

DESIGN AND DEVELOPMENT OF THE TRICYCLE FOR AGRICULTURE  
SECTOR

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This report was adduced in partial fulfillment for award condition of Bachelor of  
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I admit that I have read this report and it has followed the scope and quality in partial fulfillment of requirement for the degree of Bachelor of Mechanical Engineering (Automotive)

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## CONFESSION

“I hereby, declare this thesis is the result of my own research except as cited in the references”

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## **DEDICATION**

Dedicated to the memory of my father, Che Pa Ahmad, to my beloved mum, family, lecturers and friends, a million of thanks wished for you all, without your encouragement I will not be here.

## ACKNOWLEDGEMENT

Having a chance to explore this project is the awesome experience to me. Along the Bachelor Project period, various knowledge and experience were getting through the teaching, learning, guiding and co-operation by who help me directly and indirectly to accomplish my research.

First, I would like to take this opportunity to gratitude to Allah S.W.T because of giving me good healthy to travel my journey (study). In particular, my sincere gratitude directed towards my Supervisor 1, Mr. Mohd Zakaria Bin Mohammad Nasir because of giving me an opportunity to do this research, had lead, and guided me along my research and development and to my second evaluator, Mr. Syahibudil Ikhwan Bin Abdul Kudus.

Beside, I would like to express deep appreciation to my beloved family, lecturers and friends because gave me support to my study. Your encouragements have increased the spirit of my travelling in my study. Without them, this project would not be able to achieve its objectives. I hope this report can be a reference for other students. Thank you.

## ABSTRAK

Berdasarkan kepada keperluan daripada peladang, Lembaga Kemajuan Tanah Persekutuan (FELDA), Pihak Berkuasa Kemajuan Pekebun Kecil Perusahaan Getah (RISDA) dan Lembaga Minyak Sawit Malaysia (MPOB) untuk memindahkan barang yang berat daripada ladang/kebun ke lokasi lain, merekacipta kenderaan tiga roda memerlukan pemahaman yang mendalam dengan memberi perhatian kepada rekabentuk yang inovatif berkenaan kekuatan untuk menyokong kapasiti muatan. Kajian ke atas kenderaan tiga roda yang sedia ada untuk tujuan pertanian dan membuat soal selidik ke atas keperluan pengguna untuk ditingkatkan/diperbaharui. Seterusnya membuat rekabentuk kenderaan tiga roda menggunakan perkakasan perisian dan membuat analisa menggunakan Finite Element Analysis (FEA) ke atas komponen yang kritikal.

## ABSTRACT

Based on the requirement from farmer Federal Land Development Authority (FELDA), Rubber Industries Smallholder Development Agency (RISDA) and Malaysian Palm Oil Board (MPOB) to move the heavy things from farm to certain location, the development of the tricycle needs to have a deeper understanding with regard to the innovative design construction with respect to the strength to support capacity of load. The study on current vehicle use in agriculture case study and questionnaire on customer needs has been carried out for improvement. Then, design the vehicle by using software tools and analysis on Finite Element Analysis (FEA) on critical component.



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## **CHAPTER I**

### **INTRODUCTION**

#### **1.0 Introduction**

The final year project for final year student is aims to gain the student's comprehension and skill especially in the aspect of problem solving, research, analysis to get the solution of the problem regard to the project title chosen whether in academic or scientific research. This is due to produce the professional person which is capable to solve the engineering problem encountered by the research and development by knowledge application related to study field.

#### **1.1 Background of Study**

At the moment, the scenarios of transportation problem occur at transportation system in agriculture segment especially in the rural area lacking of new technologies and machines. This maybe happens due to less of exposure of new technology to congenial the implementation of agriculture arrangement.

Research conducted among the farmer in the rural area of Melaka and Johor state, majority of them give the positive respond of this issue. They also support this effort of developing new product.

In order to tackle this problem, the research will be do by giving more attention on the user expectation or needs to get the best product. Besides, as a student this is not only as a project needs to create a new mechanism or get a good grade but it is also the best way to create name as a new designer, engineer or entrepreneur for future.

## **1.2 Problem Statement**

There are requirement from farmer, Federal Land Development Authority (FELDA), Rubber Industries Smallholder Development Agency (RISDA) and Malaysian Palm Oil Board (MPOB) to transfer the heavy things from farm to certain location. The development of the tricycle needs to have a deeper understanding with regard to the innovative design construction with respect to the strength to support capacity of load. Besides, the suitable material must be considered to sustain load capacity to get the productive result for this research.

## **1.3 Objective**

To design and development of the tricycle for agriculture purpose

## **1.4 Scope of study**

The scope of my research was encircles:

1. Literature study on current vehicles used in agriculture and its application.
2. Case study and questionnaire on customer needs.
3. Design the vehicle by using software tools (CATIA)
4. Analysis on Finite Element Analysis (FEA) on critical component.

## **1.5 Thesis outline**

### CHAPTER 1

Chapter 1 is introduction for this project which explains briefly about the background of study, problem statement, objective and scope of the project.

### CHAPTER 2

Chapter 2 is literature review which explains briefly about the current vehicles used in agriculture, its main components, and application related.

### CHAPTER 3

Chapter 3 is methodology which consists of flowchart, concept design, concept development and detail design as a plan to follow to guide the implementation of the project.

### CHAPTER 4

Chapter 4 is result and discussion which explains briefly about result of interview and questionnaire, Quality Functional Deployment (QFD), Product Design Specification (PDS), material selection, concept generation, concept selection and detail design.

### CHAPTER 5

Chapter 5 is briefly about the result and analysis which consist of load distribution, Computer-Aided Engineering (CAE) analysis, result and discussion of the project.

### CHAPTER 6

Chapter 6 is conclusion of the project and recommendation to improve the result in future use.

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Introduction to the Tricycle

A tricycle is a three-wheeled vehicle. The position of the wheels can be either one wheel is positioned on the front or the other two wheels positioned on the rear or vice versa. While tricycles are often associated with the small three-wheeled vehicles used by pre-school age children, they are also used by adults for a variety of purposes. In the United States and Canada, adult-sized tricycles are used extensively by older persons for recreation, shopping, and exercise. In Asia and Africa, tricycles are used mainly for commercial transportation either of passengers in pedicabs or of freight and deliveries (Wikipedia, 2009).

Human-powered tricycles are usually powered engine four stroke through pedals, although some models have hand cranks. Motorized tricycle can be powered with a variety of methods, including motorcycle engines, smaller automatic transmission scooter motors and electric motors (Wikipedia, 2009). The design of the tricycle been improved year by year towards getting the convenience vehicle that meeting the customer or user expectation in term of mobility, maneuverability, performance and operating comfort and safety.

## 2.2 Example of the Motorized Tricycle

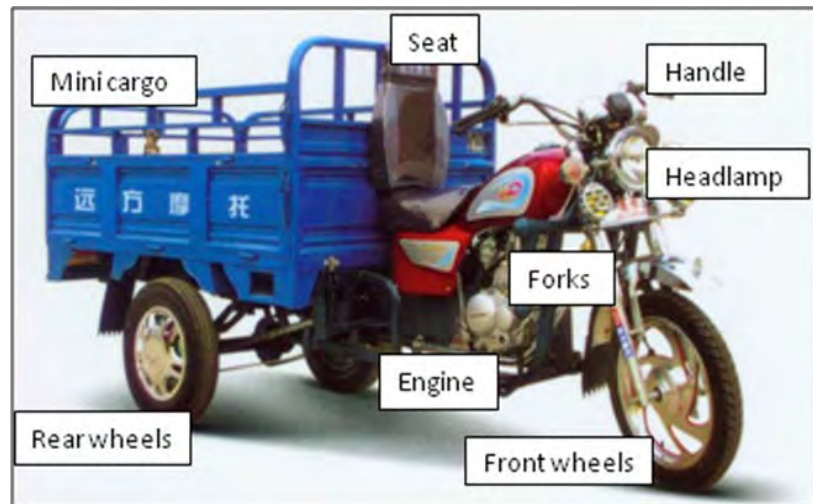


Figure 2.1: Motorized tricycle in China

(Source: motornet, 2008)

In Asian and Southeast Asian countries, motorized tricycles are used as small freight trucks and commercial vehicles. Nicknamed "three-wheelers" or "tuk-tuks" in popular parlance, they are a motorized version of the traditional rickshaw or velotaxi. They have a small three-wheeled cart driven by a person, and is related to the cabin cycle. While they are mostly used as taxis for hire, they are also used for commercial and freight deliveries. They are particularly popular where traffic congestion is a problem in cities like Bangkok, Dhaka, Ahmedabad, Pune, Delhi, Mumbai, Chennai, Hyderabad and Bengaluru (Wikipedia, 2009).

They usually have a sheet-metal body or open frame that rests on three wheels, a canvas roof with drop-down sides, a small cabin in the front of the vehicle for the driver, an air-cooled scooter version of a two-stroke engine, with handlebar controls instead of a steering wheel. The smaller motorized tricycles are used as delivery vehicles for lighter loads. The larger tricycle with more powerful engines, have larger cargo bays and they can carry freight within a city (Wikipedia, 2009). A broad variety of this transportation which is meeting the demands of short and long distance transportation have congenial the transportation quality.

## 2.3 Main components of Tricycle

### 2.3.1 Motorcycle Handlebar

Motorcycle handlebar refers to the steering mechanism for motorcycles. Handlebars often support part of the rider's weight, and provide a mounting place for controls such as brake, throttle, clutch, horn, light switch, and rear view mirrors.

The purpose of the handlebar is to control the movement or direction of the vehicle likes to change lane, overtaking, cornering, U-turn and so on.

### 2.3.2 Engine (Four Stroke Cycle Engine)

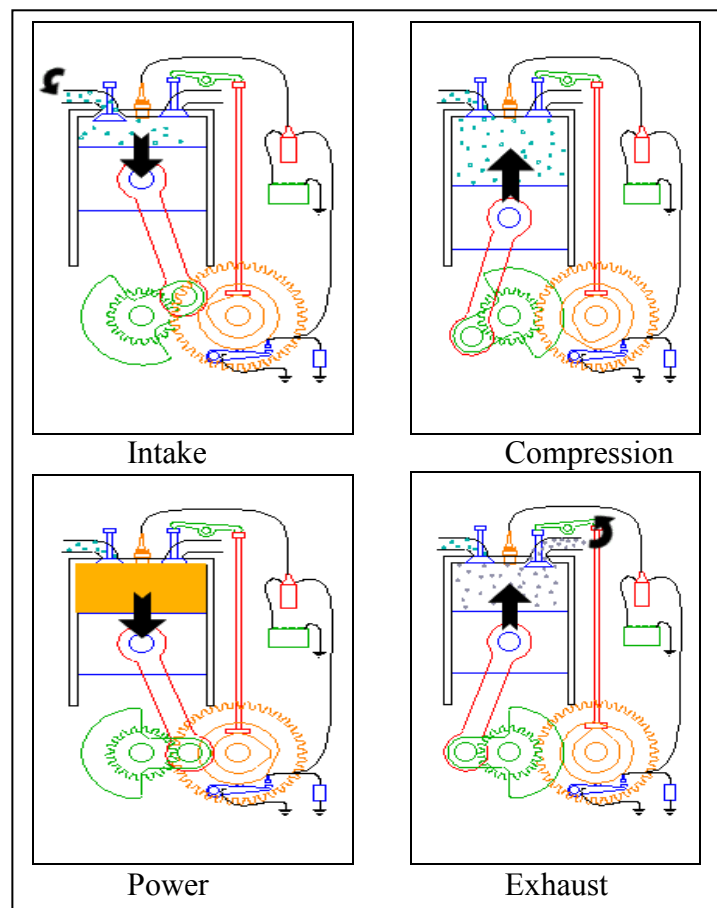


Figure 2.2: Four stroke cycle engine

(Source: animatedengines, 2009)