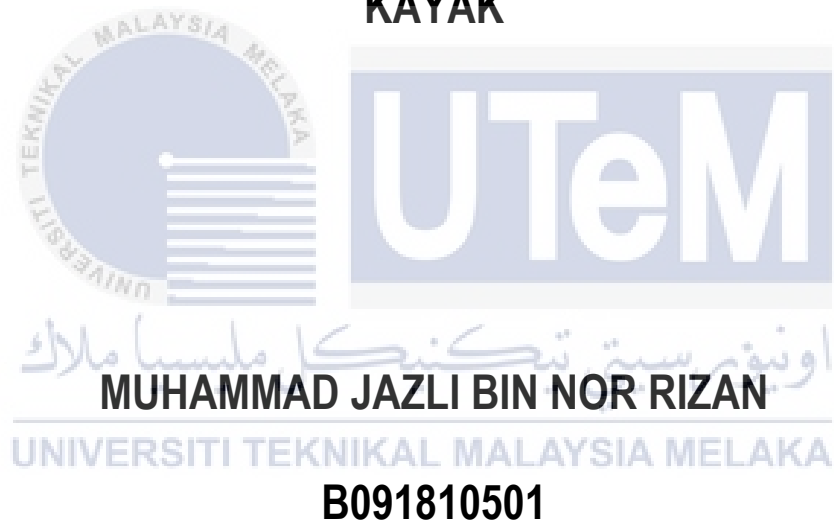




DESIGN AND FABRICATE MOTOR ASSIST BRACKET FOR KAYAK



BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY
(AUTOMOTIVE) WITH HONOURS

2022



**Faculty of Mechanical and Manufacturing Engineering
Technology**



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KAYAK**

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Bachelor of Mechanical Engineering Technology (Automotive) with Honours

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2022

DECLARATION

I declare that this project entitled “Design And Fabricate Motor Assist Bracket For Kayak” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature

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APPROVAL

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Mechanical Engineering Technology (Automotive) with Honours.

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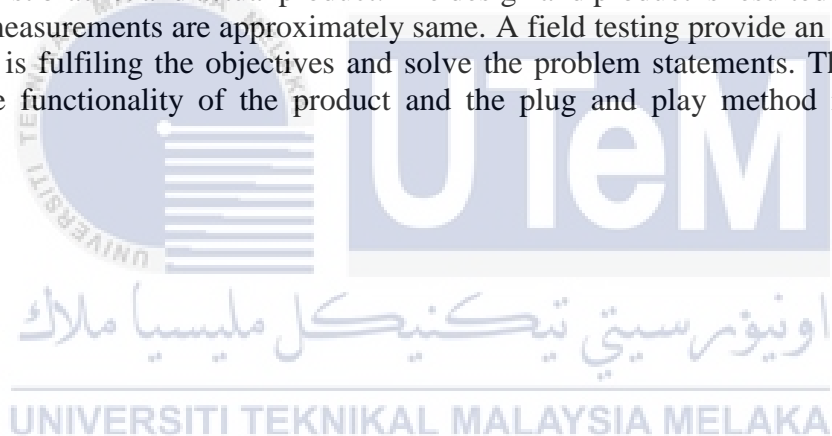
DEDICATION

This project and research task is dedicated to all my families and friends for their encouragement and for those who have supported me directly and indirectly throughout my education. Not to be forgotten, my supervisor for his sharing knowledge, advice and also his patience during this project is carried out.



ABSTRACT

Kayaking activities become popular in this century which including fishing activity, recreational activity and competitive sport activity. There are three type of driving system exists nowadays, blade paddle, foot pedal and trolling motor. Blade paddle is a conventional system and foot pedal is the evolution of kayaking drive system which are both manual driving system that require user energy while trolling motor is a latest driving system that need electrical energy input to run it. In this Design And Fabricate Motor Assist Bracket For Kayak, the outcome product will provide a bracket for trolling motor to be mounted on the kayak. The motor assist bracket is desgined and fabricated with a plug and play method for installation. The product process were going through varoius methodologies and finding such as survey, concept design, design selection method, design through Catia V5 and fabrication process. The outcome product is expected to produce and form a 3D modelling of motor assist bracket and actual product. The design and product is resulted to be 1:1 scale where the measurements are approximately same. A field testing provide an observation of the product is fulfilling the objectives and solve the problem statements. The observation includes the functionality of the product and the plug and play method is there while installation.



ABSTRAK

Aktiviti kayak menjadi semakin terkenal pada abad ini dimana termasuk sekali aktiviti memancing, aktiviti rekreasi dan aktiviti sukan yang berdaya saing. Terdapat tiga sistem pemanduan yang ada buat masa sekarang, dayung bilah, pedal kaki dan motor. Dayung bilah adalah sistem konvensional dan pedal kaki adalah evolusi sistem pemanduan untuk kayak di mana kedua-duanya adalah sistem pemanduan manual yang memerlukan tenaga pengguna sementara motor adalah sistem yang terkini yang memerlukan tenaga elektrik untuk menjalankannya. Pada reka bentuk dan fabrikasi pendakap bantuan motor untuk sistem pemanduan bantuan motor, hasil produk akan menyediakan pendakap untuk motor yang akan dipasang pada kayak. Pendakap bantuan motor direka bentuk dan difabrikasi dengan cara pasang dan pakai dalam proses pemasangan. Pemprosesan produk telah melalui pelbagai cara dan dapatan seperti soalan tinjauan, konsep reka bentuk, cara pemilihan reka bentuk, mereka bentuk menggunakan Catia V5 dan proses fabrikasi. Hasil produk dijangka menghasilkan dan membentuk model 3D dan produk sebenar pendakap bantuan motor. Reka bentuk dan produk menghasilkan skala 1:1 dimana ukuran adalah lebih kurang sama. Ujian lapangan akan menghasilkan pemerhatian keatas produk dalam memenuhi objektif dan menyelesaikan pernyataan masalah. Pemerhatian merangkumi keberfungsian produk dan cara pasang dan pakai semasa pemasangan.

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ACKNOWLEDGEMENTS

In the Name of Allah, the Most Gracious, the Most Merciful

First and foremost, I would like to thank and praise Allah the Almighty, my Creator, my Sustainer, for everything I received since the beginning of my life. I would like to extend my appreciation to the Universiti Teknikal Malaysia Melaka (UTeM) for providing the research platform. Thank you also to the Malaysian Ministry of Higher Education (MOHE) for the financial assistance.

My utmost appreciation goes to my main supervisor, Ir. Mazlan Bin Ahmad Mansor, Faculty of Mechanical and Manufacturing Engineering Technology (FTKMP), Universiti Teknikal Malaysia Melaka (UTeM) for all his support, advice, and inspiration. His constant patience for guiding and providing priceless insights will forever be remembered.

Last but not least, from the bottom of my heart a gratitude to my father, Nor Rizan Bin Abu Samah and my mother Mashitah Che Ismail and also my beloved family for their encouragements and who have been the supporting throughout the progression of this project. To not be forgotten, credits also go to classmates, housemates, and beloved friends those who supporting me directly and indirectly to complete the project task.

اونيورسيتي تيكنيكل مليسيا ملاك

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LIST OF SYMBOLS AND ABBREVIATIONS

R,r	-	Radius
mm	-	Milimeter
L	-	Length
H	-	Height
W	-	Width
Kg	-	Kilogram
m	-	Mass



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CHAPTER 1

INTRODUCTION

1.1 Background

Kayak is one of family member of boat which designed slim and small compared to boat and typically propelled by double-bladed paddle. Basically, kayak is known as manual system which requires human energy to move or drive it. Commercially, kayak is used as user's hobbies in water sport or related to water interests. By this time, kayak is innovated into pedal system which is also requires human energy but less. Pedal is drive by both human legs but soon kayak will require hybrid system which are manual and automatic system.

Due to the presence of various design and type of motor assist drive system for kayak, a universal bracket mounting for them is required as there are people that prefer to use motor assist drive for the kayak. By the existence of the universal bracket mounting, more features are provided for the kayak users which is they could plug and play two systems. Besides, kayak's community are from young to aged. Therefore, the universal bracket is required for users' convenience which provide more features on the drive system.

1.2 Problem Statement

Kayak's community facing trouble for undergo activities with existing drive system for placing the trolling motor onto the kayak. The main problem is they are consisting of aged and disable user that struggled and having hard time using the manual drive system which requires human energy to move or drive the kayak.

1.3 Project Objective

There are three (3) main objectives has been shortlisted for those problems mentioned. Specifically, the objectives are as follows:

- a) To design a universal motor assist bracket for kayak.
- b) To fabricate a universal motor assist bracket for kayak.
- c) To invent kayak motor assist bracket that is plug & play.

1.4 Scope of Project

The scope of project are as follows:

- a) Design a universal motor assist bracket mounting for kayak using Catia V5 design software.
- b) Fabricate an actual scale product of universal motor assist bracket for kayak.
- c) Plug & play mounting that suitable for any type of kayak trolling motor.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss in detail about the research that has been made by experts on existing or previous systems and definition on methods applied. Besides, this chapter also exposes the readers to recognize existed and previous system which are currently used for kayak drive system. The purpose of literature review is to explain clear information and definition to the readers. Nowadays, most of kayak user using drive systems that requires human energy to move or drive it which provide lack effectiveness for the user to enjoy the activity. These existing drive systems may bring less joy and fatigue to users. Properties of selected material is described in this chapter.

2.2 Story of Kayak

2.2.1 History



Figure 2.1 Fishing Kayak

As a tiny boat with pointed paddling posts on both ends and a smooth glide surface (rounded or with edges) that is propelled by a two-bladed paddle while seated, a kayak is

defined as follows: Kayak design has remained mostly same for thousands of years, but since the introduction of modern materials roughly two centuries ago, they have evolved into a variety of shapes and sizes that are tailored to the peculiarities of their use. The kayak is thought to have originated in the northern areas, where it was used for hunting by Native Americans. Using archaeological data, archaeologists have discovered that the kayak has been around for at least 4,000 years. Kayaks utilised in Alaska, northern Canada, and Greenland served as inspiration for the development of modern models. A timber frame covered with an impermeable textile fabric (at first leather, then rubber) was used to construct kayaks until 1950, when they were replaced entirely by kayaks made entirely of wood. It was in 1973 when the first plastic kayaks were manufactured. Those traits have contributed to the increase in popularity of kayaking as a recreational sport and in competitive sports as a result of these characteristics.

2.2.2 Kayak for Sport

Construction of kayaks benefited considerably from technology advancements during the first part of the twentieth century. They were constructed with leather-covered timber frames and wooden paddles until the 1950s, when they were replaced by plywood and lumber kayaks with canvas-covered frames and wooden paddles (used in competitions in the 1950s-1970s).

Kayaking has been increasingly popular as a recreational water sport in recent years. Kayaks were first imagined in Europe in the mid-nineteenth century as a soft-sided vehicle for skimming across frigid seas, and they have been around ever since. Germans and Frenchmen were the first to utilise kayaks for expedition purposes, despite the fact that tribes living in close proximity to the North and South Poles continued to do so. Kayaking made its debut at the 1936 Summer Olympics in Munich. Water racing events such as kayaking and canoeing were included in the Olympic Games in Berlin, Germany. As a result, kayak

community developers have been able to design lighter, more durable boats throughout time. In the 1950s, fibreglass kayaks were introduced to the market.

2.2.3 Kayaking Today

The recreational kayak sector grew, as did the competitiveness of the business as a whole. During the last two decades, fibreglass (or glass in plastic) has completely revolutionised the kayak manufacturing industry, with many boats now being constructed entirely of this material. For the first time, innovative paddle and boat designs were made possible. Fiberglass was mixed with carbon and kevlar in the 1980s and then coated in plastic to create a more durable composite material. The outcome was the development of low-cost, long-lasting kayaks that were as effective as the most expensive and sensitive boats.

Kayaks are currently constructed of high-quality materials such as polyethylene plastics, which, with proper care, can endure for ten to fifteen years under normal conditions. A variety of colours, styles, and lengths are available for you to choose from.

2.3 Mounting

The engine or motor mounting is the component that holds the engine or motor firmly in place. The purpose of a mounting is to ensure that the drive system is held firmly and securely in place. Additionally, because of the large number of moving and rotating elements included within the engine or motor, the engine or motor is a source of vibration. As a result, the amount of engine or motor vibration that the user experiences is reduced as a result of the mounting. Mountings are often made of metal that has been coated or covered with rubber to provide a secure fit.

A mounting system is crucial for reducing noise, vibrations, and harshness in a vehicle as well as improving ride comfort. To summarise, A substantial amount of static and dynamic load, as well as severe vibration, are applied to the frame mounting.

2.4 Plug and Play Method

Plug means attach or install which define a device is attached or installed into a system while play means uses or works which define a device installed works or run. Plug and play method means a device that is installed and works without need it to configure or setup to make it works.

This simple method related to the product is to provide an easy installation for the user. The user just needs to place the bracket into its place and attach the motor assist into the bracket.

2.5 Existing or Previous Drive System

2.5.1 Blade Paddle



Figure 2.2 Blade Paddle (www.kayakhelp.com)

The flat blade and a wooden kayak had been the primary tools of sprint kayak paddling until the mid-1980s. There have since been a variety of kayak and paddle designs that have gained popularity as kayakers look to improve their performance. Paddles used in international competitions, for example, have developed from a "wing" blade with a traditional airfoil shape to more "propeller-like" blades that are now preferred by kayakers. According to mathematical calculations, different blades have variable degrees of efficiency; for example, the wing blade is considered to be 15 percent more effective than a conventional

flat blade (wing blade 89 percent ; flat blade 74 percent). Because of the continuous developments in kayaking equipment design, changes in paddler technique have occurred. Identifying paddler technique has frequently necessitated the use of specialised testing settings and procedures. Because of equipment changes and field measurement limits, it is difficult to characterise the biomechanics and efficiency of each paddling method in a controlled environment. There is a great deal of confusion about the most successful teaching strategies as a result of this. Specifically, the goal of this project was to develop a submersible force sensor that could be attached to a paddle blade and investigate its ability to monitor paddle depth, stroke pull time (i.e. time spent in water), and stroke force in the field while working in conjunction with existing performance measurement equipment.

The very first paddle was probably certainly invented to assist a raft in navigating a stream, according to legend. Paddles evolved as boats gained proficiency in a variety of crafts. The early kayakers used paddles with a single blade, which were called single blade paddles. Despite the fact that modern kayakers have advanced equipment such as a foot pedal and a trolling engine, they can still choose to paddle the old-fashioned way. Despite the fact that the paddle has been used as a mode of transportation for hundreds of years, engineers and technicians continue to innovate and build new paddles. Kayak paddles are made up of a shaft and two blades that are available in a variety of materials, weights, lengths, shapes, and sizes to accommodate different paddling styles. Paddles with long, narrow blades are required for horizontal paddling, and paddles with shorter, wider blades are required for vertical paddling. When paddling, the ease with which the blade may be placed into and retrieved from the water is influenced by the forms of the blade. However, the use of a blade paddle needs greater human energy, which can lead to exhaustion and fatigue within a short period of time.

2.5.2 Foot Pedal/Powered



Figure 2.3 Foot Pedal/Powered

Kayaks that are pushed by the user's energy are known as foot pedal/powered kayaks. In order to power the pedals, users must push backward, which causes the body's lower back to mix as it presses back on the seat, potentially resulting in sciatic issues due to a mixture of several movements. In recent years, kayaking has increased in popularity as a recreational activity. This does not rule out the possibility of using a sand paddle in the future, as it has shown to be a great fishing site. As an example, when fishing for fish, a fishing vessel's forward or backward motion provides an advantage to the angler fighting the fish. A pedal kayak is separate from a recreational kayak or a kayak of a higher quality for professional use. Seat-on-top designs have maintained their dominance in the market, despite the entry of new brands into a competitive business. This means that you have a wide range of options. Additionally, determining the most suited model for ocean kayaking as opposed to lake and river activities is difficult to determine.