

# Automatic Cashew Nut Cutting Machine

B. Karthik<sup>1</sup> E. Manikanan<sup>2</sup>

<sup>1,2</sup>Department of Mechanical Engineering

<sup>1,2</sup>IFET College of Engineering Villupuram, India

**Abstract**— The Main Purpose of Cashew nut cutting machine is to reduce the manual work and help the small time farmers in rural areas to gain more profit out of cashew cultivation. The Crank mechanism is used feed to and decorticate the cashews automatically. This machine reduces the time, makes the operation easier and safer. It helps in eradicating the health hazards in manual cutting done mostly by woman in rural areas.

**Key words:** Cashew Nut Cutting Machine, Automatic Cashew Nut Cutting Machine

## I. OBJECTIVES

- Use in Small Scale Industry.
- Reduce the Manual Work.
- Increase the Production Rate.
- Reduce the weight of Automatic Cashew Nut Cutting Machine.
- Entrepreneur Development.
- Safer system.
- Eradicate health hazards.

## II. INTRODUCTION

### A. Overview

Cashew is one of the most sought after nuts among dry fruits obtained from an exotic tree species. The commercial cultivation of cashew is taken up mainly in eight states in India namely Andhra Pradesh, Goa, Kerala, Karnataka, Orissa, Maharashtra, Gujarat and Tamil Nadu. The current production in India accounts for 19.46 per cent of global production. Cashew nut is formed outside the fleshy fruit known as cashews. At the time of maturity, the cashew apple along with seed falls down on the ground. These are collected and processed to get cashew nut. The cashew apple being fleshy and sweet in taste is used to prepare a fermented fruit drink known as Feni. Kerala is the leading state in processing of cashew. More than two third of cashew processing units are in Kerala, whereas remaining are scattered in the other states. These units together have processing capacity of more than 8 lakh tons per annum. The seeds are separated from cashew apple and dried in the sun for 4-5 days. The dried raw cashew seeds are processed to get cashew nut for marketing.

In India, processing of cashew is manual and highly labor intensive process. The cashew industry is highly unorganized and scattered. Women constitute almost 90 per cent of labor force in cashew industry. Mechanization in cashew processing is picking up slowly. This model is prepared to provide guidance to start a new small scale cashew processing unit. The challenge of designing and actualizing the successful fabrication of a motorized cashew nut Cutting equipment should be accepted by engineers and investors as a result of the discovery of a dearth of mechanized system of cashew nut cutting in most cashew nut processing industries in many countries, especially in Nigeria. Therefore, this project is important because it will

proffer solution to the drudgery associated with manual cashew nut cutting. The main objective of this work is to design and develop a motorized automatic cashew nut cutting equipment and evaluate it for optimum performance.

One can start cashew processing unit at any location in the country. However, a location should be decided strategically keeping in view availability of ready market and cheap labour. The raw cashew can be transported to processing unit from raw material growing areas. Most of existing units import raw cashew from other countries like Vietnam, Africa etc. However, the units located in cashew growing areas have added advantage of readily available backward and forward linkages. India, at tamilnadu cashew nut location of paruti is a small scale industry.

### B. Problem Statement

The process of cashew nut cutting is done manually. A cutting machine operated by hand is used. The cashew nut shell is kept at the center of the work table of the machine. A lever operated by hand is process with great force to cut the cashew nut shell woman constitute more as labor to cut cashew shell. The heat radiated and the sap which flows from the shell when it is broken causes many health problems to women.

Higher or greater forces are to be applied to break the shell. So tackle these problems the semi-automatic cashew nut cutting machine is designed and fabricated.

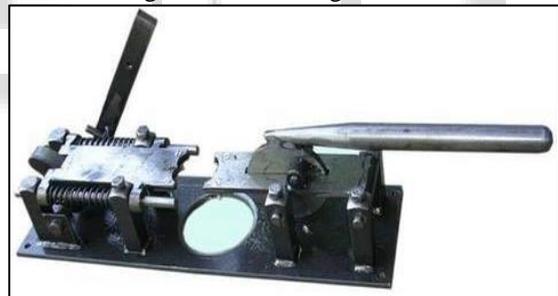


Fig. 1: Manual Hand Operated Cutting Machine

## III. PRINCIPLE

### A. Crank Mechanism

A crank is an arm attached at right angles to a rotating shaft by which reciprocating motion is imparted to or received from the shaft. It is used to convert circular motion into reciprocating motion, or vice versa. The arm may be a bent portion of the shaft, or a separate arm or disk attached to it. Attached to the end of the crank by a pivot is a rod, usually called a connecting rod. The end of the rod attached to the crank moves in a circular motion, while the other end is usually constrained to move in a linear sliding motion. The term often refers to a human-powered crank which is used to manually turn an axle, as in a bicycle crank set or a brace and bit drill. In this case a person's arm or leg serves as the connecting rod, applying reciprocating force to the crank. There is usually a bar perpendicular to the other end of the arm, often with a freely rotatable handle or pedal attached.

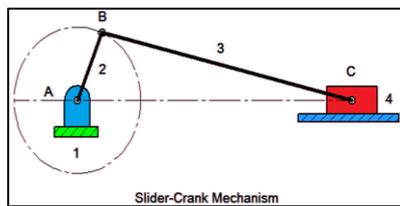


Fig. 2: Slider Crank Mechanism

#### IV. DESIGN

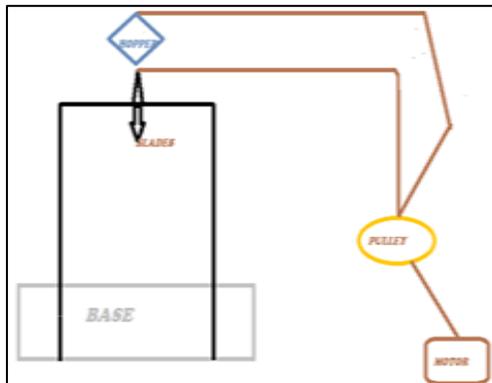


Fig. 3: Design

#### V. COMPONENTS REQUIRED

- Frame in mild steel
- Cutting Blade in stainless steel
- Motor in medium speed rpm
- Pulley and Belt in rubber
- Bearing
- Adjustment Screw Table
- HOPPER in drum

#### VI. WORKING PRINCIPLE

The cashew nut or decorticating machine works on the principle of slider crank mechanism is operated using an electric motor. When the power is given, the crank wheel is driven by the motor using the belt drive. The lever attached to the wheel also rotates which makes the slider to reciprocate vertically. The movement makes the blade moves in the upward and downward direction. During the upward stroke, the stopper to the hopper is opened and allows the cashew to drop from the hopper, to be decorticate. The upward stroke is slower. During the downward stroke, the blade is brought down with a force due to the faster stroke and the cashew gets decorticate. The nut gets separate from the shell. This process gets repeated to decorticate the rest of the cashew.

##### A. Advantages

- Less man power
- Low cost
- Maintenance is easy
- More profit
- Reduce the health hazards

#### VII. CONCLUSION

The cashew nut cutting machine works using the crank mechanism. The machine decorticates the cashews automatically. Feeding of cashews for decortication is also done automatically. The nuts and the waste are separated.

This machine can be used by all the small time farmers harvesting cashews. This machine reduces the time, makes decortication easier, and reduces the health hazards caused by sap and heat radiated from the breaking shells. This machine can further be developed for full automation of cashew nut processing.

#### VIII. COMPARISON

S. No		Automatic cashew nut cutting machine	Manual hand operated cutting machine
1	Production rate	15Kg/hr	9Kg/hr
2	Labour cost	-	Rs.90
3	Charges apply in current supply cost	Rs.10/day	-

Table 1: Cost Estimation

#### REFERENCES

- [1] Adetumbi, O. "Nigerian cashew industry: curbing the waste", paper presented at the pre-conference meeting of the National Cashew Association of Nigeria, Lagos.Oct 2001
- [2] Ajav, E.A., "The design and testing of a low-cost cashew-nut cracker for peasant farmers", Tropical Agriculture, Vol. 73, pp. 180-6. 1996
- [3] Azam-Ali, S.H. and Judge, E.C., Small Scale Cashew Nut Processing, Food and Agricultural Organization of the United Nations, Rome.2004
- [4] Calvacante, A.A.M., Rubensam, G., Erdtmann, B., Brendel, M. and Henriques, J.A.P., "Cashew (Anacardium occidentale) apple juice lowers mutagenicity of aflatoxin B1 in S. typhimurium TA102", Genetics and Molecular Biology, Vol. 28 No. 2, pp. 328-33.2005
- [5] Davis, K "Cashew", Technical Note, ECHO, North Fort Myers, FL. DermNet, N.Z., Cashew Nut, Authoritative facts about the skin from the New Zealand Dermatological Society Incorporated, New Zealand.2007
- [6] Faborode, M.O. and Dinrifo, R.R., "A mathematical model of coca pod deformation based on Hertz theory", International Agro physics, Vol. 8, pp. 403-9. 2005
- [7] ITDG, Cashew Nut Processing, ITDG Practical Answers to Poverty: Technical Brief, Intermediate Technology Development Group, Rugby.2002
- [8] Jain, R.K. and Kumar, S., "Development of a cashew nut sheller", Journal of Food Engineering, Vol. 32, pp. 339-45. 1997
- [9] Maduako, J.N. and Faborode, M.O., "Characterization of the breaking-behaviour of whole cocoa pods", Journal of Agricultural Engineering Research, Vol. 59, pp. 89-96.1996
- [10] Mandal, R.C, "Cashew (Anacardium Occidentale L.)", National Research Centre for Cashew, Puttur.2002
- [11] Mohsehin, N.N., Physical Properties of Plant and Animal Materials: Structure, Physical and Mechanical Properties, Garden and Breach Science, New York, NY, p. 95.2010

- [12] Naturland E.V., Cashew nuts, Organic Farming in the Tropics and Subtropics: Exemplary Description of 20 Crops, 1st ed., Naturland E.V., Grafelfing, 2002
- [13] Nazneen, K., "Corporate responsibility and women's employment: the cashew nut case" Perspectives on Corporate Responsibility for Environment and Development, 2, International Institute for Environment and Development, London, 2004.

