

Research and implementation of a temperature and humidity monitoring solution for the TNT explosive production workshop at Explosive Materials Company 31.

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Abstract: This study presents the design, implementation, and evaluation of a real-time monitoring system for temperature and humidity within the TNT explosive production workshops of Explosive Material Company 31. Given the stringent safety and quality requirements of explosive manufacturing, precise environmental control is critical to prevent degradation and mitigate explosion risks. The proposed solution integrates wireless sensor nodes based on industrial-grade microcontrollers and high-accuracy digital sensors (DHT22/SHT series) to collect ambient data. A centralized supervisory system, developed using a SCADA architecture, processes the data and triggers immediate audiovisual alarms when parameters exceed predefined safety thresholds. The system was deployed across multiple production zones, demonstrating high reliability, low latency in data transmission, and effective early warning capabilities. Results indicate a significant improvement in environmental oversight compared to previous manual logging methods, enhancing both operational safety and product stability. This research provides a practical, cost-effective framework for environmental monitoring in hazardous industrial environments.

Keywords: Monitoring temperature, humidity, production workshop, TNT explosive