor costs incurred can be significantly reduced. This machine's primary function is to fully automate the de-husking and husk removal process, doing away with the need for a skilled operator to dehusk the coconut. Due to the expensive expense, not all coconut farmers can afford to acquire the automated equipment utilized in wealthy nations. This project aims to create a dehusking that is less expensive and more productive. The dehusking machine is superior to hydraulic dehusking machines since it is more reasonably priced. Two revolving shafts with spikes are installed on a frame and are part of the machine. A single-phase motor rotates the shafts. Using a gearbox reduces the output speed. The husk of the coconut is removed when it is positioned between two spiky shafts revolving anticlockwise. This project is primarily intended for businesses that scratch coconuts for profit to reduce labor costs and save time.

Key Words: Dehusking,Tynes,Husk,Cylinders

1. INTRODUCTION

After Indonesia and the Philippines, India is the third-largest producer of coconuts worldwide. This project's primary goal is to speed up the dehusking of coconuts while reducing the amount of labor required from humans. Almost all of a coconut's parts are beneficial.

While the meat of a mature coconut fruit can be used to make shredded coconut or eaten fresh, the meat of an immature coconut fruit can be converted into ice cream. The husk produces fibers that are used to make coir products including coir carpets and coir geotextile. By introducing this machine in farm areas, it is possible to lessen the risk

associated with using spikes to remove the coconut's husk and do away with the need for specialized labor to do so. Dehusking is the process of removing the coconut's husk. Moreover, the system could be integrated with additional processing processes. With the aid of two revolving rollers spiked on their periphery, this coconut dehusking machine removes the coconut husk from coconut fruit to produce dehusked coconut fruit. The dehusking arrangement is connected to a single phase 1 HP induction motor with the help of a gear & chain. The motor is connected with a changeover switch for protection from an accident. The motor is protected by a double pole c-type circuit breaker. The machine has two rotating shafts with spikes and blades mounted on them. The shaft is rotated by a single phase 1 HP Induction motor. The output speed is reduced by a gearbox. When the coconut is placed between spiked shafts rotating in opposite directions, the husk is peeled off from the coconut. The coconut shafts rotate along with spikes direction & husk will peel off from the coconut. The coconut is thrown downward in a tray.

1.1 OBJECTIVES

- ❖ To improve continuous work capacity.
- ❖ To increase efficiency than conventional system.
- ❖ To build user friendly machine.
- ❖ To develop affordable automatic dehusker unit.
- ❖ To reduces human efforts

2. METHODOLOGY

The automatic dehusking machine consists of two rotating rollers having spikes on their periphery, which allows the coconut to remove the husk from it. The electric motor as a power source connected to the gear box to move it in opposite direction. The aforementioned components will be positioned on top of the supporting structure. To transmit the power from the motor to cylindrical rollers by gear & pulley transmission system. The dehusking apparatus is made up of cylinder-shaped rollers coupled with cutting pins over the surface. The average shape & size of the coconut is considered while designing the space between the two rollers.

There are two types of dehusking rollers suitable for this project

1) Hydraulic rollers: Hydraulic roller has their advantages. It can adjust the spacing between two rollers automatically. In this project cost affordability is more important. We can't use this type of roller.

2) Manual rollers: The average shape and size of the coconut are considered while designing the space between the two rollers. The main benefit of a manually adjusted roller is less cost and easily affordable.

Another main component is the coconut copra grinding unit used to separate the meal from the coconut. The proper grinding is with a sharp grinding unit attached to a dehusking machine.

The main heart of this project is an induction motor. There are two types of induction motors suitable for this project.

1) Three-phase induction motor:

The three-phase induction motor is self-starting & provides higher torque than single phase one. In an automatic coconut dehusking machine for the husking process, there is no need for higher torque. Higher power means higher energy consumption. So we try to make energy efficient dehusking unit. We cannot use 3 phase induction motor for our project.

2) Single-phase induction motor:

A capacitor start capacitor run single phase induction motor is the best suitable motor for this project. The torque generated by this motor is much sufficient. The single phase 1 HP capacitor start capacitor run motor generates approximately 5 Nm or torque. The cost of a single-phase 1 HP motor is less than a three-phase one. Over project is making it affordable price so we use a single phase 1 HP capacitor start capacitor to run the motor. The power consumed by this motor is less than three a phase motor. So the efficiency increases & running cost minimized

3. Design and Working

The coconut Dehusking machine works on single phase 1 HP Induction motor. The motor works on single phase 230 v AC 50 Hz supply. The dehusking machine is electrically operated. The single phase 1 HP motor is fitted on metal frame with gear. The motor output is given to bladed rotor and gearbox. The gearbox connected to tynes or turbine, which moves reverse direction with respect to blades rotor.

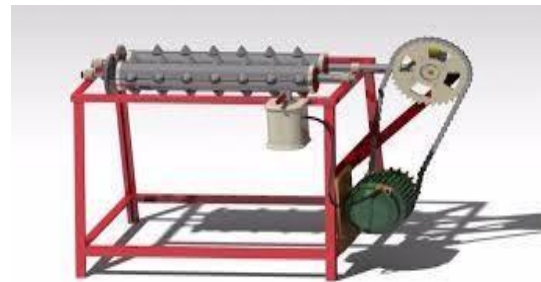


Fig -3.1: Design of the Coconut Dehusking Machine

The circuit breaker is connected for motor protection. Type C circuit breaker is used to protect from overload & overcurrent. The changeover switch for motor Forward & Reverse operation is connected in between circuit breaker & motor. It can avoid the accident when coconut looks in dehusking machine. The tearing effect causes in between tynes & bladed rotor will remove the outer shell of coconut. This process is also called as dehusking process. After dehusking process the coconut falls in bottom tray & outer shell throw out from the tynes. This helps to complete mass protection of coconut in less time with fewer efforts. The coconut dehusking machine is carry by easily with two wheels.

4. COMPONENTS

1) Frame

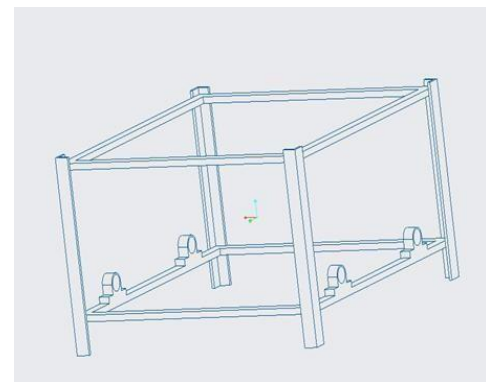


Fig -4.1: Frame

A rigid frame is a structure's load-bearing skeleton made of straight L-shaped components joined by primarily rigid connections that obstruct motions caused by the members' joints. Members of it can withstand axial, shear, and bending moments.

2) Single Phase Induction Motor



Fig -4.2: Single Phase Induction Motor

The roller shaft, which is fixed to the end of the frame structure, is found to be driven by it. A sizable pulley that the belt goes around is found at the motor's free end of the shaft. Single-phase induction motors can operate with just one power phase. They are frequently employed in low-power rating applications for both household and commercial use. An induction motor is an AC electric motor in which the magnetic field of the stator winding is used to electromagnetically induce the electric current into the rotor necessary to produce torque. Hence, it is possible to construct an induction motor without electrical connections to the rotor. Either a wound-type rotor or a squirrel-cage-type rotor can be used in an induction motor.

3) Ball Bearing

A specific type of rolling element bearing called a ball bearing uses balls to maintain the distance between the bearing races. The primary purposes of a ball bearing are to support radial and axial loads as well as to reduce rotational friction. At least two races are employed to contain the balls and convey the stresses through the balls. The majority of applications link one race to the rotating assembly while leaving the other stationary (e.g., a hub or shaft). The rotation of one of the bearing races causes the balls to spin as well. Because the balls are rolling, the coefficient of friction is much lower than it would be if two flat surfaces were moving in opposition to one another.



Fig -4.3: Ball Bearing

Due to the smaller contact surface between the balls and races, ball bearings typically have a lower load capacity for their size than other varieties of rolling-element bearings. They are tolerant of minor inner and outside race misalignment, though. Because hammering the bearings could cause them to break, they are pressed smoothly into the shafts. Mild steel makes up the bearing cap and the bearing is composed of steel.

4) Changeover switch



Fig -4.4: Changeover switch

The power circuit for the motor control receives a 440V single-phase supply. Finally, the Forward Start button is depressed. The Forward contactor in the power circuit is actuated when the Control Supply is applied to the NC contacts of Limit Switch 1 and Reverse Contactor, causing the motor to rotate forward (clockwise). As soon as Limit Switch 1 received the signal, it changed from NC to NO, deactivating the Forward Contactor coil. The Reverse Start button must be pressed to activate the Reverse Contactor for reverse control. Here, the control circuit energizes the reverse contactor coil, activating the reverse contactor in the power circuit. The power for the motor was provided by the reverse contactor.

5) Reduction Gearbox



Fig -4.5: Reduction Gearbox

The motor's input speed is decreased while its output torque is increased by using a reduction gearbox, also referred to as a speed reducer. The gadget is used to convert the basic engine's output shaft revolutions into the propeller-moving revolutions. The wheels and pinions in the reduction gearbox have teeth that mesh, transferring power from a drive shaft to a driven shaft and lowering speed.

6) Chain Drive

Using a chain drive, mechanical power can be moved from one location to another. It is frequently utilized to power a vehicle's wheels, particularly the ones on motorbikes and bicycles. It is used in a vast array of other machinery in addition to automobiles. In order to transmit power, a drive chain or transmission chain—which is most usually used—passes over a sprocket gear, and the teeth of the gear mesh with the holes in the chain links. The gear is turned, and this pulls the chain putting mechanical imposing force on the system.



Fig -4.6: Chain Drive

The chain, which can be used to lift or drag objects, can occasionally be rotated to generate power. Other times, a second gear is used, and the power is reclaimed by securing shafts or hubs to this gear. While though drive chains are frequently only two simple oval loops, they can also bend around curves if there are more than two gears attached to the chain. These additional gears are referred to as idler-wheels when they neither send power into the system nor take it out. The gear ratio can be changed by changing how big the input and output gears are in relation to one another. For instance, when the gear on a bicycle pedal spins once, the gear that drives the wheels also rotates.

7) MCB



Fig -4.7: MCB

This is utilized in commercial or industrial applications when there is a potential for increased short circuit current levels in the circuit. 5 to 10 times the full load current triggers a trip on this sort of MCB. The associated loads generally have an inductive character (e.g. induction motors) Protection against overloads and short circuits, control of circuits, and protection for resistive and inductive loads with low inrush current are all functions of type C MCBs.

8) CONCLUSIONS

In this project, we try to minimize the expenditure of an automatic Dehusking Machine. We try to build a machine that helps farmers to reduce the time and effort to husk the coconut using a conventional tool. This machine can be cost-effective compared to the existing hydraulic automatic dehusking machine. In a rural area, the conventional dehusking tool is used, which skilled labourers to dehusk coconuts, but this machine needs can do it in minimum time & fewer effort. The main purpose of our project is to make available a machine for people at an affordable price & which consumes less time.

FUTURE SCOPE

Various processes along with dehusking could be done such as conveyor belt by adding more attachments. In India due to increasing population and economy expansion, the coconut demand and supply are more demanded. To tackle the mass production of unhusked coconut we need to develop the automatic aid. This leads to the expansion of coconut dehusking.

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