

# Review on Design and Fabrication of Coconut De-husking Machine

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**Abstract-** *There are lots of agricultural equipment's which are design for the operations of post harvesting. The de-husking of a coconut is considered as the most time consuming, tiring, and difficult operation to perform. Many attempts has been made to perform this task of de-husking manually as well as mechanized. Most of the time this task of de-husking was performed by using different hand tools. In hand tools application, the de-husking depends on the skill of labours and also training. The mechanized or the power operated machines are also developed to eliminate the drawbacks of manual tools. Such a tools and machines are developed all over the world and a very few have become popular, rest of them got vanished due to their limitations. This work is aimed to list such tools and machines which are used for the post harvesting i.e. de-husking of coconut.*

**Keywords-** Automatic, Bearing, Coconut, Dehusking.

## I. INTRODUCTION

INDIA is the 3<sup>rd</sup> largest coconut production country in the world. It is popular at the sea coastal region of India such as western bank of Maharashtra and Kerala it is mostly used as the major food ingredient and in whole country it is used as the part of the food ingredient. The konkan region in Maharashtra is well known for the production of coconut but the problem is of lack of labours. And hence we have design the automatic coconut dehusking machine which reduces the work of labours and ultimately it helps to the farmer.

Today the agriculture is mechanized with the modern means. The agricultural activities like sowing, harvesting nowadays involves many light weight to heavy machinery. Use of such machines is beneficial for both farmer and labour as it saves time of farmer and the tedious and cumbersome work is simplified to workers. It also enhances the productivity of farm. The agricultural activities are broadly classified into three groups. Pre-harvesting, harvesting and post-harvesting activities. All these three groups of activities are nowadays mechanized with machines. Pre harvesting operations are inserting seeds into farms, ploughing , irrigation etc. Harvesting means obtaining the fruits from the plants. Post harvesting is the operation which is required for the

further processing of the fruits obtained from the plants. Amongst different post harvesting operations the coconut de-husking is regarded as a difficult task to perform. Coconut in India is grown on a large scale because of its numerous advantages and the atmosphere in coastal areas is favorable for its cultivation. Coconut gives coconut oil, coconut powder, husk is used to manufacture ropes, its medicinal properties etc. Hence its post harvesting is important. Many attempts have been made to make its post harvesting mechanized either manually or power operated. These attempts of mechanization have their own advantages and limitations. The study of such tools and machines is necessary for the selection of suitable mechanism to satisfy the desired need of small scale or large scale.

## II. LITERATURE REVIEW

The coconut spanner resembles the smithy tongs. Its structure is modified from that of a smithy tongs by expanding its legs. These elongated legs acts like a handle. These are hold into the hand and force is applied on it so that the other two ends which are inserted into the coconut moves away and loosens the coconut fiber. By using this tool the coconut can be de-husked in three to four repetitions. The coconut may be placed on the ground level and the further part of tongs which are blades can be inserted into the fiber of coconut and then by applying force the blades are separated from each other and de-husking takes place. But it is tiring operation as it involves reinsertion of tong blades. Also it consumes a lot time. So it is not suitable for mass de-husking.

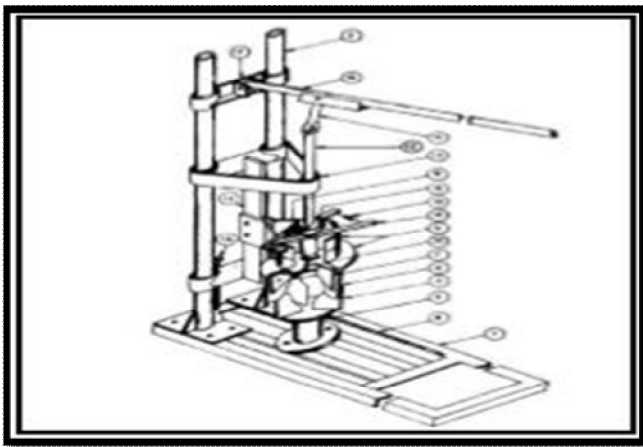
Hydraulic power unit with cylinders and valves arrangement following with operating mechanism to de-husk the coconut fiber. Coconut de-husking machine has the average capacity to de-husk the Coconut on an average at 12.1 seconds. When the observations were taken on ten Coconuts and only one skilled operator is required for operating the entire machine. The labor cost is nearly half the cost of de-husking the Coconut by using the conventional method.



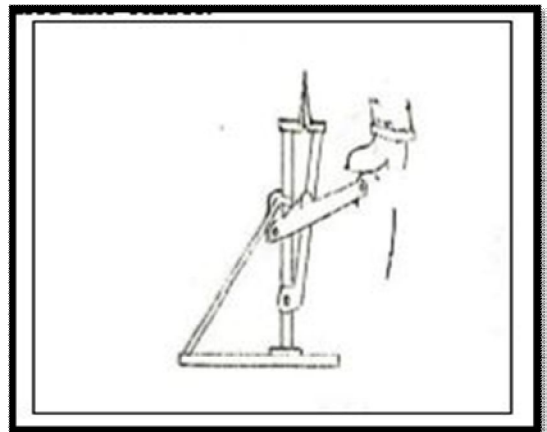
Hand operated coconut de-husker is widely used there to de-husk the coconut. Such a tool consists of two blades one is fixed to the upright column and the other is movable. The movable blade is attached to the handle. As force is applied on the handle the jaw rotates which helps in de-husking. While de-husking the coconut is impaled onto the blades in closed position, and then handle is lifted up to de-husk.



Foot Operated Coconut De-husking Equipment The Coconut is struck manually against the closed teeth blades. The paddle is accelerating turn around and the clamp action de-husk the coconut in two pieces. One or two subsequent operations are needed to separate the core completely. We can easily operated this equipment. Pedal operated Coconut de husking equipment has a simple construction, it is light weight and handy which makes it portable. Pedal operated Coconut de husking equipment also is handled by unskilled person. This equipment is simple and there is no need of power source as it is manually operated. This coconut de husking equipment able to de husk 80-100 coconuts per hour. Pedal operated Coconut de husking equipment used in hotels, houses, and canteens etc. and also for commercial purposes. The fabrication cost of Pedal operated Coconut de husking equipment in mass production is around four hundred rupees only. The efficiency of this equipment is higher when compared to other manually operated de husking methods.



Power operated De-husking Machine with twin blades. In a twin-blade was been developed in such a way that the husking of the coconut was done by inserting coconut onto one of its twin-blade and the other flat blade would help in the process of peeling. The rotating motion of the blade aided to husk the coconut easily. This rotation of the blade facilitated the husking process.



The husk peeling machine and is one of the modern and more innovative methods developed for de-husking coconuts. The innovation lies in the fact that the machine peels of the coconut husk as easily as one peels the outer skin of the banana fruit. It is a good solution in terms of quality of de-husking and completes the process of de-husking to the highest possible efficiency. Even though it requires no force to be exerted by the worker, it still remains non productive

because it requires an operator to operate the machine at all times. It makes use of links which are actuated by pneumatics or toggle mechanisms to peel off the coconut husk. It also is a very time consuming process. One other disadvantage is that the husk after peeling is not as easily conductive as in other methods for coir processing.

### III. DISCUSSION

The manpower is highly required & dehusking effort is more so it is risky. There will be one modification is possible in this mechanism that the coconut holder should be attached so the coconut can't move and it holds in proper position. Eventually the chances of risk will reduce. Cost is also low as compare to other mechanism or machine.[1]

Fluid used in a hydraulic machine has more cost & construction is complicated in which the coconut holds in holder vertically upper blades & holder is fixed so if there is any change in the coconut size then dehusking becomes complicated so the coconut holder is adjustable like jaws hence dehusking will become more easy. For dehusking skilled labour is required. The dehusking production is high as compare to other manual operation. In this mechanism, we can do modification by adding robotic arm for loading and unloading of coconut and thereby risk factor reduces gradually.[2]

In this hand operated machine, two blades can be used in which one is fixed and other is movable it can be operated manually. It can be changed by using motor or other power source to move the moving blade. By using this, the human effort can be reduced. As the tool sharpness increases, the production rate also increases. This mechanism has risk factor too much high and the cost is less as compared to other mechanisms.[3]

It is electric power operated. The cost of the machine is high. The disadvantage of this machine is that it is not safe to operator due to long blades & also the construction of the blades is complicated due to which proper adjustment of blade is necessary. To overcome this disadvantage we can reduce the blade size & also by changing the angle. In order to avoid blade wearing we can use high strength alloy material. The production rate is moderate. [4]

Foot operated machine is the same as that of [3] instead of hand in this operation foot is used. Highly manpower is required. Human is destabilized and human risk is more. By using other power source for operating pedal we can increase the production rate. Costing is depends on power source but the effective production is possible. also we can

add other useful mechanisms like deshelling by using same power source. There is effective utilization of power as well as cost.[5]

Coconut peeling machine in which the toggle mechanism can be used. It is not more efficient as compared to other mechanisms. In this machine the mechanism is same as that of [2] only power source will be changed. In order to increase the production rate or for effective production, there we can use robotic arms to fix coconut in coconut holder and remove after dehusking. Human efforts will be overcome by this method.[6]

### IV. FUTURE SCOPE

There is scope for developing this machine having following characteristics.

1. Use of conventional energy resource as a machine power. it is more efficient.
2. Use of robotics arms conveyors and sensor. So it reduces human efforts and increases production rate.
3. Hydraulic and pneumatic arrangements are more complicated. Hence instead of this use electric motor.
4. In coconut dehusking machine, by adding deshelling mechanism which de-shells the remaining outer shell of coconut. it is more effective for the cost & production and reduce area for other machinery in factory.
5. By attaching another coconut processing mechanism using same power, motion, torque, it gives reduction in the cost than other coconut processing machines.
6. The deshelling mechanism adds the advantage of removing the outer part of dehusked coconut i.e. shell and finally the white flesh will left which can be used for making different products like coconut oil

### V. ACKNOWLEDGMENT

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