



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF BUILDING INFORMATION
MODELLING (BIM) FOR LAB SCALE BY USING
AUTODESK REVIT**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Power) with Honours.

by

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LAB SCALE BY USING AUTODESK REVIT

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This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Industrial Power) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Permodelan informasi maklumat (BIM) menjadi satu proses kerjasama yang lebih dikenali di dalam industri pembinaan. Pemilik semakin memerlukan perkhidmatan BIM daripada pengurus pembinaan, arkitek dan firma kejuruteraan. Banyak syarikat pembinaan kini melabur dalam "BIM" teknologi semasa bidaan, pra-pembinaan, pembinaan dan selepas pembinaan. Matlamat projek ini adalah untuk melukis semula lukisan seni bina baru Makmal Bervoltan Tinggi selepas pengubahsuaian, menjejaki semula reka bentuk elektrik Makmal Bervoltan Tinggi. Matlamat Akhir adalah penggunaan biasa yang sesuai iaitu MS IEC 60364. Terdapat tiga objektif untuk projek ini. Pertama adalah untuk melukis semula lukisan baru untuk merangsang bangunan dan mendapatkan butiran penuh mengenai bangunan itu yang dalam masalah berlaku dalam pembinaan. Kedua, menjejaki semula sistem elektrik melukis semula lukisan juga boleh menjejaki semula sistem elektrik Makmal Bervoltan Tinggi. Ketiga adalah untuk menganalisis sistem elektrik. Projek ini mengkaji kegunaan dan manfaat BIM dalam pembinaan kemudahan penyelidikan. Projek ini diakhiri dengan analisis mengenai penggunaan, kebaikan dan halangan BIM dan alatnya. Masalah pertama, tidak boleh melihat pembinaan jika lukisan dalam 2D. Jika digunakan ArchiCAD, lukisan Makmal Bervoltan Tinggi tidak kelihatan dalam pandangan 3D tetapi dalam Revit ia boleh melihat lukisan sepenuhnya dalam dan melihat butiran setiap bilik. Kedua, dengan menggunakan kaedah konvensional memerlukan kos yang tinggi. Kaedah konvensional tidak boleh menganggarkan berapa banyak projek perlu menggunakan bahan-bahan untuk membina bangunan dan ia tidak boleh menganggarkan berapa banyak kuasa, terkini dan memuatkan projek yang hendak gunakan dalam bengkel. Akhir sekali, penyelarasan antara M.E.P. Dalam Revit, ia digunakan penyelarasan yang betul untuk kata-kata koordinat antara mekanikal, elektrik dan perpaipan.

ABSTRACT

Building Information Modeling (BIM) is becoming a better-known established collaboration process in the construction industry. Owners are increasingly requiring BIM services from construction managers, architects and engineering firms. Many construction firms are now investing in BIM technologies during bidding, preconstruction, construction and post construction. The goal of this project is to redraw the new architecture drawing of High Voltage Lab after renovation, retrace electrical design of High Voltage Lab. Final goal is use appropriate standard which is MS IEC 60364. There are three objectives of this project. First is to redraw the new architecture drawing to stimulate the building and get full detail about the building. Second, retrace back electrical system redraw the drawing also can retrace back the electrical system of High Voltage Lab. Third is to analyze the electrical system. The project examined the uses and benefits of BIM in the construction of a research facility. The project concluded with an analysis on the use, advantages and setbacks of BIM and its tools. First problem cannot see the construction if drawing in 2D. If used ArchiCAD, the drawing of High Voltage Lab does not look in 3D view but in Revit it can see the drawing fully in and see the details of each room. Second, using conventional method need a high cost. Conventional method cannot estimate how much the project need to use the materials to build a building and it cannot estimate how much the power, current and load that project want to use in the workshop. Finally, coordination between M.E.P. In Revit, it used proper coordination to remark the coordinate which are with mechanical, electrical and plumbing

DEDICATION

To my beloved parents, my family and my friends that I acknowledge my sincere indebtedness and gratitude to them for their love, dream and sacrifice throughout my life. Their sacrifice had inspired me from the day I learned how to read and write until I have become now. I cannot find the appreciate words that could find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to achieve my dream.

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LIST OF SYMBOLS

V	-	Voltage
A	-	Ampere
l	-	Length
m	-	Metre
mm	-	Millimetre
P	-	Power
D	-	Distance
kW	-	Kilowatt
kVAR	-	Kilo Volt Ampere Reactive
kVA	-	Kilo Volt Ampere
I	-	Current
kWh	-	Kilo Watt Hour
kBtu	-	Kilo British Thermal Unit

LIST OF ABBREVIATIONS

BIM	Building Information Modelling
MEP	Mechanical Electrical Plumbing
HVAC	Heating Ventilation Air-Conditioning
MS	Malaysia Standard
IEC	International Electrotechnical Commission's
CAD	Computer Aided Drafting
CIS	CIM Steel Integration Standard
IFC	Interference Check
LAN	Local Area Network
WAN	Wide Area Network
3D	3-Dimensional
2D	2-Dimensional
BAS	Building Automation System
JKR	Malaysian Public Work Department
DB	Distribution Board
MCB	Main Circuit Board
EUI	Energy Use Intensity
PV	Photovoltaic
LED	Light Emitting Diode

LIST OF PUBLICATIONS

CHAPTER 1

INTRODUCTION

1.1 Introduction

Fragmented working environment is common in a traditional construction practice. Building information modeling (BIM) intends to solve the problem and serve as a collaborative platform, yet the technology is still relatively young, and more efforts are required for the actual collaborative culture. This is especially essential as mechanical, electrical, and plumbing (MEP) systems have turned out to be progressively unpredictable to incorporate complex plans and needs of a building structure, which require more space and coordination for the installation. Conversely, the accessible space in structures is constrained due to the financial and energy efficient considerations.

Therefore, the coordination of MEP frameworks has turned into a noteworthy test especially in complex properties such as skyscraper business structures and enormous scale infrastructures. It involves locating equipment and routing heating, ventilating, and air conditioning (HVAC) duct, pipe, and electrical raceway in a manner that satisfies many different types of criteria. In the current MEP coordination process, designers among mechanical, electrical, and plumbing disciplines generally lack cooperation and many collisions are bound to occur. The custom of an MEP coordination utilizes a procedure of successively overlaying and contrasting illustrations for different systems with distinguish and dispose of spatial and utilitarian obstructions

among MEP systems with multi-discipline endeavors are time consuming and costly [1].

1.2 Background of Project

In this project, the software used was Autodesk Revit. The Autodesk Revit involve in doing the architecture and mechanical, electrical, plumbing (MEP) of the High Voltage Lab.

For review section, it involves Revit to simulate of architecture of the building. Revit is used to draw the architecture in 3D modelling with building information building (BIM).

1.3 Problem Statement

In the oil & gas field or architecture, every worker at the plant or building often faces many problems in terms of coordination. Therefore, some of the problems may have been identify. Revit can solve the problem of the MEP. MEP stands for Mechanical, Electrical & Plumbing. Therefore, if something wrong with the MEP, something like this may be can help to dig and search so the problem could be more solved faster. In the production of this project there are several of problems. For example:

- i. In 2D drawing, only top of the drawing can be seen compared to 3D drawing.
- ii. Conventional method needs a high cost because conventional method cannot show the schedule of material take off. It will be a waste if the material that did not use.

- iii. Coordination between MEP because limited building spaces for MEP systems makes efficient design and construction much more difficult.

1.4 Objective of Research

The objectives of this project are:

- i. Redraw the new drawing to simulate the building and get full details about the building which in problems occur in construction.
- ii. Retrace back electrical system of High Voltage Lab. This make easier to do maintenance or modifying.
- iii. Analyses electrical system the main objective of this project because it was easier to analyses electrical system. The details of electrical system which are from distribution board are shown in schedule.

1.5 Scope of Research

This project is focused on the development of Lab Scale by using Revit software. The main of the part is redraw the new architecture drawing of High Voltage Lab after renovation. Second, retrace electrical design of High Voltage Lab. Lastly, this project will use an appropriate standard use which is MS IEC 60364.