The Development of Korean Experimental High Speed Train HEMU-430X

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Design Concept

Based on......
Rotem’s Own Technologies & Know-How

To increase......
Speed
Strength
Aerodynamics Performance
Traction & Control Efficient
Passenger Capacity
Passenger Convenience

To reduce......
Weight
Drag Force & Energy Consumption
Noise & Vibration
Environmental Impact

and Advanced......
Power Distribution & Stabilized Bogie System

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Train Configuration

Test Train

6 Vehicles - 5M1T

T : Trailer
C : Cab
M : Motor

Motorized Bogie
Trailer Bogie

Operation Train

8 Vehicles - 6M2T

TC M1 M2 M3 M4 M5 M6 TC

Distributed Power
Vehicle Arrangement

**Test Train Layout (6 vehicles)**

1. TC
2. M1
3. M2
4. M3
5. M4
6. MC

Length: 147m

- Driver Cab
- First Class
- Business Class
- Test Lab.
- Family Room
- Snack Bar
- Economy Class

**Operation Train Layout (8 vehicles)**

1. TC
2. M1
3. M2
4. M3
5. M4
6. M5
7. M6
8. TC

Length: 197.6m

- Driver Cab
- First Class
- Business Class
- Snack Bar
- Family Room
- Economy Class

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Specification

- **Traction Type**: Power Distribution
- **Maximum Design Speed**: 430km/h
- **Maximum Operation Speed**: 370km/h
- **Train Length**: 147m (6 Vehicles), 197.6m (8 Vehicles)
- **Vehicle Length**: 25.5m (TC), 23.5m (M)
- **Vehicle Height**: 3,720mm
- **Vehicle Width**: 3,100mm
- **Axle Load**: Less than 14 tons
- **Carbody Material**: Aluminum
- **Minimum Track Radious**: 125m
- **Maximum Traction Power**: 182kN/Trainset
- **Maximum Acceleration**: 0.5 m/s² at 0 ~ 150km/h

**Traction Motor**
- Capacity: 410kW/Motor
- Control: VVVF inverter
Structural Analysis

Finite Element Analysis (FEA) Model for Carbody Static Strength Evaluation

“Aluminum Bodyshell”

Defined load case and performed FEA under the various load condition & Evaluate structural safety

Results of the vertical static load

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Aerodynamics

Aerodynamic Analysis Defined ……
- Pressure Variation in Tunnel
- Fluctuation Carbody External Surface
- Pressure Variation in Passenger Room
- Micro-Pressure Wave when the train enter into a Tunnel

Wind Tunnel Test ……
- Measure & Analysis Air Drag Coefficient
- Measure & Analysis Air Pressure Coefficient

Oil Spray Test
Wind Tunnel Test Facility
1/20 Scale Test Model

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Noise Reduction

Applied profile shape design for the carbody aluminum extrusion

Applied light weight & high capacity sound absorbing insulation

Applied special damping support to floor
Running Stability

Verified Bogie performance Through……

- Vehicle dynamic Analysis
- Structural Analysis
- Endurance Test for Wheel & Axle
- Roller Rig Test for Complete Bogie

Applied Active Control Function into Bogie
Through the Aerodynamic Analysis ……

- Verified Various Type of Pantograph
- Defined Optimized Pantograph Type
- Select Single Arm Type Pantograph

Through the Wind Tunnel Test ……

- Comparison of Aerodynamic performance
- Verified Optimized Elements Combination

Through the Active Control ……

- Maintained the Pressure between Catenary and Slider
- Guarantee the Pantograph Performance at High Speed
The development will be completed by Aug. 2012 and the test train will be running for 3 years to verify the reliability.
...Thank you for your kind attention