International Journal of Advanced Technology in Engineering and Science
Vol. No. 10, Issue No. 06, June 2022
www.ijates.com
ijates
ISSN 2348 - 7550

Design Modeling and Fabrication of an electric Bike

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Abstract:

The scarcity of the fossil fuels and the increasing pollution from the automotive industry is a huge problem with the concern about the human diseases from the air pollution. The electric powered vehicles and the recent advancement in hybrid electric technologies put a great effort towards the pollution control and greener earth. The different components are used for the design of the electric vehicle with the aid of electronic control devices with the mechanical parts. The charging of the rechargeable batteries are not harmful for nature.

Keywords: Electric Bike; DC Motor, Electric Energy

I INTRODUCTION

This paper focuses on the design modeling and fabrication of an e bike. The bike frame is modeled in solid works and the necessary configurations and the ergonomically design aspects are generated and implemented.The components on the e bike are assembled and the necessary test reports are generated. The e bike is configured for two persons with the maximum speed of 40km/Hr. The charging time discharging time and the other modifications are made based on the problems raised.

II LITERATURE REVIEW

Butler***et al.,***(1999), have presented a simulation and modeling package developed and Matlab/Simulink graphical simulation language is incorporated. The Simulation results such as fuel consumption, vehicle emissions, and complexity are compared and discussed for each vehicleand presented in this paper. **Xianmin, (2002)** has developed the theory analysis mathematical models of EV based on the vehicle dynamic characteristics further the whole system is divided into seven function blocks according to power flow, the simulation models are formed in the MATLAB language and results werevalidated in a PDM AC-AC converter, which shows that the suggested method is suitable for EV. **Brian (2007)** has created a model in MATLAB and ADAMS to demonstrate its fuel economy over the conventional vehicle. He used the Honda IMA (Integrated Motor Assistant) architecture, where the electric motor acts as a supplement to the engine torque. He showed that the motor unit acts as generator during the regenerative braking. **Cuddy and Keith** (2007)have performed a parallel and series configured hybrid vehicles likely feasible in next decade are defined and evaluated using a flexible Advanced Vehicle Simulator (ADVISOR).

The comparison has made between diesel powered hybrids vehicles to a comparable technology diesel powered internal combustion engine vehicle.

Bauml and Simic (2008)havediscussed the importance of vehicle simulations in designing the hybrid electric vehicles. A series hybrid electric vehicle simulation with the simulation language Model was developed. **Zhou and Chang** (2008)have established powertrain dynamic simulation model of an integrated starter/generator (ISG) hybrid electric vehicle (HEV) using Simulink. The parallel electric assist control strategy (PEACS) was researched and designed. **Kuen-Bao** (2008) described the mathematical modeling, analysis and simulation of a novel hybrid power train used in a scooter. The models for the hybrid electric scooter are established using the Matlab/Simulink environment. Daniel (2007) designed, developed and implemented a series hybrid electric vehicle. He showed that the vehicle runs well in the electric mode and left the hybrid conversion as future expansion. Before developing the hardware part, he did a simulation using PSCAD/EMTDC and validated the simulated results using the hardware he developed. **Emadi*et al*.**,(2008) focused more on power electronics as an enabling technology for the development of plug-in hybrid electric vehicles and implementing the advanced electrical architectures to meet the demands for increased electric loads.

III COMPONENTS OF E – BIKE

It works on the principle that the electromotive force of an A.C. motor which receives electrical energy stored in D.C. battery is converted with the help of D.C. to A.C. converter. The Electric bike consists of following components viz, DC motor, Frame, Platform, Battery**,**Drive etc.

Frame: The Frame is made up of M.S. along with some additional light weight components. The frame is designed to sustain the weight of the person driving the unit, the weight of load to be conveyed and also to hold the accessories like motor. Also it should be design to bear andovercome the stresses which may arise able to due to different driving and braking torques and impact loading across the obstacles. It is drilled and tapped enough to hold the support plates.

DC Motor: DC motor has been fitted out with the controller and the drive mechanism of the bike.

Fig. 1.DC motor

Battery: The battery also acts as a condenser in a way that it stores the electric energy produced by the generator due to electrochemical transformation and supply it on demand.Battery is also known as an accumulator of electric charge. This happens usually while starting the system.4 batteries of 24 Volt 60amp used.

Fig.2. Battery

Chain Drive: A Chain is an array of links held together with each other with the help of steel pins. This type of arrangement makes a chain more enduring, long lasting and better way of transmitting rotary motion from one gear to another.The major advantage of chain drive over traditional gear is that, the chain drive can transmit rotary motion with the help of two gears and a chain over a distance whereas in traditional many gears must be arranged in a mesh in order to transmit motion.

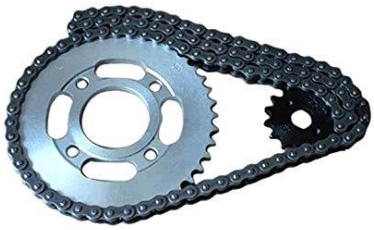

Fig.3. Chain drive

Controller: Forward type e rickshaw controller has been used to couple the 650 Watt DC motor.

Fig.4. E –bike controller

Braking System: For the braking system it is convenient to use braking system used in band brake system which consist of spring loaded friction- shoe mechanism, which is driven with the help of hand lever.

Sprockets have many engaging teeth but gears have only one or two.

- The teeth of a gear touch and slip against each other but there is basically no slippage in case ofsprocket
- The shape of the teeth is different in gears and sprockets.

Fig.5. Drum Brake

Fig.6 the electric bike

IV CONCLUSIONS

The model of the electric bike is run successfully and the charging, Discharging time and the braking force and other parameters are checked successfully. Forward and reverse type controller has been encountered.

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