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REVIEWER'S REPORT

Manuscript No.: IJAR- 58871

Title: "DIGITAL TECHNOLOGIES FOR PREDICTING THE OPERATIONAL RELIABILITY OF GLASS-FIBER MECHANICAL STRUCTURES "

Recommendation:
Accept

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

Reviewer Name: Dr. Ashish Yadav

Detailed Reviewer's Report

Reviewer's Comment for Publication.
Acceptance Comment are mentioned below suitable for the paper titled "DIGITAL TECHNOLOGIES FOR PREDICTING THE OPERATIONAL RELIABILITY OF GLASS-FIBER MECHANICAL STRUCTURES "

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction
The manuscript addresses a timely and important topic related to the prediction of operational reliability of glass-fibre-reinforced polymer (GFRP) mechanical structures. The introduction clearly establishes the importance of monitoring degradation and predicting structural performance during service. The study appropriately identifies the major failure mechanisms, including matrix cracking, interfacial debonding, delamination, fibre failure, and stiffness degradation. The influence of cyclic loading, temperature, moisture, vibration, and manufacturing defects is also appropriately recognised.

2. Literature Review
The literature review provides an appropriate overview of GFRP degradation, structural health monitoring, non-destructive testing, digital twins, and machine-learning techniques. The discussion demonstrates a good understanding of the complementary roles of fibre-optic, piezoelectric, acoustic-emission, and strain sensors. The inclusion of ultrasonic and thermographic inspection further strengthens the proposed monitoring concept. The manuscript also appropriately highlights the importance of combining data-driven methods with physics-based models.

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3. Solution Approach
The proposed solution approach is comprehensive and represents a major strength of the manuscript. The integration of a digital product passport, sensor-based monitoring, non-destructive testing, finite element modelling, digital twin technology, and prognostic analysis provides a logical closed-loop framework. The continuous updating of the digital twin using actual in-service measurements is particularly appropriate for asset-specific reliability assessment. The inclusion of loading history and environmental conditions improves the realism of degradation prediction. The proposed probabilistic remaining-useful-life assessment also appropriately considers measurement errors, incomplete data, and uncertainty in degradation parameters.

4. Results and Discussion
The results and discussion provide a convincing theoretical basis for the proposed digital reliability framework. The identified degradation mechanisms and influencing factors are consistent with the known behaviour of GFRP structures under operational conditions. The proposed combination of multiple sensing and non-destructive inspection technologies is technically appropriate for damage detection and condition assessment. The discussion of machine learning is well balanced, particularly through its proposed integration with physics-based composite models. The framework demonstrates clear potential for improving reliability prediction, optimising inspection intervals, and supporting the transition from scheduled to condition-based maintenance.

5. Conclusion
The conclusion effectively summarises the principal contribution of the study and reinforces the value of digital technologies for predicting GFRP structural reliability. The proposed integration of structural health monitoring, non-destructive testing, finite element modelling, digital twins, machine learning, and probabilistic prognostics is technically relevant and practically promising. The emphasis on updating predictions according to actual service history is particularly valuable. The study provides a sound conceptual foundation for remaining-useful-life assessment and predictive maintenance.