## HAND-ARM VIBRATION (HAV) TRANSMITTED BY HANDLE AMONG YOUNG MOTORCYCLISTS

# MOHD FAIZ BIN ISMAIL 2006689364

A thesis submitted in partial fulfillment of the requirements for the award of Bachelor Engineering (Hons) (Mechanical)

> Faculty of Mechanical Engineering Universiti Teknologi MARA (UiTM)

> > MAY 2010

#### ACKNOWLEDGEMENT

First and foremost, I would like to express my gratefulness to Allah, the Almighty for I have completed this heavy task. Without His Approval, surely there is no way I can ever complete this requirement.

My gratitude my appreciation to my beloved parents, En Ismail Ahmad and Pn Mariah Othman for their never ending prayers and financial support. It is for their unconditional love, patience and support that I could keep my feet on the ground and go through the challenge of getting this task done.

My profound appreciation goes to my supervisor, En Mohd Faizal b Mohamad for his guidance, patience and precious advice throughout the process of completing this task. Thank you so much for all the comments and this project will never come to live without his existence. I would like to thank to some of the students in Universiti Teknologi Mara (UiTM) Shah Alam for their kindness for being as a motorcyclists during completing the experiment. Once again, thanks for the co-operation given.

My appreciation goes to my beloved friends as well for sharing the knowledge and always being available in helping me. For those whom their names are not being mentioned, I truly appreciate their contributions.

### ABSTRACT

The purpose of this study is to evaluate the rate of vibration which transmitted by handle of motorcycle among young motorcyclistSrand to ensure that the vibration occur does not exceed the exposure limit value for hand arm vibration (HAV). In addition, comparison of the vibration occur by the handle between moped type and scooter type have been made which are Yamaha LC 135 has been selected for moped type and Yamaha Ego S for scooter type. The riders were among young males' students of Universiti Teknologi Mara (UiTM) Shah Alam. The data was collected based on the testing to get the rate of vibration which occurs by handles using 'Sound Level Vibration Meter' and attached to the accelerometer 4505A. Based on the result, the rate of vibration which transmitted by both motorcycle in term of maximum peak acceleration averagely are in range of 8  $m/s^2$  to 14  $m/s^2$ . Based on the analysis, the vibration transmitted by handle of scooter is greater than moped. However, the percentage different between both of them are too small. The vibration occurs by the handle of motorcycle can be classified as not dangerous and safe from hand arm vibration exposure to the riders since the percentage exposure mostly below 1% based on the maximum exposure value.

### TABLE OF CONTENTS

### CONTENTS

PAGE

PAGE TITLE	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF ABBREVIATIONS	Х

## CHAPTER I INTIIODUCTION

1.1	Overview	1
1.2	Problem Statement	3
1.3	Objectives	4
1.4	Scope	4
1.5	Significance of the Project	4
1.6	Limitation of the Project	5
1.7	Methodology Overview	6

### CHAPTER II LITERATURE REVIEW

2.1	Source	of	the	HAV	8
-----	--------	----	-----	-----	---

2.2	Case History		
2.3	Effect	11	
	2.3.1	Vascular Disorder	12
	2.3.2	Neurological Disorders	13
	2.3.3	Musculoskeletal Disorders	14
2.4	Vibra	tion Measurement	14
	2.4.1	Performing Measurement	15
	2.4.2	Determine Exposure	17
2.5	Related Findings		18

## CHAPTER III METHODOLOGY

3.1	Introduction				
3.2	Equipment Preparation				
	3.2.1	Sound Level Hand-arm Vibration			
		Meter	21		
	3.2.2	Accelerometer	23		
	3.2.3	Motorcycle	24		
3.3	Experimental Procedure				
3.4	Data Analysis				

### CHAPTER IV RESULTS AND DISCUSSION

4.1	Introduction			
4.2	Individual Graph			
	4.2.1 Moped (Yamaha LC 135)	30		
	4.2.2 Scooter (Yamaha Ego S)	35		
4.3	Tabulated Data			
	4.3.1 Average Vibration Occur	40		
	4.3.2 Percentage Different	41		
4.4	Vibration Exposure to Hand-Arm Vibration	41		
4.5	Discussion			
	4.5.1 Motorcycle Condition	44		