

## Design and Analysis of Fuel Tank -A Review

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**Abstract**— The fuel tank in an automobile is used as a reservoir for gasoline fuel which is used to propel the vehicle. The design of this fuel tank is of critical importance as it can lead to explosion if not designed properly. Also the capacity of the fuel tank plays an important role in deciding the range of the vehicle between fuel refills. In this project we are undertaking an investigation on a commercial passenger car's fuel tank design, the model of the car is "Maruti-800".

**Keywords**- Fuel tank design.

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### I. INTRODUCTION

A vehicle's fuel tank is important in terms of safety, performance, and reliability. A good fuel system in a low volume vehicle is dependent on the correct selection or construction of the tank, tank location within and attachment to the vehicle, correct venting, spillage and leakage dispersal, and care, even on the little things like fuel hoses and fittings. Note that where a production vehicle is fitted with its original fuel tank or other fuel system components in their original locations. The primary objective of this project is to apply life cycle design tools to guide the improvement of fuel tank systems.

All the commercial passenger cars available in India have to comply with the design and safety regulations put forth by Government of India to regularize the Automobile market through The Automotive Research Association of India (ARAI). These regulations also include the design requirement for fuel tank. Unless the fuel tank does not meet these minimum requirements, it cannot be installed in an automobile.

Thus the fuel tank we are investigating will be first analyzed for the existing design, once it is analyzed it will be modified either to increase the capacity of the tank or to increase the strength of the fuel tank or both. Once the primary analysis of the current design is completed, the subsequent modifications and changes in the design will be undertaken. Further the new design with modifications will be analyzed in compliance with ARAI regulations and it must comply with the same.

### II. LITERATURE REVIEW

#### A) Vehicle fuel tank

A vehicle fuel tank with the fuel level indicator positioned within the fuel tank is provided with the aperture to allow the fuel level indicator to be inserted within the tank. A mounting bracket is attached to the fuel tank to support the fuel level indicator externally. To close the fuel tank aperture provided for the fuel level detector, a base means is positioned to the fuel tank. Both the fuel tank wall & the base means are provided sealing means in a sealing relationship.

The mounting of the fuel tank to mean frame, sub-frame including fuel level indicator mounted to a base means which is secured to a mounting bracket by fastening means[1].

#### B) Arrangement for supplying fuel from supply tank to internal combustion

The supply of fuel from supplying fuel tank to internal combustion relates to an arrangement which has supply connected at a suction side with a supply tank and at a pressure side with internal combustion engine. In this arrangement for supplying fuel from a supply tank to an internal combustion engine, in which a check valve is provided in branching pipe before the ejector in the flow direction of the fuel tank & check valve opens the branching pipe when exceeding the predetermined limiting pressure. When the check valve opens the branching pipe to ejector after reaching a limiting pressure which disturbs deviation of a fuel volume flow through the feed nozzle of the ejector & therefore the delay in the pressure increase in injecting system is avoided in starting phase [2].

#### C) System for controlling liquid fuel and vapor flow

The control of fuel vapour emission system for a motor vehicle containing volatile fuel such as gasoline or alcohol or both is effective to provide recirculation of fuel vapour during refueling. This paper present the invention maintains the recirculation line operable to recirculate vapors at all levels of liquid fuel in the fuel tank & provided a "Dynamic seal" about the dispensed liquid fuel flow and the inside of the filler tube and if the refueling nozzle seal leaks & ensures a negative pressure in the filler tube and continued recirculation of vapor and ensures activation of the automatic shut-off in the filler nozzle to prevent over filling [3].

#### D) Fuel tank Arrangement

Fuel tank Arrangement & Shapes are provided simpler including two fuel chambers. The Bottom wall of a fuel tank separates at least a lower segment of an interior of the fuel tank into first & second fuel chamber. When fuel pumped out of the first chamber, a portion of it returned to the first fuel chamber by way of an ejector pump which is disposed within the fuel tank body. There is ejector pump driven by return fuel,

transports fuel from the second fuel chamber to the first fuel chamber through the communication pipe [4].

#### E) Method & Structures for Mounting a fuel tank

The methods and structures for mounting fuel tank for installing the fuel tanks improves the efficiency of assembling work, certainty of piping & workability can be attempted.

The fuel tank is placed on a tank supporting frame & tightened to said frame by a belt. For pipe and seal installation pipe & leak preventing seals are assembled with the tank. For frame fixing frame are fixed on a car body & tank is fixed on the frame. This arrangement reduces the unnecessary time hours & labor to install each fuel one by one on the car body [5].

#### F) Outer surface of the fuel tank

The surface of the fuel tank for fitment on the frame of body of car leads to design of the several types of views in new design. This paper deals with different form of outer surfaces of the fuel tank which will be increasing the size of fuel tank & help in fixing in the frame [6].

#### G) Permeation & leak preventative design for fuel tank attachments

To control Permeation & leakage of fuel frame tank, multilayer plastic vessel fluid systems are employed. Most of the motorized vehicles today are typically plastic or metallic in nature. Fuel may be lost through joints between metal sections, from an instruments sensor part etc. In case of plastic tanks, fuel may be lost through plastic itself. Different composite material used to manufacture. But there is increase in the permeability of fuel when compared to metal tanks. To decrease emissions from Plastic & composite tank, improvements have been focused on adding barrier layers resulting in tanks having multilayer [7].

#### H) Design

Based on the finite element method, the numerical solution of the shallow-water equation for one-dimensional (1D) steady flows was established [8].

This pilot project with General Motors Corporation applied the life cycle design (LCD) framework and tools to the design of fuel handling and storage systems used in the 1996 GMT600 vehicle line [9].

#### I) Safety Measures

The safety measures in case of broke is to be maintained. The fuel tank must be designed to be rust protected. Proper heat insulation must e provided to fuel tank [10].

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