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# Testing, Design & Analysis of Go-kart Chassis

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**Abstract:** Go-kart is a very small four wheeler vehicle and it is use for racing competition and it is very fan vehicle and also only for single seated .A Go-Kart is a small vehicle without suspension or differential. There are many motorsports in the world. Bikes, Cars, Formula one are examples of them. The go-kart chassis are different from chassis of ordinary cars on the road. This paper aims to do modeling the static analysis of go-kart chassis consisting of circular beams. Modeling and analysis are performed using 3-D modeling software i.e. CREO 3.0 &static analysis in ANSYS Workbench 16.2

**Keyword:** Go kart, AISI 4130, CREO 3.0, Ansys workbench 16.2, Chassi

## I. INTRODUCTION

The Go-Kart is a vehicle which is compact, simple, lightweight and easy to operate. Go-karts have 4 wheels and a small engine. Go-Kart vehicles are characterized by the absence of differential and suspensions systems . chassis is most important part of the go kart . In this paper we are analysis,Design and testing of go-kart chassis and there are three type of testing of chassis (1) practically on road (2) test by machine (3) virtually test by using software.



Fig:- 1 Go-kart

## II. MATERIAL SELECTION

The selection of material was a difficult task for us as it had many constraints of weight, structural resilience towards various types of forces, torsional rigidity, a factor of safety the amount of carbon in steel is important to determine the strength, hardness, and providing desired strength, endurance, safety and reliability of the vehicle. The chassis is made up of AISI-4130 which is a medium carbon steel. This material was selected due to its good Combination of all of the typical traits of Steel –, ductility high tensile strength, lightweight, better weld ability and comparative ease of machining.

A. Properties Of Chassis Material

Table.1

| Sr. no | properties                          | AISI 4130    |
|--------|-------------------------------------|--------------|
| 1      | brinell hardness (bhn)              | 200 to 300   |
| 2      | elongation at break (%)             | 18 to 26     |
| 3      | shear strength (mpa)                | 350 to 640   |
| 4      | tensile strength (mpa)              | 440 to 980   |
| 5      | resilience (mj/m3)                  | 120 to 180   |
| 6      | fatigue strength (mpa)              | 320 to 660   |
| 7      | thermal expansion (micrometer/mk)   | 13           |
| 8      | strength to weight (bending points) | 19 to 29     |
| 9      | thermal shock resistance points     | 16 to 31     |
| 10     | Carbon (%)                          | 0.28 to 0.33 |
| 11     | chromium (%)                        | 0.8 to 1.1   |

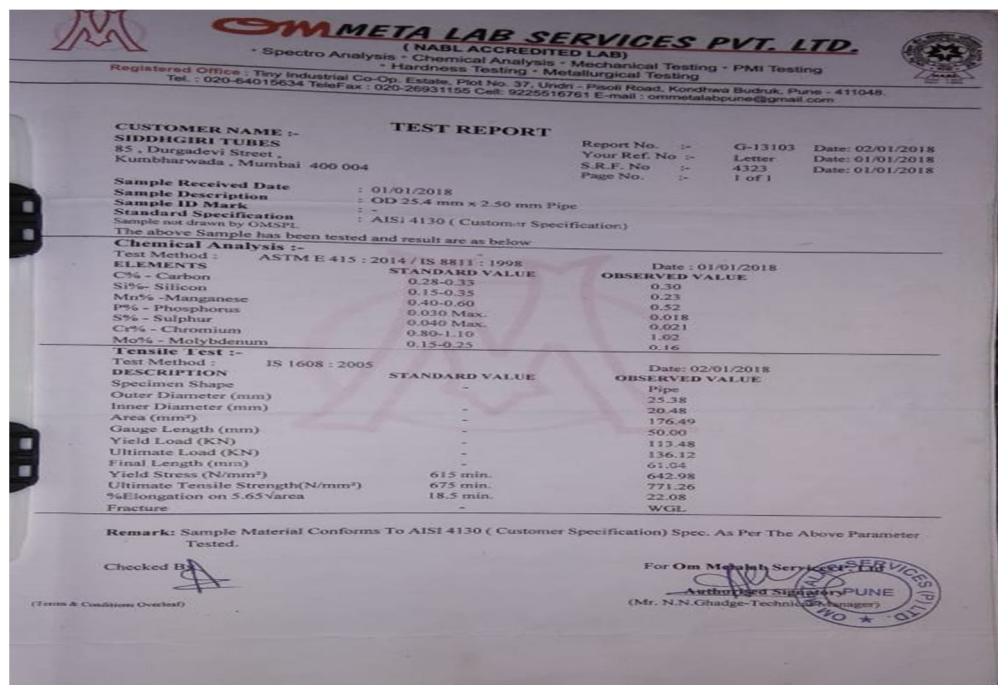


Fig. 2

III. DESIGN OF GEOMETRY OF CHASSIS

TABLE.2

| Sr.no | Chassis material        | Specifications      |
|-------|-------------------------|---------------------|
| 1.    | Type (seam or seamless) | seamless            |
| 2.    | Total length            | 1651 mm             |
| 3.    | Total width             | 1143 mm             |
| 4.    | Od & id                 | 25.38 mm & 20.48 mm |
| 5.    | Chassis material        | Aisi 4130           |
| 6.    | weight                  | 8.0569 kg           |

#### IV. 2D & 3D MODELLING

##### A. 2-D model of chassis created by PTC CREO Parametric 3.0

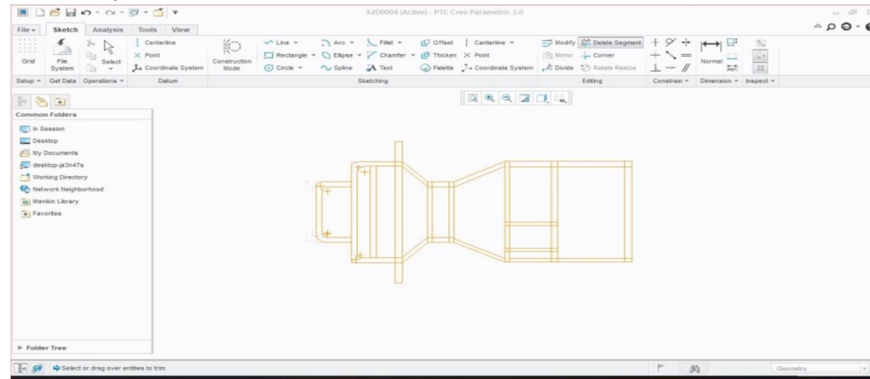


Fig.3 (2D model of chassis)

##### B. 3-D Model of Chassis Created by PTC CREO Parametric 3.0

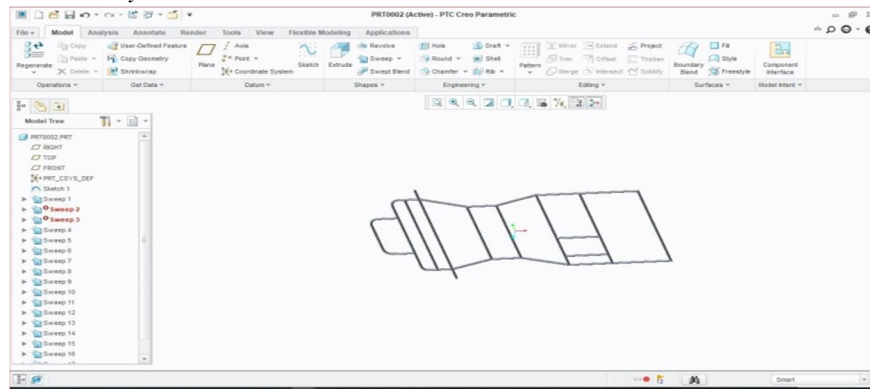


Fig. 4 (3D model of chassis)

#### V. ANALYSIS OF CHASSIS ON ANSYS WORKBENCH 16.2

##### A. Front Impact

For the front impact, engine and driver load was given at respective points. The kingpin mounting points and rear wheels position kept fixed. Front impact was calculated for an optimum speed of 65 kmph. From impulse momentum equation, 5g force has been calculated. The loads were applied only at front end of the chassis because application of forces at one end, while constraining the other, results in a more conservative approach of analysis. Time of impact considered is 0.2 seconds as per industrial standards

$$F \times t = m \times (V_i - V_f)$$

$$F \times 0.5 = 130 \times (18.05 - 0)$$

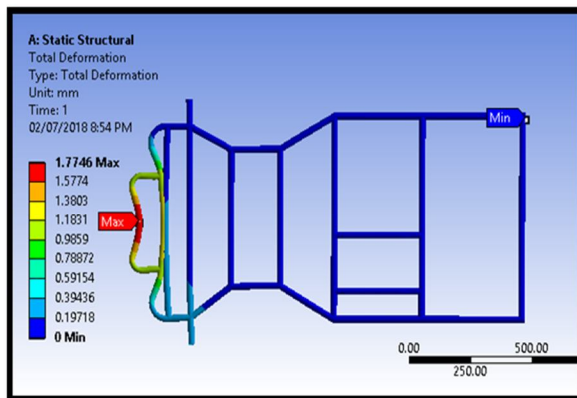


Fig. 5 (total deformation)

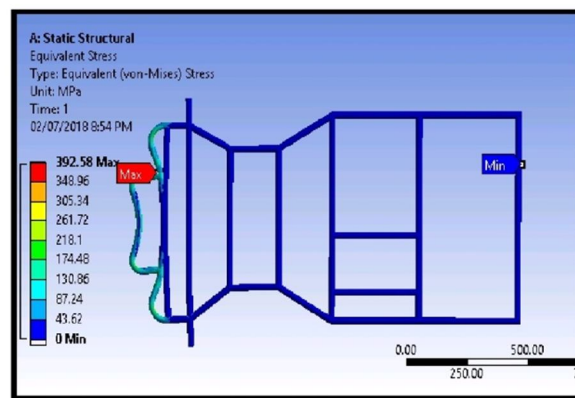


Fig.6 (Equivalent stress)

**B. Rear Impact**

Considering the worst case collision for rear impact, force is calculated as similar to front impact for speed of 65 kmph. The value of 5g force has been calculated. Load was applied at rear end of the chassis while constraining front end and king pin mounting points. Time of impact considered is 0.5 seconds as per industrial standards.  $F \times t = m \times (V_i - V_f)$

$$F \times 0.5 = 130 \times (18.05 - 0) \Rightarrow F = 4.69 \text{ KN}$$

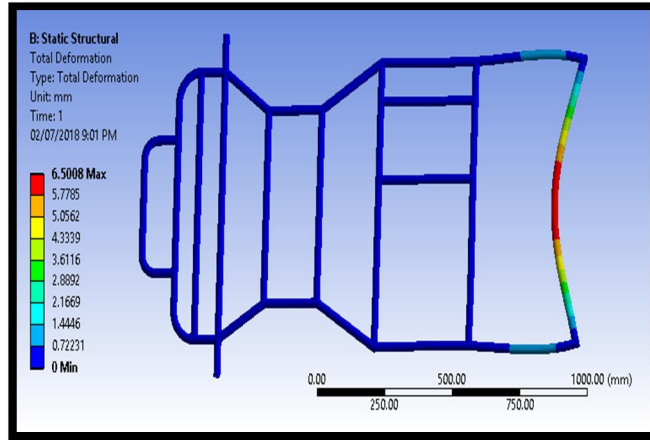


Fig.7 ( total deformation )

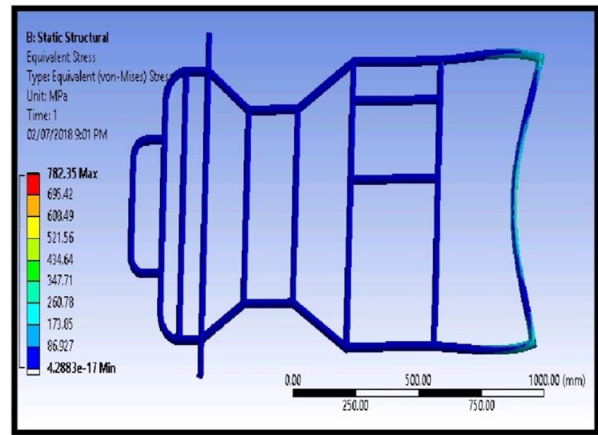


Fig .8 ( equivalent stress )

**C. Side Impact**

The most probable condition of an impact from the side would be with the vehicle already in motion. So it was assumed that neither the vehicle would be a fixed object. For the side impact the velocity of vehicle is taken 65 kmph and time of impact considered is 0.5 seconds as per industrial standards. Impact force was applied by constraining left side of chassis and applying load equivalent to 2.5g force on the right side.  $F \times t = m \times (V_i - V_f)$

$$F \times 0.5 = 130 \times (18.05 - 0) \times 0.5$$

$$F = 2.346 \text{ KN}$$

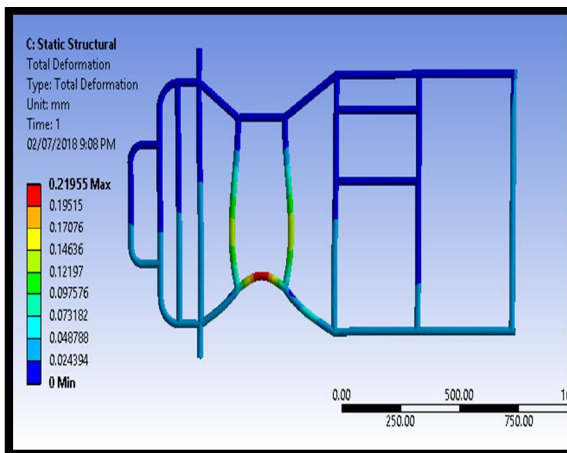


Fig. 8(Total Deformation )

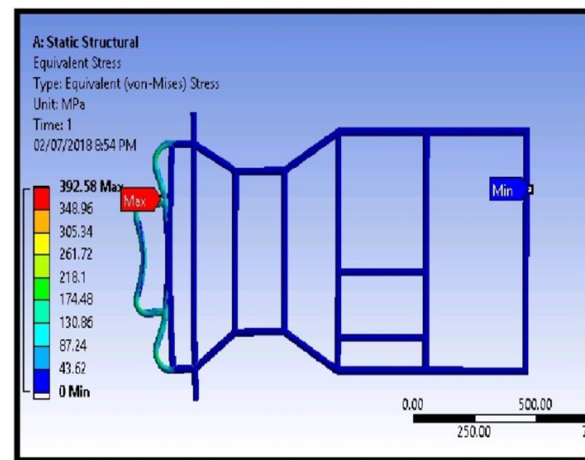


Fig.9 (Equivalent Stress)

**VI. CONCLUSIONS**

AISI 4130 is a better material in terms of reliability, hardenability, strength, and better performance as compare to AISI 1018. It is used for large scale production in industries. we are making this chassis with help of CAD Software in the form of 2D and 3D model and successfully analysis was carried out on the chassis of CAD modal using ANSYS WORKBENCH 16.2 to determine equivalent stress and total deformation and also we test the chassis on road practically but deformation and stress cannot determine.

Chassis is most important part of the go kart without it we cannot make a go-kart and also chassis should be very high in quality and also used very good material. Only one drawback of AISI 4130 material is, it get very fast corrosion during contact of water.

## VII. ACKNOWLEDGMENT

Though perseverance and enthusiasm combined with effort in right direction can bring forth the thing called success, but the realization of the reality that the path toward success is full of myriads ,temptations, impediments and pitfalls often proves to be disheartening in such situation. It the able guidance of knowledgeable persons that steers one through difficulties and help them achieve success.

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## REFERENCES

- [1] Dr.D.Ravikanth, Dr.K.Rajagopal, Dr.V.S.S. Murty, A. Harikrishna,“DESIGN OF A GO KART VEHICLE”, IJSETR, Volume 6, Issue 3, March 2017, ISSN: 2278 -7798.
- [2] Ravindra Laxman Gaikwad, Prathmesh Vishwas Waghmare, Lalit Daulatrao Deore, Akshay Mukesh Mutake, “DESIGN OF GO-KART VEHICLE SYSTEMS”, ICETEMR-16, ISBN: 978-81-932074-7-5, 23 MARCH 2016.
- [3] T. A. Babu, D. V. Praveen, and M. Venkateswarao, “Crash analysis of car chassis frame using finite element method”, International Journal of Engineering Technology and Research. 1(8) (2012)
- [4] Ammar Qamar Ul Hasan,“SIMULATION OF ATV ROLL CAGE TESTING”, IOSR-JMCE, e- ISSN: 2278-1684, P- ISSN: 2320-334x, Volume 12, Issue 3 Ver. Ii, Pp 45-49, May. - Jun. 2015.
- [5] Prashant Thakare , Rishikesh Mishra , Kartik Kannav , Nikunj Vitalkar , Shreyas Patil , Snehal Malviya, “DESIGN AND ANALYSIS OF TUBULAR CHASSIS OF GO-KART”, IJRET, Volume: 05 Issue: 10 Oct-2016.



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