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Design And Fabrication of Husking Machine

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Abstract: *This project describes about the design and fabrication of various components of groundnut, sunflower and sorghum Sheller machine. Hence in this design of various parts are necessary, and design of various parts due to which the design quality of those parts will be improved. Overall, this project involves processes like design, fabrication and assembling of different components etc. By keeping the point in our mind, we think that we should make such a machine, whose production capacity is more & machine gets operated on 1 H.P. Electric motor instead of manual work. The new and small farmer or business man can start their business by investing less capital. So, workingon the above points, we design and fabricate a newmedium production capacity machine and today we proudly present this machine called groundnut, sunflower and sorghum Sheller machine.*

I. INTRODUCTION

Groundnut is the sixth most important oilseed crop in the world. It contains 48-50% oil and 26-28% protein, and is a rich source of dietary fiber, minerals and vitamins. It grows best on soils that arewell drained, loosely textured and well supplied with Calcium, potassium and phosphorous. Over 100 countries worldwide growgroundnut. Developing countries constitute 97% of the global area and 94% of the global production of this crop. The production of groundnut isconcentrated in Asia and Africa (56% and 40% of the global area and 68% and 25% of the global production, respectively). Shelling is the removal of grains from their stalk, pod or cub, either by stripping, impact action and rubbing or any combination of these methods. The most popular method of shelling Which is still widely used in the northern part of Nigeria is the method of crushing or pressing the pods between the thumb and the finger to break off the pods and release the Seed. This method has low efficiency, it is time consuming, and has high demand of Energy. In addition, the output per-man hour is as low as 1-2.5kg of groundnut.

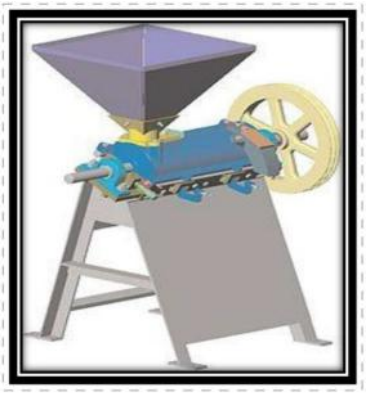

Figure: Sorghum & Sunflower Husker

There are different methods of shelling and different machines have been Fabricated and used to shell wide variety of crops under different conditions. The peasant Farmercannot afford these machines because they are too costly and complex in Operation and maintenance. Also, the operator had to be trained and spare parts imported. These factors increase the overall cost ofproduction which does not make any economic Sense to the farmer.

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Hand operated shelling machine which is of concave or semi-rotary Design is widely used locally. It had no expelling unit; hence separation is achieved by Winnowing. A simple hand operated groundnut Sheller has a semi-cylindrical screen Closed on both sides. A shaft carrying a lever at one end is fixed across the centre of the Semi-cylinder. On the lever is a pair of plate with shoes or beater bars, having blunts on Their undersides. For successful operation of the machine, the operatorstands by the side, then holding the operating lever (handle) and swinging it by pushing to provide Shelling action on the shoe's assembly.

II. MODEL DESIGN

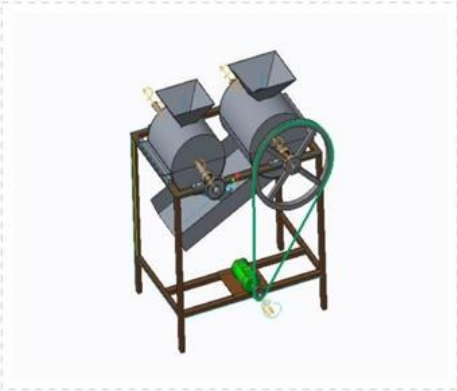

Figure: Machine Setup

III. CALCULATION

Maximum Bending moment about bearingBM = 50 x 700 = 35000N-mm

Ground nut shaft torque F = Weight * gravitational force = 5 * 9.81 = 49.05 N

Torque for ground nut shaftT= F * R = 49.05 * 0.1 = 4.9 N-m

Power required for ground nut shaft P =2 ΠNT/60 = 2Π *190 * 4.9 /60 = 97 Watt

Equivalent Twisting MomentTe = (M2 + T2) ½ = (350002 + 49002) ½ = 35341.33 N-mm

For Mild-Steel

Ultimate yield strength = 380 N/mm2

Ultimate shear strength = 0.5 * 380 =190 N/mm2

Factor of safety= 3

Maximum shear stress = Ultimate shear strength / fs = 190/3 = 63.33N/mm2

Take safe stress = 63.33 N/mm2 According to maximum shear stress theoryM=35000N-mm T= 4900N-mm

(3.14*d3) tmax = 16 *(M2+T2)½ 12.43*d3 = 35341.
D3 = 2843.20mm

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D=15mm ~25mm
The diameter of shaft taken is 25 mm which issafe.

Design of Motor:

Torque required for ground nut toolT = F*R = 5 * 9.81 * 0.1 = 4.9 N-m

Using Hindustan motors catalog for 1 HP motor,N =1440 rpm
P = 2ΠNT / 60
746 = (2Π x 1440 x T) / 60 T = (746 x 60) / (2Π x1440)T = 4.94 N-m So the maximum required torque at ground nut husking tool is 4.9N-m

To calculate the length of the belt, this isconsidered as open belt drive
L =2c + 1.57(d2+d1) + ((d2-d1)2 /(4c))

C=centre distance = 515mmD2 =385 mm

D1 = 50 mm

L = 2 x 515+1.57(385+50) + ((385-50)2/ (4 x 515)) = 1030+683.29+54.47

L = 1767 mm = 176.7cm

The length of the belt is approximately taken as 1.8 m.

DESIGN MODELS

6.1 Sorghum husker Tool

Figure: Sorghum husker Tool

6.2 Sorghum husker Tool hopper

Figure: Sorghum husker Tool hopper

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6.3 Groundnut Husker Tool

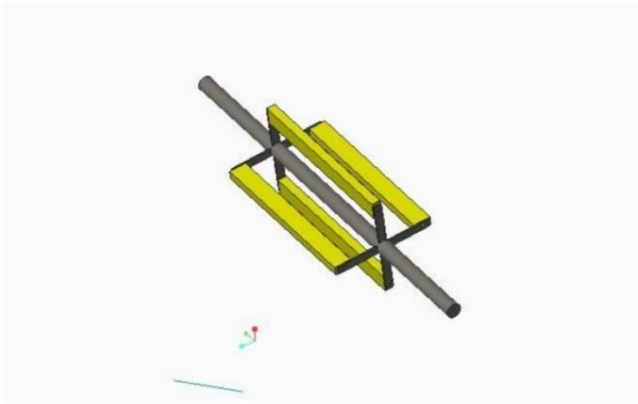

Figure: Groundnut Husker Tool

6.4 Groundnut Husker Tool hopper

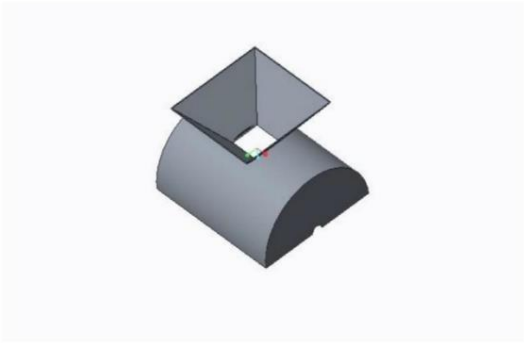

Figure: Groundnut Husker Tool hopper

IV. CONCLUSION

A multipurpose husking machinewas successfully designed, developed and tested. It can be concluded from the results obtainedfrom the test and statistical analysis that, the speed of the machine and the moisturecontent of the seeds significantly affected the shelling efficiency of the machine. The shellingefficiency increased with the speed and moisture content of the seeds within the levelsof factors considered. Seed breakage percentage of the machine was comparativelynegligible and it is significantly affected by the moisture content of the seeds alone. However,the machine capacity could be better at a higher operational speed of the machine. Multipurpose husking machine is very useful for small scale agricultural production. This machine can easily manufacture.

The shelling removing efficiency depends on the moisture content in it. When moisturecontent high then the shell removing efficiency decreases. We conclude that atthe time of removing shells the moisture content in groundnut, sunflower &sorghum should be low for better removing of shell. The husking rate also depends on themoisture content. The shell removing efficiency increases as the less moisture contentgroundnut or sunflower feed into machine. The husking rate of machine is 100kg/hr.so this machine is suitable for small scale agricultural product.

REFERENCES

[1] K Mahadevan and Balaveera Reddy- Design DataHand Book- CBS Publication,3rd Edition, 2010.
[2] R. S. Khurmi and J. K. Gupta - Machine Design-Eurasia publishing house New Delhi,14th Edition, 2008.
[3] Design of Machine Elements- V. B. Bhandari –TataMc Graw Hill Education Private Limited New Delhi, 3rd Edition, 2010.

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[4] Theory of Machine - Rattan S.S, Tata Mc GrawHill Publishing Company New Delhi, 2nd Edition, 2006.
[5] Y.V. Mahatale and V.P. Pathak "PhysiologicalEvaluation of Different Manually Operated ground nut Shelling Methods".
[6] T. A., Raji A. O and O. Kilanko "Modeling SomeErgonomic Parameters B. with Machine Parameter using Hand Powered ground nutSheller".
[7] Ashwin Kumar and Shaik Haneefa Begum "Design, Development and Performance Evaluation of a Hand Operated ground nut Sheller".
[8] International Journal of Scientific & EngineeringResearch, Vol. 7, Issue 8, August-2016 1607 ISSN 2229-551.
[9] Wangette, I. S., Nyaanga, D. M., Njue, R. M. Influence of Groundnut and Machine Characteristics on Motorised Sheller Performance.
[10] American Journal of Agriculture and Forestry. Vol. 3, 2015, pp. 178-191. doi:10.11648/j.ajaf.20150305.13
[11] International Journal of Engineering ScienceInvention ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726 www.ijesi.org Volume 3Issue 4‖ April 2014 ‖ PP.60-66
[12] Design and Performance Evaluation of a CornDe-Cobbing and Separating Machine Oriaku E.C, Agulanna C.N, Nwannewuihe H.U,Onwukwe M.C And Adiele, I.D Engineering Research; Development and Production(ERDP) Department. Projects Development Institute, (PRODA) Emene, Enug.