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Analysis of Knitting Machine Maintenance Management in the Binong Jati Convection Industry Using the Failure Mode and Effects Analysis (FMEA) Method as the Basis for Preventive Maintenance

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ABSTRACT

Knitting machines are key equipment in the textile industry production process that greatly affect the smooth operation and quality of products. In small to medium-sized textile industries, common problems include high frequency of machine breakdowns, production downtime, and reduced knitting quality due to corrective maintenance systems. This study aims to identify failure modes in knitting machines, analyze the risk level of each failure using the Failure Mode and Effects Analysis (FMEA) method, and develop improvement proposals based on preventive maintenance. The research method used was descriptive qualitative-quantitative with data collection techniques through field observation, operator interviews, historical damage data, and machine maintenance records. FMEA analysis was carried out by assessing the Severity, Occurrence, and Detection levels to obtain the Risk Priority Number (RPN) value as the basis for determining risk priorities. The results of the study show that the failures with the highest RPN values include lack of lubrication, frequent thread breakage, worn or broken knitting needles, and frequent machine jamming. These failures have a significant impact on increased downtime and reduced product quality. A number of previous studies have shown that the Failure Mode and Effects Analysis (FMEA) method is widely used in the analysis of production machine maintenance and has been proven to be capable of identifying critical potential failures and setting priorities for corrective actions. Studies on the application of FMEA to knitting machines in small-to-medium-sized textile industries are still limited. Therefore, this study was conducted to fill this gap through failure risk analysis and the formulation of maintenance proposals tailored to actual conditions in the field. As an improvement measure, this study proposes the implementation of preventive maintenance through the establishment of a routine maintenance schedule, periodic inspection of critical components, scheduled lubrication, standardization of maintenance procedures, operator training, and recording of machine damage history. The implementation of these proposed improvements is expected to reduce the risk of failure, increase machine reliability, and support the smooth running of the production process on an ongoing basis.

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