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# Literature Review on Coconut Peeling Machine

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**Abstract:** Coconut is the essential component of our daily life. Various parts of coconuts such as copra used as a food, shell as a fuel and coconut water used as nutritious liquid. Green coconut contains water in the earlier stage of its maturity and afterwards there is a development of meat. Both of them are nutritious, for the effective utilization of coconut peeling is essential. The conventional methods for this operation are using sharp knife. Which is tedious, risky and time consuming due to which to overcome these problems motorized machines are introduced. As the variation in sizes of coconuts it needs adjustment in tools used in machine to avoid breakage of nut. The presented model consists of motor, pulley, belt and tool with sharp blade and frame.

**Keywords:** Peeling, motorized, Motor, Belt, Sharp blade.

## I. INTRODUCTION

In India coconut is produced in the most of the states and it is utilized in two stages such as immature and mature, the fruit contains water and jelly like meat. For the productive usage of the coconut fruit peeling operation is essential in market. Coconut peeling machine is also called coconut trimming machine, the traditional methods for coconut peeling using sharp knife, which is monotonous and laborious. Our introduced coconut peeling machine consists rotating lower part of fixture where coconut is fixed and rotate by the motor. The husk is removed by the sharp blades fixed on tools. Tools are fixed on the frame to reduce the vibration and guide the movement of the tools. Due to the simple mechanism used in machine it will be efficient and economical with low maintenance.

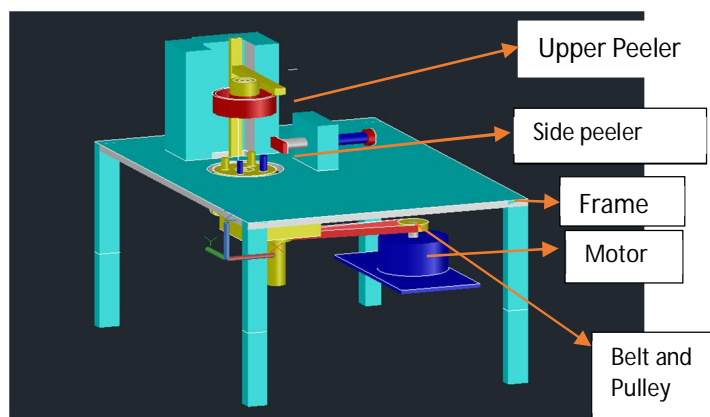


Fig:-I.1 Conceptual design of coconut peeling machine

**Description:-**This project aims to design low-cost motorized coconut peeling machine for peeling of young coconut. In this machine upper peeler used trim upper part of fruit and side peeler trim the remaining part. Fruit fixed on the rotating shaft rotated by using motor. Motion transmits with the help of belt and pulley mounted on shaft. This machine will be efficient and more economic for peeling in small scale industries and vendors.

## II. LITERATURE REVIEWS

After reviewing the various research paper relevant to Coconut Peeling Machine, the conclusions are stipulated below.

- 1) *Vijay Kumar G. Tile et.al. [1]*: In this Research paper author says that India is one of the most coconut growing country in the world. For the effective utilization de-husking is essential. De-husking is the process of expelling husk from the coconut. The conventional methods are foot operated de-husking machine, mechanical coconut de-husking machine and hydraulic operated coconut de-husking machine. As the hydraulic operated machine has high cost, another machine is presented. This machine is operated by using pneumatic systems. Valve is introduced to guide the direction for flow of fluid and dedicated lever mechanism to give downward motion of the tool. Tool having blades which penetrate into the husk and detach it without breaking the nut. Due to use of pneumatic system this machine reduced the requirement of skilled labor and time consumption
- 2) *Vishnu Murli, et.al. [2]*: In this paper author says that coconut water used as a healthiest drink which is naturally available. In many countries like it is obtained by splitting and punching but this is risky. That's why the proposed model consists of hydraulic system and frame with fixture which hold the coconut. Piercing operation is done with the tool which is operated by hydraulic system. The lever is used to control the motion of the tool. The DCV is controlled by user, tool used is hollow steel pipe which penetrate the coconut and extract the water. With this piercing operation water is extracted which maintained the hygiene of water and increase productivity. Due to the use of hydraulic system, it reduced the time consumption for the water extraction process.
- 3) *Mohd Fauzi Mohd Yunus, et.al. [3]*: In this paper author given that this paper consists the development conceptual design for dual purpose coconut processing machine. Prototype of the machine is created and tested which used to obtained de-husked as well as grated coconut. Which operated at different speed for both the operations. Three conceptual designed machines are analysed where two persons are performing two different operations simultaneously to because tools are situated adjacently. The de-husking is carried out repeatedly until the complete husk is removed. Results obtained from this testing on prototypes a final conceptual design is proposed for performing both the de-husking and grating operation efficiently.
- 4) *Krishnan.R et.al. [4]*: In this paper author found that the coconut is used by one third peoples of our world. But for the utilization it needs to de-husked before it, manual methods for de-husking are time consuming and it has risk of injury. It requires mechanized system but the existing technology consists hydraulic systems which is not affordable for the producer. To overcome these problems proposed system has simple mechanism having motorized shaft with spikes which penetrate into the husk and remove it. Gear box reduces speed from 960 rpm to 30 rpm of shafts to penetrate spikes in to the nut and peel off them. Gear box and connected with motor shaft which is lie on the same line to reduce the vibration and proper utilization of power to increase productivity.
- 5) *Danny Thomas, et.al. [5]*: In this research paper author analyzed that India is the third largest producer of coconut in the world and it accounts 50% of coir trade across the world. Coir is the outer cover of the coconut which is also called as husk. To remove the husk manually by labor and mechanized machine which requires skilled labor. To reduce the requirement of skilled worker to de-husk the coconut development and design of Automated coconut de-husking machine. This machine consists two rollers having spines mounted on frame, and powered with sprocket driven by chain drive. Motor is used with worm and worm gear assembly to drive chain drive. The experiments is done on the both the mature and immature coconut to determine the force to de-husk the coconut. Due to its simple design operation of machine is simple and having less maintenance with high efficiency. Due to automation it eliminates the labour required for this operation and increase productivity.
- 6) *Nwankwojike et.al. [6]*: In this paper author analyzed that the coconut is one of the world's most useful and important plant. Outer cover of the coconut is called as husk. There are various uses of coconut like coir in coir carpet, coir composites etc. Coconut water as a refreshing drink, it's oil is also used in cooking foods and shell as fuel source. As the coconut has economical and industrial importance removal of husk is the important task. The existing methods are manual and mechanized such as machete which having some limitations. To overcome these limitations a new de-husking machine is introduced, consists of two cylindrical rollers with spikes and screw conveyor is fixed in between to rollers. Screw conveyer was used for effective twisting and discharging of nut after de-husking. This machine de-husk nuts without breakage and distortion. Which performs with the efficiency and capacity of 93.45% and 79 nuts per hour. This machine eliminates the problem of extracted coir fiber length and reduce the risk and hazards of manual de-husking machine.



- 7) *Yohanes Nusbir, et.al. [7]*: In this research paper author says that Indonesia is the second largest producer of coconut and it has greater economic importance. Husk obtained from coconut used as a raw material for the production of various products like carpets, car seats, etc. But the manual methods for de-husking with tools like crowbar may injures the workers. To defeat these problems several research is carried out in this field and few automated machines was created. These machines having some complexity in de-husking due to which an innovative machine has been designed by Quality Function Deployment (QFD). Which based on coconut farmer's community requirements to determine the parameters of design. A survey to identify population and sample, choosing survey method, design questionnaire and distribute the questioner were done to collect coconut farmer's community needs. Afterwards Home of Quality (HOQ) is introduced to design to meets the requirements. The finalize machine consists of rollers with conical sharp knife, and 3HP motor of 2700 rpm speed, and reduction ratio of 1.50. This machine operates with low maintenance, low in cost and quickly in the de-husking.
- 8) *S.D.S. Piyathisa et.al. [8]*: In this paper author says that the most of the parts of coconut fruits are used in industries as coconut oil products, coir products, shell products and copra. Coconut has outer fruit coat called exocarp, which protect the edible flesh. For utilization in industries it should be de-husk. The prevailing methods are laborious and time consuming and semi-automatic and automatic machines are not affordable for the small-scale farmers. Due to several research is carried on de-husking and a manual system is introduced with appropriate mechanical way for coconut de-husking. The most of the methodologies which consists of rollers with spike makes it laborious, dangerous and expensive. To overcome this problem proposed system has lever operated tool supported by frame. Tool having arm like structure with sharp blades which penetrate the fruit. Due to the movement of lever arms moves outwards and detach the husk from nut. It is more efficient, affordable and require less force about 50 kg weight only.
- 9) *Ovat, Friday Aje et.al. [9]*: In this research paper author given that it consists the development and performance evaluation of coconut de-husking machine. Although coconut has immense economic importance in industries and rural residents. But it is difficult and dangerous to de-husk with the manual methodology. Proposed system is motorized which use rollers with spikes and which penetrate the fruit and remove the husk. The plurality in spikes and inside motion of rollers causes effective gripping on the husk. Gradually tapered arrangement of rollers improves the efficiency of de-husking machine. Modification and improvement of an existing coconut de-husking machine for farmers was carried out and evaluated. The performance evaluation shows that the efficiency of the machine was 92.50% while the average capacity was 120.6 coconuts per hour. Whereas the percentage number of distorted and broken coconuts were 7.5% and 3.75%. These figures are less in compare to the existing coconut de-husking machine.
- 10) *J. B. Alcantra, et.al. [10]*: In this research paper Author says that the current manual de-husking are tedious and time consuming. Due to this an automated coconut de-husking and Cutting Machine was presented and developed. This machine use pneumatic systems for actuation in machine and electronic control system for control the operations of pneumatic system. By using these systems an efficient automated machine was created. De-husking process starts with entering of coconut inside the de-husking section which consists of spiked rollers. After proper de-husking nut transferred towards the cutting section having pneumatic clamp with cutting which de-shell the nut. By using this automated machine 5 nuts per minute can be de-husked and de-shelling without any injury to machine the operator.
- 11) *N. Senthilnathan, et.al. [11]*: In this research paper author analyzed that made a study on the traditional Pedal operated and Hand operated de-huskers and concluded that De-husking efficiency of motorized system is more than 90% based on the calculations made on the total weight of the husk removed from the coconut and stated that the electric operating systems are faster and more efficient than conventional de-husking tools. The conventional tools and proposed system had spiked rollers powered by a motor to de-husk the coconut. The motor used for de-husking was 3 phase, 5 HP motor. Due to which this de-husking machine having good efficiency and it is more economic compare with others.
- 12) *R. NAVNEETHAN et.al. [12]*: In this research paper Author said that, Coconut is a primary yield of konkan district. De-husking of coconut is essential process in preparing the coconut for effective usage. Coconut de-husking includes expelling of husk from the coconut fruit. Coconuts are de-husked manually using tools like crowbar and machete. These processes are tedious and time consuming which causes injury to the operator. These methods required skilled labor for de-husking and lack of concentration may hazards sometimes. To beat these restrictions, to improve efficiency motorized machines are introduced some of which are semiautomatic and automatic. But these machines are not affordable for the small-scale industries and farmers. Another structure of de-husking machine is designed and manufactured. Parallel roller shafts are fixed on the frame which having spikes coupled by with the gear arrangements. The rollers are supported by the bearing rotated in opposite direction which de-husk the coconuts. This de-husking machine powered by the 1.5-2 HP motor of the 1440 rpm.

- 13) *Rishikesh V., et.al. [13]:* In this research paper author found that there are various methods are available for the de-husking and de-shelling of coconut. Some techniques are manual, pedal operated, hydraulic operated and pneumatic operated. But manual methods are injurious and unsafe for user. To overcome these limitations the presented machine is an automated coconut de-husking and de-shelling machine which consists of gears, shafts, bearings, frame, drum, spikes, motor, cutter, metal sheet and hopper. The rollers with spikes are fixed on frame and mounted on shaft which is rotated with help of pulley mounted on the same shaft. Cutter is fixed on the extended shaft for deshelling of coconut and steel plates is cover around the mechanism to avoid the contact between user and mechanism to prevent from injury. This machine will reduce the idle time which helps in increase efficiency and production rate of this machine.
- 14) *Mr. R. Prabhakaran et.al. [14]:* In this research paper author says that the most of the parts of coconut is useful. As the liquid inside the exocarp is used as drink, fibrous husk for furnishing and decorating, oil of cooking and it also used in cosmetics. For the effective use of coconut fruit for de-husking process there are some existing manual processes which are time consuming. Two types of de-husker used for de-husking are pull type de-husker and push type de-husker. The presented peeling machine consists rollers having sharp blades which penetrate into the husk and detach it from nut. The rollers mounted on shaft rotated by the pulley powered by motor with gear for effective transmission. The main power is approximate 2 HP motor with 1500 rpm speed. This machine having 70.42% efficiency and produced 120 nuts per hour. The automation with manual loading unloading makes this machine less injurious and safe.
- 15) *K. Ramadurai et.al. [15]:* As Per the Author it is found that in daily life the coconut is one of the most use full and important Plants. Coconuts Provides food, edible oil, Industrial products and health drink. To de-husk the coconut development and design of machine is carried out which consists of two rollers with spikes. The machine is motorized by ac motor transferred power through belt and pulleys which reduce the rpm of rollers. Efficiency of machine increased by reducing idler time. Automation of machine eliminate the requirement of skilled labor.
- 16) *Abhishek. D et.al. [16]:* In this paper author given found that post harvesting of coconut is essential for the efficient preservation, transportation and utilization. Mechanization of farm can increase the productivity and helps in reducing cost and time. Due to which simple automated de-husking machine was introduced. This machine consists of cylindrical roller with spikes, electric motor as a power source ,gear for reducing speed and transmitting unit. Coconut was placed inside the hopper and forced into the rollers which tears the husk and detach it from nuts. Guiding plates are fixed upon the frame to direct the operation of de-husking and avoiding escape of nut from rollers. To collect the husk after removing tray was placed just below the rollers. The simple mechanism of machine helps in reducing maintenance and affordable.
- 17) *P.A. WADILE et.al. [17]:* In this research paper Author says that the use of Natural fiber composite is gaining popularity in Automotive to process such a Large Number of production of coconuts some suitable mechanisms needs to be developed. This research paper investigate there is need of machines that can extracts coconut husk/ fiber Without distorting its length. This machine consists rollers with cutting pins which de-husk the nut. As per the various sizes of nuts different profile of rollers are used. These cutting pins attached with the rollers by the fastener for easy removal of pines
- 18) *Prof. VIVEK B. VAIDYA et.al.[18]:* In this paper author given that the development of coconut peeling machine with the pedal operated mechanisms. As per the Author it is found that the Pedal operated green coconut trimming machine for vendor is Working on simple drive chain mechanisms. The mechanism is used to drive and trimming the green coconut in attractive way in order to Reduce its Weight for transportation. This research paper aim to investigate to preparing the system of pedal power is converted into rotational energy which rotate the trimming Machine. By Result of this coconut trimming machine due to pedal operated machine it is human operated and totally eco-friendly and can be used in remote areas where electricity are not in reach for the operation.
- 19) *MR. AYAZ FARIDI et.al. [19]:* In this research paper Author says that the industrial need of coconut coir/fiber de-husking is full filled with the proposed machine. It is found that to design and create a coconut husk removal machine for farmers and small-scale companies. In India to provide an efficient solution to current problems, reduce time consumption and Labor costs. This machine consists cutting pin which de-husk the nut and the it removed from another side of machine. This machine can de-husk 100 Coconuts per hour.
- 20) *SOORAJ SJ. et.al. [20]:* In this research paper Author found that the coconut is used in many applications like coir industry and mat industry. For the de-husking and cutting of coconut new idea was presented which having two sections was de-husking and cutting section. Coconut was placed gently on two spiked rollers rotating with help of motor. Husk impinged into the spikes and rotating motion causes shear them out. A motor of 1 Hp was used for de-husking and cutting operation. Worm and pinion gear is used for speed reduction and ratio is high about 50:1. Rollers rotates in the opposite direction fixed on the frame

made up of MS. In cutting section sharp knife is placed inclined and operated with the help of two cams, which is powered by 1hp ac motor. Due to that this machine helps in reducing cost and faster the transformation of raw coconut fruit into the useful products.

- 21) *Mr. VINOD P. SAKHARE et.al. [21]*: In this research Paper author says that coconut is known for its great versatility. It consists exocarp also called as husk which is used in coir industry. Coconut shell used as a fuel and used to produce charcoal etc. There are many methods for de-husking of coconut fruit. The presented de-husking machine consists of frame, hydraulic power unit with cylinders and valves. Frame is the hollow L shape MS structure which supports the whole mechanical assembly. The de-husking mechanism consists of 6 linkages with sharp knife which de-husk the nut. After the de-husking supporting frame guide to stop the de-husking operation. Hydraulic system is powered by 1.5 HP pump which is used to operate the de-husking mechanism by using valves. This machine efficient and shows 97.1% efficiency when tests for 10 nuts. This machine can de-husk 317.2/hr which is more on compare with other existing machines.
- 22) *AMAL P V. et.al. [22]*: In this Research Paper Author found that the coconut husk is used in coir industry, shell as a fuel, copra as a food coconut Water is a nutrition liquid. There are different Method for de-husking of coconuts De-husking with traditional hand tools like Spikes and machetes depends on skill workers and Involves training. Due to the lack of skilled workers mechanized systems are introduced. The presented de-husking machine consists the motor as power source which connected to cylindrical rollers with cutting pins. These coconut de-husking machine peels of the coconut husk from coconut fruit to obtained de-husk coconut fruit with the help of two Rotating Rollers having Spikes on their periphery. Due to which it is efficient and economical and de-husk 220 nuts per hour which is above the existing de-husking machines.
- 23) *H. AZMI et.al. [23]*: In this research paper author says that to made the coconut fruits economically beneficial for cultivator a cost efficient processes required. Then existing methods are semi-automatic and automatic machine, which are used in small-scale industries. These machines are used individually for de-husking, de-shelling and grating operations etc. makes the process expensive. To overcome these limitations presented machine consists rollers with spikes to de-husk the nut. Two types of spikes were used to avoid breakage of nut, sharp spikes to penetrate to proper gripping and blunt spikes to tear off the husk. Due to this system the performance test analysis showed that the machine removed husk of coconut fruit without any nut breakage. It helps to increase productivity and efficiency of machine.
- 24) *ABI VARGHESE et.al. [24]*: In this research paper author given that De-husking of Coconut is the most difficult post harvesting operation relevant to coconut. A big problem associated with coconut processing was its de-husking. All Manually operated husking tools Make Use of a combination of Principles i)a Wedge and ii) Lever. The earliest of the modern coconut husking tools is a Foot operated coconut husking Machine. In this machine two wedges are used one in movable. Movable wedge operated with the help of lever which de-husk the nut. This operation is repeated generally for removing the husk in two or three sectors.
- 25) *G. Sujaykumar et.al. [25]*: In this research paper author said that Coconut de-husking includes expelling of the husk from the coconut. Conventional de-husking is risky and time consuming. To overcome these restrictions, to improve the machining and to give security to the user, another de-husking machine is presented and created. This de-husker involves utilization of two rollers with arrangement of sharp spikes, which would shear the husk from coconut when moving against one another. Shear power is required for de-husking of develop green coconut and dry dark coloured coconut. Shear power required is more for de-husk green coconut than dry coconut. More torque is required for the de-husking due to which geared motor is used, which reduce the speed 70 rpm. Ideal number of spikes is organized on the rollers to de-husk the coconut with least power. Manually operated linkage helps to make contact between the coconut and rollers for efficient de-husking.

### III. CONCLUSION

By taking the source of above stated research papers review following conclusions are made.

- 1) The coconut used in large quantity across the globe but the post-harvesting processing are the toughest part.
- 2) The existing methods with manual and power operated machines. These machines having some limitations.
- 3) This needs to design and develop a new machine which will be efficient and satisfactory.

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