

Fuel Cell Stack Assembly

The FC stack assembly is made up of the FC stack, FC boost converter, and auxiliary component assembly (hydrogen circulating pump, etc.). Integration of the assembly contributes to reducing the size, weight and cost.

Fuel Cell Stack

The new FC stack assembly is made up 370 cells that generate electricity. Hydrogen and oxygen from the air are supplied to each cell, where a chemical reaction generates electricity. Development of cells that increase power generating performance made possible the creation of smaller and lighter FC stack with higher performance. The new stack achieves volume power density at the world's highest level and can be installed below the vehicle floor.

New fuel cell stack (Mirai)	
Maximum output	114 kW (155 PS)
Volume power density/Mass power density	3.1 kW/L (World top level *3)/2.0 kW/kg
Volume/Weight	37 L / 56 kg (Cell + fastener)
Cell	Number of cells in one stack: 370 cells (single-line stacking)
	Thickness: 1.34 mm
	Weight: 102 g
	Flow channel: 3D fine-mesh flow field (cathode, world-first*)
Mounting position	Under floor (Sedan)

Toyota FC stack
 Type: Polymer electrolyte fuel cell
 Maximum output: 114 kW (155 PS)
 Volume power density: 3.1 kW/L (world top level)*
 Humidification system: Internal circulation system (humidifier-less; world-first)*

Fuel cell boost converter
 Max. output voltage: 650 V
 Number of phases: 4 phases

Auxiliary components
 Hydrogen circulating pump, etc.

* As of November 2014, Toyota data

Fuel Cell Boost Converter

The FC boost converter steps up the FC stack voltage to a maximum of 650V. This makes it possible to reduce the number of cells in the FC stack while making the system more compact and lighter. In addition, using the same voltage as as current hybrid vehicle units allows the use of motors, drive batteries, power control units, and other components from hybrid vehicles, increasing reliability and greatly reducing costs.

MIRAI

Fuel cell stack
 Fuel cell boost converter
 Power control unit
 Motor (650 V)

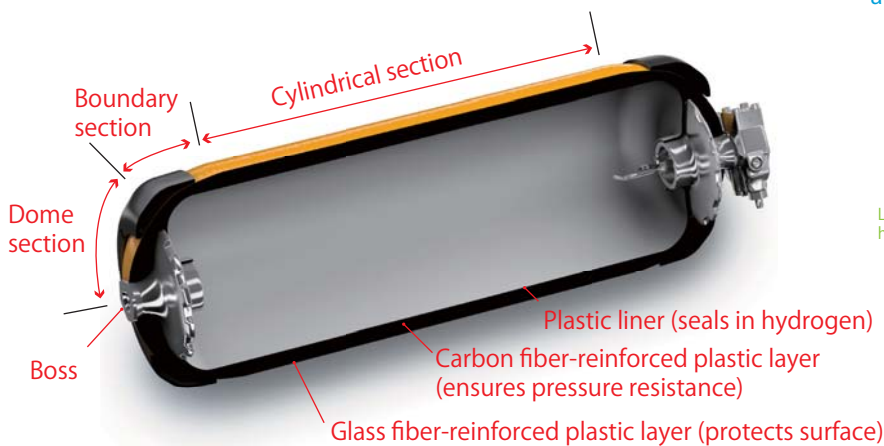
Fuel cell boost converter

Maximum output voltage	650 V
Volume	13 L
Number of phases	4 phases
Cooling method	Water-cooled

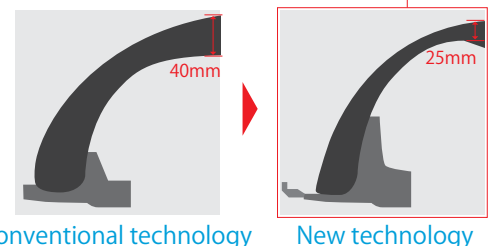
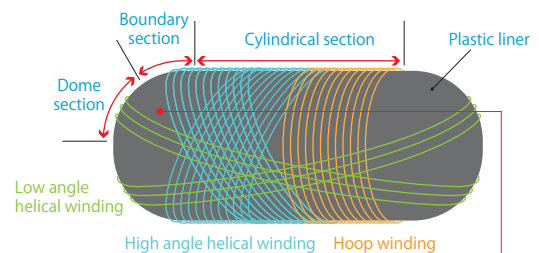
High Pressure Hydrogen Tank

The high-pressure hydrogen tanks are made of three layers: a plastic liner that seals in the hydrogen, a carbon fibre reinforced plastic layer that increases pressure capacity, and a glass fibre reinforced plastic layer that protects the surface. Improvements to the plastic liner configuration and higher layering pattern efficiency make it possible to reduce the amount of carbon fibre

reinforced plastic used by about 40%, which reduces the weight. The tanks boast storage performance at the world's highest level: (5.7 wt%).



Innovations to the plastic liner configuration and efficient layering pattern resulted in a reduction of approximately 40% in the amount of carbon fiber used



High-pressure hydrogen tank

Nominal working pressure	70 MPa (approx. 700 bar)
Tank storage density	5.7 wt% (world top level*1)
Tank internal volume	122.4 L (front tank: 60.0 L, rear tank: 62.4 L)
Hydrogen storage mass	Approx. 5.0 kg

*1 As of November 2014, Toyota data