NOVATEUR PUBLICATIONS
International Journal of Research Publications in Engineering and Technology [IJRPET]
ISSN: 2454-7875
VOLUME 3, ISSUE 7, July-2017

EXPERIMENTAL ANALYSIS OF TENSION METER ON DIFFERENT HACKSAW MACHINES

MAHESH B. NIGADE
Assistant Professor, AISSMS'S IOIT, Pune

DHANANJAY D. PISE
Assistant Professor, AISSMS'S IOIT, Pune

ABSTRACT:

It consists of blade tensioning hand wheel which is used to give proper tension to blade. Blade guide arm is used to guide the blade for proper cutting of material. Control panel is used to control movement of blade as well as blade roller. Blade is used to cut the material which is mounted on two band saw rollers which is move away from each other. Quick positioning vice is used to clamp the raw material. Vice hand wheel is used to clamp the work piece as well as it gives feed to work piece. Chip try is used to collect chip which is formed during operation. Coolant level gauge is indicating the level of coolant in coolant tank. A band saw is a power tool which uses a blade consisting of a continuous band of metal with teeth along one edge to cut various work pieces. The band usually rides on two wheels rotating in the same plane, although some band saws may have three or four wheels. Bands awing produces uniform cutting action as a result of an evenly distributed tooth load. Band saws are used for woodworking, metalworking, or for cutting a variety of other materials. They are particularly useful for cutting irregular or curved shapes, but can make straight cuts.

I. INTRODUCTION:

The use of the tension meter is the best method to measure tension in the blade as this eliminates the effect of friction of the screw threads and bearing plates in the determination of tension. When using blades from the same manufacturer and of the same type it could be assumed they are of the same steel composition and therefore will respond with the same Young's Modulus.

This device is used to measure the tension on the band saw blade. By using this device we can give proper tension to the band saw blade. By using this device, the life of band saw blade is increases.[2] If we give high tension that is above the recommended limit then the band saw blade is tends to break and if we give low tension that is below the recommended limit then the band saw blade is tends to vibrate during the operation. Hence by using the Tension Meter we can give proper tension to the band saw blade. This helps to increase the life of blade indirectly it does the cost reduction in industry as well as it increases the productivity of the industry.[3]

II .CONSTRUCTION OF TENSION METER:

The Tension Meter for Band Saw Blade consists of front plate, back plate and movable arm, dial gauge. All these parts are assembled together by means of countersunk bolts. The Dial gauge is fixed between back plate and front plate and the plunger of dial gauge is contact to the one end of movable arm which is inserted between front plate and back plate by means of Dowel pin.The Tension Meter is mounted on band saw blade and it is tighten with the help of Wing Bolt**.** Wing bolts are having an external tooth which is easy to screw and unscrew. These bolts are easy to use.[4]

III WORKING OF TENSION METER:

The Tension Meter is used to measure the tension on the band saw blade. The Tension Meter is also used to set proper tension to the blade. The Tension Meter is mounted on the blade and tightened the blade with the help of two wing bolts. One end is fixed to the body and other one is movable.[5]

As we start to give tension to the blade, the movable arm is starts to turn about the dowel pin The upper end of the movable arm is starting to turn towards the plunger of dial gauge. And the dial gauge indicates the tension on the band saw blade in terms of micron. And when we unscrew the tension meter from the blade, it regains its original position.

IV EXPERIMENTAL RESULTS:

Table no.4.1-Tension Meter measurements in MPa for each blade and species

Type of Blade	32CS	32BM	32CT	50CS	50BM	50CT
Wood Material						
Brown Mallet	200 MPa	207 MPa	214 MPa	207 MPa	131 MPa	152 MPa
Sugar Gum	207 MPa	200 MPa	181 MPa	138 MPa	172 MPa	150 MPa
Yellow Gum	207 MPa	215 MPa	207 MPa	103 MPa	124 MPa	138 MPa
Swamp Yate	190 MPa	221 MPa	197 MPa	131 MPa	148 MPa	145 MPa

Effect of blade type on straightness of cut

With the cuts for all four species combined there was a very highly significant difference ($p<0.001$) in the straightness of cut due to blade type. There was no significant difference in the straightness of cut between any of the 32 mm wide blades and the 50 mm wide Bi-Metal blade but a significant difference between both the 50 mm carbon steel and Carbide tipped blades with the other four blades. While, there was no significant difference ($p =0.053$) between the 50 mm wide carbon steel and 50 mm wide Carbide-tipped blades.[6]

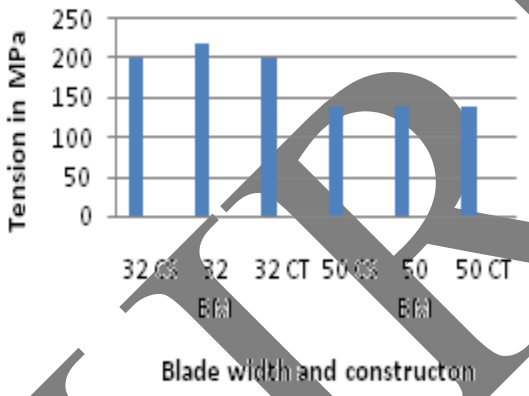

Table no. 4.2-Mean Deviation Of all Species by blade tip width and type.

Effect of blade type on straightness of cut in Brown Mallet

With the cuts for all four species combined there was a very highly significant difference ($p<0.001$) in the straightness of cut due to blade type. There was no significant difference in the straightness of cut between any of the 32 mm wide blades and the 50 mm wide Bi-Metal blade but a significant difference between both the 50 mm carbon steel and Carbide tipped blades with the other four blades. While, there was no significant difference ($p =0.053$) between the 50 mm wide carbon steel and 50 mm wide Carbide-tipped blades.

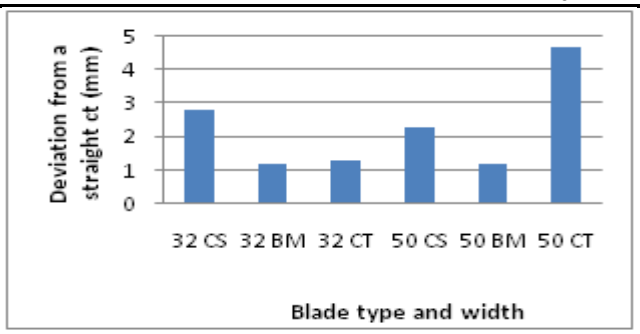

Table no. 4.3- Mean deviation of cuts in Brown Mallet using the different blades

Effect of blade type on straightness of cut in Sugar gum

As discussed earlier no result was obtained in Sugar Gum for the 50 mm Carbide-tipped blade and the results for the 32 mm Bi-Metal blade were from a previous trial. The mean deviation for all cuts in Sugar Gum was 1.7 mm. The straightness of cut produced by the 50 mm carbon steel blade was very highly significantly different ($p <0.001$) to all the 32 mm blades but not between the 50 mm Bi-Metal. There was no difference between the cut straightness of any of the 32 mm blades.[7]

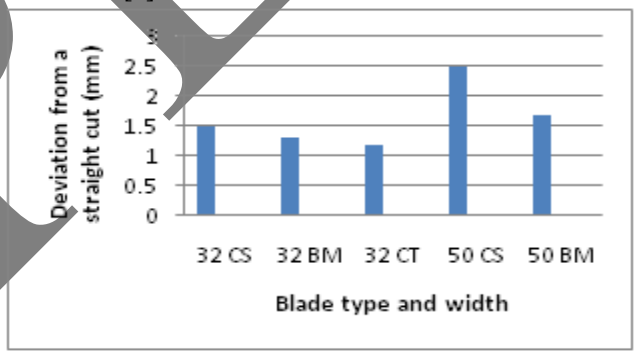

Table no. 4.4- Mean deviation of cuts Sugar Gum using the different blades.

Effect of blade type on straightness of cut in Yellow Gum[1]

The mean deviation for all cuts in Yellow Gum was 1.2 mm. The straightness of cut produced by all the 32 mm blades was very highly significantly better ($p < 0.001$) than the50 mm blades.

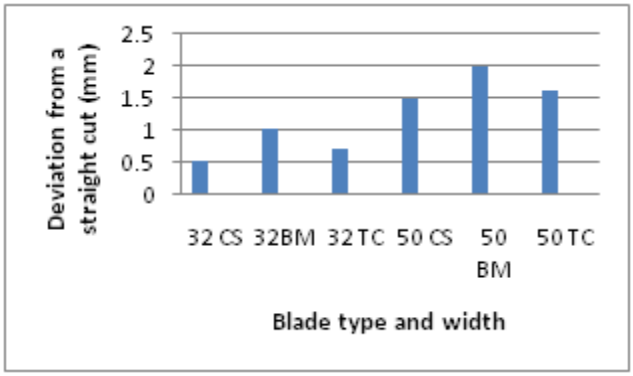

Table no. 4.5- Mean deviation of cuts in Yellow Gum using the different blades.

Effect of blade type on straightness of cut in Swamp Yate[1]

The mean deviation for all cuts in Swamp Yate was 1.8 mm. The straightness of cuts produced by all the 32 mm blades and the 50 mm Bi-Metal were not significantly different. However there was a very highly significantly different ($p < 0.001$) between those four blades and the 50 mm carbon steel and Carbide-tipped blades

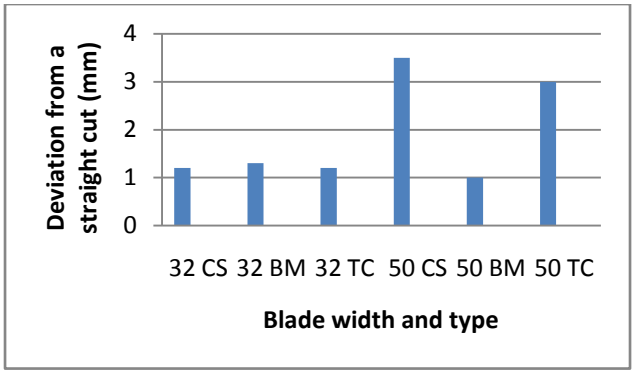

Table no. 4.6- Mean deviation of cuts in Swamp Yate using the different blades

CONCLUSION:

The tension meter for band saw blades is very useful to measure tension on the band saw blade. It gives assurance that life of blade will increase by some period of time. During the manufacturing of this project we have learnt more about the types of material and their properties types of stresses acting on the component, types of loads acting on the blades. It is very useful to measure straightness of cut in yellow gum, sugar gum swamp yate to useful measuring in blade life and to improve quality of cutting material future scope is by using strain gauge and piezoelectric crystal .

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