

REVIEWER'S REPORT

Manuscript No.: IJAR-59040

Title: Real-Time Fuel Quality Measurement and Automated Compliance Monitoring for Aviation Refuelling Systems in Saudi Arabia

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 "Real-Time Fuel Quality Measurement and Automated Compliance Monitoring for Aviation Refuelling Systems in Saudi Arabia"

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction:

The manuscript addresses a highly relevant and safety-critical topic concerning real-time fuel quality monitoring and automated compliance management in aviation refuelling systems. The introduction clearly explains the limitations of periodic sampling and the need for continuous, traceable, and operationally practical fuel-quality assessment. The focus on Jet A-1 and Saudi Arabian airport infrastructure provides strong industrial and regional relevance.

2. Literature Review:

The literature review provides a timely and relevant synthesis of research published between 2020 and 2025 on real-time aviation-fuel measurement, contamination detection, sensor integration, and automated process management. The combination of peer-reviewed research with ASTM, Joint Inspection Group, and Saudi aviation requirements gives the review both scientific and regulatory depth. The recognition that no single sensing technology can currently replace all laboratory testing is particularly important. The review therefore provides a strong foundation for developing a practical layered monitoring architecture.

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3. Solution Approach / Methodology:

The proposed layered approach is technically appropriate and provides a comprehensive framework for continuous aviation-fuel quality assurance. The integration of optical or dielectric sensing, particle detection, conductivity measurements, spectroscopy, edge validation, PLC control, and SCADA or fuelling-management systems is logically structured. The inclusion of rule-based compliance checks, audit trails, and controlled exception handling strengthens the operational and regulatory applicability of the approach. Retaining laboratory confirmation for certification-critical or ambiguous cases also provides an appropriate balance between automation and safety assurance.

4. Results and Discussion:

The findings effectively demonstrate the potential of integrated real-time monitoring to improve fuel-quality assurance, traceability, responsiveness, and operational reliability. The proposed monitoring points from fuel receipt and storage transfer through filtration, hydrant delivery, and aircraft fuelling provide a comprehensive view of the fuel-quality chain. The discussion appropriately emphasizes that continuous sensing should complement rather than immediately replace established laboratory verification. The identified priorities, including Saudi climatic validation, uncertainty budgets, cybersecurity, sustainable aviation fuel reference datasets, and regulatory pathways, provide valuable directions for future implementation and research.

5. Conclusion:

The conclusion is consistent with the evidence presented and clearly demonstrates the potential of real-time fuel-quality monitoring to strengthen aviation refuelling safety and compliance. The proposed framework is particularly relevant to Saudi Arabia's expanding aviation infrastructure and aligns well with the objectives of Vision 2030 and the Saudi Aviation Strategy. The study makes a valuable contribution by connecting advanced sensing technologies with regulatory compliance, operational assurance, and digital traceability.