

**DESIGN AND DEVELOPMENT OF RECREATIONAL
HUMAN POWERED VEHICLE**

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**This report is submitted in
fulfillment of the requirements for the award
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SUPERVISOR DECLARATION

“I hereby declare that I have read this thesis and in my opinion this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering (Design-Innovation)”

Signature:

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Date:

DECLARATION

“I hereby declare that the work in this report is my own except for summaries and quotations which have been duly acknowledged.”

Signature:

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Date:

SPECIAL DEDICATION

TO

My Beloved Parents

En.MohdZanani bin Jamil

NorsamsinahbintiSuboh

Also my beloved siblings

Muhammad Hazim bin MohdZanani

Muhammad Hasif bin MohdZanani

Muhammad Hamidi bin MohdZanani

Muhammad Haikal bin MohdZanani

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ABSTRACT

Engineering Design Process is a technique that ranks the logic for the development of a product by an engineer. A human powered vehicle is a product that is not widely used in Malaysia, especially for recreational activities. Typically, a bicycle is a very well-known human powered vehicle. It is often used for sports and recreational activities among themselves. Therefore, the development of this type of vehicle is important to promote healthy living activities to share with friends and family. The main objective of this project is to develop human powered vehicles, and a functional prototype. Several factors have been identified in detail design of this product. Next, the prototype can be modeled with the help of drawings that were produced. In conclusion, development of human power vehicles is very helpful for Malaysians in general, to give pleasure while enjoying a healthy lifestyle and a better social activity.

ABSTRAK

Proses Rekabentuk Kejuruteraan adalah satu teknik yang member urutan logic bagi membangunkan sesuatu produk oleh seseorang jurutera. Kenderaan kuasa manusia adalah produk yang tidak begitu meluas penggunaannya di Malaysia terutamanya dalam kegiatan rekreasi. Lazimnya, basikal adalah kenderaan kuasa manusia yang lebih dikenali. Ia sering digunapakai untuk kegiatan sukan dan aktiviti rekreasi sesame mereka. Oleh itu, pembangunan jenis kenderaan seperti ini adalah penting bagi mempromosikan kegiatan hidup sihat untuk dikongsi bersamarakan dan keluarga. Objektif utama projek ini adalah membangunkan kenderaan kuasa manusia dan sebuah prototaip yang berfungsi. Beberapa factor telah dikenalpasti di dalam rekabentuk mendalam produk ini. Seterusnya, prototaip boleh dimodelkan dengan bantuan lukisan yang telah dihasilkan. Secara konklusinya, pembangunan kenderaan kuasa manusia sangat membantu rakyat Malaysia amnya, untuk member keseronokan sambil menikmati gaya hidup sihat dan aktiviti social yang lebih baik.

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LIST OF SYMBOLS / TERMS

SYMBOLS	DESCRIPTION
UTeM	University Teknikal Malaysia Melaka
USA	United States of America
TN	Tennessee
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CAE	Computer Aided Engineering
M_0	Moment
F	Force
r	distance
α	angle

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND

Healthy lifestyle is the main agenda of human being. Everyone keeps talking about having happier and healthier life to spend with family. Hence, the relationship of obesity cannot be avoided from this issue. Obesity is not type of disease. It's refers to a medical condition that our body having an excessive amount of fat everywhere. Hence the agenda on health issues is closely related to the recreational activities. The project is to develop a vehicle that provides these solutions of the problem stated. The vehicle is moved by human powered so that, exercise can be done during traveling with the vehicle.

Cycling is one of the methods for human powered vehicle for recreation. People tend to choose this type of vehicle because of the simplicity and straightaway. No need other sources of energy in order to handle the bicycle. The torque is forced by human leg to move the bicycle forward. It's varied with different speeds and could be geared by different difficulties to give amount of torque to the bicycle's paddle. On the other side of recreational vehicle, most of the people like to ride without their own energy. That's implicated the invention of electrical or solar powered bicycle. The cost is the issues, and it is really handy and hard to maintain.

When the term leisure is closely related to the recreational activities, people demands doing activities in a group. This will enhance their excitement and enjoyment. The current buggy car in most of the recreation park is the solution. But, this vehicle is not helping people to do exercise while having fun. The problem involves such as a slight pollution on air and sound. It is because; park is the place of pollution-free. Hence, problem may solve if the vehicle is powered by their own leg. Just like riding a bicycle in a group of people.

1.2 OBJECTIVES

The main objective of this project is to carry out a systematic design process in designing a human powered vehicle for recreational purpose. Furthermore, this project is to develop a working prototype of human powered vehicle.

1.3 SCOPE OF PRODUCT

The development of the project needs to be specifically described. Hence, some of the particular scopes have been recognized to ease the design and development of the vehicle. The process of design is depending on various conditions and some of the element subsequently specifications need to be identified. These are types of scope that have been minimize to specific on how the design should be finalize at the end of the project;

- i. Able to carry more than one person.

Bicycle is general vehicle that powered by human leg. But the idea is to provide the carriage to be more than bicycle can do. The initial propose is to design a 4-person minimum to ride at one time.

- ii. The maximum speed exceed 15km/h

this is minimum speed to achieve to carry an average of 75 kg person for adult.

For 4-seater adult the weight achieves is about 300kg. it is enough for a pedal-powered concept to achieve this speed at average.

- iii. Can be steered by simple mechanism

The simpler, the more ease to handle. The speed is not too fast, and the handling is good enough for a speed at only 15km/h.

iv. Optimum size and weight

These factors depend on simple ergonomics of average people size in Malaysia (to be specific). For family usage, the size of people limit to 2 adults and 3 children at one time.

v. Alternative energy and green technology implication

The previous design is using motor to move the vehicle. This project will help in general to reduce green effect of environment. No sound and air pollution will involve. Will support the current agenda of state government of Malacca (to be specific) as a green-technology state 2011.

1.4 PROJECT SCHEDULE

Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Activities														
Problem identification -Observation -Field study -Chapter 1	■	■	■	■	■	■								
Literature Study -Requirement -Scope -Chapter 2				■	■	■	■	■						
Concept Design -Research -specification								■	■	■	■	■	■	
1 st draft submission														■

Table 1.1 : Semester 1 PSM Gantt-chart

Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Activities														
Embodiment Design	■	■	■											
Detail Design				■	■	■	■	■						
Analysis									■	■	■			
Prototyping										■	■	■	■	
Full thesis submission														■

Table 1.2 : Semester 2 PSM Gantt-chart

CHAPTER 2

LITERATURE REVIEW

2.1 HISTORY OF HUMAN POWERED VEHICLE

There was a debate on who was the first to invent the bicycle or human powered vehicle. Cycling is a 'verb' describing a sport that using paddle to cycle the bicycle. Back in 14th century, pupil of Leonardo da Vinci, GianGiacamoCaprotti was said to be the earliest inventor. There was a sketch founded a bicycle a-like. It is confirm that, the sketch itself does not represent the real he was the first bicycle inventor. (Prof. Dr. Lessing H.E., 1997)

17-18th century – in Germany, another ‘bicycle’ was founded. And this time, the bicycle was wooden made. It’s called ‘Laufmaschine’ in Germans, which means ‘the running machine’ with no pedals and steering installed (Hammer.M, 2005). In 1816 the German re-design it as an improvement to the previous version. This time, a steer system is attached at the front wheel. The inventor is believe named to be Karl von Drais de Sauerbrun.



Figure 2.1: no steering and pedal for the first bicycle founded also known as ‘running machine’. (Source: Gun Powder Ma, 2008)

Pedal and steering technology, 18th century – people learned from previous invention. A Scottish, Kirkpatrick MacMillan introduced the more improved design of a bicycle. He was watching the bicycle is moved by kicking their feet to the ground. Then, an idea was brilliantly came at the moment to invent something can move the bicycle without kicking your feet. It was such a big impact on the current design of a bicycle. As a blacksmith, MacMillan design the improvement. (Retrieved from Wikipedia “History of Bicycle”)