

# DESIGN AND FABRICATION OF BETEL NUT CUTTING MACHINE

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## ABSTRACT

*A semi-automatic betel nut seed cutting machine is mainly composed of a rack assembly, a conveying assembly, a seed cutting assembly and a seed pushing assembly. The conveying assembly comprises a conveyer belt and a motor for driving the conveyer belt to rotate. Betel nut seed clamping grooves are formed in the conveyer belt side by side in a rowing mode. The seed cutting assembly and the seed pushing assembly are correspondingly arranged on the two sides of the conveyer belt. The seed pushing assembly is composed of seed pushing rods and a seed pushing power assembly, wherein the seed pushing power assembly pushes the seed pushing rods to move in the direction of the betel nut seed Clamping grooves in a reciprocating mode, and the seed cutting assembly mainly comprises Seed cutters and two medial baffle plates. The two medial baffle plates are provided with synchronizers which can perform Opening and closing synchronously, and the seed cutters are arranged in the centers of the front ends of the two medial baffle plates. The structure is simple and compact, cost is low, installation is convenient, production efficiency is greatly improved, labor intensity of a worker is relieved, safety production accidents are reduced, and the safety class of food sanitation is improved.*

**Keywords-** *Semi-automatic betel nut seed cutting machine, Areca-cutting machine*

## 1. TITLE-1

### 1.1 introduction of Betel nut:

Betel nut is an important commercial crop in India. Betel nut is the seed of the Betel nut palm. It plays a prominent role in the social, cultural functions, religious and economic life of people in India. This Betel nut has uses in Ayurveda and veterinary medicines. There are two varieties of Betel nut, called White Supari and Red Supari. White variety supari is prepared by harvesting fully ripe Betel nut and by sun drying for 40 to 50 days. Red variety supari is prepared by harvesting the tender (green) Betel nut, boiling it and peeling off the husk. The nut derived by peeling the tender nut, are processed as per the variety required (i.e., whole nut, two pieces, 8pieces, etc) boiled in water and then Sun dried. Dried fruit is fruit from which the majority of original water content has been removed naturally or through the use of specialize dryers and dehydrators dried fruit has long tradition of use dating back to the fourth millennium BC in Mesopotamia, and is prized because of its sweet test, nutrition value and long shell life. There are different types of dry fruits available in India such as Almonds, Apricot, Cardamom, Cashew nut, Dates and so on .they are rich in carbohydrates and low in fat. They are source of fiber, vitamin and minerals. The fragility of vitamin C means that there is virtually none in dry fruit.

### 1.2 Introduction of Betel nut cutting machine:

The traditional method of cutting of betel nut is a manual process in which a single cutter is used to cut the nut into pieces. This method of manually cutting the betel nut is carried out from long time and is still carried out in most of the households and villages. The traditional method involves lot of time and man power. So our project “design and fabrication of betel nut and dry fruits cutting machine” will help the villagers to cut the nut efficiently in less time and in mass. Since the machine will be economical and efficient in cutting of betel nut so most of the people involved in this business can afford it. Also this method can be used to cut the dry fruit into small or required pieces. The machine will also reduce human labor, labor cost, and time keeping the quality of the nut more or less unchanged.

## 2. METHODOLOGY

### 2.1 Working principle:

This is purely a mechanical project. Taking into consideration that the betel nut has to be cut into smaller diamond shape pieces and serve the purpose of mass production. The cutting blades are arranged in a particular fashion so that the betel nut or the dry fruits should cut in small pieces suitable for particular use. The force used in cutting of betel nut or dry fruits is shear force. The betel nut or dry fruit is fed into the hopper. From the hopper it enters into the cutting chamber where the betel nut is cut into the small sizes under the action of shearing force between stationary and rotatory blades. The mesh is provided so that after cutting into required size it should pass through it or it will be taken by blades for cutting.



**Fig -1:** Betel nut cutting machine

### 2.2 Material used

- **Mild steel:** Mild steel is used to make the supporting base and casing. The base and casing should be made up of hard material. In metallurgy Mild steel is defined as steel alloy with approximately 0.05% to 0.25% carbon content with up to % manganese content. Mild steel also knows as plain carbon steel, is the most common form of steel because its price is relatively low while it provides material properties that are acceptable for many application, more so than iron. Mild steel contents approximately 0.05 to 0.25% carbon making it malleable and ductile. Mild steel has irrelatively low tensile strength, but it is cheap and malleable surface hardness can be increased through carburizing. The density of mild steel is approximately 7850 kg/m<sup>3</sup> and Young's Modulus is 210GPA.
- **High speed steel:** HSS is subset of tool steel, commonly in tool bits and cutting tools. It consist of 2% carbon, 2.5% manganese and 7% tungsten. The major advantage of this steel is that it hardened when

air cooled from the temperature at which most steels has to be quenched for hardening. The HSS material is used here for blades.

### 2.3: Operations used for fabrication

- **Cutting:** The raw material cut into the required dimensions using a grinding wheel cutter. Metal cutting is done by a relative motion between the work and piece and the hard edge cutting tool, which is multi point cutting tool.
- **Welding:** The assembly of base table is done by the process of welding. In this case the process is done by “Arc Welding”. Arc welding is type of welding that uses a welding power supply to create an electric arc between an electrode and the base material to melt the metal at the welding point. They can use either direct or alternating current, and consumable or non consumable electrode.
- **Drilling:** Drilling is easily the most common machining process. Drilling involves the creation of holes that are right circular cylinders. This is accomplished most typically by using the twist drill. The chips must exit through the flutes to the outside of the tool. The cutting front is embedded within the work piece, making cooling difficult. The cutting area can be flooded, coolant spray mist can be applied, or coolant can be delivered through the drill bit shaft.
- **Grinding:** Grinding is the finishing process used to improve surface finish, abrade hard materials, and tighten the tolerance on the flat and cylindrical surface by removing the small amount of material. Information in this section is organized according to the sub categories link in the menu bar to the left. In grinding the abrasive material rubs against the metal part and removes the tiny pieces of material. The abrasive material is typically on the surface of the wheel or belt and abrades in a way similar to sanding. On a microscopic scale, the chip formation in grinding is same as that found in other machining processes.
- **Testing:** Testing is important phase of the project. It tells us whether the project is working fine or up to the mark. The output that is obtained from betel nut and dry fruits cutting machine was 2-2.5kg/hr of betel nut or dry fruits which is quite economical.

### 3. Testing Result

Following were the results noted down.

**Table-1:** Calculation table for betel nuts

Time in min	betel nuts fed in gms	Betel nut obtained after cutting in gms
5	250	195
10	500	410
15	750	630
20	1000	820



**Fig-1** cutting output betel nut

#### 4. CONCLUSIONS

We have taken up this project as real challenge, as were not experience in the design and fabrication field. We started our project facing new hurdles initially. After the completion of the project work we tried it's our college machine shop and we were pleased to note that it does meet the requirement for what it is meant. we conclude that the amount of betel nut cut by this machine is more compared to traditional method. The dry fruit which are cut into smaller pieces can be used varies food items. In traditional method single betel nut were cut and manual force was used. But in our project betel nut can be cut into required sizes and it is suitable for mass production.

#### 5. ACKNOWLEDGEMENT

“Defeat is not when you fall down; it is when you refuse to get up. “We faced many difficulties during our project tonsure, right from the requirement gathering to implementation. There were times when the goal looked beyond reach but all difficulties were accepted as challenge. Greater the challenges were the effort to overcome it.

It has been rightly said that we are built on shoulders of others. For every things we have achieved the credit goes to all those who really helped us in completing this project successfully. We would like to thank our internal faculty guide **Prof. Jitendra Prajapati** for providing a vision about the system. We have been greatly benefited from their regular critical reviews and inspiration throughout our work.

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Thanking You,  
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