

# **DESIGN AND FABRICATION OF MANGO CUTTING MACHINE**

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## **Keywords:**

Mangos are used for making mango juice, mango pickle and etc., for making mango pickle, have to cut the mangos into cubic pieces. And the mangos are cut by manual cutting system, by hand and knife. Manual cutting system is not safe because it lead to injuries like cutting workers hand and fingers and also difficult to cut the mango because of presence of its hard seed.

In the present work it is planned to design and fabricate the mango cutting machine which overcome the drawbacks of the previously existing machines. To cut the mangos into cubic pieces, the blades are fixed to the inner wall of the cover and to the rotating shafts. The rotating shafts are mounted with the three covers one upon the other in which the 2<sup>nd</sup> shaft is perpendicular to the 1<sup>st</sup> and 3<sup>rd</sup> shaft by using bearings. The power from the motor to the 1<sup>st</sup> shaft is transmitted by using pulleys and belt drive. To obtain the required speed of the shaft different diameter of pulleys are mounted in the motor and in the shaft. The power from the 1<sup>st</sup> shaft to the 2<sup>nd</sup> and 3<sup>rd</sup> shaft is transmitted by using pulleys and belt drive.

## **Introduction:**

The mango is a juicy stone fruit (drupe) belonging to the genus *Mangifera*, consisting of numerous tropical fruiting trees, cultivated mostly for edible fruit. The majority of these species are found in nature as wild mangoes.

It is the national fruit of India, Pakistan, and the Philippines, and the national tree of Bangladesh. Which does not separate easily from the pulp? Ripe, unpeeled mangoes give off a distinctive resinous, sweet smell. Inside the pit 1–2 mm (0.039–0.079 in) thick is a thin lining covering a single seed, 4–7 cm (1.6–2.8 in) long. The seed contains the plant embryo. Mangoes have recalcitrant seeds; they do not survive freezing and drying.

## **Objectives:**

- To design and fabricate mango cutting machine is to cut the mangos into cubic pieces, which should be used for making mango pickles.
- To converting manual cutting system into automated cutting system.
- To increase the productivity.
- To overcome the time consumption. Because in other existing mango cutting machines, they are carrying the mango pieces form one machine to another machine to do different operations like first cutting the mangos into two pieces and then cutting those pieces into cubic pieces.

- To reduce the labors uncertainty.

## Methodology:

In this mango cutting machine, the raw mangos are poured in the hopper. Where the hopper is a funnel shaped section at the top of the setup to collect raw mangos, the hopper is used in this machine for moving the mangos into the 1<sup>st</sup> cover.

The main switch is turned on and the power is supplied to the 3 phase motor. This transmits power to the 1<sup>st</sup> cover shaft. And by the help of 1<sup>st</sup> cover shaft the power is transmitted to the 2<sup>nd</sup> and 3<sup>rd</sup> cover shafts to cut the mangos into pieces in different stages.

In the 1<sup>st</sup> cover the mangos comes from hopper and mangos falls on the movable blades. Mangos moves with the blades mounted in the shaft, which rotates towards the fixed blades. The mango stuck between moving blade and fixed blade. And because of shear force between the blades and mango, the mango will cut into round pieces. And simultaneously those round mango pieces moves to the 2<sup>nd</sup> cover.

In the 2<sup>nd</sup> cover, the round cut mango pieces comes from the 1<sup>st</sup> cover and falls on the 2<sup>nd</sup> cover moving blades. And those round cut mango pieces moves with blades in the rotating shaft towards the fixed blades. The rotating shaft of 2<sup>nd</sup> cover which is mounted perpendicular to the 1<sup>st</sup> cover shaft. And those round cut mango pieces stuck between the moving blades and fixed blades. Because of shear force between the blades and the round cut mango pieces, the round cut mango pieces cuts into slice. And then simultaneously those mangos slice moves to the 3<sup>rd</sup> cover. The slice cuts as shown in the below figure.

And in the 3<sup>rd</sup> cover, the mango slices comes from the 2<sup>nd</sup> cover and falls on the moving blades. And those mangos slice moves with the blades in the rotating shaft towards the fixed blades. The shaft of 3<sup>rd</sup> cover is mounted perpendicular to the 2<sup>nd</sup> cover shaft and parallel to the 1<sup>st</sup> cover shaft. And those mango slices stuck between the moving blades and fixed blades. Because of shear force between the mango slices and blades, the mango slices cuts into cubic pieces.

## Hardware requirements:

single phase ac motor, blades, shaft, plummer blocks, pulleys, belts, angles, nuts and bolts.

## BLOCK DIAGRAM:

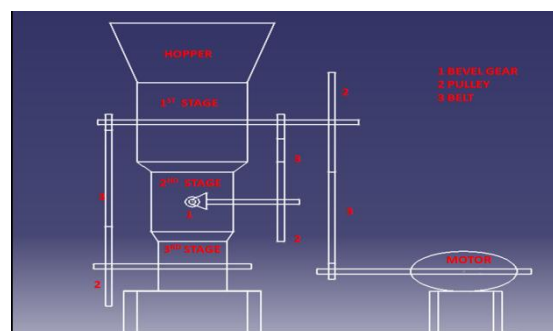


Fig. Block Diagram of Mango Cutting Machine

**Results & conclusion:**

1. After processing of all three stages of mango cutting operations, the final outcome from the last stage process by this machine is small mango pieces.
2. This machine cuts 360kg of mangoes per hour.

**Conclusion:**

1. In the present work the mango cutting mechanism is designed and developed.
2. The mango cutting operation is carried out in three different stages.
3. In the first stage, the raw mangoes are cut into round slices.
4. In the second stage, the round slices from first stage are cut into long rectangular slices.
5. Then in the third stage, the long rectangular slices from second stage are cut into cubic shapes.
6. By reducing distance between blades and making correct alignment of blades, the cubic shape mango pieces can be produced.

**Scope for Future work:**

- This mango cutting machine can install in small scale mango pickle industry for mass production of mango pickles.
- In rural houses where pickles are produced in home.
- And also can install in hotels for doing pickles.
- And also can be cut vegetables and fruits other than mangoes.