

# PNEUMATIC BAMBOO SPLITTING MACHINE

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**Abstract:** The main aim of this research is to design and manufacture pneumatic bamboo splitter machine that can split bamboo by using pneumatic pressure.

**IndexTerms** – bamboo cutting machine, pneumatic cylinder, valves.

## I. INTRODUCTION

Bamboo splits and slivers are longitudinal sections of a bamboo pole (culm). Splits are the full thickness of the culm wall and have the green outer layer still attached. Slivers are thin, narrow sections of bamboo wood. They are the primary materials used for weaving a wide range of products. On a small scale they may be used for handicraft items and objects of daily use. On a large scale, one of the most useful products they can be woven into is the mats that are used to produce bamboo mat board. Splits and slivers may be produced by hand splitting or mechanical splitting. Hand splitting is suitable for small-scale production and there is a wide range of tools available, both traditional and modern. Automated splitting machines are more suitable for large-scale production of slivers. Fresh bamboo culms are passed through a series of machines that produce splits of successively smaller sizes until the desired size is reached. The environmental benefits are considerable. The only raw material required for the splitting unit is good quality bamboo. Bamboos are fast growing giant grasses that can be harvested annually. They are a versatile and renewable resource. Cultivation of bamboo is also beneficial for soil conservation and afforestation activities and plantations are encouraged as part of social forestry programs. Therefore bamboo and its products are considered as eco-friendly. The splitting unit consumes only a small quantity of water for the boiler and electrical energy requirements are not high. Hand splitting is suitable for small-scale production of splits but we are making a pneumatic bamboo splitting machine for large scale production.

## PROBLEM SPECIFICATION

Traditionally the bamboo is processed in different steps and for each step a different machine is required which is time consuming and costlier. So there is need of manufacturing a machine which can perform number of operations. Agriculture people or any other people can't by costlier machine; we will also focusing on less man power & less cost. Other machine work as using power & we are using the pneumatic so there is no need of power to work on a machine.

## DESIGN METHODOLOGY

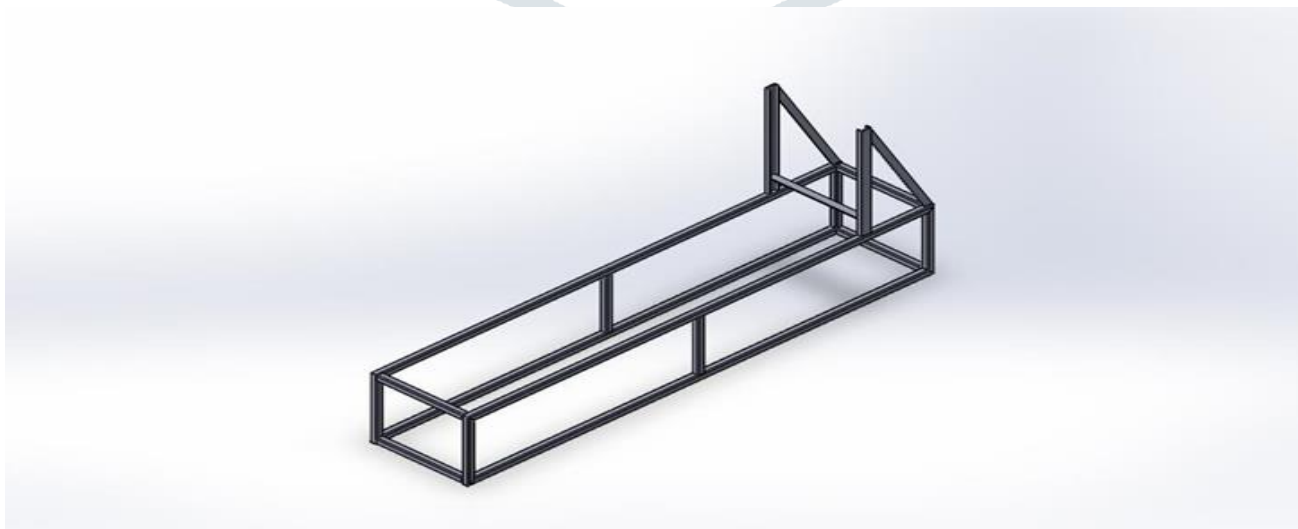
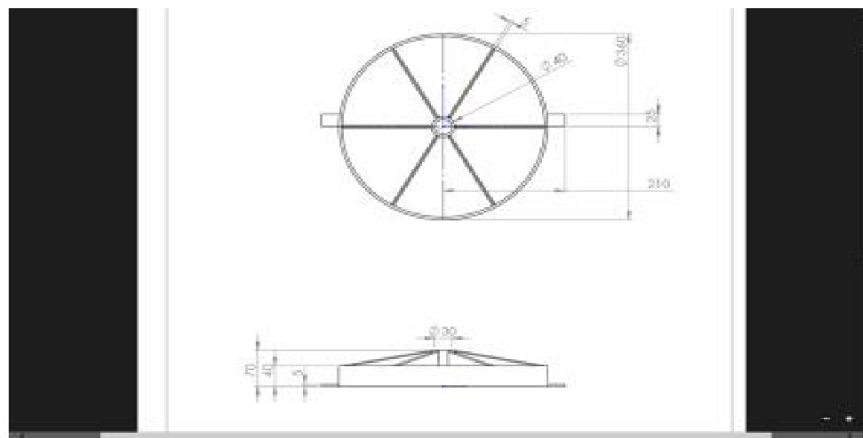


FIG 1 DESIGN OF FRAME

## Cutting tool design:



## 3D Model :

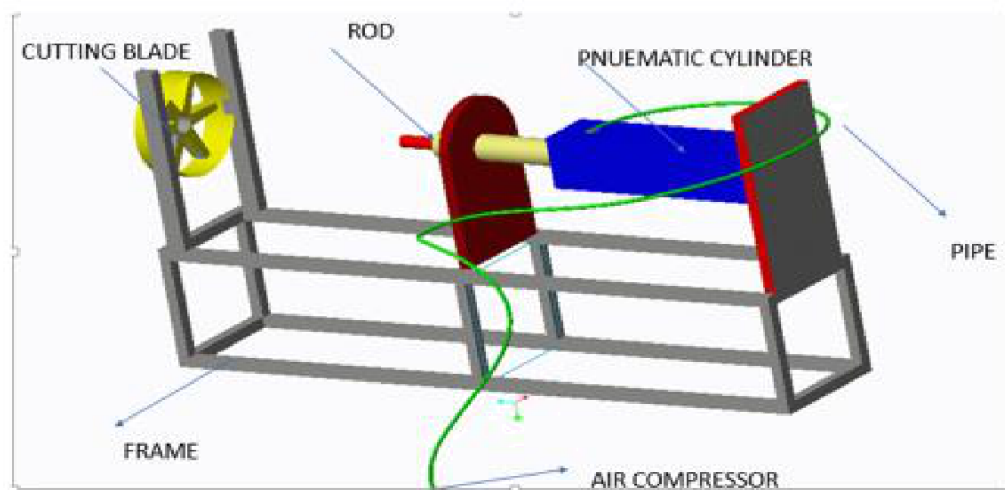


FIG 2 DESIGN OF CUTTING TOOL AND FRAME

### DESIGN ANALYSIS

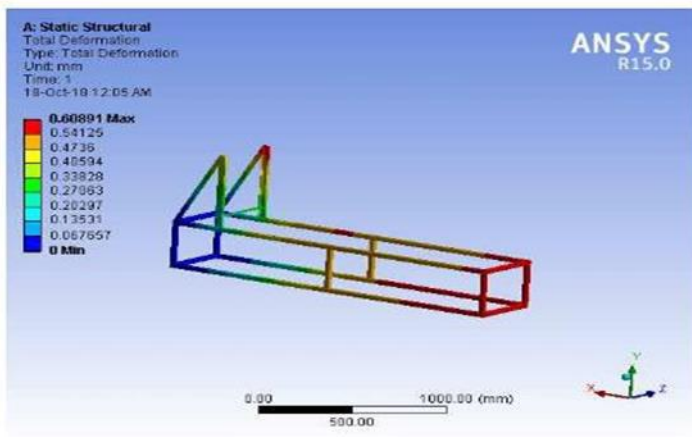
During cutting operation large force acts on the blades, hence utmost care should be taken since majority of the breakdown occurs due to the failure of blades. Therefore, analysis of Frame is carried out in ANSYS 15 as shown in Figure. The maximum deformation on the Frame is only 0.6089mm. So, the design of the frame is safe. Here maximum factor of safety is 15 and minimum factor of safety is 4. So we can say that this design of frame is safe.

Deformation :

- Max deformation : 0.60891 mm
- Min deformation : 0 mm

### Total Deformation

Subject:  
Author:  
Prepared For:  
Date: Wednesday, 17 October, 2018  
Comments:

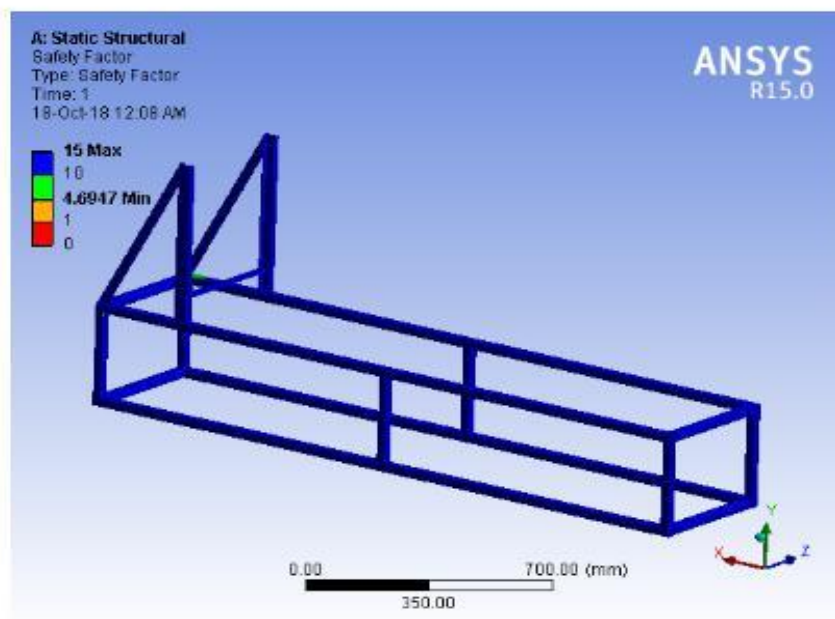


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## Safety Factor

Subject:  
 Author:  
 Prepared For:  
 Date: Wednesday, 17 October, 2018  
 Comments:



file:///C:/Program%20Files/ANSYS%20Inc/v150/aisol/DesignSpace/DSPages/html/PrintP... 18-Oct-18

### CALCULATION:

We know that,

$$\text{Pressure} = \text{Force} / \text{Area}$$

Here, pressure is fixed = 6 Bar

Area of supporting disc = 150mm

So that,

$$\text{Force} = \text{Pressure} * \text{Area}$$

$$= 6 * 150$$

$$= 900 \text{ N}$$

COMPONENTS OF MACHINE:



FRAME OF MACHINE



BLADE CUTTER

It is used for a splitting the bamboo with required dimension. Blade cutter material is EN8.



PNEUMATIC CYLINDER

Pneumatic cylinder is mechanical devices that use compressed air acting on a piston inside a cylinder to move a load along linear path.



FLOW CONTROL VALVE

A flow control valve regulate the flow or pressure of Air



3/2 SOLENOID VALVE



FINAL MODEL

Aim of this project is to make a unique machine which can perform splitting processes. This can be done by pneumatic cylinder arrangement which reciprocates the bamboo holder, so that when air compress expand in the pneumatic cylinder it allow bamboo holder to reciprocates on the Horizontal blade which strips the bamboo into small pieces around 150 cm long and 5cm to 25 cm wide.

## CONCLUSION

This machine can reduce the man power. It is cheap relative to other machine. Power consumption is less. It can reduce the laborious work. Easy to control and operation is also quiet easy. It gives efficiently work output.

## FUTURE SCOPE

It is possible that this model can replace today's machinery for particular purpose. Indeed, it can do this in many areas specifically agriculture, farmer factory, small company, industries etc. Also, in further research on this machine can improve its efficiency and can get better work from our project.

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