

From Episodic Audit to Continuous Assurance: An AI-IIoT Based Occupational Health, Safety, and Environmental Framework for Indian Calcination Operations

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Abstract

This secondary-research study synthesizes evidence on ISO-aligned AI-IIoT architectures for continuous occupational health, safety, and environmental assurance in Indian calcination operations, where episodic audits can miss transient emissions and exposure spikes. Recent reviews show that IIoT, wearable sensing, edge-to-cloud analytics, and multi-agent or explainable AI architectures improve real-time hazard detection, safety decision support, and trustworthy escalation in industrial settings. India-specific evidence on continuous emission monitoring systems (CEMS) shows gains in transparency, accountability, and enforcement, while also highlighting calibration, certification, and regulatory-integration gaps. Digital-intervention and AI-adoption studies further indicate that worker wellbeing improves when technologies are tied to safety processes, secure data governance, and practical task optimization. Accordingly, the paper maps continuous monitoring, predictive intervention, and wearable-enabled alerts to ISO 45001 and ISO 14001 management processes and evaluates how these elements can shift SHE governance from compliance-oriented inspection to proactive assurance. The resulting framework supports audit-grade evidence generation, exposure reduction, and scalable adoption in high-dust, high-heat industrial environments.

Keywords

AI, IIoT, ISO 45001, ISO 14001, occupational health, continuous monitoring, CEMS, calcination.