Available online at www.elixirpublishers.com (Elixir International Journal)

Mechanical Engineering

Elixir Mech. Engg. 127 (2019) 52636-52639

ISSN: 2229-712X

Maintenance Model in Textile Industry for Performance Improvement

Md. Moyeen Kadri* and Vivek Babele
RGPM, Bhopal.

ARTICLE INFO

Article history:
Received: 10 January 2019;
Received in revised form:
05 February 2019;
Accepted: 15 February 2019;

Keywords
Total Productive Maintenance,
Maintenance model, OEE,
Textile Industry,
Visual Basic,
Simulation.

ABSTRACT

As maintenance play key roles for smooth production especially in the textile industry. Nowadays the effective maintenance model is not an option but it is the necessity of industries. It aims to reduce unplanned stoppage, breakdowns accidents and losses obstructing equipment effectiveness. Therefore by implementing TPM the industries can increase their equipment effectiveness and productivity. This present research work is aimed at implementation of Total productive maintenance in Indian textile industries. In the yarn section the TPM model is first introduced and staff members are trained according to the eight pillars of TPM. The need for driving down costs, integrating every activities and available resources of a company, empowering the employee to make decision, eliminating waste generated by failure across the value adding process, shortening of production lead time and delivery of quality assured services and products have been given due attention.

Introduction

Total Productive Maintenance (TPM) is a maintenance programme, which involves a newly defined concept for maintaining plants and equipment. The goal of the TPM programme is to markedly increase production while, at the same time, increasing employee morale and job satisfaction. The dual goals of TPM are zero breakdowns and zero defects; This obviously improves equipment efficiency rates and reduces costs. Generally the study will focus on assessing the existing maintenance system of the selected textile industry to investigate potential area of improvement so as to develop and implement the Total Productive Maintenance to the best achievement of the objective and the best performance of all the activities.

Selected Textile Industry is one of Modern Textile companies in Madhya Pradesh, India and the machineries are computerized except the one which bought from other textile industries. The company is capable of producing different items through new and computerized machineries but what is distressing is that the company has been operating under its capacity due to high rate of unplanned failure. In addition to this problem, the machinery that is failed may be out of function for a long period of time attributable to shortage of spare parts, poor controlling system and reporting system prevailing in the industry. The study mainly focuses on dealing with the way that the selected Textile industry enables to improve the existing maintenance system of the company to have better capacity utilization and to enhance the effectiveness of its equipments. The objectives of the research are:

1. To assess the existing maintenance system of the company to identify the problem and the key potential area for the improvement of the system.
2. To provide better maintenance system along with its implementation model for the company by developing the implementation of the Total Productive Maintenance.

Literature Review

The purpose of Quality Maintenance is to produce defect free products to maintain the product quality through eliminating nonconformance so as to satisfy the demand of the customer. The JIPM define Quality Maintenance as activities that are to set equipment conditions that preclude quality defects, based on the basic concept of maintaining perfect equipment to maintain perfect quality of products. Kristy et. al. (2001) elaborated the research on Total Quality Management (TQM), Just-in-Time (JIT) and Total Productive Maintenance (TPM) generally investigates the implementation and impact of these manufacturing programs in isolation. However, many researchers believe and argue conceptually the value of understanding the joint implementation and effect of manufacturing programs. His study investigates the practices of the three programs simultaneously. We find that there is evidence supporting the compatibility of the practices in these programs and that manufacturing performance is associated with the level of implementation of both socially- and technically oriented practices of the three programs. Chavan (2001) suggested textile industry a significant contributor too many national economies. It occupies an unique position in the Indian economy in terms of its contribution to industrial production, employment and exports. It is closely linked with agriculture and rural economy and is the single largest employer in the industrial sector, employing about 35 million people. industry in terms of its structure, an attempt has been made to present an overview of Indian textile industry in terms of its structure, and problems associated with it, its impact on environment, pollution control strategies. Dinesh Seth and Deepak Tripathi (2003) studied the strategic implications of TQM and TPM in an Indian manufacturing set-up and to detail literature reviews to highlight gap areas. To examine the relationship between factors influencing the implementation of TQM and TPM and business performance for the following three approaches in an Indian context:

Tele:
E-mail address: quadri76652@gmail.com

TQM alone; TPM alone; both TQM and TPM together. This is done to extract significant factors for the above three approaches. Design/methodology/approach – Empirical survey-based research on a sample size of 108 manufacturing companies. Ahuja (2014) investigated current status of Total Quality Management (TQM) and Total Productive Maintenance (TPM) implementation initiatives as well as benefits attained through synergetic TQM-TPM implementation in the manufacturing organization to assess roadmap followed by Indian manufacturing entrepreneur toward affecting manufacturing performance enhancements. The study has been carried out in the large scale manufacturing organization in the country that have implemented or are in the process of implementing TPM alone and TQM-TPM both.

Patel (2018) observed that the last two decades have witnessed an explosion in the area of Quality and Productivity improvement initiatives in the Indian SMEs using various tools and techniques like Lean Manufacturing, TQM, TPM, Six Sigma, Lean Six Sigma, ISO implementation etc. Every manufacturing industry has put in continuous efforts for its survival in the current volatile economy. Industries are trying to implement new and efficient techniques in their manufacturing operations. Their research work will helped to illustrate the existing hidden potential in small scale industry as well as a selection of suitable methods for productivity improvements. Wen- Hsien Tsai (2018) the textile industry is one of the world's major sources of industrial pollution, and related environmental issues are becoming an ever greater concern. This paper considers the environmental issues and its control to achieve profit maximization. This paper discusses the combination of mathematical programming and Industry 4.0 techniques to achieve the purpose of green production planning and control for the textile industry in the new era.

Background of the Company

Selected Textile Industry Private Limited Company was established over twenty three years ago, a pioneer in the private sector of Textile Industry in India. Due to confidentiality matter the exact name and layout has not been mentioned. From its humble beginnings with only few employees, Selected Textile Industry has grown into one of the major players in the industrial sector of the country.

With two blanket factories and an acrylic yarn dyeing plant, it now employs in excess of 500 men and women as worker. It is in the process of increasing it's paid up capital. The Selected Textile Industry Import and export, Yarns, blankets, etc and others industrial raw materials like agricultural products. It also manufactures Dyed Acrylic Yarn, Blankets of different quality, size, design, and color. The maintenance system of the company is according to the skill of the maintenance personnel. The maintenance department of the company has no manual. The researcher tried to find the problem that the company does not have the manuals, the answer found was the equipment vendor's didn't give enough material. The maintenance personnel just changes the items which failed by the operation after the failure occurs. There is no analysis done to find the causes and the effect of the failure.

Proposed Area of Computerization for the Industry

In the advanced world, the quest for automating the activities of a system is indispensable to enhance the ever increasing demands of the users through competitive advantage. In these days of high technology and rapid economical data communication, job planning, coordination, scheduling and execution are accomplished far more efficiently with the support of a sound computerized system than manipulating the system manually. Areas that many textile industries are now turning their attention are toward developing and using computer programmes geared toward control of the maintenance organization. In light of this, it is proposed that the industry need to force itself toward exploitation of the benefits from these eras technology to survive through cost effective solution to most of its problems.

The maintenance activities of the industry are not well equipped with training and work standards. Improving the maintenance workflow of the industry is not disputable. The proposed model incorporates training, autonomous maintenance, improvement concepts and standardization of the maintenance activities that makes the model far better than the existing system. In model the operators in both factories involve in minor inspections, more over training is provided for them to have know how of their equipment.

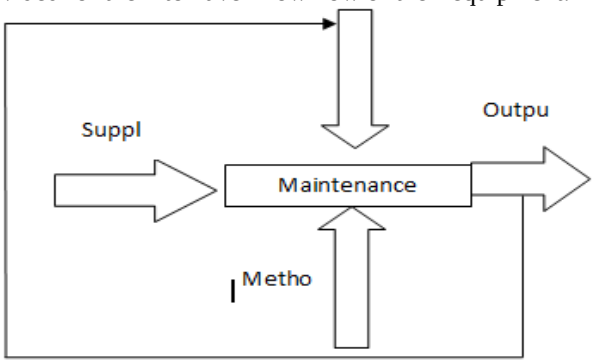

Figure 1. Simplified Maintenance System Model.

This simple proposed model is sustainable if and only if a company implements the Total Productive Maintenance system since the central core of the Total Productive Maintenance system is to integrate every activities of a company with maintenance department as well as involving the operators in maintenance activities. The subsequent section deals with the implementation model of the Total Productive Maintenance.

Software Development

The application software is developed by combining Visual basic and the Microsoft access in ARENA Simulation Software. By reviewing different literature the assessment questions are prepared and divided in to six levels. The distribution is mainly based on the steps in each TPM pillar development.

Figure 2. Screen shot of insertion, assessment, and new Factory registration command buttons (Visual basic form1)

There are eight pillars in TPM development which should be implemented side by side. The entire programme is assessed in each six months interval. The assessment will be

done according to the software and the company which does not performed well in that level will repeat the level and another six months will be given to improve the pillars on which the company performed badly. And after the sixth level the company will be awarded and should perform for the higher level of TPM. The application soft ware can be helpful for any industry which is willing to implement the TPM concept for higher equipment effectiveness and for higher productivity.

Application Software Guide

As it was discussed earlier the software is developed by combining Visual basic with Microsoft access. The Microsoft access contains the tables of different data. In these tables different questions in different pillars and levels are recorded and the questions are recalled and accessed to evaluate in visual basic form. The first form as shown in the fig 2 contains Questionnaires insertion, assessment, and new Factory registration command buttons. The second form of the software as shown in the fig3 below contains the access to register the new factory. In this form the factories are recorded and automatically the factory code will be given be the access. This window helps to recall the level at which the factory completed and the result of the same factory by that level.

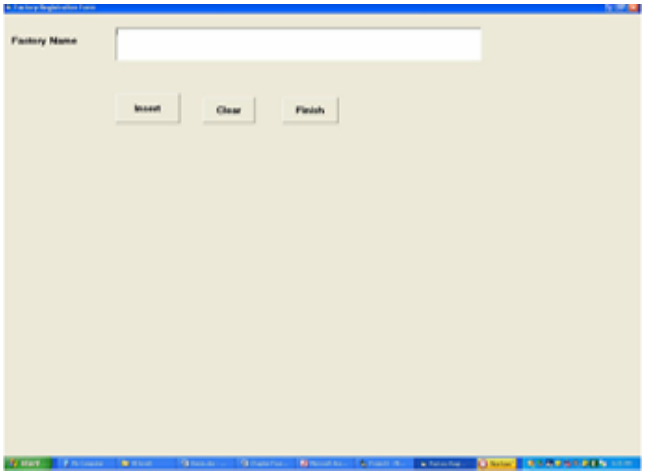

Figure 3. Visual basic Form 2.

The Third form as shown in the Fig.4 contains questionnaires insertion. In this form we can add any other questions in the database. The questions are inserted according to their respective pillars and levels are automatically added to the data base tables and stored. During assessment these questions are accessed and evaluated by the software.

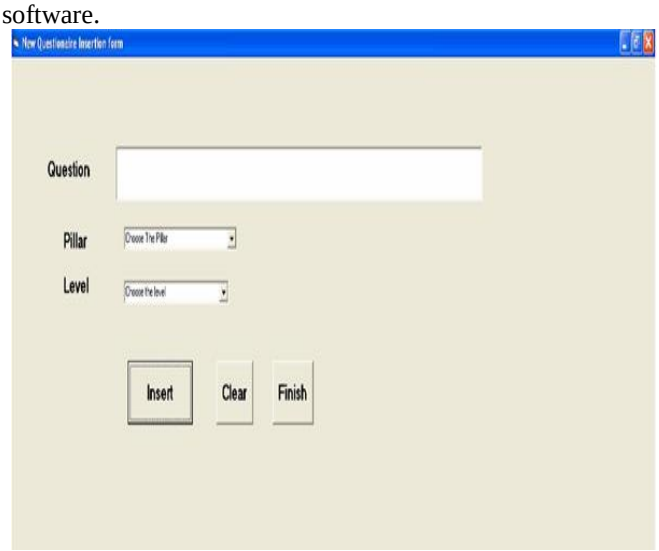

Figure 4. Visual basic form3

The fourth form as shown in the fig 5.4 below contains the pillar selection button, level selection button and factory selection buttons. After the selection of the above buttons the record button automatically records the questions to the form. The evaluation should take place by the experts and finally the value is recorded. The option buttons allow the evaluator to give the values from 15. If the factory has performed excellent by the indicated question the value 5 will be given and if it performed badly it will be given.

Figure 5. TPM assessment form4.

The last form of the visual basic shows the details of each pillar. After the last pillar of the level has been evaluated the summery command will be clicked and it will show the overall percentage of the score and after that if the user wants to view the details of the score in each level it will display the average out of five for each pillar.

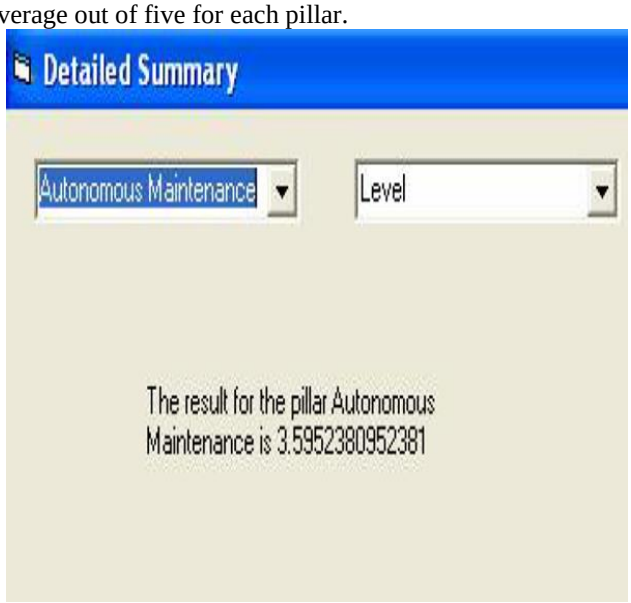

Figure 6. Detailed summery Form5

Conclusions

The study aims initially at scrutinizing the maintenance system of the industry and categorically concluded that the high rate of unplanned failure reigns in the Industry. This can be attributed to the condition of equipment, due to negligence of the operator and shortage of spare parts.

In order to alleviate the current situations of the maintenance system a typical model has been proposed based on the above findings. The model emphasizes three concepts of the modern era which are inevitable to implement in any day to day activities, in addition to the four major duties of maintenance; Inspection, management, failure management, work management, and spare part management. The concepts rely on the continuous improvement, empowering the employee and standardizing every activity to minimize the time of execution. And the model can be applicable to the transport and manufacturing industries with some adaptation.

The study also develops the implementation of total productive maintenance system to preserve the results of the above model since the central core of the Total Productive Maintenance system is to integrate every activities of a company with maintenance department as well as involving the operators in maintenance activities. The proposed implementation process executed devising the implementation steps systematically by breaking down each activities of the pillars of TPM and leveling them according to their priority.

References

Dhruv Shah & Mr. Pritesh Patel (2018) Productivity Improvement by Implementing Lean Manufacturing Tools In Manufacturing Industry, International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 03

Dinesh Seth and Deepak Tripathi (2003)Relationship between TQM and TPM implementation factors and business performance of manufacturing industry in Indian context, "International Journal of Quality & Reliability Management", Vol. 22 No. 3.

Johansson B., Nord C, TPM – one way to increased competitiveness.Examples from a medium sized company, Swedish, 1999.

Kristy et. al. (2001) Relationships between implementation of TQM, JIT, and TPM and manufacturing performance, Journal of Operations Management 19, 675–694.

Kanwarpreet Singh and Inderpreet Singh Ahuja (2014) An evaluation of transfusion of TQM-TPM implementation initiative in an Indian manufacturing industry, Journal of Quality in Maintenance Engineering, Vol. 21 No. 2, 2015

Masaji Tajiri, Fumio Gotoh, TPM Implementation: A Japanese Approach, McGrawHill, Inc., New York, 1992.

R B Chavan (2001), Indian Textile Industry-Environment, Indian Journal Of Fiber & Textile Research, Volume 26 .

Wen- Hsien Tsai (2018), Green Production Planning and Control for the Textile Industry by Using Mathematical Programming and Industry 4.0 Techniques, MDPI,