

A Review on Analysis and Optimization of Two Wheeler EV Chassis

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Abstract: Today due to global warming issues across the world the technology in automobile is started to migrate from conventional energy sources to renewable for minimize the emission. The role of electrical vehicle is part of them. The main purpose of this project is to study, analyze and optimize the two wheeler electric vehicle chassis for improving the driving performance with stability; vehicle efficiency also improves the by selecting appropriate location of battery in EV.

This paper describes the design methodology of the frame. The design of vehicle in such a manner that it satisfies the maximum loading conditions, the safety and comfort of the driver. The EV frame designed in CAD software while the total structural analysis has been made by ANSYS simulation software in which maximum bending stress and deformation has been analyzed. The outcome results from the simulation will help for modification of frame to minimize stress and deformation developed during steady and running condition of electric vehicle as well help for suggestive location of EV battery position for smooth operation.

Keywords: EV vehicle, Frame, Structural analysis, Simulation software

I. INTRODUCTION

The major problem in today's world is energy crisis that is Caused by depletion of natural resources like petrol, diesel To overcome this problem there must me a suitable Alternative solution for world to make earth safe place for Upcoming generation. Electric vehicle is a rechargeable Battery operated vehicle which converts electric energy Into mechanical energy with low maintenance and zero Pollution. The batteries that are used here are either lead Acid or lithium ion which can be recharged or replaced Easily and the maintenance cost is very cheap. There are so Many electric vehicles are there in present market based on Complexity and price Although electric vehicles are not Exact solution for this environment problems but it is a Better alternative comparing to other vehicles. On average These bikes can travel up to 50 km based on the battery Capacity without tail emission pollution and these don't Make noise. The basic components used in the electric vehicle are Frame, battery, controller, motor, transmission, brakes, Suspension

1.1 Components

Frame: Frame is the main structure of the vehicle which Holds the battery, motor, driver weight and gives holding To various parts the vehicle. So it should be strong enough To with stand the impact forces.



Fig 1 Frame

Battery: Battery is the heart of the electric vehicle why Because it stores the energy mainly there are two types of Batteries that re lead acid and lithium ion which are Rechargeable and replaceable and they are with bms and The travel time depends on the power rating of the battery



Fig 2 Battery

Motor: Motor is a device which converts the electrical Energy to mechanical energy and the power is transmitted To rear wheel by chain drive .it gives high transmission Efficiency and high speed ratio.



Fig 3 Motor

Controller: Controller is electric device which controls The electric power deliveries to various components Depends on the input. It detects the higher voltages and do Cut off the power when it is more than necessary and Protects the circuit.



Fig 4 Controller

Suspension: Suspension is one of the main part in vehicles Which reduces the jerks by converting the shock pulse into KE. There are two types of suspension used in bikes in front Telescopic suspension is used it may be upside down or Straight one and in rear suspension springs are used Whether mono is twin.



Fig 5 Suspension

II. LITERATURE

Sushma et al. [1] The paper shows us the design of an Electric bike which is useful for daily users. They designed The electric bike with 2kw BLDC 48volts motor with Rotational speed 3000rpm. They chose material of AISI Chromo 4130 and AISI Aluminium 6060 for front shock Observers. They also considered the various factors like Frame, stiffness, load paths and overall weight of frame. The analysis was done in various iterations and testing. They considered lithium-ion battery, because of high Energy density of 100 why/kg and low risk of exploding. Irfanudeen et al. [4] has studied about the frames of Mountain bike and they designed the frame with low cost That satisfies all the conditions of user. They replaced the Material with advanced composite materials to increase the Strength and also reduce the cost. Advanced Composite Materials having high strength and low cost and consist of Various mixtures like resin matrix, epoxy, Kevlar, Polycyanate, vinyl ester. They designed in cero and did Various structural and dynamic analysis.

Nikhil et al. [2] has developed a chassis of electric scooter That produces less pollution and eco-friendly. They Developed the chassis made by AISI 1018, because of its Less density and good strength and good price. Aluminium Material used for weight reduction. They designed 3d Model in CATIA V5 R17 and analysis in ANSYS WORKBENCH. The main objective of this paper is to Design frame and perform analysis under various Conditions and suitable for market standards.

Khurana et al. [3] The survey gives the result of adoption Of electric vehicles in India. The pollution due to Greenhouse gases are also increasing, so the country Prepares to shift to electric vehicles by 2030 (IEA 2016). These results in reducing emissions to 37 per and reduce Dependence on imports of fuels. The government also Planning battery swapping option to adopt electric Vehicles. Government announced all cars to be electric by2030 (SIAM,2017). The survey gives the information About usage of electric vehicles in future.

Nigam et al. [4] has designed and developed the modern Electric bike. Due to increase of automobiles the fuel costs Are rapidly increasing to overcome the situation they Designed an alternative electric bike. The model of bike Frame was designed in CAD software and analysis in ANSYS workbench. The chassis of the frame was tested For its strength while carrying the driver. The project shows A study and development process of smart, affordable Electric bike to reach the market standards

III. CONCLUSION

The main objective is to achieve the lightweight frame and from the above design and the analysis we have achieved the light weight frame by decreasing the unwanted material and we achieved it. The cost is reduced by decreasing the material and the additional welding's are also reduced which decreased the cost of labour and welding.

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