iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** III **Month of publication:** March 2022

DOI: https://doi.org/10.22214/ijraset.2022.41072

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue III Mar 2022- Available at www.ijraset.com

Design and Fabrication of Groundnut Sheller

Manthan Patil[1], Chirag Raut[2], Rahul Raut[3], Anish Vartak[4], Iqbal Mansuri[5]
[1, 2, 3, 4]*Mechanical Department, Mumbai University*
[5]*Assistant Professor, Mechanical Engineering Theem College of Engineering Boisar*

Abstract: ***In a developing countries like India groundnuts is grown on small scale, so there is a lack of lack of groundnut sheller machine which are affordable. The average price of peanut is approximately twice the price of pod. There are some groundnut sheller machines are available in market but the cost is not affordable and also they are large in size so they are not suitable for domestic applications they are suitable for mass production like industrial applications. Hence it is essential to design and fabricate a portable groundnut sheller machine for domestic applications. The performance of the machine was evaluated in terms of overall capacity, shelling and material efficiency and mechanical damage. This paper describes about the working, result and conclusion of the groundnut shelling machine.***
Overall, this project involves processes like design, analysis, fabrication and assembling of different components.

I. INTRODUCTION

The process of removal of the skin and bark of the beans is a very time-consuming process and requires labour. Hence machine could fasten this process and reduce labour to one man that would be very advantageous in mass production. The need of this machine is in food processing industry and in agriculture sector for de-shelling of the beans. The bean Sheller will be very efficient for mass production. The objective of this machine is to speed up the process of de-shelling and to reduce the labour work. When the beans are de-shelled manually the bean are pressed at the edge and their shell opens. Same thing happens when we thrash the bean at a hard place it opens up its shell. The same principal is used here in our bean Sheller. The beans are hit by the wooden arms and they cause the bean's skin to rupture and the beans fall in our collect.

II. OBJECTIVES

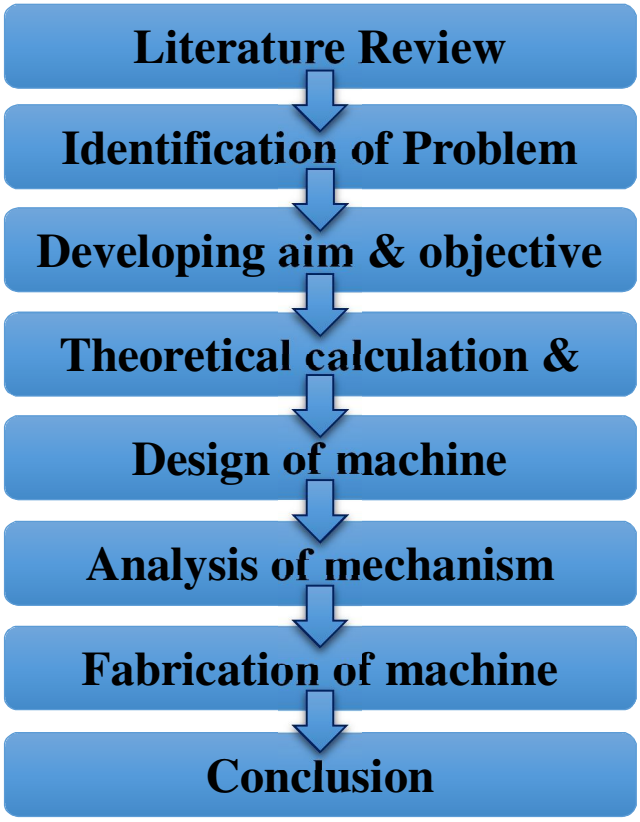
A. The main and basic objective is to make low-cost groundnut shelling machine.
B. Another thing is that to shell maximum possible groundnut in shortest possible time

III. LITERATURE SURVEY

Sr no	Name Of Paper/journal	Authors Name	Year of	Findings Of the Paper published
1	A Review on Design and Fabrication of Groundnut Shelling and Separating	Adwal Ravindra1, Ghadge Rohit, Awad Saurav, Prof. Khare G.N	2017	The agriculture is the basic profession of vast of population world-wide. Some modifications can be done in this machine and it will be used over long scale. This machine provides better help to farmers so that they can get proper income of their crop. The scope in agricultural field is tremendous. It will definitely be a vast sector to work on to minimize man power and improve efficiency of operation, decrease cost of operation, decrease efforts.
2	Design and Fabrication of Groundnut Pods and Shell Stripper Machine.	G. Karthik, D. Balashankar	2018	This work presents the design of an electrically powered groundnut pods stripper and shelling machine. It can be used for both domestic and industrial purposes. The advantage to be derived from the use of this machine far outweighs its shortcomings. It was also observed that groundnut with one seed per pod and those with two small seeds in their pods were the ones that came out unshelled or partially shelled

3	Groundnut Peeling Shelling Machine	A. Mani1 P. Manish Kumar, Krishna Karthick	2021	The main importance of this project is as this machine is battery operated it can be directly transported to the groundnut farms and can be operated without an external electric supply which is not available at most of the farms. Proper evaluation of the design will be performed and created something even better instead of simply manually operated operations. Finally, we conclude that atomizing machines is a better option to use farmer instead of manually operated. The demands atomize shelling machine of farmers & other customers will be also considered while designing.
4	Design & Fabrication of Groundnut Sheller Machine	Tushar Walke1, Praful Gadge, Ganesh Gohate, Ritesh Banpurkar	2017	The cost of the machine is less and if the farmer buys this machine, farmer can recover the invested money back. By using this machine problem of the labour crises can be reduced. Comparing with manual harvesting only one labour is required. It makes the process faster hence reduces most of the shelling time and labour cost. This machine is helpful for both small and big farms.
5	Design and Fabrication of Pedal Operated Groundnut Decorticator Machine	Kulbhushan M. Shejole1, Nitin B. Borkar, Abhijit M. Bobade	2017	Based on it is concluded that, the pedal operated groundnut decorticator machine is better option to use farmer instead of hand operated. The machine is pedal operated so that there is no energy consumption which wills helps to reduce the cost of productions. This machine also saves time and manpower. If we go on continuous work, we got a higher output in very short time. The operating procedure of this system is very simple, so there is no skill labour required to operate a machine.

IV. DESIGN METHODOLOGY



V. RESULTS AND CALCULATION

The sample of a readings are recorded. Five tests are conducted each of them consists of one Kg of groundnuts. Each of test conducted at a same speed. Approximately 72% groundnuts are shelled. The shelled groundnuts are collected in a drawer among with some small size pods. In shelled groundnuts damaged and undamaged peanuts are separated for calculating efficiencies.

Sr. No.	Total wt. of groundnut in Kg. (Qt)	Wt. of shelled groundnut in Kg (Qs)	Wt. of undamaged groundnut in Kg (Qu)	Wt. of damaged groundnut in Kg (Qd)	Time for shelling operation in seconds (Tm)
1	1	0.75	0.55	0.195	30
2	1	0.74	0.56	0.175	30
3	1	0.7	0.51	0.187	30
4	1	0.72	0.54	0.179	30
5	1	0.73	0.54	0.186	30
Total	5	3.61	2.66	0.922	150
Average	1	0.722	0.532	0.184	30

Shelling Efficiency(%) = $\frac{Qs}{Qt} x100 = \frac{0.722}{1} x100 = 72.2\%$

Material Efficiency(%) = $\frac{Qu}{(Qu+Qd)} x100 = \frac{0.532}{(0.532+0.184)} x100 = 74\%$

Mechanical Damage(%) = $\frac{Qd}{(Qu+Qd)} x100 = \frac{0.184}{(0.532+0.184)} x100 = 25.07\%$

Overall Capacity(Kg/h) = $\frac{Qs}{Tm} = \frac{0.722}{0.0083} =$ 87Kg/h

DESIGN MODEL

VI. CONCLUTION

A. *Reduction in Size*

The overall size of the unit fabricated is smaller than the one which are commercially available in the market. The dimensions this of the machine are 1117.6x762 mm (44" x 30"). Upon calculating the area occupied by the machine it comes out as 851611.2mm^2. The dimensions of the machine available in the market is about 1150x762 mm. The machine can be made even more compact by reducing the free space in the body and drum. However, reduction in the free space will make the maintenance and cleaning of the machine harder. Also adding of the accessories like a gear box, shaker or blower and changing the mesh (drum net) will be harder.

B. *Reduction in Weight*

The project is light in weight as it is built from wood. Using high quality steel would have increased the weight as well as the cost of the machine. Also the mechanism which includes the drum and the planks are made from wood which not only reduces the weight, but it also reduced the direct forced and centrifugal forced acting on the shaft which also helps in the reduction of vibrations.

C. *Reduction in Cost*

The overall cost of the fabricated project is around Rs. 13000 whereas the average cost of the machines available in the market ranges from Rs. 15,000 to Rs. 50,000. The lower power motor, the wooden body and drum are some of the factors which help in major cost cutting of the overall cost of the project both in terms of material cost and machining cost.

D. *Power Saving*

The motor used in the project is a 0.5 hp (0.37 KW) 1440 rpm motor whereas most of the machines in the market uses around 1.1 to 2.2KW. It reduces the power consumption. The motor is able to drive the mechanism as it is light in weight. Also higher power motors are costly and bulky that is it adds in more weight to the machine. Using a higher RPM motor would lead to the mechanism rotating at much higher RPM producing un-necessary sound and vibration.

VII. FUTURE SCOPE

The groundnut sheller can be modified with various attachments and changes in the components to increase the efficiency and for maximum output conveniently. These changes would increase the cost of the machine but also increasing the efficiency and can avail new featuresto the machine A few of the attachments/modifications are as follows:

A. *Blower*

A process for removing the skins from the bean comprises:
Loading the beans in the de-shelling chamber
Rotating the de-shelling chamber and the arms inside on the shaft that will hit the beans and the beans will fall down and if some of the skins fall down, it will get collected in the draw.
To avoid the skins of the beans to get collected in the drawer a blower should be installed so that the peeled skins of the beans are blown away and would be expelled from the rear side ofthe machine.

B. *Automatic Pouch Packing*

This machine can be attached to the Bean Sheller and the beans could be packed and sealed directly which will increase the productivity and the time will be saved. This machine should be installed just before the unloading drawer where the beans would fall after passing the mesh. The beans would be packed and sealed in plastic bags and can be sent straight for sales in the market or it can even be frozen to increase its life.

C. *Solar Driven Motor*

Motor installed on the machine could be driven by solar panels increasing the efficiency much and would eliminate the wastage of electricity but these installments could be expensive causing high initial costs. The solar panels would be installed and would set onthe open field which would simply generate electricity giving power to the motor.

D. Replaceable Mesh

The mesh of the de-shelling chamber and the sliding mesh provided in the machine should be made replaceable so that different kinds of beans and nuts can be loaded. This would increase make the machine more flexible and would be used for many other beans,nuts, etc.

REFERENCES

[1] Ashish S. Raghtate and Dr. C. C. (anda,DzDesign Consideration of Groundnut Sheller machinedz. Department Of Mechanical Engineering, KDK College of Engineering, Nagpur. International Journal of Innovative Research in Science And Technology// Vol.01 Issue 1//September 2014//ISSN (online) 2349-6010.

[2] Ikechukwu Celestine Ugwuoke, Olawale James Okegbile and)bukun Blessing)kechukwu, DzDesign and Fabrication of Groundnut Shelling and Separating Machinedz.)nternational Journal of Enigeneering Science Invention//ISSN (online):2319-6734//ISSN (Print):2319-6726//www.ijesi.org//Vol. 03//Issue 04// April 2014//PP.60-66.

[3] Santosh Mangave and Bhagyesh Deshmukh, DzDesign of Portable Groundnut Sheller Machinedz. Department of mechanical engineering, WIT, Solapur. International Journal of Mechanical Engineering and Information Technology// Vol.03 Issue 04// April//Page No: 1125-1129//ISSN-2348-196x

[4] Oladeji Akanni Ogunwole "Design, Fabrication and Testing of A (Manually and Electrically Operated) Roasted Groundnut Decorticating Machine" Food Science and Quality Management www.iiste.org ISSN 2224-6088 (Paper) ISSN 2225-0557 (Online) Vol.14, 2013

[5] Engr Aminu ,Ezekiel Usman Jabba, "DESIGN CONSTRUCTION AND EVALUATION OF GROUNDNUT SHELLING MACHINE PEDAL OPERATED" EPRA International Journal of Research and Development (IJRD) Volume: 5 | Issue: 9 | September 2021

[6] Tushar Walke1, Praful Gadge2, Ganesh Gohate3, Ritesh Banpurkar4, "Design & Fabrication of Groundnut Sheller Machine" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 Issue: 03 | Mar -2017

[7] Z Iqbal1, G Jowowasito1, Darmanto1, M Lutfi1, F I Wardani1, R A Lubis1, L B Siahaan1 and I Hidayah1,Published under licence by IOP Publishing Ltd "Designing small-medium scale groundnut" IOP Conference Series: Earth and Environmental Science, Volume 230, International Conference on Green Agro-industry and Bioeconomy 18–20 September 2018, Universitas Brawijaya, East Java IndonesiaCitation Z Iqbal et al 2019 IOP Conf. Ser.: Earth Environ. Sci. 230 012013

[8] Ikechukwu Celestine Ugwuoke , 2,Olawale James Okegbile 3,Ibukun Blessing Ikechukwu, "Design and Fabrication of Groundnut Shelling and Separating Machine" International Journal of Engineering Science Invention ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726 www.ijesi.org Volume 3 Issue 4| April 2014| PP.60-66

[9] R. Bhalavignesh1,L. Arjunan1, B. S. Arunkumarrao1, G.Arun1,S.P.Vinayagam Mohanavel "Modelling and Fabrication of Groundnut Separating Machine" INTERNATIONAL RESEARCH JOURNAL OF AUTOMOTIVE TECHNOLOGY (IRJAT) http://www.mapletreejournals.com/index.php/IRJATReceived 15July2019 ISSN 2581-5865 Accepted 20August2019 2019; 2(5); 1-7Published online 25 September2019

[10] E. Gu¨zel a,*, _ I.D. Akc¸ali b , H. Mutlu c , A. _ Ince a "Research on the fatigue behavior for peanut shelling" Journal of Food Engineering 67 (2005) 373–378 Received 20 October 2003; accepted 26 April 2004

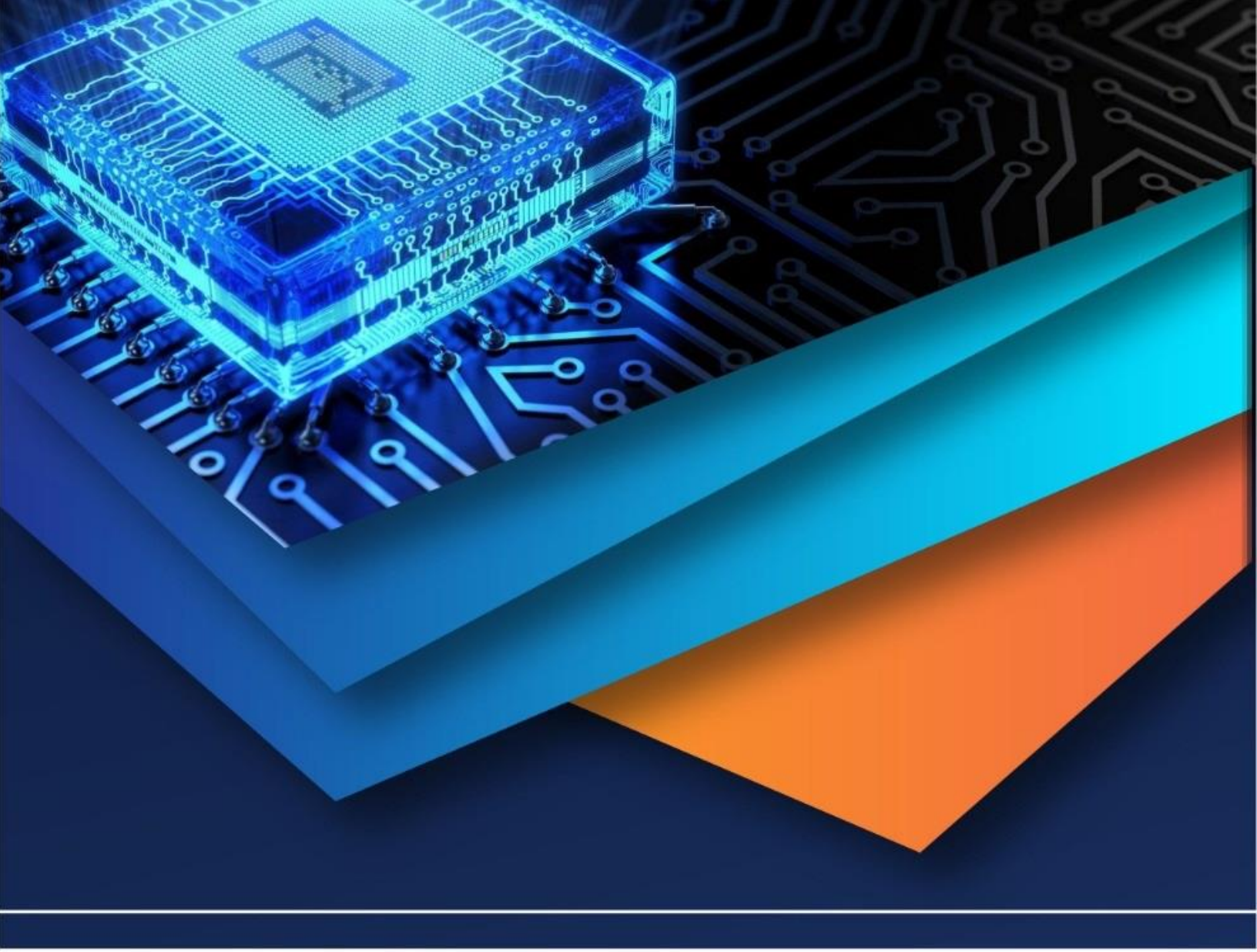
[11] Bello Benjamin1 , Engr. Prof A. Tokan2 and Prof. J. D. Jiya3, "Design and Fabrication of an Automated Groundnut Threshing Machine" INTERNATIONAL RESEARCH JOURNAL OF AUTOMOTIVE TECHNOLOGY Vol. 9(34), Oct. 2019, PP. 4383-4400

[12] G. Karthik#1 , D. Balashankar#2, G. Rambabu#3 , B. Nagabhushanam#4 , Lvs Akhil#5 , A. Lakshumu Naidu,"Design and Fabrication of Groundnut Pods and Shell Stripper" International Journal of Engineering Trends and Technology (IJETT) – Volume 58 Issue 2 – April 2018

[13] Adwal Ravindra1, Ghadge Rohit2, Awad Saurav3 , Prof. Khare G.N "A Review on Design and Fabrication of Groundnut Shelling and Separating Machine" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 04 Issue: 10 | Oct -2017

[14] Wangette Isaac S., Nyaanga Daudi M., Njue Musa R "Influence of Groundnut and Machine Characteristics on Motorised Sheller Performance" American Journal of Agriculture and Forestry 2015; 3(5): 178-191 Published online August 20, 2015 (http://www.sciencepublishinggroup.com/j/ajaf)

[15] ANTHONY UNUIGBE, HENRY UNUIGBE, EDDY AIGBOJE, PAUL UGBOYA, "Design and Development of Beans (Phaseolus Vulgaris) Shelling Machine" Innovative Systems Design and Engineering www.iiste.org ISSN 2222-1727 (Paper) ISSN 2222-2871 (Online) Vol.8, No.1, 2017



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY