Design and Analysis of Chassis of a Go Kart Vehicle

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Abstract— This paper concentrates on explaining the design and analysis of the chassis of a Go-Kart vehicle. This report explains the objective and calculation made in designing a Go-Kart chassis. The primary objective is to design a safe and functional vehicle.

Keywords: Go Kart Chassis Design, Solidworks, Finite Element Analysis

I. INTRODUCTION

A go-kart or shifter karts is an open 4-wheel mini-vehicle that is used in motorsports activities. Most of the formula 1 racers to begin their career by practicing on go karts. Go Kart is most popular among Engineering Students because of the very basic automobile fundamentals. The Power source in go-kart can be small engines with few hundred cubic capacities of displacement or an electric motor. In other words it may be both fossil fuel and electric powered vehicle. According to the International Karting Commission – Federation International Automobile (CIK– FIA) the chassis is constructed using round or rectangular steel pipes. Various research works have been carried out on the modulation working and efficiency of go karts. N. R. Patil et. Al[1] in their paper deals with the model simulation and performance along with static analysis of a go kart chasis consisting of circular beams. It is done by modeling system i.e solidworks according to the rulebook of Indian Society of New Era Engineers(ISNEE).They also studied the maximum deflection and results were computed and subjected to statistical analysis. According to Sathish Kumar And Vignesh[2] the other type of go kart has electric motor powered kart which has been designed to reduce the consumption of organic fuels with the help of emerging electric vehicle sector. Alternate materials have been applied in the kart to reduce both static and dynamic forces there by improving the efficiency of the kart. Wegert Et. Al[3] , also studied to model, simulate and perform the static analysis of go kart chasis consisting of circular beams. The maximum deflection was determined by performing statistical analysis.

In this paper, we have used CAD software SOLIDWORKS and subjected to analysis using ANSYS. After thorough analysis of our results, we have modified the existing design and fixed the final one.

II. DESIGN METHODOLOGY

The following design methodology was used during designing of chassis:

- Visualization & Sketching
- Material Selection
- Assuming the dimension and calculation
- CAD Model & Analysis
- Optimization of Design

III. MATERIAL SELECTION

AISI 4130 was used for the chassis because of the following reasons:

- Good Corrosion Resistance
- Weldability
- Cost-Efficient
- Reasonable Strength
- Machinability
- Properties[4] of AISI 4130

Physical Properties	Metric
Tensile Strength (Yield)	435 MPa
Elongation at Break	25.5%
Modulus of Elasticity	205 GPa
Poisson's Ratio	0.29

IV. CHASSIS DESIGN AND ANALYSIS

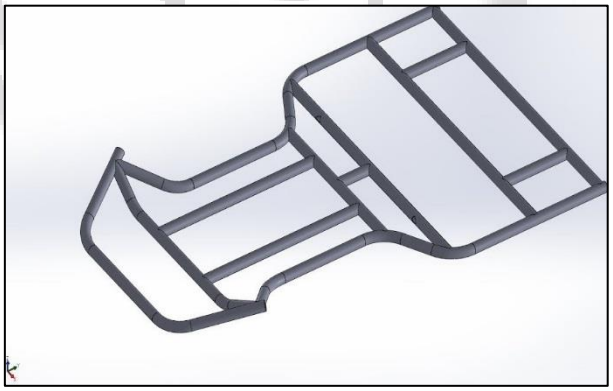

Fig. 1: Chassis

A. *Front Impact Analysis*

For an ideal condition for testing the front impact force the acceleration is considered to be 2g. a=2g, F = ma Where F = impact force & m = mass of vehicle F = 110 x 2x 9.8 =2156 N Max displacement=0.29412mm

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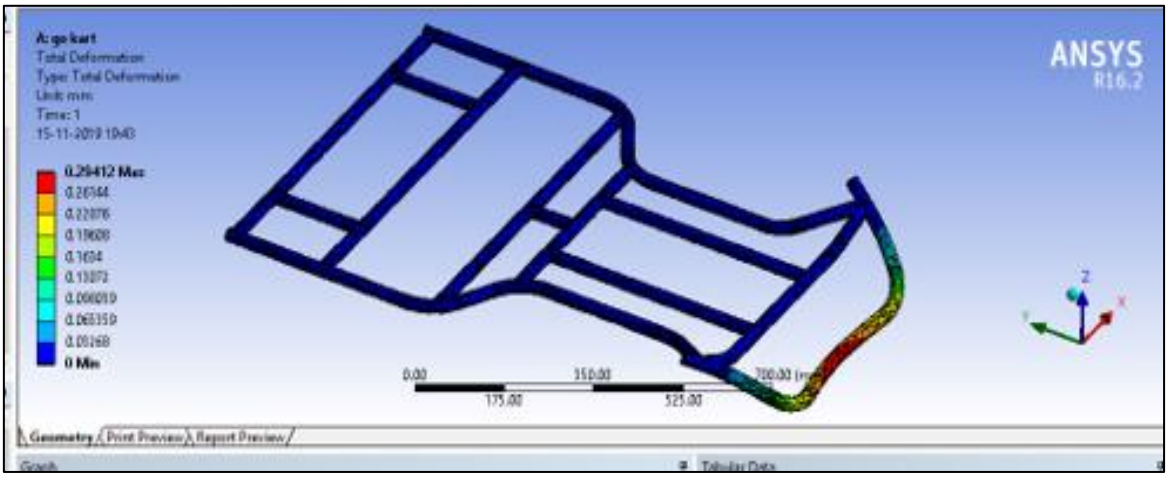

Fig. 2: Front impact (deformation)

B. Rear Impact Analysis

Max Displacement = 0.30379 mm

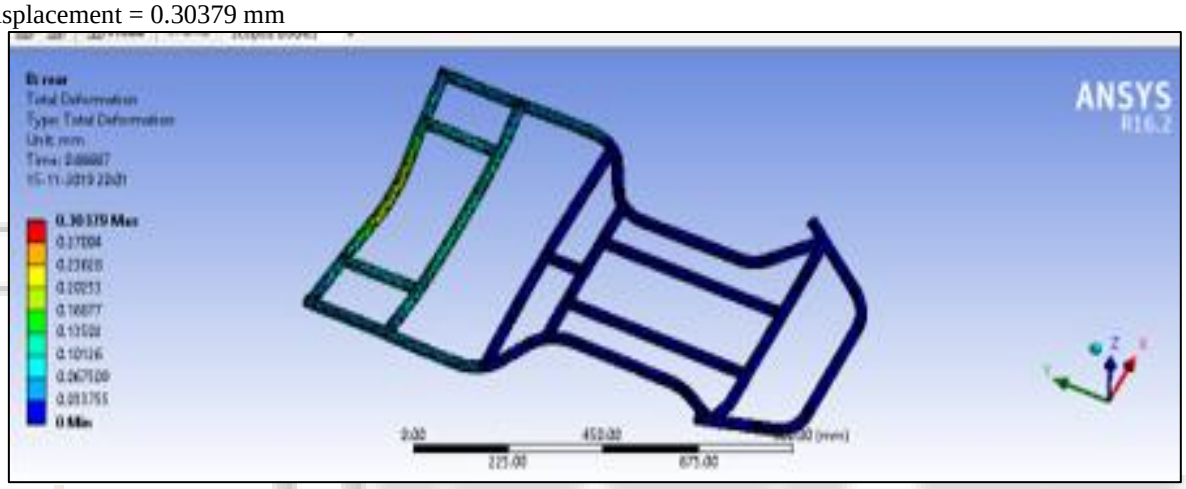

Fig 3: Rear Impact (deformation)

C. Side Impact Analysis

Max Displacement =0.26193

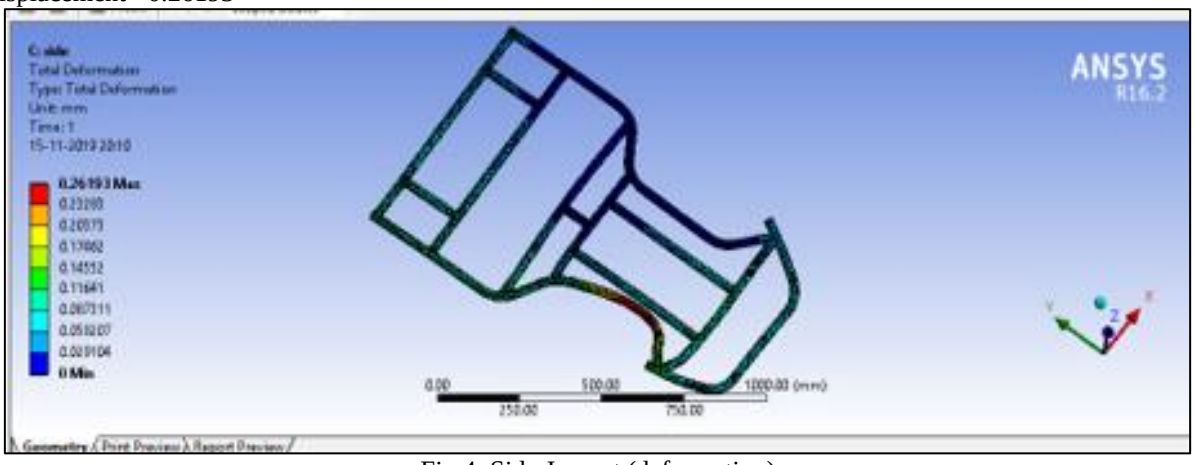

Fig 4: Side-Impact (deformation)

V. CONCLUSION

Hence from our study we conclude that-

1) When go kart having mass of 110 kg with acceleration of 2g when collided head on there was a maximum deflection of 0.29412mm.
2) When the same go kart impacted from rear side, maximum deflection of 0.3079 mm was noted.
3) When impact from side the maximum deflection was found to be 0.26193 mm.
4) Therefore a conclusion can be drawn that optimal selection of material and efficient design made our go kart reasonably stable at high speed.

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