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Efficient Dispatch of a Maintenance Crew for a Network of Feedwater-Heater

Mohammed Alqahtani
King Khalid University
Saudi Arabia
m.alqahtani@kku.edu.sa

Abstract

Efficient maintenance of feedwater heaters in industrial facilities is essential for optimizing energy consumption and minimizing operational costs. This project addresses the logistical and cost challenges associated with managing inspections, repairs, and preventive maintenance across multiple feedwater heaters. The objective was to develop a cost-optimization model using a Mixed Integer Programming (MIP) approach to streamline crew dispatch and route planning. The system integrates predictive maintenance techniques to prioritize tasks based on real-time equipment health, ensuring timely interventions and reducing downtime. Scenario-based testing demonstrated significant improvements, including annual cost savings of up to 89.9% during peak demand periods and emission reductions of 84.4% for new heaters. The model's adaptability to various scenarios highlights its robustness and potential for scalability. The findings suggest that integrating AI for real-time data processing and scaling the system to larger networks can further enhance operational efficiency. This work establishes a framework for sustainable and cost effective maintenance management in complex industrial environments.

Keywords
Predictive maintenance, Optimization, Feedwater-Heater