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DESIGN AND FABRICATION OF NON DUST PAPER WOOD CUTTER

Mr. G.Manikandan, Mr .M.Manivel,Mr. D.karthick raja,Mr. P.Gunasekaran
UG, Department of Mechanical Engineering, V S A Group of insitution's, Salem, India

Abstract-- **Our project work is design and fabrication of non dust paper wood cutter can be used for cutting the wood by using the chart paper. Generally the paper has less stiffness, which attaches with high speed motor,the stiffness will be increased, and the respective action will be useful for cut woodpieces, lore amount of heat producing on the edge of the paper when cutting thewood pieces. We have seen hacksaw, chisels, metal cutter, for cutting the wood on that we have different cutter used for cutting, for cutting of maximum thickness 35mm. we use chart paper as a cutter of various thickness for cutting the wood. And we have an analysis for cutting the wood different thickness by increasing the thickness.**

Index Terms— **Analysis wood cutter with paper thickness, cutting the wood different thickness.**

I. INTRODUCTION

A tallow candle bullet can be fired through a board. A straw driven by a cyclone will penetrate a tree. A stream of water, under high pressure, will tear the skin off a man's hand. A copper disk rotating slowly can be cut by a steel cutting tool; but if rotated at high speed it will turn about and cut the tool. These facts suggested the following experiment on the cutting ability of paper. Everyone knows that the hand can be badly cut with paper; but the experiment was undertaken to discover whether hard substances, such as wood, could be cut with paper. A page of the Scientific American was trimmed to the form of a disk, 10 or 11 inches in diameter, and a wooden spool was glued to the paper at its center. An electric fan was dismantled of its fan and guard and the spool was bored out to fit snugly on the armature shaft. A woodscrewwith its point blunted was threaded through the spool and against the shaft to fix the disk securely thereon. Then the current was turned on and a pencil was held lightly against the edge of the spinning paper. Although the paper bit into the wood the centrifugal force was not sufficient to hold the paper rigid, and instead of making a clean cut it scratched the wood as if by a file. The fan was making about 2,000 revolutions per minute, but the speed should have been doubled for so thin a paper. Better results were obtained by pasting the paper on a disk of cardboard of smaller diameter, so that the edge of the paper projected half an inch over the periphery of the cardboard. With this a clean cut was made into the wood of the pencil. But the best cutter was made out of a sheet of three-ply Bristol board, the kind on which drawings for the Patent Office are commonly prepared. With this stiff paper the pencil was cut into very quickly, and the cut was exceedingly fine and clean. When the lead of the pencil was reached, the progress of the cutter was much slower because the graphite acted as a lubricant. Neither the paper nor the Bristol board showed any material wear with use. Bristol-board cutter making a cut, while in the foreground is a pencil which has been cut in two by the paper.

II. MAJOR COMPONENTS

a.Single Phase Motor

We use single phase AC series motor use for cutting the wood, the speed of the motor is 3000/min and power obtained is 1200 watts. A series A.C motor is same electrically as D.C series motor. Refer to figure and use the left hand rule for the polarity of the coils. You can that the instantaneous magnetic polarities of the armature and field oppose each other and motor action results. Now, reverse the current by reversing the polarity of the input, note it the field polarity still opposes the armature polarity. This is because the reversal affects both the armature and the field, the A.C input causes these reversals to make place continuously. The construction of the A.C series motor differs slightly from the D.C series motor. The special materials, laminations, and windings are used. The reduce losses caused by eddy currents, hysteretic, and high reactance D.C power can be used to drive an A.C series motor efficiency but opposite is not true. The characteristics of the A.C motor are similar to D.C motor. It is varying speed machines. It has low speed for larger loads and high speed for lighter loads.

Motor Specification

Sl. No	Specification	Units
1	Voltage	230 v
2	Frequency	50 / 60 Hz

3	Speed	12000 rpm
4	Power	1050 w
5	Phase	1AC supply
6	Motor	Series motor
7	Cutter diameter	110 mm

b.Paper cutter

Paper is a commonly of thin materials produced by the amalgamation of fibers, typically vegetable fibers composed of cellulose which are subsequently held together by hydrogen bonding imparting desirable physical properties.

Figure.1 Chart paper 0.3mm thickness

Figure.2 chart paper 0.6mm thickness

Figure.3 chart paper 0.9mm thickness

c.Machine Diagram

Figure.4

d.Cutter Diagram

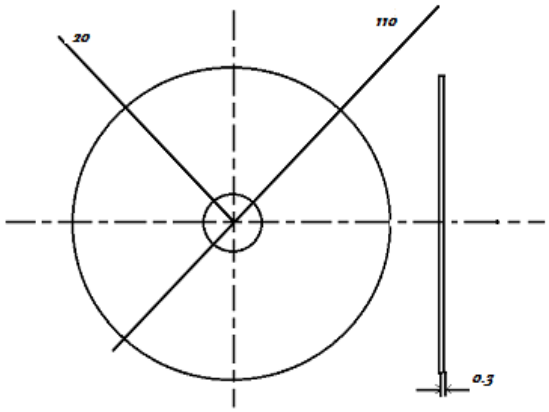


Figure.5

e.Chart P{aper

We use chart paper for cutting the wood, the stiffness of the chart paper is very less. We cut the chart paper of circular shape maximum diameter of 100mm. The thickness of the paper is 0.5mm; we increase the thickness by attaching the chart paper.

f.Cutting Material

Wood is a solid material derived from woody plants, notably trees but also shrubs. Wood from the latter is only produced in small sizes, reducing diversity of uses. In its most common meaning, "WOOD" is the secondary xylem of a woody plan, but this is an approximation only: in the wider sense, wood may refer to other materials and tissues with comparable properties. Wood is a heterogeneous, hygroscopic, cellular and anisotropic material. Wood is composed of fibers `of cellulose and anisotropic materials. Wood is composed of fibers of cellulose and anisotropic material (15%-25%) held together by lignin (15%-30%) Wood has been used for millennia for many purposes. One of its primary uses is as fuel. It is also used as for making artworks, furniture tools, and weapons, and as construction materials. Wood has been an important construction materials since humans began building shelters, houses, bolts, nearly all bolts were made out of wood till the late 1800's. It remains in common use today for wooden bolts and wooden materials (notably in roof construction) or exterior decoration. Wood to be used for construction work is commonly known as lumber in North America. Elsewhere, lumber usually refer to felled trees and the word for sawn planks (etc), ready for will be timber. Wood which in its native from is unsuitable for construction may be broken down mechanically (into fibers or chips) or chemically (into cellulose) and used as a raw material for other building material such as chipboard, engineered wood, hardboard, medium-density fiberboard (MDF),oriented board (OSB). Also, wood fibers are important components of paper, and cellulose is used as a component of synthetic materials. It can also be used for kinds of flooring for example laminate flooring wood can also be used for cutler, such as chopsticks and toothpicks, and utensils, such has as the wooden spoon. A tree increase in diameter by the friction between the old wood and the inner bark, of new woody layers which envelop the entire stem, living branches, and roots. Where there are clear seasons, this can happen in a discrete pattern, leading pattern, leading to what is known as growth rings are annual rings. Within a growth ring it may be possible to see two parts. The part nearest the center of the tree is more open textured and almost invariably lighter in color than that near the outer portion textured and portion is formed early in the season, when growth is comparatively repaid; is wood, as early wood or spring wood. The outer portion is the late wood or summer wood, being produced in the summer. In the diffuse-porous woods, the demarcation between rings is not always so clean and in some cases is almost (if not entirely) invisible to the unaided eye.

III. EXPERIMENTAL ANALYSIS

Figure.1 Experimental setup

Figure.2 Experimental setup Finish

a.Experimental Data Thickness 0.3 mm

TABLE.1 EXPERIMENTAL DATA

Speed	6,000 rpm
Thickness of chart cutter	0.3 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	102 mm
2	110 mm	15x15 mm	3	105 mm
3	110 mm	20x20 mm	3	106 mm

Graph.1 Initial diameter,final diameter vs Sample size

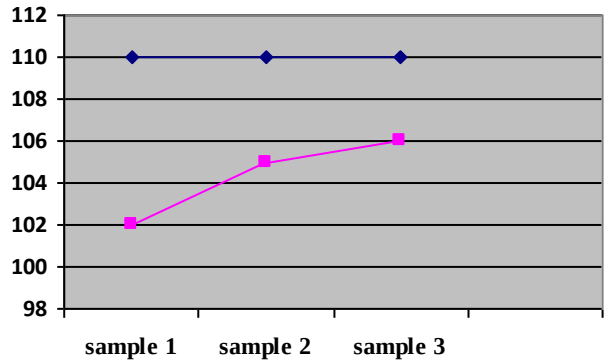


TABLE.2 EXPERIMENTAL DATA

Speed	8,000 rpm
Thickness of chart cutter	0.3 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	106 mm
2	110 mm	15x15 mm	3	107 mm
3	110 mm	20x20 mm	3	108 mm

Graph.2 Initial diameter,final diameter vs Sample size

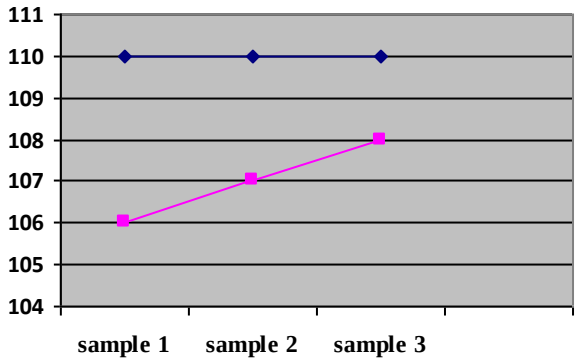
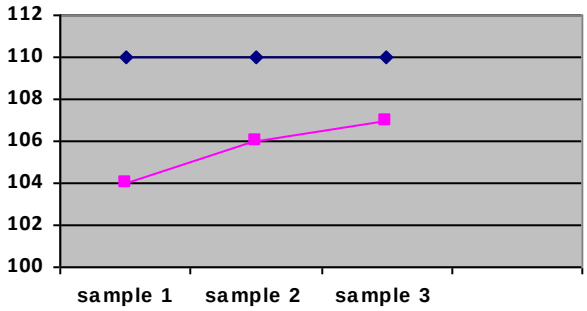


TABLE.3 EXPERIMENTAL DATA

Speed	10,000 rpm
Thickness of chart cutter	0.3 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	104 mm
2	110 mm	15x15 mm	3	106 mm
3	110 mm	20x20 mm	3	107 mm

Graph.3 Initial diameter,final diameter vs Sample size



b.Experimental Data Thickness 0.6 mm

TABLE.1 EXPERIMENTAL DATA

Speed	6,000 rpm
Thickness of chart cutter	0.6 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	100 mm
2	110 mm	15x15 mm	3	103 mm
3	110 mm	20x20 mm	3	105 mm

Graph.1 Initial diameter,final diameter vs Sample size

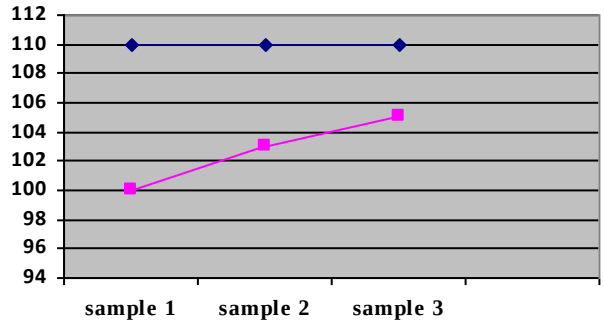


TABLE.2 EXPERIMENTAL DATA

Speed	8,000 rpm
Thickness of chart cutter	0.6 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	98 mm
2	110 mm	15x15 mm	3	102 mm
3	110 mm	20x20 mm	3	104 mm

Graph.2 Initial diameter,final diameter vs Sample size

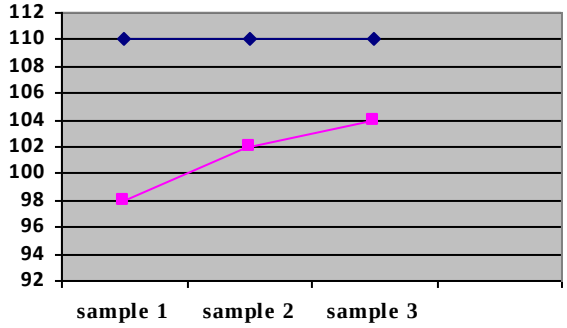
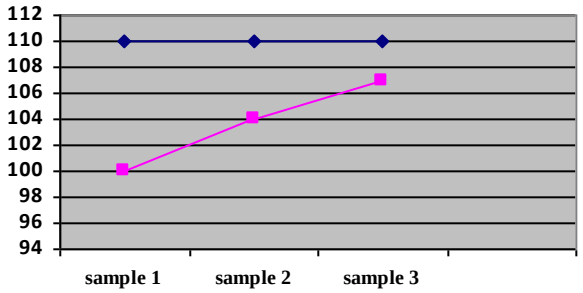


TABLE.2 EXPERIMENTAL DATA

Speed	10,000 rpm
Thickness of chart cutter	0.6 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	100 mm
2	110 mm	15x15 mm	3	104 mm
3	110 mm	20x20 mm	3	107 mm

Graph.3 Initial diameter,final diameter vs Sample size



c.*Experimental Data Thickness 0.9 mm*

TABLE.1 EXPERIMENTAL DATA

Speed	6,000 rpm
Thickness of chart cutter	0.9 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	104 mm
2	110 mm	15x15 mm	3	105 mm
3	110 mm	20x20 mm	3	107 mm

Graph.1 Initial diameter,final diameter vs Sample size

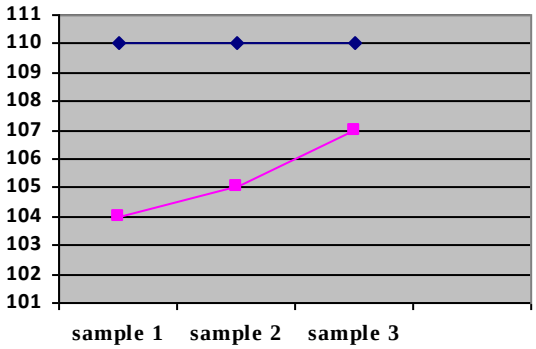


TABLE.2 EXPERIMENTAL DATA

Speed	8,000 rpm
Thickness of chart cutter	0.9 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	99 mm
2	110 mm	15x15 mm	3	103 mm
3	110 mm	20x20 mm	3	106 mm

Graph.2 Initial diameter,final diameter vs Sample size

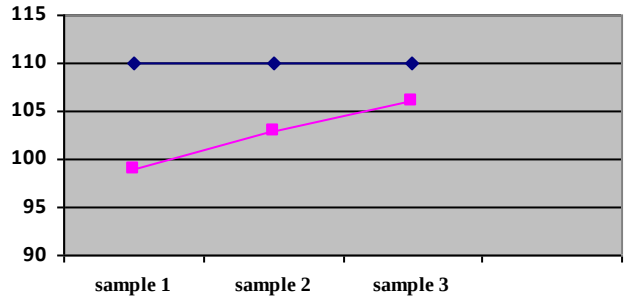
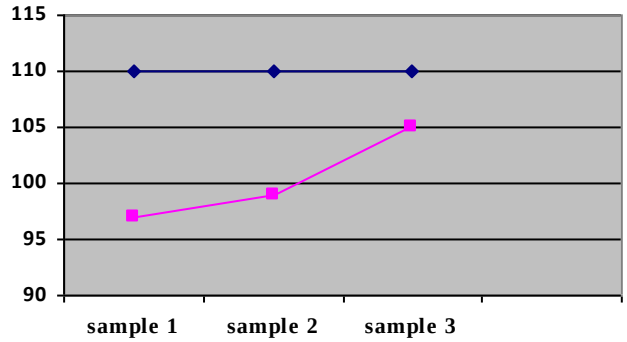


TABLE.3 EXPERIMENTAL DATA

Speed	10,000 rpm
Thickness of chart cutter	0.9 mm

Sl. No	Initial cutter diameter	Thickness of the wood	Number of pieces cut by a cutter	Final diameter of cutter
1	110 mm	10 x 10 mm	3	97 mm
2	110 mm	15x15 mm	3	99 mm
3	110 mm	20x20 mm	3	105 mm

Graph.2 Initial diameter,final diameter vs Sample size



IV. MODIFICATION

In this project, we paper as a cutter instead of using hacksaw, chisels, etc. Cost is reduced because of using paper as cutter. We can increase the thickness of the paper cutter, so that the cutter efficiency is increased. If we increase the cutter diameter, paper cutter will be flexible and cutter will wear out easily. So the suitable diameter must be used.

V. CONCLUSION

Our project is "Design and fabarication of non dust paper wood cutter" can be used for cutting the wood by using the chart paper. For future work instead of using paper we can use fiber sheet, mica sheet. During the course of action of our work, we have gained sufficient technical as well as practical knowledge as how a machine is to be designed, fabrication, and priced. This machine was fabricated successfully and tested. It works properly. We hope that this will be one among the most versatile and interchangeable one even if future.

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