

DESIGN OF WOOD CHIPPER MECHANISM

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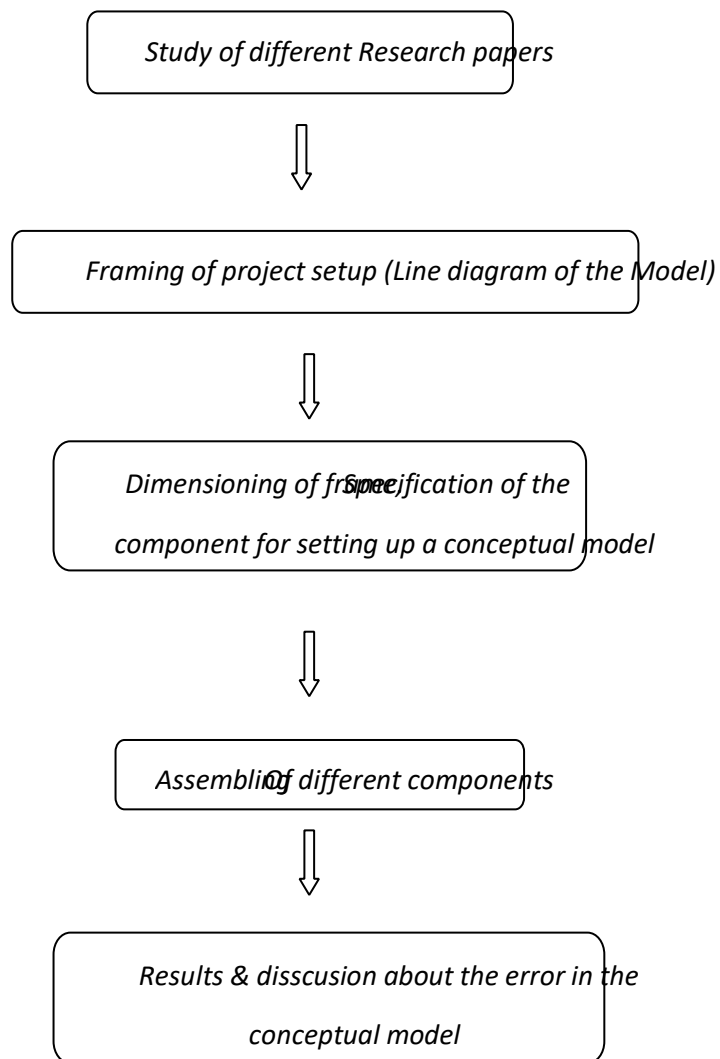
Abstract The wood chipper was invented by Peter Jensen (Maasbüll, Germany) in 1884, the "Marke Angeln "; wood chipper soon became the core business of his company, which already produced and repaired communal and woodworking-machinery. Today's commercial size chipper devour wood debris and even entire trees in mere seconds spitting out chips that can be used as much for your garden makes wood chipper one mean recycler whether it's fallen tree or just a few broken limbs a wood chipper will sink it's industrial teeth into the problem and transform it into the something useful. A tree chipper or wood chipper is a machine used for reducing wood (generally tree limbs or trunks) into smaller woodchips. They are often portable, being mounted on wheels on frames suitable for towing behind a truck or van. Power is generally provided by an electric motor. Tree chippers are typically made of a hopper with a collar, the chipper mechanism itself, and an optional collection bin for the chips.

1. INTRODUCTION

Tree chippers or wood chippers are typically made of a hopper with a collar, the chipper mechanism itself, and an optional collection bin for the chips. A tree limb is inserted into the hopper (the collar serving as a partial safety mechanism to keep human body parts away from the chipping blades) and started into the chipping mechanism. The chips exit through a chute and can be directed into a truck-mounted container or onto the ground. Typical output is chips on the order of 1 inch (3 cm) to 2 inches (5 cm) across in size. The resulting wood chips have various uses such as being spread as a ground cover or being fed into a digester during papermaking. They are often portable, being mounted on wheels on frames suitable for towing behind a truck or van. There are also high-power chipper models mounted on trucks and powered by a separate engine.

1.1 Problem Statement

The main use of the chipper is to reduce the wood into small chips further the chips into wood pulp later it uses for making papers the demand for paper in the paper industry is high since the demand is high there should be a cost friendly wood chipper



The wood chippers are cost way too much that one can purchase, most of the Wood Chippers ranges from approximately Rs 30000 to 900000 per Piece. Price of Wood Chippers depends on Production Capacity & Brand. So, in order to reduce the price, the chipper will be cost effective so that anyone can afford it.

The amount of chips produce from wood chipper mechanism is 600-700 chips per minute.

1.2 Proposed Solution

Automated system for welding is the required for mass production as MAKE IN INDIA is on higher priority. So in order to compute the production rate of china we have to implement such machine in higher scale. So if machine

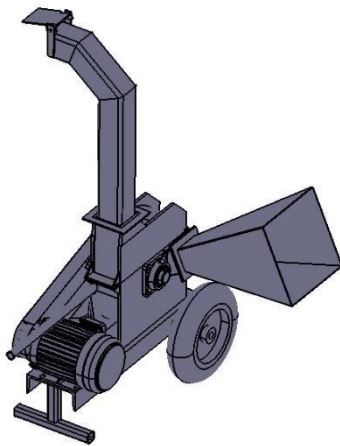
cost is kept lower it will be in higher demand. So above methodology is utilized to develop the automated system

1. Design

In our attempt to design a special purpose machine we have adopted a very a very careful approach, the total design work has been divided into two parts mainly;

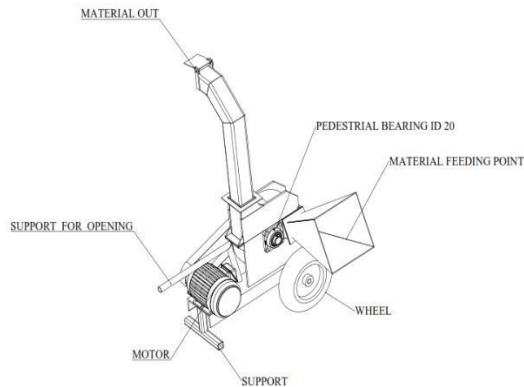
- ☐ System design
- ☐ Mechanical design

System design mainly concerns with the various physical constraints and ergonomics , space requirements, arrangement of various components on the main frame of machine no of controls position of these controls ease of maintenance scope of further improvement ; weight of m/c from ground etc



1. Selection of timer pulley ,timer belt and output pulley arrangement from pedal to flywheel shaft
2. Selection of chain sprocket, chain and free wheel arrangement from flywheel to wheel .
3. System design for Gravity flywheel , as to calculation of desired output for optimized performance
4. Design of flywheel hub
5. Unidirectional clutch design
6. Un-balance mass selection
7. Gear train design
8. Shock-absorber design
9. Hinge bracket for seating design

10. Rack and pinion design for – e-shock
11. Output –augmentation using e-shock theoretical derivation
12. Theoretical derivation of energy augmentation using the combined system.



GRINDING

Grinding practice is a large and diverse area of manufacturing and tool making. It can produce very fine finishes and very accurate dimensions; yet in mass production contexts it can also rough out large volumes of metal quite rapidly. It is usually better suited to the machining of very hard materials than is "regular" machining (that is, cutting larger chips with cutting tools such as tool bits or milling cutters), and until recent decades it was the only practical way to machine such materials as hardened steels. Compared to "regular" machining, it is usually better suited to taking very shallow cuts, such as reducing a shaft's diameter by half a thousandth of an inch or 12.7 μm .

DRILLING

Drilling is a cutting process that uses a drill bit to cut a hole of circular cross- section in solid materials. The drill bit is usually a rotary cutting tool, often multi- point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work-piece, cutting off chips from the hole as it is drilled

WELDING

Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastics, by causing fusion, which is distinct from lower temperature metal-joining techniques such as brazing

and soldering, which do not melt the base metal. In addition to melting the base metal, a filler material is typically added to the joint to form a pool of molten material

CONCLUSIONS

The researcher acclaims that in the process of feeding wood, care should be taken before switching the machine on to check if it is in a good condition to function and the users are recommended to wear eye protection goggles to protect themselves in the case of flying cuts. In sustaining the machine, the bearings should be greased after approximately every 5000Hrs of service and after use, the machine should be shut down, cleaned and covered to prevent dust from accumulating which may end up hindering the sight of the user which is un-safe. The researcher also recommends the exchange of the cutter knives after sharpening to a maximum of 4mm from the cutting edge. The gears should consistently be lubricated with a thicker lubricant to reduce gear failure probabilities. The researcher also recommends the mounting of a horizontal based hopper for easy feeding of the stock into the machine for cutting and the use of rollers to pull the wood into the machine which is safer to the user as well as user friendly. In conclusion of the whole write-up, the main aims of the project which are to design an automated wood cutter for cutting wood in the wood industry as well as for domestic use were achieved.

ACKNOWLEDGEMENT

We would like to express our deepest appreciation to all of those who helped and supported us during this entire project. First and foremost we would like to express our thanks to our guide Prof. Nitin Jadhav, for his great guidance, dedicated support and suggestions not only in project work but also in preparation of project report.

REFERENCES

- 1]. "A LABORATORY WOOD CHIPPER FOR CHIPPING UNDER REALISTIC CONDITIONS" by Lisbeth M. Hellström, Mårten Gulliksson and Torbjörn Carlberg October 2010.
- 2]. "THE SYSTEM WOOD CHIPPING IN DISC CHIPPER PROBLEMS OF UNIFORMITY OF CHIPS LENGTH" by Mariusz Reczulski January 2016.
- 3]. "The research on the characteristic of the cutting force while chipping of the Caucasian Fir (Abies Nordmanniana) with a single-shaft wood chipper" by Wargua and P Krawiec 2020.
- 4]. "Effects of Wood Properties and Chipping Length on the Operational Efficiency of a 30 kW Electric Disc Chipper" by Fulvio Di Fulvio, Gunnar Eriksson, Dan Bergström 2015.

5]. *"INFLUENCE OF DRUM CHIPPER SETTING ON THE WOOD CHIPS PERFORMANCE"* by Ismail, Z. E. M. I. Ghazy October 2016.