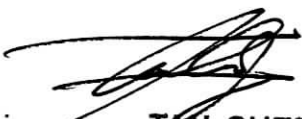


DECLARATION

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

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ELECTRONIC MECHANICAL DESIGN SYSTEM (E-MECH SYS) FOR
CONSULTANCY SERVICES FIRE FIGHTING APPROACH

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This report is submitted to Faculty of Mechanical Engineering in partial fulfillment
of the requirements for the award of the degree of Bachelor of Mechanical
Engineering (Thermal-Fluids)

Faculty of Mechanical Engineering
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November 2005

DECLARATION

“ I declare that this report “ELECTRONIC MECHANICAL DESIGN SYSTEM (E-MECH SYS) FOR CONSULTANCY SERVICES FIRE FIGHTING APPROACH”
is the result of my own research except as cited in the references. ”

Signature : 

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Date : 15.12.05

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ABSTRACT

Electrical Mechanical Design System is a software that design for the consultant. This system is based on Building Law 1984 and follows the specification required by Jabatan Bomba. This software is design using Microsoft Visual basic and also Microsoft Access. All the display that have been sketch will display here. However, for the database, Microsoft Access were choose as a database. E- Mech System contains of 8 types of services. There are portable fire extinguisher, external hydrant, hose reel system, dry riser system, wet riser system, down comer system, automatic sprinkler and automatic carbon dioxide extinguisher. Each service will display the information and data that fixed by Jabatan Bomba. Other than that, the figure and installation techniques also contains in this software. This software is not only for display the data but it is also the user can print the data, either installed or display data. Among that, this software also can be as database of the fire fighting. This software will help to determine the quantity, type of system, pump size, type of pipe and others. With this software, hopefully it will helps an engineer to ready up the plan in the aspect f time, calculation and so on. Lastly, hopefully it will improve the system of fire fighting in Malaysia.

ABSTRAK

Electronic Mechanical Design System (e-MechSys) direka untuk digunakan oleh jurutera perunding mekanikal dalam bidang sistem pencegah kebakaran. Perisian yang direka bentuk ini merupakan system yang berpandukan kepada Building By Laws 1984 dan juga mengikut syarat-syarat yang telah ditetapkan oleh Jabatan Bomba Malasia untuk sesebuah pembangunan hendak dibangunkan. Perisian ini direka bentuk dengan menggunakan perisian Microsoft Visual Basic. Dan paparan yang telah dilakarkan akan dibina dan di hubungkan menggunakan perisian tersebut. Manakala bagi kegunaan database pula, e-MechSys telahpun menggunakan perisian Microsoft Access. Electronic Mechanical Design System (e-MechSys) merupaka perisian pencegah kebakaran yang menggandungi lapan jenis servis. Diantaranya ialah 'Portable Fire Extinguisher, External Hydrant System, Hose Reel System, Wet Riser System, Dry Riser System, Down Comer System, Automatic Sprinkler System and Automatic Carbon Dioxide Extinguisher System'. Setiap paparan servis ini akan juga memaparkan informasi dan juga ketetapan kehendak daripada pihak bomba mengikut undang-undang dan ketetapan yang digunakan dinegara ini. Selain daripada informasi, gambar-gambar mengenai servis yang disediakan, juga dimuatkan didalam perisian ini. Perisian ini juga direka bentuk bukan sekadar digunakan untuk memaparkan maklumat, tetapi ia juga digunakan untuk mencetak maklumat yang telah paparkan. Disamping itu , perisian ini juga boleh digunakan sebagai penyimpan maklumat berkaitan system pencegahan kebakaran. Perisian ini akan cuba mendapatkan kuantiti, jenis sistem, saiz pump, jenis dan bahan paip yang digunakan, dan sebagainya. Dengan adanya perisian ini ia mungkin banyak membantu jurutera perunding menyediakan plan dari segi masa dan juga pengiraan yang akan meningkatkan lagi taraf system yang digunakan di Malaysia.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In the early 50' it was very difficult for the architects, engineers and the building designer to submit the standard design building plans to the various local authorities and district councils in the country. In 1957, the federation of Malaya society of Architects-predecessor of Penubuhan Arkitek Malaysia (PAM) approached the Ministry of Natural resources and Local Government (Ministry of Housing and Local Government) to update the Uniform by Laws to replaces the various outdates Local Council Building by Laws and Sanitary Board Ordinances [1].

And the first draft of the UBBL was published under government Bill No. 1065 dates 5 April 1973 and was submitted to the Ministry based on the result of the submission received. The present UBBL was published by the government in 1984 for the implementation [1].

Until now the statistic, the calculation and the decision for the fire fighting system for the construction plan have done using the manual system. With this method, its may caused the project become late and delay from the schedule that can affect the fire fighting project. Form the experienced and research, to stale this problem we must build software for this fire fighting services that Mechanical

consultant can use. With this solution the consultant can do their work as quick as they can to state the plan for the construction that they involve.

Actually the software was already in the market at over sea, and this software also has been promoted in this country, but the system does not match with Malaysian system. So that our consultant prefer to do their job manually for their construction.

To soft this problem, we prefer to build this software for fire fighting system to use in our country with our laws. A fire fighting system design needs a serious attention. This is because, this system incriminate people soul. At first stage, it must be decide and analyze the type of instrumental and the position of each instrument. Among that, it is also have to determine the arrangement of the facilities.

1.2 Problem Statement

Fire Fighting system is divided to 8 types of services which is Portable Fire Extinguisher, External Hydrant System, Hose Reel System, Wet Riser System, Dry Riser System, Down Comer System, Automatic Sprinkler System and Automatic Carbon Dioxide Extinguisher System., Hydraulic calculation and design system is a task need to be complete before project implementation. The problem in consultancy services in hydraulic calculation is needed more time, more concentration, and the result not accurate. This is because, there are many aspects needed to be considering in the calculation like pipe sizing, effective of pipe length (pipe run), flow rate in imperial gallon per minute (igpm), loss of head and others. Human error can occur, as example in implementing the formula application and as well as very difficult to produce calculation on time especially when time available is very limited (time constrain).

In order to increase their professionalism level, software was needed as an aid to engineers in order to minimize design time and increase the efficiency. It's

involved all mechanical services including the plumbing system. Its helps those to reduce manpower, human error and the energy wasted during the hydraulic calculation.

1.3 Objective

The idea to build this software is adapted from the phenomena that usually happen in fire fighting system. M&E Consultant as example has to take so much time to prepare their fire fighting drawing for construction work in Malaysia. On the other hand, *Fire Fighting Services Software* means the solution for the consultant to save their times for prepare the fire fighting drawing services.

There are a few objectives in developing this software like as listed as to computerize the element of the fire protection that was using in fire fighting services in this country, to create a solution in resolving the fire protection calculations. Design and build a software use in the fire fighting protection system calculations and to build and develop software using programmed language of 'Visual Basic for Applications (VBA)' and supporting by the Microsoft Access. This software was design not only to solve the calculations problem, but it is also can use as a project data

1.4 Scope of Project

The scope of this project is about development of Electronic Mechanical design system (E-Mech Sys) for consultancy services in Fire Fighting system. This program will be built by using Visual Basic software and using the Microsoft Access as the database for this software development.

1.5 Thesis Outline

Thesis outline is a summary of every chapter was described to introduce about the chapter. Chapter one (1) introduced about mechanical system in consultancy services and the objectives develop of the software. Then go to the chapter two (2) where all information about consultancy services in Malaysia and the fire fighting system is discussed. It also includes about Microsoft Visual Basic and design consideration of fire fighting system. The next chapter will describe the project implementation from collect data and information until the software was verified. After that, chapter four (4) will perform all steps to develop of software by using Visual Basic. The example flow chart for system will showing in this chapter which is there had more one form. Then go to chapter five (5), where the results from software development will performed. Its include summary of case study from the previous project in Mechanical Consultant. Recommendation and conclusion will explain in the end of this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 Construction Consultant in Malaysia

In Malaysia, there are plural of consultant that operates. There are developing consultant, business consultant and many more. From the researched, the consultant that involved in building construction was chosen.

Consultant that involve in this field, have been divide into a few type which are architect, Civil and structure (C&S) consultant, Mechanical and Electrical (M&E) consultant, and contractor. Architect is a company that designs the building and C&S consultant is a company that analyzes the civil parts and the structure for the construction, M&E consultant is company that will provide the instrumentations of mechanical and electrical for the construction. However, a consultant will estimate the costing and responsible in distributing the development. Lastly is the contractor. A contractor is responsible to perform the project at the site.

This contractor must follow the rule and regulations as permitted in executing the project. Because of that, all consultant that involve, are responsible for what have been decide and agreed. It is whether from the position, type of equipment, and others regarding from their field.

2.2 Mechanical & Electrical Consultant (M&E)

In building development site, M&E consultant is a company that responsible to mechanical and electrical part. For example, the scope for deciding the equipment to use in the construction, total quantity, and others. The consultant also is responsible to do an applications and approval example in requirement of power supply from TNB. M&E consultant will support from the drafting site. This plan will then pass to the contractor for the site working. All plans will be verified and authorized by the professional engineer (Ir.) where he or she will verify and qualified the plan before authorized.

2.3 Type Of Servicing In MNE Consultant

In M&E Consultant, there are many types of services that they provide for the following range of Mechanical and Electrical Consultancy services. In the construction, this service has been fixed according to the design and type of building. There are as list as below: -

2.3.1 Landed Residential and Mixed Development

- a) Internal Electrical and Telephone Installation
- b) Electrical Infra-works
- c) Street Lighting Installation
- d) Telephone Infra-works

2.3.2 Factories

- a) Internal Electrical and Telephone Installation
- b) Electrical Infra-works and Compound Lighting
- c) Lightning Protection System
- d) Air-Conditioning and Mechanical Ventilation system
- e) Fire-Fighting Installation
- f) Cold and Hot Water Supply Services
- g) Sanitary Plumbing Services

2.3.3 Condominium, Apartment and High Rise Flats

- a) Internal Electrical and Telephone Installation
- b) MATV System
- c) Electrical Infra-works
- d) Security System
- e) Lightning Protection System
- f) Fire-Fighting Installation
- g) Cold and Hot Water Supply Services
- h) Sanitary Plumbing Services
- i) Lift Installation
- j) Swimming Pool Installation

2.3.4 Commercial Complex, Hotels, Shopping Malls and Recreational Complexes

- a) Internal Electrical and Telephone Installation
- b) MATV System
- c) Electrical Infra-works

- d) Security System
- e) Lightning Protection System
- f) Fire-Fighting Installation
- g) Cold and Hot Water Supply Services
- h) Sanitary Plumbing Services
- i) Lift Installation

2.4 Fire Fighting Services

Fire fighting system becomes a need from Jabatan Bomba Malaysia which is focus on safety level for each type of project. This system has been divided into Passive and Active fire defense.

2.4.1 Passive Fire Defense

Passive fire defense is basically a planning matter and must be considered at the planning stage in the building design. The selection of the fire resisting materials, sub division of the building into fire tight cells or compartments both vertically and horizontally to contain an outbreak of fire and spread of fire are basic precautions at the planning stage. Effective passive fire precautions represent good planning, good design, and sound construction, which could complement other basic functions of a building [1].

2.4.2 Active Fire Defense

Active fire defense is basically the manual or automatic fire protection system such as: fire alarm, detectors (heat and smoke) rising mains, hose reels, fire telephone, CO² fixed installation, automatic sprinkler and smoke spills system etc. to

give a warning of an outbreak of fire and containment and extinguishment of a fire. The provisions of adequate and suitable facilities to assist rescue and fire suppression operation are also within the active fire defense strategies.

The overall fire defense strategies for development project in Malaysia are based on the “Fire Safety Philosophy” of the Malaysian Uniform Building By – Laws 1984 where life safety is the first consideration [1]. The fire prevention and operational requirement for both external and internal fire suppression must be considered together. It must also be possible for the fire fighter to operate at any point in the building. Facilities must be built into the building to enable the fire fighter to reach the top – most floors and carry out rescue and internal fire suppression operations[1].

In this system, it has been done regarding to the preliminary and the concept of drawing. There are few rules that must be followed from Jabatan Bomba Malaysia. For example fire alarms, detectors (heat and smoke) rising mains, hose reels, fire telephone, CO2 fixed installation, automatic sprinklers and smoke spills system and the other safety system of the building development.

Architect will determine the type of building, the usage and the area of the project. The architect will apply for the qualification of the building layout that develops from Jabatan Bomba Malaysia. If the qualification is fail, so the architects have to do the changes about the design and required for the approval again. After an approval, the negotiator of M&E will ready up the fire fighting for the project and then submit to the Jabatan Bomba Malaysia for the qualification. MNE consultant will arrange the inspection of the building with ‘Jabatan Bomba Malaysia’. If the department has agreed with the safety ness, then they will bring out a covered letter for the project.