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Validation of root causes for knitting machine downtime

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All machines and machine components are critical and their maintenance is of prime importance in every industrial sector. The halt of a manufacturing process is referred to as the downtime, which may have caused due to a planned or an unplanned event. The main objective of this study was to identify the root causes of knitting machine downtime. There were 178 knitting machines in the knitting section. Those 178 knitting machines were placed in 9 lines whereas each line contains 19 or 20 knitting machines each. Data were collected for a month. This research was based on quality factors including quality control charts and process capability analysis to identify and represent the output of the knitting machine production mainly based on the factors that are related to machine efficiency. The descriptive analysis, one-way ANOVA and the multiple comparison tests were done to the product-wise performance data. Some other analyses were done to find the top contributing reasons that affect the loss of availability in knitting machines. Since there are several types and products and three different teams, the product and team-wise variations were calculated considering availability, performance and quality factors. Out of the many reasons that cause downtime in knitting machines, in this project the stuck of liners in the machine, stuck of main yarn, broken of main yarn, broken of elastic yarn, stoppages occurred due to time taken to replace main yarn, needle run and main machine breakdowns were identified as the main reasons. Further analysis is done by using a fishbone diagram for the root causes for top reasons for machine downtime and liner rejection. The inspections found that most of the quality issues have occurred due to yarns which were not winded up to standard methods and proper conditioning was not done by the relevant employees. The actual liner maturation time is 24 hours. Due to urgent orders, liners are not kept for the maturation purpose. Proper planning should execute to keep the process clean and to give ample time to the employees of the yarn covering section to do their job.

Keywords: Knitting machine downtime, Yarn, Knitting, Downtime