UNIVERSITI TEKNIKAL MALAYSIA MELAKA

THE SIGNIFICANT OF TOTAL PREVENTIVE MAINTENANCE IMPLEMENTATION – CASE STUDY

Thesis submitted in accordance with the partial requirements of the Universiti Teknikal Malaysia Melaka for the Bachelor of Manufacturing Engineering (Process and System)

By

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DECLARATION

I hereby, declare this thesis entitled “The Significanct of Total Preventive Maintenance Implementation – Case Study” is the results of my own research except as cited in the reference.

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ABSTRACT

In today’s global economy customers expect manufacturer to provide excellent quality, reliable delivery and competitive pricing. This demands that the manufacturer’s machines and processes are highly reliable. The overall effectiveness of the machines, equipment and processes are the paramount to provide consistency of product quality and supply at a realistic price, poor equipment operating performance are no longer affordable or acceptable. Some world class companies recognized that the effective application of modern technology can only be achieved through TPM, Total Preventive Maintenance with the meaning takes steps to prevent and fix problems before failure occur. So, this case study is specially written to highlight the concept, the principle, the significant and the important of the TPM. TPM is rooted in seven specific and clearly defined solid principles. These underlying concepts or principles, which are the fundamental doctrine of TPM, can be referred to as the pillars of TPM. The word pillar is used as all the criteria in the TPM are so important that if any one of the criteria is unable to be taken into the account, the TPM will not be well performed or the serious case is it will damage the overall TPM. This can be compared with the pillar in constructing a building. When there is no pillar, the building cannot be constructed. In the end of this report it will provide an overview to the reader regarding the basic of Total Preventive Maintenance.
ABSTRAK

DEDICATION

For all of the gifts they have given me, I dedicate this report to my best friends – my parents and my siblings, for their enduring belief in me and years of patience, support, advice and love.
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CHAPTER 1
INTRODUCTION

1.1 Background

“The Significant of Total Preventive Maintenance Implementation”- a topic to be discussed. Verbally, every single word for this topic can be defined as:

- “Significant” as some important thing which having a special or suggestive meaning.
- “Total” is defined as the complete or entire.
- “Preventive” is defined as the type of serving or designed to avoid.
- “Maintenance” as something to keep up or retain.
- “Implementation” as an action of carrying an understanding or an agreement.

Nowadays, people from all walk of lives fight for zero rejection no matter in company, factory, supermarket, school or others. As a proverb goes “Prevention is better than cure”. So, it is trying to tell us that in order to get or achieve a good result for anything we do, we need to think what will give impact to the work and prevent those obstacles from happening.

In this age, all the factories have their own preventive maintenance. But the approach for each factory applies may different from one and another. Since there are many approaches that can be used, so some of the factory prefer the “5S” system, some of the factory prefer “Kaizen” techniques and others factories prefer others methods.
The main purpose of conducting out the preventive maintenance is to ensure that the organization which includes management, production and others can be well operated. The authorities use preventive maintenance to fight for zero rejection, zero complaint from customer and zero accident in the organization. As a result it is vital for us to know what is exactly mean by the total preventive maintenance and what is inside the total preventive maintenance.
1.2 Objective

There are several objectives for this case study. Among them are:

1) To carry out a research regarding the significant of total preventive maintenance implementation in the manufacturing industry.
2) To study the existing TPM and identified their use in the industry through reference books, journal and surfing internet.
3) To observe and evaluate on the actual condition of TPM applied or implemented by the manufacturing industry and the forms needed in order to make the TPM successful.
4) To compare and observe the differences between the company with good TPM and the company with no (or not complete) TPM.
5) To highlight the significant of the TPM implementation in one’s company.
1.3 Scope

The scope of this case study is actually trying to identify the significant of the total preventive maintenance in a company or a factory. Here, the research will be stressed on the production line for that particular industry.

In this research, firstly a study on the theoretical of the total preventive maintenance will be carried out. Here, different type of TPM will be studied but this involved only the basic part of each type of TPM. The most important is the significant of the TPM as stated in the reference book, journal or others materials. After that a visit will be carried out to two sample companies. Here, one of the company will have a good TPM and the other will not have a good (only 20% complete) TPM. During the visit, an observation and investigation on the company’s TPM will be done. From there, the significant of the total preventive maintenance and the kind of preventive maintenance has been chosen by the factory will be identified. Then a comparison may be made with the information collected from the research and the real industry in the form of the significant of the TPM. At the same time, a comparison may be made between the differences of the both companies in the form of the significant with and without TPM. Besides that, the forms need to be used in making the TPM success in a company will be identified by referring to the sample company. In the end, how a Total Preventive Maintenance can help a company to achieve high productivity and zero reject will be highlighted.
1.4 Report Outline

In this case study, it will consist of two phases. First phase will consist of three (3) chapters and the second phase will consist of another three (3) chapters. Chapter 1 discusses on the scope, the objectives, the outline and the problem statement related to the topic. Chapter 2 outlines the literature review of this case study. In this chapter, the concept, the pillar of TPM, the steps in implementing TPM, the 5S system, the Kaizen system and others theoretical concept related to the TPM are clearly highlighted. Besides that, the significant of the TPM as stated in the reference book, journal or any others material are discussed. In Chapter 3, various type of techniques used in this research are outlined. All the techniques are clearly explained. In the first phase, it will provide an overview for the reader regarding the TPM, Total Preventive Maintenance. As for the second phase, it determines the actual result by going through the visit to the company with and without TPM. From the visit, all the data and information collected are discussed and analyzed in the second phase. In Chapter 4 entitled Result try to put in all the data and information from the visit. From the data, graphs are produced by using Excel. At the same time, the comparison between the company with TPM and the company without the TPM are also highlighted in this chapter. Apart that, the forms needed in order to make the TPM program successful are also attached in this chapter. Subsequently, in Chapter 5 it tries to further discuss the result or all the information under the chapter 4. All the findings are clearly discussed in this chapter. Before ending the chapter 5, the problems face while conducting out the survey and the recommendations for the study are attached in the chapter 5. Lastly, it comes to the final chapter - Conclusion. In this chapter, it will finalist and conclude all the discussions that have been made by relating them to the objectives and the scopes.
1.5 Problem Statement

Total Preventive Maintenance is no longer a new topic to discuss for. Over the year, humans’ lives have been inflected from day to day. So as the same for the global business environment and global technology which have been faster and more drastically than ever before. As a result, to make the system in a company to become easier, smoother and able to survive in this new world, total preventive maintenance will be the best choice. For example, in a company without a TPM the process in the production of that company is unable to fight for zero error and when things happened such as the machine malfunction, the production needs to be stopped compared to a company with a systematic TPM who can fight for zero error in the production and even when the machine is malfunction, the production line still can be moved on as there is a good preventive system.

Actually, we realize the advantages of a TPM to one’s company or factory. But the problem is that we do not know the correct way to implement the TPM. The worst thing is that some of the companies or factories even do not want to accept this new change. Even we know, but we want to learn deep as nowadays, all the countries in the world already try to hold hands together to shape, to motivate, to develop and to welcome the total preventive maintenance inflection! So, this study will at least give an overview to the people who read this report to help to get some knowledge regarding the TPM.
CHAPTER 2
LITERATURE REVIEW

2.1 History of Total Preventive Maintenance

TPM evolved from TQM, which evolved as a direct result of Dr. W. Edwards Deming's influence on Japanese industry. Dr. Deming began his work in Japan shortly after World War II [1]. Dr. Deming initially began to show the Japanese how to use statistical analysis in manufacturing and how to use the resulting data to control quality during manufacturing. This new manufacturing concept eventually became known as Total Quality Management or TQM.

When the problems of plant maintenance were examined as a part of the TQM program, some of the general concepts did not seem to fit or work well in the maintenance environment. Preventative maintenance (PM) procedures had been in place for some time and PM was practiced in most plants. Using PM techniques, maintenance schedules designed to keep machines operational were developed.

However, this technique often resulted in machines being over-serviced in an attempt to improve production. Manufacturer's maintenance schedules had to be followed. There was little or no involvement of the machine operator in the maintenance program and maintenance personnel had little training beyond what was contained in often inadequate maintenance manuals.

In order to improve productivity and product quality was quickly recognized by those companies who were committed to the TQM programs. To solve this problem and still adhere to the TQM concepts, modifications were made to the original TQM
concepts. These modifications elevated maintenance to the status of being an integral part of the overall quality program.

The origin of the term "Total Preventive Maintenance" is disputed. Some say that it was first coined by American manufacturers over forty years ago. Others contribute its origin to a maintenance program used in the late 1960's by Nippondenso, a Japanese manufacturer of automotive electrical parts. Seiichi Nakajima, an officer with the Institute of Plant Maintenance in Japan is credited with defining the concepts of TPM and seeing it implemented in hundreds of plants in Japan [1].

Books and articles on TPM by Mr. Nakajima and other Japanese as well as American authors began appearing in the late 1980's. The first widely attended TPM conference held in the United States occurred in 1990 [1]. Today, several consulting companies routinely offer TPM conferences as well as provide consulting and coordination services for companies wishing to start a TPM program in their plants.

### 2.2 Definition of Total Preventive Maintenance (TPM)

First and foremost, as a definition, it can be considered that TPM as the medical science of machines. Total Preventive Maintenance (TPM) is a maintenance program which involves a newly defined concept for maintaining plants and equipment. At the same time, preventive maintenance takes steps to prevent and fix problems before failure occur [2].

Regarding the steps involved, it may include proper design and installation of equipment where all the equipments involved are designed properly so as to make the installation become easy. Apart from that, the step may includes keeping an accurate history of equipment performance where it means the performance of the equipment should be listed down and keep well for further reparation if there is a need. Moreover there should be an equipments scheduled routine inspections which
equipment needs to be inspected from time to time to make sure that the equipment can function well.

If these activities are planned, shutdowns, when necessary, will not cause undue burden on the production activity. As a result, the cost of the repair and breakdown will decrease (Figure 2.1). What can be said here is when there is a continuous preventive maintenance, once there is a breakdown or a repair work is needed, the repair work will not cost much. On the other hand if there is no preventive maintenance, the cost for reparation will be very high.

![Figure 2.1: The comparisons of costs at different levels of maintenance](image)

So, what can be said here is that TPM is not merely a maintenance program; it is an equipment management program. It combines and promotes the concepts of continuous, total quality improvement and zero defects by making the operator a partner in the maintenance and equipment management efforts.
2.3 Goals of TPM

Things will not be recommended of there is no goal. As a result, TPM is recommended for certain goals. First and foremost is it tries to maintain the capability of the existing equipment. By establishing an adequate preventive maintenance programs, it can accomplish the timely and appropriate response to equipment failure, reduction of equipment downtime, and an increase in equipment availability. So, the capability of equipment will be maintained.

Secondly, the goal of the TPM is to inspect the cleanliness as well as the lubrication available in equipment [3]. This goal may include development of a comprehensive program for operators to perform routine tasks to detect problems before they occur and a comprehensive schedule for regular and routine cleaning and lubrication and equipment.

Thirdly, the goal of TPM is to modify, alternate and install equipment [5]. Of course the modification is carried on order to improve the capability of the equipment. Anyway, these are non-routine activities and therefore can be scheduled during non-peak or slack periods to increase the efficiency and utilization of the maintenance personnel.

At the same rime, the goal of TPM is to maintain the existing building and grounds. This may include building repairs, painting, and a variety of other similar tasks. By going through these processes, it can make the building looks new and the operator can carry out their tasks in more comfortable environment.

By going through the TPM, it aims to change all the investment (input) items (Figure 2.2) such as the material, money, tools and others into the safeness of the organization, the maintainability of the equipment, to help the organization to achieve profit and many others. By going through the maintenance, it hopes that the organization will be able to achieve high performance and hence will guide and lead the organization to serve better for the customers.