# Design, Analysis and Fabrication of Go Kart With Modification of Ignition Interlock System

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***Abstract-*** *The objective of this report is to highlight the Go kart design report of our team 'TWISTED TORQUE' and the modification of the ignition system for safety. This report explains objectives, assumptions and calculations made in designing a Go Kart. We have also introduced a new safety system for go kart. This includes the seat belt ignition interlock system which provides safety to the driver if the seat buckle is not attached. We have designed the go kart as per International Series of Karting event (ISK). To achieve our goal the team has been divided into core groups responsible for the design and optimization of major sub systems which were later integrated into final blueprint.*

***Keywords***- Go kart, Seat belt, seat buckle, Modification, Ignition system.

## I. INTRODUCTION

Go-kart is a simple four-wheeled, small engine, single seater racing car used mainly in United States. They were initially created in the 1950s, Post-war period by airmen as a way to pass spare time. Art Ingles is generally accepted to be the father of karting. He built the first kart in Southern California in 1956. From then, it is being popular all over America and also in Europe. A Go-kart, by definition, has no suspension and no differential. They are usually raced on scaled down tracks, but are sometimes driven as entertainment or as a hobby by non-professionals. Karting is commonly perceived as the stepping stone to the higher and more expensive ranks of motor sports. Kart racing is generally accepted as the most economic form of motor sport available. As a free-time activity, it can be performed by almost anybody and permitting licensed racing for anyone from the age of 8 onwards. Kart racing is usually used as a low-cost and relatively safe way to introduce drivers to motor racing. Many people associate it with young drivers, but adults are also very active in karting. Karting is considered as the first step in any serious racer's career.

We approached our design by considering all possible alternatives for a system and modelling them in CAD software subjected to analysis using ANSYS based on analysis result, the model was modified and retested and a final design was fixed. The design process of the vehicle is based on various engineering aspects depending upon Safety and Ergonomics, Market Availability, Cost of the Components and Safe Engineering Practices. Safety, Serviceability, Strength, ruggedness.

The design objectives set out to be achieved were three simple goals applied to every component of the car: durable, light-weight, and high performance, to optimizing the design by avoiding over designing, which would also help in reducing the cost. With this we had a view of our kart. This started our goal and we set up some parameters for our work, distributed ourselves in groups for the technical design of our vehicle.

## II. LITERATURE REVIEW

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 COSMOS works express using Solidworks.

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.

## III. OBJECTIVES

1) The go kart is made to meet the requirements of the event.
2) The first priority is the drivers safety.

3) Light weight chassis for better performance.
4) To modify the ignition system by providing seat belt for safety purpose.

## IV. DESIGN OF KART

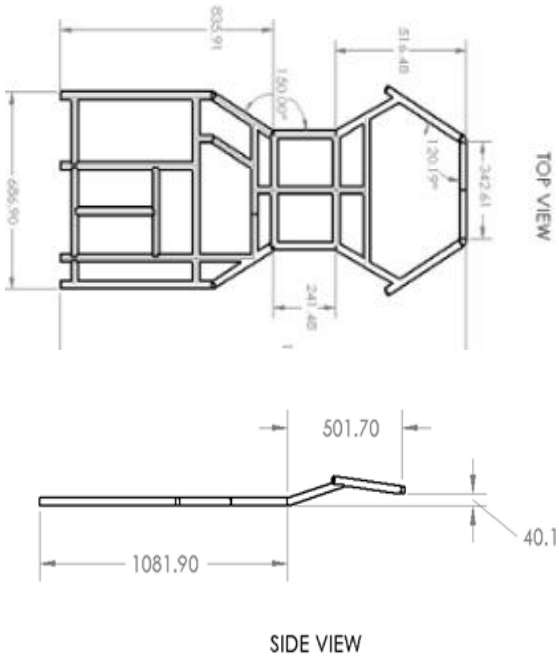
The important design objectives set out to be achieved by our team were simple goals: more efficient, durable, light weight, high performance, reduction of cost, etc. Sub teams for design:

- Chassis and bodyworks
- Braking system
- Steering system
- Engine
- Transmission

We proceeded by keeping a particular budget of the different design departments. Throughout the design process we distributed the budget in such a way that if we assign more money to one system, we reduce that amount from some other system.

### CHASSIS DESIGN

The chassis frame is the central and supporting part of the whole kart. It must be sufficiently resistant to be able to absorb the charges produced when the kart is in motion. We used SOLIDWORKS software to design a three dimensional model of the chassis. This software allowed our team to visualize the design in 3-D space and reduce errors in fabrication. The main criterion in chassis design was to achieve perfect balance between a spacious and ergonomic driver area with easy ingress and egress, and compact dimension to achieve the required weight and torsional rigidity criteria.




### BRAKE

The braking system provides the means to stop or slow the vehicle. To control for the vehicle, we need to be able to start it moving, make it turn, accelerate and decelerate and of the major importance to stop it. A vehicle with a breaking system that is not working properly is a candidate for the wrecking yard and may because injury to the driver and passenger as well as to others.

Basic Parts of brake system:

- Calliper and Disc - Slow or stop the wheels when the brake callipers at the wheel.
- Brake Pedal - Operated by the driver.
- Master cylinder - Provides hydraulic pressure
- Brake lines and Hoses - Connect the master cylinder to the calliper at the wheels
- Brake Fluid - Transmits force from the master cylinder to the callipers at the wheels
- Connector Rod - Connected from brake pedal until master cylinder to transmit the pressure when pedal is applying.

We have used Apache 180 brake disc due to its less thickness and better performance. In the figure given below is the thermal analysis of brake disc. We have used brake fluid of DOT 3.

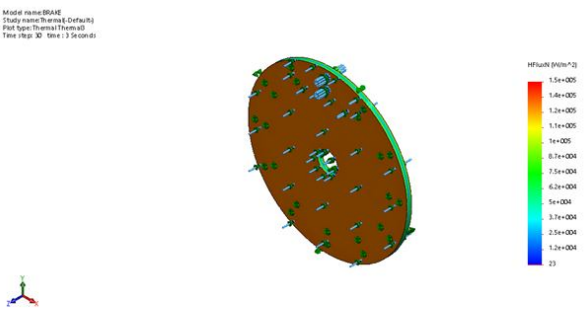


Fig 4.2 thermal analysis

## STEERING SYSTEM

This is the mechanical arrangement of the entire steering system in go kart. We have selected a simple steering mechanism and a steering ratio of 1:1 so to simple mechanical type linkage.

| Parts | Dimensions |
|---|---|
| Steering Column | 50 cm x 2 cm |
| Tie rod | 38 cm x 1.2cm |
| Flange bearing | 2.1 cm |

Specifications:

| | |
|---|---|
| Wheel Base(H) | 1100 mm |
| Track width(W) | 1060 mm |
| Turning radius (R) | 3180 mm |
| Steering Ratio | 1:1 |
| Ackermann Angle | 51 deg |
| Caster angle | 12 deg |
| Camber angle | 0 deg |
| King pin inclination | 10 deg |
| Inner angle | 29 deg |
| Outer angle | 20 deg |

## ENGINE

Engine used in our go kart is of ACCESS 125cc. Engine is mounted in the position above the rear axle on the rigid frame with the anti-vibration mountings the positioning of engine is decided on the basis of the availability of the space in the engine compartment of the frame.

Engine Specifications:

| | |
|---|---|
| Displacement | 124cc |
| Cylinder | 1 |
| Maximum Power | 8.50 bhp @7000 rpm |
| Maximum torque | 9.80 Nm @5000 rpm |
| Bore | 53 mm |
| Stroke | 55 mm |
| Valves Per Cylinder | 2 |
| Fuel Delivery System | carburetor |
| Fuel Type | Petrol |
| Ignition | CDI |
| Sparks Plugs | 1 per cylinder |
| Cooling System | Water cooled |
| Gearbox type | Automatic |
| Number of gears | None |
| Transmission Type | Chain Drive |
| Clutch | Continuous Variable Transmission |

## SEAT BELT IGNITION INTERLOCK SYSTEM

Seatbelt ignition interlock system is used for the safety purpose of the driver. This system reminds the driver of locking the seat belt before starting the engine. In seat belt ignition interlock system of go kart the materials mainly used are tongue and buckle. Tongue is the part that is pushed in to the buckle to connect to the seat. Buckle is a quick release device enabling the wearer to be held by the seat. In this system the wire from the kill switch Seat belt interlocks are a vehicle safety technology that is designed to raise levels of seat belt compliance. They allow a vehicle to be started only when the vehicle's occupants have fastened their seat belts.

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## VI. CONCLUSION

In these we have made a go kart fort the International Series of karting event as per its rules. We have made light weight chassis with high power engine which provides high speed. The seat belt ignition interlock system prevents the drivers to drive the vehicle without buckling the seat belt. This system can be used for the safety or for the prevention of accident purpose.

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## VII. ACKNOWLEDGMENT

We are using this opportunity to express our gratitude to everyone who supported us throughout the course of this B.E. project. We are thankful for their aspiring guidance, invaluably constructive criticism and friendly advice during the project work. We are sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the project.

We express our warm thanks to **Prof. Mohd. Mustaque Ahmed** for his support and invaluable guidance, suggestions and attitude, which inspire us to submit this report in present form at Theem College of Engineering.

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