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Design and Fabrication of Bamboo Slicing Machine

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Abstract - *This research Journal proposed the design and fabrication of Bamboo slicing machine. This machine can do the various bamboo slicing operations like Bamboo cross cutting and Bamboo splitting and slicing. So the basic aim of this project is to make a unique machine which can perform all the processes. The Bamboo is a very useful plant for humans as well as animals. By using this plant one can make house furniture, Tea shop, Motels, Toys, Musical instruments and some decoration items. This machine can split bamboo along the length which gives a number of slices. The main parts of this machine are hardened and ground chisels, Table, Motor and Base.*

Key Words: Bamboo Slicing, Decoration Works, Slicer Blades, Splitting bamboo

1. INTRODUCTION

We specialize in manufacturing bamboo processing machines that are designed and developed to process bamboo and make it ideal for use in furniture, handicraft and other products. Our modern technology machines are known for precision, energy efficiency, user friendliness and ease in handling. These machines are widely used in processing of bamboos and the variety offered includes Bamboo Cross Cutting Machine, Splitting Machines, Slicing Machines, Round Stick Making Machine, Stick Sizing Machines, Stick Polishing Machines, Slicing Machines and more. All our machines are widely uses for Basketry, Furniture making, Handicrafts and many other purposes etc. Bamboo is very useful plant for human being as well as for animal. This machine can split bamboo along the length which gives no. of slices. This machine is used for splitting of bamboo into number of equal parts it depends upon the module of die it might of four or six equal parts and so on.

2. DESCRIPTION OF COMPONENTS

i) Base: Base is the basement of the project it carry the whole weight of the machine. It reduces the vibration of the table. It is the main part to carry the whole body like table, motor. Lead screw. It is made up of L-shape steel.

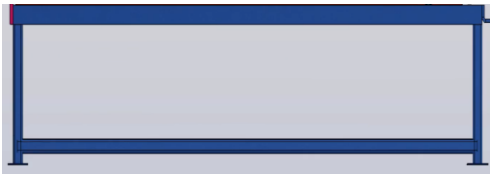

Fig -1: Base

ii) Table: The table is the functioning area the working purpose is run this area .It carry the bearing, Slicer, Roller, Lead screw, Bamboo pushing drive. It is made up of L-Shape steel.

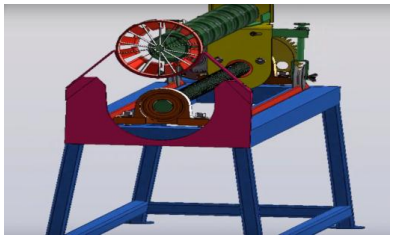

Fig -2: Table

iii) Motor: AC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields.

Fig -3: Motor

iv) Pulley Drive: A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave. A pulley may have a groove or grooves between flanges around its circumference to locate the cable or belt. The drive element of a pulley system can be a rope, cable, belt, or chain.

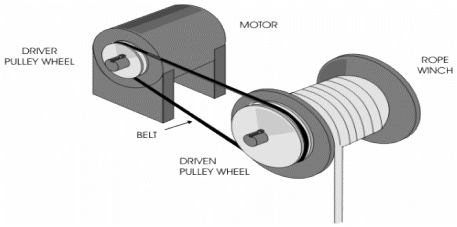

Fig -4: Pulley Drive

v) Lead Screw: A lead screw also known as a power screw or translation screw is a screw used as a linkage in a machine, to translate turning motion into linear motion. Because of the large area of sliding contact between their male and female members, screw threads have larger frictional energy losses compared to other linkages.

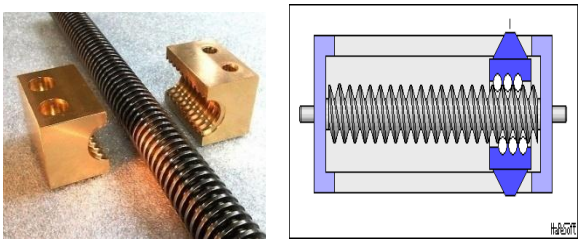

Fig -5: Lead Screw

vi) Bearing: A Plummer block usually refers to housing with an included anti-friction bearing. A Plummer block refers to any mounted bearing wherein the mounted shaft is in a parallel plane to the mounting surface, and perpendicular to the center line of the mounting holes, as contrasted with various types of flange blocks or flange units. A Plummer block may contain a bearing with one of several types of rolling elements, including ball, cylindrical roller, spherical roller, tapered roller, or metallic or synthetic bushing.

Fig -6: Bearing Block

vii) Supporting Roller: Roller support allows thermal expansion and contraction of the span and prevents damage on other structural members such as a pinned support. The typical application of Roller supports is in large bridges. Roller support cannot prevent translational movements in horizontal or lateral directions and any rotational movement but prevents vertical translations Its reaction force is a single linear force perpendicular to, and away from, the surface (upward or downward). This support type is assumed to be capable of resisting normal displacement.

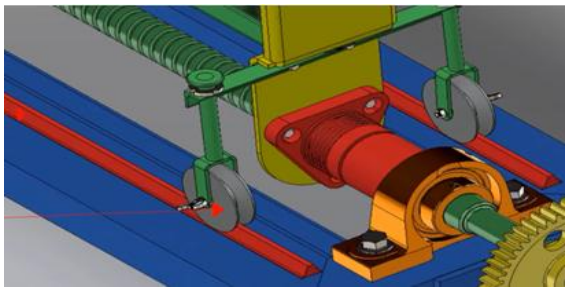

Fig -7: Supporting Roller

viii) Chisels (Slicer): A chisel is a tool with a characteristically shaped cutting edge (such that wood chisels have lent part of their name to a particular grind) of blade on its end, for carving or cutting a hard material such as wood, stone, or metal by hand, struck with a mallet, or mechanical power. The handle and blade of some types of chisel are made of metal or of wood with a sharp edge in it. Chiseling use involves forcing the blade into some material to cut it. The driving force may be applied by pushing by hand, or by using a mallet or hammer. In industrial use, a hydraulic ram or falling weight ('trip hammer') may be used to drive a chisel into the material.

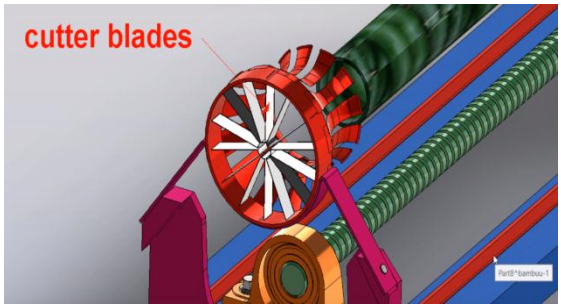

Fig -8: Slicer

ix) Bamboo Pushing Drive: The important part here is Bamboo Pushing Mechanism .it involve backlash free lead screw nut, pushing plate, supporting roller. Lead screw nut is engaged with lead screw shaft. Plate is attached with flange which is on lead screw nut using nut and bolts. For further extra support on both sides pulleys with guiding horizontal railing which parallel to lead screw are attached.

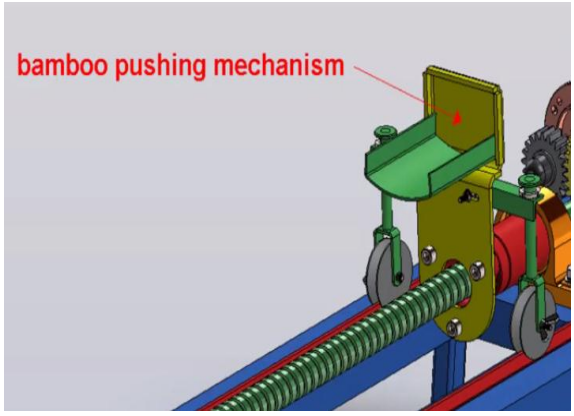

Fig -9: Pushing Drive

2.1 Specifications

1. Motor

- Type of power – AC
- Speed – 1440 rpm
- Voltage – 230 volt
- Ampere – 2.5 amps

2. Lead Screw

- Length – 110 cm
- Diameter – 3.5 cm
- Thread – 58 no's

3. Pulley

- Driving pulley
- Inner diameter – 7 cm
- Outer diameter – 9 cm
- Driven pulley
- Inner diameter – 10 cm
- Outer diameter – 12 cm

3. DRAWING

i) Front View

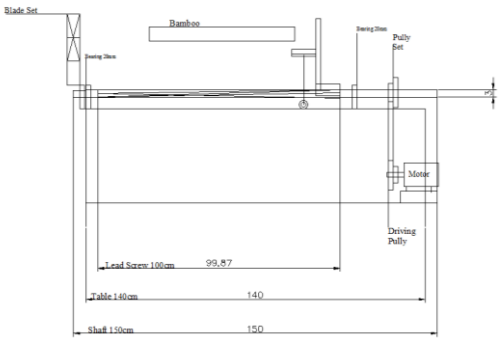

Fig -10: Front View

ii) Top View

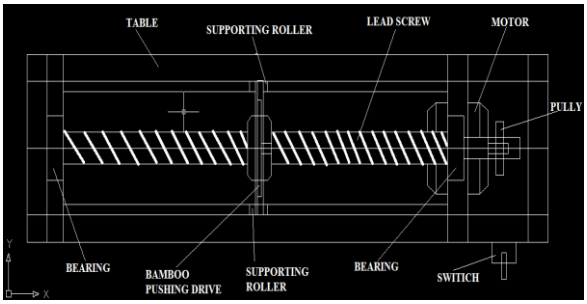

Fig -11: Top View

4. WORKING PRINCIPLE

Working is easy. As motor started it will rotate pulley and lead screw. As soon as lead screw rotate, nut starts moving forward direction along the lead screw i.e. horizontal direction .Bamboo should place in between cutting blade and push plate by worker or operator. As nut moves forward it push bamboo towards the cutter and bamboo get spitted in several slices. To reverse the machine at home position we can reverse the motor direction by using some type of circuit and switching arrangement.

4.1 ADVANTAGES

- Cutting rate is high
- Maintenance is less
- No other finishing process required
- Different Design Can Make

4.2 APPLICATIONS

- It can be used for wood decorative works.
- It is used in light weight wood cutting industries

5. COST ESTIMATION

Table -1: Cost Estimation

S.No	Description	Cost ₹
1	Table	₹ 600
2	Base	₹ 1200
3	Motor	₹ 2000
4	Pulley Drive	₹ 700
5	Lead Screw	₹ 2000
6	Bearing	₹ 400
7	Supporting Roller	₹ 330
8	Chisel (Slicer)	₹1500
Total		**₹ 7730**

Direct Material Cost = ₹7730

Direct Labour Cost = ₹1500

Other Expenses = ₹1000

Direct Cost

Direct Cost = Direct Material Cost + Direct Labour Cost = 7730 + 1500 = ₹8730

Total Cost

Total Cost = Direct Cost + Other Expenses = 8730 + 1000= ₹9730

Total Cost of the Project = ₹9730

6. BILL OF MATERIALS

Table -2: Bill of Materials

S.No	Description	Material	Quantity
1	Table	Steel	Required
2	Base	Steel	Required
3	Motor	½ HP	1
4	Pulley Drive	Steel	1
5	Lead Screw	Mild Steel	1
6	Bearing	Steel	2
7	Supporting Roller	Steel	2
8	Chisel (Slicer)	Steel	1

7. CONCLUSION

It is concluded that Design and Fabrication of Bamboo Slicing Machine is a good choice to slice's the bamboo in to different slices. This is used for wood decorative works, It is used in light weight wood cutting industries, Different design can make It is the useful project. It is used in many verities decorative things. The project is fabricated successfully.

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BIOGRAPHIES

Mr.U.Aravind currently working as a Lecturer in Mechanical Engineering at Lakshmi Ammal Polytechnic College, Kovilpatti, Tamilnadu, India. He has 3 years experience in teaching. He published two international journals and presented paper in three international conferences and three national conference. His area of interests is Manufacturing Technology.