ERGONOMICS RISK ASSESSMENT ON MANUAL MATERIAL HANDLING TASKS FOR UTeM PEMBANGUNAN STAFF

This report is submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Hons.)

by

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DECLARATION

I hereby, declared this report entitled “Ergonomics Risk Assessment on Manual Material Handling Tasks for UTeM Pembangunan Staffs” is the results of my own research except as cited in reference.

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Date : 26 June 2019

APPROVAL

This report is summitted to the Faculty of Manufacturing Engineering of Universiti Teknikal Malaysia Melaka as a partial fulfilment of the requirements for the degree of Bachelor of Manufacturing Engineering.
The members the supervisory committee are as follow:

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Dr Muhammad Syafiq bin Syed Mohamed

ABSTRAK

Kajian ini bermatlamat untuk mengkaji kecederaan yang disebabkan oleh kerja-kerja manual yang memerlukan tenaga pekerja sendiri. Kajian ini berfokus kepada golongan pekerja di bawah Unit Pembangunan Universiti Teknikal Malaysia Melaka (UTeM) yang menjalankan tugas-tugas penyediaan upacara dan majlis di UTeM. Kajian ini bertujuan untuk memberi cadangan yang berguna agar dapat mengatasi masalah kecederaan otot tuland rangka (MSD) dalam kalangan staf UTeM. Kajian ini dimulakan dengan soal selidik dengan staf Unit Pembangunan UTeM. Soal selidik ini bermatlamat untuk memahami jenis kecederaan yang dialami oleh golongan pekerja tersebut. Selain itu, "revised NIOSH lifting equation" digunakan untuk menganalisis jumlah berat objek yang selamat untuk dikendalikan semasa pekerja tersebut menjalankan kerja. "Rapid entire body assessment (REBA)" juga digunakan untuk menganalisis postur pekerja ketika mengambil, membawa dan menurunkan sesuatu objek. Keputusan kajian-kajian tersebut telah dikumpulkan dan dianalisis untuk mencari penyelesaian untuk pekerja-pekerja agar dapat meminimumkan kesan sampingan dan kecederaan otot tulang rangka akibat pekerjaan mereka.

ABSTRACT

This research intends to investigate the occurrence of work-related musculoskeletal disorders (WMSDs) among Universiti Teknikal Malaysia Melaka (UTeM) Pembangunan staffs who are exposed to manual material handling task and then, to suggest for improvement on the way to cope with their tasks in order to reduce their WMSDs symptoms. Ergonomics self-assessment form was distributed to analyse the musculoskeletal symptoms experienced by UTeM Pembangunan staffs. After identifying the syndromes, revised NIOSH lifting equation was calculated to justify safe lifting limit for the staff while handling an object. A lifting index value of more than 1 indicates that the task is risky and can cause injury. Rapid entire body assessment (REBA) was then applies to evaluate the lifting, carrying and lowering postures performed by the labours. Results obtained from the assessments were gathered and evaluated in order to come out with a solution to overcome the occupational risks among UTeM Pembangunan staffs.

DEDICATION

To my excellent parents

Thank you for being my role model all the way

To my brother

I appreciate for your kind support

To all my friends and family,

Thank you for your companions

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First and foremost, I would like to highlight my appreciation to my project supervisor, Dr. Muhammad Syafiq bin Syed Mohamed from Faculty of Manufacturing Engineering. I am thankful for his supervision all the way when conducting this project, and always shared his knowledge and expertise with me. He also being a caring supervisor, by providing guidance to me whenever I am in any difficulty.

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LIST OF ABBREVIATIONS

UTeM	-	Universiti Teknikal Malaysia Melaka
NIOSH	-	National Institute of Occupational Safety and Health
REBA	-	Rapid Entire Body Assessment
WMSDs	-	Work-related Musculoskeletal Disorders
MMH	-	Manual Material Handling
HSE	-	Health and Safety Executive
LBP	-	Low Back Pain
SOCSO	-	Social Security Organisation
ERA	-	Ergonomics Risk Assessment
ERS	-	Ergonomics Research Society
EPA	-	European Productivity Agency
IEA	-	International Ergonomics Association
DOSH	-	Department of Occupational Safety and Health
FMA	-	Factories & Machinery Act
OSHA	-	Occupational Safety and Health Act
UCR	-	University of California, Riverside
CTS	-	Carpal Tunnel Syndrome
EU-OSHA	-	European Occupational Safety and Health Association
RWL	-	Recommended Weight Limit
LI	-	Lifting Index
RULA	-	Rapid Upper Limb Assessment
OWAS	-	Ovako Working Posture
NMQ	-	Nordic Musculoskeletal Questionnaire
LC	-	Load Constant
HM	-	Horizontal Multiplier
VM	-	Vertical Multiplier
DM	-	Distance Multiplier
FM	-	Frequency Multiplier
AM	-	Asymmetry Multiplier

CM	-	Coupling Multiplier
PPE	-	Personal Protective Equipment
PLAD	-	Personal Lift-Assist Device

LIST OF SYMBOLS

Kg	-	kilogram
Cm	-	centimetre

CHAPTER 1
INTRODUCTION

1.1 Project Background

Manual handling works also known as manual material handling (MMH). MMH is defined as any work which required men power to deliver or hold up a load. This included lifting, holding, putting down, pushing, pulling, carrying or moving of a load, either by human's hand or body force. In other words, MMH is any duty, which requires human's force to complete it without any aids of tool or machine. MMH can be classified into two major categories: primary MMH and combined MMH. Primary MMH is any task that includes only one MMH elements such as either lifting, carrying or holding. Combined MMH is any design of task whereby more than one element of MMH is carry out in a sequence (Taboun & Dutta, 1989). For example, a job that require worker to lift-carry-lower is considered as a combined MMH.

Although new era technology has moving towards Industry 4.0, however manual handling work cannot be eliminated in some of the industry. MMH is required in many workplaces, such as in factories, construction site, warehouse etc. The common MMH jobs performed by the workers are to lift and carry an object or tool from one place to another place, and then lowering it down. When workers are dealing with MMH, they are exposed to several ergonomics risk factors, which are awkward posture, forceful exertion, repetitive motion, static and sustained posture, contact stress, vibration and environmental factors such as extreme temperature, lighting and noise (Guidelines for Manual Handling at Workplace, 2018). Therefore, the workers are on high risks of injuries when they are dealing with MMH task, especially when the load they handle is too heavy or bulky.

MMH might cause two types of injuries to the workers, which is non-musculoskeletal injuries caused by unexpected accidents and work-related musculoskeletal disorders (WMSDs). Accidents can happen anywhere and anytime when dealing with MMH job and

might cause serious injuries to the workers, such as bone fractures. These accidents occurred due to MMH is unpredicted and cannot be avoided.

Improper way to carry out MMH tasks can lead to several diseases and injuries. According to Health and Safety Executive (HSE), the main contributor to WMSDs is the improper ways of handling the material or task. WMSDs included injuries occurred on bones, joints, muscles, nerves, ligaments, bursa and blood vessels. According to Ninica et.al (2016), the common risk factors for WMSDs include repetitive motions, awkward body postures, forceful hand exertions, and heavy or frequent manual material handling. Besides, Kuijer et.al (2007) claims that almost 50% of the MMH tasks involves pushing and pulling. A survey done by Raghunathan and Maiti (2015) shows that 83% of the lifting tasks and 60% of pushing-pulling tasks are moderate to high exertion tasks. These tasks usually lead to lower back pain, shoulder pain and wrist pain to the workers. Furthermore, handling MMH tasks with wrong method might lead to low back pain (LBP). Low back pain usually experienced by workers who are associated with forceful lifting tasks (Beeck & Hermans, 2000).

Injuries caused by manual handling will affect employees' health and safety during work. Some of the workers might become disable due to WMSDs or LBP. Moreover, WMSDs among labours bring lost to companies in term of productivity and cost. Companies are claimed to pay high compensation fees to workers who had faced WMSDs or any other occupational diseases. Niu (2010) stated almost 50% of the compensation fees paid by companies are resulted from WMSDs. Thus, this problem must be addressed in order to minimize the injuries, ensure the safety of the workers and reduce company lost.

This study will be conducted in Universiti Teknikal Malaysia Melaka (UTeM), among their Pembangunan staffs who are dealing with MMH tasks along the year. All the maintenance staffs will be involved in this study. This purpose of this study is to investigate the working conditions and working styles of the staffs and, justify the associated ergonomics risk factors that may contributes to WMSDs or low back injuries. An ergonomics self-assessment form will first be distributed to the staffs to find out their common MSDs symptoms. Then, the level of seriousness of the entire risk factors will be justified by using ergonomics risk assessment tools such as Rapid Entire Body Assessment (REBA) and revised NIOSH lifting equation. Suggestions on maximum allowable loads to lift and posture to carry out the task will be provided to the staffs according to the identified risk factors.