International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES)
Impact Factor: 5.22 (SJIF-2017),e-ISSN:2455-2585
International Conference on
Recent Explorations in Science, Engineering And Technology (ICRESET'19)
Volume-5, Special Issue-March, 2019.

Design and Fabrication of a Go-Kart Chassis

K.Gowtham[1], T. Ashok[2], T.R.Akash[3], M.Gopalakrishnan[4]

[1234]*Ug scholar, Department of Mechanical Engineering, KGiSL Institute of Technology*

Abstract*— This report documents the process and methodology to produce a low cost go-kart which is comfortable, durable and complete in all aspects by modelling it with CAD software. The feasibility of the go-kart design was examined through FMEA, Cost report. The team focuses on a technically sound vehicle which is backed by a profound design and good manufacturing practices. The report explains approach, reasons, selecting criteria and expected working of the vehicle parameters. The best way known had been use to go on to the final result of all parameters.

Keywords*— Design, Analysis, Fabrication, Impact test

I. INTRODUCTION

The go-kart will be built from the ground up to maximize the efficient use of space. We approached our design by considering all possible alternatives for a system & modeling them in CAD software like SOLIDWORKS and subjected to analysis using ANSYS 14.5 FEA software. Based on analysis result, the model was modified and retested and a final design was frozen. The design process of the vehicle is iterative and is based on various engineering and reverse engineering processes depending upon the availability, cost and other such factors. So the design process focuses on following objectives:

II. MATERIAL AVAILABILITY

Materials	Yield strength(Mpa)	Percentage elongation at break	Cost per metre (in rs)
ASTM a106 grade-b	240	35%	135
AISI 4130	435	25.5%	1175
ASTM a106 grade-a	205	40%	135

AISI 4130 was rejected because of its high carbon content and lack of machinability, 4130 have the superior harden ability that other iron alloys like 4130 and 4140 possess. But 4130 is a popular steel in race car industry but is not easily available in India. Therefore, the material that the team chose to use is ASTM a106-B. The benefit of using the ASTM a106-B is that it can be easily welded than the 4130 chromyl. The ASTM a106-B has *excellent weld ability* and produces a uniform and harder case and it is considered as best steel for carburizing parts. The 106-B carbon steel offers a good *balance of toughness*, *strengthened ductility*. Considering the above factors we choose *ASTM a106 grade-B* for our chassis material.

III. DIFFERENT PROJECTIONS OF CHASSIS

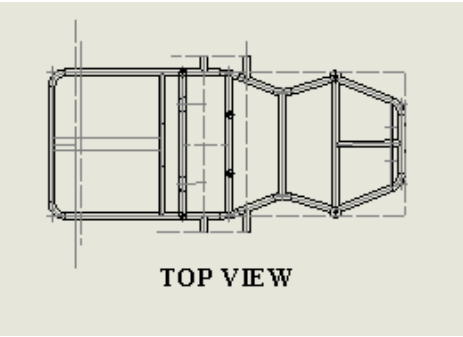

Fig.1 top view of chassis

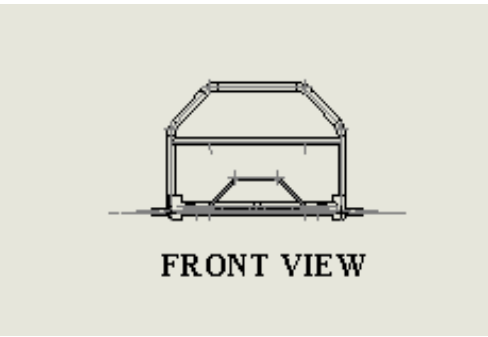

Fig.2 front view of chassis

IV. CAD MODELLING

Computer aided design (CAD) is the use of computer systems to assist in the creation, modification, analysis or optimization of a design.

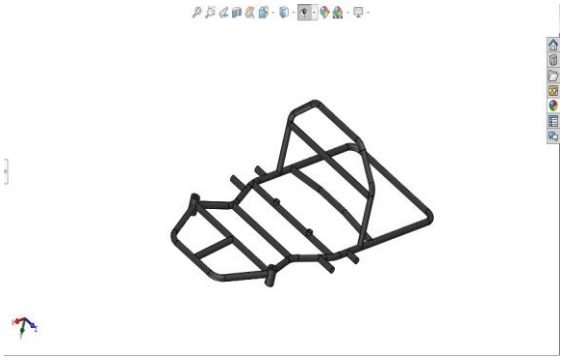

Fig.3 Isometric view of chassis

V. FRAME ANALYSIS

We approached our designs by considering all possible alternatives for system and modelling them in CAD software like Solid works etc. and subjected to analysis using ANSYS software. Based on analysis result the model was modified and retested and a final design was developed. The design process of the vehicle is iterative and is based on various engineering and reverse engineering process. The design objective set out to be achieved where three simple goals applied to every component of the go-kart, 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 viewed of our kart. This started our goal and we set up some parameters for our work, distributed ourselves in group.

A. Front Impact

Front impact test is carried out as mass of the vehicle is (estimated) = 180 kg
Velocity of the vehicle, V = 16.66m/sec
From mass moment of inertia equation front impact force F = P × ΔT Where,

P = momentum
ΔT =duration time = 1sec
P = M×V
= 180×16.66
= 3000kgm/s
F = P×ΔT
= 3000×1
= *3000 N*

Now, keeping the rear part fixed the calculated force is applied using the ansys analysing software the following image shows the result of deformation.

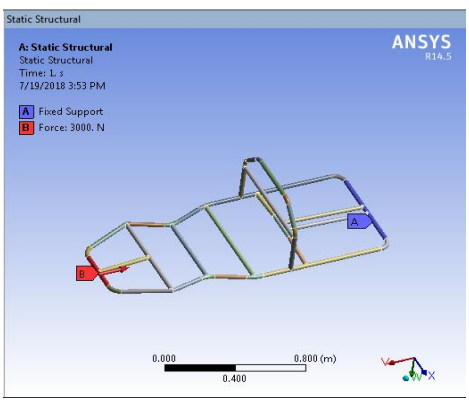

Fig.4 position of load acting to chassis

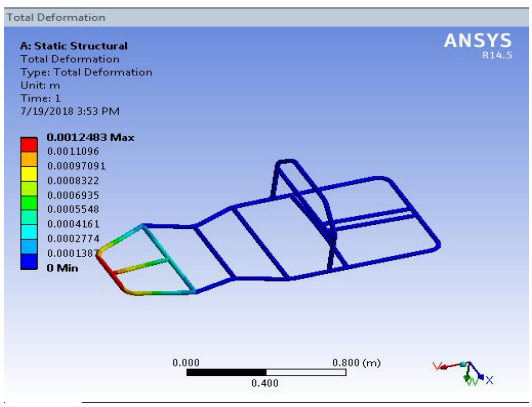

Fig.5 Total deformation during front impact

B. Side Impact

Side impact test is carried out as
Mass of the vehicle is (estimated) = 180 kg
Velocity of the vehicle, V = 13.8 m/sec
From mass moment of inertia equation,
Front impact force F = P×ΔT
Where,

P = momentum
ΔT =duration time = 1sec
P = M×V
= 180×13.8
= 3000kgm/s
F = P×ΔT
= 2500×1
= *2500 N*

Now, keeping the other end of the frame fixed the calculated force is applied using the ansys analysing software the following image shows the result of deformation

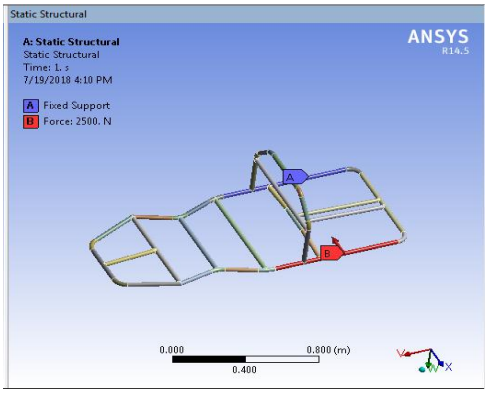

Fig. 6 Position of Load in side Impact

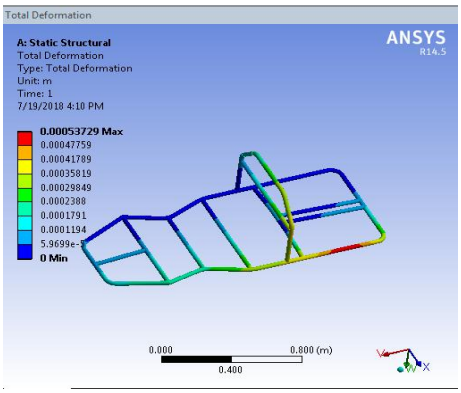

Fig.7 Total deformation during side impact

C. Rear Impact

Rear impact test is carried out as
Mass of the vehicle is (estimated) = 180 kg
Velocity of the vehicle, V = 15.27 m/sec
From mass moment of inertia equation,

Front impact force F = P×ΔT

Where,

P = momentum
ΔT =duration time = 1sec

P = M×V
= 180×15.27
= 2750kgm/s

F = P×ΔT
=2750×1
= *2750 N*

Now, keeping the front part fixed the calculated force is applied using the ansys analysing software the following image shows the result of deformation.

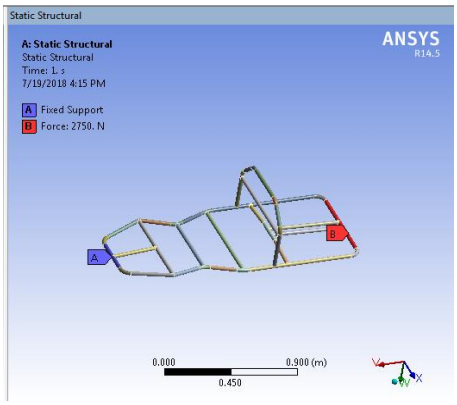

Fig. 8 Position of load in Rear Impact

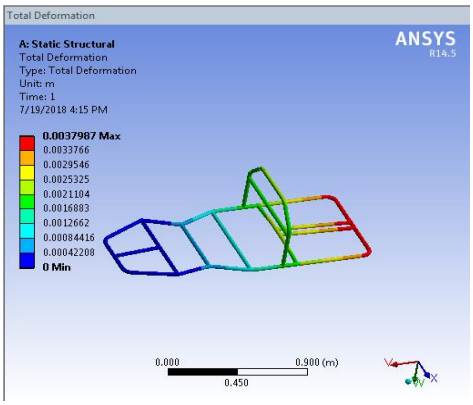

Fig. 9 total deformation during Rear Impact

D. Rolling Impact

Rolling impact test is carried out as
Mass of the vehicle is (estimated) = 180 kg
Velocity of the vehicle, V = 18.05 m/sec
From mass moment of inertia equation,

Front impact force $F = P \times \Delta T$
Where,

P = momentum
ΔT =duration time = 1sec
$P = M \times V$
$= 180 \times 18.05$
$= 3250$ kgm/s

$F = P \times \Delta T$
$= 3250 \times 1$
$= 3250\ N$

Now, keeping the one side of the frame part fixed the calculated force is applied using the ansys analysing software the following image shows the result of deformation.

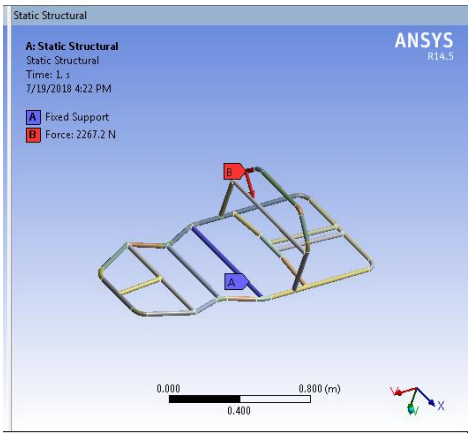

Fig. 10 Position of load in rolling impact

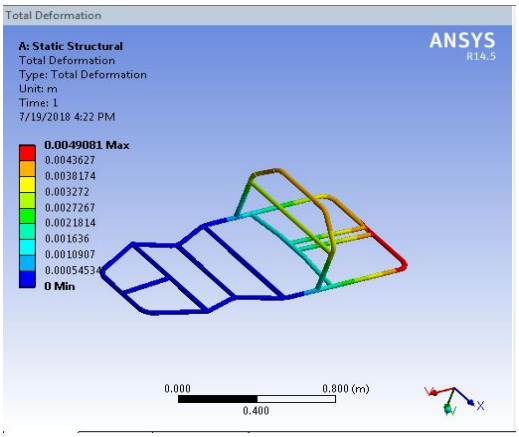

Fig. 11 total deformation during rolling impact

VI. CONCLUSION

Thus, this report provides a clear insight in design and analysis of our chassis. The design and Fabrication of go kart has become more challenging due to the increased participation. Hence, all the alterations are done after analysing and the final results are provided to get a stable chassis which would be more helpful for all the go-kart manufacturing to enhance a safe and spiritual racing.

REFERENCES

[1] Design and analysis of a go – kart chassis, IJEDR2018|*Volume 6,Issue 2|Issn:2321-9939*
Ujjal kalita, Yenduru surya teja,Darisi sri veera venkata manikanta.

[2] Design and analysis of a GO – KART chassis for high strength and durability
IJESI MAY 2018|*Issn:2319-6734|Volume 7 Issue 5*
Harish harsurkar, G.Srikanth Reddy.

[3] Design and fabrication of race spec GO-KART
AJER 2016|*Issn:2320-0847|Volume 5,Issue 6*
Simranjeet singh,aniket badgujar,pushparaj patil.

[4] Design and analysis of a GO-KART chassis
IJESRT NOV 2016|*Issn: 2277-9655|Impact Factor: 4.116*
D.Ragunadhan, A.Pandiyan, Sajin majeed.