



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Fabricate The Body of The Agriculture Smart Mover

This report submitted in accordance with requirement of the UniversitiTeknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Mechanical Engineering Technology (Automotive) with Hons.

By,

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DECLARATION

I hereby, declared this report entitled “Fabricate The Body for The Agriculture Smart Mover” 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 Engineering Technology of UTeM as a partial fulfillment 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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(MR. AHMAD ZAINAL TAUFIK BIN ZAINAL ARIFFIN)

ABSTRACT

This study discussed about the fabrication for the body of the ‘Agriculture Smart Mover’. Briefly, the product propose is to facilitate the works of transporting fruit palm in palm oil plantation. The objectives and targets of this project is to fabricate the body, select the material and minimize the cost of this project production. The body is fabricated based on the received design from the design team. Fabrication method that used in this project are forming process and welding process. The mild steel had been used as the main material for the body. The part joining for the body part must be really strong to exert the load. Finally, the body was created and the real test held in the palm oil plantation

ABSTRAK

Kajian ini dijalankan untuk memfabrikasi reka bentuk rangka ‘Agriculture Smart Mover’. Secara amnya, tujuan produk ini diperkenalkan adalah untuk membantu memudahkan kerja-kerja memungah buah kelapa sawit di kawasan penanamannya. Objektif dan target projek ini adalah untuk memfabrikasi rangka, memilih bahan dan meminimalkan kos penyediaan projek. Rangka projek ini difabrikasi berdasarkan draf rekabentuk yang diterima daripada pasukan pereka bentuk. Kaedah fabrikasi yang digunakan adalah proses membentuk dan proses kimpalan. Bahan utama yang digunakan untuk proses fabrikasi rangka ini adalah keluli lembut. Bahagian rangka yang telah dicantumkan mestilah cukup kuat untuk menampung beban. Akhir sekali, setelah selesai proses menyediakan rangka, ia akan diuji untuk membawa beban di lading kelapa sawit.

DEDICATION

I dedicate my dissertation to my family and many friends. A special feeling of gratitude to my loving parents, Mr. Omar and Mrs. Rasnani whose give me endless support throughout my studies and never forgot my names every time of their pray. A lot of love to my lovely sister Siti Fatonah Binti Omar for always being by my side whenever good or bad.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Research

Agriculture is pivotal part of human society due to the reality that human and agriculture are strongly related to each other. This fact leads towards the development and upgrading of the typical, inappropriate and time consuming methodologies, used for agriculture. The fast moving world with a new patterns and innovative progression has changed the intellectual and the lifestyle. Starting from home with a newly design that can comfort human, the road and highway which as the main facilities and the full of technology at the workplace. People get the information and communicate with each other with only on the fingertips. The worlds without any limits.

In this globalization era today, Malaysia has extremely evolved as a country that is able to produce their own crops and also known around the world as a country that is rich in flora and fauna. One of the Malaysia biggest agriculture source is the palm oil plantation. Palm oil production is vital for the economy of Malaysia, which is the world's second largest producer of the commodity after Indonesia. The Malaysian Palm Oil Board (MPOB) act as the government agency that is responsible to the development of the palm oil sector in the country. The country palm oil industry produce a million tone of biomass, including empty fruit bunches, oil palm truck and palm oil frond.

Briefly, this project will introduce the mechanism that will help workers in palm oil plantation. At the same time, this project will somehow ease the burden of the workers.

From the final design, this project process will focus on the selecting the best material (mild steel) and continued it with some fabrication process including the forming and welding process. The product will be put forward for the purpose of commercialization.

1.2 Problem Statement

The palm oil is the prime export commodity in our country. It also has been one of the big tax revenue that contribute for Malaysian budget. But, there are some kinds of problem that is inseparable with the development of the palm oil industry such as contributing to the global warming and environmental. There are many step have been taken by the farmer and the entrepreneur to implement the strategic plan for the enhancement in a way for a better palm production.

Nowadays, demand on palm have been increase drastically. The development in palm oil industry must be able to solve the problem to increase the quality and quantity to meet the customer requirement. Starting at the basic, normally in oil palm plantation they are using a normal wheelbarrow to gather the oil palm fruit that have been pick from the palm tree. This method has been practicing for a decade. This method will increase the number of workers and it will lead to the increasing of the costing.



Figure 1. 1: The wheelbarrow

1.3 Objective

Palm oil is the main export commodities in our country. It has also become one of the largest tax revenue that contribute to Malaysia's budget. But, there are some types of problems that cannot be separated with the development of the palm oil industry as much use of labor to produce palm oil. Salaries of employees also increased its workforce in great numbers. There are many steps that have been taken by the farmers and entrepreneurs to implement a strategic plan to facilitate the work and transport of oil better.

Nowadays, demand for oil has increased drastically. Developments in the palm oil industry should be able to solve the problem to improve the quality and quantity to meet customer needs. Starting at the base, usually in oil palm plantations they use normal wheelbarrow to collect palm fruit which have been taken from the palm trees. This method has been practiced for a decade. This method will increase the number of employees and it will lead to increased costs.

The aim of this project is to facilitate the work of transporting fruit palm in the palm plantation with the problem that occur. Among the objective of this project is:

1. To fabricate the body of the Agriculture Smart Mover from the final design
2. To select a suitable material for the body from the final design
3. To minimize the cost of the product from the final design

1.4 Scope

- i. From the final design that have been received, the wheelbarrow is mainly design to minimize the cost of production.
- ii. The final design of the wheelbarrow is based on the House of Quality.
- iii. The material selection process will be conducted by taking account the cost and the material endurance, hardness and durability. Then, the material will go through some fabrication process.
- iv. The material will be process by cutting it into the small parts follow the dimension that had been given.
- v. The small parts will be joined by the welding process (Metal Inert Gas Welding) as the body structure of the product.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review was studied earlier on the body structure of the wheelbarrow. This chapter will discuss and explain about the fundamentals, theories and concept of this project. In this chapter also the perspective, components and method that will be used in this project will be discuss. The concept of Agriculture Smart Mover that will be discussed and explained is more about the body structure and comparison.

2.2 The Agriculture and Ergonomic

2.2.1 Agriculture

In general, agriculture is the science or practice of farming, including cultivation of the soil for the growing crops and the rearing of animals to provide food, wool and others product. In the other word, agriculture is also mean as the land management or farm management.

Agriculture and forestry activities is conducted in agricultural undertakings including crop production, animal husbandry, farm management, land processing, the primary processing of agricultural and animals product by or on behalf of the operator of the undertaking as well as the use and maintenance of

machinery, equipment, appliances, tools and agriculture installation, including any process, storage, operation or transportation in an agricultural, which are directly related to agriculture production. (Probert, 1981)

Agriculture is one of the most threaten the working activities by related to risks. As known, the agriculture sector is one of the most important sectors worldwide. It is not only in terms of supplying food, it is also in terms of the number of employees. The unsafe condition of this agriculture activities lead the attention to concerning the application of practical action in agricultural settings to help reduce work-related accidents and illness. (Silverstein, Bao, Howard, Hunter, & Meyers, 2015)

In this project, we are focusing on how to help the workers in the palm oil plantation. In 2012, over 10% of Malaysia's export income is from the palm oil industry. This make the palm oil industry is the third most important source of export income as Sabah as the largest producer with 1.43 over 5 million hectares of palm oil plantation. (Martin, Rieple, Chang, Boniface, & Ahmed, 2015)

2.2.2 Ergonomic

Generally, ergonomics is a multidisciplinary science that endeavors to make a better fitting or relation between the job and the workers to make them safe. Ergonomics is also defined as “micro-ergonomics”, micro-ergonomic, cognitive ergonomic and environmental ergonomic. However, the main problem among the workers or farmers is the micro ergonomic. (Silverstein et al., 2015)

Briefly, there are a strong related between the agriculture and ergonomics. The effort of ergonomist to develop a product or tools that can help workers in agriculture based on ergonomic design. This ergonomic concept is designed to give a pleasure to the workers or employees in the farm or plantation. (Silverstein et al., 2015)

The physical capabilities of the human body in the other mean the limitations of the human body is called the ergonomic. It will able the workers to perform work task, the tool used and including the job environment. The main goal or vision is to make sure the workers are free from injury or incident, safe and comfortable with the job. (Farooq, Kirchain, Novoa, & Araujo, 2017)

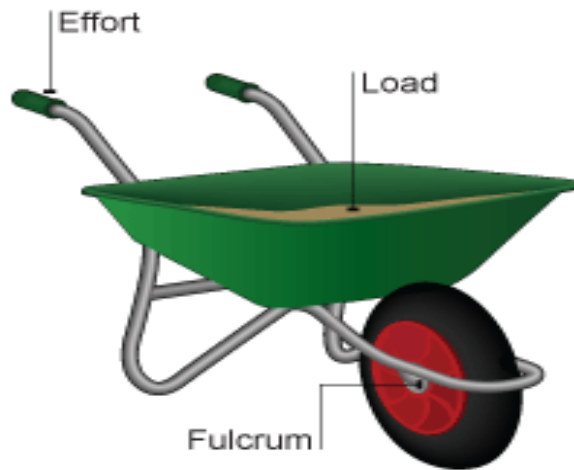


Figure 2.1: The wheelbarrow

2.3 Agriculture Smart Mover

2.3.1 The Wheelbarrow

The wheelbarrow is a small vehicle with one wheel that actuated or driven by hand. It is designed from the two handles bar at the rear to make it can be pushed or guided by a single person. The term of wheelbarrow come from two word: wheel and barrow. “Barrow” come from derivation of old English word “bearwe” which it is a components that used for carrying load.

The wheelbarrow is mainly designed to from the concept of weight distributed of its load between the wheel and the operator. From that the convenient carriage of heavier and bulkier loads is enabled. It would be possible were the weight carried entirely by the operator.



Figure 1.2: Transporting the palm fruit

2.4 Body Frame

The original design of wheelbarrow is come from the Western or European-type wheelbarrow built by the Romans for carrying load in a short distance, while the two-wheel carts is used for the long distance. Road in Romans is hard-surfaced straight road and it only fit for carts and chariot. This were the point where the wheelbarrow become popular. In this type of wheelbarrow, a small and single wheel is placed to the front. The wheel placed on the front give an improvement for the weight distributed, ease the burden of the carrier, easy in handling. If the wheel placed right on the center of load, the efficiency be more increase. This design of wheelbarrow is still used until today with some renovation and innovation. (Probert, 1981)

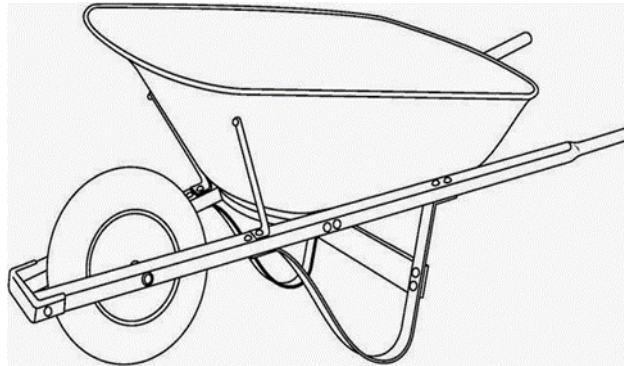


Figure 2.3: Old type of wheelbarrow

2.5 Material

2.5.1 Introduction

In engineering, the understanding about the material is very important in innovation or developing a new product. Stainless steel, alloy, carbon fiber and any others material have it own characteristic besides of its own advantages and disadvantages. The material is use depends on the condition and needed. In selecting the material there are several consideration must be make such as the availability in the market and the cost. (Kunčická, Kocich, & Lowe, 2017)

Composites have been used widely in the engineering field such as in automotive, marine, construction, aerospace, sport equipment, agriculture and others. The advances of composites material are it high in strength-to-weight and stiffness-to-weight ratio. Therefore, the composite material is suitable for the application of the non, semi and fully structural parts or component. Composite material selection is consider as a main part in concurrent engineering. It must be stated briefly in composite design, design of the product, and manufacturing process as a stage in the design process. (Sapuan & Sapuan, 2017)