UNIVERSITI TEKNIKAL MALAYSIA MELAKA

A DESIGN AND FABRICATION OF MOTORCYCLE JACK LIFTER

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

by

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Tajuk:a design and fabrication of motorcycle jack lifter

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I hereby, declared this report entitled a design and fabrication of motorcycle jack lifter is the results of my own research except as cited in references.

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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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ABSTRAK

Kandungan Laporan ini menunjukkan keseluruhan proses yang dilakukan untuk menyiapkan projek ini. Tujuan jek motosikal ini dibuat adalah untuk memberi tambahan pada ketinggian tayar bagi memudahkan kerja penyelenggaran asas seperti menukar minyak enjin, minyak fork, menukar tayar atau membasuh tayar motorsikal. Terdapat beberapa proses yang terlibat bagi menyiapkan projek ini seperti proses penyambungan, proses pengukuran, proses pemotongan dan proses menebuk lubang. Pengubahsuaian dan membaik pulih yang dilakukan pada tongkat motor yang sudah ada dipasaran memerlukan analisa sepenuhnya untuk memastikan produk yang terhasil mempunyai kualiti dan keselamatan yang lebih baik. Ujian tegasan dilakukan keatas jek motosikal ini di analisa bagi mengkaji kekuatan dan ketahanan maksimum yang boleh ditampung. Dengan menggunakan *Mild Steel*, jek motorsikal yang terhasil mampu memenuhi kehendak dan ciri-ciri kajian.

ABSTRACT

This contain of this report shows the whole process used to complete this project. Motorcycle jack lifter is build is to give extra lifting to the user is to ease the most basic motorcycle maintenances such as engine oil or fork oil change, tyre replacement or even cleaning the wheels. There are processes that involve completing this project such as welding process, measuring process, drilling process, milling process and cutting process. This modification is done onto an existing designed motorcycle jack lifter which available on market and need to be analyse completely to make sure the product have a better quality and safety factor. Stress testing is done onto the motorcycle jack then analyses to investigate the strength and can withstand to its maximum. By using Mild Steel, the motorcycle jack will fulfil objective and experiment properties.

DEDICATION

To My Parents

Thank you to my father, Mohd Salleh bin Khalid and my mother, Noraini binti Abdul Rashid for giving me mental support and lots of advice.

To My Final Year Project Supervisor

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LIST OF SYMBOLS

D, d	-	Diameter
F	-	Force
g	-	Gravity = 9.81 m/s
I	-	Moment of inertia
1	-	Length
m	-	Mass
N	-	Rotational velocity
P	-	Pressure
Q	-	Volumetric flow-rate
r	-	Radius
T	-	Torque
Re	-	Reynolds number
V	-	Velocity
w	-	Angular velocity
x	-	Displacement
z	-	Height
q	-	Angle

LIST OF ABBREVIATIONS

UTeM	Universiti Teknikal Malaysia Melaka
CAD	Computer Aided Design
MIG	Metal Inert Gas
3D	Three Dimension
MIG	Metal Inert Gas
TIG	Tungsten Inert Gas
Psi	Pressure per square inch
MPa	Mega Pascal
%	Percent
◦	Degree
CC	Centimetre Cubic
Kg	Kilogram
kN	Kilo Newton
mm	Millimetre
cm	Centimetre

CHAPTER 1

INTRODUCTION

This chapter begin with an introduction to the process or research, thus brief explanation and discussion of the project flow in general. This chapter focuses on preparing the entire report content including project background, problems statement, objectives and scope of project will be discussed through by part. Each sub-topic that related to literature relevant to theoretical method to fully describes more regarding the project flow and purpose of the project. This chapter provides purposes and reason for further studies to proceed with this project which conducted to overcome the problem statement issues.

1.1 Project Background

Project background of the project sub-topic explain about the project development of motorcycle jack lifter process by step based on the project background, problems statement, objectives, project scope and project conclusion. The reason this design exists is to ease the most basic motorcycle maintenances such as engine oil or fork oil change, tyre replacement or even cleaning wheels by giving an extra lift to the motorcycle. The existing center stand is design to have their own specialities such as Swing Arm Jack Stand, Bottle Jack Stand, and Standard Jack Stand. The design will be assemble and fabricating by using MIG welding or TIG welding thus the design is stimulated by using Simsolid software to perform structural analysis. This part of topic will analyse the modification of the existing vehicle jack by installing the portable design onto an actual motorcycle. In this modification design, the existing standard double stand is to be combining with a gear lifting mechanism to create an extra lifting.

A common jack is a device that uses to lift a heavy loads or weight. A primarily mechanism when force is applied, depending on its specified type of jack mechanism which is a screw thread or a hydraulic cylinder. As we know, mechanical jack commonly used for cars and hydraulic jack tends to have higher lifting capacities than mechanical jacks due to the amount of force that generated to lifting action. Hydraulic jack functions based on a concept in fluid mechanism known as Pascal's principal which explain when two cylinder (a large and a small) are connected by an incompressible fluid. During side road emergency like tyre puncher, jack is required hence it is important for a motorcycle to have a personal jack for repairing breakdown or minor maintenance.

1.2 Problem Statement

The purpose of the research is to execute the minor maintenance tasks by using jack stand for an extra lift. Easy basic maintenance such as changing engine oil or fork oil, tyre replacement or even cleaning the wheels are even more difficult or, in some cases, nearly impossible without any extra lift, stands or jacks. However, most motorcycle is standardized with standard center stand, this design is made to provide an extra lift and hence stable and its whole body of the motorcycle is lift.

1.3 Objectives

Basically, the report will have to fulfil:

i. Fabricating and designing motorcycle jack lifter.
ii. Improving the stability of the motorcycle when lifted.
iii. To ease basic motorcycle maintenance.
iv. Designing a jack lifter that can be operated on or off road area.

1.4 Project Scope

The scope of this project is:

i. The motorcycle jack lifter designed is for Honda Wave 125cc.
ii. To accommodate and withstand load up to 150kg.
iii. To perform the design analysis by using Simsolid software.
iv. To select suitable material (Mild Steel) for the jack lifter.
v. To fabricate with mechanical method such as welding, drilling, cutting and etc.

1.5 Summary

In this chapter, the obtained result is based on objective and scope for project process referred to the problem statement to fabricate and design motorcycle jack lifter. The project can proceed to the next step when the design is generated according to the objective and scope of the project itself. As minor task can resolvedly giving extra lifting to the motorcycle and thus improves the stability of the motorcycle when lifted would improve the quality of the design product. Another problem is the knowledge of user where some users might have less strength on manually lifting a motorcycle and might lift the motorcycle incorrectly and hence by having a very simple and extra accessory that could make the basic maintenance easier. When exploring for a new possible solutions to solve this problems, those major problems could be solved by having an extra equipment which suitable for both types of grounds even on and off road. Discovering materials to most efficient material by considering cost, strength, safety and the situation. Moreover, the possible solutions evaluation will be carried out to finalise each solutions differently to solve the problems.