



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**Safety Health And Environment :
Potential Risk In Construction Industry
(Confined Space & Scaffolding)**

Thesis submitted in accordance with the requirements of the
Universiti Teknikal Malaysia Melaka for the Degree of
Bachelor of Engineering (Honours) Manufacturing (Design)

By

Mohd Eya Redhuan Bin Khairudin

Faculty of Manufacturing Engineering
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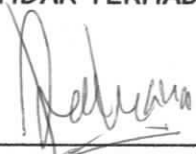
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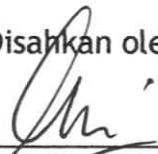
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Alamat Tetap:
 G-85 RAKR, Gong Gemia
 23100 Paka, Dungun
 Terengganu Darul Iman

Cop Rasmi:
MOHD. AMRI BIN SULAIMAN
 Pensyarah
 Fakulti Kejuruteraan Pembuatan
 Universiti Teknikal Malaysia Melaka
 Karung Berkunci 1200, Ayer Keroh
 75450 Melaka

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This thesis submitted to the senate of UTeM and has been accepted as fulfillment of the requirement for the degree of Bachelor of Engineering (Honours) Manufacturing (Design). The members of supervisory committee are as follow:



.....
EN.MOHD AMRI BIN SULAIMAN

Supervisor

Faculty of Manufacturing Engineering

ABSTRACT

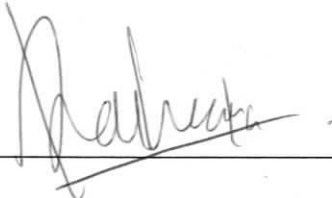
The title of *Projek Sarjana Muda (PSM)* is “*Safety Health and Environment: Potential Risk in Construction Industry (Confined Space & Scaffolding)*”. Occupational, Safety and health is relevant to all branches of industry includes traditional industries, information technology companies also at office. It is particularly important for the construction industry. Construction is a large industry which accounts for gross domestic product of the country. The construction industry has a world reputation for the quality of its work but it remains one of the most dangerous in industries. A confined space is a space that is large enough to be entered and has limited means of entry and exit; and is not designed for continuous occupancy. Examples are tanks, vessels, vaults and pits. The scaffolding means is a temporary modular system of metal pipes forming a framework used to support people and material in the construction or repair of buildings and other large structures. The aim for this project is to identify potential risks that could be occurred in construction industry. The other aim is to relate these risks with Acts (OSHA), Factory & Machinery Acts (FMA) and other related acts along with the related regulation to make some recommendations to minimize the potential risks. This project can also be used to expose the OSHA, FMA and Environment Acts that are commonly used in industry law. During the implementation of this project, confined spaces & scaffolding working area is to be selected for construction industry to make some observation and take photos to verify the potential risks. Observation can analyze the risks and describe potential injuries that could occur. An analysis will be done through questionnaires which are distributed to workers at confined space and scaffolding working area. After this, every risk will be identified by referring to relevant acts. Finally, some recommendations will be made on those risks to minimize the potential hazard and injuries.

ABSTRAK

Tajuk bagi Projek Sarjana Muda (PSM) ini ialah "*Safety Health and Environment: Potential Risk in Construction Industry (Confined Space & Scaffolding)*". Keselamatan dan kesihatan pekerjaan adalah berkait dengan semua bidang industri termasuk industri tradisional, teknologi maklumat, pendidikan, serta berkaitan di pejabat. Ia juga adalah amat penting bagi industri pembinaan. Industri pembinaan merupakan industri yang mendapat perhatian dunia pekerjaan, tetapi perlu diingat bahawa industri ini merupakan industri yang bahaya dan berisiko. Ruang terkurung adalah satu kawasan yang luasnya adalah terhad. Ruang ini juga adalah tidak direka untuk bekerja pada satu tempoh yang lama. Contoh ruang terkurung ialah tangki, vesel, bangunan kedap udara dan juga kawasan lombong. Perancah membawa maksud struktur kerangka sementara yang dibuat untuk membantu pekerja dalam membaiki dan membina bangunan juga struktur yang tinggi. Tujuan kajian projek ini dijalankan adalah untuk mengenalpasti potensi risiko-risiko yang terdapat dalam industri pembinaan amnya dan di kawasan ruang terkurung serta kawasan perancah khususnya. Selain dari itu, tujuannya adalah untuk mengait potensi tersebut dengan akta dan juga beberapa peraturan yang berkaitan. Hasil daripada analisis tersebut cadangan dibuat untuk mengurangkan potensi risiko tersebut. Kajian ini juga untuk memberi pendedahan kepada akta-akta seperti OSHA, FMA, Akta Alam Sekitar serta beberapa peraturan yang berkaitan dengan undang-undang industri. Sepanjang kajian dilakukan, lawatan industri dilakukan dengan memilih dua kawasan pembinaan (ruang terkurung dan perancah) untuk membuat pemerhatian dan mengambil gambar untuk mengkaji potensi risiko dan menerangkan bahaya atau kecederaan yang berpotensi untuk berlaku. Selain dari itu kaedah analisis adalah melalui soalselidik yang di perolehi daripada pekerja di kawasan ruang terkurung dan perancah. Akhir sekali beberapa cadangan dicadangkan untuk mengurangkan potensi bahaya dan kecederaan.

DECLARATION

I hereby, declare this thesis entitled “Safety Health And Environment: Potential Risk In Construction Industry (Confined Space & Scaffolding)” is the result of my own research except as cited in the reference.

Signature : 
Author's Name : MOHD EYA REDHUAN BIN KHAIRUDIN
Date : 08 MEI 2007

DEDICATION

Firstly thank to Allah S.W.T for the opportunity to finish this project. I owe this project and my true happiness to my beloved parent. Since the day I started going to this university until today, they are very caring and supporting for me.

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I am taking this opportunity also to extend my respect towards his patience and tolerance.

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CHAPTER 1

INTRODUCTION

1.1 DEFINITIONS

Safety

The protection of people from physical injury. The borderline between health and safety is ill defined and the two words are normally used together to indicate concern for the physical and mental well-being of the individual at the place of work (R.K. Penny, 1996).

Health

The protection of the bodies and minds of people from illness resulting from the material, processes or procedures used in the workplace (R.K. Penny, 1996).

Environment

The surroundings or conditions in which a person, animal, or plant lives or operates. The natural world, especially as affected by human activity (OXFORD University Press, 2006)

Potential

Capable of being or becoming (Dictionary.com, 2007)

Risk

The possibility of suffering harm or loss; danger. A factor, thing, element, or course involving uncertain danger; a hazard. The danger or probability of loss to an insurer. The amount that an insurance company stands to lose. The variability of returns from an investment. The chance of nonpayment of a debt. One considered with respect to the possibility of loss (Dictionary by Farlex, 2006)

Construction

The act or process of constructing. The art, trade, or work of building. A structure, such as a building, framework, or model. Something fashioned or devised systematically. An artistic composition using various materials; an assemblage or a collage. The way in which something is built or put together (Phil Huges & ED Ferrett, 2005)

Industry

Commercial production and sale of goods. Specific branch of manufacture and trade. The sector of an economy made up of manufacturing enterprises. Industrial management. A standardized tradition of tool making associated with a specified tool or culture (Phil Huges & ED Ferrett, 2005)

From Act 514 Occupational Safety and Health Act 1994 (Sec. 3) Interpretation:

Industry means the public services, statutory authorities or any of the economic activities listed in the First Schedule (OSHA, 1994).

From **Laws of Malaysia Act 520 Lembaga Pembangunan Industri Pembinaan Malaysia Act 1994**: “**construction industry**” means the industry concerning construction works; and “**construction works**” means the construction, extension, installation, repair, maintenance, renewal, removal, renovation, alteration, dismantling, or demolition of:

- (a) Any building, erection, edifice, structure, wall, fence or chimney, whether constructed wholly or partly above or below ground level;
- (b) Any road, railway, cableway, canal or aerodrome;
- (c) Any drainage, irrigation or river control works;
- (d) Any electrical, mechanical, water, gas, petrochemical or telecommunication works; or
- (e) Any bridge, viaduct, dam, reservoir, earthworks, pipeline, sewer, aqueduct. Culvert, drive, shaft, tunnel or reclamation works,

and includes any works which form an integral part of, or are preparatory to or temporary for the works described in paragraphs (a) to (e), including site clearance, soil investigation and improvement, earth-moving, excavation, laying of foundation, site restoration and landscaping;

1.2 INTRODUCTION

Occupational health and safety is relevant to all branches of industry, business and commerce and includes traditional industries, information technology companies, the National Health Services, care home, schools, universities, leisure facilities and office. It is particularly important for the construction industry.

The purpose of this unit is to introduce the foundations on which appropriate health and safety systems may be built. Occupational health and safety affect all aspects of work and may simply require a trained competent manager in a low hazard organization. In a high hazard manufacturing plant, many different specialists, such as engineer (manufacturing, electrical, mechanical and civil), lawyers, medical doctors and nurses, trainers, work planners and supervisors may be required to assist the professional health and safety practitioner in ensuring that there are satisfactory health and safety standards within the organization.

Construction is a large industry which accounts the gross domestic product. The construction industry has a world reputation for the quality of its work but it remains one of the most dangerous in industries.

There are many obstacles to the achievement of good standards. The pressure of production of performance targets, financial constraints and the complexity of the organization are typical examples of such obstacles. However, there are some powerful incentives for organizations to strive for high health and safety standards. These incentives are moral, legal and economic (Phil Huges & ED Ferrett, 2005).

Every construction organization should have a clear policy for the management of health and safety so that every body associated with the organization is aware of its health and safety aims and objectives. For a policy to be effective, it must be honored in the spirit as well as the letter. A good health and safety policy will also enhance the performance of the organization in areas other than health and safety. It is important that each construction site throughout the organization is aware of the policy (Richard J. Coble, 1996)

1.3 PROBLEM STATEMENTS

1.3.1 Scaffolding

The definition of scaffolding is a temporary modular system of metal pipes (termed tubes in Britain) forming a framework used to support people and material in the construction or repair of buildings and other large structures.

The dangers work in scaffolding working area is as an accident hazards for example is a falls from ladders or scaffolds during the erection or the dismantling jobs. Other dangerous is physical hazards as exposure to UV radiation when routinely working

under sun and exposure to excessive noise from mechanical equipment and hand tools. Chemical Hazards also one of the hazard in scaffolding working area as a no specific chemical hazards have been identified for scaffolders. However, on a construction site, scaffolders may be exposed to chemical hazards generated by the work of others and for example, to paint solvents and to thinners if painting work is being done simultaneously

1.3.2 Confined Space

The definition of confined spaces is a space that is large enough to be entered; has limited means of entry and exit; and is not designed for continuous occupancy. Examples are tanks, vessels, silos, storage bins, hoppers, vaults, and pits.

The dangers work in confined spaces working area as the atmosphere in a confined space can entail a variety of hazards in connection with work. Deleterious, explosive or flammable fumes or gases can occur in hazardous concentrations, as can high or low concentrations of oxygen. Dust can also constitute a hazard.

1.4 OBJECTIVES

- To identify potential risks that could be occurred in construction industry.
- To relate these risks with Acts (OSHA), Factory & Machinery Acts (FMA), and other related acts.
- To make some recommendations to minimize the potential risks.
- To expose for OSHA, FMA and Environment Acts those have been used in industry law.

1.5 SCOPE OF PROJECT

- Student will visit the selected construction industry (scaffolding & confined spaces working area), make observation and take photos to verify their claim on the potential risks.
- Analyze the risks and describe potential injuries that could be occurred.
- Refer to relevant acts on every risk that have been identified.
- Make recommendations on those risks to minimize the potential injuries and propose to industry management if they preferred on that study.

1.6 PREVIOUS CASE

Nearly 6.5 million people work at approximately 252,000 construction sites across the nation on any given day. The fatal injury rate for the construction industry is higher than the national average in this category for all industries.

Potential hazards for workers in construction include:

- Falls (from heights)
- Trench collapse
- Scaffold collapse
- Confined space
- Electric shock and arc flash/arc blast
- Failure to use proper personal protective equipment
- Repetitive motion injuries.

The hazards in confined spaces have caused the deaths of many workers and those who were trying to rescue them. On average 15 people each year are killed in confined spaces. There have been several tragedies in confined spaces due to lack of oxygen. Several

years ago, a young mining trainee was killed whilst attempting to rescue an unconscious colleague from a dead end underground roadway. The cause death was oxygen deficiency (Phill Huges, 2005)

CHAPTER 2

LITERATURE REVIEW

2.1 CONFINED SPACES

2.1.1 INTRODUCTION

A confined space can be defined as any space of an enclosed nature which has limited means of access and egress, restricted natural ventilation and is not intended for continual occupancy by persons. It is therefore, any space which by virtue of its enclosed nature, presents a reasonably foreseeable specified risk of serious injury. The main hazards encountered in confined spaces are fire or explosion, asphyxiation, toxicity, drowning in liquids or free flowing solids and injury or death if mechanical equipment within the confined space is inadvertently turned on while someone is still inside. These hazards are due to the presence of hazardous gases, vapours, fumes, dusts or the creation of an oxygen-deficient or oxygen-rich atmosphere (John F. Rekus, 2002).

Example of a confined space include manholes, sewers, tunnel, excavations, storage tanks, holds of ships, pits, trenches, ducts, some unventilated areas or rooms within buildings (particularly below ground level), boilers, combustion chambers in furnaces, chambers, vats, silos, trenches, pipes, flues and wells. Confined Spaces are classified

into two main categories as permit-required and non-permit required (Eric LeBreton, 2006).

2.1.2 HAZARD IN CONFINED SPACE

There are a number of occupational health and safety hazards associated with working in confined space.

- Fire and explosion
- Gases
- Heat stress
- Dust associated with grit blasting
- Falling objects
- Falling from heights
- Hydrocarbon vapour including additives and aromatic compounds like benzene.
- Oxygen deficient atmosphere

Relevant training, procedures, personal protective equipment and recovery measures should be in place to ensure that work in confined space could be carried out safely. Equally important, workers must be free from medical conditions which may compromise their safety. It is therefore important that workers involved in confined space work must first undergo health screening and be certified fit before they start work.