

DESIGN AND ANALYSIS OF AMLA PUNCHING MACHINE

¹Kishor V. Ghuge, ²Renuka T. Kolhe, ³Shreya P.Borkar, ⁴Kalpesh C.Chaudhari, ⁵Swapnil S. Dange

^{1,2,3,4}B.Tech. Scholars, ⁵Assistant Professor
Department of Mechanical Engineering
Sir Visvesvaraya Institute of Tehnology,Sinner,Nasik

ABSTRACT: In India, an economical manufacturing remedy is vital for product being affordable to rural areas as well as small scale industries. In India, amlas are produce on very large scale for various purposes. The purpose of study conducted is to investigate and overcome the problems by manual method of punching amla while manufacturing murabba & providing the solution for the above manufacturing problem with providing machine which is both economical and also yields best results. This method is also not suitable to worker as it causes harm to wrist and hand of the worker. The present work is implementation of tool in utilization of amla punching machine in appropriate manner. The above present work is also to utilize small scale to medium scale food processing industries.

1. INTRODUCTION

India is a country of agriculturist peoples. Instead of industrialization income the income from the agricultural field is also important for India. The productivity of food, fruit, crop & other agricultural related product is sufficient in our country but the wastage of the same is also more due to unavailability of modern sophisticated manufacturing and storage. Amlas has been use for making pickle, murabba, chyavanprash. The method is use for this is traditional in which punching, remorse; seed removing, shredding processes are manual. These methods are unhygienic in nature, very time consuming and it also causes the minor accidents. Nutrients are loss at higher rate due to unhygienic method. This paper indicates capability of machine to pierce the amlas to overcome the problems like time consumption, unhygienic in nature & loss of nutrients. This makes the life better of the people doing this business in rural areas.

2. REQUIREMENT

- I. We decided to prepare amla punching machine because people under the rural areas manufacture various products at home.
- II. In this machine we use needle to punch amla. A single amla is punched more than 10 times, due to this amla can be punched properly.
- III. After punching, amla are discharged from machine are collected in the receiving tray.
- IV. When this same process done by the people in rural areas, it is difficult to punch by hand and also difficult to punch

2.1 OBJECTIVES

- I. Amla punching machine have low cost and will give high productivity

- II. This machine is less harmful and less power consuming machine
- III. It requires less supervision and less man power
- IV. No skilled labour require for operating the machine.
- V. Due to low cost it will be feasible to people of rural areas to easily buy it.

3. SELECTION OF PARTS FOR MACHINE

I. FOUNDATION:

Foundation the machine is regular frame of 600*380*180mm as shown in figure. The material is a mild steel 19mm wide & 3mm thick L-angle. The angle are cut in a given size and fabricated by conventional welding method. The whole m/c equipments & parts are fitted inside & over the foundation frame.

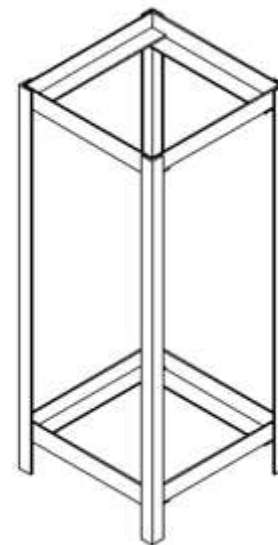


Fig 1. Foundation

II. HORIZONTAL SUPPORTS:

The 04 nos. 180*300*5 flats are joint to frame on 180mm side to support the guide ways of telescopic channels. The sliding channels are fitted to horizontal supports 20mm*10mm solid bars.

III. HOPPER:

This is fitted at the top of the machine frame so that its lower open end is adjusted over the amla guide pipe. The flow of amla inside the pipe due to gravitational force.



Fig2. Hopper

IV. NEEDLE PLATES AND NEEDLES:

The needle plates 125*25*3mm are fitted to the rod middle which is welded to the both ends of the telescopic sliding channels at the upper and lower side. These are two numbers one is as the left side and other is at the right side of the 180mm side of the foundation frame. The needles are mounted over the plates. The needle plates moves to & fro inside the frame as it is made to slide over the telescopic channels.

THE FUNCTION OF NEEDLE PLATE AND NEEDLE:

As a needle plate move to & fro , naturally it pierce the amlas when amlas are inside the pipe.

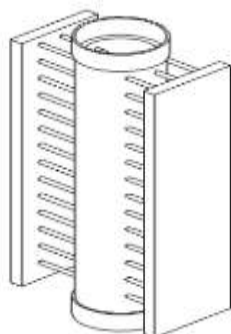


Fig3. Needle Plate and Needles

V. OPENING AND CLOSING VALVES:

The one valve adjusted just under the hopper lower side one end i.e just 5-10mm over the upper side open end of the amla guide pipe. The another valve is fitted just under the lower open end of the amla guide pipe.

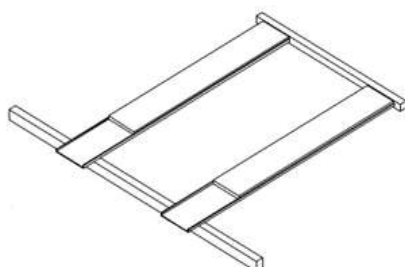


Fig4. Opening and Closing Valve

VI. POSSIBLE MECHANISM:

For the better movement of the needles plates the rotary engine mechanism is use as shown in fig. The middle centre of the plate having a hole at its centre is joined to the motor shaft. When motor start to revolves, the round plate say cranks are also revolves.

The arm is joined with the help of bearing pin method having smooth rotation. The pitch circle dia. is taken over the crank. The P.C.D taken is 50mm hence the total distance travel by the point 'A' is 500mm we said it is the maximum stroke. The plates are also joined to the location point 'A' hence the plates are also moves by 50mm backward & forward.

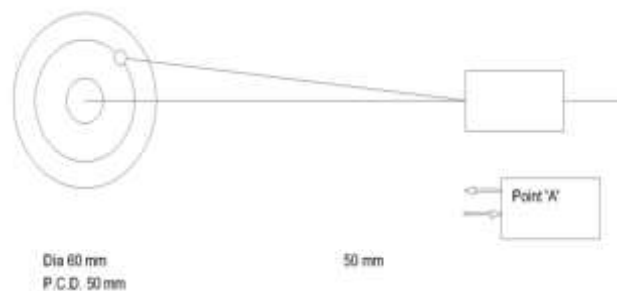


Fig5. Possible mechanism

4. WORKING

1. Initially we select suitable no of amla and place that amlas in the hopper for punching.
2. Through hopper suitable no of amlas are allowed to fall in a long cylinder pipe when needle are placed
3. Both the valves are in the closed conditions, when we start the machine then first valve is open and suitable no of amlas are dropped in the guide pipe, After this first valve is closed,
4. We give common 12v supply to the motor which is connected to the rotary engine mechanism, because of this punching action is done by the needle.
5. As rotary engine mechanism is used, Needle plates which are attached to the unit moves forward to punch and after punching moves backward.
6. When all amlas are punched properly motor supply is switched off and first valve is gets closed.
7. Now the second valve is switched on and all punched amlas are drawn out from this machine in the receiving tray.
8. This cycle repeat for punching more amla.

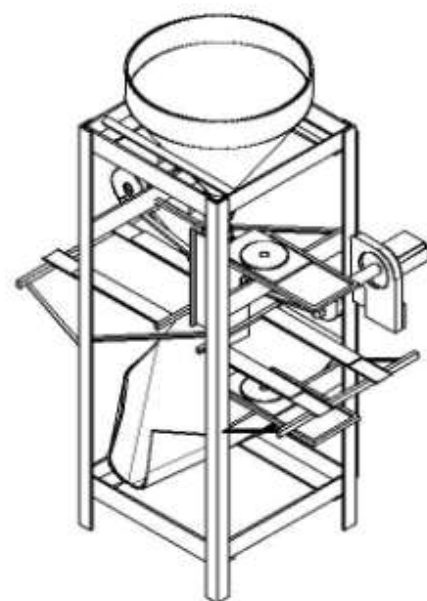


Fig6. Line diagram of machine

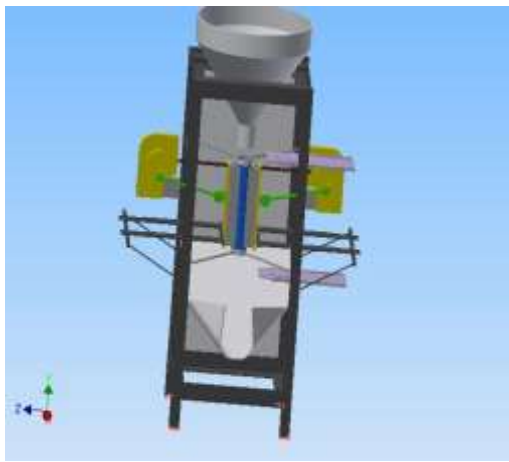


Fig7. Model of machine

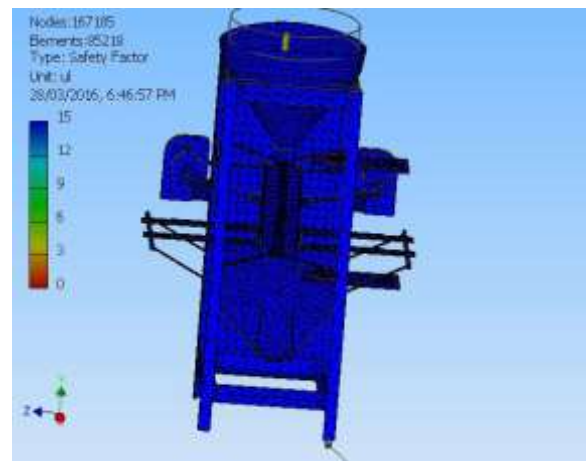


Fig10. Safety factor

5. DESIGN BY USING ANSYS

ANSYS mechanical software is the comprehensive finite element analysis (FEA) tool for structure analysis. It provides a complete set of element behavior, material models and equation solver for wide range of mechanical design problems. By using ANSYS software we design amla punching machine. The machine analyzed by ANSYS to find out weak parts and areas of failure during actual working. If there will be any change in the machine than that can be made and modified easily as per the requirement of the procedure.

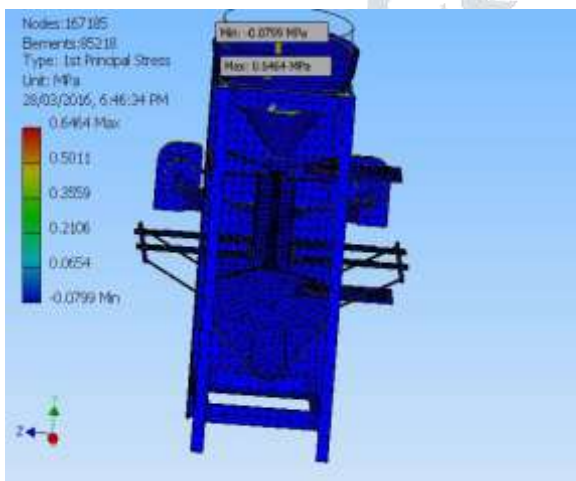


Fig8. Principal stress

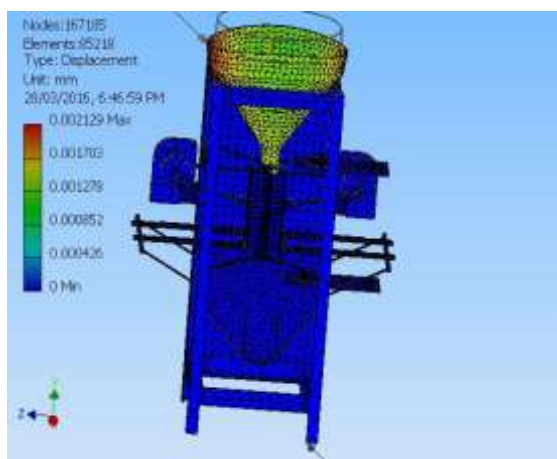


Fig 9. Displacement

6. ADVANTAGES

1. It is small in size.
2. It increases the production rate.
3. It minimizes the problem of manual accident.
4. It can punch all size of amla.
5. No skilled labor is required.
6. It requires less power consumption.
7. The machine is more efficient.

7. DISADVANTAGES

1. The machine has possibility of corrosion.
2. Replacement of needles is required after some interval of fixed time.

8. CONCLUSION

Amla punching machine is efficient to punch the amlas which is used for prepare the murraba and pickle. This is the modern technology mentioned in the study for preparation of amla products are hygienic, less time consumption and provide maximum retention of nutrients. On the basis of design and analysis by ANSYS software we conclude that the stresses occurred on the machine is under control. Hence this machine is safe with in respect of operators and environment.

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