

Performance Enhancement of Hybrid Racing Car by Design Optimization

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Abstract : Environmental pollution and shortage of conventional fuel are the main concerns in the transportation sector. Most of the vehicles use an internal combustion engine (ICE), powered by gasoline fuels. This results into emission of toxic gases. Hybrid electric vehicle (HEV) powered by electric machine and ICE is capable of reducing emission of toxic gases and fuel consumption. However to build HEV, it is required to accommodate motor and batteries in the vehicle along with engine and fuel tank. Thus, overall weight of the vehicle increases. To improve the fuel economy and acceleration, the weight of the HEV can be minimized. In this paper, the design methodology to reduce the weight of the hybrid racing car is proposed. To this end, the chassis design is optimized. Further, attempt is made to obtain the maximum strength with minimum material weight. The best configuration out of the three main configurations such as series, parallel and the dual-mode (series-parallel) is chosen. Moreover, the most suitable type of motor, battery, braking system, steering system and suspension system are identified. The racing car is designed and analyzed in the simulating software. The safety of the vehicle is assured by performing static and dynamic analysis on the chassis frame. From the results, it is observed that, the weight of the racing car is reduced by 11 % without compromising on safety and cost. It is believed that the proposed design and specifications can be implemented practically for manufacturing hybrid racing car.

Keywords : design optimization, hybrid racing car, simulation, vehicle, weight reduction

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