

**PREVENTIVE MAINTENANCE OF MEDIUM SPEED ELECTRIC TRAIN
SYSTEM**

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**PREVENTIVE MAINTENANCE OF MEDIUM SPEED ELECTRIC TRAIN
SYSTEM**

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**A report submitted in fulfilment for the requirements for the degree of Bachelor of
Mechanical Engineering**

Faculty of Mechanical Engineering

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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DECLARATION

I declare that this project report entitled 'Preventive Maintenance of Medium Speed Electric Train System' is the result of my own work except as cited in the references.

Signature :

Name of Supervisor :

Date :

APPROVAL

I hereby declare that I have read this project report and in my opinion this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering.

Signature :

Name of Supervisor : Assoc. Prof. Dr. Mohd Azman Bin Abdullah

Date :

DEDICATION

To my beloved family, respected supervisor, lecturers and friends,

Thank you for everything and I love you all.

ABSTRACT

In the developed country, commuter rail transportation has a higher demand than other transportation. It is because of the good service and it easy to use. However, the maintenance issues that occur in the train is one of the challenges that the company has to face it. These kinds of situation can cause the uncomfortable to the passengers and the drivers during their journey. In other to make sure the railway service is to be reliable and safe the apparatus must be maintained in great working control and standard maintenance is the basic fixing to accomplish this. The study of the maintenance issues and the actions taken are making as prepared to make sure the process of maintenance can be settled smoothly. The research was focused in the local commuter rail express company in the duration of nine months. Eight commuter rail has been analyses which are commuter rail Express 101, Express 102, Express 103, Express 104, Express 105, Express 106, Express 107 and Express 108. The maintenance routine is recorded by technician into the daily report. The data will show the type of the maintenance issue on which express train, when it occurs and also the attachment. The interview session has been done with the technician manager of the company when doing the site visit. The important of interview session is to understand with deeper the objectives of this research. Other than that, the main goal of this site visit is to know the level severity of the maintenance issues and to learn how the operation of the train.

ABSTRAK

Di negara maju, pengangkutan kereta api komuter mempunyai permintaan yang lebih tinggi daripada kenderaan lain. Ini adalah kerana perkhidmatannya yang baik dan mudah digunakan. Walau bagaimanapun, isu penyelenggaraan yang berlaku di dalam kereta api adalah salah satu cabaran yang dihadapi oleh syarikat. Keadaan seperti ini boleh menyebabkan tidak selesa kepada penumpang dan pemandu semasa perjalanan mereka. Oleh itu, untuk memastikan perkhidmatan keretapi boleh dipercayai dan selamat, peralatan mesti dikekalkan dalam kawalan kerja yang baik dan penyelenggaraan standard adalah penetapan asas untuk mencapai tahap terbaik. Kajian tentang isu-isu penyelenggaraan dan tindakan yang diambil adalah membuat persiapan untuk memastikan proses penyelenggaraan dapat diselesaikan dengan lancar. Penyelidikan ini ditumpukan pada syarikat ekspres kereta api komuter setempat dalam tempoh sembilan bulan. Lapan kereta api komuter telah dianalisis yang merupakan rel kereta api Express 101, Express 102, Express 103, Express 104, Express 105, Express 106, Express 107 dan Express 108. Rutin penyelenggaraan direkodkan oleh juruteknik ke dalam laporan harian. Data akan menunjukkan jenis isu penyelenggaraan di sekian kereta api, apabila ia berlaku dan juga lampiran. Sesi temuduga telah dilakukan dengan pengurus juruteknik syarikat semasa melakukan lawatan tapak. Perkara yang penting dalam sesi wawancara adalah memahami dengan lebih mendalam objektif kajian ini. Selain itu, matlamat utama lawatan tapak ini adalah untuk mengetahui tahap keterujaan isu penyelenggaraan dan untuk mengetahui bagaimana operasi kereta api.

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LIST OF ABBREVIATIONS

ERL	Express Rail Link
O&M	Operation and Maintenance
Sdn. Bhd	Sendirian Berhad
MRT	Mass Rail Transit
LRT	Light Rail Transit
KTM	Keretapi Tanah Melayu
KLIA	Kuala Lumpur International Airport
DDU	Driver Display Unit
MCB	Motor Circuit Breaker
BCU	Brake Control Unit
EB	Emergency Brake
APC	Automatic Power Control
EP	Electric Panel

LIST OF SYMBOLS

& = And

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CHAPTER 1

INTRODUCTION

1.1 Background

Railroads are combined of complex mechanical and electrical frameworks and there are a huge number of moving parts. In other to make sure the railway service is to be reliable and safe the apparatus must be maintained in great working control and standard maintenance is the basic fixing to accomplish this. Despite the fact that maintenance is costly, it will turn out to be increasingly costly to supplant the failing equipment since the maintenance has been ignored.

Rolling stock is the most important maintenance part of the railway framework and it is the most unsafe if maintenance is ignored. Reliability is the most important point to keep the railway activity success and maintenance should be the main priority to make sure safety and reliability is continuing.

In Malaysia, Express Rail Link (ERL) maintains the safety of rail operations with the highest priority. Operation and Maintenance (O&M) subsidiary, ERL Maintenance Support Sdn. Bhd has a 24-hour skilled workforce to ensure the rail system is in excellent condition and reliable. The train collectively records more than 66 million miles so far, with an average of 6,500 trips made each month. It is worth noting that ERL has successfully made a canceled trip, due to unforeseen circumstances, with an average of two or less in a month.

Strict compliance with maintenance schedules ensures the train is in the top position and supports the Reliability of Train Service. Distance traveled daily is monitored to determine the type of scheduled maintenance. The maintenance work is very important to ensure the train services are safe and reliable for thousands of passengers traveling with this train every day.

1.2 Objectives

The objectives of this research are first to analyse the routine maintenances and problems that occur on the train. Second, to study the action taken for maintenances in the future.

1.3 Problems statements

On the train, there are many types of maintenances issues and problems occur. These kinds of situation can cause the uncomfortable to the passengers and the drivers during their journey. It can be seen that the problems can influenced the rate of the passengers. The study of the maintenance issues or problems and the actions taken are making as prepared to make sure the process of maintenance can be settled smoothly. Furthermore, the most important of this study is to provide good experienced to the passengers on the train.

1.4 Scope

In order to accomplish the objectives, the main scope of work for this project is to study the most critical problems and maintenances issues that occur at the local train. These problem and maintenance issues occur on the local train in Malaysia.

1.5 Thesis Outline

There are five chapters that contain in this report. Chapter 1 covered the introduction, chapter 2 discussed about literature review, chapter 3 explained the methodology, chapter 4 show the results and discussion and the conclusion and recommendation reviewed in chapter 5.

1.5.1 Chapter 1: Introduction

In this chapter the background study, objectives, problem statement, scope of the study and thesis outline are explained briefly relating to the project.

1.5.2 Chapter 2: Literature review

The literature review of this report is discussed in the second chapter. Many journals, articles or any other issues from the old research related to this project are reviewed deeply.

1.5.3 Chapter 3: Methodology

The project methods are discussed in this part. Begin with the general methodology that shows the steps of research regarding to the project. Then the flowchart also included in the general methodology.

1.5.4 Chapter 4: Result and Discussion

From the data and the graph, the result of the maintenance issues can be analysed briefly. From the pattern of the graph, it showed the higher rate of maintenance issues of the train. Then, the problems are discussed deeply in this chapter.

1.5.5 Chapter 5: Conclusion and Recommendation

For this chapter, it concluded the entire thesis briefly from each chapter and the recommendations also included in this part in other to propose for further research.

CHAPTER 2

LITERATURE REVIEW

21 Introduction

This chapter discussed about the preventive maintenance of medium speed electric train system. The sources include journals, articles, report, book and websites. The sources are used as guideline to complete this study by using the related information, ideas and knowledge obtained from it. In this study, theories related to the train maintenance are discussed. Besides, the history of the early development of the train and the applications of maintenance are also discussed. The type of investigation approach also discussed in this chapter.

Railways are comprised of complex mechanical and electrical frameworks and there are a huge number of moving parts. To make sure that a railway is solid and safe, the equipment must be kept in good working order and regular maintenance is the fundamental fixing to accomplish this. Rail transport has expanded in the course of the most recent decade and it is probably going to additionally increment as traveler and freight transportation move from street and air to rail, because of rising vitality costs, congestion of roads and sky, and the interest to diminish discharges (Stenstrom, 2014).

Benefits for transportation alludes to the sum and kind of movement that individuals will pick under specific conditions and factors, for example, costs and administration quality. There has been expanded considerably with respect the way to quantify the effects of administration quality on movement request and how to foresee the

effects of particular administration quality changes toward transport. In particular, public transportation has been becoming more important for environmental goals. With growing competition, it is expected that service quality will have an increasing impact on the public transport demand. Improvements of service quality can help smoothen the operation and make transit a more attractive travel option.

22 Development of the train.

In 1767 Richard Reynolds made an arrangement of rails for moving coal at Coalbrookdale. These were initially wood however change to iron rails. In 1801 the principal Act of Parliament was passed for the making of a railway, despite the fact that at this point it was a horse pulled trucks on rails. Small, scattered railroad advancement proceeded, and yet, the steam motor was developing. In 1801 Trevithic invented a steam driven train which kept running on streets, and 1813 William Hedly fabricated Puffing Billy for use in mines, pursued a year later by George Stephenson's motor.

In 1821 Stephenson assembled the Stockton to Darlington railroad utilizing iron rails and steam power with the point of breaking the monopoly of the canal owners. The underlying arrangement had been for horses to supply the energy, however Stephenson pushed for steam. The significance of this has been misrepresented, as despite everything it stayed slow. The first run through a railway utilized a true steam train running on rails was the Liverpool to Manchester rail route in 1830. This is most likely the genuine milestone in rail, and reflected the course of the ground breaking Bridgewater Canal. In fact, the owner of the canal had restricted the railroad to ensure his investment. The Liverpool to Manchester railroad gave the administration outline to later advancement, a permanent staff and perceiving the capability of passenger travel. For sure, until the 1850s railroads made more from passengers than cargo.

During the 1830s canal organizations, tested by new railroads, cut costs and generally kept their business. As railroads were once in a while associated they were generally used for local freight and passengers. In any case, industrialists soon realized that railroads could make a clear profit, and in 1835 – 37, and 1844 – 48 there was such a blast in the production of rail lines that ‘railway mania’ was said to have cleared the nation. In this later period, there were 10,000 acts making railroads. Obviously, this madness empowered the making of lines which were nonviable and in rivalry with each other. The government largely adopted a laissez-faire mentality however intervened to attempt and stop accidents and perilous rivalry. They also passed a law in 1844 requesting third class travel to be on at least one train a day and the Gauge Act of 1846 to ensure the trains kept running on a similar kind of rails (Wikipedia, 2018).

23 Rail Transport in Malaysia.

Rail transport in Malaysia involves heavy rail (including commuter rail), light rapid transit (LRT), mass rapid transit (MRT), monorail, airport rail link and a funicular railway line. Heavy rail is mostly used for intercity passenger and cargo transport as well as some urban public transport, while rapid transit is used for intercity urban public transport. There are two airport rail link services connecting Kuala Lumpur with the Kuala Lumpur International Airport and Subang Airport. The sole monorail line in the nation is likewise utilized for public transport in Kuala Lumpur, while the main funicular railroad line is in Penang. The railroad organize covers the vast majority of the 11 states in Peninsular Malaysia. In East Malaysia, just the territory of Sabah has railroads. There are several type rail transport in Malaysia.