UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN,DEVELOPMENT AND TEST KR-150 GO-KART

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Design) with Honours.

by

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FACULTY OF MANUFACTURING ENGINEERING

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It is hereby, declared this report entitled "Design, Develop, Analyze and Test KR-150 Go-kart" is the results of my own research except as cited in references.

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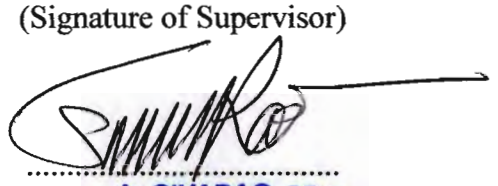

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ABSTRACT

The existing design of go-cart is not suitable for road driving. This is because of the height measurement of existing go-cart where it is lower than the daily vehicle while the lack of suspension system in existing go-cart's design will cause the use of existing go-cart on the road is not relevant and has many problems in terms of safety factors. After doing some studies on the measurement and the design of go-cart, the new innovation design is produce which is called GK-150. GK-150 is the suitable design to drive on the road or on the racing circuit. GK-150 is operational with the suspension system and 150cc engine. The height measurement of the go-cart is also capable passing bumpers and can be used as a racing vehicle or daily use.

ABSTRAK

Rekabentuk go-kart yang sedia ada adalah tidak sesuai untuk di pandu di jalan raya. Ini kerana ukuran ketinggian bagi Go-kart sedia ada adalah lebih rendah daripada kenderaan seharian manakala ketiadaan sistem perendam di dalam rekabantuk gokart sedia ada menyebabkan penggunaan go-kart di atas jalan raya adalah tidak relevan serta mempunyai banyak masalah dari segi faktor keselamatan. Setelah membuat kajian ke atas ukuran dan rekabentuk go-kart yang sedia ada, lahirlah rekabentuk inovasi yang dinamakan GK-150. GK-150 adalah rekaan yang sesuai dipandu di jalanraya mahupun di atas litar perlumbaan. GK-150 dilengkapi dengan sistem perendam dan enjin berkuasa 150cc. Ukuran ketinggiannya juga berkeupayaan melepasi bonggol serta boleh dijadikan alat perlumbaan atau kenderaan kegunaan harian.

"Special dedicated to my mother, father, and family for their understanding and support. May Allah be with us"

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In the name of Allah the most Beneficent and Merciful. A deep sense of thankfulness to Allah who has given me the strength, ability and patience to complete this project and thesis as it is today. Firstly, I would like to take this opportunity to put into words my deepest gratitude and appreciation to the project supervisor, Mr. Sivarao a/l Subramonian, Ir for their support, guidance, patience, encouragement and abundance of ideas during the completion of this project. Secondly, special thanks to honorable panels, Puan Nurazua binti Mohd Yusop and En. Kamarul B. Amir Mohamad for their comments, invaluable suggestions and outstanding deliberations to improve the project during the project presentation. I would also like to express my extraordinary appreciation to my family for their invaluable support along the duration of my studies until the completion of this thesis. Finally yet importantly, thanks to all the persons who are directly or indirectly contributed because their perspective and guidance helped greatly to point me in the right direction until the completion of this thesis.

"THERE'S LIGHT AT THE END OF THE TUNNEL".

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1.0 Introduction

The objectives, significant and scope of the project are explained including the problem statements. The main important thing is the objectives of this project. Significance of project is more about what this project is done for. Then, the scope of the project tell about what are the project requirements and the product of the project. The methods and the procedures that involve in this project be discussed more in the project methodology.

1.1 Background of Project

Go-kart or karting was born from United States in 1950s, where the engine mainly from discarded lawn engine. Go-kart is a driving and racing miniature, skeleton frame, and rear engine automobiles called karts (DiNozzi. B, 1999). Go kart is a non popular sport previously, but today it has become one of the most popular sports by multiple group of age. Now days, racing go karts are considered as one of the most economic activity where a large number of people can participate.

We regularly hear about motorsport racing such as formula one, NASCAR, rally art and many more. Those motorsports activity is out of reach of the average people because of strict regulations and high cost. But apparently, go kart motorsport gives chances to public to get involved in legal racing with no restricted age and low budget needed. Seven times formula one World champion, Michael Schumacher started his involvement in motorsports with karting. He joined go kart motor sports at his hometown, Germany and won his first go kart championship when he was 19

years old (McAuley. J, 2008). All go-karts look alike, but the fact is go karts have its own classes such as sprint kart, road racing kart, indoor karting and speedway karting. In addition, with small engine and skeleton frame go karts speed can reach up to 100 miles per hours and stand a weight up to 210 pounds.

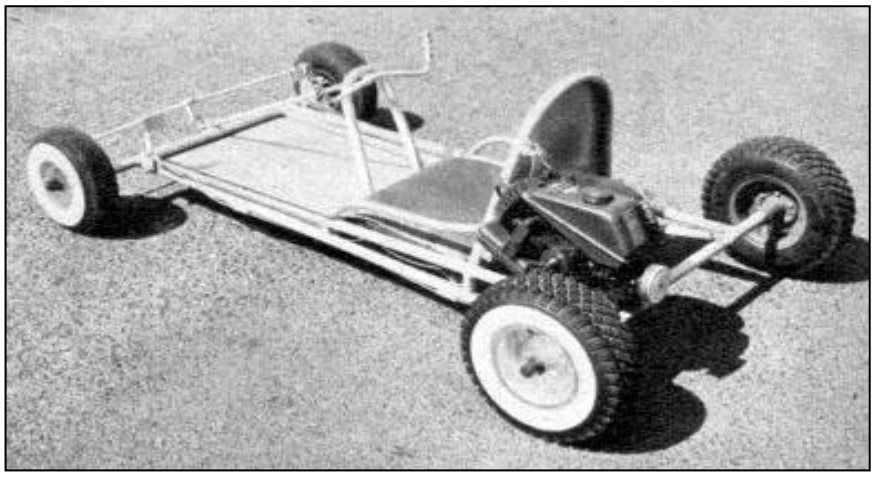

Figure 1.1: Old version go-kart (www.rc-trucks.org, 2008)

Figure 1.2: Go- kart (www.TornadoDriver.com, 2008)

The development in karting has expanded rapidly together with advanced technology. As this motorsport become popular among citizens, those go karts manufactures started to do more research and development to improve the go kart in terms of the chassis design, speed, braking system and transmission system. Today's, go-kart frames are made from lighter iron, chromoly and others which is more durable and it can absorb more vibration even if it has no suspension. Designers, engineers and others have involved directly towards new achievement in improving all aspects in the go kart. The usage of advanced technology in manufacturing is widely utilized to invent a better go-kart.

1.2 Objective of the Project

The objectives of the project are as follow:

- To select and evaluate the optimum design of go-kart.
- To design and develop a go-kart with the KR-150 engine.
- To test dynamically for its performance and suitability of campus use.

1.3 Scope of Project

The scopes of the project are as follow:

- To suite the KR-150 engine into develop chassis.
- To mount disc break application.
- To apply the simple design of steering system to suite into GK-150 project.
- To apply the suitable suspension system into GK-150 project.

1.4 Problem Statement

- There is no go-kart in Faculty of Manufacturing Engineering (FKP).

- To improve the skill and knowledge of Manufacturing Engineering student in designing and importance of project developing go-kart.
- The dimension of existing go-kart design is very low and is not suitable to drive on the road.

1.5 History of Go-kart

In 1958, go-kart was already a popular racing motor sports especially among locals around California. The history took placed at rose bowl in Pasadena, California. One of the significant names of this sport was Don Boberick. He started his participation in karting when he was still working at Art angels. Art Angels, Duff Livingstone and plenty of individuals was the participant of motor racing type of events at rose bowl parking lot (DiNozzi. B, 1999). Roy Desbrow had constructed a kart named the "Drone" and he was also a business partner of Duffy Livingstone. The kart was powered by 250cc engine originally used in a U.S Army radio controlled drone air plane (DiNozzi. B, 1999). Don Boberick was the driver to the kart at the rose bowl kart competition. At the same time Don was also contacted by Jim Rathman to drive the latest kart design at GKCA (Go Kart Club of America) Nationals called FIRST Rathman Xterminator prototype kart in 1959.

Figure 1.3: Don Boberick driving the "Drone" (www.vintagekarts.com, 1999)

In 1959, the world of go kart revaluated to be more organized event as Don Boberick, Duffy Livingstone, Marvin Patchen the advertising manager of Peterson Publishing Cooperation and few members agreed to form an organized pattern called Go Kart Club of America (GKCA) to manage and organized motor racing at an inexpensive level (DiNozzi. B, 1999). The role of this organization was to prepare the technical regulation that could comprise the competition. Dick Van der Veer was the first president of the GKCA. Duffy Livingstone and partners, Res Desbrow and Bill Rowles built a new go kart Mfg.Facalitiy in Azusa, California in 1959(DiNozzi. B, 1999).

Figure 1.4: This is the old Drone testing on the new "Azusa" track in early 1959 (www.vintagekarts.com, 1999)

In 1960, in California they had their own racing team such as Go Kart Manufacturing and Bug who already had their own facilities like bus transports. During that time, there was Championship held at Rockford, IL, for the North American Kart Association (NAKA) National Championships in California.

Figure 1.5: Go Kart Manufacturing Company's class "B" drivers
(www.vintagekarts.com, 1999)

In 1961, GKCA published kart magazines named "The Karter" issued on the February 1961. Then GKCA became International Kart Federation (IKF) initiated by GKCA president 1961 for the reason of it was important to divide the kart club and the manufacturer (DiNozzi, B, 1999).

Figure 1.6: The Karter magazines February edition
(www.vintagekarts.com, 1999)

1.6 Summary

As a summary, this chapter listed the objectives, significant and scopes of the project and problem statements. The objectives of this project will ensure that this project has a target to be achieved. From the chapter, it allows the author to be known what needs to be done in completing the project such as the project requirements and the product of the project.

1.7 Outline of Thesis

The objectives, significant and scope of the project are explained including the problem statements. The main important thing is the objectives of this project. Significance of project is more about what this project is done for. Then, the scope of the project tells about what are the project requirements and the product of the project. The methods and the procedures that involve in this project are discussed more in the project methodology.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

This chapter focuses on all features of go kart parts which is to modify go kart design with different types of material used. In addition, this chapter also emphasizes on information needed crucially to encounter the problem to the existing go-kart. This chapter also discusses the definition of all go kart features, basic go kart theory on every part or system, effect of chassis flexibility and COSMOSworks express using Solidworks.

2.1 Basic go kart chassis theory

According to Martin B, (2000), it is the responsibility of the karter to determine his own requirement and to obey the rules stated by the organization. This is true because the option of setting up the go kart such as which type of chassis preferable depends to the convenience of the karter. The combination of knowledge and experienced would the best requirement to set up a good chassis. The understanding of basic chassis setup would assist the rookie on setting up the chassis but experienced will lead to improvement and development in tuning up the chassis. Furthermore, the fundamental of go-kart needed crucially as a main reference for the author to design new chassis.

2.1.1 Chassis Design

Chassis is a frame on which the body of an automobile or air plane is mounted (Licker M. D, 2003). Typically, chassis designs have three basic designs. There are frame, unit body and space frame construction. According to Capitani, M. De. (2007) go kart is the simplest form of motorsport run with small cars with essential shape. The essential shape refers to the tubular form of the frame. The author agreed with Capitani view, because based on the author study most go-karts are made from hollow steel tubing. Referring to the existing go-kart, the chassis was too stiff. Therefore, to solve this problem, the author has designed a new chassis with longer rails to increase the flexibility and improve the go kart handling.

2.1.2 Body and frame Construction

Generally, this type of frame supports the engine, rear axle, transmission and all suspension components. It consists of Channel shape steel beams welded together. Such frame is compatible for trucks and any larger vehicle. It is easy to identify ladder frame because the chassis look like a ladder once the body is removed. At the perimeter of the frame, there are lots of welded and riveted unit on the frame member (Halderman J. D, 2000).

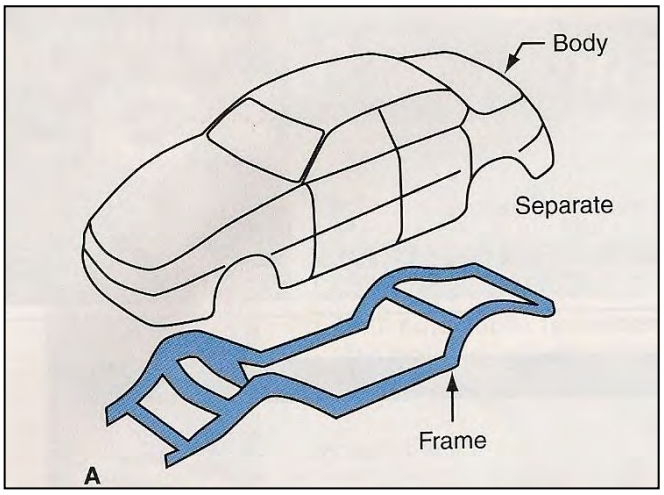

Figure 2.1: Body and Frame construction (Halderman J. D, 2000).