



Design, Analysis And Fabrication Of Go Kart Vehicle

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Abstract: A Go-kart is a small four wheeled vehicle. 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.

Our goal is to design and fabricate an eco-friendly go-kart that offers exceptional performance, driver comfort, and safety. The primary focus is on creating a lightweight kart that delivers impressive performance. Adherence to the rulebook of Edge line Championship is mandatory and significantly influences our objectives.

The go-kart, which is propelled by a rear-wheel internal combustion engine without suspension or differential, has been designed in accordance with standard principles. All critical factors and design parameters have been taken into account, resulting in a thoroughly failure-analysed and ergonomically optimized go-kart.

Comprehensive calculations have been conducted for each component, followed by 3D modelling and simulation using professional software tools.

The analysis was carried out with different iterations and finally the optimum design of each part of the Go kart was done so as to obtain the optimum result.

Keywords: Go-kart, Design, Frame, Analysis, Steering System, Braking System, Engine, Transmission, Innovation.

I. INTRODUCTION

Go-Kart is four wheeled racing car that can be used by any one and can be made by professional and non-professional personal so.

Driver in Go-Kart may or may not be professional. They denote Formula1 car in manners of speed but it is less costly. They are widely used for racing in America and now increasing its popularity in India because of cost effectiveness and racing thrill. Go-kart is simple, light weight and easy to operate. Most of go-kart used simple mechanical principles to manufacture its body. As the popularity is increasing new participants are introducing themselves in competition. Each team has to the go through many positive and negative aspects throughout the designing process to achieve the exact solutions.

Go-karting is a thrilling motorsport that offers an exhilarating experience for participants of all ages. Originating in the United States in the 1950s, go-karting has evolved into a popular recreational activity and competitive sport worldwide.

The essence of go-karting lies in its simplicity: small, lightweight vehicles powered by engines ranging from electric motors to high-performance gasoline engines. Tracks can vary in size and layout, from indoor facilities with tight turns to outdoor circuits with long straights and challenging corners.

Participants can experience the adrenaline rush of racing against friends or competitors in both recreational and competitive settings. Go-karting is not only a fun activity but also serves as a stepping stone for aspiring professional racers, providing valuable skills in vehicle control, racing tactics, and sportsmanship.

Safety is paramount in go-karting, with participants required to wear helmets, gloves, and other protective gear. Tracks implement strict safety measures, including barriers, marshals, and safety briefings to ensure a secure racing environment.

Whether you're a casual enthusiast looking for a weekend thrill or a serious competitor aiming for the podium, go-karting offers an accessible and exciting motorsport experience for all.

According to CIK-FIA (International Karting Commission Federation International Automobile), Go-Kart is a land vehicle with or without bodywork with four non-aligned wheels in contact with the ground, two which control the steering while the other transmits the power. Go-kart came into existence after the 1950 post-war period by airmen to pass their time. Arts Ingles is known as the father of karting. As compared to motor racing, kart racing is a comparatively safe game. Go-karts are usually powered by electric or gasoline engines. Go-kart chassis is made up of steel pipes that are stiff and flexible to make up for the absence of suspension. It should adjust itself for suspension function and be durable enough to absorb the impact of maneuvers. A chassis with high rigidity level will perform best on dry conditions whereas a flexible one in wet condition.

Go-kart chassis can be classified into four types: (i) Open kart chassis which has no roll cage (ii) Caged cart chassis, which is preferred for dirt tracks (iii) Straight chassis is suitable for sprint racing providing a centre seat for the driver and (iv) Offset chassis is suitable for the left or right turn only, speedway racing providing a left or right seat for the driver. When there is a change done in the design of chassis both vibration pattern and the stress pattern will change.

The advantage of Go Kart is that it can absorb the road shocks and can drive directly as there is no need for suspension in it. Sometimes the Go Kart is also provided with double wishbone type of suspension which gives more comfort to the racers which makes them to drive easily in the city and even in the rough road. The yield strength values were 250 N for steel and for grey cast iron it was 250 N which indicates that it is considered to be a safe for the racer riding the car.

The sudden vibration, shock and impact occurring can be easily found out by doing the Analysis. The Analysis also helps to identify the life span of materials when it undergoes the effect of continuously loading. It also identifies where the crack may occur in the Go Kart and is used to determine the conductivity of the material. The static analysis of the chassis frame is given by calculating the minimum stress, maximum stress and maximum deformation. The maximum deformation was found to be 0.3028 mm under static load, 0.2386 mm in front impact and 0.2033 mm in rear impact.

I. RESEARCH METHODOLOGY

The team initiated the process with brainstorming, followed by a comprehensive review of considerations. This was seamlessly followed by stages of designing, design analysis, fabrication, assembly, and documentation, all meticulously aligned with the specifications outlined in the Go-kart rulebook.

Our design methodology involved a thorough exploration of all conceivable alternatives for each system, which were then modelled in CATIA V5 R21. Subsequently, the model underwent iterative modifications and retesting, reflecting a dynamic engineering process that hinges on factors such as availability and cost.

The design objectives we pursued centered around three fundamental goals, each systematically applied to every vehicle component: durability, lightweight construction, and high performance. These objectives were achieved through meticulous design optimization, which concurrently contributed to cost reduction. In this manner, our vision for the kart's form and function crystallized.

Following fig explains the steps for project.

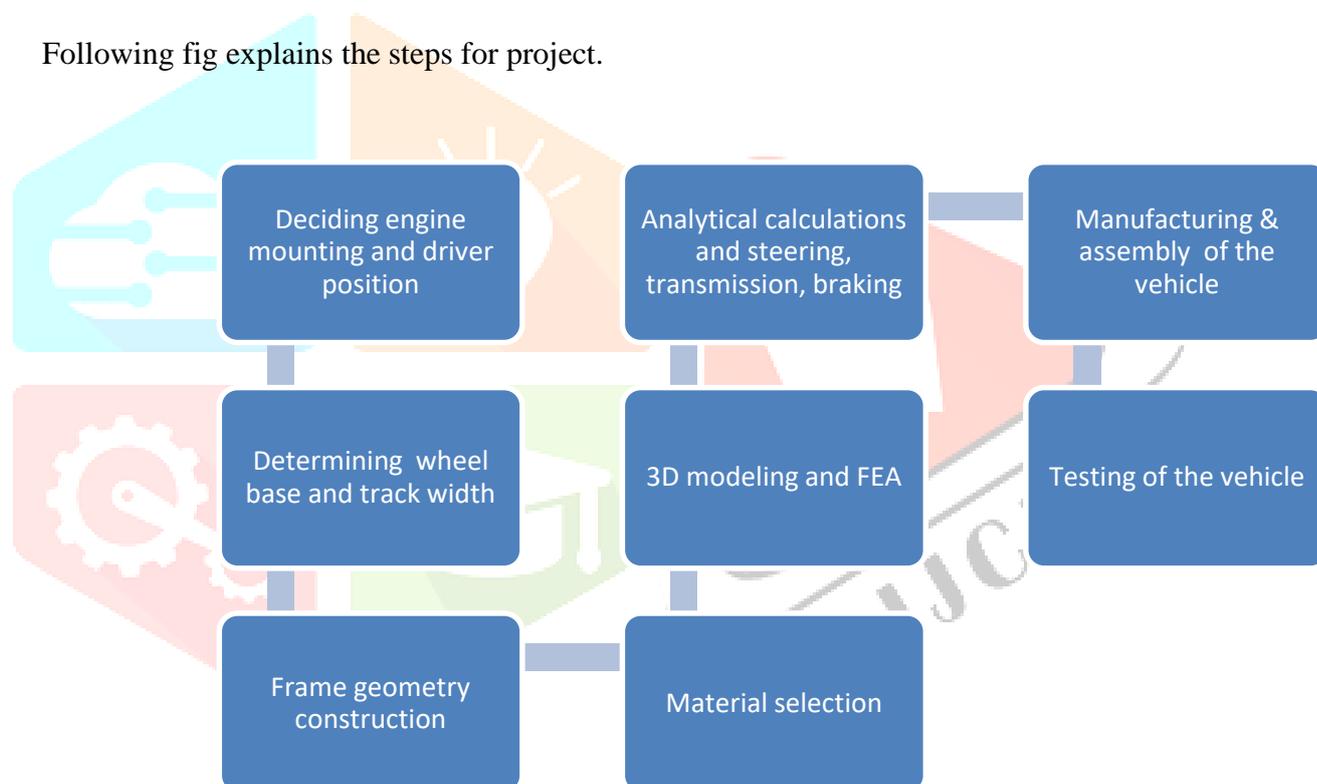
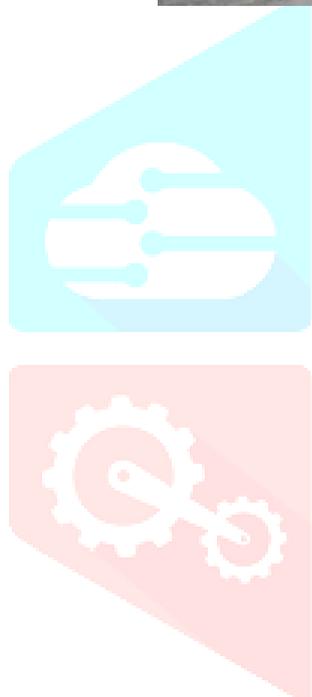


Fig.no. 1 steps of execution

MODELING AND ANALYSIS



Fig, 3D v view of building

IV. RESULTS AND DISCUSSION

This project aimed to build a go-kart based on a conceptual design that was optimized to improve the vehicle's stability. The Go-design kart's and fabrication focuses on creating a simple, lightweight, and easy to-operate vehicle. The design specifications included ergonomics, safety, and reliability considerations. All major components were analysed to improve vehicle performance, improve strength and rigidity, and reduce complexity and manufacturing costs.

The Go-kart design has been as per usual calculations of go-kart, but to reduce the weight of this vehicle, we used the option of choosing lighter material of 304 grade of stainless steel. Moreover, the engine used in this project is 150 cc that is light enough to design a light-weighted vehicle.

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