UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FABRICATION OF BRAKING SYSTEM FOR THE PALM OIL PLANTATION AGRICULTURE SMART MOVER THROUGH ANALYTICAL METHOD

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Power) with Honours.

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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 Electrical Engineering Technology (Industrial Power) with Honours. The member of the supervisory is as follow:

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I hereby, declared this report entitled "Fabrication of Braking System for The Palm Oil Plantation Agriculture Smart Mover Through Analytical Method" is the results of my own research except as cited in references.

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ABSTRAK

Sistem brek digunakan secara meluas dalam bidang automotif bermula dari basikal ke kenderaan moden untuk memastikan keselesaan dan keselamatan semasa perjalanan. Matlamat projek ini adalah untuk mengarang sistem brek yang sesuai untuk 'Agriculture Smart Mover'. Sistem brek sangat penting untuk setiap kenderaan yang bergerak kerana ia adalah medium yang paling berkesan untuk melambatkan atau menghentikan kenderaan dan untuk mengelakkan pergerakannya. Pada masa ini, terdapat banyak jenis sistem brek yang digunakan untuk kenderaan dari segi bahan, hentian sederhana, dan kecekapan. Oleh itu, projek ini akan membincangkan, menganalisis dan mengarang sistem brek terbaik dan sesuai untuk Penggerak Pintar Pertanian ini untuk kegunaan ladang kelapa sawit. Dalam projek ini, applikasi reka bentuk CATIA Versi 5 akan digunakan untuk menjana model dan melaksanakan analisis komponen yang dipilih. Selain itu, projek ini juga akan mengurangkan kos produk dan bahagian brek dari reka bentuk akhir.

ABSTRACT

Brake systems are widely used in automotive from bicycles to modern vehicles to ensure the comfort and safety when travel. The goal of this project is to fabricate the brake system that suited for the `Agriculture Smart Mover'. The brake system is very important for every moving vehicle as it is the most effective medium to slow down or stop the vehicle and to avoid its movement. Currently, there are many types of braking systems used for vehicles in terms of materials, medium stops, and efficiency. Therefore, this project will discuss, analysis and fabricate the best braking system and suitable for this Agriculture Smart Mover for use in oil palm plantation. In this project, the CATIA Version 5 design package will be used to generate the model and perform analysis of the selected components. Besides, this project also will minimize the cost of the product and braking parts from the final design.

DEDICATION

I want to thank and appreciate all the supports and encouragements from my beloved parents, supervisors, housemates and fellow friends as long as I complete my thesis.

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CHAPTER 1

INTRODUCTION

1.0 Background

Brake systems are widely used in automotive from bicycles to modern vehicles to ensure the comfort and safety of travel. The brake system is very important for every moving vehicle as it is the most effective medium to decelerate or stop the vehicle or to prevent its movement. Basically, the brake system provides two objectives, to make a deceleration and make the absorption. For deceleration, by pressing on the brake pedal or lever, the brake pad compresses the rotor mounted on the wheel, which then forces the vehicle slowly due to friction. Then, absorption means the brake system absorbs the mechanical kinetic energy of the vehicle. In mechanical braking, friction changes the kinetic energy into heat. In electric brakes, electric current forces the magnet to use the brakes.

Brakes can be widely described as using friction, pump, or electromagnetic. Currently, most vehicles use friction type brake systems. In this type of friction there are two more types of brakes consisting of drum brakes and disc brakes. A brake is a vehicle important thing where friction is caused by a set of brake shoes which is pressing against the inner surface of the rotating drum and the drum is connected to the detour wheel hub. Disc Brake is a tool for slowing or stopping the wheel of the road. Brake discs are typically made of cast iron, connected to wheels or axles. To stop the wheels, brake pad friction materials are mechanically, hydraulically, pneumatic or electromagnetic to both sides of the disc. Friction causes discs and wheels to be installed to slow down or stop.

Finally, other types of friction brakes are ceramic brakes, or "carbon ceramics," which are the type of luxury brake brakes with brake pads and rotor made of porcelain compound mixing, resulting in better stopping capabilities and greater resistance to

overheating. These ceramic brakes are not commonly used in the industry and lack availability in the automotive aftermath due to high production costs. However, the main task of the brake is still to reduce the speed of the vehicle or prevent it from moving. Therefore, a suitable braking system for certain types of vehicles is different from efficiency and safety.

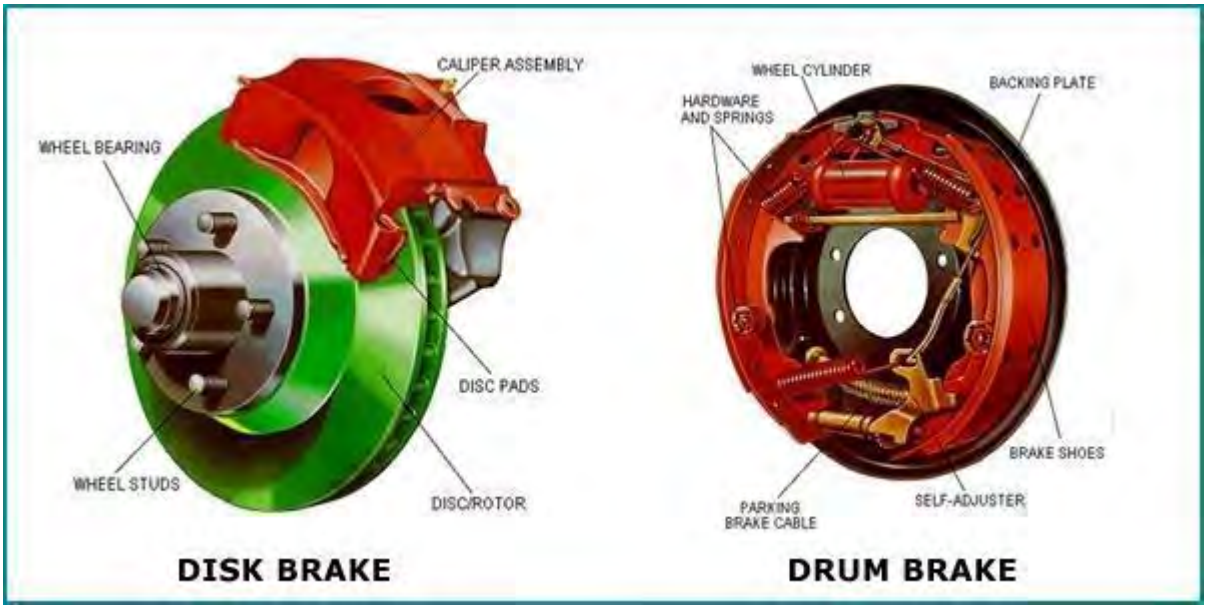

Figure 1: Disc and Drum Brake

Therefore, having a good brake system for the vehicle is very important because the main function of the brake system is to able and safely carry a car, tricycle, bike to stop without causing it to deviate to one side or slip. In another way for safety that in all things should put safety first as the main priority.

1.1 Problem Statement

Nowadays, issues of convenience in any organization, especially organizations in agriculture industry such as oil palm require manpower. In addition, oil palm worker still

using old method to collect and gather the palm fruit which is using wheelbarrow. Some problem are being detect such as:

1. Time working consuming when collecting the oil palm fruit is long.
2. Oil palm workers easy to get tired and use much energy to collect the oil palm fruit.
3. The current wheelbarrow that commonly used in oil palm plantation does not have a braking system.

Wheelbarrow or wheel loader is a work engine that is used to lighten the load to carry in different fields and different conditions. The use of manual carts gives advantages, in terms of low prices and low maintenance costs

The goal of this project is to fabricate the brake system that suited for the Agriculture Smart Mover. The brake system is very important for every moving vehicle as it is the most effective medium to slow down or stop the vehicle and to avoid its movement. Currently, there are many types of braking systems used for vehicles in terms of materials, medium stops, and efficiency. Therefore, this project will examine, discuss and fabricate the best braking system and suitable for this Agriculture Smart Mover for use in oil palm plantation.

1.2 Project Objective

The objectives of the project `Agriculture Smart Mover' are:

1. To fabricate the braking system and choose the suitable material of the Agriculture Smart Mover from the finalized design.

2. To conduct structure analysis of brake components using CatiaV5 and performing experiment testing.

3. To minimize the cost of the product and braking parts from the final design.

1.3 Project Scope

The scopes of this project are to fabricate and develop the model of Agriculture Smart Mover which is the braking system by:

1. Determine and decide the best material of braking system to be used to Agriculture Smart Mover.
2. Ensure that the brake components system suits the agriculture smart mover through CatiaV5 analysis.
3. The material and braking system parts will go through fabrication work like joining process and forming process then experiment testing.

1.4 Project Significance

From this study, students can get the information about braking system and how it work to improve the comfort and safety. This project will discuss:

1. Proper studied about brake components will allow the best selection of the brake system for the typical design of the current project.
2. The on-site experimental work will prove that the selected braking component suit the present product.
3. This project also would ensure the comfort of the palm oil workers to control the machine to stop as required.
4. Time working consuming to collect the oil palm fruit will be less burden.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Within about a hundred years since the car holds human imagination, technology designed to make it accelerate and achieve higher speed has grown with anger. As with what's going to go down, what's happening faster is definitely slow and here's where braking works.

2.2 Brake history

Since the vehicle has grown over the years, the technology needed to stop this vehicle has also undergone mass evolution. The first type of braking is an external type brake used on carriage driven by a lever carrying rubber pad in contact with an axle. This is followed by internal brakes using a drum or disc attached to each wheel (Engineering, P and Ujjain, 2013).

The main test of the brake system took place in 1902 on unpaved roads in New York City called Riverside Drive. Ransom E. Olds has set up to test the new brake system against the tire brakes of a four-horse trainer and the internal drum brake of a Victorian car without a horse. His Oldsmobile has a flexible, stainless steel stainless steel, wrapped in drums on the rear axle. When a brake pedal is used, the band is contracted to control the drum.

As roads improved and cars began to be driven at high speeds, manufacturers recognized the need for even greater braking power. One solution to the problem became apparent during the Elgin road Race of 1915. A Duesenberg took the flats at 80 mph, then screeched to a virtual crawl to negotiate the hairpin curves. Duesenberg's secret for such

magnificent braking power was to simply use an internal brake on each front wheel as well as each rear wheel (Engineering, P and Ujjain, 2013).

Figure 2: First Swedish car 1897, No brake

2.3 Bicycle brake history

There are three main types of bicycle brake system which are rim brakes, disc brakes, and drum brakes. There are various types of brakes used from early age, and some of the types are still used today. As far back as 1490, Leonardo da Vinci had envisioned a machine remarkably similar to the modern bicycle. Unfortunately, da Vinci did not attempt to build the vehicle, nor were his sketches discovered until the 1960s. In the late 1700s a Frenchman named Comte de Sivrac invented the Celerifere, a crude wooden hobby horse made of two wheels and joined by a beam. The rider would sit atop the beam and propel the contraption by pushing his or her feet against the ground.

In 1818, Baron Karl Drais in Mannheim, Germany, had patented `dandy horse 'in France in February 1818 (Badenian privilege). The dandy horse is a human-powered vehicle that, being the first means of transport to make use of the two-

wheeler principle, is regarded as the forerunner of the bicycle. Then, the earliest bicycle with pedal which was Boneshaker was invented with spoon brake type in 1860s in France and manufactured by the Michaux company from 1867 to 1869. This boneshaker then copied by others during that time. After summer in 1869, it fell out of favour and then a year after, it was replaced with type of bicycle called `ordinary 'or` penny-farthing'. An alternative to the spoon brake for penny-farthings was the calliper brake patented by Browett and Harrison in 1887. This early version of calliper braking used a rubber block to contact the outside of the penny-farthing's small rear tire. After some years, On November 23, 1897, Abram W. Duck of Duck's Cyclery in Oakland, California was granted a patent for his Duck Roller Brake (U.S. Patent 594,234). The duck brake used a rod operated by a lever on the handlebar to pull twin rubber rollers against the front tire, braking the front wheel. Next, In 1898, after the advent of freewheel coasting mechanisms, the first internal coaster brakes were introduced for the rear wheel. The coaster brake was contained in the rear wheel hub, and was engaged and controlled by backpedalling, thus eliminating the issue of tire wear. In the United States, the coaster brake was the most commonly fitted brake throughout the first half of the 20th century, often comprising the only braking system on the bicycle

Figure 3: Dandy Horse

2.3.1 Bicycle Brake Type

Spoon brakes

The first bicycles came into existence before the invention of pneumatic tires. Smooth solid rubber tires provided a nice even surface that early spoon-style brakes would press into and slow down your Penny-Farthing. While early cyclists appreciated the ability to stop, they did not like the harsh ride of hard rubber tires. As soon as squishy air-filled tires (with tread) became the norm, cyclists needed a stopper that did not touch the tires.

Spoon brakes consist of pads (often leather) or metal shoes (possibly rubber faced), which are pressed to the top of the front tire. This is almost always handled rod by the right lever. In developing countries, the shape of a leg-mounted sponge brakes are sometimes converted to old brake roadsters. It consists of a piece of glass attached to the back of the fork. This is depressed against the front tire by the rider's leg.

Perhaps more than any other bicycle brake form, the brake brakes are sensitive to road conditions and increase tire wear dramatically.

Figure 4: Spoon Brake Type

Duck brake

Created in 1897, duck brakes or dental roller brakes using lever-controlled rods to pull twin friction rollers (usually made of wood or rubber) against front tires, Sealed on axles secured by friction washers and mounted at an angle to adjusting to the shape of the tire, rollers are forced against the friction humidors when touching the tire, thus plunging the front wheels. The cause of tension holds the roller from the tire except when brake. The brake power is enhanced with an additional brake lever that is mounted parallel to and behind the stick, which provides extra leverage when the brakes (two hands can be used to pull the lever if necessary). Used in combination with the rear brake coaster, a day rider may stop much faster and with modulation better than brake effort than it may only use a spade brakes or rear brakes. Colloquially known as duck brakes, the design has been used by many famous riders on that day, and is widely exported to England, Australia, and other countries. In 1902, Louis H. Bill was granted a patent for an improved version of the Breed Roller Brake (Patent 708,114) for use on motorcycles (motorcycles).

Figure 5: Duck Brake Type

Rim brakes

Rim brakes are called because the brake force is used by the friction pad to rotate the rim of the wheel, thereby slowing it and the bike. Brake pads can be made from leather, rubber or cork and are often installed in metal "footwear". Rim is usually driven by a lever-driven rider mounted on the stick.

Rim has come in many types over the years. The same design elements in the 1920s and 30s were used cork or felt feather pads that would seamlessly drag across the lacquered wood rim. For heavy bicycles with chromed-steel smooth wheels, braking brake callipers need to be made which can crush hard steel. Hard rubber pads slowly

Rod brake

Calliper-driven callipers, which use thick metal rods instead of thin brass wires for use are usually found in heavy-duty Dutch bicycle bicycles that sit in the weather. Brake brakes, while strong enough, do not give bicyclists more flexibility. An easy change in