

Quality Analytics and Big Data-Driven Optimization

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Abstract

In today's complex production systems, reactive quality control methods reliant on human factors are proving insufficient, leading to an increased Cost of Poor Quality (COPQ). This study proposes a proactive, data-driven Multi-Objective Optimization model integrating Machine Learning (ML) and Operations Research (OR). By utilizing key data streams like Nonconformity Forms and Vendor Inspection Reports, the model shifts from backward looking error detection to a prescriptive decision-making process. Our aim is to minimize total quality costs by simultaneously optimizing resource allocation, supplier selection, and production line assignments.

Keywords

Quality, Big Data, Optimization