

Eurailspeed

Parallel Session D.3

Toshihide Uchimura

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Hitachi Ltd., Japan**



Under the patronage of



Organisers



Partners



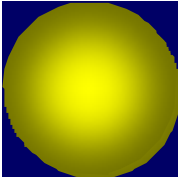
Media partner



***Development Philosophy
of
High Speed Rolling Stock
in Japan***

Toshihide Uchimura

General Manager, HITACHI, Ltd., Transportation Systems



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1. High Speed Railway in Japan (1)

Challenge of Rolling Stock Development

Safety

High Reliability

Low Interior Noise

Good Riding Comfort

Reduction of Exterior Noise

*Innovative
Solution*

High Speed

1. High Speed Railway in Japan (2)

SAFETY

Zero injury for 41 years

PUNCTUALITY

Average delay time
0.1 minutes / train

JAPANESE QUALITY

RELIABILITY

MDBF 2 million miles

1. High Speed Railway in Japan (3)

JR-EAST Fastech 360S

360 km/h
Technical target of
service operation

FASTECH 360 S

Series N700
The fastest rolling stock for
the Tokaido-Sanyo Shinkansen

JR-CENTRAL

Series N700 Shinkansen



1. High Speed Railway in Japan (4)

Philosophy of High Speed Railway Development

Key Issue of High Speed Railway

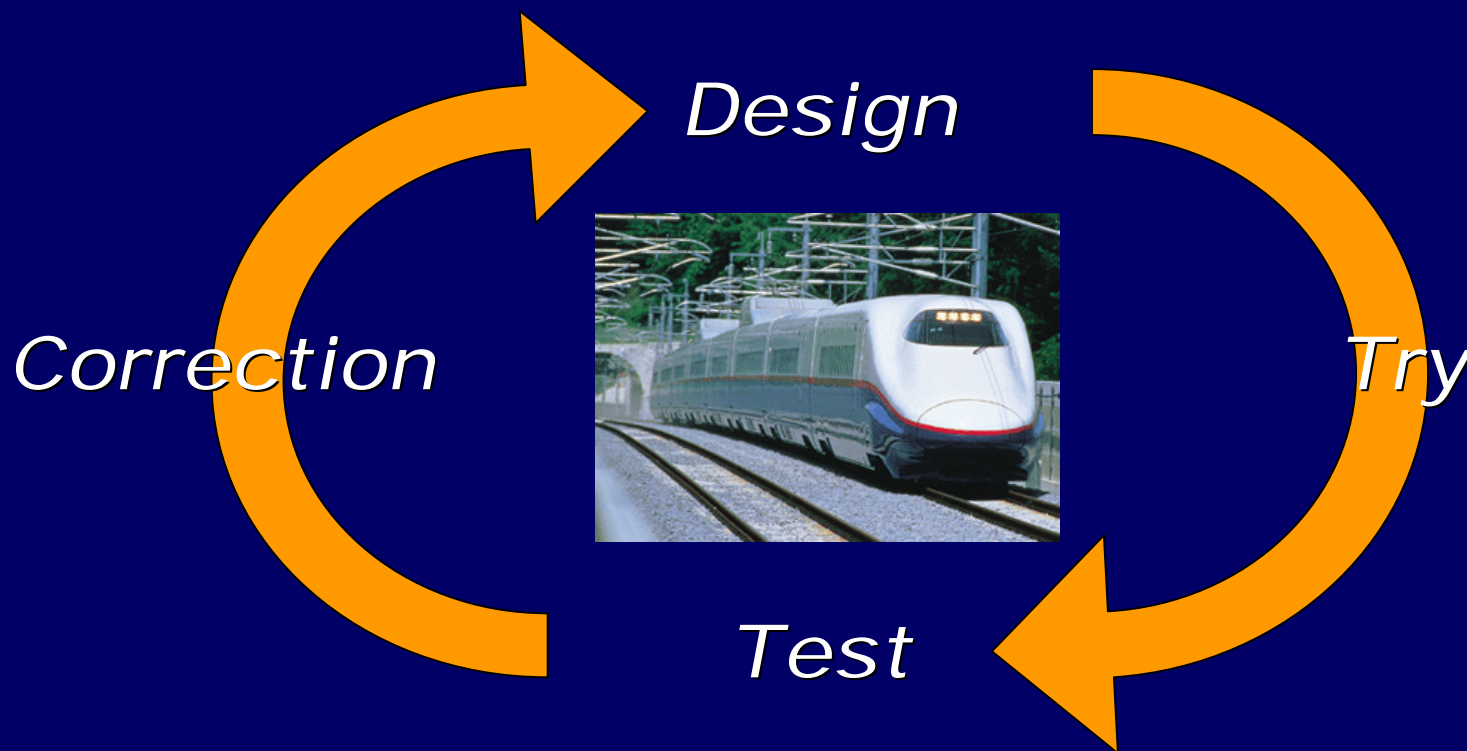
- *Front Nose Design of Rolling Stock*
- *Low Noise Track System*
- *New Type Signaling System*
- *Noise-proof Wall on Track*
- *...*

As a Total Railway System

Operator is Responsible for Leadership and Total Engineering

1. High Speed Railway in Japan (5)

Improvement Cycle of High Speed Railway



Continuous Improvement Cycle Ensures High Quality and High Reliability

1. High Speed Railway in Japan (6)

Operator's role is total system integration including rolling stock, track, catenary, signal and environment

Involvement from the initial stage of rolling stock development

Manufacturer's role is development of rolling stock with innovative solution

2. Hitachi Rail Division

Rolling Stock



Depot



Maintenance
supervisory system

Control Center



**HITACHI is Railway System
Integrator**

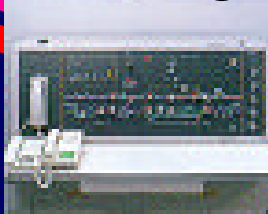
Substation



Transformer



Signaling



Interlocking Equipment



Station



Door Security Shutter Security Elevator Escalator Fire Alarm

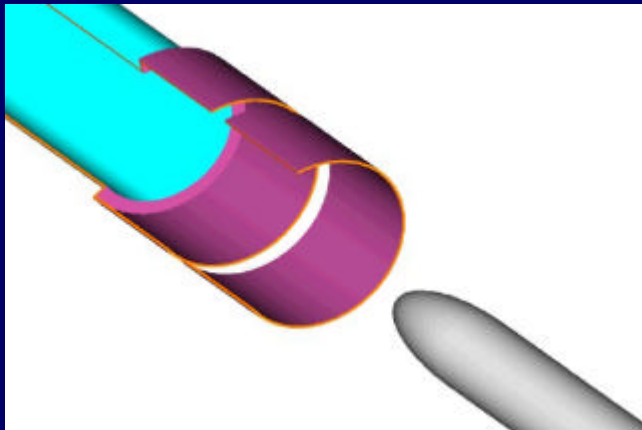
3. Simulation Technology (1)

Innovative technology by Manufacturer

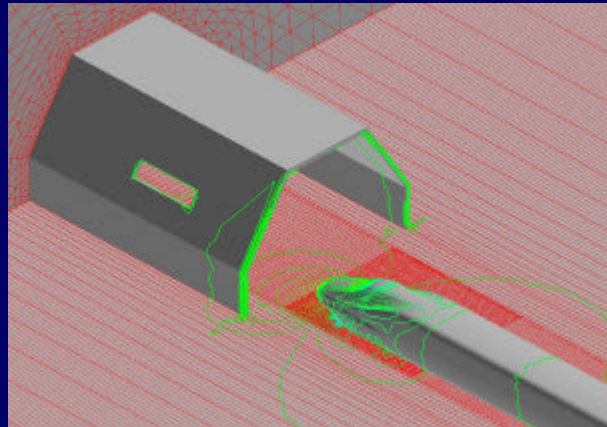
“Aerodynamics Design”

41 years experience in high speed tunnel operation

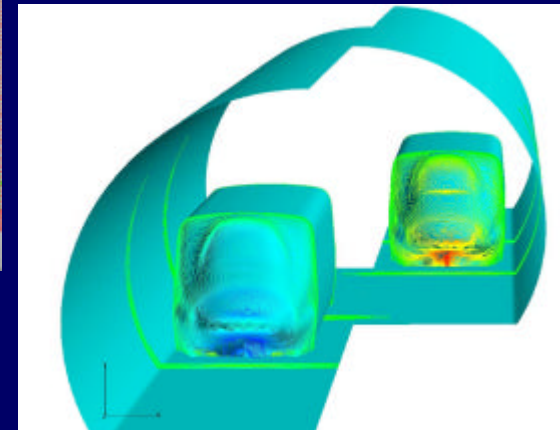
Axi-symmetric Model



3-D Design Model



Passing Simulation



3. Simulation Technology (2)

Innovative technology by Manufacturer

Analysis and simulation of external noise level

Ex. Analysis of External Noise Level (X-Array Microphone Method)

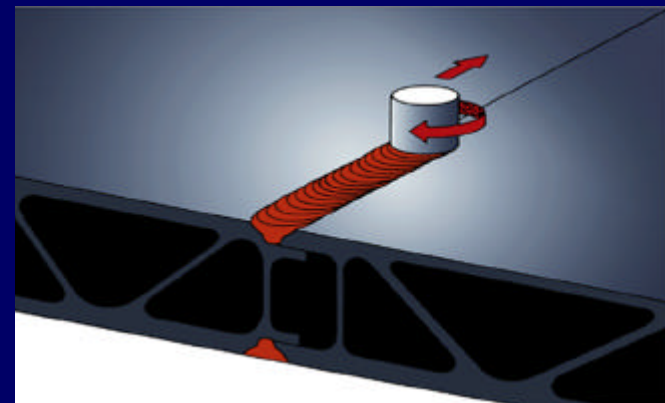
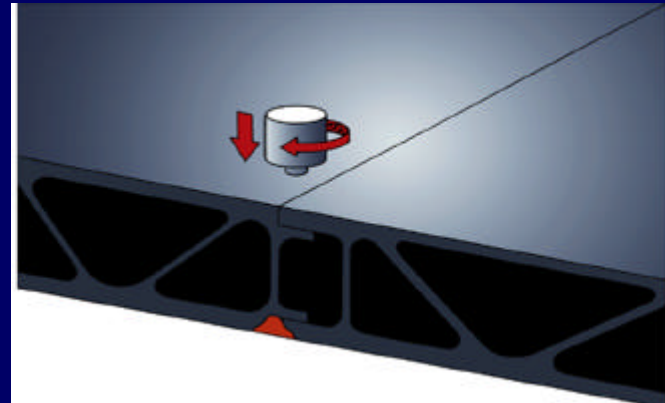


4. Manufacturing Technology (1)

Innovative technology by Manufacturer

FSW(Friction Stir Welding)

- *Minimised Distortion*
- *Smoother Surface Finish*
- *Higher Strength*
- *Best fit for modular design*



4. Manufacturing Technology (2)

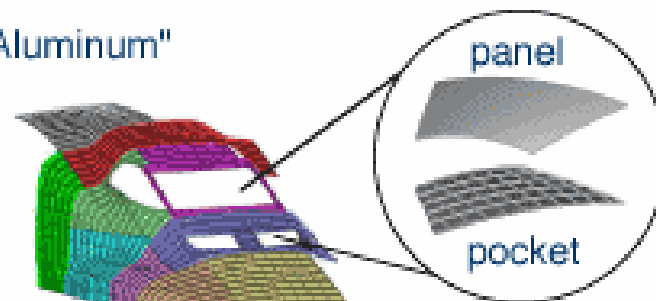
Innovative technology by Manufacturer

All Aluminum front end 3D NC Machine



After development:
"Integral rib panel structure"

"Aluminum"

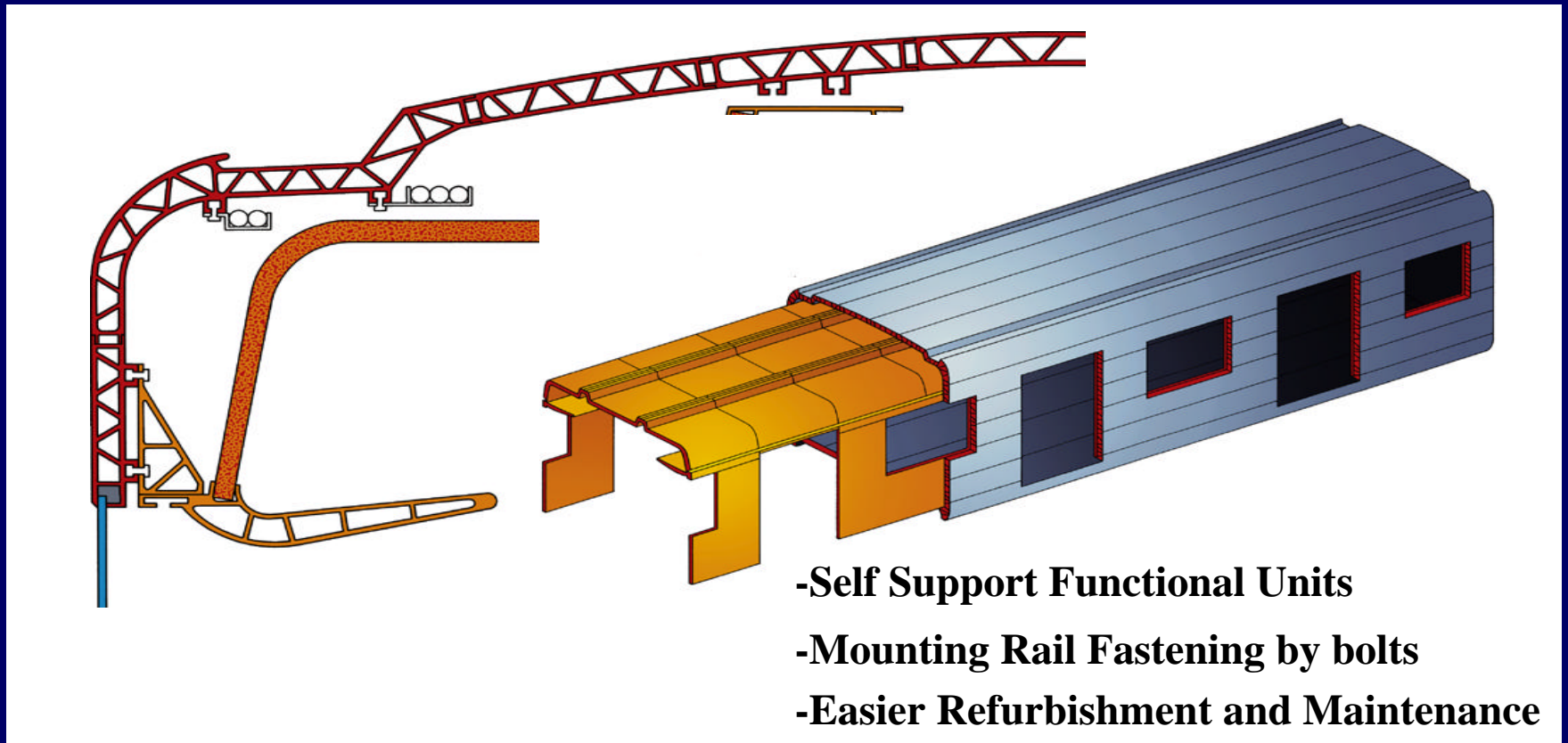


number of parts : 20 (-97%)
press forming and
high-speed cutting

4. Manufacturing Technology (3)

Innovative technology by Manufacturer

Modular construction for easier refurbishment and maintenance



4. *Manufacturing Technology (4)*

Corroboration for High Speed Rolling Stock Development

Operator

- *Interface Engineering*
- *Coordination*

Manufacturer

- *Simulation Technology*
- *Manufacturing Technology*



Achieve High Quality and High Reliability



5. Hitachi UK 'A-train' for CTRL-DS (2)

Approach to UK Market

Key Factor to Meet the Requirement from

- *UK Infrastructure*
- *UK Regulation*

Based on Japanese Quality

5. Hitachi UK 'A-train' for CTRL-DS (3)

Verification Train on UK Infrastructure

Network Rail/AC Running test : Dec 2003~

Network Rail/DC Running test : Feb 2004~

CTRL Running test : Mar 2005~

No failure during test

**Accreditation
of Safety Case**

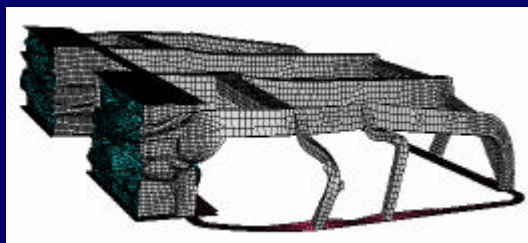
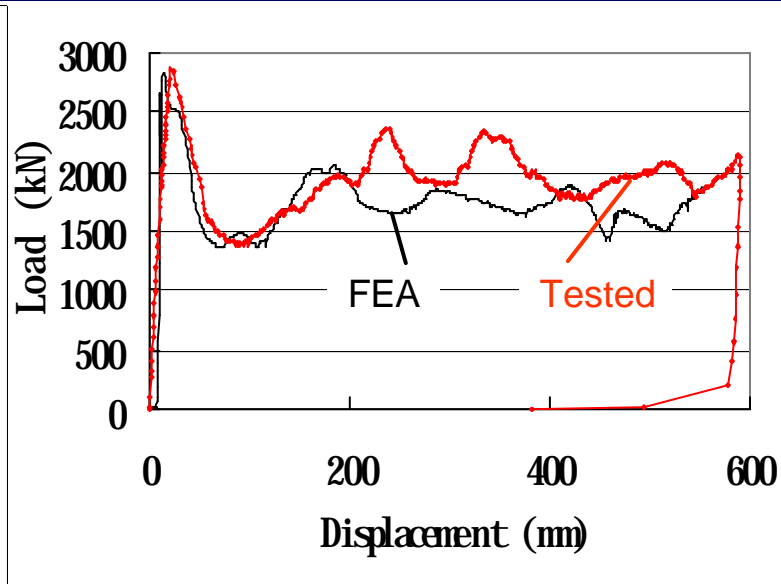
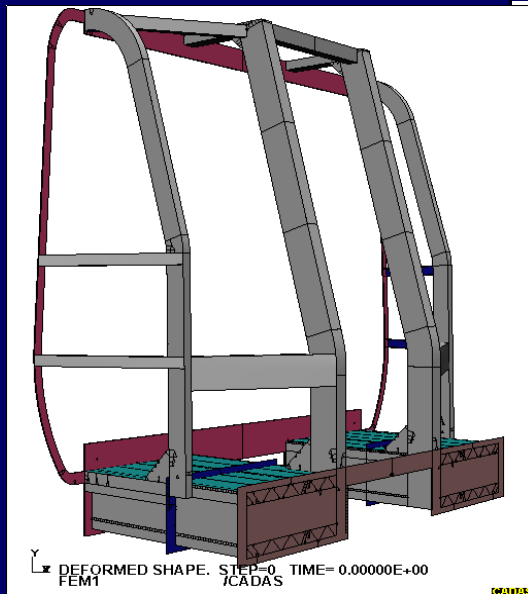


Hitachi Verification Train



5. Hitachi UK 'A-train' for CTRL-DS (4)

Verification of Safety Regulation Compliance Full Scale Quasi Crash Test



Comparison of Test Result and FE Analysis

Calculation results well agreed with test results



5. Hitachi UK 'A-train' for CTRL-DS (5)

Aerodynamics (Nose Shape etc.)

- Pressure change in tunnel
- Exterior noise < 87dB

Light Weight

- Unit weight : 268.5ton
- Track maintenance

Air Tight Body

- Fatigue strength
- Pressure sealed door

Sound Insulation

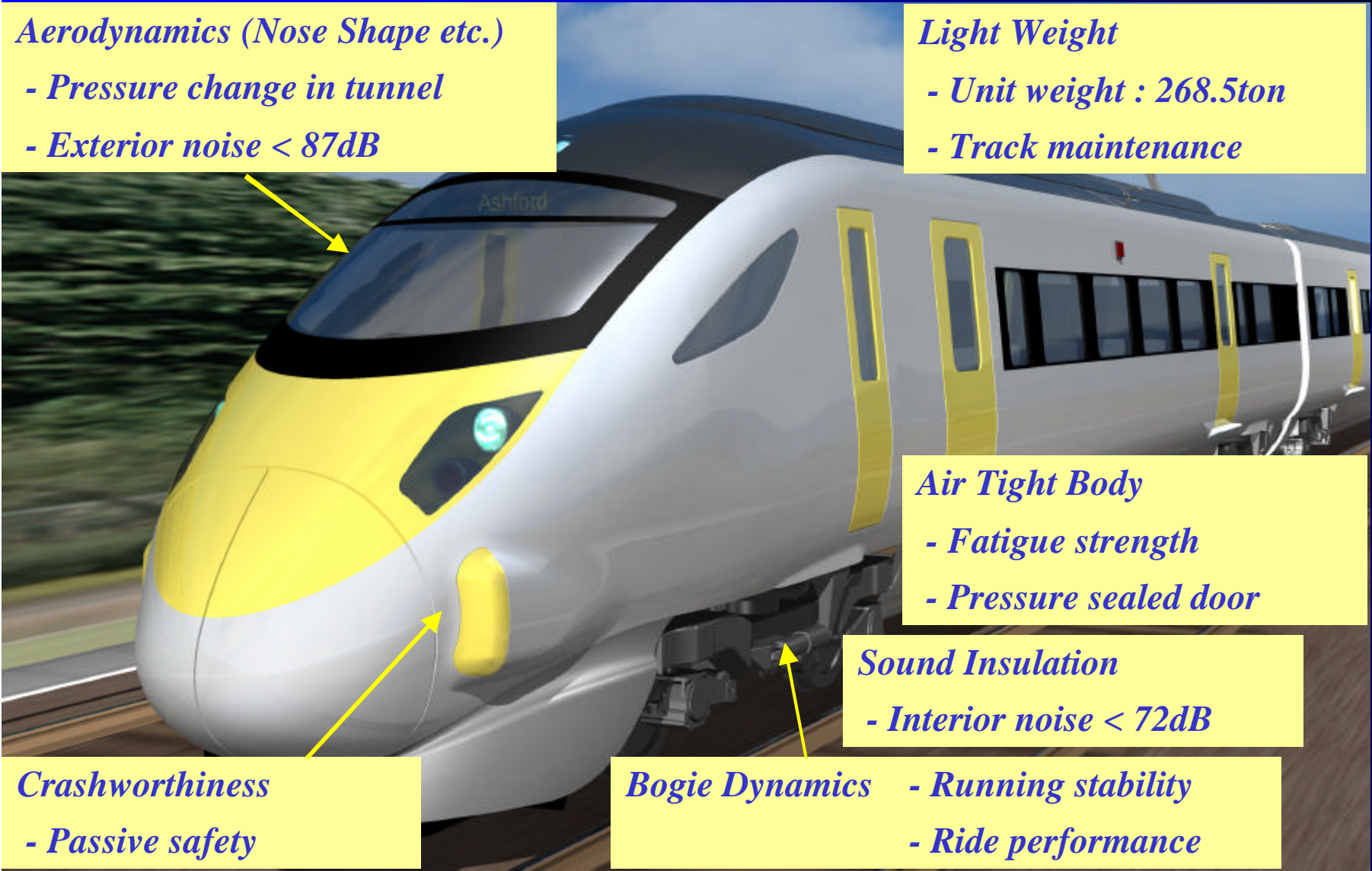
- Interior noise < 72dB

Crashworthiness

- Passive safety

Bogie Dynamics

- Running stability
- Ride performance





Thank you

Toshihide Uchimura

General Manager, HITACHI, Ltd., Transportation Systems