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Design and FEA of Go Kart Chassis

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***Abstract*- Chassis is basis foundation of any Automobile locomotive. Go-Kart is primary form of racing car where engineers can make use of theoretical knowledge with practical existence. There are various kinds of chassis out of which Tubular frame chassis are suitable for small vehicle. Design of chassis is on the basis of rigidity, strength and safety of driver by considering car that is durable as well as reliable whose material easily available in India. The kart has been designed using sound design principles .Go-kart is small four wheeler vehicle without suspension light powered vehicle used for racing. Basically CREO, CATIA, AUTO-CAD software are used for designing of Chassis whereas ANSYS- BENCHWORK software is used for Analysis of Chassis. Chassis is made up of joining various small links by using welding with limited number of joints so to avoid increase of weight and make the chassis strong enough to withstand high load.**

Keyword- Sound; Design Principles; Go-Kart

I. INTRODUCTION

Chassis word derived from French which is divided into two parts, one as running gear and another one is power plant. Running gear consist frame, steering system, brakes, wheels and the tyres. The power plant includes the engine assembly and power transmission assembly. Important things in chassis are it must be rigid, having high strength, good impact resistance, better rigidity, good compressive and tensile properties within structure etc. along with that weight is effective parameter in case the chassis is for racing purpose. Go-Kart is good example of that where engineer face the above problem. Go-kart frame should be enough strong to with stand shocks, twists, and vibrations and all other stress. This Paper deal with design of Go-Kart Chassis and various loading test like front impact test, side impact test, rare impact test, all these tests have done on ANSYS software by application of 1Ton load. The Chassis is designed to withstand 1 Ton load by using limited welded joint so that Chassis don't look like a bulky and make it lighter.

II. OBJECTIVE OF PAPER

1. To get knowledge of Go-Kart Chassis Design for beginner in stepwise manner so to avoid unnecessary thing and focuses on competition.
2. Focusing area of analyzing Software to get desirable result.
3. To make use of welding alternative of hydraulic press.
4. Use of welding Principle effectively without increasing weight of chassis and make it simple.

III. SCOPE OF PROJECT

1. Go- kart is gaining wide popularity as it is suitable for most of people to make their own playing car as well as working car by using their knowledge and competition with other in racing.
2. Making advance engineering Knowledge to use at chassis for making it better and light weight.
3. Using variety of material to make better chassis for various applications and mostly for racing purpose.
4. Practice Engineering knowledge with budgeting for making Cost effective chassis.

IV. METHODOLOGY

For compilation of project following steps have to be performed:

1. Selection of Material.
2. Material Purchasing.
3. Designing.
4. Analysis.
5. Manufacturing
6. Testing.

V. SELECTION OF MATERIAL

As project is focusing on manufacturing of Go-Kart chassis for racing purpose so project developed team have followed the material list provided by the Racing organizer and National Event Rule these are as follows:

Table I. Selection of Material

Properties of Material	AISI 1018	AISI 1022	AISI 4130
Modulus of elasticity (GPa)	205	200	210
Carbon content %	0.15-20	0.20-23	0.28-33
Yield strength (MPa)	370	375	435
Ultimate strength (MPa)	440	400	560
Density (Kg/m^3)	7.87×10^3	7.70×10^3	7.85×10^3

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From Table Material AISI 1018 having desirable properties for chassis we can clearly see.

We can also use the Hybrid or composite material but team have to justify their material selection this stage is better for expert person but for beginner should avoid it for short time period availability and taken into consideration in case of excessive time.

Cross-section of small link for the chassis formation is given in Rulebook. We can follow that procedure.

VI. MATERIAL PURCHASING

This is next step followed by Material selection, for this student have sufficient knowledge of market. Student can fulfill this requirement by surveying market, use of social media contact, use nonsocial contact, getting help from expert etc.

Note: This is vast Process student or beginner must start this process at the beginning of project.

VII. DESIGNING

Before going to do design our team has done theoretical calculation by using engineering knowledge to find out SFD, BMD. After making of rough calculation the team moves towards to software designing.

There are various software's are available for designing as well as analysis our team have used different software for designing and analysis.

Procedure followed by team is:

- Drawing rough diagram on drawing sheet for finding of required dimension.
- Drawing actual model on CATIA (CREO/ProE) as this gives 3D and 2D view for better understanding.
- Assembled various parts of chassis because of welded joint.
- Converting 3D model file into .stp format for analysis purpose.

VIII. ANALYSIS

Our team has done analysis in ANYSIS which gives following Result for load of 1 Ton:

A .Front Side Analysis

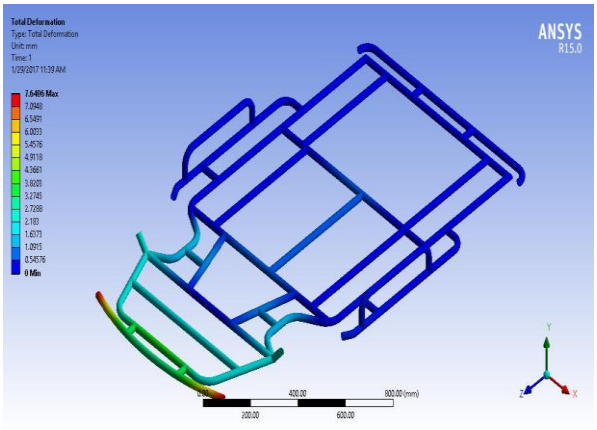

Fig.1.Front Side Impact Analysis

In Front side analysis of chassis it is clearly seen that after impact major deformation take place at side of bumper and reduced its effect toward chassis.

B. Left Hand Side Analysis

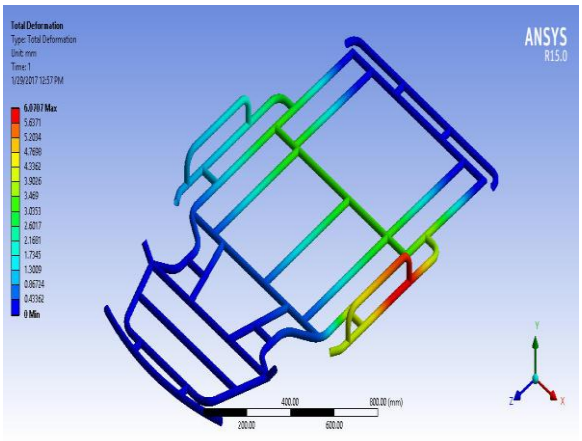

Fig.2.Left Hand Side Impact Analysis

In this analysis impact effect is limited up to the left hand side bumper only and several damages happen at middle shaft.

C. Right Hand Side Analysis

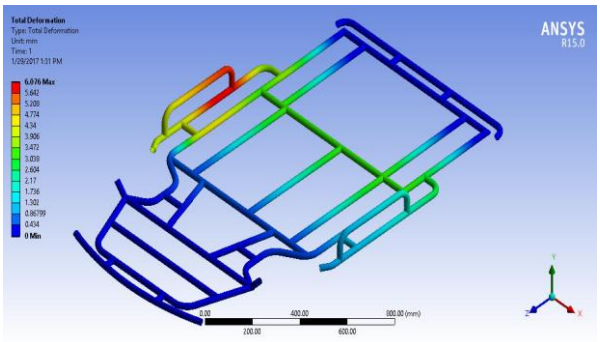

Fig.3.Right Hand Side Impact Analysis

We can see same condition happen as in result of Left Hand Side Impact.

D. Rare Side Analysis

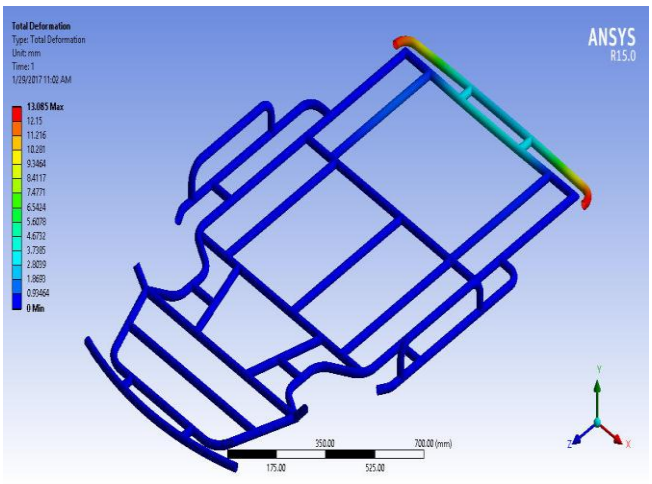

Fig.4.Rare Hand Side Impact Analysis

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In the rare side Analysis impact effect if more on end of bumper and less on chassis this means that our chassis is safe in rare side.

As analysis gives result which shows chassis is safe from all side of impact load of 1 Ton.

Table II. Analysis Result

Analysis Type	Force Applied	Number Nodes	Type of Solution	Min Results	Max Results
Static Structural	10000 N	668675	Total Deformation	0 mm	7.6406 mm
Static Structural	10000 N	668675	Equivalent Stress	0 MPa	59.32 MPa
Static Structural	10000 N	668675	Equivalent Strain	0 mm/mm	0.0038857 mm/mm
Static Structural	10000 N	668675	Life	702.79 cycles	$1e^6$ Cycles
Static Structural	10000 N	668675	Factor of Safety	0.56118	15

IX. MANUFACTURING

Manufacturing is done by Oxy-Acetylene welding on outer side frame as per heavy part location and Arc welding is used for inner side.

X. TESTING

Testing is done by applying load up to design criteria and tests the chassis. We have find chassis is safe for that load.

XI. CONCLUSION

So we have manufactured Go-kart Chassis with a very simple manner and simple manufacturing technique i.e. welding only. This saves our time and makes our chassis simple which can withstand a load of 1 ton. Chassis have more number of weld which affect its strength can be overcome by use of hydraulic press to make continuous shape and increase its strength but it result into cost increment.

REFERENCES

[1] Abhijit Padhi ,Ansuman Joshi, Hitesh N ,Rakesh C, “Increase Factor of Safety of Go-Kart Chassis during Front Impact Analysis,” International Journal for Innovative Research in Science & Technology, Volume 3, Issue 04, September 2016.

[2] Mr.Virendra.s.Pattanshetti, “Design and analysis of Go kart chassis,”International Journal of Mechanical and Industrial Technology, Vol. 4, Issue 1, pp: (150-164), April 2016 - September 2016.

[3] prashant thakare, “Design and Analysis of tubular chassis of Go-kart,” International Journal of Research in Engineering and Technology ,Volume 05 issue: 10 ,oct-2016.

[4] D.Raghunandan, “Design and Analysis of Go-Kart chassis,”International Journal of Engineering Sciences & Research, Technology, November, 2016.

[5] Simranjeet singh, “Design and Fabrication of Race Spec Go-Kart,” American Journal of Engineering Research, Volume-5, Issue-6, 48-53, 2016.

[6] Abhinay Nilawar, Harmeet singh Nannade, “Design of Go-Kart,”International Journal for Engineering Applications and Technology, 2016.

[7] Aritra Nath, “Design and Fabrication of a Go Kart,” International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Issue 9, September 2015.

[8] Rahul Thavai, “Static Analysis of Go-Kart Chassis by Analytical and Solid Works Simulation,” International Open Access Journal Of Modern Engineering ResearchVol. 5, Iss.4, Apr. 2015.

[9] N. R. Patil, “Static analysis of Go-Kart Chassis frame by Analytical and Solid Works Simulation,” International Journal of ionship Scientific Engineering and Technology, Volume No.3, Issue No.5, pp : 661-663 ,1 May 2014.

[10] Prashant Tiwari, Go-Kart Championship-2013, RIT INDORE.

[11] Go-Kart Rulebook 2016-2017.