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Research Article

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Aerodynamic Frame Designing and Chassis Analysis of Go-Kart

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Abstract The report covers all the parts of the structuring and examination of the last go-kart suspension plan. It additionally covers the material utilized and the explanation of utilizing the material in the go-kart frame. Aside from this we will likewise investigate the parts coordinated into the go-kart and the purposes for it. In the cover all Go-Kart Frame Designing and Analysis.

Keywords Chromalloy Aisi 4130, Go-Kart, Frame, Pivot, Stress

Introduction

The go-kart is small car in driver is drive and turn any angle because it has good turning radius. We approached our design by considering all possible alternatives for the system and modeling them in the CAD software like AUTO CAD, SOLID WORKS and subjected to analysis using ANSYS 15.0 FEA software. Based the model was modified and a final design was by ANSYS. The design process of the vehicle is aerodynamic and is based on various engineering processes in depend upon the working designing process, cost and other factors. So, the design focus on following: Driving Position and Aerodynamic, Aesthetics. This started our Go-Kart working and set some diagrams and designs for the present work and distributed ourselves in groups for the design of the vehicle and it's working.

Material Selection

Tubes have different size: 1, 1.12 or 1.25, 1.5. The wall thickness is limited of the strength working condition. internal wall thickness is : 1.5, 1.8 or 2 and 3 mm.

Table 1: List of material

Materials	Yield strength (MPa)	Percentage elongation break at
AISI 1026	260-440	17-27%
AISI 4130	435-979	18-26%
AISI 1020	230-370	18-28%
AISI 1018	270-400	18-29%

The best material is AISI 1018 used for go-kart. We are use for the best strength and moveable in any angle of without breaking tube pipe in the similarity material AISI 4130. Both material almost have same working strength but AISI have better in cost and strength for all moving position at all the actual conductivity of heat and low weight.

Final Configuration Model

The PC Helped Structure of our go-kart vehicle is appeared underneath in Solidworks Software.

Figure 1: Side Views

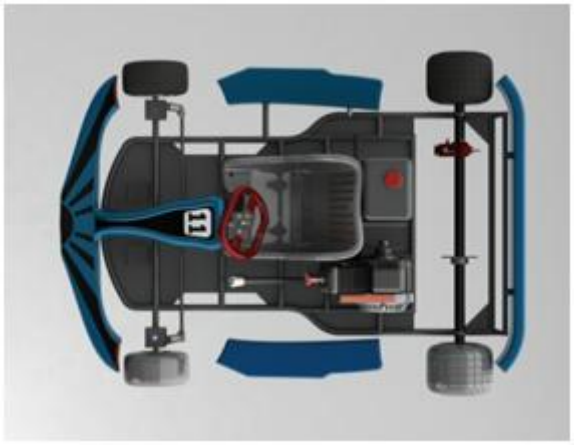

Figure 2: Top Views

Figure 3: Isometric Views

Frame Analysis

The purpose of analysis, we have conducted front impact test. The Front impact analysis has been worked on the Ansys Software while construction a perfect space frame tubular chassis on Solidwork Surface module and it was imported to Ansys Software, Gusset plates have been applied the stress concentration.

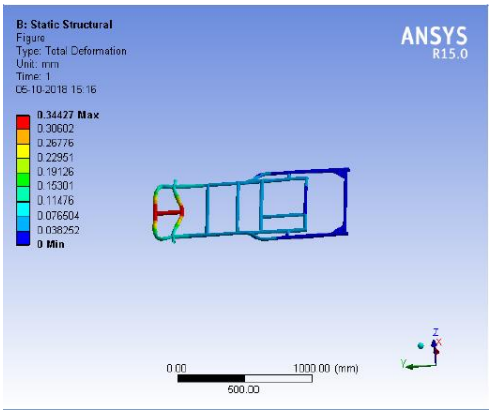

Figure 4: Ansys Design

Front Impact

The actual force 7500 N was applied to the front ends body panel rods, assuming that by applying actual force of 7500N, the maximum deformation of 1.2875mm will be bserved in the chassis. This deformation is Anysis the acceptable limits.

So, FOS = 371 /118.75

FOS= 3.12

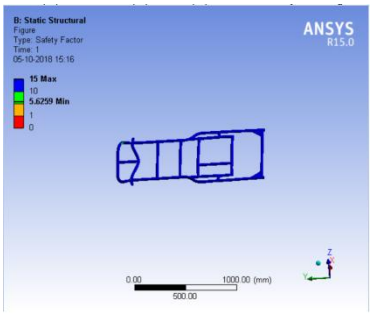

Figure 5: Front Impact

Side Impact

The Side Impact the Ansys Software while constructs a perfect space chassis on Solidwork Surface model and then it was import to Anysis Software with a Force 2G criteria angle of 2daimantional Force applied on the Software.

SO, FOS= 371/112.8

Factor of Safty =3.29

A force of 3750N has been applied and the deformation is 0.93mm and is within the acceptable limits.

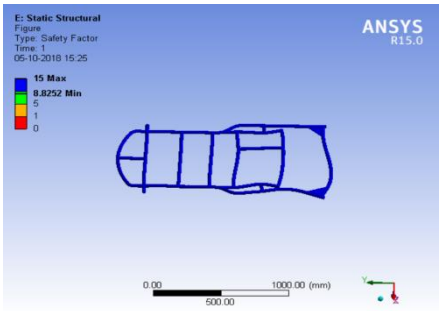

Figure 6: Side Impact

Rear Impact Test

Rear impact force we can decided 5550 N was applied to the rear ends by totally constraining the degree of freedom of the suspension points and we have the assuming the actual decleartion of 3G.

So, FOS= 371/101.5

FOS= 3.66 and force of applying on rear 5550 N has been applied and the deformation is 3.10mm and is within the acceptable limit.

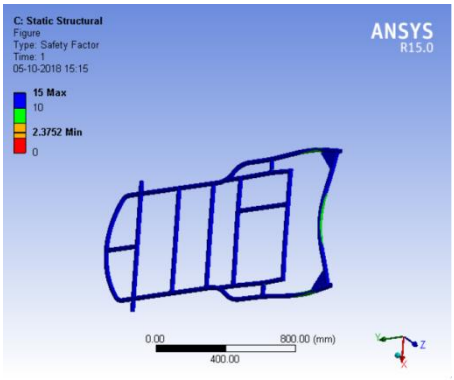

Figure 7: Rear Impact

Results

Table 2: Impact Analysys

Impact	FOS	Deformation
Front impact	3.12	1.2875mm
Side impact	3.29	0.93mm
Rear impact	3.66	3.10mm

Conclusion

We used the finite element analysis system to evaluate, create, and modify the best vehicle design to achieve its set goals. A point by point procedure of virtual structure and testing has been introduced including the explanation of utilizing the materials for creation of the case and hub. Additionally, the thinking of manufacture of new undercarriage plan of go-kart which is not the same as the standard go-kart has been given and demonstrated. Indeed, even the whole procedure of structure and testing proposed has demonstrated fascinating outcomes yet strategy must be as yet approved through unique test tests. This will permit the making of scientific model totally characterized and approved, giving the premise of future developments regarding the streamlining procedure of Go-kart execution.

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