

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 4, April 2019

Design and Development of Peanut Peeler Machine

Maurya Mohit¹, Ladani Meet¹, Nakum Sujeet¹, Patel jugal¹, Patel Raj¹, Mahendra M Korat²

Diploma Student, Department of Mechanical Engineering, Tapi Diploma Engineering College, Surat, Gujarat, India¹

Lecturer, Department of Mechanical Engineering, Tapi Diploma Engineering College, Surat, Gujarat, India²

ABSTRACT: Peanut is grown on small scale by farmers in developing countries like India. Lack of peanut processing machines at affordable cost, especially peanut peeler, is a major problem of groundnut production. The peanut peeler machines available in market are large in size and costly and not suitable for domestic purpose. The machine is fabricated by locally sourced materials. The major parts of machine are Hopper, crushing chamber, Separating chamber. The processes involved in the project are like design, fabrication and assembly of different components.

KEYWORDS: Peanut peeler, Peanut crushing, Shearing action, Efficiency, Cost, Mechanism, CAD model.

I. INTRODUCTION

The purpose of these papers is to understand the knowledge of design and fabrication mechanism of Peanut Peeler machine. The design is an environment friendly and uses simple mechanism properties such as crushing system, roller mechanism, separating system etc. In this, some crushing force is needed to crush the peanut. The design is so done that the knowledge of designing, mechanism and forces are increased. This project consists of designing and fabrication of a peanut peeler machine considering various important parameters. In this project, designing & development of a machine to crush or shell peanuts so the farmers can gain high profit by selling groundnut direct in market, also to reduce overall cost of production. 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 peeling machine considering forces and ergonomic factor for people to use. This project is mainly about generating a new concept of peanut peeler (crush) that would make easier to bring anywhere and easier to crush peanut. After the design has completed, it was transformed to its real product where the design is used for guideline.

Designed the portable groundnut sheller machine. They also fabricated it. The fabricated machine is manually operated. Sheller machine is used to shell only dry pods and it can be used as a groundnut Sheller machine for domestic application.

Ashok. S. Andhale et.al [8] designed and developed a groundnut separator machine which runs with a robotic arm. The main purpose of the robotic arm is to pluck the ground nut from the plant and put into the rotor which has blades. With this the human effort is reduced and also efficiency is increased as it is fully automatic. Kulbhushan M. Shejole et.al [9] designed and fabricated the pedal operated groundnut crusher. It is a manual process where the groundnuts are removed from shell. The pedal is used for the movement of the crusher. There will be no energy consumption and the cost of production is less. It has less maintenance cost.

Ashish S. Raghtate et.al [10] designed and fabricated a groundnut Sheller machine. It is very cheap and 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 decoating process of groundnut by this machine is more economical and faster than manual process or any other processes. "GROUNDNUT SHELLER MACHINE" will save the tremendous time, energy manpower and save financial input of the project, reducing the cost and time considerably which is the backbone of the present world economy.

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Tushar Walke et.al [11] designed and fabricated the groundnut machine which is electrically operated. The working of the machine is 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. Thus, the ground nuts are removed from the shell. Ikechukwu Celestine Ugwuoke et.al [12] designed an electrically powered groundnut shelling machine. The machine was fabricated using materials that were sourced locally. 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. The test result showed that the machine can shell a total of 400kg of groundnut in an hour.

II. OBJECTIVES

By using peanut peeler machine, due to shearing action between roller and semicircular net which removed the coat of the peanut.

The main and basic objective is to make low cost peanut peeling and separating machine.

- The machine should not damage the peanuts in according to earn profit.
- The cost of a machine should be affordable to the farmers.
- The space required by the machine should be less and its should not have high weight.

III. WORKING

Peanut PEELER is operated on the shearing action rolling action and separating action. Firstly the inputs i.e. the Peanut are fed to the machine through the hopper. Then Peanut 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 Peanut comes in contact with these two members then the shearing action takes place here. Due to shearing action (crushing) the peanut gets peeled and divided into two parts. i.e. in the nut and outer coat of the peanut. There clearance is provided between the net and roll shaft. The clearance provided is depends upon the size of the peanuts which is to be decocted. & also it was adjustable. After peeling the peanut the nut and outer coat of the peanut gets dropped from the semicircular net, in downward direction. Due to more weight, the peanuts gets moved downward and collected in the separator. After some time by giving angular movement to semicircular net dust is collected at other side of machine.

ADVANTAGES :

- High efficiency.
- Reasonable design.
- Limited number of labours are required
- Non – pollution.
- Affordable for farmers
- The space required by the machine should be less.

DISADVANTAGES:

- Parts are not available easily in market.
- Regular Maintenances is Must.
- Power Range Is Limited

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Methods of peanut peeling:

- Manual Method
- Mechanized Peeling Method



Fig.1 Manual method (11)



Fig.2 mechanized peeling method (11)

Fig (1) & (2) shows the two different methods of peeling the peanut. In fig (1) shows Manual method. 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. In fig (2) shows mechanized peeling method. 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.

IV. DESIGN

In fig (3) shows different views of machine most of the doubt may be a clear; by this dimensions of machine are easily knowable, which is helpful for selection of different parts for machine.

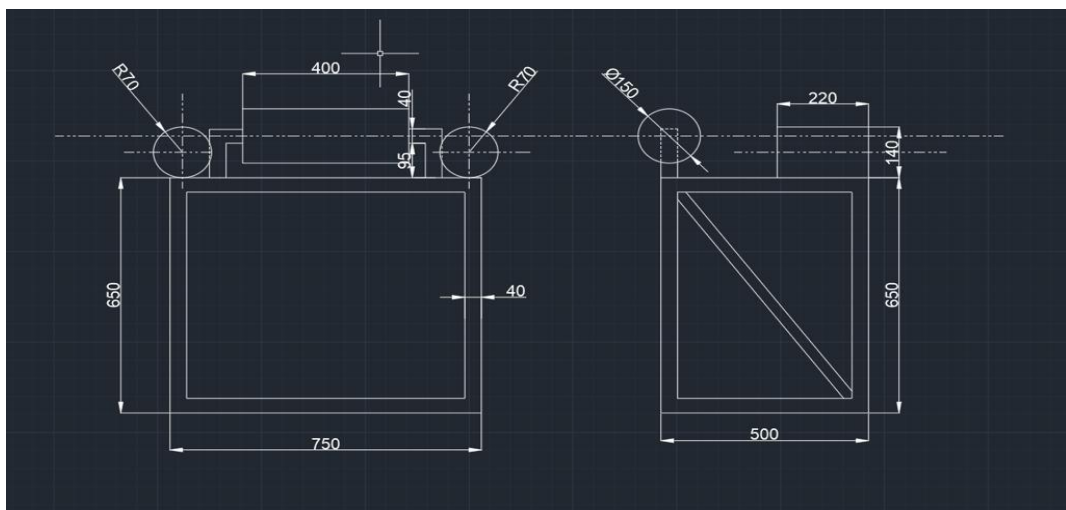


Fig.3 different views of machine

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1. AutoCAD model:-

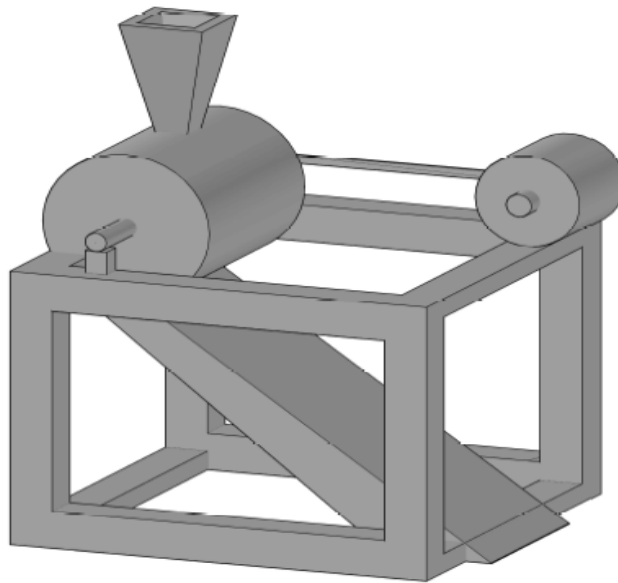


Fig. 4 Design of machine

2. Components:

- Frame
- Electric motor
- Roller
- V-Belt
- Pulley
- Semicircular net

2.1 Frame:

Structure relative to which a machine moves during operation, which structure will of particular utility. The frame is used to support all the components. Material of frame will cast iron and height up to 1m.



Fig .5 Frame

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2.2 Electric motor:

An electric motor is an electrical machine that converts electrical energy into mechanical energy. This motor is used to rotate the roller by using belt and pulley.



Fig. 6 Electric motor

2.3 Roller:

Roller will be made up of hollow cylinder of 1ft. diameter and on its periphery. The material of roller is cast iron. It is used to crack the peanuts. As per size or output of peanuts roller is designed. It is rotated by electric motor. It is the main element or mechanism of machine. Overall cost depends on it. On the surface of roller there were approx 120 nos. threaded nut & bolts are drilled. By which we are easily able to shearing the peanuts. The rotor is supported by bearings, which allow the rotor to turn on its axis.



Fig.7 Roller

2.4 V –belt:

It will be used to transmit rotary motion of shaft of motor to the shaft of roller. Material of the belt is rubber or polymer for strength and reinforcement. It is connected on one pulley to another pulley. A belt is a loop of flexible material used to link two or more rotating shafts mechanically, most often parallel. Belts may be used as a source of motion, to transmit power efficiently or to track relative movement. As a source of motion, a conveyor belt is one application where the belt is adapted to carry a load continuously between two points.



Fig.8 V - belt

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2.5 Pulley:

Pulley will be used to transmit the torque of motor to the roller. One pulley is directly mounted over the motor shaft and another pulley mounted on the shaft of roller. And both the pulleys are connected with the help of V-belt. Pulley Dia. = 30mm.



Fig.9 Pulley

2.6 Semicircular net:

This semicircular net is fitted beside the roller at very small distance so that shell of groundnut should be easily cracked and peanuts remain uncracked. The clearance between roller and semicircular net depends upon the size of peanuts. It is the second most part of the machine which is supported by threaded stud. As per size of peanuts it will be adjusted.

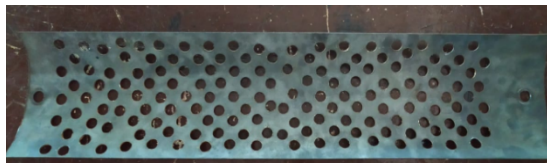


Fig.10 Semicircular net

3. Specification of Components:

1. Electric motor

❖ SPECIFICATION:-

- THREE PHASE MOTOR
- 220 VOLT
- 0.5 H.P
- 1440 RPM

2. Bearing pedestal

❖ SPECIFICATION:-

- INTERNAL DIAMETER:- 30 MM
- OUTER DIAMETER :- 60 MM

3. Roller

❖ SPECIFICATION:-

- DIAMETER :- 180 MM
- LENGTH :- 600 MM

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4. Semicircular net

❖ SPECIFICATION:-

- LENGTH :-750MM
- DRILL DIAMETER :- 12MM

5. TABLE

❖ SPECIFICATION:-

- LENGTH :-750MM
- WIDTH :- 500MM
- HEIGHT :-650MM

V. CONCLUSION

By using our Peanut peeler machine, labour cost as well as effort is decrease for Shelling the groundnut which means only one labour is required to operate this machine so that we have to give less wages for labour work. It performs work speedily as compare to manual work so that time is reduces.

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