

DESIGN AND FABRICATION OF AUTOMATIC COCONUT BROWN SKIN REMOVER

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Abstract: Coconut husk removing machine has been developed to remove testa from coconut seed coat. Testa is important operation during the process of making High value coconut products like to make a dedicated coconut. Coconut brown skin remover using in oil industry with the traditional and tool grinding and spike depend upon the skilled worker and inverted nowadays there is a shortage of workers the power operated machine of development to elements the drawback of manual tools this present aims to design and develop a automatic coconut brown skin remover, machine with eliminating the above mentioned drawback of the existing tools and machine contained shell many parts like testa remover unit mounted on frame with electric motor used as a power source speed reducing unit. The testa remover as grate circular cutter on its surface this circular cutter will rotate and penetrate into the seed coat till white flesh remove testa is collected in the bottom.

Keywords:-Testa, Grater, Coconut brown skin

INTRODUCTION

This work is related to design and development of a machine to remove coconut brown skin, the outer surface of coconut is covered with the brown skin. According to the prior art India account survey 22.34% the world coconut production have been produced. At present the production of coconut is 1.91 million the annual production of coconut is approximately 13,000 million. Many of industries produced high value production from coconut, desiccated coconut, virgin coconut oil etc. requires removal of the brown skin(testa). Desiccated Coconut Powder is produced by drying coconut after the removal of brown skin. It will be used in many of the food preparing industries. In India the desiccated coconut is produced by small scale industries located in Karnataka, Tamil Nadu, Kerala and Andhra Pradesh. A survey made by the Coconut Development Board has checked that a growing consumer demand for desiccated coconut. Powder sales can be improved in the country by advertising into the market for the popularization of the desiccated coconut consumer packs for household uses. According to the survey that desiccated coconut powder in consumer packs is taken even in non producing coconut areas.

According to the survey we came to know that middle class and upper class families living in Kerala cities and towns they uses desiccated coconut powder. In other countries there is a lot of demand for coconut oil, these coconut brown skin remover machine peels off the coconut brown skin from coconut fruit to obtain brown skin remover coconut fruit with the help of cutting plate (grater) having spikes on their periphery. The coconut is placed in plate. The cutter will rotated in clockwise direction with the help of electric motor.

The roller should rotate in clockwise direction which is connected to the motor between motor and cutter a plate is made to hold brown color of coconut which is removed from the coconut. As the machine starts rotating in clockwise direction slowly pour the coconut in the tray as the coconut touches the cutting blades it will start removing the brown skin after totally brown skin is removed slide up the tray the coconut will be collected in the bucket coconut in a food processor to obtain a course or fine powder. Desiccated coconut is the best way to get all the nutritional benefits of coconut all year round. So, make various delightful recipes and enjoy the goodness of coconut

LITERATURE REIVEW

Terdwongworakul et al. (2009) studied the physical properties of fresh young Thai coconut for maturity sorting. Judging the maturity of young coconut was difficult and thus a harvested crop .typically featured fruit of varying levels of maturity, which currently require was manual grading. In an attempt to help reduce the time and costs associated with grading process, the correlations between the physical, mechanical, physiological and acoustic properties of coconuts and their maturity levels were investigated. The analysis showed that specific gravity, husk rupture force and husk firmness showed a decreasing trend with progressing days after pollination. Other properties including resonant frequency, shell rupture force, shell firmness, total soluble solids, flesh thickness, wet flesh weight and dry flesh weight indicated an increase in values with days after pollination. The flesh thickness was the parameter best correlated with days after pollination.

Alonge and Adetunji (2010) studied the properties of coconut related to its dehusking. One hundred seeds were randomly selected for the physical properties such as the shape, size, volume, density, surface area. They observed that the major diameter varied from 17.36 cm to 19.70 cm, surface area varied from 4724 mm² to 5797 mm², seed volume varied from 600 cm³ to 800 cm³ with an average density of 1.065 g/cm³. The coefficient of friction was high for plywood and minimum for glass, the average modulus of elasticity was 153.625 N/mm with an average load at yield and deformation at yield at 5390.6 N and 35.22 mm respectively on the major axis.

Alonge and Folorunso (2012) determined the some engineering properties of coconut related to its cracking. As part of steps towards the development of processing 60 and handling equipment for the seeds, some engineering properties such as size, sphericity, roundness, volume, surface area, density, coefficient of friction against different materials and compression tests were studied. The authors reported that the major diameter varied from 132.3 mm to 101.4 mm with a mean value of 112.1 mm, surface area varied from 5986 mm² to 4621 mm², the seed volume varied from 7060 mm³ to 4350 mm³, with an average density of 1.043 kg/m². The coefficient of friction reported to be 0.531 for glass, 0.431 for plywood and 0.436 for galvanized steel. 2.2 Coconut Dehusker for obtaining a coconut shell the husk available over it is removed. This is removed manually or using tools and machinery. Manual methods are labors and time consuming involve lot of drudgery. Dehusking tools and machinery are now commercially. The available tools and machinery for coconut dehusking their design, construction, working etc.

OBJECTIVES

- To increase the production rate by using automatic peeling technique.
- To reduce the human effort in removing brown skin of coconut
- To reduce the man power in term minimizes the time and money to remove brown skin

METHODOLOGY

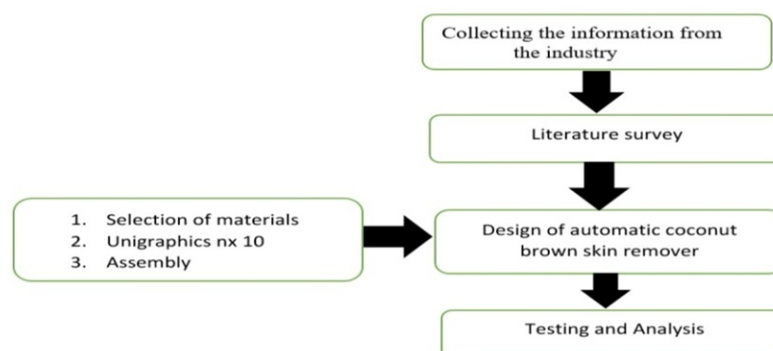


Figure. No. 1 Flow chart of Methodology.

WORKING PRINCIPLE

Coconut brown skin remover machine peels off the brown skin from coconut with the help of cutter having spikes on their periphery. The coconut is placed in plate lengthwise. The cutter should be rotated in clockwise direction with the help of electric motor.

The roller will rotate in clockwise direction which is connected to the motor between motor and cutter a plate is made to hold brown color of coconut which is removed from the coconut. As the machine starts rotating in clockwise direction slowly pour the coconut in the tray as the coconut touches the cutting blades it will start removing the brown skin after totally brown skin is removed slide up the tray the coconut will be collected in the bucket.

MAIN COMPONENTS OF MACHINE

Table.No.1. Cost of equipment used

Sl.no	Components	Material	Specifications
1	Single phase induction motor	-	0.25 HP
2	Shaft	Mild steel	5mm
3	Cutting plate	stainless Steel	1
4	Frame	Mild steel	920*460*360 mm
5	Tray	Sheet metal	500 mm
6	Plate	-	1

Frame

It is the component of the coconut brown peeling machine and it is made up of mild steel of size 920*460*360mm

AC Motor

Here we had used ½ hp AC motor which is an electric motor driven by an alternating current.

Stainless steel cutting palte

There are many type of graters and having different sizes of grating spikes, and it can be used for preparing different type of foods, commonly they are used to grate lemon and cheese or orange peel (to create zest), and other soft foods can also be grated for the preparation of toasted cheese graters are commonly used, Graters produce shreds they are thinner at the ends than the middle. This type of grated shreds helps us in different ways to melt and cook. From the grating blades most commonly uniform thickness can be formed for a food processor

Steel tray

Sheet metal is metal obtained by an industrial process into thin, flat in shape and size. Sheet metal can be cut or bent in a variety no of shapes and sizes it is one of the fundamental thing used in metal working. Countless no of objects are fabricated everyday from sheet metal. Thicknesses can varied simultaneously; extremely thin sheets are considered for foil or leaf, and pieces thicker than 6 mm (0.25 in) are considered plate steel or "structural steel". It is used to hold the coconuts it is placed inclined to the inclined to the cutter

Shaft

A shaft is a rotating member, used to transmit power or motion, usually of circular cross section. It provides the axis of rotation, to the motor it is used to transmit the power from the motor to the cutting plate and it controls the geometry of their motion

DESIGN OF COCONUT BROWN SKIN REMOVER

2D diagrams with sectional views

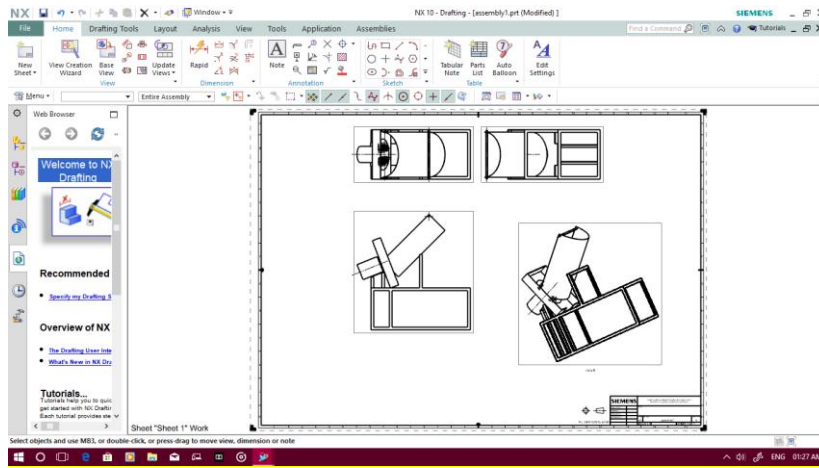


Figure 2.2D Drawing of coconut skin remover

DESIGN OF COCONUT BROWN SKIN REMOVER and MODEL

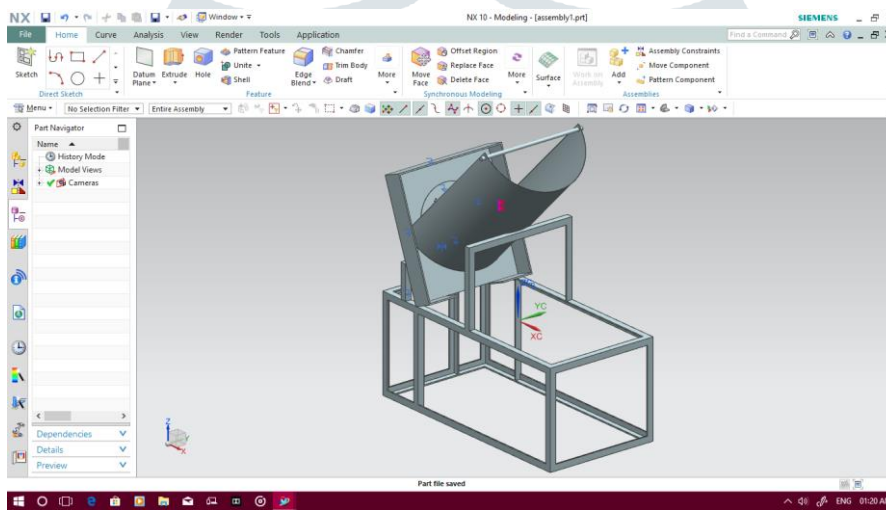


Figure 3. 3D Drawing of model



Figure 4. Working model

Comparative study

Table No: 2 Comparisons of Manual and Peeling Machine

Sl.No	Particular	Manual	Peeling Machine
1	Time consumption	Time consumption is more	Time consumed is less
2	Cost	More cost is required	Less cost is required
3	No. of coconuts	Peeling of coconut is less	Peeling of coconut is more
4	Quality	Quality is less	Quality is more
5	Hygienic	Less Hygienic	More Hygienic
6	Production rate	Production rate is less	Production rate is more

It is the comparison of manual and peeling machine in the above table we have compared the peeling of coconut with the traditional and hand tools with coconut brown skin peeling machine

Result and Discussion

It is observed that the machine has the capacity to peel the commonly available coconut of different thickness and hardness, effectively. The machine can normally peel about 150 to 200 coconuts per hour. Graph 1. Shows time taken to peel.

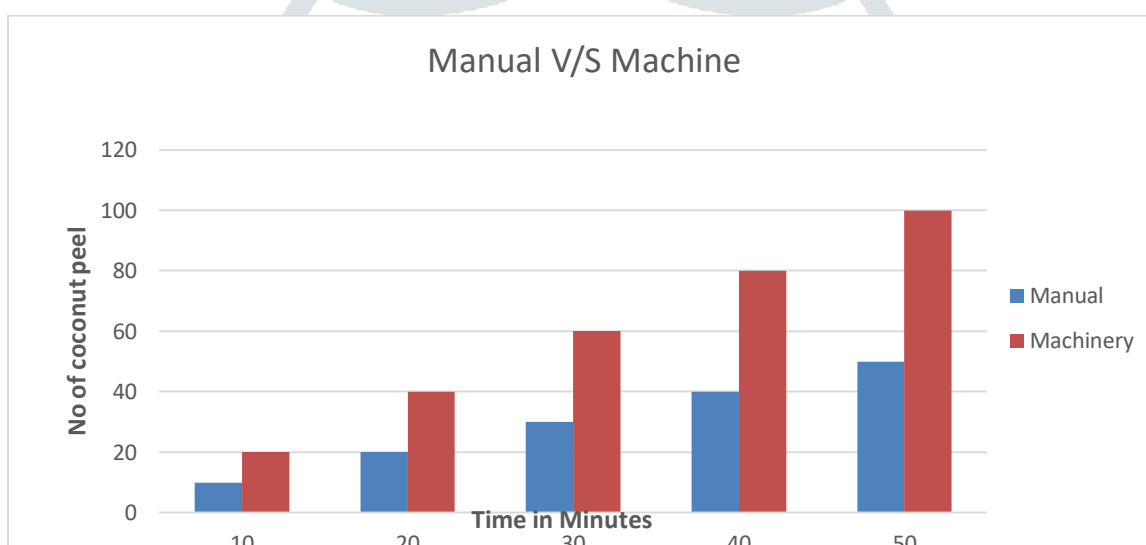


Figure No: 5, Graph 1 : manual coconut peeled v/s machine operated coconut peeled

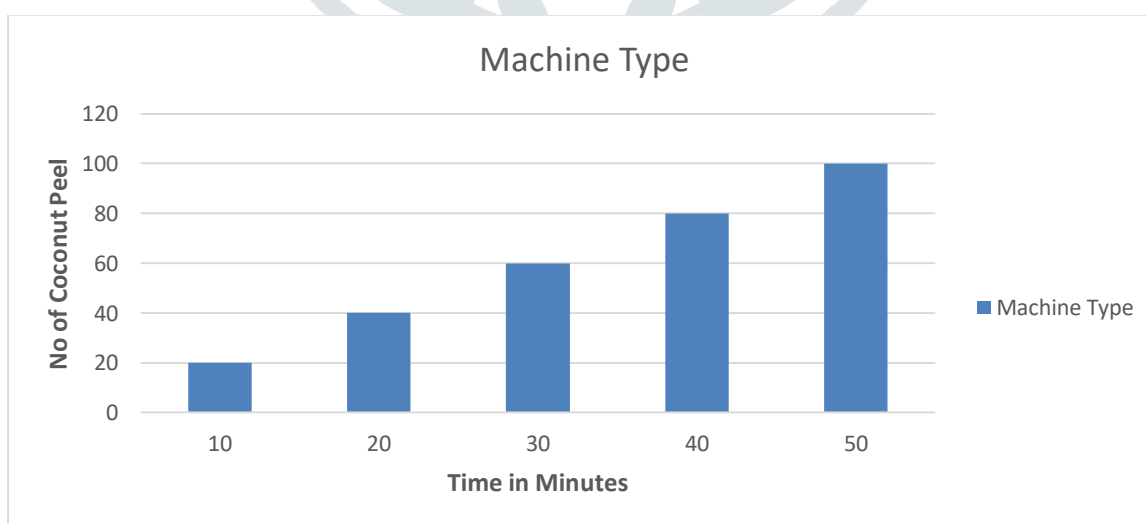


Figure No: 6, Graph 2 : No of coconut peeled v/s Time in minutes

The results of the performance evaluation graphs shows that the machine performed above 86% efficiency in all the tests cases as expected. It is also obvious from this table that the capacity of the developed machine ranges between 191 and 206 coconut’s per hour depending on the operator, however, on average an operator can peel 195 coconut’s per hour with this machine. This machine was fabricated with standard and locally sourced materials and its estimated cost is seven thousand four fifty only (7450) thus, the machine is affordable to small scale industry and maintainable

CONCLUSION

In this modern world the time and cost has more precious for each and every operation. So a new machine has been designed, fabricated and named as “Coconut Brown Skin Peeling Machine”. By comparing with many types of existing methods, includes traditional, and automatic, it can be concluded that this machine require less human effort and time the test results substantiate the above. The developed model is simple, efficient, requires less time and cost effective when compared to the existing available method. Importance is given towards user friendly in operation and mainly safety. The rotating elements like cutter,

ADVANTAGES & DISADVANTAGES

- Skilled labor is not required while performing the operation
- Easy operation
- It can be transported easily from one place to another since dismantling and assembling is simple.
- Maintenance is easy
- Required less time to peel
- It reduces the man power
- It reduces injury to the worker

Limitations includes

- For peeling operation it requires electricity
- More irregular shape of coconut cannot be peeled

APPLICATIONS

Used in desiccated coconut industry:-brown skin of coconut is to be removed from the coconut seed coat which is raw material for oil industry by the use of automatic coconut brown skin peeing machine

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