

# DESIGN AND ANALYSIS OF ELECTRIC TRI CAR

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**Abstract :** It is planning to design and analyse three wheeled car which will be driven by an electric motor is used for multi purposes like travelling , patient carrying and it will be free from air pollution and noise pollution.. Design of Tri car was completed by using CATIA V5R20 software. Designed tri car able to carry two people with comfort and the car model will look like vintage cars. According to the comfort of driver and to the meet the general requirements of an electric tri car, and the analysis have done in ANSYS WORKBENCH 15.0 to check whether this design able to sustain loads and wind forces. Impact analysis also done on the designed electric tri car by using ANSYS WORKBENCH 15.0. the analysis results shows that electric tricar can easily carry the two passengers with comfort and safety. It can carry two people in any road conditions, the maximum distance that it can move for full charge is 35 km, and the maximum speed that it can attain is 35 km/h, It is completely eco-friendly and safe to drive in any road condition.

**Index Terms - Tri Car, CATIA V5 R20, ANSYS WORKBENCH 15.0, Plug-In electric Tri Car, .**

## I. INTRODUCTION

A Tri car is a vehicle which has either one front wheel and two rear wheels or two front wheels and one rear wheel and can be driven by engine, motor or animal powered. The motorized tricycles legally called as motor cycles, if it is driven by electric motor it is called as tri cycles. The vehicle which was prepared by us has a two wheels at front and one wheel at back.

In daily life we can observe the difficulties of carrying the patients, old people, physically challenged in public places like airports, railway stations, bus stands, hospitals, college campuses etc. To aid such people we decided to a fabrication project to ease the task of carrying them. The final object should not be a simple motorized wheel chair or trolley car. It must be a concept vehicle. For this we had drawn so many drawings and finalized electrically driven Tri-Car with seats of side by side, so that the disabled can get on easily.

A configuration of two wheels in the front and one wheel at back presents two advantages: it has improved aerodynamics and that it readily enables the use of a small light weight motorcycle power plant and rear wheel. Alternatively, a more conventional front motor driving, front wheel drive layout as is common in four wheeled cars can be a used, with subsequent advantages for traversal stability (the center of mass is further to the front) and traction (to driven wheels instead of one) some vehicles have a front motor driving the single rear wheel, similar to the rear motor driving the rear wheel. The wheel must support acceleration loads as well as lateral forces when in a turn, and loss of traction can be a challenged.

For lower wind resistance (which increases battery efficiency), a tear drop shape is often used. A tear drop is wide and round at the front, tapering at the back. The three wheel configuration allows the two front wheels to create the wide round surface of the vehicle. The single rear wheel allows the vehicle to taper at the back.

## II. DESIGN

### 2.1 Frame design

The frame is designed to meet the technical requirements of car the objective of the chassis is to encapsulate all components of the car, including a driver, efficiently and safely. Principal aspects of the chassis focused on during the design and implementation included driver safety, drive train integration, and structural weight, and operator ergonomic. While designing chassis the first priority was given to driver safety. By the competition rules and analysis in ANSYS, the design was assured.

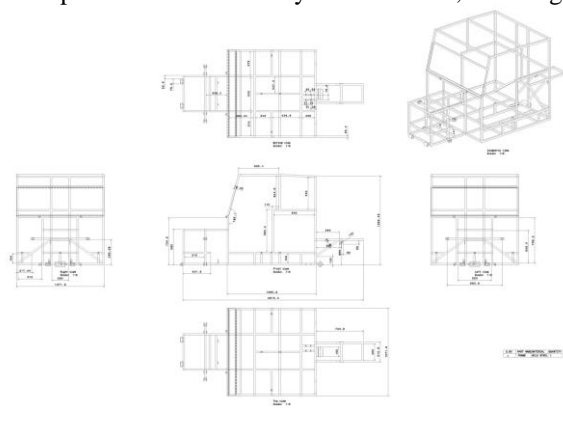


Fig. 1 Frame Design

### 2.2 Design and assembly of Components of a Tri Car

Tri car frame, suspension system and wheels are designed separately and they are assembled by using assembly module in the CATIA V5 R20 Software. The assembly of various parts shown below.

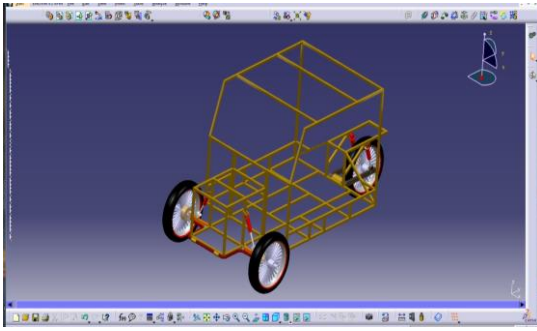


Fig. 2 Assembly of frame and suspension system

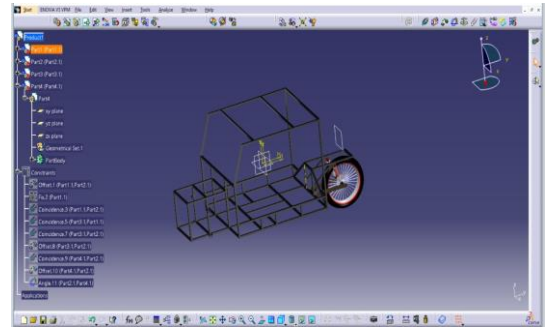


Fig. 3 Assembly of a front wheel and frame

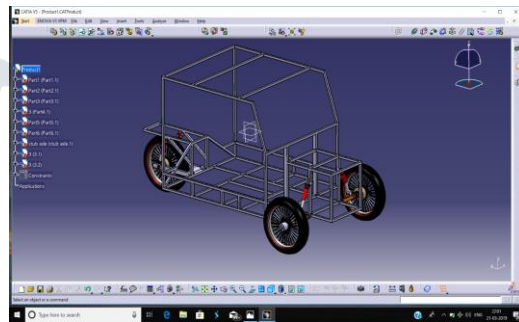


Fig. 4 Another view of a Assembly of wheels and frame

### CAD Views of Electric Tri Car

Various views of designed electric tri car as shown below.

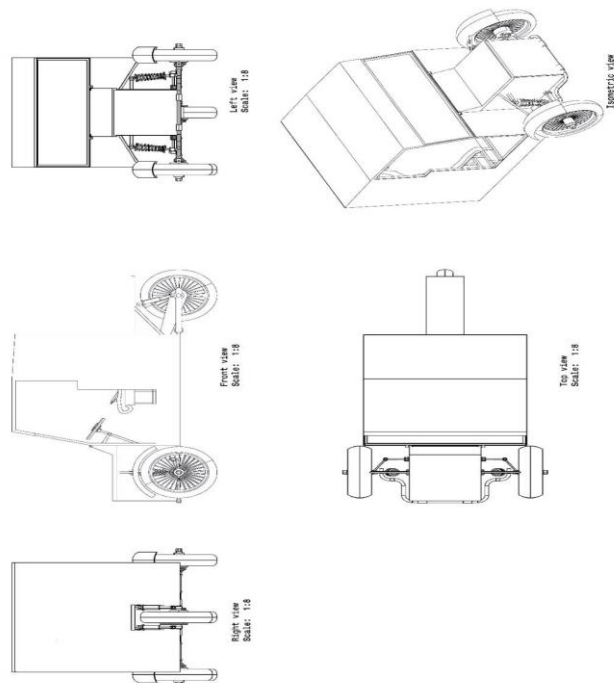


Fig. 5 CAD Views of Electric Tri Car

**III. ANALYSIS**

The Analysis is used to check the respective design is satisfying the conditions during static condition and dynamic condition.

**3.1 Front Impact Analysis**

The front impact analysis has done in ANSYS WORKBENCH and the load that has applied is 6240 N. The following figure shows the results got after the task has been completed.

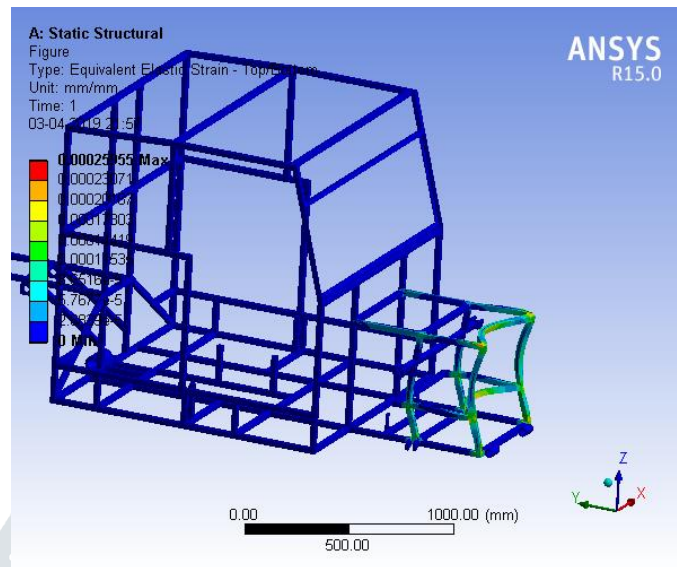


Fig. 6 Front impact

**3.2 Rear Impact Analysis**

This impact has done to know the strength of the vehicle and for the safety of the driver and passenger while the vehicle on road. The force that has applied is 5000 N. The following figure shows the results.

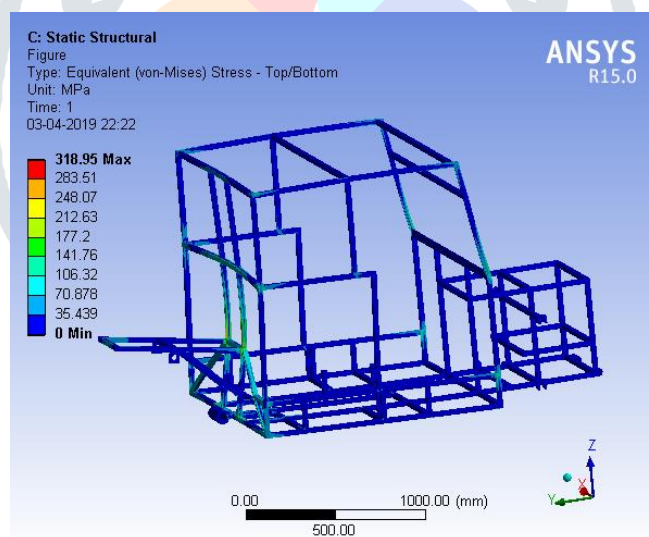


Fig. 7 Rear impact

### 3.3 Side Impact Analysis

The following figure shows the results of side impact analysis.

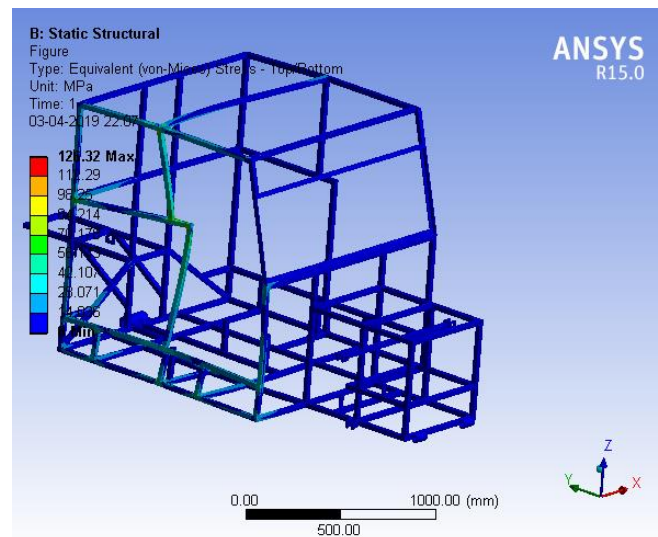


Fig. 8 Side impact analysis

## 4.RESULTS AND DISCUSSION

Designed electric tri car can able to carry 2 persons with comfort and safety at any road condition. Analysis results shows that does not harm the passengers during accidents because the designed tricar can able to absorb the impact and it wont trasmit the impact in all directions.

Designed Electric tri car can able to move upto 30 Km for one complete charge and with a speed of 40Km/hr.

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