

Design and Fabrication of Multifunctional Cashew Collector

Sumeet Katala¹, Naufil Kazi¹, Abrar Kotawdekar¹, Asadkhan Gawankar¹, Prof. Sumit Malusare²
B.E. Student, Department of Mechanical Engineering, FAMT Engineering College, Ratnagiri, Maharashtra, India¹
Associate Professor, Department of Mechanical Engineering, FAMT Engineering College, Ratnagiri, Maharashtra, India²

ABSTRACT: Development of Multifunctional cashew Harvester will combinedly function as sucking, cleaning and collecting. Using these Machine we aim to reduce the labour fatigue and the most important thing it will be time saving. It can also be widely used for collection of waste in any type of field. This machine comes with an Operators / Parts Manual. The useful life and good service you receive from this machine can be utilized to a large extent.. The machine can collect the cashew as a raw material and the fruitful products are nuts and the juice which is extract from cashew as the cashew which is collected by the machine in excess quantity so the demand of wine industries can be successfully fulfilled by the end user and lead for cash grow crops and boon for agriculture as well as agro generation. The Machine having an different Pressure Regulating Unit so that depending On the requirement the pressure head is created and the work can be done efficiently.

KEYWORDS: Agriculture, High productivity, Increase production, Innovation in agriculture system

I. INTRODUCTION

More than 70 % of the Indian population lives in rural areas and agriculture is the major livelihood for most of them. Mechanized equipment has changed the way farming is done. However, lack of availability of labours is a critical issue faced by many farmers and agriculture entrepreneurs across the breadth and width of the country. Western coast of Maharashtra is not an exception for the same [7]. It is world famous for Cashew which are considered as hyper sensitive to atmospheric changes and having Cashew Harvesting on time is important so that they get market value, Cashew Crops are widely cultivated in Konkan region with a large number of trees planted by farmers, usually in the hundreds. The circumference of the trees at the base are usually higher, which requires more time for harvesting from plant and quantity is also more

For Harvesting a large no trees Huge man Power are required as well as the working capacity of human being can't remain as it is for all the working time and this lead to the loss in the money as well as time use for the collection of raw material only having process on them is another part [5]. Scarcity of labours is a major issue even though they are available, the time required for collecting the raw is more and this machine help for mankind only.

The need's can be created and that needs help to improve the productivity and achieves maximum productivity with minimum wasted effort or expense. If this project became successful, then it can use in farms For Harvesting the Cashew with Multifunctional Ability, which will create more impact on farmers growth. Problem of availability of labour human efforts, processing time like many problems will solve by only one machine. As the technology enhances day by day, modifications, changes as per new technology can be possible in future. Solar power, electricity also can be use in future as source of energy for this machine. So basically there will be good scope for this machine. [6]

II. LITERATURE REVIEW

Hsiao et al. [1] developed the method to set up the market position of the product through the image scale and subsequently by 5W1H and tree diagram method, and clarifies the problems and the direction of the design goals. The following step, according to Morphological Analysis and Finite Structure method (FSM), arranges the positions of the major components of the product, and shapes the forms for developing the possible alternatives. Then, it is the most suitable for the consumers that using PUGH several times to choose the final solution.

Manreet Kaur et al. [3] demonstrated the predicted performance for power, flow rate, pressure, and efficiency using the

present method agreed well with the experimental results obtained for an equivalent system within 2% difference at best efficiency point. Three models of the fan-motor assembly (S1, S2 and S3) were analyzed at the component level and the decrease in efficiency produced by flow resistance was estimated to be 1% (S1 and S3 models) or 4.7% (S2 model) using the developed method.

Min-Chie Chiu et al. [7] show the Pro-Endurance indicators are applicable to investigate the durability of products in several different scenarios and they are robust and flexible since the assessment based on a large number of parameters and different scenarios. These indicators can be used to assess product at the design stage or to support policy measures to promote more durable products.

III. COMPONENTS

I - OIL SEALED HIGH VACUUM PUMP

These are of oil-immersed, rotary vane type pump[8]. The rotor, with two springloaded vanes, is mounted eccentric in the stator body. As the rotor, rotates the vanes sweep the crescent shape air space twice in each revolution. There is inbuilt non returned valve which prevents back flow of air.[1]

Manufactured from graded material, oil moving parts are precisely machined, ground and assembled with close tolerances, This results in increased efficiency and long trouble free operating life[8].

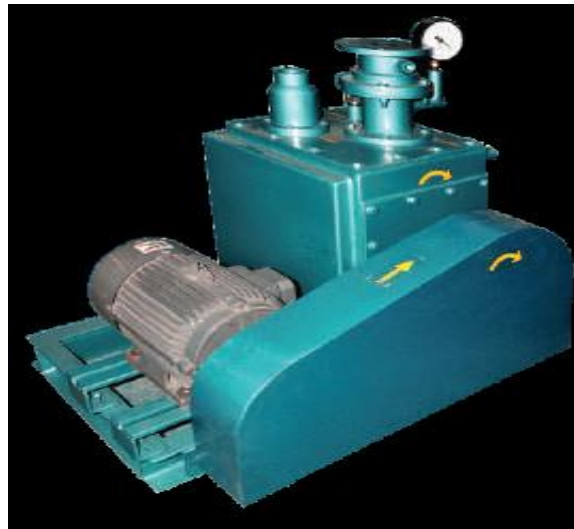


Figure 1: vacuum pump [8]

Salient Feature of vacuum Pump

- Trouble free operation
- Easily handle dust laded gases
- Simple & Rugged Construction
- Built in anti suck facility to prevent back of oil

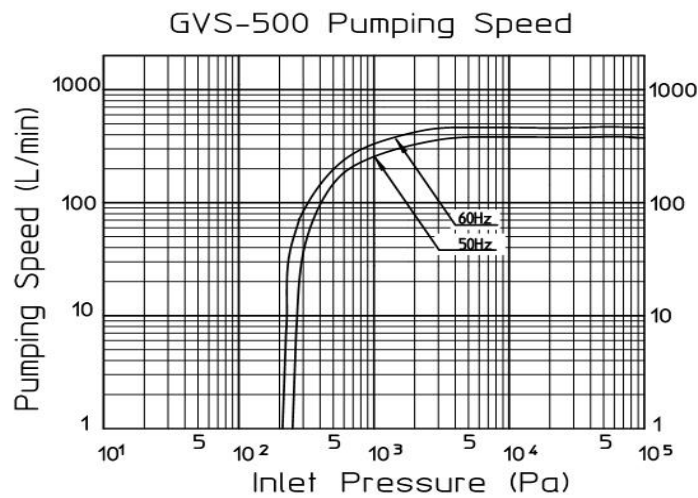


Figure 2 : Pressure Vs pumping speed[4]

They generally use a low-volume sliding vane pump or a liquid ring pump to create a negative air pressure. The use of diaphragm mud pumps is less common, but with the advantage of a simpler design and usually lower overall costs. The disadvantage is that mechanical parts come into contact with the sludge, which is not the case for the more common vacuum pumps.[3]

There are two different ways to mount the pump: either directly on the truck with the vacuum drive powered by the truck motor, or on the trailer with an independent motor. The second option with the independent motor is more complicated and not commonly used. It has the advantage of potentially having the pump closer to the septic tank. It is also able to use the negative pressure suction side of the pump as well as the positive pressure side to pump sludge over longer distances or lift it higher into the tank.[4]

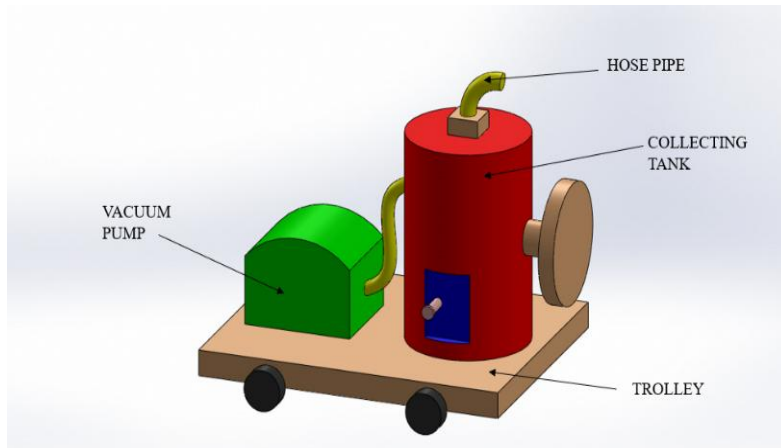
The suction hoses are typically 2" - 4" (or 50mm to 100mm) in diameter with 3" (or 75mm) being the norm. The possible length depends on various factors mainly related to the lift and other pressure losses. It is usually impossible to extend it beyond 50 metres (160 ft). Others factors affecting the possible lift and total length of the suction hose are that single stage vacuum pumps only reach an 85-90% partial vacuum, and that small air leakages, pipe friction losses, and the viscosity of the liquid further reduce the possible lift[2]. However, due to the viscosity of fecal sludge it is possible to mix air into it either by sucking close from the surface or by adding air with a compressor through a separate hose.

The suction head created by the vacuum pump in the tank is high its needs to be variable in between a rage so that depending on requirement the pressure drop and other factor to be take into consideration and the suction of raw material is variable and depending on the pump LPM and vacuum specification the factor to be consider and the work to be done and the filter is use restrict unwanted component entered inside vacuum pump and stop working[6].

- ii. Tank
- iii. Hose Pipe
- iv. Trolley and Wheels
- v. Filtering Component

IV. CAD MODEL

This is the 3-d model of our project. The constructional details are as follows: it contains a vacuum pump to create the vacuum inside the tank, a tank into which a filter is installed to prevent the dust to be get inside the vacuum pump and thus protect the pump from any damage, a hose pipe to collect the cashew fruit from the ground and a door is made at the bottom of the collecting tank to collect the cashew from the tank.



V. CALCULATION

This is the calculation done for the selection of vacuum pump. In this calculation we calculate the vacuum required to suck at least 3 cashew fruit at a time. The vacuum required to suck the cashew fruit is coming approximate to 0.2283 mm of Hg. Therefore we select ‘SV-1000’ vacuum pump which can create vacuum upto 0.5 mm of Hg.

$$P = F/A$$

Where, P= Pressure (N/m²)

F= Force (N)

$$A = \text{Area of tank} = \pi/4 * D^2$$

$$F = mg$$

Where, m= Mass of 3 Cashew fruit(Kg)

g= Gravitational Force (m/s²)

$$m = 3 \times 130 \text{ gm} = 0.39 \text{ kg}, \quad g = 9.81 \text{ m/s}^2$$

$$F = mg = 0.39 \times 9.81 = 3.8259 \text{ N}$$

$$P = F \div A$$

$$A = \pi/4 \times d^2$$

$$= \pi/4 \times (0.4)^2 = 0.12566 \text{ m}^2$$

$$P = 3.8259 / 0.12566$$

$$= 30.446 \text{ N/m}^2$$

$$P = 0.2283 \text{ mm of Hg}$$

Since the vacuum required to suck 3 cashew fruit is 0.2283 mm of Hg. Therefore selecting ‘SV-1000’ pump which can create 0.05 mm of Hg of vacuum.

VI. CONCLUSION

If this project became successful, then it can use in farms For Harvesting the Cashew with Multifunctional Ability, which will create more impact on farmers growth. Problem of availability of labour human efforts, processing time like many problems will solve by only one machine. As the technology enhances day by day, modifications, changes as per new technology can be possible in future. Solar power, electricity also can be use in future as source of



energy for this machine. So basically there will be good scope for this machine and the calculation and its results depending on the pressure to be required to Hold the object and the hose pipe length and diameter factor to be taken into consideration.

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