

Analysis of User Reachability, Accessibility, and Posture in Locating CNG Cylinders on Vehicle Structure

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Abstract

The concerns for a greener environment and an improvement in air quality have increased the need for natural gas vehicles (NGVs). However, on-board compressed natural gas (CNG) fuel storage presents unique challenges for the commercialization of natural gas vehicles such as vehicle range, storage system, durability, weight and compatibility of component material. In Malaysia, the CNG tanks are commonly mounted in the luggage compartment. The low fuel capacity and the limited number of refuelling stations have discouraged the use of CNG as the source of alternative energy in vehicles. In this study, 3D CAD models were used to analyze precisely the space available on the vehicle structure. Once the areas were computed, various design configurations were considered to match with the commercially available CNG cylinders to maximize the fuel capacity. Clearance and mounting requirements were specified and all relevant standards were identified. Within the space available, it was found that a dedicated NGV with four CNG cylinders (one at luggage area and three underneath the car platform) and a bi-fuelled NGV (an original gasoline tank and a cylinder at luggage compartment) are possible. This was then modelled into CAD software. Analysis for reachability, accessibility, and posture during installation, assembly, disassembly and maintenance showed acceptable results.