

An Optimization of the FC Truck Chassis System

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KEY WORDS: Fuel Cell Truck, Chassis System, Electric Efficiency, Package Layout, Weight Reduction, Optimization

Hyundai Motors recently succeeded in mass-producing the world's first fuel cell truck. Since the concept of the chassis system of fuel cell truck is different from the existing diesel engine truck, a package layout suitable for the fuel cell truck was required. In a fuel cell vehicle, high heat is generated from a motor, a high voltage battery, and a fuel cell stack. Sufficient cooling performance is necessary because the vehicle cannot be operated without adequate cooling of the heat. In fuel cell trucks, one of the most important performance is the electric efficiency. When the cooling efficiency is improved, the electric efficiency is improved, so the system optimization to improve the electric efficiency is essential.

The first step to improve the electric efficiency is to optimize the package layout of the cooling system. In this stage, the optimal package layout of the chassis system was studied to improve the cooling performance. The second step is to reduce the weight of these systems. The target system of the weight reduction is a representatively heavy chassis system such as a high voltage battery cooling module, a PE cooling module, a controller module, and a high voltage battery carrier. For weight reduction of these systems material, shape and thickness were optimized using CAE in the early design stage.

Through this study, the following results were obtained.

(1) To maximize the cooling performance of hydrogen electric trucks, the package layout of chassis systems such as PE cooling module, motor and transmission system, and controller module was optimized.

(2) After optimizing the package layout of the hydrogen electric truck chassis system, mounting brackets and structures for mounting each chassis system to the truck frame were analytically optimized at the initial stage of design to reduce the total weight by 121kg in the controller module, 5.2kg in the high voltage battery cooling module, 7.2kg in the PE cooling module, and 8kg in the high voltage battery carrier. In the previous Elaxity electric efficiency analysis results,

(3) A total of four patents have been filed for the frame that maximizes the internal space utilization of the hydrogen electric truck, the layout of the hydrogen electric truck motor mounting system, the structure of the hydrogen electric truck cooling performance improvement system, and the structure of the hydrogen electric truck high voltage battery.