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DESIGN AND ANALYSIS OF LEAF SPRING USING AGAVE TEQUILANA, LOTUS AND MADAR FIBRE WITH EPOXY

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INTRODUCTION

A composite material can be defined as a combination of two or more materials that results in better properties than those of the individual components used alone. In contrast to metallic alloys, each material retains its separate chemical, physical, and mechanical properties. The two constituents are reinforcement and a matrix. The main advantages of composite materials are their high strength and stiffness, combined with low density, when compared with bulk materials, allowing for a weight reduction in the finished part. In recent years, polymeric based composites materials are being used in many application such as automotive, sporting goods, marine, electrical, industrial, construction, household appliances, etc. Polymeric composites have high strength and stiffness, light weight, and high corrosion resistance. Natural fibres are available in abundance in nature and can be used to reinforce polymers to obtain light and strong materials .The natural fibre present important advantages such as low density, appropriate stiffness, mechanical properties with high disposability and renewability. In this project that we are used the natural fibre of lotus. Moreover, these lotus fibre are recycle and biodegradable.

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LITERATURE SURVEY

Mukundan.s-However, during the seventies and eighties, cellulose fibres were gradually substituted by newly developed synthetic fibres because of better performance. Tenholm et al.(1991) [40] studied the nature of adhesion in composites of modified cellulose fibres and polypropylene. Cellulose fibres were surface-modified with polypropylene maleic-anhydride copolymer and characterized by contact angle measurement, ESCA, FTIR, and SEM techniques

Salit [15] studied the background of the importance of natural fibres. The advantages and disadvantages of tropical natural fibres are listed. The information about fibre extraction process, the application of fibres and other important topics are discussed. Idicula et al.[14] studied the physical properties of natural fibres were mainly determined by their chemical and physical composition such as structure of fibres, cellulose content, angle of fibrils, cross section and the degree of polymerization. Laly et al. A number of investigations have already been carried out on several types of Natural fibres such as hemp, flax, bamboo, jute and kenaf to study the effect of these fibres on the mechanical characteristics of composite materials. In dynamic mechanical analysis. Cazaurang et al.The mechanical behviour of jute and kenaf fibre reinforced polypropylene composites has been studied by Schneider and Karmaker Pothan et al. reported that kraft pulped banana fibre composite has good flexural strength. Luo and Netravali studied the mechanical properties like tensile and flexural strength of the green composites with different pineapple fibre percentage and compared with the virgin resin. Belmeres et al. reported that sisal, henequen, and palm fibre have similar physical, chemical, and tensile properties. A systematic study on the properties of henequen fibre has been made by Cazaurang et al. And reported that fibres have mechanical properties suitable for reinforcement in thermoplastic resins. Various aspects of banana fibre reinforced polymer composites have been studied by various investigators. Cazaurang et al. have done a detailed study on the properties of henequen fibre and

concluded that these fibres have mechanical properties suitable for reinforcing thermoplastic resins. Gowda et al. The mechanical properties of jute fiber reinforced polyester composites were evaluated by Gowda et al. It is reported from their study that they have better strengths as comparison to wood based composites. The use of cotton fibre reinforced epoxy composites along with glass fibre reinforced polymers was done by Khalid et al. The effect of various loading rate on mechanical properties of jute/glass reinforced epoxy based hybrid composites has been studied by Srivastav et al. showed that chemical treatments (alkali, benzoyl chloride, KMnO4and silane treatment) of banana fibre based polypropylene composites improved the thermo physical properties (thermal conductivity and diffusivity) in each case. Kushwaha et al. have found the optimum alkali percentage for best results and have discussed the effects of chemical treatments on mechanical properties bamboo fibre composites. Hongwei Ma et al. effect of silane coupling under different types of radiation on the structural properties of bamboo fibre reinforced poly (lactic acid) bio composites.

MATERIALS AND METHOD

Materials for leaf spring

Carbon/graphite fibres

Glass fibres

MATERIALS PREPARATIONS

The agave tequilana, lotus and madar fibre which is taken as reinforcement in this study is collected from local sources. The epoxy resin and the hardener are supplied. Wooden mould having been first manufactured for composite fabrication. The fibre material is mixed epoxy resin by simple mechanical stirring and the mixture was poured into various mould, keeping in view the requirement of various testing conditions and characterization standard. The composite sample of different composition are prepared .the composite of mixing ratio Agave tequilana 20

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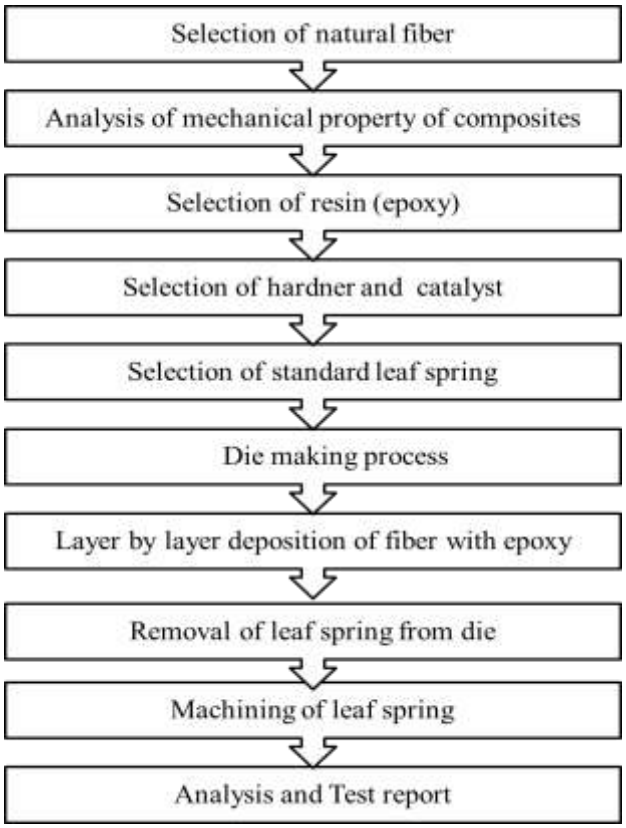
%, lotus 10 % and madar fibre 15% with mixing of epoxy resin 55%. The different type of fibre is used, while keeping the length of the glass fibre constant. The detailed composition and designation of composite materials. A releasing agent is used on the mould release sheets to facilitate easy removal of the composite from the mould after curing. The entrapped air bubbles are removed carefully with a sliding roller and the mould is closed for curing at a temperature Of 30 degree C for 24 hours at a constant load of 50kg .after curing the specimen of suitable dimension is cut using a diamond cutter for mechanical test as per the ASTM standards.

4.15 FLOW CHART



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MECHANICAL PROPERTY TESTS

TENSILE TEST

Tensile tests are performed for several reasons. The results of tensile tests are used in selecting materials for engineering applications. Tensile properties frequently are included in material specifications to ensure quality. Tensile properties often are measured during development of new materials and processes, so that different materials and processes can be compared. Finally, tensile properties often are used to predict the behaviour of a material under forms of loading other than uniaxial tension. A universal testing machine is used to test tensile strength of materials. It is named after the fact that it can perform many standard tensile and compression tests on materials, components, and structures.

COMPARISON

SL.NO	CONTENT	FORGED STEEL	NATURAL COMPOSITE
1	Weight (Kg)	1.94	0.255
2	Hardness (HRB)	101	40
3	Impact value (Joules)	60	7

4	Tensile strength (N/mm^2)	780	914.79
5	% of elongation	28	7.33
6	Yield strength (N/mm^2)	625	525.78

CONCLUSION

As a lot of work has been done in designing of leaf springs which is discussed briefly in this text, on the basis of this study, problems in overall weight reduction by using composite materials are identified. Many of the authors suggested various methods of designing, manufacturing and analyses of composite leaf springs. After studying all the available literature it is found that weight reduction can be easily achieved by using composite materials instead of conventional steel, but there occurs a problem during the operation while using the composite leaf spring i.e. chip formation when the vehicle goes off road. Therefore there is an immense scope for the future work regarding use of (agave tequilana, lotus and madar fibre) composite materials in leaf springs to reduce the overall weight of the vehicle as well as the cost of the vehicle.

REFERENCES

1. Erol Sancaktar and Mathieu Gratton, Design, Analysis and Optimization of Composite Leaf spring for Light Vehicle Application, Elsevier Science Ltd. Vol. 44, 1999, pp195-204.
2. Mahmood M. Shokrieh, Davood Rezaei, Analysis and Optimization of a Composite Leaf Spring. Elsevier Science Ltd. Vol. 60, 2003, pp317-32
3. Gulur Siddaramanna Shiva Shankar, Sambagam Vijayaragan, Mono Composite Leaf Spring for Light Weight Vehicle – Design, End Joint Analysis and Testing, Material Science , Vol. 12, April 2006, pp220-225.

4. Patunkar M. M., Dolas D. R., Modelling and Analysis of Composite Leaf Spring under the Static Load Condition by using FEA, International Journal of Mechanical & Industrial Engineering, Vol.1, 2011, pp1-4.
5. Venkatesan M., Devraj D. Helmen, Design and analysis of composite leaf spring in light vehicle, International Journal of Modern Engineering Research, Vol. 2, Jan-Feb2012, pp213-218.
6. Shishay Amare Gebremeskel. Design, Simulation, and Prototyping of Single Composite Leaf Spring for Light Weight Vehicle. Global Journal of Research in Engineering Mechanical and Mechanics Engineering, Vol. 12, 2012, pp21-30.
7. Kumar Y. N. V. Santosh and Teja M. Vimal, International Journal of Mechanical and Industrial Engineering, Vol. 2, 2012, pp97-100. 8. Jadhav Mahesh V., Zoman Digambar B, Y. R. Kharde and R. R. Kharde, Performance Analysis of Two Mono Leaf Spring used for Maruti 800 Vehicle, International Journal of Innovative Technology and Exploring Engineering, Vol. 2, December 2012, pp65-67.