



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**PREVENTIVE MAINTENANCE (PM) SYSTEM APPLYING AT
JTKP'S LABS**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Manufacturing Engineering Technology (Process & Technology) With Honors

by

CHE KU ABDUL MAJID BIN CHE KU ARIFFIN

B071110335

890412-11-5515

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.....
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ABSTRAK

This project describes about the application of Preventive maintenance (PM) on the milling machine and lathe machine. As a preference, this project has been held at the JTKP's Labs in Universiti Teknikal Malaysia Melaka (UTeM). Many of labs do not have proper scheduling of maintenance. This situation will lead cost of maintenance system for all machine, tool and equipment will be increase. Some of labs have maintenance system but do not document properly the maintenance documentation. The type of machine used in this research is Vertical/Horizontal Milling machine (Full Mark) and Metal Turning Lathe machine. The purpose and main objective of this project was to study the process of Preventive Maintenance (PM) for milling conventional and lathe conventional at JTKP labs which is to find the advantage and benefit use Preventive Maintenance (PM), to document a daily, weekly, monthly and annually and then make improvement schedule for all labs and then to investigate before and after apply total preventive maintenance. This Preventive Maintenance (PM) will be held at JTKP's Labs due on company do not have preventive maintenance system which should performed periodically to reduce the incidence of equipment failure. In this research, Fuzzy mapping technique is used to eliminate the abnormalities following with development of standard maintenance check sheet to enhance the machine performance. Research has been done before and after the machine was used. At the end of this research, the maintenance application was used which the Preventive Maintenance has been documented and recorded based on standard as reference later. Thus, the Preventive Maintenance keep the milling and lathe machine more clean, equipment and facilities will be systematic, equipment failure will decrease and also makes the machine always in good condition and preventing the machine becomes breakdowns.

ABSTRACT

Projek ini menerangkan mengenai penggunaan “Preventive Maintenance (PM)” pada mesin milling dan juga mesin lathe. Sebagai rujukan, projek ini telah di jalankan di JTKP’s Labs di Universiti Teknikal Malaysia Melaka (UTeM). Kebanyakan makmal tidak mempunyai penjadualan betul penyelenggaraan. Keadaan ini akan menyebabkan kos penyelenggaraan sistem untuk semua mesin, alat dan peralatan akan meningkatkan. Beberapa makmal mempunyai sistem penyelenggaraan tetapi tidak mendokumenkan betul dokumentasi penyelenggaraan. Jenis mesin yang digunakan dalam kajian ini adalah Vertical/Horizontal Milling (Full Mark) dan Mesin Larik. Objektif utama projek ini adalah untuk mengkaji proses Penyelenggaraan Pencegahan (PM) untuk pengilangan konvensional dan pelarik konvensional seperti mengetahui kelebihan dan manfaat penggunaan Penyelenggaraan Pencegahan (PM), Untuk dokumen harian, mingguan, bulanan dan tahunan dan kemudian membuat jadual peningkatan untuk semua makmal dan juga untuk menyiasat sebelum dan selepas memohon jumlah penyelenggaraan pencegahan. Dalam kajian ini, teknik “Fuguai Mapping” digunakan untuk mengesan kelainan dan juga perubahan yang berlaku kepada mesin mengikut standard yang telah ditetapkan untuk meningkatkan keupayaan mesin. Kajian ini dilakukan sebelum dan selepas mesin itu digunakan. Pada akhir kajian ini, penyelenggaraan yang menggunakan PM telah didokumen dan direkodkan berdasarkan standard sebagai rujukan. Oleh itu, PM dapat menjaga mesin Milling dan mesin Larik supaya lebih bersih, peralatan dan kemudahan lebih sistematik, kegagalan peralatan dapat dikurangkan dan juga mesin sentiasa dalam keadaan yang baik dan mencegah mesin dari mengalami kerosakan.

DEDICATION

Special thanks to my beloved family especially to my mother, my supervisor and also thank you so much to my friend for your support and invocation.

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LIST OF ABBREVIATIONS

PM	-	Preventive Maintenance
OPL	-	One Point Lesson

CHAPTER 1

INTRODUCTION

Preventive Maintenance (PM) is the application of preventive maintenance strategies in an organized and standardized method. Preventive maintenance is an approach that places the responsibility for routine maintenance on the workers who operate the machinery, rather than employing separate maintenance personnel for that function. This Preventive Maintenance will be conducted at machine in lab Jabatan Technology Kejuruteraan Pembuatan (JTKP) which is milling machine and lathe machine. The common focus of this study is changed from fixing breakdowns machines to preventing them.

1.1 Background Of The Study

In this study, it is clearly shown that the conditions of machine are the important term in manufacturing industry. Proper hands-on maintenance techniques provide increased reliability and uptime for machine in lab JTKP which is milling machine and lathe machine. The common focus of this study is changed from fixing breakdowns machines to preventing them. The benefits of Preventive Maintenance (PM) come when companies transition from a fire-fighting mode of fixing one sudden breakdown after another to preventing those breakdowns.

The research of this study involved the fundamentals of maintenance of milling machine and lathe machine and also the process which are related to the PM concept. The main focus of this study is focused on PM applying at milling machine, lathe machine and welding machine. The purpose of this research is on the aspect need on

maintenance of those machine such as maintenance, strategies in an organized and standardized method. Preventive maintenance is an approach that places the responsibility for routine maintenance on the who operate the machinery. The term maintenance is used to describe the efforts that will make for keeping the facilities and equipment in good working order. This Preventive Maintenance (PM) should be make continuously at JTKP labs for extending the life of a machine for used by students in the future.

1.2 Problem Statement

Nowdays many of labs do not have proper scheduling of maintenance. This situation will lead cost of maintenance system for all machine, tool and equipment will be increase. Some of labs have maintenance system but do not document properly the maintenance documentation. Preventive maintenance brings maintenance into focus as a necessary and vitally importance part of the labs. JTKP labs is a new labs at campus industry under Universiti Teknikal Malaysia Melaka (UTEM). There have many new machine, new equipment, new arrangement and many new thing. This situation will lead to not make proper arrangement for document. Good document management is very needed in every company or every organization because when some document is need, then you know where to find and that document are easy to get. When apply PM for arrangement document, we can reduce time to get any document because with PM all document will be in the right place, organized, neat, beautiful and most importantly easy to find. Many equipment and tool have at JTKP's lab and need to arragement in proper to make sure all equipment will put in the right place. Proper arragement need because that can make easy when to use or to find any equipment. If all equipment put in one place, this situation will make problem when want to fnd some equipment and it also can lead to damage or broken tool when there have many tool in one place. Machine requires proper way to handle and care to extend its life span. Before the occurrence of any damage, we should do a deterrent to prevent worse damage. To do prevention, the most accurate way is to use Preventive Maintenance (PM).

1.3 Objective

The main objective of this project was to study the process of Preventive Maintenance (PM) for milling conventional and lathe conventional at JTKP labs.

- (a) To find the advantage and benefit use Preventive Maintenance (PM) at JTKP labs.
- (b) To document a daily, weekly, monthly and annually and then make improvement schedule for all labs.
- (c) To investigate before and after apply total preventive maintenance.

1.4 Scope of Project

This study focuses on the concept of Preventive Maintenance (PM) that will applying at JTKP labs. Beside that, this project will study what aspect that need on maintenance of milling and lathe. The aspect of maintenance such as a daily maintenance, weekly maintenance, monthly maintenance, and annually maintenance will be incetigated. The maintenance action is very important to avoid the breakdown problem from happened to the machine. There have preventive maintenance, breakdown maintenance and corrective maintenance had been implement in this lab, but the show the poor result of maintenance and not implement systematic. So the solution is to implement of PM programme for milling machine and lathe laboratory. This project will define PM in some detail, evaluate its strenghts and weaknesses as a maintenance philosopy, and discuss implementation procedures. Example of successfully implement programs will be present.

Other than that, this project will be focus on aspect make improvement and arrangement schedule for every document in JTKP labs. All document will be make arrangement in proper way for keep the document be in the right place and easy to find went needed. Preventive Maintenance (PM) very need to apply at all machine

for keeping the facilities and equipment in good working order. This PM also should be make continuously at JTKP labs for extending the life of a machine for used by students in the future.

CHAPTER 2

LITERATURE REVIEW

1.1 Introduction

In this literature review, issue that is related with the Preventive Maintenance (PM) in manufacturing industry will discuss thoroughly. The legal requirement regarding the Preventive Maintenance (PM) is state in this part and explains further on what is the preventive maintenance and how important the factor to be controlled the maintenance process in machining operation. The other related topic is about the maintenance overview, milling machine and lathe machine and then the other factor that related the maintenance operation. Here in this literature review also review the other method and techniques which used in the preventive maintenance and also the development and the challenge of the preventive maintenance in industry nowadays.

2.1.1 Preventive Maintenance

Preventive Maintenance (PM) is the application of preventive maintenance strategies in an organized and standardized method. Preventive maintenance is an approach that places the responsibility for routine maintenance on the workers who operate the the machinery, rather than employing separate maintenance personnel for that function.

2.3 Overview of Preventive Maintenance (PM)

The term maintenance is used to describe the various efforts businesses make toward keeping their facilities and equipment in good working order. It encompasses both breakdown maintenance a policy that involves dealing with problems as they occur and attempting to reduce their impact on operations and preventive maintenance a policy that involves using such measures as inspecting, cleaning, adjusting, and replacing worn parts to prevent breakdowns from occurring in the first place.

Preventive maintenance is performed periodically in order to reduce the incidence of equipment failure and the costs associated with it. These costs include disrupted production schedules, idled workers, loss of output, and damage to products or other equipment. Preventive maintenance can be scheduled to avoid interfering with production. Common methods of planning preventive maintenance are based on the passage of time, on the amount of usage the equipment receives, and on an as-needed basis when problems are uncovered through inspections. Ideally, preventive maintenance will take place just before failure occurs in order to maximize the time that equipment is in use between scheduled maintenance activities.

Furthermore, hidden costs, such as lost production and the cost of wages while equipment is not in service, must be factored in. So must the cost of injuries or damage to other equipment and facilities or to other units in production. All of the costs associated with these side effects can be minimized by PM. There is, however, a point at which the cost of preventive maintenance exceeds the benefit.

The decision of how much maintenance to perform involves the age and condition of the equipment, the complexity of technology used, the type of production process, and other factors. For example, managers would tend to perform more preventive maintenance on older machines because new ones have only a slight risk of breakdown and need less work to stay in good condition. It is also important to perform routine maintenance prior to beginning a particularly large or important production run.

In PM, production employees are trained in both operating procedures and routine maintenance of equipment. They perform regular inspections of the machinery they operate and replace parts that have become worn through use before they fail. Since the production employees spend so much time working with the equipment, they are likely to pick up small signals that a machine is in need of maintenance. Among the main benefits of PM is that employees gain a more complete understanding of the functioning of the system. PM also gives them increased input into their own productivity and the quality of their work.

2.4 Introduction to Engineering Maintenance

Each year billions of dollars are spent on engineering equipment maintenance worldwide, and today's maintenance practices are market driven, in particular for the manufacturing and process industry, services suppliers, and so on. Because of this, there is a definite need for effective asset management and maintenance practices that can positively influence success factors such as price, profitability, quality, reliable delivery, safety and speed of innovation.

In the future engineering equipment will be even more computerized and complex. Further computerization of equipment will increase the importance of software maintenance significantly, approaching, if not equaling hardware maintenance. In addition, factors such as increased computerization and complexity will result in greater emphasis on maintenance activities with respect to areas such as cost effectiveness, quality, safety, and human factors. In the future creative thinking and new strategies will definitely be required to realize all potential and turn them into profitability.

2.4.1 History of Maintenance

Although humans have felt the need to maintain their equipment since the beginning of time, the beginning of modern engineering maintenance may be regarded as the development of the steam engine by James Watt (1736-1819) in 1769 in Great Britain. In the United States the magazine *Factory* first appeared in 1882 and has played a pivotal role in the development of the maintenance field. In 1889 a book on maintenance of railways was published. In the 1950s the term preventive maintenance was coined, and in 1957 a handbook on maintenance engineering was published. Over the years many other developments in the field of engineering maintenance have taken place, and today many universities and other institutions offer academic programs on the subject.

2.4.2 Maintenance Engineering Objectives

There are many objectives of maintenance in engineering. Some of the important have been shows in figure 2.1.

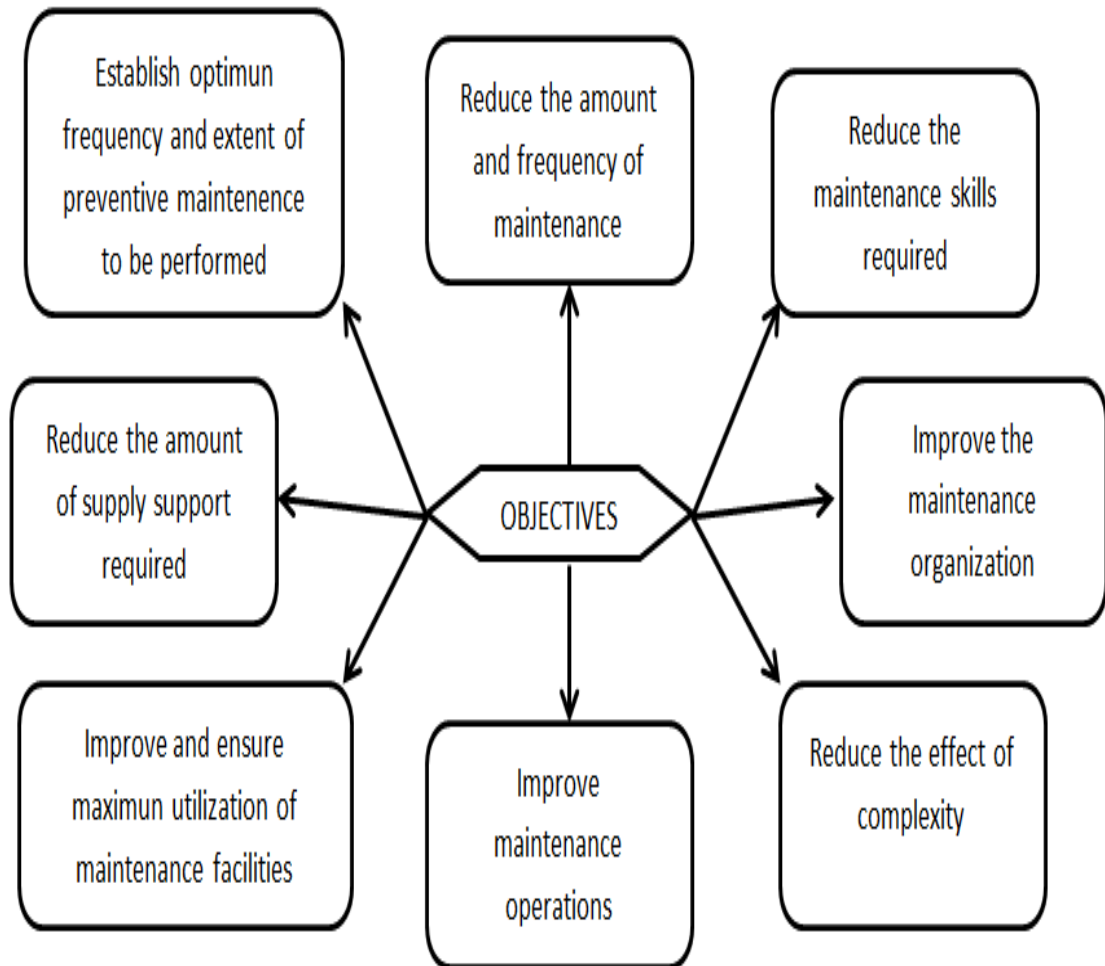


Figure 2.1 : Important objectives of maintenance engineering