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Design and Fabrication of Groundnut HarvestingMachine

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ABSTRACT

Groundnut is grown on small scale by farmers in developing countries like India. Lack of groundnut processing machines at affordable cost, especially groundnut sheller, is a major problem of groundnut production. The groundnut sheller machine available in the market are large in size & costly & not suitable for domestic purpose. The machine is fabricated by locally sourced material. The major part of machine are hopper, crushing chamber, separating chamber & blower. The processes involve in theproject are like design, fabricating &assembly of different component.

A groundnut separating machine is a device used to remove the outer shell or husk of groundnuts or peanuts. The machine uses a combination of mechanical and pneumatic methods to separate the shells from the nuts. The groundnuts are fed into the machine where they pass through a series of rollers and screens that separate the shells from the nuts. The shells are then blown away by a fan, leaving the clean nuts behind. The abstract of the machine highlights its features and functionality, and its potential use in the agricultural and food processing industries. It also discusses the benefits of using a groundnut separating machine in terms of increased efficiency and reduced labor costs.

Keyword: ***- Pulley, Electric motor, V-belt, revolutions per minute***

1. LITERATURE REVIEW:

Pratima G. Mungase et al. [1] designed and fabricated a machine where sprockets of a bicycle are rotated by pedaling action and this rotary motion is used to rotate the shaft of a screw conveyor. The peanut gets crushed in between the flights around the shaft and the casing of the conveyor. By considering all these designs we designed our own equipment which is of low cost and less maintenance but higher efficiency. 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.

Kulbhushan M. Shejole et al. [2] 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.

Tushar Walke et al. [3] designed and fabricated the groundnut machine which is electrically operated. It is also offered to be less-weight. The fresher and small farmer or business man can start business by investing less capital. In this project, we designed and developed a small machine to peel out the shell of groundnut so that machine will reduce their labor cost and processing time and high profit by selling the groundnut. The main motto of the design is to remove the pods from the roots of the plants. This equipment is eco- friendly and also has less maintenance cost. So that processing time and labor cost was decreases and farmers have getting the high profit by selling the groundnut.

Shelling is the removal of grains from their pod either by stripping, impact action and rubbing or any combination of these methods [4].the most popular method of groundnut shelling, which is still widely used in the method of crushing or pressing of pods in between the thumb and the first method has low efficiency, it is time consuming, and has high demand of energy [4]. Groundnut shelling machine is a machine used to remove the shell of obtain the groundnut seed[3]. They are different machine have been fabrication and used to shell wide variety of groundnut pods[4].The machine are too costly and complex in operation and maintenance .The lowest price is 13000/- some of these machine have very high shelling capacity, shelling capacity varies from machine to machine groundnut so as to ranging from6kg speed/h to 60 kg speed/h same hand sheller machine are suitable are domestic application but they only do shelling operation. , separation of seeds we have to do manually by using traditional methods such as by using natural wind or by using sieve. 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 as shown in the Fig.1 (a). 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 operator stands by the side, then holding the operating lever (handle) and swinging it by pushing to and fro to provide shelling action on the shoes assembly [4]. The semi-rotary, action of the shoes shells the pods against the screen but this

type of machines cannot do separation of shell and seed.

2. OBJECTIVE OF PROJECT:

- The machine is reasonable price for the farmers.
- The machine space is less.
- Improve the groundnut production.
- Time consumption is less by this machine.
- Reduce the farmers work and gain profit

3. DESIGN OF GROUND NUT POD SEPARATING MACHINE:

In our attempt to design a GROUND NUT POD SEPARATING MACHINE we have adopted a very a very careful a AGBoach, the total design work has been divided into two parts mainly;

1. System design
2. Mechanical design

System design mainly concerns with the various physical constraints and ergonomics, space requirements, arrangement of various components on the main frame of machine no of controls positionof these controls ease of maintenance scope of further improvement; height of m/c from ground etc.
In Mechanical design the components are categories in two parts.

1. Design parts
2. Parts to be purchased.

For design parts detail design is done and dimensions thus obtained are compared to next highest dimension which are readily available in market this simplifies the assembly as well as post production servicing work. The various tolerances on work pieces are specified in the manufacturing drawings. Theprocess charts are prepared & passed on to the manufacturing stage .The parts are to be purchased directlyare specified &selected from standard catalogues.

- **SYSTEM DESIGN:-**

In system design we mainly concentrate on the following parameter

1. System selection based on physical constraints:-

While selecting any m/c it must be checked whether it is going to be seed in large scale or smallscale industry in our case it is to be used in small scale industry so space is a major constrain .The systemis to be very compact. The mechanical design has direct norms with the system design hence the foremostjob is to control the physical parameters.

2. Arrangement of various components:-

Keeping into view the space restriction the components should be laid such that their easy removal or servicing is possible moreover every component should be easily seen & none should be hidden every possible space is utilized in component arrangement.

3. Components of system:-

As already stated system should be compact enough so that it can be accommodated at a corner of a room. All the moving parts should be well closed & compact A compact system gives a better look& structure. Following are some example of this section

- Design of machine height
- Energy expenditure in hand operation
- Lighting condition of m/c

4. Chances of failure:-

The losses incurred by owner in case of failure of a component are important criteria of design.Factor of safety while doing the mechanical design is kept high so that there are less chances of failure. Periodic maintenance is required to keep the m/c trouble free.

5. Servicing facility:-

The layout of components should be such that easy servicing is possible especially those components which required frequent servicing can be easily dismantled.

6. Height of m/c from ground:-

Fore ease and comfort of operator the height of m/c should be properly decided so that he may not get tired during operation .The m/c should be slightly higher than that the level also enough clearance be provided from ground for cleaning purpose.

7. Weight of machine:-

The total wt of m/c depends upon the selection of material components as well as dimension of components. A higher weighted m/c is difficult for transportation & in case of major break down it becomes difficult to repair. Input to the automatic gear box is to be given similar to engine drive hence the aAGBoach is to utilize an variable speed AC motor with the facility to vary input power and there bythe input speed by use of an electronic aviator.

PROCESS SHEET:

3.1 PART NAME:- SHAFT

Part weight – 1.5 kgPart material – C30 Part quantity – 1
Part size – Φ20 x 170 mm.

Sr. No.	Operation	Machine	Tool	Time
1	Cutting the material as per our required size.	Power Hacksaw	Hacksaw HacksawBlade	10 min
2	Facing both side	Lathe machine	facing tool	10 in

3.2 PART NAME:- BEARING MOUNTER-1

Part weight – 1 kg Part material – M.SPart quantity – 4
Part size – 60 x 60 x 10 mm.

Sr. No	Operation	Machine	Tool	Time
1	Cutting the material as per our required size.	Power Hacksaw	Hacksaw Blade	10 min
2	Drilling10mm hole and 20mm hole	Lathe machine	Drilling Bit 10mm&20mm	10 min
3	Make Φ42mm	Lathe machine	Boring tool	15 min

3.3 PART NAME:- SLIDER BUSH

Part material – M.SPart quantity – 2
Part size – Φ30 x 25 mm

Sr. No	Operation	Machine	Tool	Time
1	Cutting thematerial as per us required size.	Power Hacksaw	Hacksaw Blade	10 min
2	Drilling at center 14mm Hole	Lathe machine	Drilling Bit 14mm	10 min
3	Tapping M6 onbody	Drillingmachine	Drilling bit 5.2mm & M6tap	15 min

3.4 PART NAME:-SHAFT 2

Part weight – 1.5 kgPart material – C30 Part quantity – 1
Part size – 30 x 16x 320 mm.

Sr. No	Operation	Machine	Tool	Time

1	Cutting thematerial as per our required size.	Power Hacksaw	Hacksaw Blade	10 min
2	Turning bothside & make dia 14mm	Lathe machine	Turning tool	10 min
3	Drilling center10 mm hole	Lathe machine	Drilling bit 10 mm	11 min

4. USED MATERIALS AND THEIR PROPERTIES

The materials used in this project are detailed as follows

4.1 Ferrous Materials

A) Mild steel

EN – 4 to EN – 6
Carbon – 0.15% to 0.35%
Tensile strength –1200/1420MPAYield strength – 750/1170 MPA

B) C30

Carbon – 0.25% to 0.35% Tensile strength – 620 MPAYield strength – 400 MPA Izod Impact Value – 55 Nm
% Minimum Elongation – 21
Typical composition — Carbon – 0.25% to 0.35%Manganese – 0.60% to 0.90%
BHN – 207
C30 material is generally used for cold formed levers, hardened and tempered tierods, Cables, Sprockets, Hubs and Bushes –Steel Tubes.

C) 40C8

Carbon – 0.25% to 0.35% Tensile strength – 620 MPAYield strength – 400 MPA Izod Impact Value – 55 Nm

5. CONCLUSION

While concluding this part, we fill quite contended in having completed the project assignmentwell 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 co-ordination of our batch colleague in bringing out a resourceful 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 choiceof 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 whichis 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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