

Design and Fabrication of Groundnut Sheller Machine

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Abstract – The Groundnut is one of the agricultural semi-finished products. Groundnut is grown by small scale farmers in developing countries. The average price is approximately twice the price of pod. Due to non-availability of groundnut processing machines, especially groundnut Sheller, is a major problem of groundnut production, especially in our country India.. In the beginning the peanuts were separated from its shells by the workers. They simply decoct the groundnut by their hands and separate the peanuts from its shell l. The output got from this method, was very low and it does not fulfill the market demand because it is time consuming process. A research-work for design and fabricate of a groundnut Sheller consisting of pedal operated ground nut Sheller.

Keywords - Groundnut Sheller Machine, Efficiency, Design, Calculations, Fabrication, Assembly, Evaluation.

I- INTRODUCTION

The purpose of this paper is to understand the knowledge of design and fabrication mechanism of groundnut Sheller machine. The design is an environment friendly and uses simple mechanism properties such as shelling system, bowering mechanism and automation separating system etc. In this, so rm cms hing force is needed to crush the groundnut. The design is so done that the knowledge of designing, mechanism and forces are increased. This project consists of designing and fabrication of an autoImtic groundnut Sheller machine considering various important parameters. In this project, designing & development of a machine to cms h or shell groundnut so the farmers can gain high profit by selling groundnut direct in market. As well as the study of manufacturing was very important in order to carry out this project to ensure that what are needs to do. This project involves the process of designing and fabrication of different parts of this shelling machine con sidering forces and ergonomic factor for

people to use. This project is mainly about generating a new concept of groundnut shell (cms h) that would make easier to bring anywhere and easier to cms h groundnut. After the design has completed, it was transformed to its real product where the design is used for guideline.

Problem identification

In the beginning the peanuts were separated from its shells by the workers. They simply decoct the groundnut by their hands and separate the peanuts from its shell. The output got from this method, was very low and it does not fulfill the market demand because it was very time consuming process. It was also a boring work for the worker. The traditional method of separating nuts from groundnuts by putting the peanuts in a cloth bag and rolling over it with a rolling pin. This technique did a good job of cracking the shells (deleting the painful fingers problem), but we still had to pick the peanuts out since they didn't corm all the way loose. This is not a reliable method for shell a ground nut due to this crack the ground nut

and nuts mixed with shell. Introduction gives knowledge that the traditional method is not a sufficient method for separating the groundnut. Due to this manual process, identify some major problem & to overcome this problem some idea or concepts generates. According to generated ideas deciding objective of project. Farmers and small businessman are facing.



Fig.1: Farmers and small business man are facing

Problem formulation

The aim is to design and develop a low cost ground nut shelling machine which will help farmer to semi-finished (shelled groundnut) instead of unshelled groundnut. Today electricity consumption rate is not economical so to overcome this problem we show our innovative ideas in our project.

II - WORKING PRINCIPLE

Groundnut sheller is operated on the shearing action, bowing action and separating action. Firstly the inputs i.e. the groundnut are fed to the machine through the hopper. Then groundnuts come in contact with the two members, one is semicircular net and another is roll shaft. Semicircular net is a stationary member while the roll shaft is rotating member. When the groundnut comes in contact with these two members then the shearing action takes place here. Due to shearing action (crushing) the groundnuts get shelled and divided into two parts i.e. in the peanut and outer shell of the groundnuts. There is clearance provided between the net and roll shaft. The clearance provided depends upon the size of the groundnuts which is to be decorticated. After shelling the groundnut the peanut and shells of the groundnut get dropped from the semicircular net, in downward direction then a centrifugal force is applied by a fan on the peanut and shell of the groundnut. Due to inner weight, the

peanuts get moved downward and collected in the separator. But due to lighter weight the shell of the groundnuts are thrown outside the machine and which are collected from the backside of the machine. From the shelling chamber the unshelled groundnuts also get dropped in the tray. This groundnut gets dropped from the clearance made among the grill. The three kinds of the nets can be used with different size of capsule slots, size wise small, medium and large for various sizes of groundnut. In this way the groundnut sheller works.

III - RESEARCH METHODOLOGY

Research methodology deals with design & fabrication of all of the components which is to be used in the machine with required identification. Firstly, synthesize the all the problems which are consulted with the project. After that design complete manually operated machine, then regarding development done on shelling machine. Parameters will be selected according to objectives. It includes components and assembled machine and line diagram, with labeling. The various instruments used for fabrication of machine. Another problem is that nuts and husk are mixed coming after shelling operation, this problem will be relieved by using blower or other mechanism to separate nuts and husk (outer covering of a groundnut). By making manually operated for productivity improve with minimizing time consuming and damages of nuts, capacity also improve. The approach will be synthesis, design, development & testing of the machine.

Modeling and fabrication

After that design complete manually operated machine, then regarding development done on shelling machine. Parameters will be selected according to objectives. It includes each component and assembled machine and line diagram, with labeling. Main objectives of this project were to develop the first prototype of an easy to use, low priced and efficient ground nut decorticator and test its performance. Taking leads from previous researchers following design constraints were established. Design should be easy to maintain and should not require highly skilled labor, which is difficult to be found in rural areas. Design should be based on easily available material in rural areas. Manufacturing process should be simple and based on locally available machines in rural areas. The various instruments used for fabrication of machine. Following are the main components of machine:-

1. Rotary drum
2. Self-Alignment Bearing.
3. Roller Chain and Sprocket.
4. Pedal drive.
5. Frame.

Assembly

The arrangement of various component of Groundnut sheller is as follows:

1. The foundation frame is being selected which carry the entire load of the machine.
2. The self-alignment bearing to rotating the machine component by using chain drive.
3. The fan shaft is mounted at the back face of the foundation frame with the help of pedestals bearing which is fasten using nut and bolt.
4. The semicircular the project are balanced and also center of gravity of the assembly is on axis as that of the center of gravity human body that is on spiral cord mounted on the support provided at inner side of the foundation frame.
5. The hopper is mounted on foundation frame covering rolling shaft, and permanently fastened at one side using hinged, and other side is temporary fasten for time to time change of semicircular net.
6. The chain drive and sprocket are connect pedal operated to crusher portion
7. The pedal operated to connect crusher for chain drive.



Fig.2. Final Assembly of Ground nut Sheller Machine

IV - TESTING AND RESULTS

Sample is selected according to the research work done in previous chapter. The sample is brought from market (randi). It is sun dried for one day to remove moisture content. Sample contains unshelled

groundnut and some soil adhered to shell. As we discussed about the working principle and experimental set up of testing Machine in the previous chapter, accordingly research we decide one sample & testing can done five times. After taking reading, calculating total sample reading and this total reading give an reading. This mean reading help us to calculating result of Sheller machine. As the experimental set up of machine shown in the previous chapter regarding this, the sample reading are tabulated in the following table. In testing table following parameters are mention like, wt. of sample, wt. of shelled nuts and time required to shelled groundnut. The testing of the system was done and the following results were observed:- Testing Table

Sr. No.	Total Wt. Of Groundnut In Kg. (Qt)	Wt. Of Shelled Groundnut In Kg. (Qs)	Wt. Of Undamaged Groundnut Seed in Kg. (Qu)	Wt. of Damage Groundnut Seed In Kg. (Qd)	Time To Shelling Operation In Sec. (Tm)
1	0.83	0.645	0.185	23	2
1	0.81	0.655	0.155	21	3
1	0.8	0.64	0.16	20	4
1	0.82	0.65	0.17	25	5
1	0.8	0.655	0.145	23	Total
5	6.06	3.245	0.815	112	Mean
1	0.812	0.649	0.163	22.4	

from testing we conclude that we can save the time and money, by using groundnut decorticator. In this machine if we put the 1kg of groundnut in the groundnut Decorticator" then we get the output of 0.8 kg of decayed seeds. In same manner if we put the 5kg of groundnut in the groundnut Decorticator" then we get the output of 6.0 kg of decayed seeds. So if we go on continuous work on machine we got greater output in very short time. If we put input in large amount then we got the more output from machine with a minimum wastage. That is if we put the 50kg of groundnut in the "Groundnut Decorticator" then we get the output of 40 kg of decayed seeds. Results:-A.

(1) Shelling efficiency (%) = $\frac{[Qs/ Qt] \times 100}{}$ = 81.2 %.

V - CONCLUSION

Proper evaluation of the design will be performed and created something even better instead of simply manually operated operations. Finally we conclude that manually operated machine is better option for consuming electricity. The demands very low cost shelling machine of farmer & other customers will be also considered while designing machine. Purpose of fabrication of the Sheller was to determine the suitability of machine for farmer's use. Five experiments were performed with peanuts. Since this machine is made for small businessman or for

farmers, therefore the work carried out by this machine is less. The capital required for purchasing the bigger size groundnut decorticator is very high or the cost required for decorticating the groundnut on the job work is also more. In comparison these "Groundnut Sheller" is very cheap. We have selected the groundnut sheller machine" as our project work. The "groundnut sheller machine" is the ideal equipment for decocting Process.

FUTURE SCOPE

Future scope of work is what is required to be delivered. It is importuned that future scope statement is clear unambiguous and easily to understand. It should also include details leaving the reader in no doubt what is being delivered as part of project. The groundnut Sheller, with sufficient market penetration, would offer a substantial in shelling efficiency. Most shelling is done by hand in groundnut producing region of the developing world. This type of task is usually done by woman. The low cost groundnut Sheller is a case of intermediate technology.

1. Shelled nuts are in different sizes. Per kg price of nuts varies according to size of nuts. For fetching premium quality nuts grading system can be attach at nuts outlet of Sheller machine.
2. If we provide the arrangement at the outlet of shells, we can better control the dust.
3. If we provide the arrangement at the outlet of shells, we can better control the dust.
4. In groundnut sheller if we connect the gear chain drive so we can operate it with the help of bull instead of manually operated.

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