Design & Fabrication of Tourer Vehicle by using Electric Motor

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***Abstract*:- There are many motor sports in the world. Bikes, Cars, Formula one are examples of them. The drivers in these are very professionals and trained. They can drive the vehicle very fast. But there are also motor sports which do not need professional drivers and need no great speed. The vehicles used are also very cheap. Such a motor sport is go-karting. They resemble to the formula one cars but it is not as faster as F1 and also cost is very less. The drivers in go-karting are also not professionals. Even children can also electric dc motor drive it. Go-karts have 4 wheels and a small engine. They are widely used in racing in the world and also they are getting popular in our country. Go-Karting is a big craze to all the people. It is initially created in United States in 1950s and used as a way to pass spare time. Gradually it became a big hobby and all countries followed it. In India go-karting is getting ready to make waves. A racing track is ready in Nagpur for go-karting and Chennai is also trying to make one. Indian companies are also producing go- karts in small scale. MRF and Indus motors are the major bodies in karts and they are offering karts between 2 lakh and 3 lakh. But to make go-karts popular, the price must come down. For that, many people are trying to build one under 1 lakh and we had also take up the challenge and make our under 78 K. This is a dream come true. A go-kart just under Rs. 30000/-. So we are sure that our project will have a high demand in the industry and also we are hoping to get orders from the racing games.**

This paper concentrates on explaining the design and engineering aspects of making a Go Kart .This report explains objectives, assumptions and calculations made in designing a Go Kart. The design is chosen such that the Kart is easy to fabricate in every possible aspect.

Keywords-Go kart, design of Go-kart, calculations.

INTRODUCTION

Go-kart is a simple four-wheeled, small engine, single Seated 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. It can prepare the driver for highs-speed wheel-to- wheel racing by helping develop guide reflexes, precision car control and decision- making skills. In addition, it brings an awareness of the various parameters that can be altered to try to improve the competitiveness of the kart that also exist in other forms of motor racing. We approached our design by considering all possible alternatives for a system and modeling 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.

PARTS OF A GO – KART : In a Go-Kart, There are mainly seven parts. They are

Chassis, 2 .Engine, 3. Steering, 4. Transmission 5. Tiers 6. Brake, and 7.Electric Starter.

SYSTEMS USED IN A GO – KART:

Like every automobile, go-karts also have various systems. Mainly there are 4 systems

in this kart. Fuel system ,Ignition system, Lubrication system and Coolin

GO-KARTS IN INDIA

Home of go-karts in India. Many people take part in the racing and is getting popular. Go-karts emerged in India in 2003 from MRF, which has a 250cc two-stroke engine, which produce 15 bhp of power, which costs around 3 lakh. Indus motors are also offering Go-karts for 1 lakh to 3 lakh. There are racing tracks in Nagpur for go-karting, which is known as the home of go-karts in India. Many people take part in the racing

OUR WORK HAS BEEN DIVIDED INTO FOLLOWING GROUPS.

- **Design**
- **Engine and**
- **Transmission**
- **Steering**
- **Brakes**

First of all, the chassis is constructed. The"A"pvc pipe is taken as per dimensions and bends in required places using bending machine. Then the pipes are poonded rigid

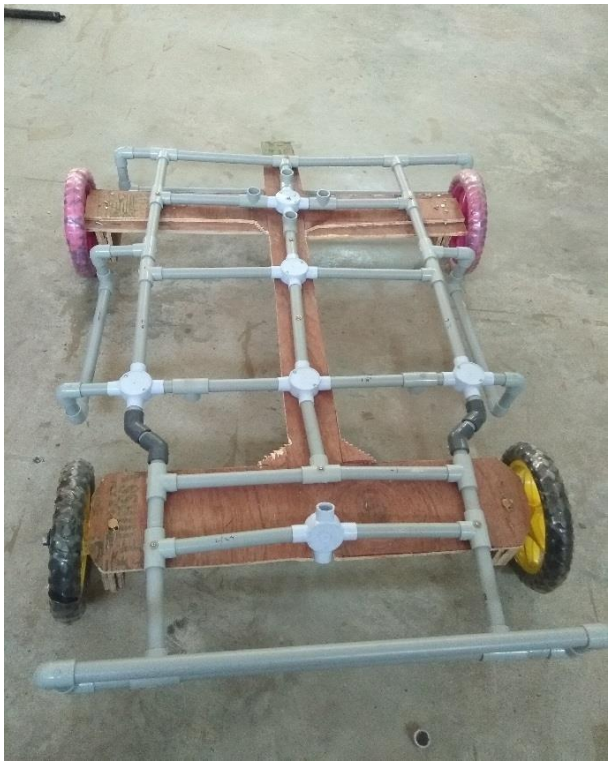
BRAKING SYSTEM

The braking system controlled by speed braking force to completely lock the wheels at the end of a specified acceleration run, it also proved to be cost effective. The braking system was designed by determining parameters necessary to produce a given deceleration, and comparing to the deceleration that a known braking system would produce.

Considerations for braking system based on type of dc motors use for driving.

DIMENSIONAL SPECIFICATIONS

Round tube of dimension = 24mm OD Thickness = 2mm Round hollow tubes are light in weight are used. The fabrication is done on drilling bonding and shaping work.



STEERING SYSTEM

Mechanical arrangement is planned to be used this type of steering system was selected because of its simple working mechanism and a steering ratio of 1:1 so to simple we have used .We are replacing hollow tubular shaft with hollow rectangular shaft. The purposes of this replacement are, for the same length of tubular shaft, PVC weighs the same, for visual improvement, for better mounting ability, and the main thing is, it is found that hollow round shaft has more bending stress than the tubular shaft

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CONSIDERATIONS FOR STEERING SELECTION

Caster Angle 12 degrees Camber Angle 0 degrees
King pin Inclination 10 degrees Combined Angle 10 degrees Toe- in5m
Scrub Radius 9 mm
Minimum Turning Radius 1.15 m Maximum Turning Radius 2.89m

CALCULATIONS

Discs, calipers and master cylinders which were used for considering suitable
Brake line pressure: p = force on the brakes / area of master cylinders (as pedal ratio is 4:1) (Assume the normal force applied on the pedal: 300n) =pedal ratio *force on the pedal / area of master cylinder.
Vehicle after market survey
Inner lock angle (θ) = (total steering wheel rotation * 360) /steering ratio = 50 degrees Outer lock angle (ϕ)= cot ϕ – cot θ= w / l
= 32degrees
Ackerman angle calculation: Tan α = (sin ϕ – sin θ) / (cos ϕ +cos θ – 2) = 40degrees
Ackerman inside angle: Ψ = tan-1 (WB / (WB / tan ϕ – TW)) – ϕ= 14 degrees Ackerman percentage:
%Ackerman = ((inside angle - outsideangle) / (Inside 100% Ackerman)) * 100% = 99.97% Turning Radius(R max) Calculation R min = length of wheel base / tan θ = 1.15m
R max 2= [R min + Wheel track width] 2 +Length of wheel base 2] = 2.89 m

CONCLUSION:

The report is prepared in such a manner that every layman can understand the details pertaining to the project. The report is prepared in simple language and described well. The report give adequate idea and design guide lines for making suitable report is expected to prove valuable to the successor students of mechanical engineering to know the essentials of a project and project report. The matter discussed in the early pages just give a broad outline of small-scale industries. We have, tried to cover all the aspects concerned with our project. The design and construction for go-kart design has become more challenging due to number of constraints. Thus this report provides a clear insight in design and analysis of our vehicle. The making of this report has helped us in learning

FUTURE SCOPE

Go Karts can develop by using high fraction eithb capacitor aided Li-ion batteries. Solar Energy can also utilized by solar panels where they are pollution free with moderate cost.
Suspension system can also be added in system to lower vibrations and shocks. Body development of kart can be done preventing it from environmental conditions and aero dynamic shape of body increases its speed.

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