RESEARCH ARTICLE OPEN ACCESS

Effect of Load on Dry Abrasive Wear in Blades of Hand Hacksaw.

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ABSTRACT
In this study, the abrasive wear is calculated in the High Carbon Steel (HCS) blades of Hand Hacksaw at different Loads. The wear is calculated by Mass Loss of blade before and after cutting the prepared specimen of Mild steel. The Wear is calculated for different specimen of blades at different Loads ie. 5N,10N,15N and 20N with the help of the experimental Setup prepared. The result indicates that the wear in the blades increases with the increase in load.
KEYWORDS: Abrasive Wear, Mass Loss, Blades, Load.

I. Introduction

A hacksaw is a fine-tooth saw with a blade under tension in a frame, used for cutting materials such as metal. Handheld hacksaws consist of a metal frame with a handle, and pins for attaching a narrow disposable blade. A screw or other mechanism is used to put the thin blade under tension. Hacksaw blade cutting is conventional machining process which works on the principle of metal cutting. Where harder material which is tooth of the blades cuts the relatively softer material as per need .A power hacksaw (or electric hacksaw) is a type of hacksaw that is powered by electric motor. Most power hacksaws are stationary machines but some portable models do exist. Stationary models usually have a mechanism to lift up the saw blade on the return stroke and some have a coolant pump to prevent the saw blade from overheating**.** The saw or saw blade is the one of the most important component of a sawing machine. Saws are characterized by their material, tooth form, teeth set, tooth spacing and size. The geometry of the teeth is singular to that of the single point tools. The straight tooth form is suitable for finer pitches whereas the undercut face tooth forms are used for coarser pitches. Undercut tooth form is better from design point of view, because the cutting edges are backed up by more metal. It is very difficult to have this tooth form if teeth are very small in size. For the maximum efficiency for cutting process, hacksaw blade is fixed at 30◦ inclined to the work piece. Here, due to relative motion between work piece and hacksaw blade, heat is generated which is not desirable because it leads to more wear of blade tooth as we as will change the properties of final product.

In view of the above description, an attempt has been made in this study to determine the abrasive wear in the blade of hand hacksaw at different loads for a certain duration of time.

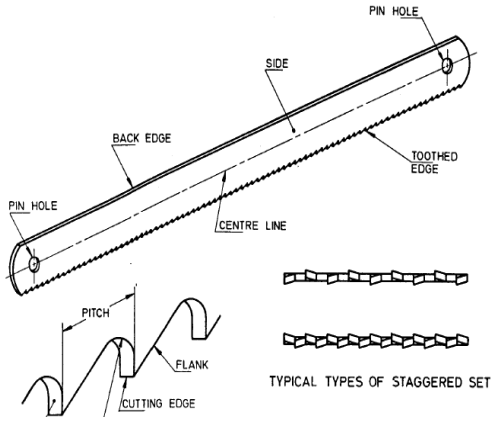

Fig 1:- Hacksaw Blade

1.1 Abrasive Wear

If the contact interface between two surfaces has interlocking of an inclined or curved contact, ploughing takes place in sliding. As a result of ploughing, a certain volume of surface material is removed and an abrasive groove is formed on the weaker surface. This type of wear is called abrasive wear.

II. Material And Method

2.1 Materials

- **Blades:-** High Carbon Steel
- **Specimen to be cut:-** Mild Steel

Fig 2:- HCS blades Used.

2.2 Dimensions of specimen:-

- Well prepared
- Mild Steel flat of Dimensions
- Length = 60 mm
- Breadth = 40 mm
- Thickness= 6 mm

2.3 Cutting Time =2 Minutes.

2.4 Apparatus Used

- Setup prepared, Files, Try Square ,
- Weighing Balance, cotton cloth, Steel Rule.

Fig 3:-Step Up prepared for Load calculation

2.5 Applied Loads

Loads applied while cutting was 5N, 10N,15N and 20N.

III. Result and Discussion

Wear is calculated through loss of mass in blade before and after cutting for certain time limit at different loads .The load is applied through the setup prepared. The reading obtained are as follows:-

Fig-4:-Dry Wear in HCS blades of Hand Hacksaw at 5 N

Cutting Time =2 Minutes **Depth Of Cut=7mm**

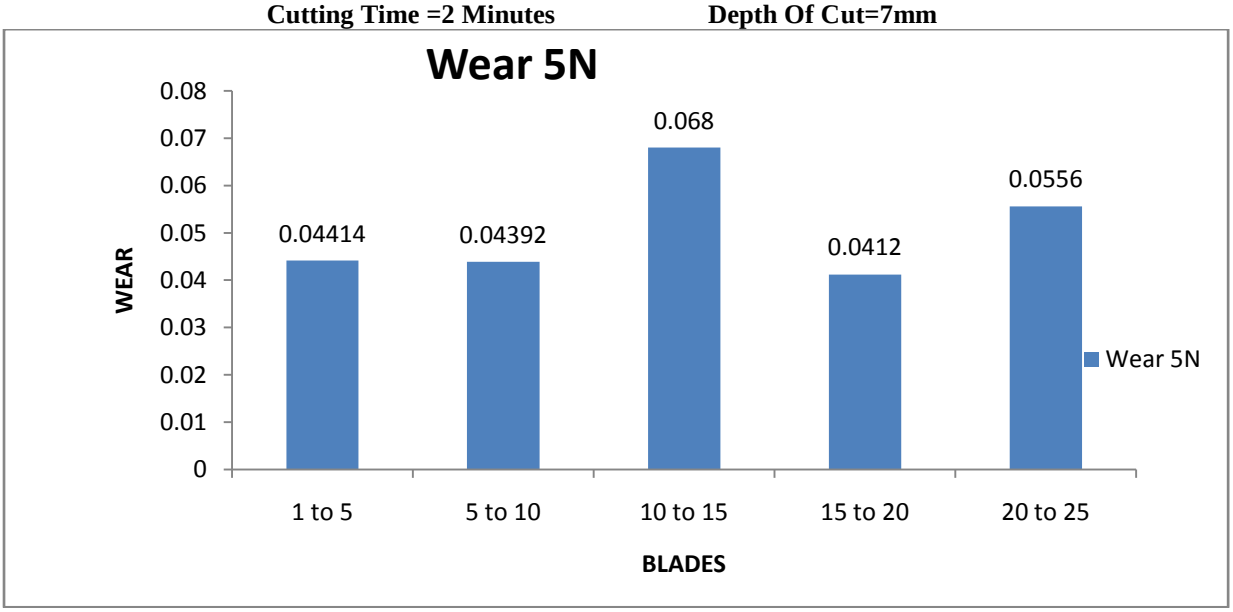

Fig-5 :-Dry Wear in HCS blades of Hand Hacksaw at **10N.**
Cutting Time= 2 Minutes **Depth of Cut =11.5mm**

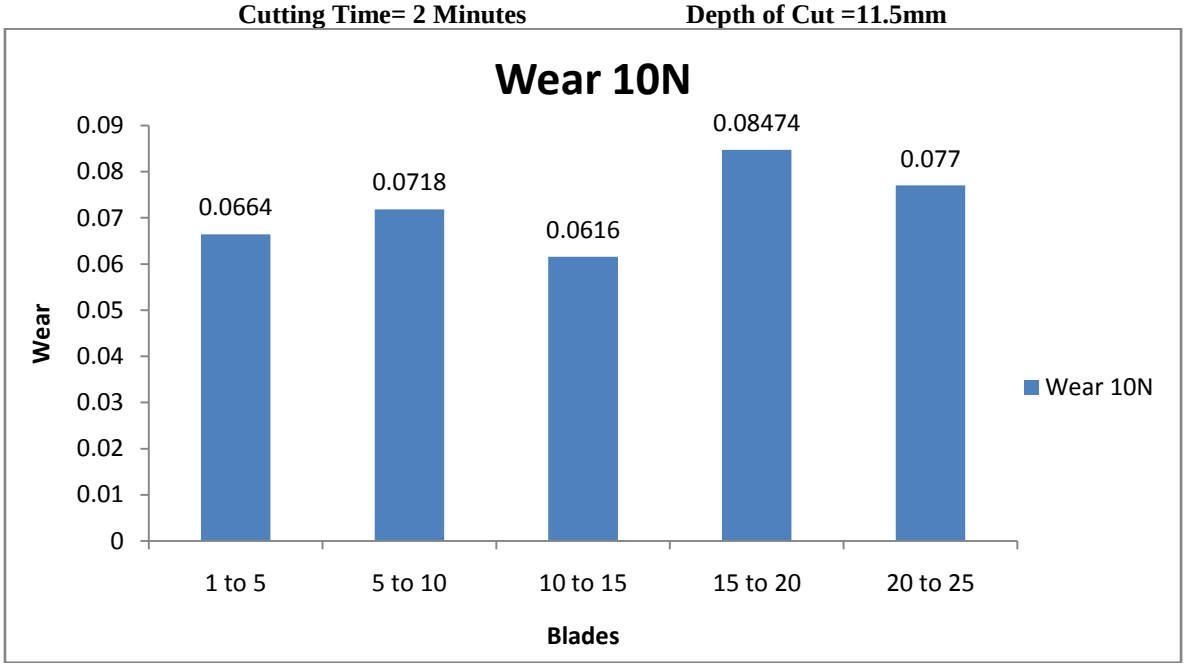

Fig-6 :-Dry Wear in HCS blades of Hand Hacksaw at **15N.**
Cutting Time=2 Minutes **Depth Of Cut =18 mm**

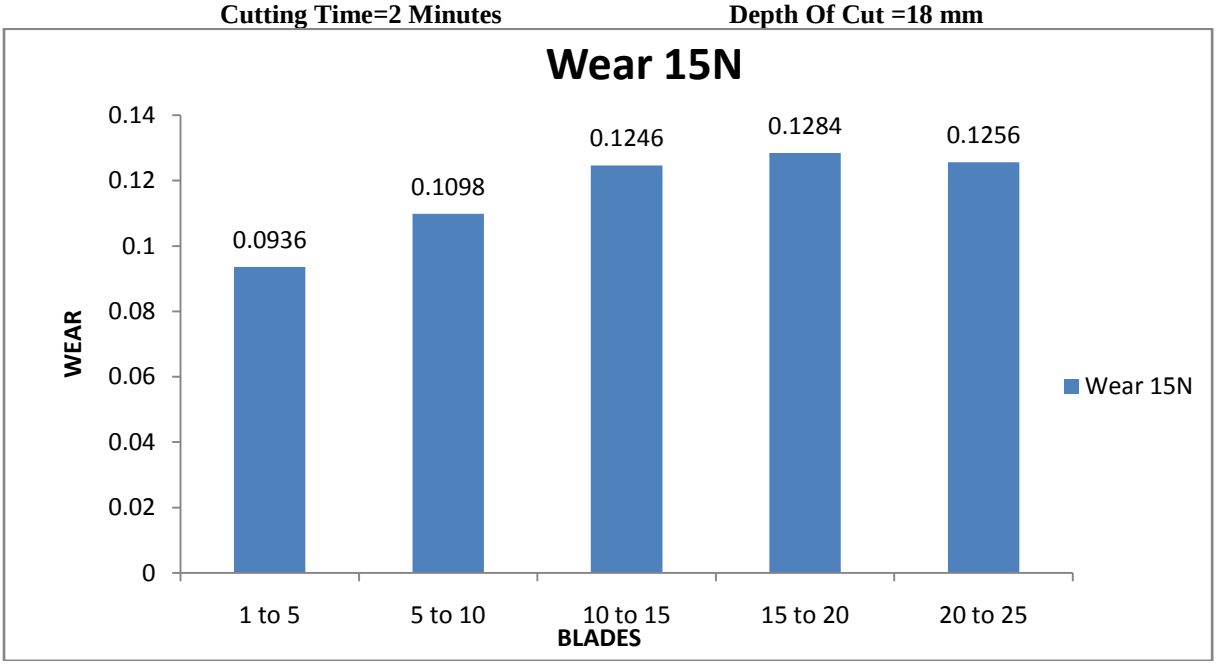

Fig-7 :-Dry Wear in HCS blades of Hand Hacksaw at **20N.**
Cutting Time:- 2 Minutes **Depth Of Cut 26 mm**

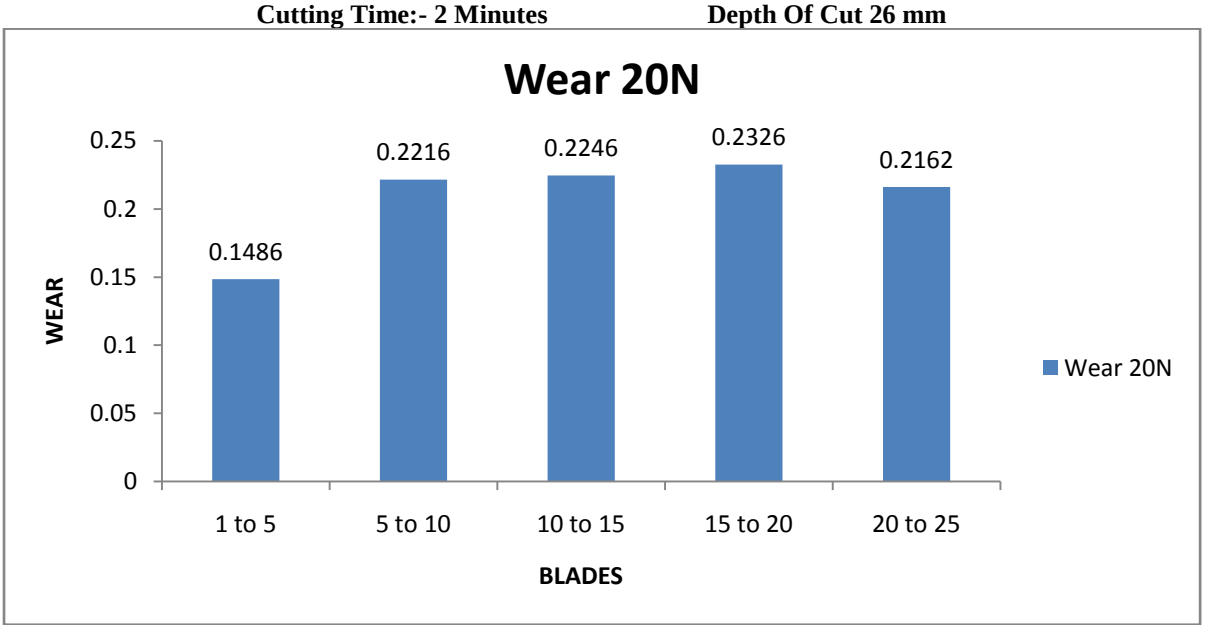

TABLE-1 :-Mean of Dry Wear in High Carbon Steel Blades of Hand Hacksaw at different Loads.

Wear				
Load	**5N**	**10N**	**15N**	**20N**
	0.044	0.066	0.094	0.149
	0.044	0.072	0.110	0.222
	0.068	0.062	0.125	0.225
	0.041	0.085	0.128	0.233
	0.056	0.077	0.126	0.216
Mean	**0.051**	**0.072**	**0.116**	**0.209**

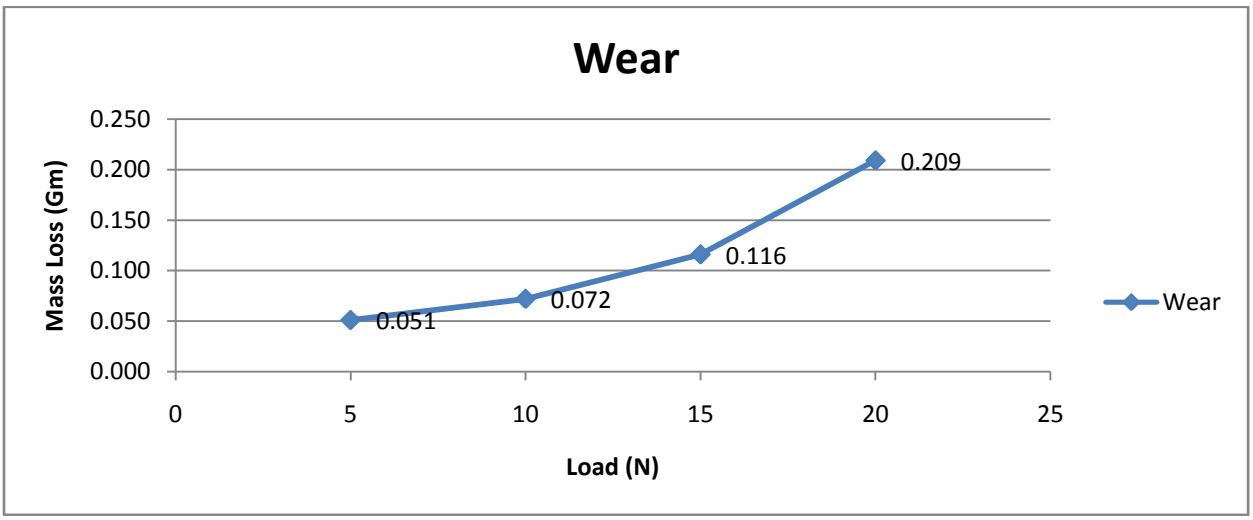

Fig 8:- Representation of Mass Loss at different Loads.

IV. Conclusions

On the basis of experimental work, the conclusions can be drawn that with increasing load, wear (mass loss) increases. Thus ,our attempt to determine the wear against different load through in manual cutting through our setup of Hand hacksaw is successful. Further some steps can be taken to reduce wear by using some lubricant in order to increase the life of the blade and to get better cutting.

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