

REVIEWER'S REPORT

Manuscript No.: IJAR-59397

Title: Numerical Simulation of the Influence of the Effect of Tooth Number on the Mechanical Behavior of Natural Fiber Composite Gears: The Case of HDPE 40B .

Recommendation:

Accept

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality		Yes		
Clarity	Yes			
Significance		Yes		

Reviewer's ID: JPR- 015

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comment are mentioned below suitable for the paper titled "Numerical Simulation of the Influence of the Effect of Tooth Number on the Mechanical Behavior of Natural Fiber Composite Gears: The Case of HDPE 40B"

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction

The introduction should highlight the increasing interest in composite materials for mechanical power transmission applications. The advantages of natural-fibre composites, including lightweight construction and potential environmental benefits, should be discussed in relation to conventional metallic gears. The authors should explain the importance of tooth number in determining gear geometry, load distribution, stress concentration, and deformation. The motivation for investigating HDPE40B composite gears should be clearly established. The introduction should conclude by stating the research objectives and the specific contribution of the numerical investigation.

2. Literature Review

The literature review should cover previous studies on the mechanical performance of polymer and natural-fibre composite gears. Relevant research on numerical stress analysis, gear-tooth deformation, contact mechanics, and the influence of tooth geometry should be discussed. The authors should also review existing applications of finite element analysis or other numerical simulation techniques in gear design. A comparison between conventional gear materials and composite alternatives would help

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establish the engineering relevance of the study. The review should clearly identify the research gap concerning the influence of tooth number on the mechanical behaviour of HDPE40B composite gears.

3. Solution Approach / Methodology

The numerical simulation approach is appropriate for evaluating the mechanical response of composite gears under different loading conditions. The development of three-dimensional gear models provides a suitable basis for investigating the relationship between tooth geometry and mechanical performance. The analysis of stress distribution and deformation under applied loads can help identify critical regions and potential failure locations. The consideration of tooth number and wear-related operating conditions adds practical relevance to the investigation. The methodology provides a useful foundation for understanding and optimising the design of natural-fibre composite gears.

4. Results and Discussion

The results indicate that increasing the number of teeth reduces the stress experienced by the gear, which is attributed to changes in the normal loads carried by individual teeth. This finding is relevant to understanding the relationship between gear geometry and mechanical performance. The numerical analysis of stress distribution and deformation provides useful insights into the structural response of HDPE40B composite gears. The investigation also offers a basis for evaluating the effects of tooth wear and operating conditions on gear behaviour. Overall, the findings contribute to the development of improved design strategies for lightweight composite gear systems.

5. Conclusion

The manuscript provides a useful numerical investigation of the influence of tooth number on the mechanical behaviour of HDPE40B composite gears. The results highlight the importance of tooth geometry in determining stress distribution and deformation under applied loading conditions. The observed reduction in stress with an increasing number of teeth offers a valuable consideration for composite gear design. The study contributes to the broader application of natural-fibre composite materials in mechanical engineering. Future research could extend the analysis through experimental validation, fatigue-life assessment, and comparative evaluation of different composite formulations.