

A New Fuel Cell Hybrid Test Vehicle Completed - Compact and High-Performance -

RTRI has been developing a next-generation train, fuel cell hybrid train which uses hydrogen energy in order to save fossil energy and reduce the environmental footprint, and has completed a test vehicle that is close to practical use. Considering the deployment to many commercial-service lines, this vehicle has allowed a larger cabin space by reducing the size of the on-board apparatus and improving its performance and has boosted its traction power output and startup acceleration.

[Major characteristics]

- 50% increase in the power output of the fuel cell and 20% decrease in the volume per output by raising power density and dispersedly locating the cooling apparatus.
- The volume of the power converter for fuel cell has been reduced 45% by adopting silicon carbide element and compact circuit breaker.

With these advantages, this test vehicle will speed up future introduction of fuel cell vehicles by railway operators.

[Previous test vehicle]

Since the Paris Agreement took effect, further reduction of greenhouse gas has been required. RTRI has been developing a fuel cell railway vehicle that will be able to reduce greenhouse gas emission by replacing diesel engine vehicles powered by fossil fuel. Since 2008, we have conducted running tests on our test track using a fuel-cell-battery hybrid test vehicle and confirmed its basic performance. However, the vehicle in that stage had larger onboard devices and some of them were laid in the cabin, and its acceleration performance remained at the same level as diesel cars.

[Outline of the new test vehicle]

Figure 1 and 3 show the test vehicle and its cabin. The layout of devices and vehicle performance are shown in Figure 2 and Table 1 respectively.

[Development for the next phase]

By continuing the running tests on RTRI's test track, we will improve the controlling method for the hybrid system in order to raise the energy efficiency and develop a method to reduce the load to fuel cell.

- ✧ Part of this development has been implemented with the subsidy for railway technical development by the Ministry of Land, Infrastructure, Transport and Tourism.



Figure 1 New test train

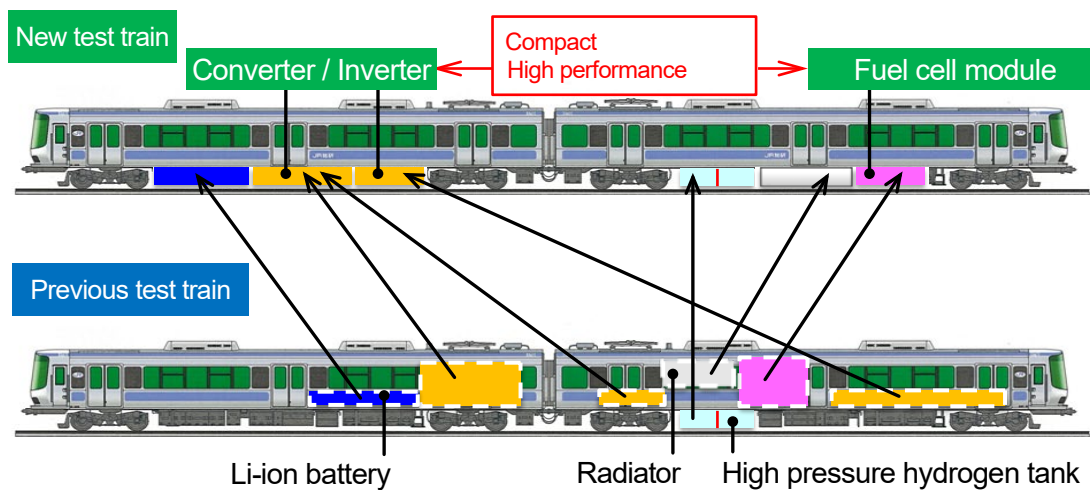


Figure 2 Layout of devices

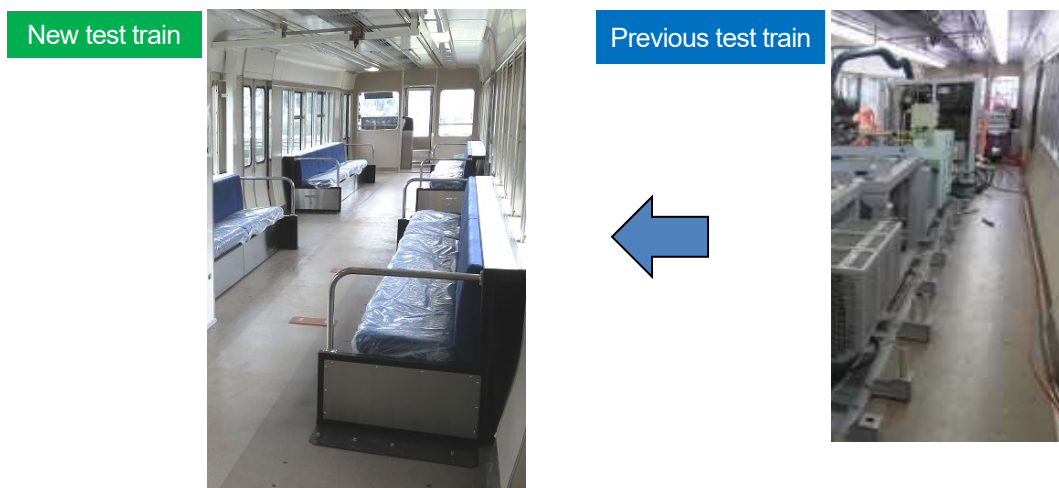


Figure 3 New cabin without devices

Table 1 Test train performance

Item	Performance	Previous performance
Startup acceleration	2.5 km/h/s	1.5 km/h/s
Number of drive shafts per trainset	2 bogies 4 axles	1 bogey 2 axles
Trainset power output (fuel cell output (net))	690kW (150kW)	460kW (100kW)