



DESIGN AND FABRICATION OF GROUNDNUT SHELLING AND SEPARATING MACHINE

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Abstract

This work focused on the design and fabrication of a groundnut shelling and separating machine electrically powered by a 0.5hp motor. The machine has the capacity of shelling 60kg of groundnut per hour with a shelling and separating efficiencies of 80% and 85% respectively. The machine was fabricated from locally sourced materials, which makes it cheap and easily affordable and also easy and cheaper to maintain. It is also of light weight and comprises of the hopper, crushing chamber, separation chamber and the blower unit. During the process of testing, it was observed that majority of the groundnut pods that came out unshelled or partially shelled were the ones with one seed per pod and those with two small seeds in their pods.

Keywords— Design and fabrication, groundnut shelling, separating machine, locally sourced materials

1. INTRODUCTION

Groundnut is the sixth most important oilseed crop in the world. It contains 46- 50% oil and 25 - 28% protein, and is a rich source of dietary fiber, minerals and vitamins. It grows best on soils that are well drained, loosely textured and well supplied with calcium, potassium and phosphorous. Over 100 countries worldwide grow groundnut. The main purpose of this paper is to understand the knowledge of design and fabrication mechanism of portable groundnut Sheller machine. The design is very simple and eco-friendly which uses simple mechanism properties such as shelling system, automatic separating system and crushing chamber etc. The study of manufacturing was very important for this project. In this project we are designing the different parts of shelling and oil extracting machine considering all forces and ergonomic factor for people to use, This project is mainly about generating a new concept of groundnut shell (crush) and oil extract that would make easier to transport anywhere and suitable to crush groundnut and extract oil. This machine shell about more than 5kg of groundnut per hour. Oil extraction is the process of recovering oil from oil bearing agricultural products through manual, mechanical, or chemical extraction. The agricultural products are classified into oil-seeds, nuts and mesocarps or fruits. Bicycle technology is one of the oldest technology in world, it can be used to transmit power but in our machine we are using motor to transmit power. In this groundnut shelling and oil extracting



machine, the first step is to shell the groundnut using crusher and in the next step peanuts enters another machine and in that machine oil from peanut will extracted using roller.

2. METHODS OF SHELLING Manual method:- In Manual Shelling method groundnuts are shelled by hand simply. They are wrapped into the cloth and then rubbed onto the surface to decoct it. The cost for shelling is 5 to 6 Rupees per kg for one person and also this is very time consuming process. Mechanized Shelling Method:- In mechanization we use large machinery for groundnut shelling. These machines are used in the industries where large production is required. They are having shelling capacity of 400 to 3300 kg/hr. But these machines are costly in order to purchase by the farmers.

3. MODELING AND SPECIFICATIONS OF REQUIRED COMPONENTS

Frame• Electric motor• Crusher• V-Belt• Pulley• Hopper• Fan or Blower•

4. WORKING AND BLOCK DIAGRAM The machine is operated with help of the Electric Motor which is connected to the external power supply. As power supplied to motor it rotates the roller. Groundnuts are supplied in crushing chamber through hopper and they get crushed between Semicircular net and the roller. Now we can collect both the cover of the groundnut and peanuts. These are passed in front of the fan so that shells are blown away due to light weight and peanuts falls down directly. Continuous pressing by means of expellers (also known as screw press) is a widely applied process for the extraction of oil from oil seeds and nuts. Groundnut Sheller is operated on the shearing action, blowring 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 gets shelled and divided into two parts. i.e. in the peanut and outer shell of the groundnuts. There clearance is provided between the net and roll shaft. The clearance provided is depends upon the size of the groundnuts which is to be decocted. After shelling the groundnut the peanut and shells of the groundnut gets 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 more weight, the peanuts gets 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 gets 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 varies small, medium and large for various size of groundnuts. In this way the “groundnut Sheller” works

6. DESIGN AND CALCUALTIONS



6.1 Hopper Design The hopper design is based on the rectangular section.

The volume of the hopper is given by $V = \frac{H}{3}[(X^2Y - x^2y)/(X - x)]$ Where V= volume of the hopper, H= Height of the hopper, X= Length of the upper rectangular base, Y= Width of the upper rectangular base, x= Length of the lower rectangular base, y= Width of the lower rectangular base Therefore

$$H=290\text{mm}, X=450\text{mm}, Y=185\text{mm}, x=250\text{mm}, y=30\text{mm} = \frac{290}{3}[(450^2 \cdot 185 - 250^2 \cdot 30)/(450 - 250)]$$

$$V = 8190800\text{mm}^3$$

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