Factory Visit - Report

Factory Visit at	**:**	**TI Automotive (Bundy India Ltd)**
Place	**:**	**Sriperumbudur**
Date	**:**	**31st January 2017**
Number of Participants	**:**	**57**

SAEINDIA Southern Section organized **Factory Visit** at **TI Automotive (Bundy India Ltd)**, **Sriperumbudur** on **31st January 2017**.

TI Automotive develops, manufactures and supplies automotive fluid storage, carrying and delivery systems. The company supplies all of the world's major automobile manufacturers. TI Automotive serves the automotive aftermarket through Bundy, Walbro and Marwal brands. The company's headquarters are located in Oxford, UK, with Corporate Offices based in Auburn Hills, Michigan. In 2015 TI Automotive was acquired by Bain Capital.

Mr. Rakesh gave an overview presentation about the history of **TI Automotive (Bundy India Ltd)** and briefed about their products. He explained about the research and developments going on in the fluid storage, fuel delivery systems and described about various testing facilities available and the tests which are done to ensure the quality of their products.

Plastic Fuel Tanks

There are two types of plastic fuel tanks

1. Mono-Layer Fuel Tank
2. Multi-Layer Fuel Tank

Mono-Layer Fuel Tank

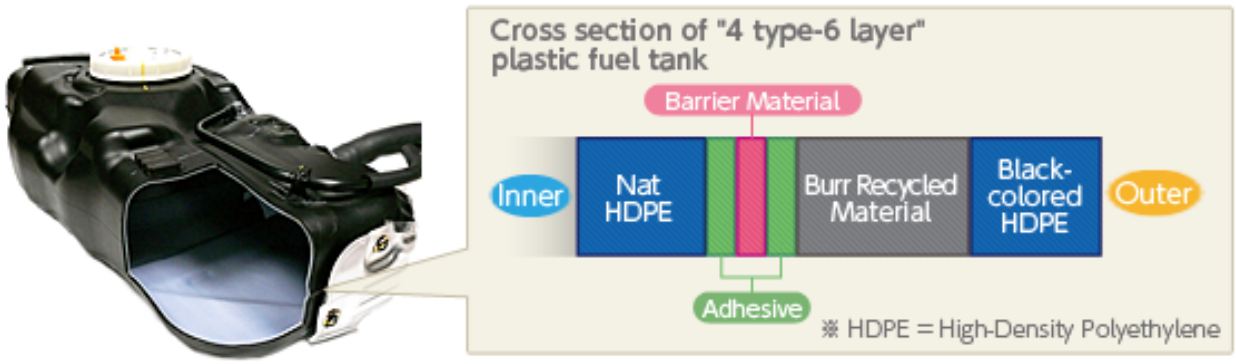
This type of fuel tanks has only one layer of High Density Polyethylene (HDPE). Monolayer plastic fuel tanks are widely used for diesel storage tank.

Multi-Layer Fuel Tank

Multi-Layer Fuel Tanks are preferably manufactured for gasoline storage tanks. The important necessity for multi-layer fuel tank in storing the gasoline is to prevent the vapour escaping from the fuel storage tank.

There are six layers in this type of fuel storage tank. The various layers follows:

- HDPE with small amount of carbon(Black colour) [Outer layer]
- Regrind Material
- Adhesive Material
- Ethyl Vinyl Oxide (EVOH)
- Adhesive Material
- Virgin HDPE(White colour) [Inner Layer]



The outermost layer is made of HDPE mixed with small amount of carbon. The addition of carbon is for the black colour and to ensure the hardness of the tank. The regrind material is fed into the blow molding machine using an online feeder. Ethyl Vinyl Oxide (EVOH) acts as the barrier material which prevents the vapours escaping the tank. The EVOH is bonded to the HDPE with the adhesive material. Pure HDPE is used for the innermost layer of the tank.

Blow Molding

Blow molding is a manufacturing process by which hollow plastic parts are formed. In general, there are three main types of blow molding: extrusion blow molding, injection blow molding, and injection stretch blow molding. The blow molding process begins with melting down the plastic and forming it into a parison or in the case of injection and injection stretch blow molding (ISB) a preform. The parison is a tube-like piece of plastic with a hole in one end through which compressed air can pass.

The parison is then clamped into a mold and air is blown into it. The air pressure then pushes the plastic out to match the mold. Once the plastic has cooled and hardened the mold opens up and the part is ejected.

The stainless steel rings are fixed in the tank during the blow molding process which after molding will be used to fix the fuel pump.

Welding Section

The tank which is blow molded will be welded with the Inlet Check Valve (ICV) in the welding section. After welding the tank moves to the assembly section.

Assembly Section

The fuel pump will be assembled in the fuel tank in the assembly section. The tanks will be checked for any leaks post the assembly and will be moved to the storage area after successful testing.

Testing Lab

TI Automotive has a Test Lab which helps to ensure the quality of each and every individual product manufactured by them. Individual test rigs are there for testing the components. The different tests done by them are:

- ✓ Baking Test – Heating at 160^{o}C
- ✓ Peel Test – Check the bonding of Adhesives
- ✓ Flower Test – Check the welding strength
- ✓ Layer Test – Ensuring the proportion of all layers using Microscope
- ✓ HAZ – Examining the Heat Affected Zone

Advantages of Plastic Fuel Tanks

- ❖ **Weight reduction**, thus better fuel economy and lower CO2 emissions: an average plastic tank weighs one-third less than an average steel tank.
- ❖ **Tank durability and biofuels compatibility**: plastic fuel tanks made of high-density polyethylene (HDPE) are corrosion-resistant without any need of special coatings, making it also compatible with all kinds of bio-fuels. In addition, HDPE can help dissipate electrostatic charge and prevent igniting fuel. Also, several studies demonstrated the superiority of plastics in terms of Life Cycle Assessment.
- ❖ **Design freedom allowing space economy**: Due to the flexibility of this material, fuel tank systems made of plastics can be designed to fit the exact given space on the car chassis, thus increasing fuel storage capacity.
- ❖ **Noise attenuation**: insulating properties of plastics allow to reduce fuel system related noises and offer innovative and efficient solutions to control the fuel behavior and soften the slosh impact.
- ❖ **Low permeability**: With the advanced composite structures and functional component integration allowed by plastics, combined with efficient process innovations.
- ❖ **Crash worthiness**: through high impact performance, **Fire resistance**
- ❖ **Suitability for hybrid power trains**: plastic fuel tank systems are fully compatible with hybrid power trains and only a few minor adjustments on fuel system components are required. Enabling high design freedom and integration feasibility, plastic fuel tank systems require only minor component adjustments to be fully compatible with hybrid powertrains.

- **Cost effectiveness** achieved through the combination of great design and manufacturing flexibility for complex shapes, mechanical and chemical resistance, and quantity of material to be used. Besides, plastics can be processed at lower temperatures than steel or glass.

Factory Visit Champion - Mr. K. Muniyappan, RNTBCI

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