

In this paper, the authors describe the interesting use of distributed fiber optic sensors for measurement of gearbox torque and temperature measurement. Such a system can be used for gearbox usage monitoring and has potential for health monitoring. I appreciate the authors' recent revisions, but I still offer the following comments for improvement and greater clarity.

Abstract

- Lines 13-17: I did not notice it during the first review, but the phrase "...captured millimeter-scale distributed strain profiles..." may be a little confusing, as this I think implies the strain being measured is on the order of millimeters, rather than being measured every few millimeters. That is the quantity being measured is related to strain (distance) and is measured at a fine spatial resolution (distance), so care is needed here. This is stated later in the paragraph with "...measured strain across all monitored locations ..., with data collected every 2.6 mm". After rereading (including similar text in the Conclusions), I suggest the following wording for these 2 sentences "...we measured circumferential strain from planetary gear passage every 2.6 mm around the ring gear under different input torque levels. Our results show accurate identification of planet gear locations in real time and rotation speed (10.42 revolutions per minute) with a strong linear correlation ($R^2=0.9997$) between applied torque and measured strain across all 2,500 measured locations."
- Lines 21-22: I understand the authors' perspective and recent changes here, but the authors' response is better stated than the current sentence. That is, the DFOS alone doesn't "enhance structural integrity and operational efficiency" – or really what "operational efficiency" means in this case, which I tend to interpret literally as power transmission efficiency. I recommend instead a sentence similar to that described in the authors' response, such as "The approach offers a scalable and practical solution for early fault detection and support of design validation, and when combined with modeling can lead to a more durable and optimized design."

Introduction

- Line 32: I appreciate the authors' recent change here. However, rather than quoting the number of replacements, which in the case of 2,000 per year is specific to the US market, it makes more sense to simply say "Approximately 1% to 2% of gearboxes are replaced annually (Haus et al., 2024)."
- Line 63: The phrase "...measure strain continuously at millimeter-scale resolution around..." may seem contradictory or confusing as described above. I suggest simply "...measure strain every few millimeters around..."

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- Line 99: The phrase "...enabling continuous sensing at millimeter-scale resolution" may seem contradictory or confusing as described above. I suggest simply "...enabling sensing every few millimeters along the length of the optical fiber".

Results and Discussion

- Line 169: I appreciate the authors' revisions; however, I might recommend a slight modification to "...caused by frictional heat generated by shearing of the oil between the gear teeth and in the bearings, while..." I ask the authors to please though check my interpretation of their

statement for accuracy – I believe it's really a matter of stating the main cause(s) of temperature rise in a gearbox.

- Line 238: I appreciate the authors' response regarding "ratcheting". Considering that, I recommend adding the provided short description to the term such as "...ratcheting (i.e. the progressive, incremental deformation that occurs in a material when it is subjected to cyclic loading), inadequate lubrication...".
- Line 291: Similar to previous comments about the meaning of "operational efficiency", here I believe this refers to making O&M easier in general and reducing O&M costs. So, I recommend this be simplified to "...enabling proactive maintenance. This is particularly important for offshore wind farms, where reducing downtime and O&M costs is critical."

Conclusion

- Lines 309-311: Similar to previous sentences, I think the phrase "...millimeter-scale spatial resolution and a strain measurement accuracy of approximately 1 microstrain at a sampling rate of 12.5 Hz, with approximately 2,500 data points collected simultaneously around the gearbox" can be more clearly stated as "...a strain measurement accuracy of approximately 1 microstrain at a sampling rate of 12.5 Hz simultaneously over approximately 2,500 measurement locations spaced every 2.6 mm around the gearbox circumference".
- Line 325: Related to the changes in the Abstract, I think a more accurate phrase than "...optimizing tooth design for improved mechanical performance and refining gearbox control systems" is "...optimizing tooth design for improved reliability and refining turbine control systems".

Minor grammatical comments

- Line 292: Should be "the current DFOS system also has limitations."