ISSDA STAINLESS STEEL

Stainless Steel Fuel Tank

Case Studies in India

INTRODUCTION

The automobile industry in India is ranked the 4th largest in the World and the 7th largest commercial vehicle manufacturer globally. Commercial Vehicles Industry in India has witnessed speedy growth and at present is considered as one of the most flourishing sectors of the Indian economy. With the country's increased focus on safety and environmentally friendly products & components, all key stakeholders in the automotive fuel tank segment are investing in R&D to spur the development of innovative and sustainable technologies. Technologies that would enable manufacturers to develop advance automotive fuel tanks which would be able to withstand corrosion, become light-weighted and maintain their durability.

Coated and Aluminised Steel fuel Tanks of commercial vehicles are not only prone to pitting corrosion externally but are also subjected to internal corrosion, thereby, contaminating the fuel leading to clogging of nozzles by the corrosion by-products.

The adoption of Stainless steel enables development of fuel tanks which are more corrosion resistant, are lighter in weight and offers the best-in-class safety. With almost nil maintenance, and protracted operational life, Stainless Steel fuel tanks minimise the total cost of ownership of the components.

ADVANTAGES OF STAINLESS STEEL

- Crash Resistance
- Fire Resistance

Best in Class Safety

- Reduction in fuel tank wt by 25-30%
- Completely hermetic structure, and hence no loss in fuel due to evaporation
- Stronger and more robust than plastic or Aluminised mild steel fuel tanks

Improved Design

- Least total cost of ownership.
- Due to nil corrosion, longevity and durability is significantly enhanced.
- Provides the option of increased warranty life

Lower life cycle cost/ Longer life

- No corrosion of fuel tanks, hence no clogging of nozzles by iron particles.
- Thus, there is no requirement of cleaning of fuel nozzles.
- Negligible maintenance cost
- Superior aesthetics.
- Can be used in both painted or unpainted form.

Lower maintenance

Stainless Steel Fuel Tanks

Case Study 1

Ashok Leyland

Prototype Fuel Tanks of 350 litre capacities were developed in Stainless Steel for Ashok Leyland, in grade SS 201. All components of the fuel tank such as rectangular shell, Baffle plates, end covers plate were made at MRPL, Chennai. The tank was painted from outside based on the requirement as suggested by Ashok Leyland. Due to higher strength of SS 201, the thicknesses of the SS fuel tanks could be reduced, leading to an overall reduction in the weight of the SS fuel tank by almost 27%. The Stainless Steel fuel tanks successfully passed all approval and product validation tests, subsequent to which, Ashok Leyland commercialised the development of 350 litre capcity fuel tanks in Stainless Steel. Till date, 4,500 nos. of SS fuel tanks have been fabricated and are in use on Indian roads.

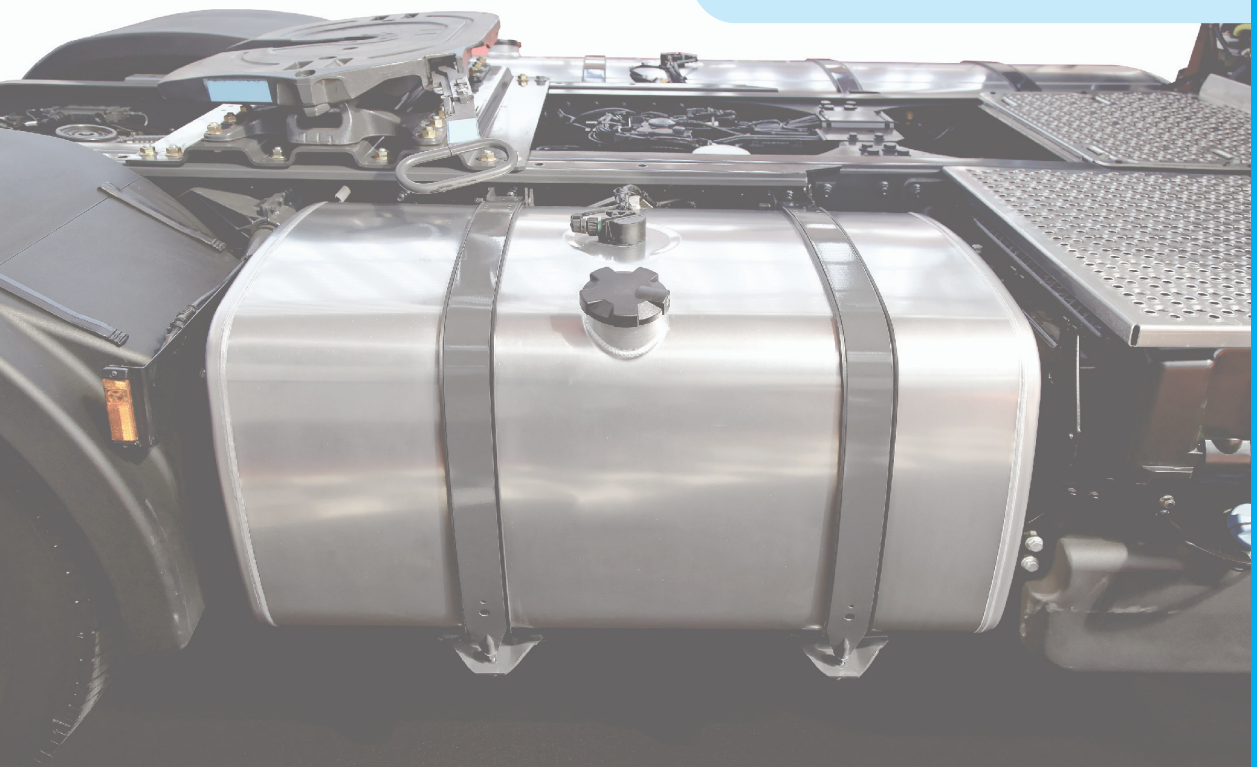
350 litre capacity Stainless Steel fuel tanks for Ashok Leyland

Case Study 2

Tata Motors

Tata Motors is the largest manufacturer of Commercial vehicles in India, and for their heavy duty buses and trucks, they have been looking at alternate materials for fuel tank fabrication. Few prototype fuel tanks in 300 litre capacity had been fabricated in stainless steel grade, SS 439 in 1.2 mm thickness at Garg Engineers, Jamshedpur. The results have been positive.

The stainless steel made fuel tanks successfully passed all approval tests, such as leakage test, salt spray test and slosh test. Further, Stainless steel fuel tanks enabled a weight reduction of 22%, vis-à-vis aluminised mild steel fuel tanks. During the fabrication process, it was observed that stainless steel fuel tanks, owing to its lower thickness, consumed 30% lower current during the seam welding processes.



Case Study 3

Volvo-Eicher Commercial vehicles

Volvo-Eicher Commercial vehicles have also developed prototype fuel tanks in Stainless Steel for their 250 litre capacity model. These Stainless Steel fuel tanks, fabricated at Gatiman Auto Pvt Ltd, Pithampur, Indore, are made out of SS 201 grade and in 1.2 mm thickness. They have passed the slosh test and are now undergoing on road performance validation tests at Pithampur, Indore.

Frequently Asked Question (FAQ)

Q. Why is Stainless Steel better than Aluminised / coated mild steel for fuel tank fabrication?

A. Fuel tanks which are fabricated out of Aluminised mild steel / galvannealed steel experience localised flaking off of the coating during welding and fabrication process. At these flaked off regions, the fuel comes in direct contact with the mild steel substrate and initiates the corrosion process. The corroded iron particles gradually clog the fuel tank nozzles, thereby necessitating frequent repair and cleaning of the fuel tanks.

Stainless Steel, by virtue of its innate chemistry, is corrosion resistant and does not require application of any physical coating on the inside, thereby eliminating the problem of clogging of fuel tank nozzles. Usage of Stainless Steel, therefore enables maintenance-free operation of the fuel tanks and increased longevity of the components as compared to Aluminised mild steel or coated steel.

2. Can Stainless Steel fuel tank be fabricated using the same set-up as coated or Aluminised mild steel fuel tank?

Yes, Stainless Steel fuel tanks can be fabricated using the same set up as that of coated / aluminised mild steel fuel tank. For fitting of the fuel inlet neck, MIG welding can be done, using 308L filler wire and a gas mixture of 80% Argon and 20% CO_2.

3. What are the advantages of using Stainless Steel over plastic fuel tanks?

Stainless Steel provides a completely hermetic structure, and hence there is no fuel loss due to evaporation. This is in sharp contrast to plastic fuel tanks, where there is considerable fuel loss due to evaporation.

Stainless Steel, is 100% recyclable and is a "green steel". Thus, it is completely environmental friendly. Plastic on the other hand has considerable recyclability issues and is environmentally hazardous.

Stainless Steel fuel tanks are safe and can withstand temp in excess of 1000 C.

In contrast, global studies conducted by the National Fire Prevention Research Foundation and Factory Mutual Research Corporation indicated that plastic containers storing flammable or combustible liquids fail abruptly when exposed to a small fire. This failure results in a rapidly developing spill fire that overpowers conventional sprinkler systems.

The same tests conducted with flammable and combustible liquids stored in steel containers resulted in no spill fire, no excessive temperatures, no content involvement, and no significant loss of visibility due to smoke. The fires involving the steel containers extinguished themselves.

These findings have led to a return to steel containers from plastics for safety and fire insurance cost reasons.

For further information :

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