DESIGN AND FABRICATION OF GO-KART FOR A DRIVER SAFETY CONCERN

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Abstract : A go kart is a small four wheeled vehicle basically used of traditional kart racing and amusement purpose. The design includes applications of extensive engineering analysis, teamwork, project management, and development of conceptual ideas. These ideas have been then converted into viable concepts ready for fabrication. The main objective of the design is to make a kart that is durable as well as reliable and will last through the endurance using parts that are cost effective and easily available in India. The kart has been designed using sound design principles. The principle of triangulation has been extensively used to make sure that the chassis is extremely rigid and provides a safe cocoon for the driver in case of an accident. The vehicle has been designed in such a way that the reliability is not compromised in the pursuit of speed.
In this study the frame design geometry have been designed taking into account the possible chances of miss happening and safety of driver and properly analyzed on solid work at maximum possible impact forces on front , rear and both sides.

***IndexTerms* -Analysis, Teamwork, Durable, Reliable, Sound design principles, Triangulation.**

I. INTRODUCTION

Go-karts is a simple four-wheeled, small engine, single seated racing car used mainly in United State. They were initially created in the 1950s. Post- war period by aimed as a way to pass spare time. Art Ingels is generally accepted to be the father of karting. He built the first kart in southern California in 1956. From them, it is being popular all over America and also Europe.

A Go-kart by definition has no suspension and differential. They are usually raced on scaled down tracks, but are sometimes driven as entertainment or as a hobby by non-professionals. Karting is commonly perceived as the stepping stone to the higher and more expensive ranks of motor sports.

Kart racing is generally accepted as the most economic form of motor spot available. As a free-time activity, it can be performed by almost anybody and permitting licensed racing for anyone from the age of 8 onwards

In present work we design and fabricate the go kart with considering all side impact upon kart in case of any accident and make frame as per driver safety to perform well in endurance round of Go-kart racing.

1.1 Design of kart

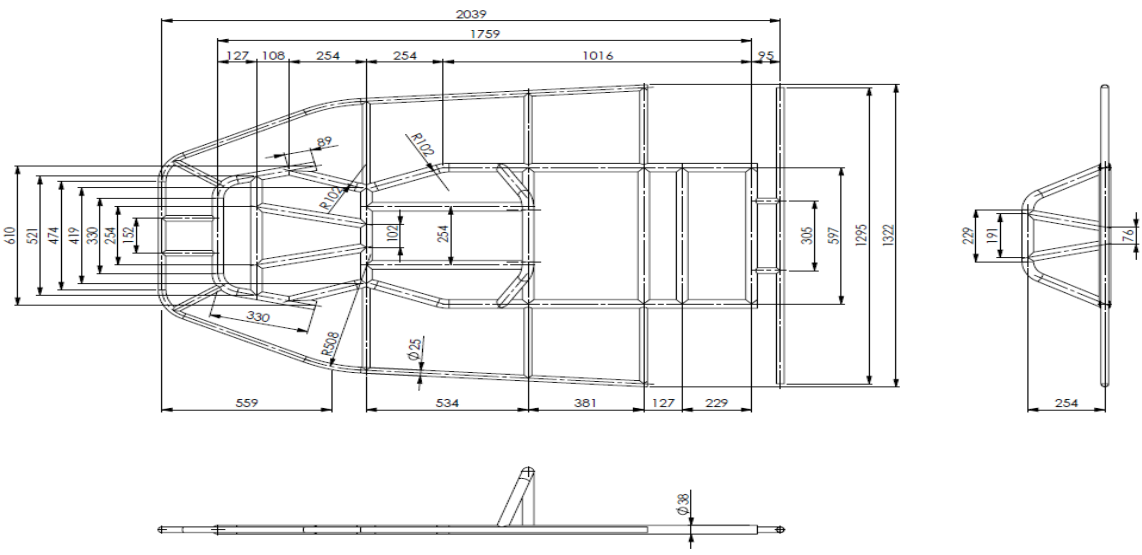

Fig. 1: 2D design of kart

Table 1: Specifications of kart

PART	SPEIFICATION	VALUE
Engine	Displacement	134.6 cc
	Maximum Power	10 Bhp @ 7500 rpm
	Maximum Torque	11.58 Nm @ 5000 rpm
	Number of Cylinders	1
	Number of Gears	5
Steering system	Rack And Gear	6:1
Clutch	multi plate clutch	
Brake	Disc type	
Tyres	Sleek tyres	Front Tyres Size 10x4.5
		Rear Tyres Size 11x7.1
Brake oil	Dot 4	
Engine oil	Castrol 20-40w	

II. RESEARCH METHODOLOGY

The methodology we have adopted by studying different type of go kart's design and drawbacks in there manufacturing to ensure to make safe and flexible kart while considering all possibilities of miss happening during kart competitions.

2.1 Research Methodology Flow chart

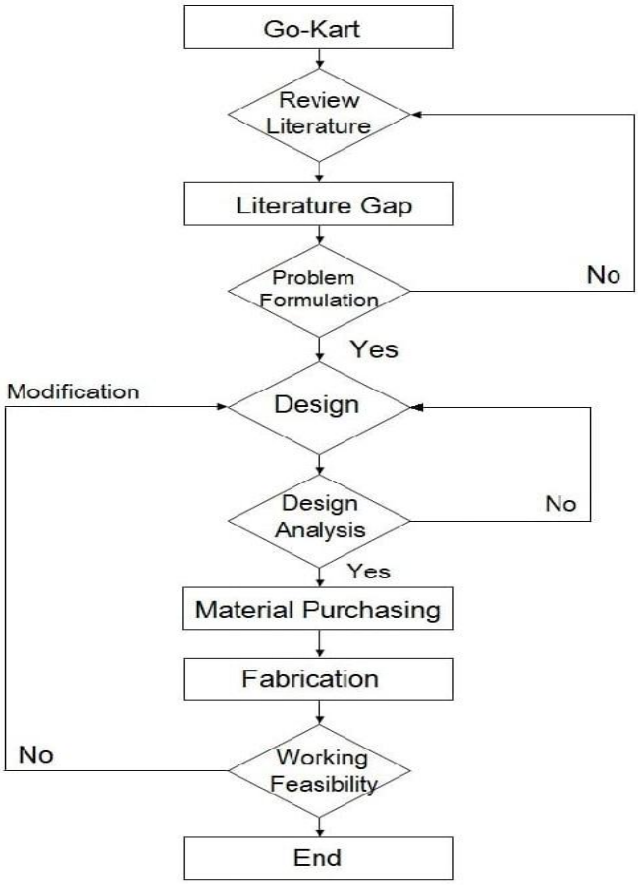

Fig. 2: flow chart of research methodology

The fig no 2 shows the process adopted for the designing and manufacturing of kart as per the pre decided objectives

III. RESULT AND DISCUSSIONS

3.1 Impact upon front side

The impact of force upon front side has been concluded on Solid works and its analysis is as follow
mass of the go-kart to be = 200 Kg
Let our go-kart hit an immovable object (such as wall) at maximum speed about 50 Kmph. F = 14000 N
Now the calculated force were placed on the frontal part of frame by keeping the rear part fix on Solidworks the result along with the image as

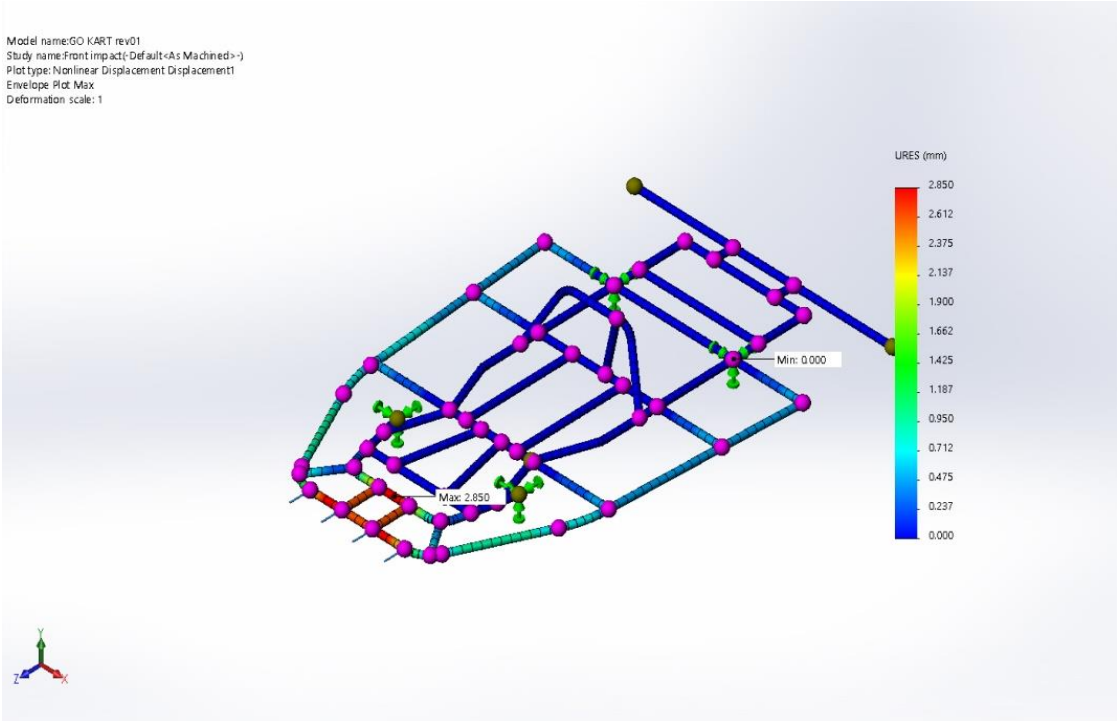

Fig . 3: front impact upon a frame

The figure no 3 shows that the kart is able to with stand the force upto 14000 N, which is the maximum possible force of strike with a wall or standing object while running on track. Moreover the possibility of striking front side is only during turning and the speed of kart reduce around 40 km/hour at turn. Therefore the value of force would not exceed 14000N.

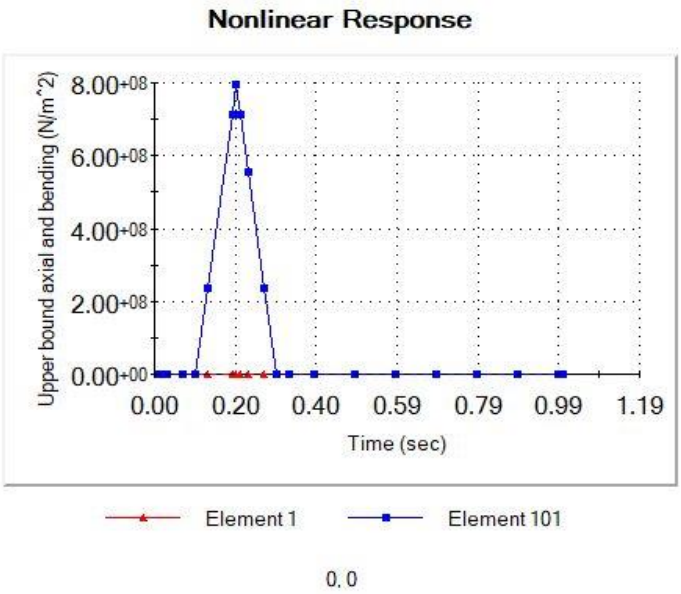

Fig .4 :Non Linear response of front impact upon a frame

The figure no 4 shows the non linear response of front impact upon a frame. It shows the possible axial and bending stress upon frame.

3.2 Impact upon both side

For side impact we have considered the maximum speed of go-kart in the main event to be 50 Kmph. Assuming our go-kart at rest and some other go-kart hit it at the side.
mass of both the go-kart to be = 200 Kg
Before Collision V = 0 m/s & U = 50 Kmph
Force x U = Change in K.E / Impact Time F = 4500 N
Hence the calculated force were placed on one side of the modal of frame while keeping another side fixed and the stresses were simulated the image is shown as-

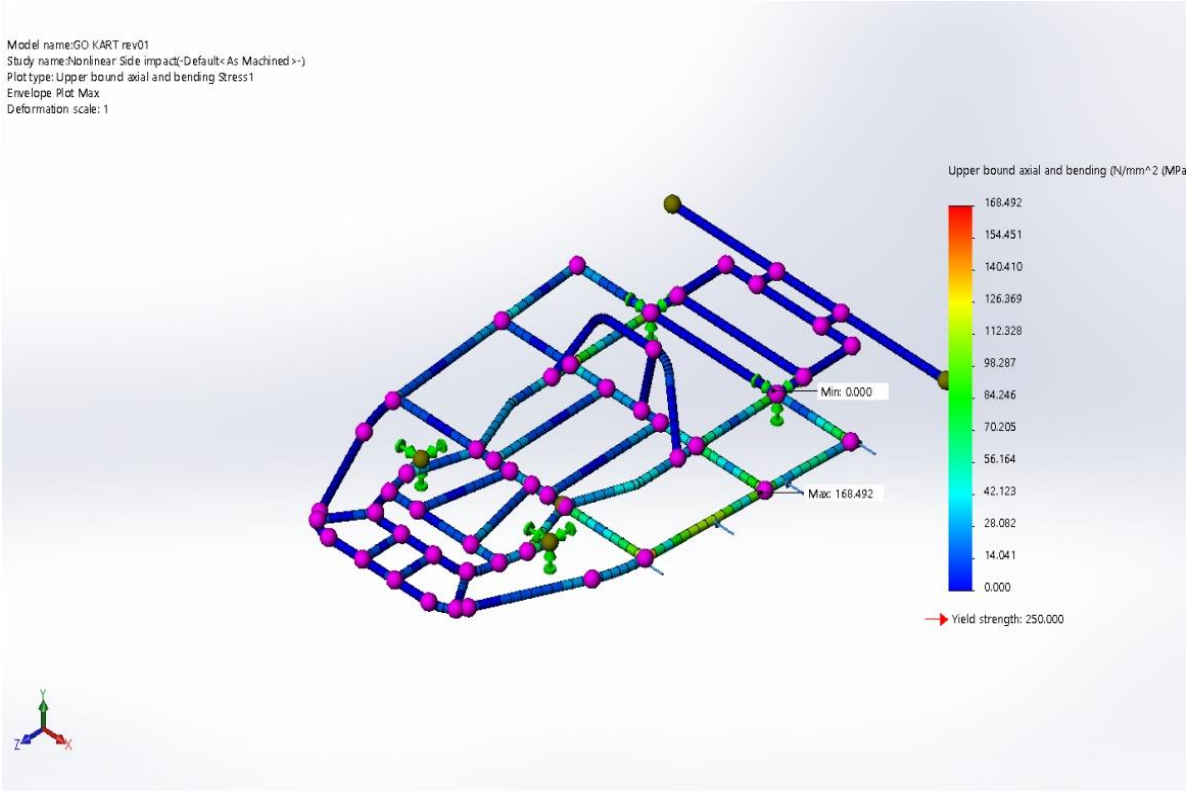

Fig 5:Side impact upon a frame

The figure no 5 shows that the kart is able to with stand the force on both sides. As the frame is showing extra frame is attached around the main frame. This able to with stand the side impact to protect the driver from accident on side hit by another kart.

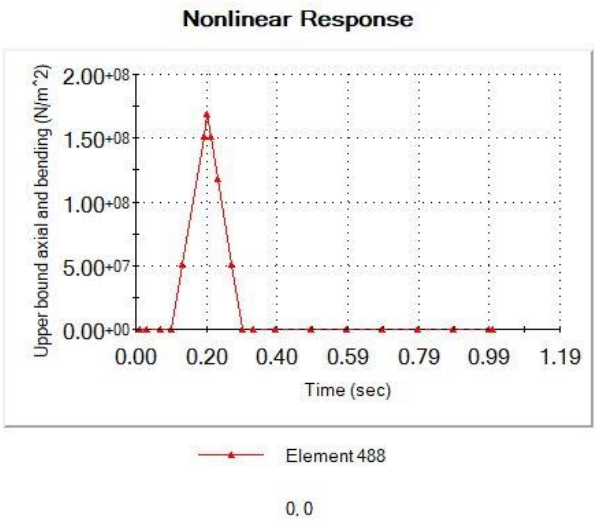

Fig 6: Non Linear response of Side impact upon a frame

The figure no 6 shows the non linear response of side impact upon a frame. It shows the possible axial and bending stress upon frame.

3.3 Impact upon Rear side

For rear impact we have considered the maximum speed of Go-Kart to be 50 Kmph. Assuming our go-kart at rest and some other go-kart hit it at the back.
mass of both the go-kart to be = 200 Kg
Before Collision V = 0 m/s U = 50 Kmph
Force x U = Change in K.E / Impact Time F = 25000 N
Hence the calculated value of the rear impact force was placed on the rear part of the frame while keeping the frontal part fixed. The analysis result is shown as

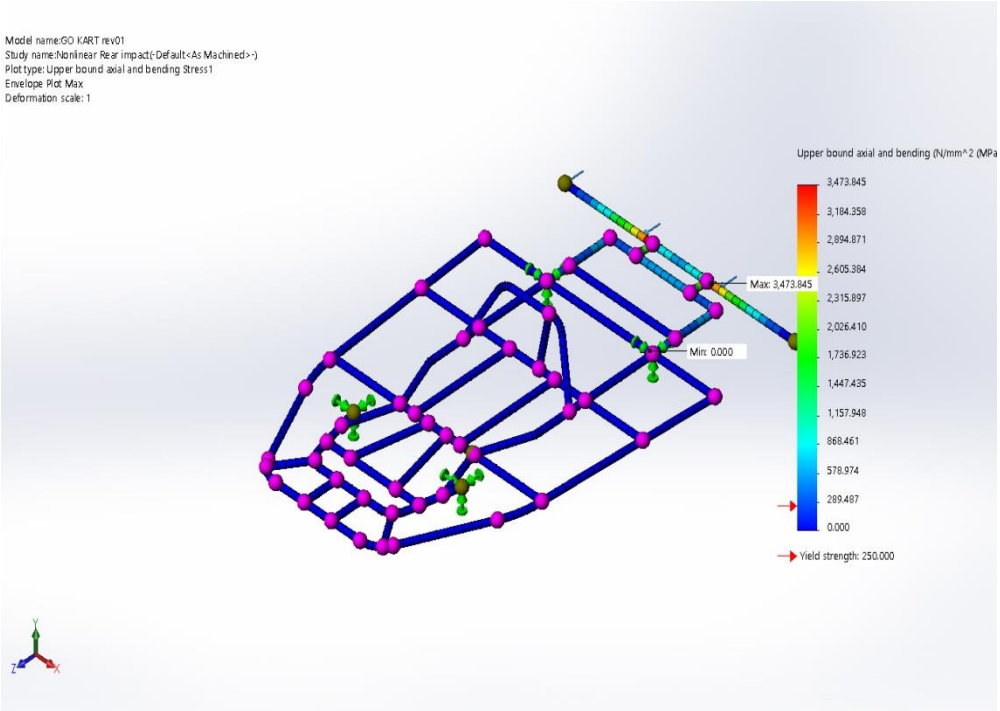

Fig . 7: front impact upon a frame

The figure no 7 shows that the kart is able to with stand the force upto 25000 N, which is the maximum possible force of strike from rear side while running on track..

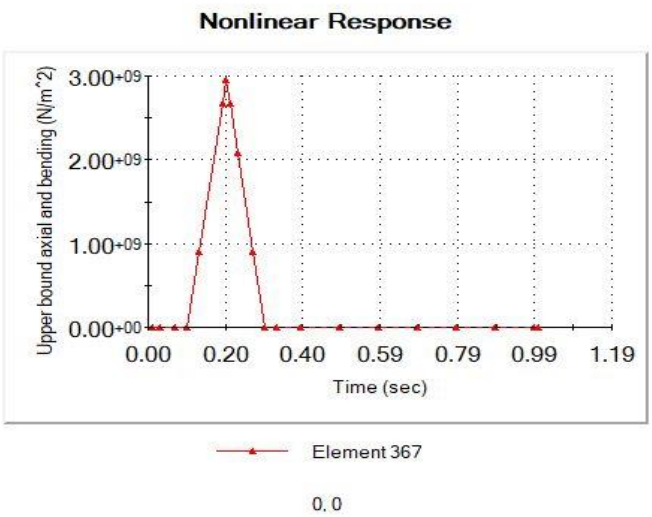

Fig 8 : Non Linear response of front impact upon a frame

The figure no 4 shows the non linear response of rear impact upon a frame. It shows the possible axial and bending stress upon frame

IV. CONCLUSION

In our work we conclude that:-

1. The kart able to bear impact upto 14000N/M from front, 25000N/M rear and 4500N/M both sides at 50 km/hr for weight 200kg.

2. With using side frame around the wheels, help to reduce chances of breakage in case of accident and increase driver safety.

V. REFERENCES

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