BENCHMARKING ON MANAGEMENT SYSTEM IN MANUFACTURING COMPANIES IN ESTABLISHING MAINTENANCE AWARENESS

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Report submitted in partial fulfilment of the requirements for the award of the degree of Bachelor of Mechanical Engineering

Faculty of Mechanical Engineering
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NOVEMBER 2008
SUPERVISOR’S DECLARATION

We hereby declare that we have checked this project and in our opinion this project is satisfactory in terms of scope and quality for the award of the degree Bachelor of Mechanical Engineering.

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STUDENT’S DECLARATION

I declared that this dissertation entitled “Benchmarking on Management System in Manufacturing Companies in Establishing Maintenance Awareness” is the result of my own research except as cited in the references. The dissertation has not been accepted for any degree and is not currently submitted in candidature of any other degree.

Signature : .....................................................
Name : MOHD FAISAL BIN CHE YUSOF
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Date :
To my beloved mother and father,

Mrs. Normah Binti Killa
Mr. Che Yusof Bin Che Ismail
ACKNOWLEDGEMENTS

Praise to Allah S.W.T, the Most Merciful and the Most Compassionate. Peace upon him Muhammad S.A.W, the messenger of Allah.

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ABSTRACT

In manufacturing companies, gaining profit is the most obvious goal to be achieved. Many systems and application are being used by various international companies in improving their profit. Quality Management System (QMS) is among the system applied in achieving the goal of high maintenance awareness. This is because a good condition of the machines will give high productivity. Most of the companies are applying the recommendation based on the documentation to get the accreditation for ISO 9001:2000. This is significant to prove that the company is reliable and serves an international level of standards in their services. Companies are having their documentation on management of their own to observe the process executed and the weaknesses arise from the process. To be more advance, the maintenance awareness can be established in earlier stage such as in universities or college. This project is to benchmark the work applied by the companies in their process to maintain their status as an accredited company. It also a study to find a better systems and application that can be applied in the educational institution. To achieve the goal, every steps need to observed from the documentation until the production. The maintenance awareness will be observed and measured by using questionnaires sets and also interviews. With the lack of exposure to real working environment, the results show that respondents in an educational institution are able to have a higher maintenance awareness level than respondents in manufacturing companies.
ABSTRAK

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CHAPTER 1

INTRODUCTION

1.0 Introduction

The topic of this thesis is **benchmarking on management system in manufacturing companies in establishing maintenance awareness**. Since most of the manufacturing companies are international companies, obviously they need to ensure a production with a high quality and meet the customers’ expectations.

In achieving these objectives, the companies have applied ISO 9001: 2000 in their system. It is a Quality Management System (QMS) Standard that is applied so they can achieve the finest quality in their production.

Maintenance plays a key role in supporting the production systems and also contributing to the achievement of organization objectives. The objective of the maintenance function is to maintain current technological, managerial, and operating standards. The improvement function is aimed at improving current standards.

Under the maintenance function, the management must first establish policies, rules, directives, and standard operating procedures (SOPs) and then work towards ensuring that everybody follows SOP.
The types of maintenance that will be focused are the preventive maintenance, predictive maintenance and the continuous improvement. The review is also on what is the most effective way to establish a maintenance culture in an organization.

1.1 Problem Statement:

In the companies, the problem occurred is with the information flow from the upper management to the lower workers. The workers, usually the technicians, received the information but they did not execute it. This is obvious in the matter of maintenance in the companies.

In UMP, the problem assumed is the exposure about the maintenance culture. Students did not take maintenance as part of their responsibilities. As a result, they may not implement the culture in their daily life.

1.2 Objectives of this study:

The main objective of this project is to establish and implement maintenance culture in University Malaysia Pahang (UMP). This is done by benchmarking three manufacturing companies.

1.3 Scopes of the this study:

The scopes of this project is to benchmark the Quality Management System (QMS), in accordance to ISO 9001:2000, which is applied in all of the three companies.
In specific, the focus is on preventive maintenance, predictive maintenance and the continuous improvement.

The scope of the observations is on the machines used in the companies which are similar to the machines used in UMP (if possible). The milling machine section will be the focus for observations in UMP.

1.4 Thesis organization

The thesis is divided into five chapters. Each chapter has several sub-topics. The chapters are:

1.4.1 Chapter 1: Introduction

This chapter works as an early introduction to the topic of this thesis. It exposed a brief explanation for the entire report. Through to the end of this report, every topic will be explained in more details.

1.4.2 Chapter 2: Literature Review

Since the beginning of this project, some literature review had been done to make a clear understanding on the topic. There are some media that had been used including internet, booklet, and also all the maintenance forms from the companies.

1.4.3 Chapter 3: Methodology

In this chapter, all the methodology used to complete this thesis is stated. The flow of the project will be stated chronologically.
1.4.4 Chapter 4: Result and Discussion

All the data collected from the visits and observations will be gathered in this chapter. Analysis will be done based on the data collected from the questionnaires, interviews and observations.

The data and analysis will be discussed with the supervisors. This is important in order to get a valid and an acceptable analysis. Further elaborations after the analysis will be combined together in this chapter.

1.4.5 Chapter 5: Conclusion and Recommendation

The overall statement in this thesis will be stated clearly in this last chapter. After all the data collection and analysis, a conclusion will be presented in this chapter. Furthermore, recommendations will also be stated if any improvements can be made based on the conclusion.
CHAPTER 2

OVERVIEW ON ISO 9001:2000

2.1 INTRODUCTION

In this chapter the content will be about the literature review made in order to complete this project. It can be considered as the summary of the literature review. It is needed since the early stage of the thesis to understand the need of the topic. This chapter consists of companies backgrounds and products, machines, terminologies, how to construct questionnaires sets and how to analyze it. The previous study on related topic also is reviewed.

2.2 ISO 9001:2000

The International Organizational of Standardization (ISO) is a worldwide organization that develops many different kinds of standards.

ISO 9001 is a series of documents that define requirements for the Quality Management Standard. ISO 9001:2000 is one of the documents in this set. It contains the actual requirements an organization must be in compliance with to become ISO 9001 Registered.
Past version of ISO 9001 is ISO 9002 and ISO 9003, but those are no longer in use. ISO 9001:2000 is the current version of the Standard. It was revised in the year 2000. Companies are now only registered to ISO 9001.

Both companies and customers can gain benefits from the implementation of ISO 9000. With a well defined organization and responsibilities, the grey areas and possible resources wastage can be minimize.

The standardize practices and establishment of proper communication channel can maximize the communication efficiency. In the same time, the productivity can also be increased. A greater degree of internal control can be established as well.

By the side of the customers, this can increase satisfaction and growth in confidence. It will reduce the audit needed to be done by the customers in order to get the highest quality possible in production.[1]

An organization with an effective QMS will typically meet customers’ expectations better than an organization that does not have an effective QMS. Many organizations require their suppliers to have ISO 9001:2000 Registered.

Organizations worldwide are implementing an ISO 9001:2000 because it has proven over the years that it leads companies to better operations, improved performances, and improved profitability. In other words, ISO 9001:2000 increase internal effectiveness and productivity benefits.
2.2.1 Quality Management System

This term can be defined as a set of policies, processes and procedures required for planning and execution (production/development/service) in the core business area of an organization. Implementing a QMS within an organization needs to be a decision by the top management.[2]

QMS integrates the various internal processes within an organization and intends to provide a process approach for production.

QMS enables the organization to identify, measure, control and improve the various processes that will ultimately lead to improve the performance. The QMS consists of written a document that addresses the ISO 9000 standard.

2.2.2 Maintenance

Including tests, measurements, adjustments, and parts replacements, performed specifically to prevent faults from occurring.

2.2.3 Preventive Maintenance

The care and servicing by personnel for the purpose of maintaining equipment and facilities in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.

The scheduling of a program of planned maintenance or equipments overhauls. The goal of preventive maintenance is to reduce equipment failure, and the need for corrective maintenance. It can be performed at regular time intervals ,after a specified amount of equipment use, when the opportunities arises, for example, at a factory’s
annual shutdown, or when a certain preset conditions occur to trigger the need for action.

2.2.4 Predictive Maintenance

It can be defined as a type of condition-based maintenance emphasizing early prediction of failure using non-destructive techniques such as vibrations analysis, thermograph, and wear debris analysis.

PdM techniques help to determine the condition of in-service equipment in order to predict when maintenance should be performed. This approach offers cost savings over routine or time-based preventive maintenance because tasks are performed only when needed.

2.2.5 Statistical Process Control (SPC)

It is an effective method of monitoring a process through the use of control charts. Much of its power lies in the ability to monitor both process centre and its variation about that centre. By collecting data from samples at various points within the process, variations in the process that may affect the quality of the end product or service can be detected or corrected. This will reduce the waste and as well as the possibilities that problems will be passed on to customers. With its focus on early detection and prevention of problems, SPC has advantage over quality methods, such as inspection, that apply resources to detecting and correcting problems in the end product or service.

In addition, SPC can also lead to a reduction in the time required to produce the product from end to end. This is partially due to a diminished possibility that the product will have to be reworked, but it may also result from using SPC data to identify bottlenecks, what times, and other sources of delays within the process. Process cycle
time reductions coupled with improvements in results have made SPC a valuable tool from both a cost reduction and a customer satisfaction standpoint.

2.2.6 Continuous Improvement

An organization should have a continuous improvement in the matter of effectiveness of the quality management system. This is done through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management's review.[3]

A continuous improvement can be implemented by using three sources. The first one is through the feedback from corrective actions. Corrective actions only been executed after a problem has been encountered.

The second way is by applying preventive actions. This is quite similar by preventive maintenance but maintenance actions are not executed. For example, calibration of machine should be done after a period of action. Through this way, the machine only been checked to make sure that the machine is in the condition it should be.

Lastly, it is by applying improvement in a big step. For example, this can be done by changing the whole machine. After considering the feedback, if a small change cannot prevent the failure from occurred again, then a big improvement should be executed. This is good for a long term plan.

2.2.6.1 KAIZEN

There are many approaches in having a continuous improvement in an organization. One of them is the application of Kaizen. Kaizen means “continuous improvement”. A Kaizen strategy call for never-ending efforts for improvements