



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**IMPROVEMENT ON LIGHT REFLECTIVE JACKET
TO INCREASE VISIBILITY OF MOTORCYCLIST**

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

by

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APPROVAL

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 (Automotive) with Honours. The member of the supervisory is as follow:

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DEDICATION

I dedicate my dissertation work to my family and all my friends. An enormous gratitude to my father, Zolkefle bin Md Shahid, whom trust me and always encourage me in being confident. I also dedicate to my entire course mate from BMMA KOHORT 6 whose give me a lot of ideas and tips throughout this this semester in improving my report. Not forgetting, to all my lecturers whose had taught and gave a knowledge directly or indirectly. Last but not least, to my supervisor Dr Nur Hazwani binti Mokhtar who always guided me to finish my report.

ABSTRAK

Salah satu faktor penyebab kemalangan motosikal ialah kebolehlihatan motosikal. Kemalangan maut melibatkan motosikal adalah yang tertinggi di Malaysia berbanding kenderaan jenis lain. Tujuan projek ini adalah memastikan para penunggang motosikal sentiasa dipantau dengan menarik perhatian pengguna jalan raya yang lain semasa menunggang motosikal. Satu kajian oleh Wood mendapati bahawa pemandu pada waktu malam benar-benar mengenal pasti orang memakai jaket pemantul cahaya sebanyak 67% dari masa itu. Untuk meningkatkan kebolehlihatan motor, penunggang motosikal perlu memakai jaket pemantul cahaya. Bahan reflektif berfungsi mengembalikan cahaya ke arah sumber cahaya dan membolehkan pemandu melihat cahaya yang dipantulkan dari bahan yang dipakai oleh penunggang motosikal. Jenis bahan ini cenderung untuk berfungsi dengan baik dalam persekitaran yang bercahaya tetapi ianya tidak dapat mementulkan cahaya dengan baik di siang hari. Bahan floresen berbeza dari bahan reflektif kerana ia menyerap sebahagian cahaya ultraviolet yang tidak kelihatan dari sinar matahari, maka pigmen khusus melepaskan sinar cahaya UV sebagai cahaya yang lebih terlihat. Sebelum itu, kaedah kaji selidik digunakan untuk mengumpul data dengan menggunakan borang Goggle dan mengedarkan kepada 100 responden tentang peningkatan perlu dilakukan pada jaket motosikal. Projek ini dapat mengurangkan kemalangan penunggang motosikal pada waktu malam selain tawaran harga sangat berpatutan.

ABSTRACT

One of factor that increases motor accident is motorcyclist visibilities. Fatal accidents involve motorcycles are the highest in Malaysia compare to other type of vehicle. The purpose of this project is to ensure that motorcyclists are constantly monitored by attracting other road users while riding a motorcycle. A study by Wood found that at night drivers correctly identified person wearing a reflective vest 67% of the time. In order to increase motor visibilities, motorcyclists need to wear light reflective jacket. The reflective material returns light into the direction of the light's source and serves to allow the driver to see the light reflected from the material that the person is wearing. This type of material tends to work best in environments that are dully lit. It's not that these materials can't reflect in the daylight, but it doesn't do a very good job. The fluorescent material differs from reflective materials in that it absorbs some invisible ultraviolet light from sunlight, then special pigments release those UV light rays as more visible light. It can only do this in areas where there is natural light. Before that, survey method is used to collect data by using Goggle form and distribute to 100 respondents about the improvement need to do on motorcyclist jacket. This project can reduce the rider accident at night besides the price offer is very affordable.

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LIST OF ABBREVIATIONS

ANSI	International Safety Equipment Association
EMS	Emergency Medical Services
FTK	Fakulti Teknologi Kejuruteraan
in	inch
km/h	kilometre per hour
LED	Light-emitting diodes
m	meter
MOT	Ministry Of Transportation
MUTCD	Manual on Uniform Traffic Control Devices for Streets and Highways
PPE	Personal Protective Equipment
s	second
US	United State

CHAPTER 1

INTRODUCTION

1.1 Background

Currently, fatal accidents involving motorcycles are the highest each year despite accidents involving cars is the highest among the other vehicle as shown in Figure 1.1 (MOT, 2018). One of factor that increases motor accident is motorcyclist visibilities. In order to increase motor visibilities, motorcyclists need to wear light reflective jacket. Reflective materials used in high visibility warning suits are typically glass bead and microcrystalline, consisting of a base material that is striking in color and retroreflective material.

The effect is clearly visible and the driver has enough time to stop or take evasive action. Recent study stated the single car fatal crash were the highest at total evening and night as shown in Table 2.1 (Regev, Rolison & Moutari, 2018). Additionally, the motorcyclist forms a clear contrast with the surrounding environment under the daytime or nighttime illumination due to the effect of fluorescence and reflection.

During the night, drivers correctly identified persons wearing a reflective vest 67 percent of the time; however, the combination of a reflective vest and a knee and knee reflector increased to 94 percent (Wood, 2012).

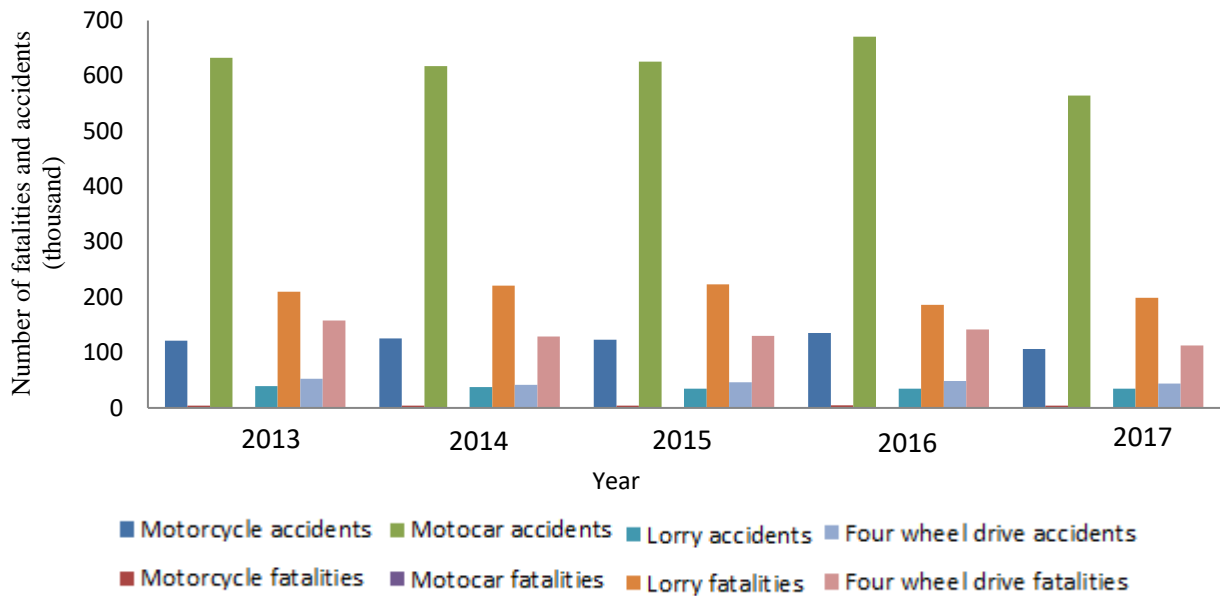


Figure 1.1 Top four type of vehicle that has highest accident and fatalities statistic from 2013 to 2017 in Malaysia

Table 1.1 Time for motorcycle accident in Thailand (n = 214)

	Time classifications	Number (%)
Period	0:00-5:59	81 (37.9)
	6:00-11:59	35 (16.4)
	12:00-17:59	38 (17.8)
	18:00-23:59	60 (28.0)
Time of day	Daytime	73 (34.1)
	Night time	141 (65.9)
Time of week	Weekday	145 (67.8)
	Weekend	69(32.2)

1.2 Objective

1. To compare the visibility of reflective clothes by taking the driver reaction time.
2. Design a new jacket to increase visibility for motorcyclist.

1.3 Problem Statement

One of factor that increases motor accident is motorcyclist visibilities. In order to increase motor visibilities, motorcyclists need to wear light reflective jacket. Most of the motorcyclist safety accessories are very expensive in price like the rider wear in Grand Prix motorcycle racing. During low light condition and night, the human distance of sight is very limited. Sometimes even an object like lizard passes in front of the driver, the driver cannot able to see it clearly and hit the object especially when the road is dark.

This project develops to solve the problems mentioned above. These problems need to solve because it can help to reduce accident among motorcyclist and increase visibility. Besides that, this jacket also can be used for pedestrians and cyclist.

1.4 Scope of the project

The scope of this project is to improve the jacket used for the motorcyclist especially when ride during the low light condition or night. The most important things on this project is the price for one unit does not exceed RM 100 which is very affordable if need to compare to the risk of life.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

The studies and researched for this project were gathered from numerous sources for example, books, articles, journals and internet. In this section, the statistics based on the accident during low light condition and night is gathered starting from the world, followed by the Asia and lastly Malaysia. Besides that, the information about the reflective and fluorescent jackets are collected like type of jacket, class of the jacket, and the right place to apply. The other things to be discuss in this chapter is a few accident conditions that often occur with the aid of graphic and description. The fabric to develop the reflective jacket for the rider also being discuss in this chapter.

2.1 World statistic

In Great Britain, most of the fatal crash on night experienced by males compared to females as shown in Table 2.1 (Regev, Rolison & Moutari, 2018). However, the statistic shows that both males and females having the highest fatal crash on the age of 21 to 29 years old. The lowest statistic on fatal crash for both males and female are at the age 70+ on the evening and night. Surprisingly, there is no accident occur on the females on that time.

Table 2.1 Single-car fatal crash counts by driver age, gender, and time of day in Great Britain, 2002 to 2012

Age	Males			Females		
	Day	Evening	Night	Day	Evening	Night
17–20	16	10	44	3	1	6
21–29	35	16	66	6	2	7
30–39	40	16	35	6	2	4
40–49	28	10	19	6	1	2
50–59	17	7	12	3	1	1
60–69	12	2	5	2	0	0
70+	19	2	2	6	0	0

On the other side based on motorcycle data crash at Brasil (Carrasco, Godinho, Berti de Azevedo Barros, Rizoli, & Fraga, 2012), there were 479 deaths. 90.8% were male, the mean age was 27.8 (range 0-73), 86.4% were conductors of the vehicles, 26.1% of the accidents occurred at night, 69.1% were urban and 30.9% occurred on highways.

2.2 Asia statistic

The effect is clearly visible, and the driver has enough time to stop or take evasive action. Based on study done by Mahidol University, Thailand in Table 1.1, accident frequently occurs early in the morning and during the night (Wittayarungruengsri, 2007). Most of the accident time occurs early in the morning and on the night that is on 0:00 to 5:59 and 18:00 to 23:59. On the daily statistic, the motorcycle accident occurs on night time. On the weekly statistic, most of the motorcycle accident occurs on weekday. From the weekly statistic, the factor of accidents comes from the people that busy on the working day.

Another Asian statistic from western Nepal by (Mishra, Sinha, Sukhla, & Sinha, 2010) as shown in Table 2.2 mention that most of the accidents occur at 3am to 7 am with 350 cases of accidents. The accidents occur during low light condition and dark. During weekdays and weekends shown in Table 2.3, the average most accident time occur at 3pm to 7pm with 81 and 72 numbers of accidents. On this time, most of the people almost done working and ready to get back home.