Review Form 1.7

Journal Name:	**Journal of Engineering Research and Reports**
Manuscript Number:	**Ms_JERR_106486**
Title of the Manuscript:	**Analysis of the force on the tooth surface of the cycloid pinwheel of RV reducer considering manufacturing errors**
Type of the Article	**Original Research Article**

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty'**, provided the manuscript is scientifically robust and technically sound.
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PART 1: Review Comments

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Compulsory REVISION comments **1. Is the manuscript important for scientific community?** (Please write few sentences on this manuscript)	**1.** Analyzing the forces on the tooth surface of a cycloid pinwheel in an RV reducer while considering manufacturing errors is essential for optimizing performance, ensuring durability and reliability, enhancing safety, improving efficiency, reducing costs, maintaining quality control, and minimizing noise and vibration. It is a critical step in the design and manufacturing process to ensure the successful and reliable operation of the reducer in various applications. The element of novelty with respect to other studies, the author introduced the manufacturing error of RV reducer into the force analysis of the cycloid pinwheel by establishing the mechanical model of RV reducer considering displacement and stiffness.	
2. Is the title of the article suitable? (If not please suggest an alternative title)	**2.** Since the main contribution of this analysis was to evaluate the effect of the manufacturing error on the load of the teeth of the cycloidal pinwheel, in my opinion, it would be much more attractive to say directly in the title what the main purpose is of the present study. I would therefore propose the following title: "*Impact of manufacturing errors on tooth surface forces in RV gearbox cycloid pinwheels*".	
3. Is the abstract of the article comprehensive?	**3.** Yes.	
4. Are subsections and structure of the manuscript appropriate?	**4.** In my opinion, the introduction is too short and it does not illustrate exhaustively the advantages of adopting the model RV110E with respect to other RVE models. Additionally, the author does not mention the significant limitations of his/her model. Additionally, a section describing the most important manufacturing errors that can impact the performance and reliability of the cycloid pinwheel and other components is missing. Other suggestions can be found in point **7.** below.	
5. Do you think the manuscript is scientifically correct?	**5.** The numerical results obtained by the MATLAB calculation software are certainly correct. The basic questions concern the validity of the proposed model, the modeling of manufacturing errors in a realistic RV gearbox, the inclusion of nonlinear effects in the model, and the discussion of the precision, accuracy, and stability of the obtained results (see the suggestions in point **7.** below).	
6. Are the references sufficient and recent? If you have suggestion of additional references, please mention in the review form.	**6.** *In my opinion, the list of references cited in the work needs to be completed. I propose the following suggestions*. [1] D.J. Jang *et al*., *Geometry design and dynamic analysis of a modified cycloid reducer with epitrochoid tooth profile*, Mech. Mach. Theory (2021). [2] Y.H. Yang *et al*., *A modeling approach for kinematic equivalent mechanism and rotational transmission error of RV reducer*, Mech. Mach. Theory (2021). [3] C.-H. HUANG* and S.-J. TSAI, *A study on loaded tooth contact analysis of a cycloid planetarygear reducer considering friction and bearing roller stiffness*, Bulletin of the SME, Journal of Advanced Mechanical Design, Systems and manufacturing, **11**(6), 00213 (2017). [4] N. D. Leque and A. Kahraman, *A three-dimensional load sharing model of planetary gear sets having manufacturing errors*, ASME 2015 PTG Conference (2015), paper No. DETC2015-47470. [5] X. Li et al., Investigation on Tooth Surface Wear of Cycloid Drives Considering Tooth Profile Modifications, MDPI - Lubricants, **11**(8), 323 (2023). [6] Q. Zhao, et al., *An Improved Modeling and Numerical Analysis Method for Tooth Surface Wear of Double-Arc Harmonic Gears,* Materials, **15**, 8869 (2022). [7] R. Zhang, J. Zhou, and Z., *Study on transmission error and torsional stiffness of RV reducer under wear*, J. Mech. Sci. Technol., **36**, 4067 (2022).	
7. Apart from above mentioned 6 points, reviewers are free to provide additional suggestions/comments.	**7.** *The work contains several gaps that need to be filled. Below, I shall limit myself to mentioning just a few of them.* **7a.** In general, no acronyms should appear in the abstract. Anyhow, acronyms must be specified when they first appear in the manuscript, even those that are well-known in the literature (e.g., RV reducer = *Rotate Vector reducer (or Rotary-Vertical reducer)*; RV-E is a *2-stage reduction gear*; RV- 110E is a particular *RV-E model having some performance characteristics*, etc.). **7b.** In a realistic RV (Rotary-Vertical) reducer, several manufacturing errors can impact the performance and reliability of the cycloid pinwheel and other components. While the specific	

	errors can vary depending on the manufacturing process and equipment used, some of the main components of manufacturing errors are common. The author is invited to introduce a brief section where the main manufacturing errors are described (e.g., *pitch errors*, *tooth spacing errors*, *runout errors*, *surface finish and roughness*, *assembly tolerances*, etc.). **7c.** Manufacturing errors introduce *nonlinear effects* that are difficult to capture in analytical models. These effects can include variations in contact patterns, stress concentrations, and dynamic responses, which may require advanced numerical simulations for accurate analysis. For clarity, the author is invited to mention these drawbacks by highlighting which of them have been considered in his/her RV model. **7d.** While force analysis is a valuable tool for assessing the impact of manufacturing errors on the tooth surface of a cycloid pinwheel in an RV reducer, it has limitations related to assumptions, uncertainty in error profiles, complexity, and the need for empirical validation. For completeness, the author is invited to mention them in his/her analysis. ***Some suggestions.*** i) *Force analysis often relies on idealized models and assumptions about the gear's geometry, material properties, and load distribution*. ii) *Manufacturing errors can be challenging to predict and quantify accurately. Variability in the manufacturing process, machine tolerances, and other factors can lead to uncertainty in the magnitude and distribution of errors on the tooth surface*. iii) *Manufacturing errors can take various forms, including profile errors, pitch errors, tooth spacing errors, and more.* iv) *RV reducers often experience dynamic loads and variations in operating conditions. Analyzing the effect of manufacturing errors under dynamic conditions adds complexity to the analysis and may require finite element analysis (FEA) or other advanced simulation techniques*. v) *Force analysis typically assumes uniform material properties, but variations in material properties due to manufacturing can also impact tooth surface stresses. These variations may not be adequately considered in simplified analyses*. vi) *Real-world operating conditions, such as temperature fluctuations and contamination, can affect the behavior of gear components. These factors are often difficult to incorporate into force analysis models*. **7e.** A short section in which the precision and stability analysis of the numerical results obtained must be added.	
Minor REVISION comments **1. Is language/English quality of the article suitable for scholarly communications?**	**1.** Some typos were found. Please double-check the English of the manuscript.	
Optional/General comments	Certainly, of great relevance is the inclusion of manufacturing errors in the study of the force exerted on the surface of the tooth of the cycloidal pinwheel of the RV gearbox. However, the present analysis contains several gaps that need to be filled. Given the very limited time dedicated to evaluating this work, I limit myself to providing only the few suggestions reported in point 7. above. The author is invited to take this into account in the new version of the manuscript.	

PART 2:

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

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