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Lean-based process improvements in nylon filament yarn for enterprise competitiveness

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Abstract

The study demonstrates systematic efforts to improve the nylon filament yarn production process derived from various lean-based initiatives. This improvement supports smart factory transitions in alignment with enterprise's competitiveness and sustainability goals. The study applied value stream mapping (VSM), ECRS principles, and digital tools to identify and eliminate non-value-added activities, focusing on both process flow and defect reduction. The improvement essentially involved four steps: analysing the current process, identifying key waste areas, setting improvement targets, and implementing five practical interventions. These included streamlining yarn alignment, digitising yarn size measurement, reducing machine setup waste, minimising deformed yarn defects, and introducing a real-time material requisition and alert system. Over a 90% reduction in deformed yarn waste and significant cost savings were achieved. This approach demonstrates a replicable (and practical) framework for other production lines or units and contributes to competitiveness and sustainable improvements in the textile manufacturing sector.

Keywords

enterprise development, lean manufacturing, value stream mapping, VSM, waste reduction, ECRS, digital process improvement, smart factory, learning

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