

Analysis of TPM implementation to improve production in a selected section of textile industry

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ABSTRACT

The primary goal of TPM (Total Productive Maintenance) programme is to change the culture of the company's maintenance policy by involvement of all employees toward the maintenance system of the company. The present paper aims to reduce unplanned stoppage, breakdown the accidents and losses obstructing equipment effectiveness. Prior to induce the TPM in the industry a review is being done by researcher and real time Overall equipment effectiveness is measured and shown to management of companies. Real time TPM is being implemented for an effective maintenance of the company and consecutive six month data is collected to see the change. Due to effective maintenance and employee involvement for one purpose has enforced the management for continuous improvement in the company through the systematic implementation of TPM.

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1.1 Introduction

Manufacturing industries have been adopted and accepted new approach to enhance the production performance around, developed and implemented so as to survive in the dynamic and fierce competitive system that are becoming ever more complex. 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 [1]. As they are the necessity to secure a sound future within an ever changing market and to be open to all market and technology driven opportunities. To meet these needs, one of the new techniques in maintenance area that is developed in Japan to support TQC and JIT is Total Productive Maintenance [2]. Even though, many management personnel consider maintenance as expense and evil activity, presently, there is a gradual shift in thinking as companies began to identify the role of maintenance and it is also well accepted that maintenance is one of the main potential area to use as a competitive advantage. Currently, the concept of TPM in Indian Manufacturing Industries is the critical missing concepts in successfully achieving not only world class equipment performance, but also it is a powerful new means in improving overall company performance [3].

The present research mainly deals with the principles and concepts of Total Productive Maintenance based on literature review and assess the existing maintenance activities of the selected textile industries in line of TPM. The work is organized in such a way that the results of the conducted study will be presented in comprehensible way.

2.1 An Introduction to Tpm

Maintenance is a profession devoted to keep the factory running in the best possible shape, making equipment reliable,

productive, and secure to operate. The maintenance function has historically been thought of as a necessary cost of doing business. However, new technologies and innovative practices have positioned the maintenance function to be an integral part of the overall profitability of many businesses. Modern maintenance techniques and practical approaches have the potential for significantly increasing competitive advantages in the global market. Just as the finely meshed gears of machinery must work together for the machine to perform its function, Production, Safety, Design Engineering, other team members, and Maintenance must work together to achieve true excellence.

The challenge for today's maintenance managers and reliability professionals, and all those involved in the maintenance profession, is to capture these opportunities. This requires establishing standards for maintenance and reliability practices, creating an appropriate information system to collect facts and build enthusiasm, and initiating enabling action plans. The responsibility of keeping our equipment and facility in optimal working conditions is not that of a small group of Engineers and Technicians, but every individual in the whole organization.

We all benefit of this optimal condition and therefore we all should be empowered to learn and intervene more in the vital process of preservation. TPM is exactly the discipline that will allow for us to achieve such optimal level of success [4].

2.1.1 Tpm Process at the Selected Company

At a pace to be chosen according to the particular conditions, the implementation process will go, at least, through 60% of the most important process machines at the most critical areas or departments [5]. Also "spontaneous implementation" is expected in some areas. For those, the TPM coordination will supply all the technical support required.

The general foremen and other key people of each shop department or production area will reach a decision about what is the next machine and what the most feasible schedule. They will also assign the people to the team for that particular project. Teams are normally comprised of four to eight people. Machine operators have a very important participation in this process. They will lead the team to solve the most important concerns that they have in the day to day dealing with the machine. They know how the machine could be improved to become safer and more comfortable to work with. They become customers and co-providers of the TPM effort. By participating, they develop "ownership" on their machines.

At the beginning, teams will be comprised of one or two operators and one supervisor from the production area and one mechanic, one electrician from the maintenance department and the coordinator. As the programme evolves, the production departments will be more involved all the time, to a point when they will build the teams with three to six production people and only one coordinator from maintenance. They will be supported eventually, but momentarily, by maintenance technicians that may be required for each task. The training will be given to those small teams, one each time. Each team meets for a total of five to six one hour sessions, some of them before starting the "hands on experience" of the TPM implementation.

As a result of the training, the team develops an implementation plan that consists of cleaning, reconditioning, lubricating and also making any modifications that may be convenient for the equipment to be more accessible to the daily operator's routine and any maintenance service that may be needed in the future. Such modifications may also be made to prevent the equipment from getting dirty or damaged by external agents, such as rain, dust, spills and all kinds of contamination. When those modifications imply any structural or engineering changes, experienced people from other departments or even external resources, such as contractors, will be involved [6,7].

3.1 Objectives

The study mainly focuses on dealing with the way that the selected Textile industry try to improve the existing maintenance system of the company to have better capacity utilization and to enhance production performance of the company. Critically examine and investigate the problems of the existing maintenance system of the company using various TPM tools.

4.1 Research Methodology

This study will exploited various research methodologies by exploring their contribution toward the best triumph of the anticipated results. Relevant primary and secondary information was congregated to induce superior maintenance system for the industry. The relevant secondary data was collected from the technical manual, monthly and annual report of the industry. Information was also gathered using questionnaire and interview in structured way besides direct observation on site visit to enable the investigator to keep tracking the responses.

The collected data mainly aims at assessing the existing maintenance system and the future business plan of the industry. Besides, the data is synthesized with literature for investigating the potential area of improvement. Data analysis in the research has been conducted using appropriate tools in order to identify core problems in the specified company. Based on the analysis, for various maintenance activities of the industry some work flow and systems are developed and

proposed. More over a systematic approach is to be analyzed for production performance is improvement. Finally, Total Productive Maintenance system is developed along with its implementation and master plan for the selected textile industry. The whole research will be divided into many phases in sequence as follows; exhaustive literature review, visit to industry, discussion with expert/production manager/engineer etc., data Analysis, interpretation of finding

4.1.2 Short History of the Company

The growing aspirations of consumers have led to sea change in the way of textile products are produced and delivered. The STI has understood the finer nuances of technology-led transformation by constantly seeking new technologies and product solutions to cater to the changing needs of customers. The Group has a proactive focus on the contributions that technology can make in developing new products, improved business processes and effective client service since the establishment of company in 1982.

The art of absorbing new technologies have been perfected over the years through a process of collaborative training with the manufacturers, inter-plant experience sharing, cross functional groups and a continuous feedback system. Thus, there is a large pool of soft know-how, which helps to generate value added textile solutions for the customers. The STI is on the cutting edge of technology in Spinning which has propelled the Group to be the largest producer of compact, gassed, mercerized and fibre dyed yarns in India. In fabric, the Group uses the ultra modern weaving and processing technology sourced from Japan and Europe. In sewing thread, it has accessed A & E's technological prowess. In acrylic fiber, the Group uses the most coveted Japanese technology. The STI is among the few fully integrated fabric suppliers in the country. An exquisite range of fabrics for shirting and trousers enables The STI to offer fashion solutions to the leading clothing manufactures in the world. The state-of-the-art manufacturing facilities producing 90 mn meters per annum processed fabric are located in North and Central India, which cater to the highly customized fabric needs of the buyers. An integrated fabric supply chain extending from raw materials to yarns and from weaving to processing provides the winning edge to the customers.

5.1 Data Analysis of Blanket Factory

The required data are not available especially to assess the maintenance effectiveness of the company, but few related data are collected to assess the overall performance and problem areas of the company.

As the Figure 1, which shows the monthly production of blanket? This is being caused by different problems of the company. One of the problems assessed is the unplanned stoppages of the machineries caused by the shortage of spare parts. When we think of production we have to think the health of the machineries first. Otherwise the unplanned stoppage is expecting situation.

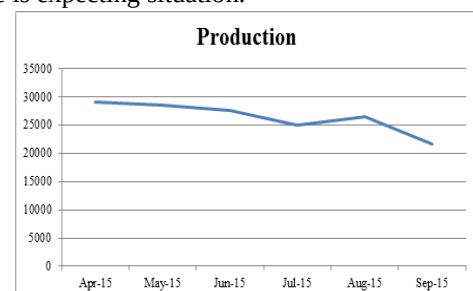


Fig 1. Monthly production of blanket.

The other situation analyzed from the data collected is the amount of waste. In this case it is difficult to analyze the amount of waste in Kg with the previous month waste, because it is proportional to the amount of product.

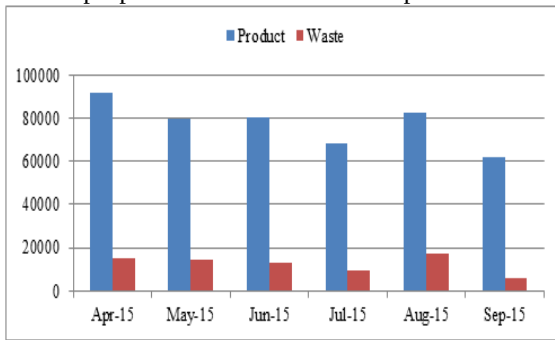


Fig 2. Waste and production report of the six months.

It can analyze that the wastage is not in increasing rate. This is not to show that the company should be satisfied by the result but still it has to perform much to decrease the amount of waste scientifically. The data collected shows that there are four types of defects in the process of blanket factory. These are Salvage, Loom pantor, Raising, and Cutting wastes.

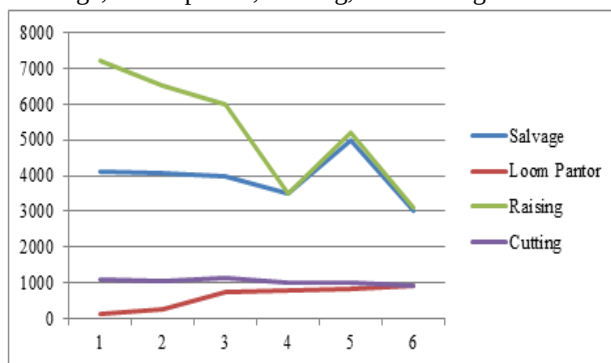


Fig 3. Shows the comparative analysis of the types of defect in blanket factory.

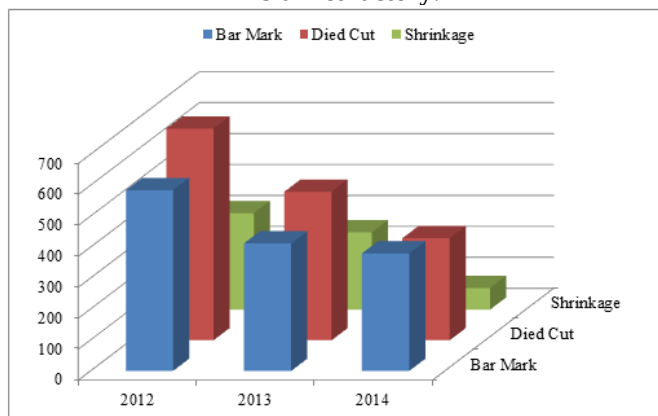


Fig 4. The type and amount of defects in three years.

1. Defect: bar mark

Cause: Improper loading, over loading, stick misallocation, over loading the stick

2. Defect: cutting

Cause: Improper detaching the package, Carelessness in unloading, Carelessness in loading.

3. Defect: shade variation;

Cause: Raw material problem, non-uniform in quality, mixed yarn, low quality yarn poor supervisor, Color incompatibility operator negligence

4. Defect: shrinkage

Cause: improper loading, stick misallocation

5.2 Reasons for Failure Of Preventive Maintenance

The probable reasons for failure of preventive maintenance in the company are identified into eight categories. These were scanned for mentioned failure reasons, which were then recorded in a spreadsheet, which the reasons were sorted is shown in figure 5.

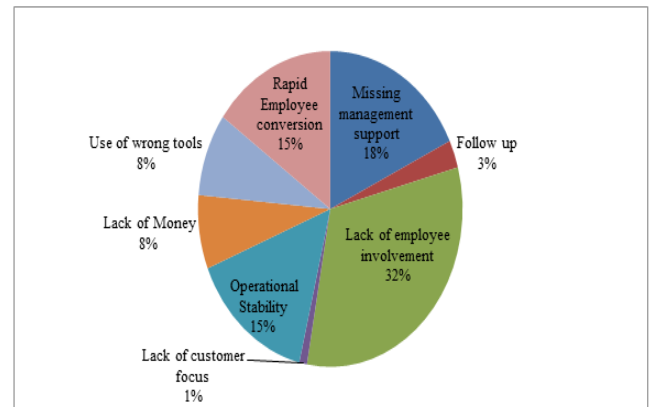


Fig 5. Problem areas of the company.

Missing Management support (1) refers to the situation that one person in the company is assigned with the task to implement Lean but gets no support from upper management who has to provide resources (people, money, machines, material) but also has to exemplify the Lean ideas in order for them to be taken seriously by all employees and therefore create a culture change. Further the failure also takes place due to lack of follow up (2) because everywhere follow up is required and it is the basic steps of management. Failure through lack of employee involvement (3) happens because the ideas, improvements and problems of the Lean implementation are not communicated within the organization. Employee involvement additionally includes employee training and involving all affected employees in the problem solving process, which is often lacked in the so called “top down” implementation, where the problems are solely solved by the engineering department and then forced onto the operators. The lack of customer focus (4) refers to the thought that all an organization does should be seen through the eyes of the customer and then reduced to those actions that the customer is actually willing to pay for. This idea is mentioned in almost every book on Lean and is a valuable proposal of Lean. Operational Stability (5) refers to the earlier explained base of the house of lean, which includes demand leveling and standard work to create a stable operation. The problem of lacking money (6) for the TPM implementation is usually due to the fact that the monetary value of lean improvements is not always immediately visible, which makes it difficult to get the needed resources from upper management. In this sense, it is connected to the first problem of management support. If the wrong tools (7) are used in a Lean implementation, the organizations took tools from the house of lean without considering the need of the situation, which can either be caused by insufficient understanding of the tools or by a wrong assessment of the problem. Lastly, a rapid conversion of employee or changing duty schedule (8) is often caused by short planning horizons of organizations who aim to retrieve the invested money in between 6 to 24 months. A real conversion involves multiple cycles of continuous improvement which will not be accomplished in such a short time frame. In fact, it violates one of the main ideas of TPM that continuous improvement is never over and the company is therefore continually striving for perfection.

6.1 Conclusions

This research has been conducted and written in relation to the implementation of Total Productive Maintenance System in a reputed textile industry willing to improve their system. 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. The underprivileged preventive maintenance system of the industry is also contributed to this effect. The line of investigation winds up that the effect of not involving the operator in minor inspection and restoration of equipment escalates unexpected number of failures which challenges to maintain the proactive maintenance program. 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.

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