

# Design and Fabrication of Groundnut Pod 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 1hp motor. The machine has the capacity of shelling 400kg of groundnut per hour with a shelling and separating efficiencies of 95.25% and 91.67% 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 pod, separating machine, locally sourced materials.

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## 1. 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 fibres, minerals, and vitamins. Groundnut is grown on 26.4 million ha worldwide with a total production of 37.1 million metric t and an average productivity of 1.4 metric t/ha (FAO, 2003). Over 100 countries worldwide grow groundnut.

Developing countries constitute 97% of the global area and 94% of the global production of this crop. The production of groundnut is concentrated in Asia and Africa (56% and 40% of the global area and 68% and 25% of the global production, respectively). India is an agricultural based country. since last 50 year's lot of changes has been occurred in agriculture sector. Many new agricultural based industries have been started new varieties and species of plant have been discovered. In our country most of the people can be depend on the agriculture sector/field.

The Groundnut is one of the major seed crop. This product in the cultivated in abundant quantity. There is lot of time waste in old method of groundnut pod separating. The time required for 1 Kg of groundnut pod separating from this groundnut is about 1 to 2 hours. so we have we have produces new machine for fast groundnut pod separating.

### Objectives:

- To minimise the time for separating the groundnut pod from plant body .
- To minimise manpower.
- To simplify the process.
- To improve efficiency of operation of separation of groundnut pods from plant body.

## 2. LITERATURE SURVEY

**Mr. Marotrao Sarode Dist; Ahmednagar, International Journal of Mechanical and Industrial Technology ISSN 2348-7593 (On-line) Vol. 2, Issue 2. Design and Fabrication of Groundnut Shelling and Separating Machine**

Groundnut is the sixth most important oilseed crop in the world. It contains 48-50 per oil and 26-28 per protein, and is a rich source of dietary fibers, 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 world-wide grow groundnut. Developing countries constitute 97 per of the global area and 94 per of the global production of this crop. The production of groundnut is concentrated in Asia and Africa (56 per and 40 per of the global area and 68 per and 25 per of the global production, respectively)

**Design and Fabrication of Groundnut Decorticator** by Arjun Vishwakarma, Tejas Tandale, Prof R.H.kekan. 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.

## 3. WORKING PRINCIPLE

By using electrical motor, the rotating moment transferred with the help of belt to the rotor shaft and fan shaft. The step pulley is maintained on the electrical motor shaft. When rotor rotating the groundnut falls in the hopper and then groundnut pressed between the rotor and grill. At that time groundnut seed and pod separated. The groundnut pod and groundnut seeds fall in the tray. Due to high fan speed the high velocity of air is created by using this high velocity air the light weight pod is thrown out from the machine and the groundnut seed falls in the tray due to this weight. we collect the seeds in the pot of bag.

## 4. CONSTRUCTION AND WORKING

The spatial agitator consists of a basic mechanism that produces an oscillating motion from continuously rotary input. The mechanism to produce an oscillating motion in the vertically suspended output shaft through the continuously rotating horizontal input shaft at one end and the fork . The fork is coupled to output shaft by means of fork pin. During 0 to 180 degree rotation of the input shaft the crank and the fork together make output shaft to rotate in clockwise di-reaction by 60 degrees, whereas during 180 to 360 degrees of input the output changes direction and returns to mean position .The motor is bolted to the base plate mounted on the base frame.

The Spatial agitator machine consists of the following parts:-

### 1. Motor:

The motor is a single phase AC commutators motor, 0.5hp power meaning that the speed is infinitely 1440 rpm. The motor is mounted on the base plate and is connected to the input shaft by means of a v belt.

### 2. Main Pulley:

The main pulley is V- belt pulley mounted on the input shaft by means of an allen head grub screw. This pulley is a reduction pulley that is time reduces the motor speed 5 times so also torque available at machine input shaft is amplified.

### 3. Input shaft:

The input shaft is held in ball bearing supported in the central bearing block. The input shaft carries reduction pulley at one end whereas the input crank at the other end. The input crank is fixed on the input shaft and carries the fork at the other end.

### 4. Fork:

The fork is connected to the input crank at one end where as it is connected to the output shaft at the other end by means of fork pin.

**5. Output shaft:**

The output shaft is a vertical member which is supported in two bush bearing at either ends that are held in suitable bearing blocks. The arrangement converts clockwise rotation of output shaft. This arrangement converts clockwise rotation of output when input shaft. This arrangement converts clockwise rotation of output when input shaft turns from 0 to 180 degrees, but during this operation or motion conversion the output also moves in the axial direction, which needs to be constrained, which need to be constrained, hence a spring is incorporated in the set up.

**6. Base plate:**

The base plate is the base member that supports the bearing housings.

**7. Flywheel:**

The flywheel is vertical shaft with a blade assembly at its upper end. It is supported at its top end in the flywheel bracket.

**8. Almond coupling:**

Coupling that can convert rotary motion into oscillating motion.

**5. TRANSMISSION**

The mechanical power produced by prime mover we used to drive various machines in the workshop and factories. A transmission system is the mechanism, which deals with transmission of the power and motion from prime mover to shaft or from one shaft to the other. The machine tool drive is an aggregate of mechanism that transmits motion from an external source. To the operative elements of the machine tool the external source of energy is generally a three phase A.C. motor, which has a rotary motion at its output shaft.

The rotary motion of the motor is transmitted to the operative element to provide an operative working or auxiliary motion. When the required motion is rotary; the transmission takes place through mechanisms that transfer Rotary motion from one shaft to another. Transmission of the motion from the external source to the operative element can take place through Mechanical elements such as belts, Gears, chains etc.

**Mechanical Transmission and its elements: -****1) Belt Transmission****2) Gear Transmission****3) Chain Transmission****1) Belt Transmission:**

Belt drive is one of the most common effective devices transmitting motion and power from one shaft to the other by means of thin inextensible belt over running over to pulleys. This largely used for general purpose on mills and factories especially when the distance between the Shafts is not very great.

When the centre distance between the two shafts is large than the tight side of the belt should be the lower one the pulley called driver is mounted on the driving shaft while the shaft while the other, which is mounted on the shaft to which power is to be transmitted is called the driven pulley or follower. When the belt moves over the pulleys there is always the possibility of slipping between the belt and pulley and hence the character of the motion transmitted is not positive when positive action is required. Gears and chain must be used.

**2) Gear Transmission:**

Efficiency of power transmission in belt and rope drives is less. The power may be transmitted from one shaft another by means of mating gears with high transmission Efficiency and a gear drive is also provide when the between driver and follower is very small.

**3) Chain Transmission:**

Chains are used for high transmission number. They are mostly used when distance between center is short but the centre distance is as much as 8m. They are now generally used for transmission of power in cycle, motor vehicle, and agriculture

machinery in workshops. It is general requirement for any machines that they should provision for regulating speed of travel. The regulation may be available in discrete steps or it may be steeples i.e. continuous. The format are known as stepped drives Ex. Lathe machine, milling machine, printing machine etc.

## 6. FUTURE SCOPE

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 minimise man power and improve efficiency of operation, decrease cost of operation, decrease efforts.

The world is growing so fast and all want healthy food for healthy life. This food comes from agriculture. So the crop handling techniques should be efficient to keep it healthy. The new innovations in agriculture field will not only help farmer but also beneficial to fulfil demand by not causing price-hike.

## 7. CONCLUSION

While concluding this part, we \_ll quite contended in having completed the project assignment well on time. We had enormous practical experience on the manufacturing schedules of the working project model. We are therefore, happy to state that the inculcation of mechanical aptitude proved to be a very useful purpose. We are as such overwhelmingly elated in the arriving at the targeted mission. Undoubtedly the joint venture has had all the merits of interest and zeal shown by all of us the credit goes to the healthy-ordination of our batch colleague in bringing out a resource fulfillment of our assignment described by the university.\Although the design criterion imposed challenging problems which however were welcome by us due to availability of good reference books. The selection of choice of raw materials helped us in machining of the various components to very close tolerances and thereby minimizing the level of wear and tear. In this report, we developed a branch and bound approach which is coupled with quick. The design of control architecture was an important aspect of study because a strong interaction between the many different parts was needed.

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