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Design and Fabrication of Go-Kart

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Abstract: ***A Go-Kart racing is jogging and continuously developing idea everywhere in the world. Go Karts are 4 wheeled cars designed for racing and leisure purpose. We have made a go-kart by keeping leisure and recreation as the purpose. It is neither manufacturing unit made product nor expert engineers made product. The venture consists of designing, analysis, teamwork, venture control and development, costing and budgeting. The major goal of automobile is to make that automobile inside a time, with none lack of time.***
Keywords: Design, Fabrication, Go-Kart, Assembly.

I. INTRODUCTION

GO- Kart is a small four wheeled vehicle. Go-Kart was invented in 1950 after war period by airmen as a way to pass spare time. Arts ingles is known as the father of karting. It comes in all forms and shapes, from a motor less model to high-powered racing vehicles. like Super Karts being able to compete with Racing cars in a long circuit. GO-KART is a land vehicle with or without bodywork with four non-aligned wheels in contact with the ground, two of which control the steering while the other two transmit the power. Apart from the engine and attached wheels. There are many major components of GO- Kart which undergo forces and heavy loading condition, out of which few are components like chassis and driveshaft. The design objectives set are to achieve light-weight, high performance, durable design, which would also help in reducing the cost.

II. METHODOLOGY

We started with the process of brainstorming; literature review and continued with design and analysis; fabrication; assembly and documentation according to the standard specification of Go-kart.

We consulted our design by taking into account all possible alternatives for a system and modelling them in SolidWorks. The model was then modified and tested again in ANSYS for the final design. The design objectives were set out to be achieved with three simple goals applied to every component of the vehicle: durable, cost-effective and high performance, to optimize the design by avoiding over designing, which would also help in reducing the cost.

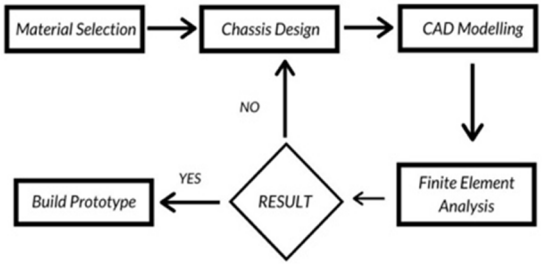


Fig.1. Methodology flowchart

III. PARTS OF A GO-KART

The parts of the go-kart are:

1) Chassis
2) Engine
3) Power Transmission System
4) Steering System
5) Breaking System

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IV. CHASSIS

A. Material Selection & Design

Various materials are available to manufacture Go-kart chassis by focusing on list of materials that can be preferred by using different research papers. AISI 1018(American Iron and Steel Institute -1018) was preferred because of better mechanical properties, better weldability and excellent machinability. Further, the design was created as a computer aided drawing and was analyzed for various tests for stress factors.

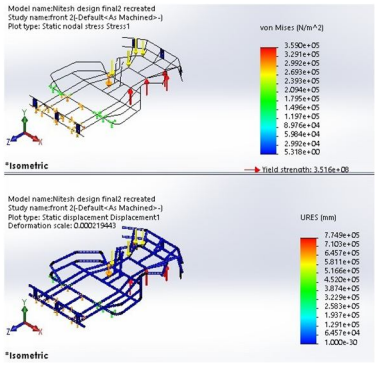


Fig.2. Analysis of the chassis structure.

B. Fabrication and Welding

Once the design and analysis were done, the raw material was purchased and was fabricated according to the need. The welding process used for welding the chassis is Tungsten Inert Gas Welding.



Fig.3. The fabricated chassis before painting



Fig. The fabricated chassis after painting

V. ENGINE

The engine powers the go-kart. The engine that was used for the go-kart was a Honda GX200 air-cooled, 4-stroke petrol engine which produced 5.5 BHP of net power output at 3,600 rpm and 12.4 N-m of net torque output at 2,500 rpm with a compression ratio of 8.5:1.

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VI. POWER TRANSMISSION SYSTEM

The power transmission system is the part of a go-kart which transmits power from the engine to the wheels for movement. The major components of the power transmission system are:

A. Rear Axle

This is the part of the power transmission which is connected to the wheels and transmits the motion from the engine to the wheels.

B. Sprocket

The sprocket is the part used to transmit rotary movement among the engine's crankshaft to the rear axle. When the engine rotates the crankshaft, it transfers this movement to the rear axle, which in flip receives your go-kart moving. The sprocket we chose for our go-kart had a specification of 200mm as sprocket diameter and 64 teeth as the no. of sprocket teeth.

C. Clutch

The clutch is used to prevent the engine from stalling when the output shaft decelerates or stops suddenly, and to keep the load removed when starting and entering. The input of the clutch is connected to the engine crankshaft and the output is connected to the drive chain. The type of clutch we have used in our go-kart is a centrifugal clutch that uses the centrifugal force to act. The clutch had a specification of 120mm as the clutch diameter and 14 teeth as the no. of teeth in the clutch assembly.

D. Tires

Tires move the go-kart. They are connected to the end of the power transmission system. Off-street go-karts alternatively have large tires which have a profile. These large tires assist the go-kart navigate round tough terrain, assist to offer them with a better clearance and take in the shocks that end result from off-street racing.

VII. STEERING SYSTEM

The steering system is the one that helps the driver to control the direction of the go-kart. It primarily consists of the following parts:

A. Steering Wheel

This is the part of the go-kart the driver uses in order to channel the go-kart in the right direction. It is connected to a guidance shaft which is in turn connected to the front wheels. It's available in different shapes and sizes. The particular one that we have used in our go-kart is a 3-spoke unit with polyurethane covering for comfort of driver. It has diameter of 310mm.

B. Tie rod

Tie Rods are attached to the front sides of the go-kart frame. Their function is to carry the hub of the wheel. There is no front axle on a go-kart, as steering is required. This is achieved through tie rods, spindle arms and spindle. The tie rod had a diameter of 20mm and length of 500mm.

C. Stub Axle

A stub axle is a sub-assembly of a front axle beam upon which the road wheel mount. Stub axle is connected to the front axle using kingpin. These stub axles turn about the kingpin, which is light drive fit in the axle beam eye, located and locked by the taper cotter pin.

D. Steering column

The steerage column is supposed basically for connecting the steerage wheel to the steerage mechanism via way of means of moving the motive force's enter torque from the steerage wheel.

VIII. PERFORMANCE ANALYSIS

After the fabrication and assembly of the parts, the go-kart was tested on track for analysing the performance of the go-kart. The results are as follows:

Tire Circumference=Π x Tire Diameter = Π x 27.9
= 87.6 cm = 0.876 m
Gear Ratio = Axle Teeth/Clutch Teeth = 65/14

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= 4.57
Wheel RPM = Engine RPM/Gear Ratio =2500/4.57
= 547.04 wRPM
Tire circumference x wRPM = 0.876 x 547.04
= 479.20 m/min = 28.74 km/h
The speed of the Go-Kart is 28.74 kmph.

IX. CONCLUSION

The major objectives of the go-kart design and fabrication was to design a safe and functional vehicle based on rigid and torsion-free frame and to enhance driver comfort and performance and maneuverability for the go-kart. During design, we kept the weight to strength ratio and optimized it to be as low as possible. The chassis hence shows a great structural stability in side, front and rear collisions.
Also, from calculations and surveys, we got to understand that AISI 1018 is one of the best materials that can be used to give better performance.



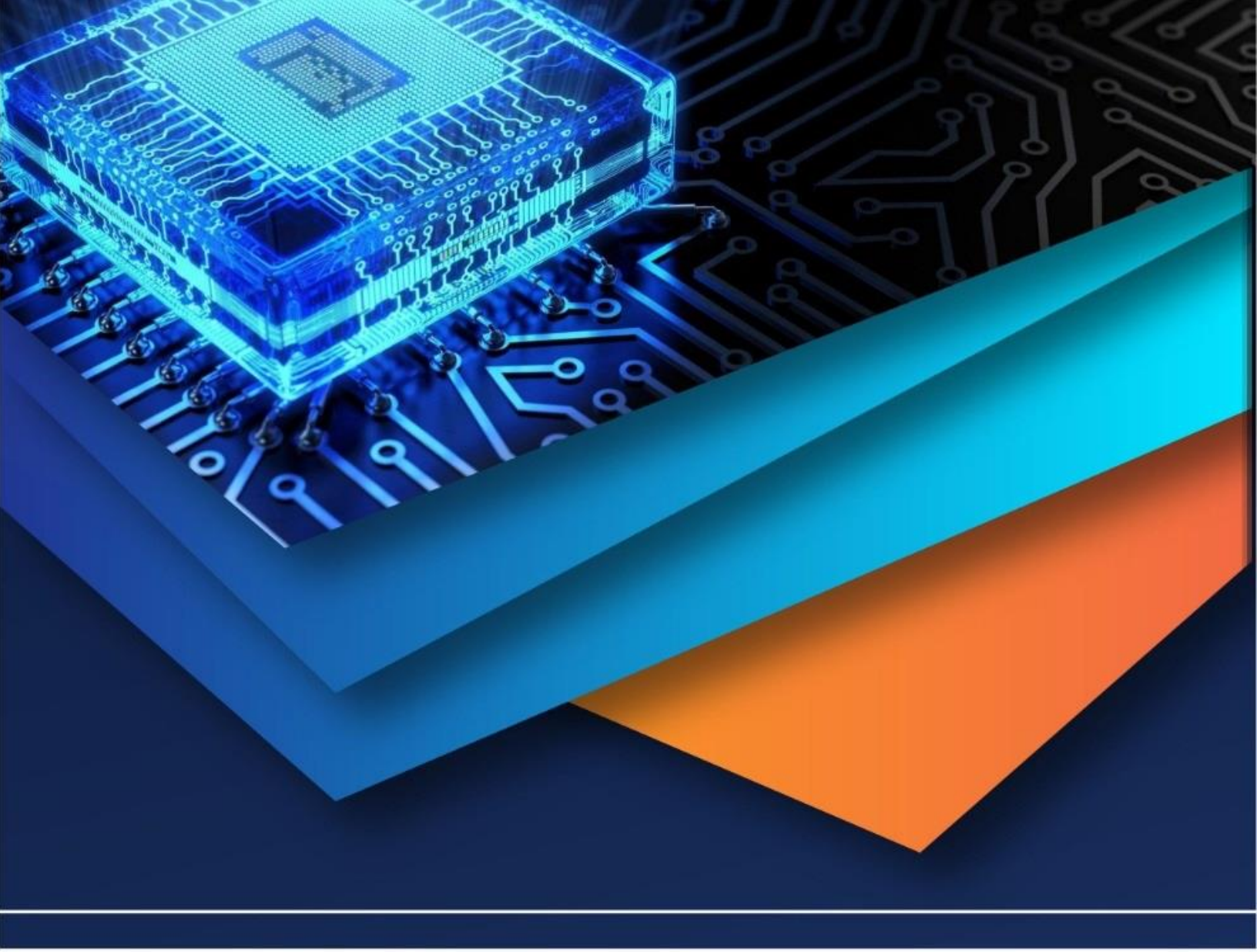
The finished go-kart

We would like to thank the management of East Point College of Engineering and Technology for providing us with an opportunity to work on the project.
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