



## **DESIGN OF PORTABLE POWER ASSISTED TOWING MECHANISM FOR MOTORCYCLE**

This report submitted in accordance with requirement of the Universiti Teknikal  
Malaysia Melaka (UTeM) for the bachelor's degree of Manufacturing  
Engineering (Hons.)

by

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Sesi Pengajian: **2019/2020 Semester 2**

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I hereby, declared this report entitled “Design of Portable Power Assisted Towing Mechanism for Motorcycle” is the result of my own research except as cited in references.



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## APPROVAL

This report is submitted to the faculty of Manufacturing Engineering of UTEM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering with (Hons.). The member of the supervisory is as follow:

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(IR. DR. MUHAMAD ARFAUZ BIN A. RAHMAN)

## ABSTRAK

Isu pemmasalahan yang paling biasa dihadapi oleh penunggang motosikal pada masa kini adalah tayar pancit ataupun kerosakan pada tayar motosikal. Masalah ini boleh berlaku pada bila masa sahaja. Tayar boleh menyebabkan rosak oleh pelbagai sebab dan faktor, dan ia boleh berlaku tanpa pemandu segera menyedari masalah mereka. Di samping itu juga, motosikal tidak mempunyai penyediaan tayar untuk digantikan dan menyebabkan perkara ini menjadi lebih teruk. Berbeza kenderaan seperti kereta, tayar ganti disediakan di dalam bonet dan ianya mudah diganti apabila kenderaan mereka mengalami kecemasan. Berdasarkan penyelidikan yang dibuat, kebanyakan alat mekanisma penundaan yang terdapat hari ini adalah sangat besar dari segi saiz, tidak boleh menunda secara individu dan tidak mudah dibawa jika mengalami kecemasan. Pada masa kini, alat pembaikan yang terbaik adalah dengan menggunakan pengedap getah tayar atau mencari perkhidmatan penundaan yang berhampiran tetapi kedua-dua kaedah ini merumitkan dan sangat mengambil masa yang lama. Selain itu, mekanisma seperti pengedap getah tayar hanya bertindak sementara pada tayar pancit dan tidak boleh digunakan untuk tayar yang rosak. Dalam kajian ini, mekanisma penunda baru untuk motosikal telah dicipta. Mekanisma penunda kuasa mudah alih adalah peranti yang dibuat untuk memudahkan penunggang motosikal yang menghadapi tayar pancit dan rosak. Apabila seorang penunggang motosikal mengalami masalah tayar pancit ataupun rosak, mekanisma penundaan yang direka ini bertindak sebagai tayar ganti tanpa perlu mengubah tayar sedia ada pada motosikal. Mekanisma ini akan mengurangkan proses pemasangan dan pembukaan tayar ganti. Reka bentuk ini adalah bertujuan untuk memastikan produk tersebut mudah dipasang dan boleh digunakan pada bahagian tayar pancit depan dan belakang. Oleh itu, dengan mencipta mekanisma penunda kuasa mudah alih untuk motosikal ini ianya membantu banyak penunggang motosikal yang berpengalaman mengalami masalah tayar pancit ataupun rosak



## ABSTRACT

The most common issue faced by motorcyclists today is damaged, or tire flatted. This problem can occur anytime. The tire can become damaged for various reasons and factors, and it can happen without the driver being immediately aware of their problems. Besides that, a motorcycle does not provide a spare tire and led this problem to occur. Unlike vehicles such as cars, spare tires are supplied inside the bonnet and can easily replace when they are suddenly experiences with an emergency. Based on the research made, most of the towing mechanism device available today is vast in size, cannot be done individually and not portability formed. Nowadays, the best tire repairing tool kits in service are either applying tire inflator/sealant or seeking for nearest towing service. Still, both methods are not convenient and very time-consuming. Moreover, a mechanism such as a tire sealant/inflator only acts temporarily on a flat tire and not applicable for the damaged tire. In this research, a new towing mechanism for a motorcycle has been invented. A portable power-assisted towing mechanism is a device made to ease motorcyclists who face flat/damaged tire situations. When a motorcyclist experiences in tire flat/damaged, the towing mechanism acts as the spare tire without having to change the existing tire at the motorcycle. This mechanism eliminates the process of assembling or disassemble the spare tire. This design aims to make sure the product is easy to install and allows for attaching at the front and rear flat/damaged tire. Thus, by inventing this portable power-assisted towing mechanism for motorcycle, it will help many motorcyclists when they faced flat and damage tire problems.

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## **DEDICATION**

I would like to dedicate this work to my:

Beloved parents

Dearest siblings

Honorable supervisor and lecturers

Supportive friends and mates



## ACKNOWLEDGEMENT

First and foremost, gratitude is to GOD Almighty who has been all along and giving the strength to complete this Final Year Project. I am very grateful and would like to express sincere gratitude to my lecturer Ir. Dr. Muhamad Arfauz Bin A Rahman for his invaluable guidance, continuous encouragement and constant support in making this project possible. I appreciated his guidance from the start to the final level, which enabled me to develop an understanding of this project thoroughly. Without his advice and assistance, it would be a lot tougher to complete.

I am acknowledging my sincere indebtedness and gratitude to my parents for their love, dream and sacrifice throughout my life. I am very thankful for their sacrifice, patience, and understanding that were inevitable to make this work possible. Their sacrifice had inspired me from the day my self-learned how to read and write until what I have become now. I cannot find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to achieve my dreams.

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## LIST OF ABBREVIATIONS

3D	-	Three Dimension.
AMP	-	Ampere.
BOM	-	Bill of Material.
CAD	-	Computer Aided Design.
CSP	-	Constraint Specification Problem.
DC	-	Direct Current.
DFE	-	Design for Environment.
E	-	Efficiency.
FYP	-	Final Year Project
HOQ	-	House of Quality.
IDP	-	Integrate Design Project.
MIG	-	Metal Inert Gas.
N	-	Speed.
PDS	-	Product Design Specification.
P	-	Power.
SUB	-	Subtitution.
QFD	-	Quality Function Deployment.
T	-	Torque.
V	-	Voltage.



## LIST OF SYMBOLS

-	-	Minus.
+	-	Plus.
=	-	Equal.
^	-	Power of
%	-	Percentage.
e	-	Exponential.
/	-	Devided.
*	-	Multification.
$\Delta$	-	Changed.
$\uparrow$	-	Increase.
$\downarrow$	-	Decrease.
◻	-	Weak.
○	-	Strong.
AH	-	Ampere Hour.
CM	-	Centimeter.
D	-	Diameter.
HV	-	Hardness Vickers
GPA	-	Giga Pascal.
KG	-	Kilogram.
KG/M <sup>3</sup>	-	Kilogram Per Meter Cube.
KM/H	-	Kilometer Per Hour.
KW	-	Kilowatt.
MM	-	Milimeter.
MPA	-	Mega Pascal.
MYR	-	Malaysia Ringgit.
M/S <sup>2</sup>	-	Meter Per Second Square.
N	-	Newton.

N.M	-	Newton Per Meter.
PC	-	Piece
PCS	-	Pieces
RPM	-	Revolution Per Minute.
W	-	Watt.

# CHAPTER 1

## INTRODUCTION

This chapter introduces the project background and briefly describes the objectives and scope of the study. This chapter will give an overview of the implementation of the project.

### 1.1 Project Background

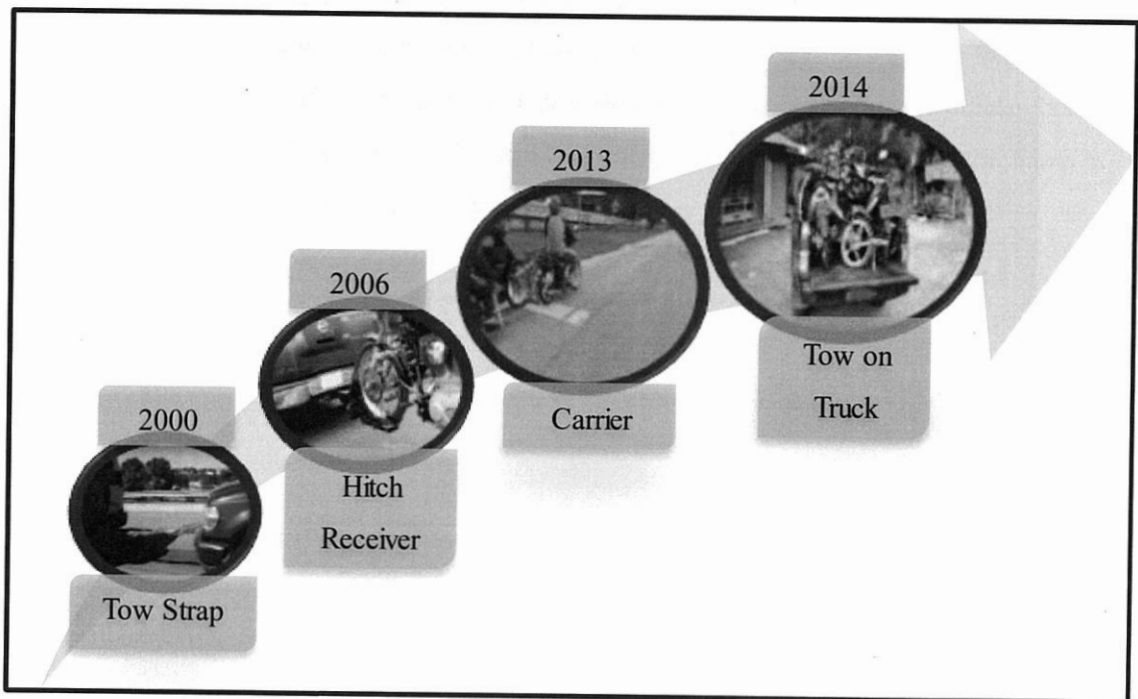


Figure 1.1: Evolution of towing mechanism

Towing is a linking of two or more objects together so that a specified power source may pull them out. There are many towing sources such as a motorized land vehicle, animal or human being, and the load can be anything that can be pulled. Usually, the towing device can relate to various towing mechanisms such as rope, belt, hook, linking, integrated platform, or other means of holding the objects in contact.

According to Wanye Pingel (2000), a protected tow strap system was connected to the towing vehicle, and the towed vehicle is secured with a hook/loop fastener. W. Thomas McClellan (2006) pointed out that a towing vehicle device includes vertical and horizontal members interconnected to support the motorcycle wheel. A support column was mounted on at least one of the members, such as a removable hinge pin passing through holes in the support column and brackets on the support column. Jens Vortmeyer (2013) stated that a towing vehicle device includes a coupling shaft attached to a towing vehicle, and a ball head mounted on the coupling shaft so that the ball head can rotate about a vertical axis, which can be coupled to the coupling counterpart on a trailer vehicle. KD Genoe (2014) comes on with his statement that a tow truck, aside from recovery boom attached to a tow truck chassis, includes a frame. The boom extending in and out of the frame is through telescopic means linked by a hydraulic boom cylinder to a boom track of the frame. The stabilizer arm, extending in and out of the frame is telescopically connected to a stabilizer hydraulic cylinder.