| 講演番号 | 055 |
| --- | --- |

| 文献番号 | 20225055 |
| --- | --- |

# High-Pressure Hydrogen Tank for FCEV

**Yuji Kuriyama [1)] Yoshiaki Kameda [1)] Takashi Mitsuda [1)]**

*1)TOYODA GOSEI Co.,Ltd*
*1 Haruhinagahata Kiyosu,Aichi, Japan 452-8564*

**KEY WORDS**: **Hydrogen tank, Composite material, Forming process,** TypeⅣ tank (A3)

The automobile industry is accelerating the development of electric vehicles toward the achievement of "2050 Carbon Neutral". In order to accelerate the spread of FCEVs, we developed the high-pressure hydrogen tank, which is one of our main products, with the aim of improving productivity and reducing costs, and in 2020 we mass-produced the second-generation new MIRAI hydrogen tank.

This tank is called Type IV and consists of a three-layer structure consisting of a resin liner, carbon fiber reinforced plastic (CFRP), and glass fiber reinforced plastic (GFRP) from the inner layer (Fig. 1).

Since the liner is made of resin, it has high fatigue resistance and low specific gravity. The amount of carbon fiber used can also be reduced, making it possible to reduce weight and cost. On the other hand, since there are problems with the hydrogen permeability of the material and the temperature dependence of the physical properties, the legal requirements were satisfied by modifying the material and performing the optimum design.

As a point of development, "injection molding + welding" was adopted as the molding and processing method of the resin liner because the wall thickness and physical properties are uniform and the processing time can be shortened. The material is based on PA6, which has high heat resistance, and has been modified to improve impact resistance at -50 ° C or lower, hydrogen permeability, and fluidity so that products with long product lengths can be molded. Injection molding has advantages such as thinning, uniform physical properties, and dimensional stability, but depending on the material, the weld at the fusion point reduces the physical properties of the product (impact strength, durability, etc.).In order to solve this problem, we adopted the ring gate specification and succeeded in zeroing the weld.

CFRP improved the epoxy resin, suppressed the entanglement during FW, improved the invasiveness to the fiber, and was able to significantly shorten the epoxy curing time. In FW machining, the winding device was simplified and the control was improved to increase the speed, resulting in a significant reduction in machining time. In addition, the quality could be stabilized by automatically inspecting the winding state of the fibers.

In the future, FCEVs will reach the popularization period in 2025 and the expansion period in 2030, and it is expected that they will be expanded to various vehicle types and their use for mobility other than automobiles. In addition, further weight reduction and low cost are required.

For this reason, in resin liners, we will develop materials that further improve hydrogen permeability and fluidity for thinning.In CFRP, we will develop epoxy materials to further shorten the curing time. In addition, in the carbon fiber, I push forward the innovation including the method of construction in the material maker. I realize these early and want to contribute to spread of FCEV expansion with Japanese overall collective strength.

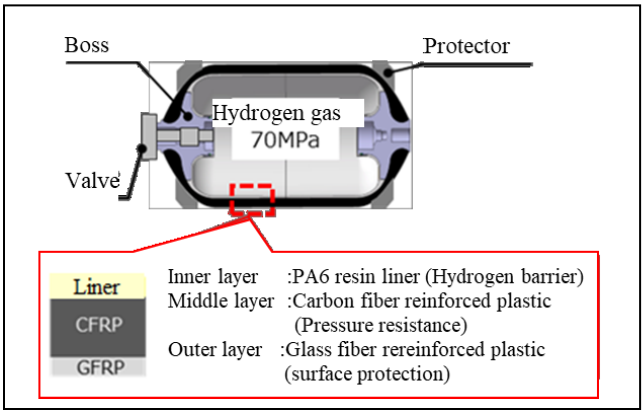


Fig.1 Structure and Function of the High-Pressure Hydrogen Tank