

Thermal Stress analysis on Hacksaw blade by using Ansys 19.0

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Abstract

Aim of this paper is to propose an Eight-Way Hacksaw Machine. We have designed our proposed model on designing platform DS Solid Works. In this 8-Way Hacksaw Machine, we will use mild steel blade for cutting purpose for calculating thermal stresses and buckling load on different working speeds of cutting blade, we will use Ansys 19.1 Workbench analytics software. Finally, we found the best working speed for different loading and speed condition. It is expected that, this work will help researchers, designers and practicing engineers by making them aware of current trends in this immensely relevant topic that has become a necessity for the very survival of the manufacturing sector.

Keywords: *Eight-Way Hacksaw Machine, Slotted Link mechanism, Multi-purpose, Power Hacksaw.*

INTRODUCTION

The saw was one among the primary innovations of Metal Age. it absolutely was developed with smelted copper, from that a blade may well be forged. several of the first copper saws have the final look of enormous meat-craving knives. throughout the Bronze Age, saws became rather more widespread within the craft. it absolutely was during this time that the trendy kind of the saw began to return into play. a number of the saws used resembled metal saw blades of these days. Iron saws began to be produced within the mid-7th century BC. The Romans, accessorial several enhancements to easysays that created them easier to figure with. whereas saws for cutting metal had been in use for several years, vital enhancements in longevity and potency were created within the Eighties by liquid ecstasy Flower-Nash. Clemson, founding father of Clemson Bros., INC of Middletown, New York, United state. Clemson conducted tests that concerned ever-changing the size, shapes of teeth, kinds of set, and variable heat treatments of blades. Clemson claimed monumental enhancements to the cutting ability of blades and designed a serious industrial operation producing metal saw blades sold below the brand Star Hack Saw. In 1898, Clemson was granted United States Patent 601947, that details varied enhancements within the metal saw. much, we tend to use metal saw machine for cutting operation. during this machine, frame plays a really necessary role as a result of we tend to apply force on frame. Therefore, coming up with of metal saw

frame is vital parameter. Till now, nobody man of science done this work. during this paper we are going to conclude the strain evoked on the frame on varied loading condition. we tend to designed our model on coming up with platform and conclude the various result. the subsequent table represents the various parts that we tend to square measure victimization in our model.

The major issue in the industry is about mass production in lesser time. To overcome that problem. Hence a model of 8-way hacksaw machine has been proposed which can cut eight workpieces simultaneously of different material and with different kinds of blades. The proposed model will overcome the disadvantages of conventional machine. A power hacksaw used in the industry today can only cut a single workpiece at a time which consumes lot of time for whole fabrication process. The proposed model will enhance the work power of small as well as medium scale industry.

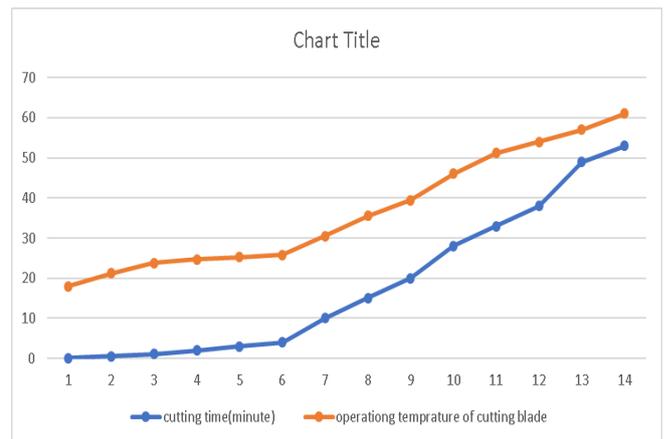
LITERATURE REVIEW

1. Proff. Nitin Chandra R. PATEL- He done a test on four types of blades for testing their stress, hardness, tensile strength etc. he concluded material properties of high-speed steel is good as compared to other 3. Whereas for cutting performance Bi- metallic strip is better for cutting Aluminium, mild steel & high carbon steel is good to cut brass material in case of wear resistance. High carbon steel is good for aluminium, alloy and HSS is better for mild steel.
2. D.V. Sabrinanda- In the reference of his paper author proposed a modifies model of conventional hacksaw m/c which cut more than one work piece at a time and is fully automatic. He has given detailed analysis of hacksaw parts and design. This proposed will reduce work of the labour.
3. Prof. Dipak patil- In this the author has suggested the idea of development and optimization of the machine and its optimum use. He proposed to achieve mass production, to reduce man power, to increase efficiency of plant, to reduce work load.
4. Prof. k. shirsagar – In this paper author has given the specification of the machine and the calculations involved in making the machine with its proper CAD diagram.

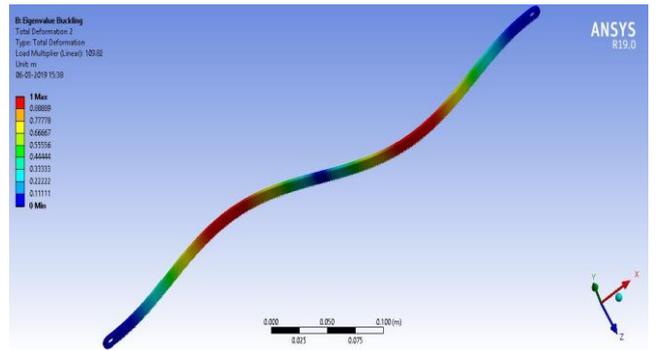
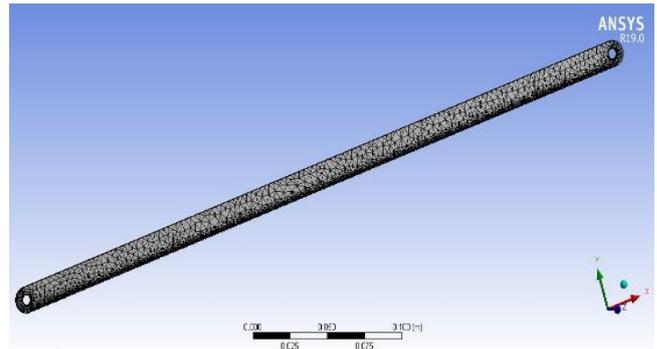
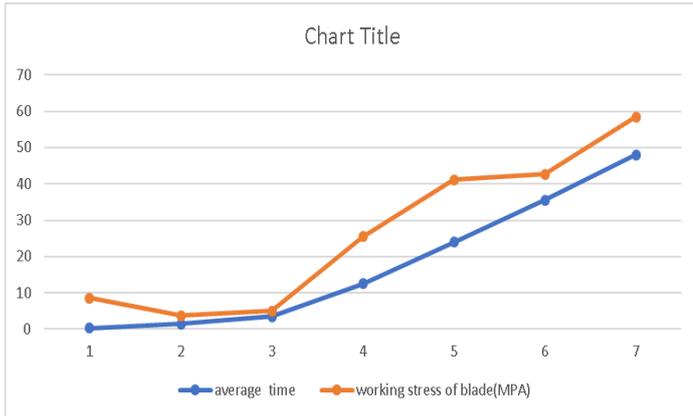
5. Gaurav B. Bariya- It is the modification of 4-way hacksaw machine by adding shaper in it. Principle used in scotch yoke mechanism. He conclusion that this machine is mixed machine which can do 2 works at a time and can overcome the problem of both machines.
6. Shubham Parashar – The author has stated that appropriate frame should be used for different loading conditions. Tests have been performed on 3 frame materials – 4340 steel, carbon steel, plain carbon steel. 4340 steel can bear load till 20 N at 25 N it will deform. Carbon steel and plain carbon steel can bear load till 25 N and it will deform at 30 N.
7. Sachin Mate – Author has proposed a prototype model of a 4-way hack saw machine which will cut 4 work pieces at same time. He concluded that design of this machine will enhance the production work and will save time and labour.
8. Vaibhav Nanabhau Pawar – Four-way hacksaw machine – the author has made an attempt to develop and manufacture a multiway hacksaw machine which have the ability and potential to machine no. of workpieces simultaneously in order to minimize the time for the operation. it's gave us an understanding about the systematic process involved in the designing and fabrication of a multiway hacksaw machine.
9. Raj raturaj – In this paper author has described the role of automation in the industry. author further added to attach an automatic small pneumatic feeding system to cut work piece for this machine. It increases efficiency of plant. Saves labour and errors in the working will be less.
10. Harsh modi- Design and fabrication of four-way hacksaw machine gave an understanding about the proper construction and stress analysis of multiway hacksaw machine. The author mounted a disk on a rotating shaft which is connected to a single-phase motor. Connecting rod is used to connect hack saw with rotating disk. Stress analysis of this model is also done to determine exact calculation of deflection, strain and distribution of loads. This provides us a comprehensive view of the fact that the ultimate goal is the design of structures and artifacts that can withstand a specific load.
11. Anandita biswas – Author has proposed a multiway hacksaw machine with a gear box which can control the speed of the machine. size of the material which has to be cut can be increased by the increasing the size of eccentric cam. Author further added pedals to the multi-operational machine. It's working with analysis is explained how much electricity we can make 12VDC with strokes per minute and diameter.

RESULTS AND DISCUSSION

CUTTING TIME(MINUTE)	OPERATING TEMPERATURE OF CUTTING BLADE
0	18
0.5	21.2
1	23.8
2	24.7
3	25.2
4	25.8
10	30.5
15	35.5
20	39.4
28	46
33	51.2
38	54
49	57
53	61



AVERAGE TIME	WORKING STRESS OF BLADE (MPA)
0.25	8.3
1.5	2.3
3.5	1.5
12.5	13
24	17.1
35.5	7.2
48	10.4



MEAN TEMPERATURE OF BLADE	WORKING STRESS OF BLADE(MPA)
19.6	8.3
24.25	2.3
25.5	1.5
33	13
42.7	17.1
52.6	7.2
59	10.4

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