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Design and Fabrication of Multistage Coconut Dehusking Machine

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Abstract: ***Dehusking with hand tools like matchet or a spike depends on the talent of employee and want training. These days there's decreasing of such expert workers. The atomized or the ability operated machines are developed to eliminate the drawbacks of manual tools. This gift works to style and develop a semiautomatic coconut dehusking machine that overcomes these drawbacks. It contains elements like dehusking unit mounted on a frame with motor as an influence supply alongside speed reducing unit. The dehusking unit contains a tray of cylindrical rollers with tynes (cutting pins) on its surface and extra tray of cylindrical rollers once it's needed. These rollers can rotate in other way with totally different speeds so the tynes will penetrate into the husk and tear it far from the shell. The tearing of husk from shell happens when the coconut offers excellent mesh with the cutting pins and it depends on the depth of insertion of nut into rollers and profile of tynes. Additionally the appropriate profile of cutting pins are needed for effective dehusking. These cutting pins are hooked up to the cylinders with fasteners so that replacements are often simply done.***
Keywords: ***Husk, motor, rollers, Gears.***

I. INTRODUCTION

Coconut is one among the international most helpful and demanding perennial plants. Coconuts are grown in additional than ninety three international locations of the international, with an entire producing of 5.4 billion lots in step with year. Asian country is a prime manufacturer of coconut within side the international Coconut offers food, suitable be eaten oil, business oil and fitness drink to humanity. Coconut performs associate crucial position within side the economic, social and cultural sports of tens of thousands and thousands of individuals in our country. In many rural areas, massive wide selection of individuals contain in coconut dehusking system. Before extracting oil from the coconut, the coconuts bear dehusking and slicing processes. So, to try to to that dehusking system individuals use sharp instrumentation that consumes overtime and to boot that's a unstable system, because of the actual fact loss of awareness may to boot result in extreme injury. Thus motorized dehusking and slicing device is also used. In the early levels the coconuts are dehusked via method of the employment of the knife edged timber stripes. However in recent times the coconuts are dehusked manually via method of the employment of the many mechanical instruments. This coconut dehusking device peels off the coconut husk from coconut fruit to accumulate dehusked coconut fruit with the assist of rotating rollers having spikes on their periphery. The coconut is found in among the rollers lengthwise. The rollers are pushed at distinctive speeds with assist of gears and powered via method of electrical steam-powered motor. The movement rate of rollers should be distinctive so as that the coconut is also grown to become by method of this differential velocity. The spikes penetrate into the coconut husk and additionally rotation of rollers creates peeling of the husk. The husk that's peeled off is pulled downwards via way of the rollers. once a 360° rotation of the coconut, the husk could be eliminated absolutely and therefore the fruit is also taken out. The designed Virtual version of the Coconut Dehusking Machine is modelled the employment of SOLIDWORKS 2010 modelling software. Then it's miles imported into the ADAMS VIEW, and via way of making use of vital joints, motions and contacts the version is simulated to watch its Dynamic Behaviour.

II. DIMENSION

A. Torque Calculation

Force for dehusk coconut in kg : 55Kg
Force for dehusk coconut in N : 540N
Torque : 43.2N.m
Total torque with FOS(FOS=2) : 86.6N.m

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B. Design of Motor

Phase : Three phase
Speed : 1450rpm
Power : 2.5hp

C. Design of Gear

Diameter : 100mm
Teeth : 50
Module : 2

D. Size of Roller

Diameter of roller : 76mm
Length of roller : 300mm
Shaft Size : 20mm

E. Size Of Spike Or Blade

Spikes are used
Diameter of spike : 20mm

*F. 2*Frame*

Height : 810mm
Length : 720mm
Width : 330mm
Material : Mild steel

G. Reduction Gear Box

Speed : 1500rpm to 30rpm.

III. FABRICATION

After making a solid model of machine as per the model different components of coconut dehusking machine are fabricated. The frame is the main supporting structure upon which the other components are mounted on. The frame is a welded structure constructed from 50mmx50mmx5mm angle iron with dimensions 720mm in length, 330mm width and 810mm height. The electric motor mounted bottom of the frame and the chain drive is used to transfer the power to the reduction gear box. The reduction gear box is attached to the rollers shaft.The unit comprises of 2 rollers and 2 roller shafts. The another unit comprises of 2 rollers and 2 rollers shaft are attached when it is required. Each roller shaft is a mild steel rod of 76mm diameter with length 300mm supported at both ends by pillow block bearings. Two gears mounted on the shaft with 50teeth the driver gear rotates driven gear. Spikes welded on the roller, distance between two spikes is 30mm and 6 spikes welded on periphery of the roller at 90° angle. Total 48 spikes welded on one roller. Selection of above specifications is done on average diameter of the coconut and forces acting in vertical and horizontal plane.

Figure 1. Fabricated model.

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IV. 2D-DIAGRAM

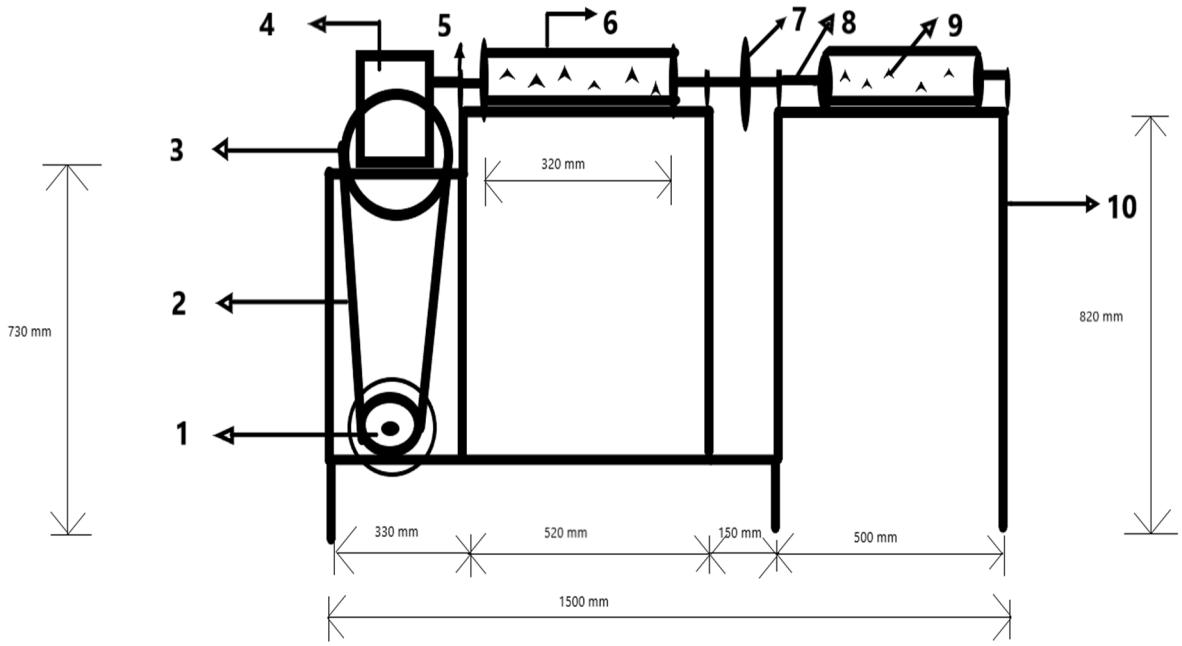

Figure 2. 2-D Diagram.

1) Motor.
2) Chain.
3) Chain drive.
4) Reduction Gearbox.
5) Pillow block bearing.
6) Roller.
7) Flange coupling.
8) Shaft.
9) Spike.
10) Frame.

V. RESULTS & DISCUSSIONS

This power operated coconut dehusking machine operates on 3 phase, 2.5 HP motor. The dehusking unit consists of two cylinders, this cylinder rotates same speed therefore on cause tearing impact over the coconut husk. The 2 diameters offer same speeds at opposite directions. The spikes are mounted on the cylinders in an exceedingly explicit manner, to induce a lot of grip and effective dehusking. The dehusking technique in really easy, place the coconut in between the two rolling cylinders, rotating in opposite directions and press it by a operated by hand mechanical linkage. because the cylinders rotate, tynes provided on the boundary can penetrate into the husk and tear it away. Tynes are designed in such how that it'll not cause any injury to the coconut shell. Removed husk is in the form of separated fibers, so these fibers are more useful in coir industry. Thus the dehusking can be done, effectively.The skilled labour remove the coconut husk 240 fruit per hour it is so difficult to remove the husk .so we fabricated a new machine it removes the husk very easily 480+480 fruit per hour.

VI. CONCLUSION

This project made an impressive task within the field of agricultural. It's very useful to the farmers for motorized husk remover. Easy to assemble, Easy Maintenance. This model is compact with good range of productivity with low cost and high safety. This project will reduce the value involved within the concern. Project has been designed to perform the whole requirement task at the shortest time available.

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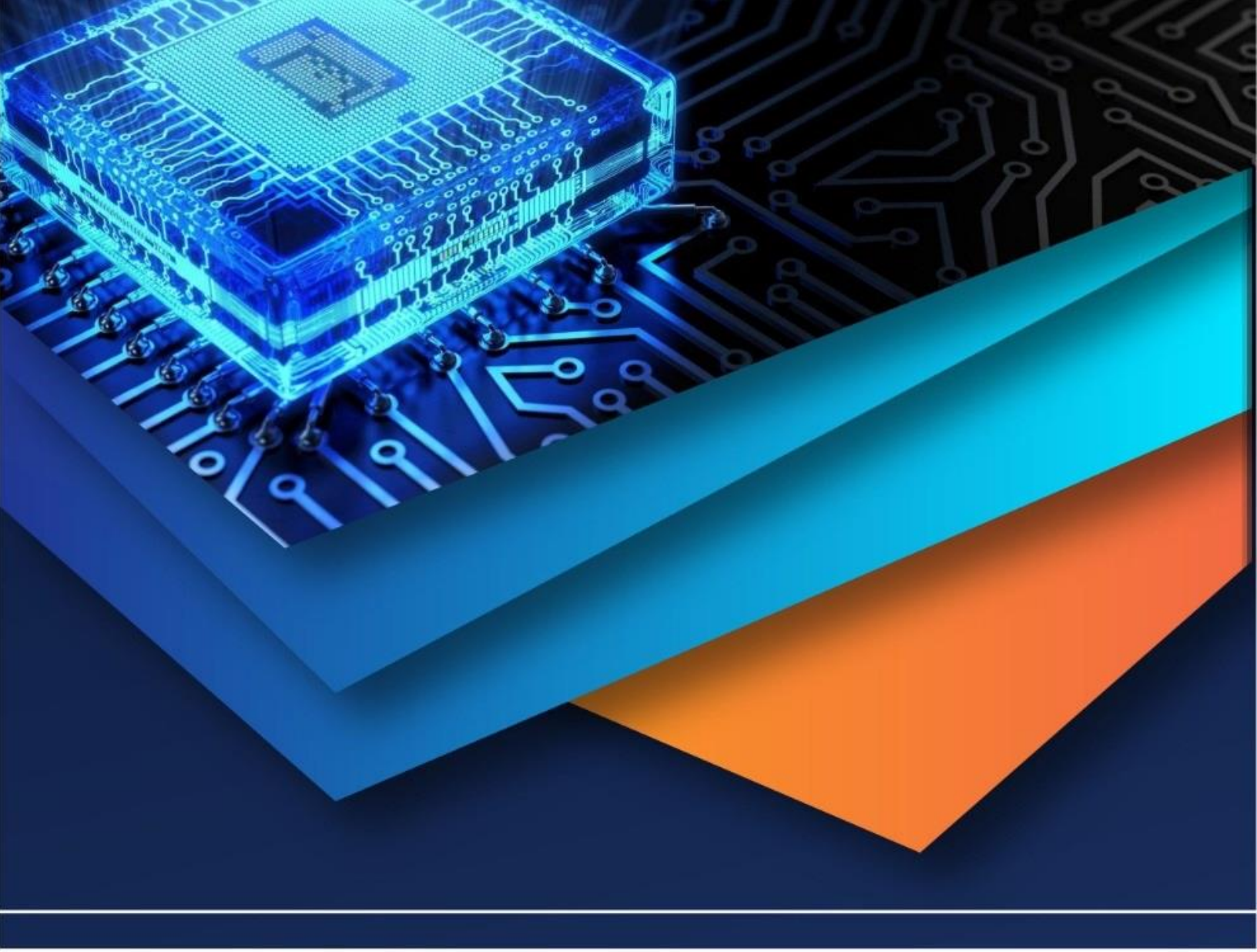

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