RTRI Fuel Cell Train

-FC Application to the Traction System-

1. Back Ground

The issue of Diesel Traction System

-Non-Recuperative Brake

-Emission (CO_2, NO_x SO_x)

-Noise and Vibration

Solution!

PEMFC with Energy Storage System

FC Commuter Train

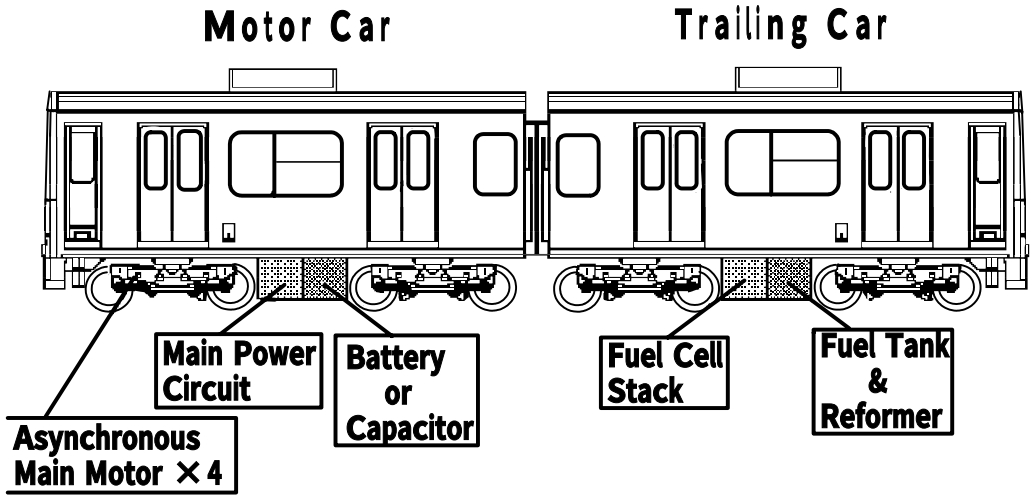
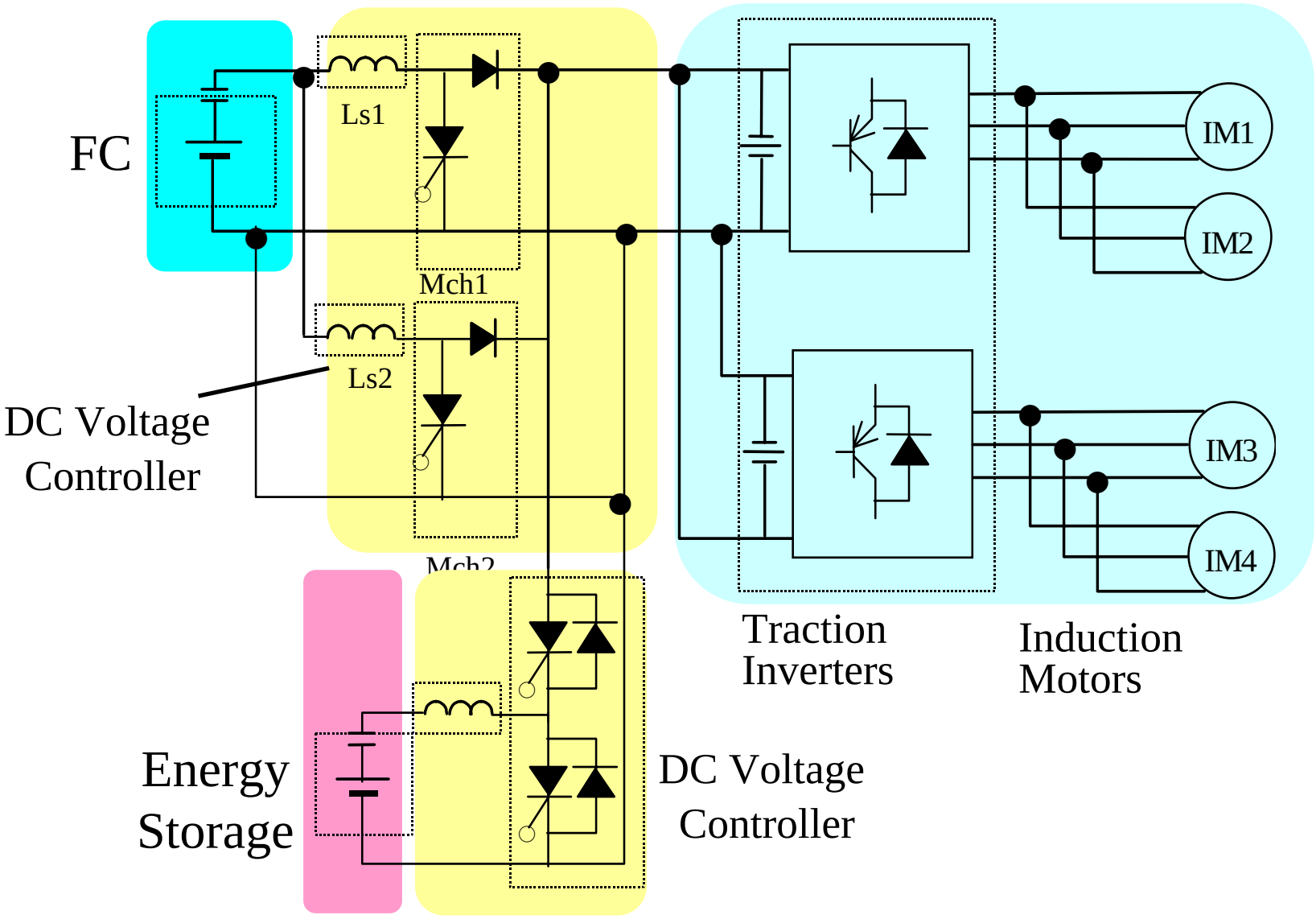


Table2. Specification of the FC train

Train Set	2Cars
Mass of Train sets (t)	62
Vehicle Dimensions (m)	20.0×2.8×3.9
Total Output(preliminary) (kW) Fuel Cell System Battery or Capacitor	600 450- 150
Maximum Speed(km/h)	110
Passenger Capacity	280
Running Distance (km per day)	300～400

FC train traction system.



Benefits on Energy Consumptions

The Assumption for the Evaluation.

Items	Values
The Running Distance	26 [km]
Stops	11
Running Time	32 [min]
Max. Speed	80 [km/h]

Result of Simulation

- DMU 1850MJ
- FC Vehicle 765MJ

(60% Fuel to Wheel Energy Saving!)

Request for FC

State of Art of Fuel Cell.

Items	Required	Current	Future(2010)
Power Density (kW/kg)	0.2～0.23	0.2 (Auto:0.5-1.0)	0.3-0.4? =>OK
Life time (Hour)	35000-40000 (4-4.5 Year)	Max 10000 (for CRU)	50000?
Cost (USD/kW)	100	10,000	???
Robustness	30[Hz] -0.5[G] (JIS4031)	Graphite =>NG?	Metal =>OK
Temp. (C)	-40-50	0-50	-40-50

Issue to be solved

Life time and Cost

H_2 Supply and Storage

Options (on Board System.)	Benefits	Back draws
Pure H_2 (MH)	Less volume. Less loss on fueling	Heavy weight
Pure H_2 (Comp)	Light weight	More volume More loss on fueling
Pure H_2 (Lq.)	Longer running distance	More loss on fueling
On board Reforming	Longest running distance	On-board reformer. More loss on reform.

As of first stage

Compressed H_2 on board

(Light weight and less energy loss to refuel H_2)

First in Test!

Thank you for your attention!