

# Module-based Design & Manufacturing in Rolling stock



2014.10.24

**Hyundai Rotem**  
R&D center



***Rolling Stock Market Status to date***

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***Modular Manufacturing in Rolling Stock***

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# Corporate Information

Hyundai Rotem, a Member of Hyundai Motor Group(HMG)



# Product : Rolling stock

## High Speed Trains



KTX-Sancheon, Korea      KTX-Honam, Korea

## Locomotives



KORAIL Diesel Electric Locomotive, Korea      TCDD Electric Locomotive, Turkey

## Light Rail Vehicles



Busan-Gimhae, Korea      Incheon#2, Korea

## Electric Multiple Units

### Metro Vehicles



MTRC Metro, Hong Kong      Athens Metro, Greece

## Diesel Multiple Units



IRICO Commuter, Iran      Irish Rail Intercity, Ireland

### Driverless Vehicles



Sao Paulo, Brazil      Canada Line, Canada

### Commuter Vehicles



TCDD, Turkey      SEPTA, USA

## Passenger Coaches



SCRRRA Bi-Level, USA      MBTA Bi-Level, USA



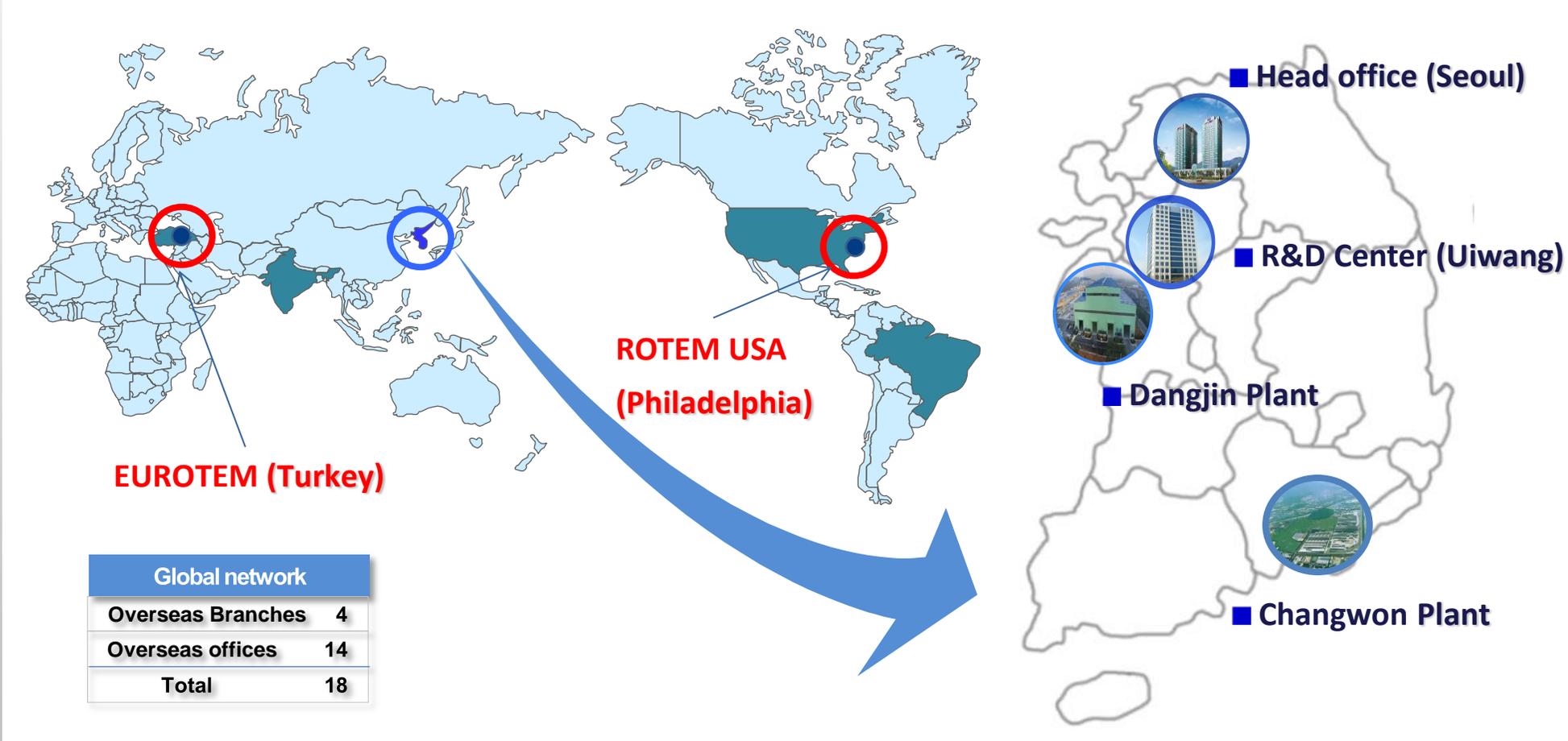
Incheon Airport MAGLEV



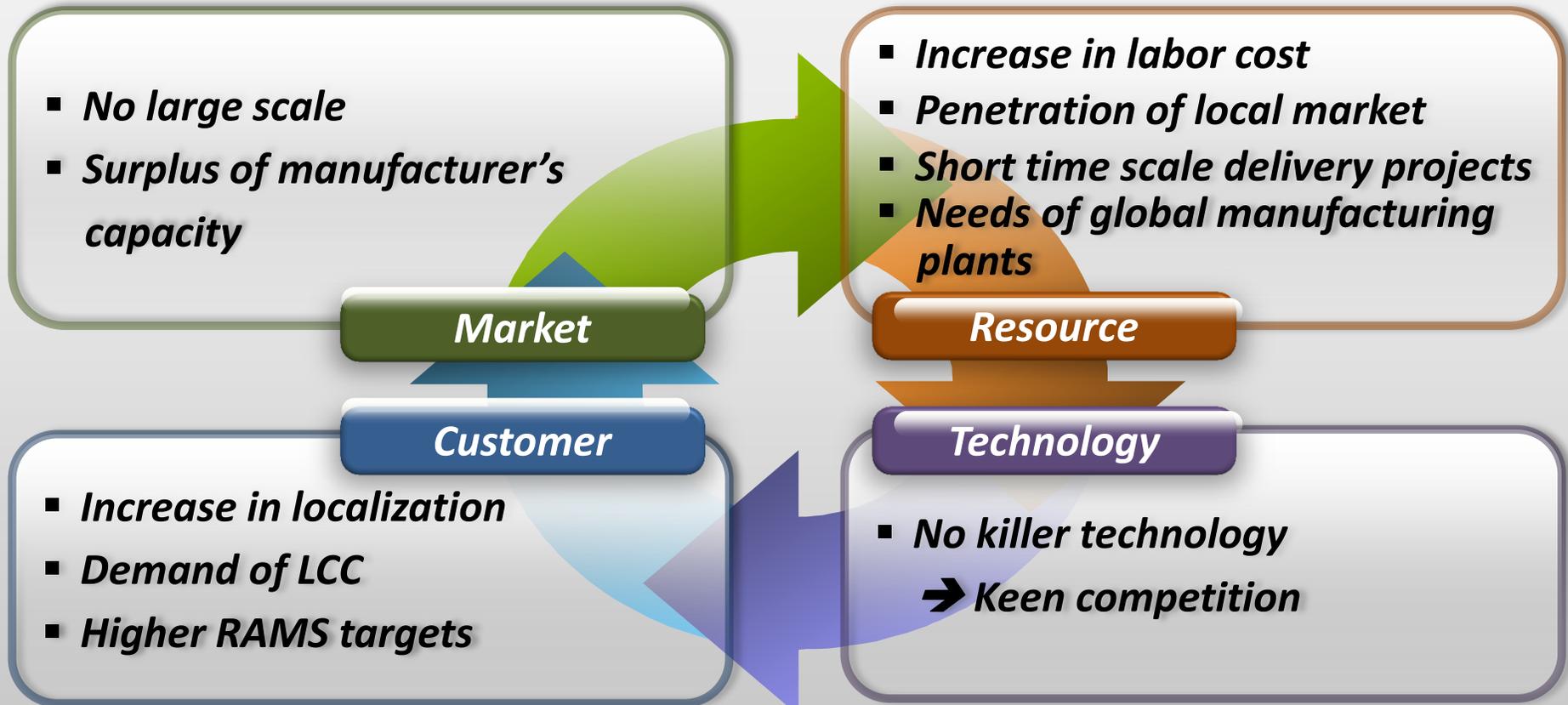
Wireless Hybrid Low Floor Tram

# Main Facilities

*Technology from around the world to markets around the world*



# Trend and Needs

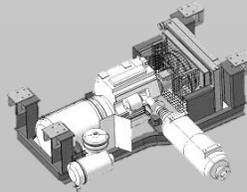
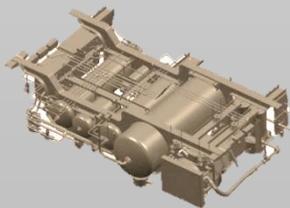
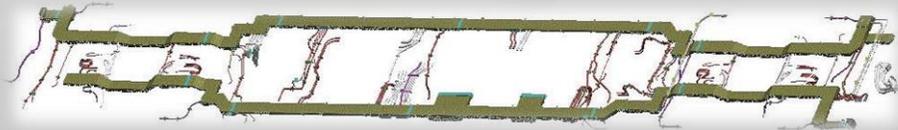
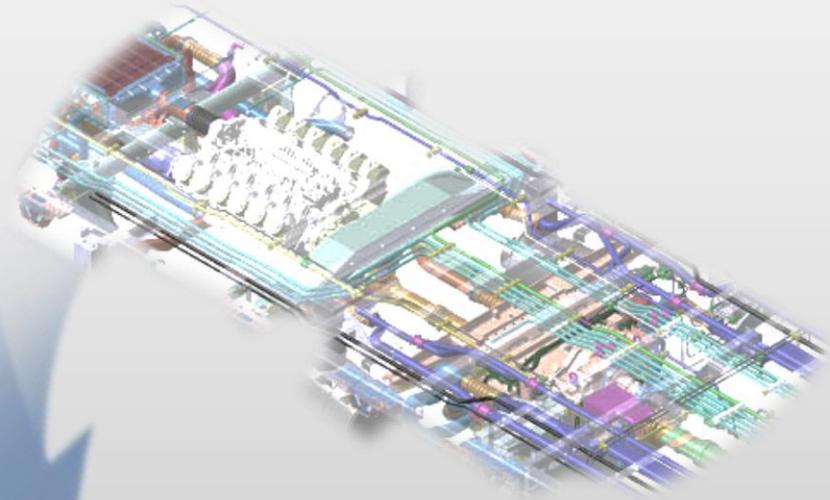


**Necessity for Manufacturing Methodology Innovations**

# How to Innovate?

- **Productivity improvement**
  - *Shorter lead time*
  - *Standardization & Design platforms*
  - *Simpler interfaces*
- **Competitive costs**
- **Demand for local manufacturing**

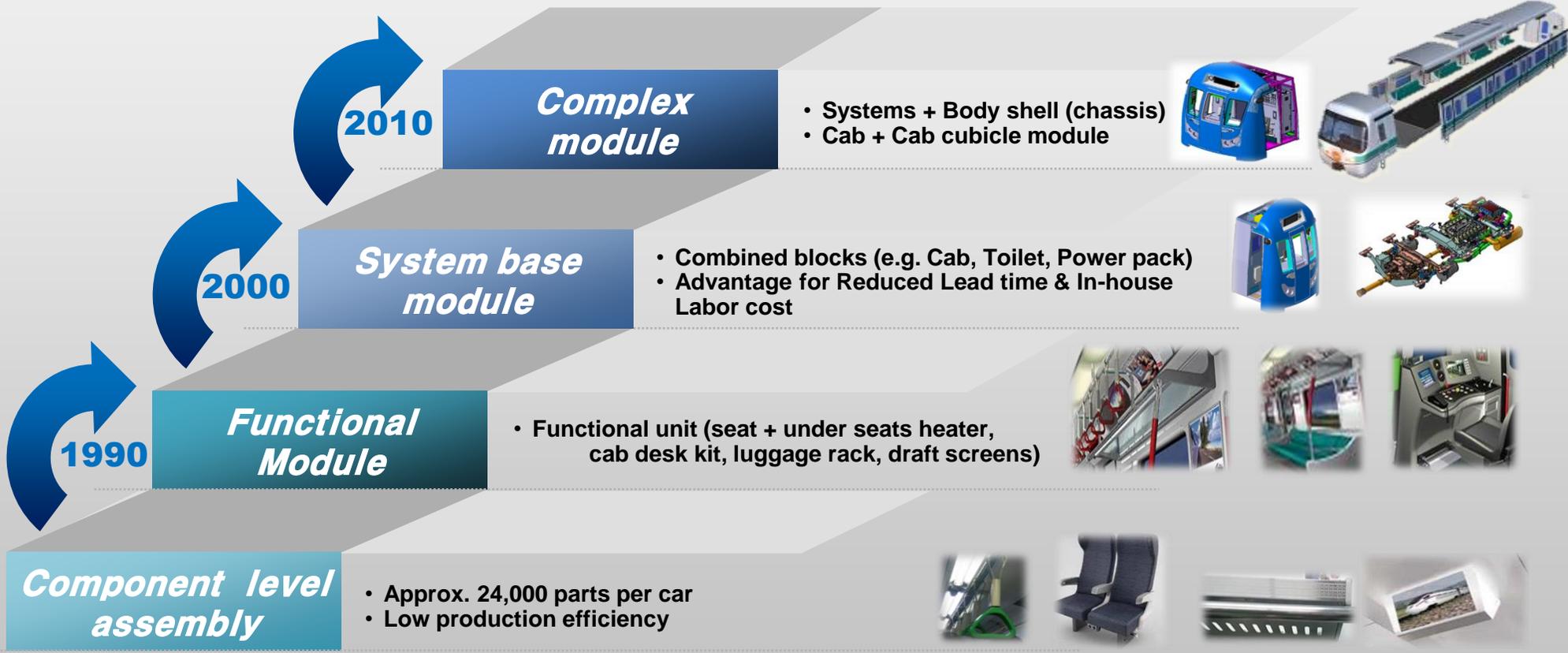
**Task**



- **Modular manufacturing**
- **Platform based designs**
- **New manufacturing technologies & materials**

**Methodology**

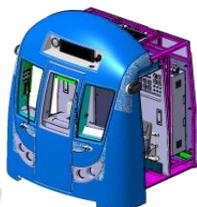
# Hyundai Rotem Modular Concept Evolution



# Status of Hyundai Rotem Module Scope

**① Driver's cab**

- Cab frame
- Desk module
- Cab mask
- Back wall & D/B
- Windshield/Wiper
- Lights / Interior trim



※ D/B : Distribution Board

**② Ceiling components**

- Insulation
- Air flow ducts
- Interior panels
- Air return grilles



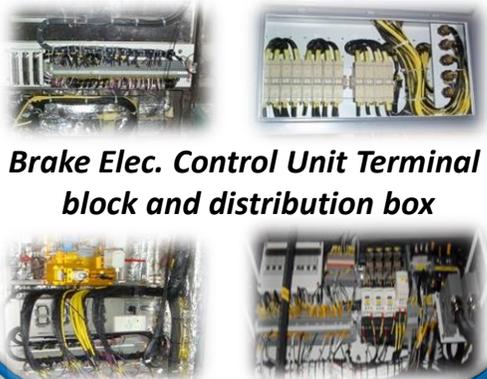
**③ Ceiling cable tray**

- Cable tray
- Wiring
- Elec. accessory
- Connectors



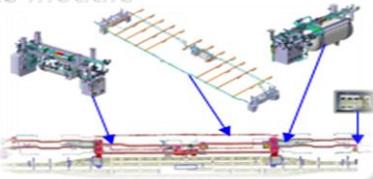

**④ Elec. Wiring conn.**

- Train Inform. Manage. System
- Terminal block and connection
- Brake Elec. Control Unit Terminal block and distribution box



**⑤ Under Frame module**

- Under frame complex modules
- e.g. Air brake module



**⑥ End Cubicle module**

- Distribution board
- Elec. equip.
- Interior panels



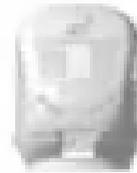
## Under Frame Construction with Module

### ① U/F complex module

*Cable harness & conduits*  
*Pneumatic components & piping*  
*Small electric equipment*

### ⑤ APU module

*Engine generator set*  
*Cooling system*  
*Accessories*



### ② Air brake module

*Compressed air supply Equip.*  
*Pneumatic brake control Equip.*  
*Reservoirs & piping*

### ③ Propulsion module

*Diesel engine module*  
*Transmission module*  
*Accessories*

### ④ Fuel tank (Locomotive/DMU)

*Fuel tank*  
*Filling cap*  
*Gauges and sensors*

# Advantages

- *Lower maintenance cost*
- *Higher availability*

*Customer*

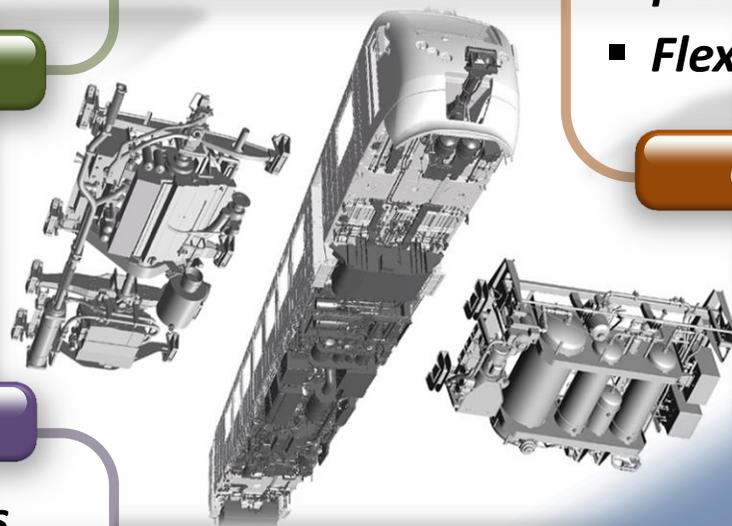
- *Shorter lead time*
- *Adaptation of various global plants to the business needs*
- *Flexible production capacity*

*Car builder*

*Sub supplier*

- *Increase business chances*
- *Package delivery*
- *Flexible production capacity*

**Win-Win Strategy**



# Conclusion and Direction



## Productivity

- *Shorter lead time*
- *Lower manufacturing & maintenance costs*
- *Flexible production capacities*

## partnership

- *Expand outsourcing range*
- *Win-win partnerships*
- *Reliable supply chains*

## Globalization

- *Corresponding to the global production plant*
- *Advantages of localization*

**Modular, an innovated manufacturing paradigm !**

Thank You !

HYUNDAI  
**Rotem**