DEVELOPMENT OF MAINTENANCE MONITORING SYSTEM FOR FACULTY OF MANUFACTURING ENGINEERING

Submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Management)(Hons.)

by

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2018

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DECLARATION

I hereby, declared this report entitled "Development of Maintenance Monitoring System for Faculty of Manufacturing Engineering" is the results of my own research except as cited in references.

Signature : …….

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Date : 22th MAY 2018

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management) (Hons.). The member of the supervisory is as follow:

……

(Mr. Nik Mohd Farid bin Che Zainal Abidin)

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ABSTRAK

Matlamat projek ini adalah untuk membangunkan sistem pemantauan penyelenggaraan Fakulti Kejuruteraan Pembuatan di Univesiti Teknikal Malaysia Melaka. Sistem pemantauan penyelenggaraan yang dikembangkan meliputi mesin lathe di mesin syop sahaja. Sistem pemantauan penyelenggaraan semasa yang digunakan di bengkel FKP merupakan sistem berasaskan kertas yang didapati merupakan salah satu faktor yang menyebabkan tugas penyelenggaraan di atas tarikh tamat tempoh. Objektif projek ini adalah untuk mengenalpasti masalah sistem penyelenggaraan yang sedia ada di bengkel Fakulti Kejuruteraan Pembuatan di UTeM, untuk membangunkan sistem pemantauan penyelenggaraan alternatif untuk memudahkan penyelenggaraan dan untuk mengesahkan kaedah yang ada untuk membina sistem pemantauan penyelenggaraan. Untuk mengurangkan berlakunya tugas-tugas penyelenggaraan di atas tarikh tamat tempoh, sistem pemantauan penyelenggaraan berasaskan spreadsheet dibina dengan menggunakan pengaturcaraan Microsoft Excel Visual Basic for Applications (VBA). Sistem yang dibina menyediakan fungsi untuk menambah tugas penyelenggaraan baru, mengemas kini tugas dan menghantar e-mel untuk memberitahu orang lain apabila tugas diselesaikan. Tambahan pula, sistem ini juga boleh menghantar pemberitahuan kepada pengguna apabila tugas penyelenggaraan adalah berhampiran tarikh akhir dan memindahkan data MS Excel ke dokumen MS Word untuk beberapa dokumen penyelenggaraan yang diperlukan, seperti borang KEW.PA-9 yang merupakan borang aduan kerosakan aset alih. Selepas pembangunan sistem diselesai, ia telah dicuba gunakan oleh pembantu jurutera dan maklum balas mereka telah dikumpulkan. Akhir sekali, ini adalah cara yang mudah tetapi berkesan untuk menguruskan semua proses penyelenggaraan yang penting dan memastikan keselamatan dan kebolehpercayaan kemudahan yang lebih baik dalam bengkel FKP.

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ABSTRACT

The aim of this project is to develop a maintenance monitoring system for Faculty of Manufacturing Engineering at Universiti Teknikal Malaysia Melaka. The developed maintenance monitoring system covered on lathe machine at machine shop workstation only. The current maintenance monitoring system applied at FKP workshop which is a paper-based system is found that is one of the factors to cause maintenance tasks overdue date. The objectives of this project are to identify problems of existing maintenance system at the workshop of Faculty of Manufacturing Engineering at UTeM, to develop an alternative maintenance monitoring system for ease of maintenance and to validate the available methods to construct maintenance monitoring system. To reduce the occurrence of maintenance tasks overdue date, a spreadsheet-based maintenance monitoring system is constructed by using Microsoft Excel Visual Basic for Applications (VBA) programming. The constructed system provides a function to add new maintenance tasks, update the tasks and send an e-mail to inform others when a task is completed. Furthermore, the system also can send a notification to the user when a maintenance task is near due date and transfer the MS Excel data to MS Word document for some maintenance required form, such as KEW.PA-9 form which is a complaint form regarding the damage of a movable asset. After the development of the system is completed, it is test used by the assistant engineers and their feedbacks are collected. Last but not least, this is a simple but very effective way to manage all important maintenance processes and ensure greater safety and reliability of the facilities in FKP workshop.

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DEDICATION

To my beloved family

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I would like to express my deepest appreciation to all those who provided me the possibility to complete this report. A special thanks to my final year project supervisor, Mr. Nik Mohd Farid bin Che Zainal Abidin whose help, stimulating suggestions and encouragement, helped me to coordinate my project especially in writing this report. I would also like to acknowledge with much appreciation the crucial role of the assistant engineers of FKP‟s Workshop, who gave the cooperation suggestions to complete this report.

My special thanks go to all of my friends that had supplied thought, advice, challenges, criticism, help, and suggestion that have influenced my performance and increase my knowledge and understanding upon completing my Final Year Project. I would appreciate the guidance given by another supervisor as well as the panels especially in our project presentation that has improved our presentation skills by their comment and tips.

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List of Abbreviations, Symbols and Nomenclature

UTeM	-	Universiti Teknikal Malaysia Melaka/ Technical University of Malaysia Malacca
FKP	-	Faculty of Manufacturing Engineering
MS	-	Microsoft
CNC	-	Computer numerical control
PM	-	Preventive maintenance
TPM	-	Total Productive Maintenance
CMMS	-	Computerized maintenance management system
VBA	-	Visual Basic for Applications
HTML	-	Hypertext Markup Language
PDF	-	Portable Document Format

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CHAPTER 1
INTRODUCTION

This chapter provides a summary of the intended project. It consists of a background of the project, problem statement, objectives, scope, and importance of the study.

1.1 Background of Study

Maintenance in enterprises has its specific characteristics. On average, it is using various diagnostic procedures from the different producer of diagnostic techniques. These organizations deliver their own context for reading information and tendencies. Planned maintenance is an organized maintenance type, responsible for other aspects of work, such as control and records required for such work (Mishra and Pathak, 2002). Nowadays, increasingly companies realised that the implementation of planned maintenance can provide proper care to their system due to its powerful benefits which make it really worth to apply. According to Smith (2012), the benefits of planned maintenance are show as below:

a) The performance of equipment can be increased to lower power costs and keep them operate more efficiently.
b) The beneficial lifecycle of equipment is increased by lowering the decision for capital replacements.
c) Due to the unplanned maintenance is less applied to the system, the maintenance team can react to new breakdown problem faster and hence the quality of customer (internal or external) service increased.
d) The fame of companies is enhanced undoubtedly.

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e) The performance of equipment increased due to their operating time increased.

Specifically, planned maintenance is a scheduled service visit carried out by a competent and suitable agent or consistent monitoring of various parameters different, incompatible systems, to prevent unscheduled breakdown and downtime problems occur by making sure the operation of equipment is correct and normal. So, yield a bigger emphasis on personality and skill a maintenance team and its management. In any case, without good supporting software now nobody is cannot do.

A maintenance monitoring system (MMS) software can assist the procedure of inspecting maintenance assets in order to prevent the organization occurs downtime from damaged equipment or cost wastage on inefficient maintenance strategies (Ernst and Henrik, 1993). Typically, the aims of the maintenance monitoring system are to make sure the work scheduled efficiently, limit fees, and make sure regulatory compliance. Both of the time and money of a commercial enterprise can be saved by make the appropriate maintenance earlier than the downtime takes place. An MMS features like automating activity capabilities and completing them greater as it should be and on schedule can lower the labor fees. On schedule maintenance can preserve system functioning better and for longer. This represents a lower repair cost is needed with the aid of the fact this machinery received breakdown as an awful lot. Further to the monetary advantage of an MMS, the ability to apply the historical records gathered to make extra knowledgeable commercial enterprise choices can be some other large justification for investment in a maintenance system. Identification of trends, recognition of maintenance fees, and improvement of inventory control can be made by access to the information.

1.2 Problem Statement

This study focuses on the current maintenance monitoring system applied in the workshop of FKP which is a paper-based maintenance monitoring system. The personnel who in charge of a maintenance task need to spend a lot of time to find out

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the records of repaired or performed maintenance on some of the devices or machine. Other than that, this paper-based maintenance system also brought late detection of the due date for maintenance and causes the facilities can‟t properly function.

By the way, to identify the problems which encounter in the existing maintenance system at FKP workshop, a survey form (in APPENDIX A) was conducted to collect the assistant engineer‟s opinions. The survey form was distributed at FKP workshop and 22 assistant engineers were selected as respondents for this study. Then, the data is tabulated and analysed to obtain an appropriate result. Pie chart which a graphical techniques statistics is selected for used to describe the analysed opinion and data. The statistical analysis and result will provide a clearer view of the seriousness of this particular issue at FKP workshop.

1.2.1 Has Experience in the Maintenance Tasks Assigned Are Over Due Date

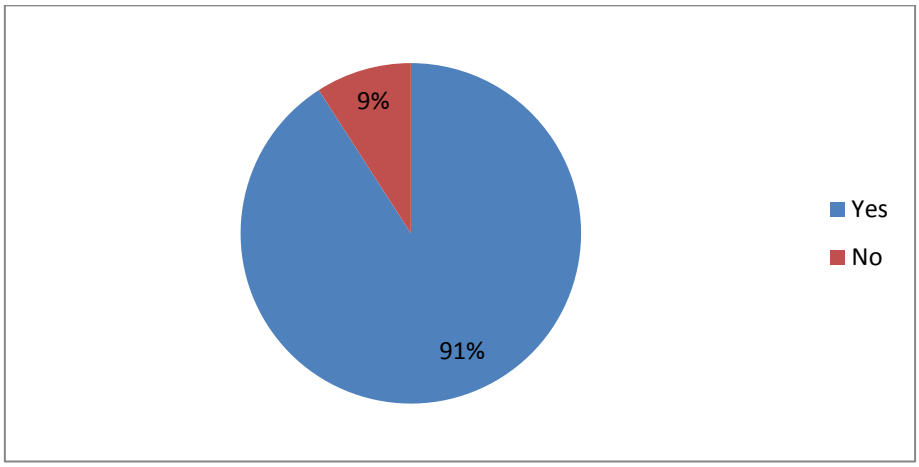

Figure 1.1: Pie chart of the agreement to has experience in assigned maintenance tasks are overdue date.

Figure 1.1 is about the agreement to has experience in assigned maintenance tasks are overdue date. The chart is divided into 2 parts. The chart shows that there are 20 respondents with option „yes‟ and 2 respondents with option „no‟. This can be concluded that most of the respondents which are 20 people have experienced in the assigned maintenance tasks are overdue date.

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1.2.2 Satisfaction of the Current Maintenance System

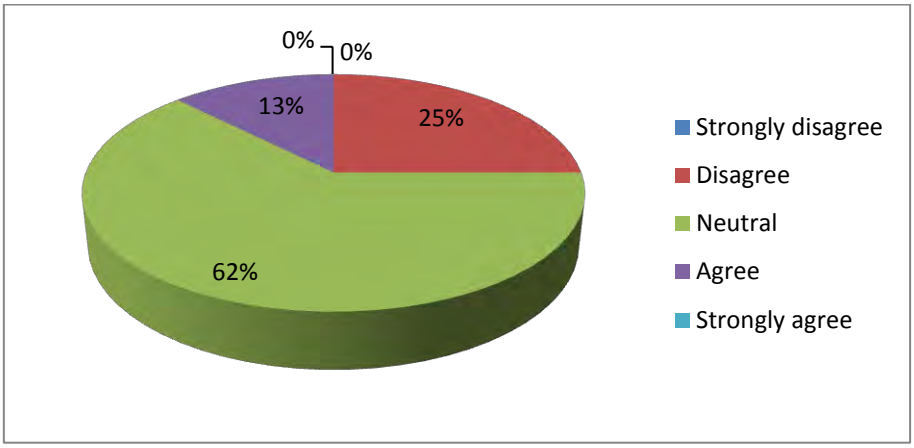

Figure 1.2: Pie chart of the satisfaction of the current maintenance system applied at FKP workshop.

Figure 1.2 illustrates the satisfaction of the current maintenance system applied at FKP workshop. The chart is divided into 5 parts. The chart shows that there is no any respondent strongly disagree and strongly agree, 8 respondents disagree, 10 respondents select neutral, 4 respondents agree with the statement. Since the percentage of disagree is higher than the percentage of agree, so most of them are not satisfying to the current system and think that can make change or improvement to the system.

1.2.3 The Current System Is Time Consuming

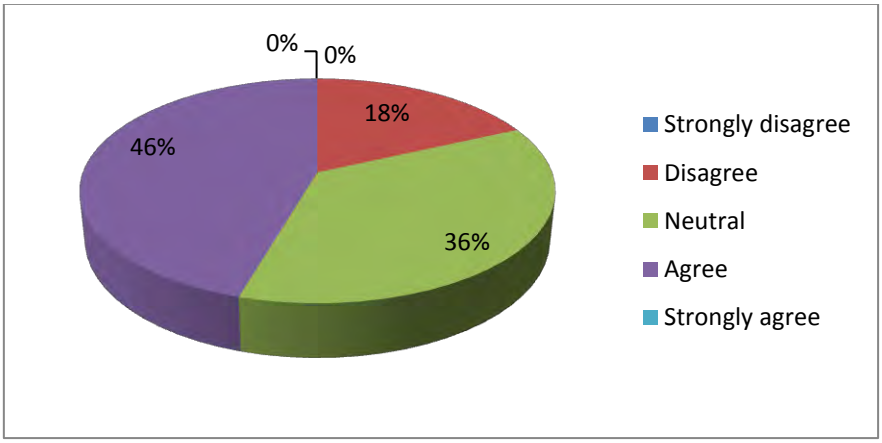

Figure 1.3: Pie chart of the agreement of the current system is time-consuming.

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The Figure 1.3 illustrates the agreement of the current system is time-consuming. The chart shows that there is no any respondent strongly disagree and strongly agree, 4 respondents disagree, 8 respondents select neutral and 10 respondents agree with the statement. This can be concluded that most of the respondents are agree that the current system used is time-consuming since the percentage in agree is 46% which is higher than disagree with 18%.

1.2.4 Inconvenient in Finding Past Maintenance Records

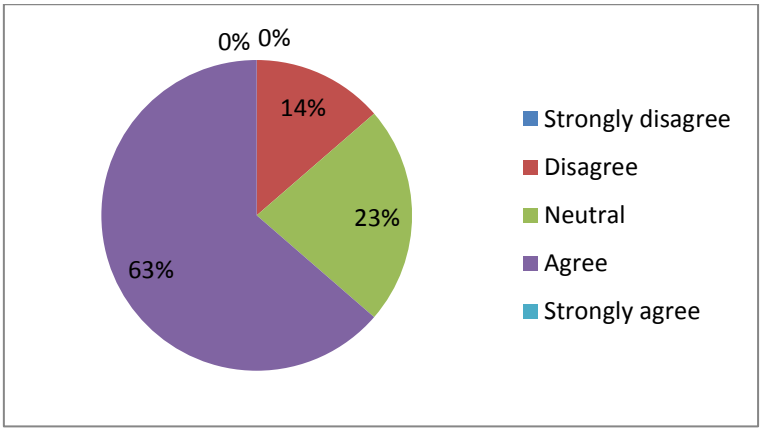

Figure 1.4: Pie chart of the agreement of inconvenient in finding past maintenance records.

Figure 1.4 illustrates the agreement of inconvenient in finding past maintenance records. The chart shows that there is no any respondent strongly disagree and strongly agree, 3 respondents disagree, 5 respondents select neutral and 14 respondents agree with the statement. This can be concluded that most of the respondents are agree that inconvenient in finding past maintenance records by using the current system since the percentage in agree is 63% which is higher than disagree with 14%.

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1.2.5 Unable to Give Notification When a Task Is Near Due Date

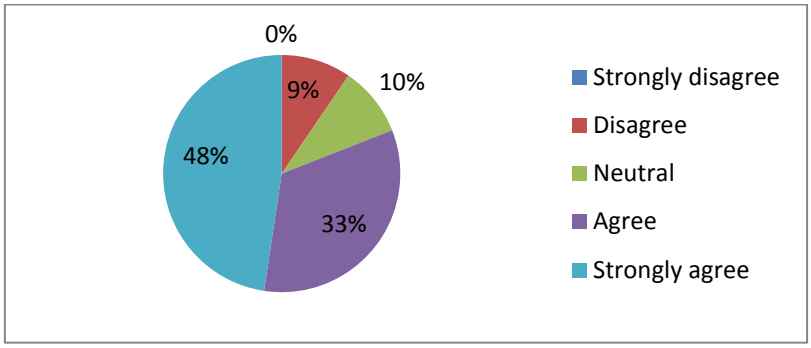

Figure 1.5: Pie chart of the agreement of the current system is unable to give notification when a task is near the due date.

The Figure 1.5 illustrates the agreement of the current system is unable to give notification when a task is near the due date. The chart shows that there is no any respondent strongly disagree and disagree, 7 respondents select neutral, 11 respondents agree and 4 respondents strongly agree with the statement. So, this can be concluded that most of them are agree that the current system does not provide a proper notification system which can automatically remind them while a maintenance task is near its due date. Because of the senior assistant engineer cannot use a spreadsheet to assign work, so text messages, sticky notes and word of mouth might seem like a nimble way to submit a work request. But these "systems" typically carry a pretty high risk of being lost or forgotten.

1.2.6 Inconvenient in Planning a Maintenance Task

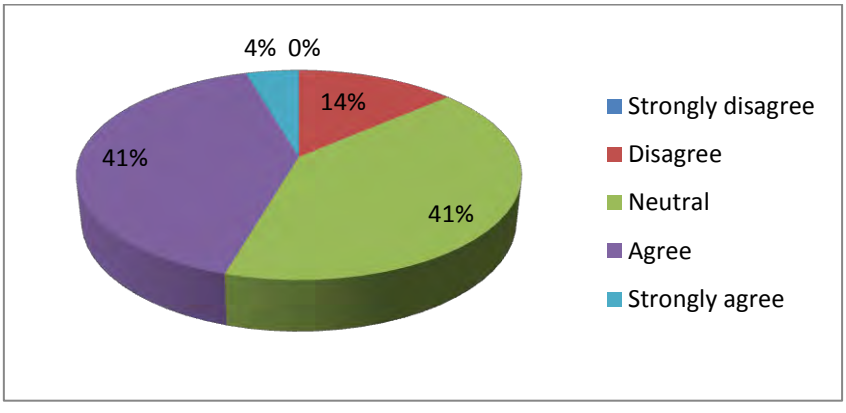

Figure 1.6: Pie chart of the agreement of inconvenient in planning a maintenance task.

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Figure 1.6 illustrates the agreement of the inconvenient in planning a maintenance task. The chart shows that there is no any respondent strongly disagree, 3 respondents disagree, 9 respondents select neutral, 9 respondents agree and 1 respondent strongly agree with the statement. Because when in the planning stage of a preventive maintenance task, the planner must refer the information of machine to estimate the equipment, materials, and tools required, so they may feel trouble to find information from a lot of files inside a folder.

1.2.7 This System Allows Maintenance Task to Be Carried Out Efficiently

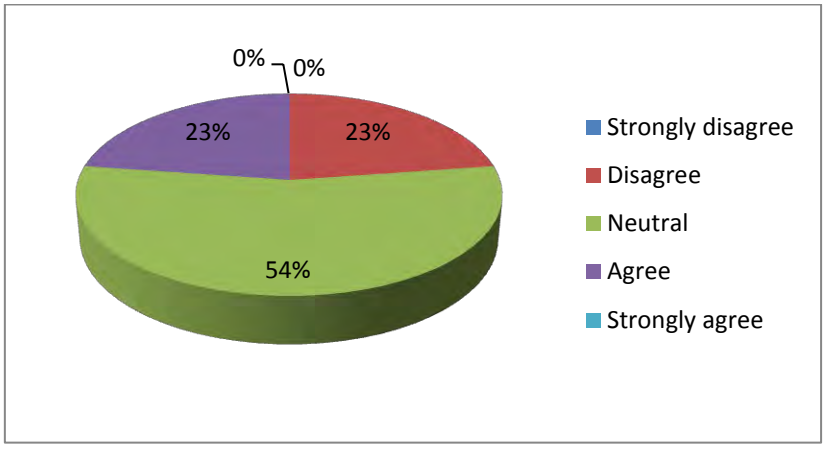

Figure 1.7: Pie chart of the agreement of the system allows maintenance task to be carried out efficiently.

The Figure 1.7 illustrates the agreement of the system allows maintenance task to be carried out efficiently. The chart shows that there is no any respondent strongly disagree and strongly agree, 5 respondents disagree, 12 respondents select neutral and 5 respondents agree with the statement. The percentage of respondents in selection agree and disagree are same which is 23% because maybe some of them don't think the current maintenance system used has related to their work efficiency.

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1.2.8 The System Is One of the Factor of Maintenance Tasks Over Due Date

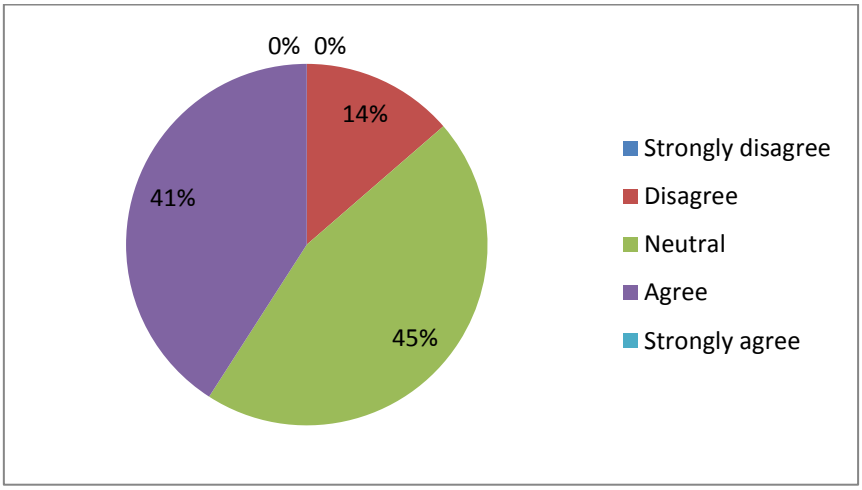

Figure 1.8: Pie chart of the agreement of the system is one of the factors of maintenance tasks overdue date.

The Figure 1.7 illustrates the agreement of the system allows maintenance task to be carried out efficiently. The chart shows that there is no any respondent strongly disagree and strongly agree, 3 respondents disagree, 10 respondents select neutral and 9 respondents agree with the statement. This can be concluded that most of the respondents are agree that the paper-based maintenance monitoring system is one of the factors to cause the maintenance tasks overdue date.

Thus, this study proposed to develop a maintenance monitoring system for Faculty of Manufacturing Engineering. The result of this study enables the preventive maintenance tasks scheduled and planned by the user according to its date readings and hence, the program will automatically generate a work order when the assigned date reading appears. Otherwise, easily store and track machinery‟s documentation and warranty information which can support the maintenance workflow.

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