Design and Analysis of an Automobile with Convergence Concept

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Abstract- Nowadays, the usage of cars is increasing day by day. Cars (or automobiles) make up approximately 87% of the total motor vehicle annual production in the world. The number of cars on the world's roads surpassed one billion last year, according to a study that has spurred debate on what the rapidly-growing car population will mean for the world's economy and environment. Not surprisingly, China led the way in vehicle growth, with the number of cars on Chinese roads increasing by 27.5 per cent, amounting to half the entire global growth. That gives China the world's second largest car population, with 78 million vehicles. But the United States still constitutes by far the largest vehicle population in the world, with 239.8 million cars. In India also, the percentage of cars usage has increased vastly. By usage of more cars, parking of car is becoming a problem. Since the parking space is not increasing with the increase of cars. To avoid this problem, in our project we have designed a concept car that is smaller than the usual cars present today. A concept vehicle or show vehicle is a car made to showcase new styling and or new technology.

I. INTRODUCTION

A concept vehicle or show vehicle is a car made to showcase new styling and or new technology. They are often shown at motor shows to gauge customer reaction to new and radical designs which may or may not have a chance of being produced. The following car is car cum bike which converts in a bike with a press of a button. The car is called as a convertible car. The whole concept is developed keeping in mind the day today increasing cost as well as the number of vehicles in the present world. The concept is based on a simple converging of a two parts. The chassis of the car is the basics of the car. It has been designed to converge. The design is such that the whole one part side of the chassis moves in side the other part which is stationary. The concept is designed keeping in mind the day to day scenario which is causing a problem these days of parking and space. The designed who is prepared is a space reducing one as and when is beneficial in many ways. The car when converted in bike is a two wheeler which works the same as that of the current two wheeler. The bike is a more sophisticated as well as very advanced as compared to the current bike. The bike is a full covered and is provided with safety factors such as seat belt and as well as the same beneficial conditions of that a car like ac and comfortable ride. The car can we used as a bike which enables a family to own a car and a bike in one go. The Car is cost efficient one. The car is having an electric engine which is an advantage in matter of fuel and the environmental friendly also which makes it more beneficial. It reduces the fuel expenditure as well as it reduces the pressure on the environment.

II. LITERATURE REVIEW

The car is the concept which is new in its type. The rinspeed presto is the same type on converging car. The car cum bike idea is the converging of the chassis of the car in the other part. The car is having a principal on converging in the horizontal direction which just reduces space. The other concept cars developed have been developed by taking in consideration individual car or bike and worked on it. The concept which has been a new door opening in the field of automobile are Buick y job-is the first most concept. General motors le saber-it helped introduce 12 volt electronics 215 ci v8 to gn. Cadillac cyclone-futuristic styling. Chevrolet corvette mako shark-corvette. Chevrolet volt-the first hybrid electric engine. Ford sinus-reflects the modern obsession with safety. Mit car-concept car. Phantom corsair-a 1930 concept car developed. Pontiac club de mer-first stainless steel sports car. Lancia meggamma-the prototype of mpv. Mercedes benz f700-allows you not to feel any bumps on road.

III. SCOPE OF PRESENT WORK

The work done or the concept created has a waste area to cover anywhere in the automobile field. The car cum bike is a very new concept in this case. The car when converted in the bike reduces space here and also gives a two in one product that is a car and a bike as one hole product. The cost of production the material used and the other resources used are also easily available. The production of the car is using easily available material like the sheet steel and the carbon epoxy material. The car when converted in a bike is a more safer one as compared to the present bikes. The bike will have the same comforts that of the car in a two wheeler also. The car cum bike is having an electrical engine which is now a days a booming one in the market. The electric engine used is having many advantages and is very user friendly. The car cum bike is eco friendly by this use of electric engine. The use of this has reduced the fuel consumption and the emission also. The car cum bike wills the first of its kind in which an electric bike is also there. The bike after converting will be a few of its kind. The car cum bike will be made of light material which will reduce the weight and also the strength remains the same. The bike will also be of the same kind and hard and light material which will open new doors for the separate knd of bikes also. The car cum bike will be having

less space to park in and be converted. The car cum bike can be compressed and parked in when necessary which resolves the parking and the space problems. The car cum bike is having over all small area as well when working as a car. The present concept cars and bikes do not have the same objective as well as any of the design concepts.

IV. OBJECTIVE AND METHODOLOGY

The main objective behind making this concept was to reduce the number of vehicles on the road and as well as the space factor which is a major issue now a days. The concept covers mostly these two main parts the other include the electric engine which is the next best part of this project. The use of the electric engine does reduce the use of fuel and the emission of the burnt fuel in the air. This makes it an eco friendly concept. The car cum bike is have all the safety factors as that of the car in a bike. This objective is also necessary now days as it is important due to the changing world and the safety parameters. The other objective is it opens new door towards the new concept coming in the market in the automobile field. The methodology used in this is the converging of th hole chassis is to the other part. The upper top of the car is of leather and the whole mechanism works on the concept on converging the hole parts in the car work on this concept.

V. DESIGN CONSIDERATION

The following are the key features of the proposed convergent concept:

(1)Chassis: The design has been made by basically making two different parts. The first and the second part is the main chassis part on which the whole concept works. The steering system and the suspension are attached to the main body itself. The car bodies are aliened is the same plane. After that the one part of the body which is the driver side is the first part and the basic part of the chassis. The other part the passenger part fits in the second part and goes in and out the driver side part. The parts when are in car are clamped in to each other and when converting in bike act as a support guide to converge in to form a bike. This is done by keeping a tolerance of 0.15 which is required for its converging action. The chassis has been modeled in PROE-Wildfire-5, and Fig (a) represents the chassis of the convergent car

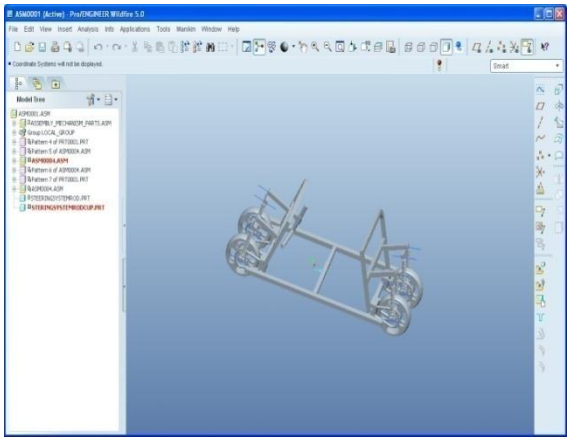


Fig1. Represents (a) Chassis of the car

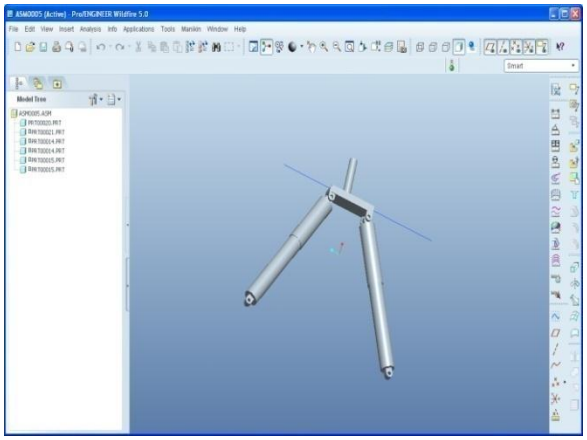


Fig 2. Represents (b) Steering system

(2)Suspension: The suspension is protruding out and connected to the main chassis. The suspension is a connected one for the front and back. This is done to give the suspension an independent wave like motion when the bike is formed. This is done to give the same mechanism as that of a normal bike when driven. The suspension is designed for giving it a bike look but also work as a car suspension. The basic functionality is same but it differ in the working principal of that of the ordinary one but it differ in the function that it is attached to the main body and allows inclination of the main body when bent as a bike. It helps the suspension to act like this which inclines the body only when a bike as the cross section area is reduced.

(3)Steering system: the steering system has also been made as per the car requirement. the hole suspension consist of a rod mechanism which includes the rods attached to each other for providing the steering mechanism by the help of ball joint and also have the converging mechanism incorporated with it. This helps to even lock the steering in its turning radius and also to provide the required radius. This mechanism is created keeping in mind the basic mechanism which is used in the car cum bike. The components have been designed in such a way that the have the same tolerance and get converge when the whole chassis does. The main steering column is also attached to the main chassis for the support.

(4)Seating system: The seats are also made as per the requirement of the car cum bike. They are designed to look like a car as well as a bike seat. The seats are also made by using the

light weight materials so that they are easy to converge and the mechanism is also important to work. The seats are provided with bars supporting them. These bars are fixed in the bottom of the seats. The passenger seat sits in the groves provided in the bar on its side and then slides in side and beneath the driver seat which co insides with the back seats. The seating is now in the form of a bike. The seat bars also work on the same mechanism that of the car chassis. The bar on the passenger side has a grove so that the seat first sits in to that grove so that it attains the height to go under the driver side seat. The seat are made of fiber

(5) Wheel: The wheels will be four on the ground. This will help in better support and also the center of gravity is not disturbed. The wheels are also designed in such a way that they give a look of being just a wheel when the car is converted in a bike.

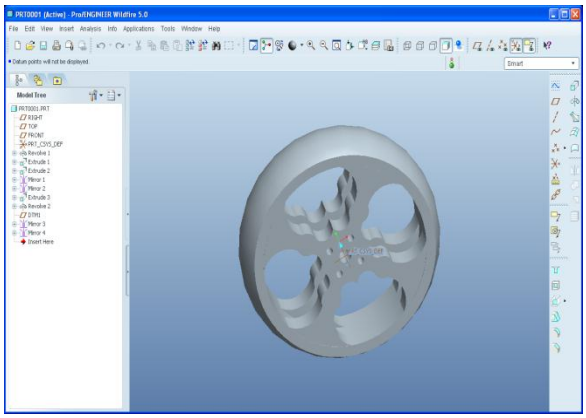


Fig 3. Represents (a) Alloy wheel

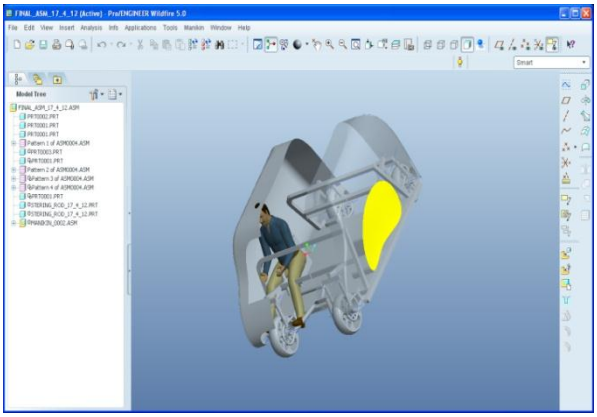


Fig 4. Represents (b) Steering system

Fig 3. Represents (a) Alloy wheel

(6) Engine: The engine is an electric engine which is having 4 batteries to work which are of 12 volt each. The car is having 6 batteries each of 6v each. The batteries will be charged back with the help of 220 V, 2.2 kW, requiring a 15 A socket. The car will have a power of 18ps@1300rpmwo.It will have a top speed of 60 km/hr. Four different motors are used and synchronized to work at the same speed.

(7)MATERIALS:

The material used is the sheet steel and the carbon epoxy material. They are used because of their characteristics such as high strength and light weight which are essential for this car. The sheet steel material used will be of the thickness of 3mm in the floor and the other parts will be made of 2mm in thickness. The carbon epoxy material used is also used for the hole body some of the basic parts are made with sheet steel and other light weight material for the engine components. The use of this material has been done to reduce the weight. The material is easily available. The analysis done has proved that the material is satisfying the car strength needs corresponding to be light in weight.

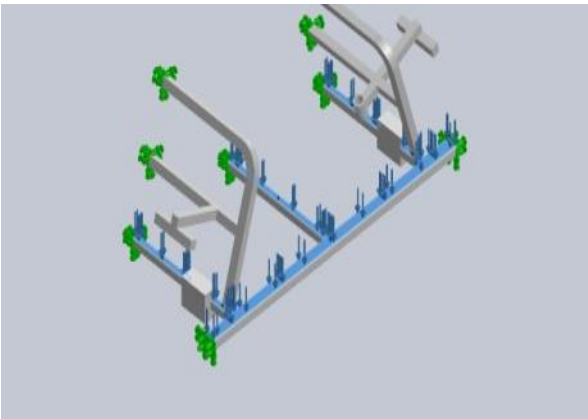
VI. ANALYSIS

The analysis has been carried out in COSMOS 12 for stress calculation, thermal analysis and structural calculations.

Table 1: Material properties

Properties		
Name:	Alloy Steel	**CARBONEPOXY**
Model type:	Linear Elastic Isotropic	**Linear Elastic Isotropic**
Default failure criterion:	Max von Mises Stress	**Max von Mises Stress**
Yield strength:	6.20422e+008 N/m^2	**1.089e+009 N/m^2**
Tensile strength:	7.23826e+008 N/m^2	**3e+007 N/m^2**
Elastic modulus:	2.1e+011 N/m^2	**1020 kg/m^3**
Poisson's ratio:	0.28	**2e+009 N/m^2**
Mass density:	7700 kg/m^3	**0.394**
Shear modulus:	7.9e+010 N/m^2	
Thermal expansion coefficient:	1.3e-005 /Kelvin	

Table 2: Material properties



Name:	**CARBONEPOXY**
Model type:	**Linear Elastic Isotropic**
Default failure criterion:	**Max von Mises Stress**
Yield strength:	**1.089e+009 N/m^2**
Tensile strength:	**3e+007 N/m^2**
Elastic modulus:	**2e+009 N/m^2**
Poisson's ratio:	**0.394**
Mass density:	**1020 kg/m^3**
Shear modulus:	**3.189e+008 N/m^2**

Fig5 Indication of Loads acting on chassis

Table 3: Mesh Information

Mesh type	Solid Mesh	Total Nodes	19998
Mesher Used:	Standard mesh	Total Elements	10380
Automatic Transition:	Off	Maximum Aspect Ratio	14.994
Include Mesh Auto Loops:	Off	% of elements with Aspect Ratio < 3	92.6
Jacobian points	4 Points	% of elements with Aspect Ratio > 10	0.135
Element Size	32.3371 mm	% of distorted elements(Jacobian)	0
Tolerance	1.61685 mm	Time to complete mesh(hh;mm;ss):	00:00:05

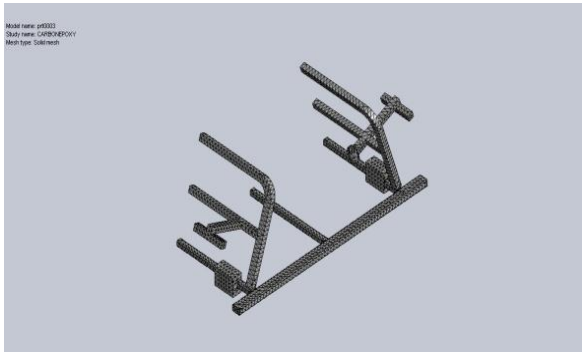


Fig6. Represents mesh frame

TABLE 4: Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.303558	3999.79	-0.00549316	3999.79
Reaction Moment(N-m)	0	0	0	0

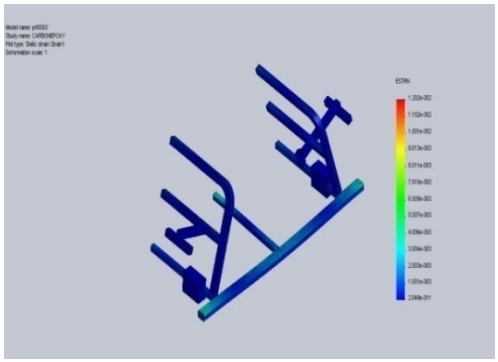


Fig7. Represents analysis

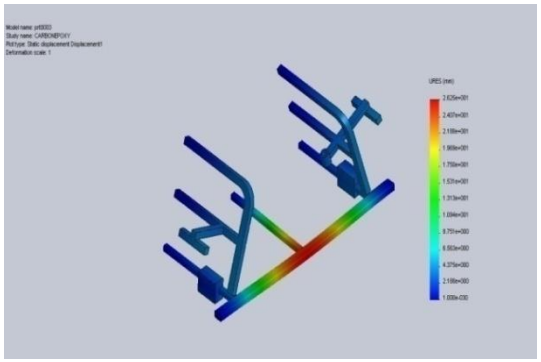


Fig8. Represents analysis

VII. Conclusion

By the use of this new concept we are now able to overcome the space related issues in the automotive world. The new concept has also open new doors for the use of new light weight materials which are tough and light weight. The properties of these materials are the same as that of the present scenario. The concept has opened new doors for the new innovation keeping in mind this new concept. The new concept is electric engine which is eco friendly and brought in use by keeping in mind the environment. The fuel consumption is zero and the environment is also safe from the pollution. The use of electric engines is also in the bike form also which has brought up a new invention in bikes as being a electric bike. This concept is useful in many ways and has opened new ways in the automotive world for new and innovations and has also helped us over come many problems in one product and is cost efficient which is affordable by a common man and has included safety factors in every aspect and also in a bike form it gives the same comforts and safety precautions.

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