

Module-based Design & Manufacturing in Rolling stock



2014.10.24

Hyundai Rotem
R&D center



Rolling Stock Market Status to date



Modular Manufacturing in Rolling Stock

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

Driverless Vehicles



Sao Paulo, Brazil



Canada Line, Canada

Commuter Vehicles



TCDD, Turkey



SEPTA, USA

Diesel Multiple Units



IRICO Commuter, Iran



Irish Rail Intercity, Ireland

Passenger Coaches



SCRRRA Bi-Level, USA



MBTA Bi-Level, USA



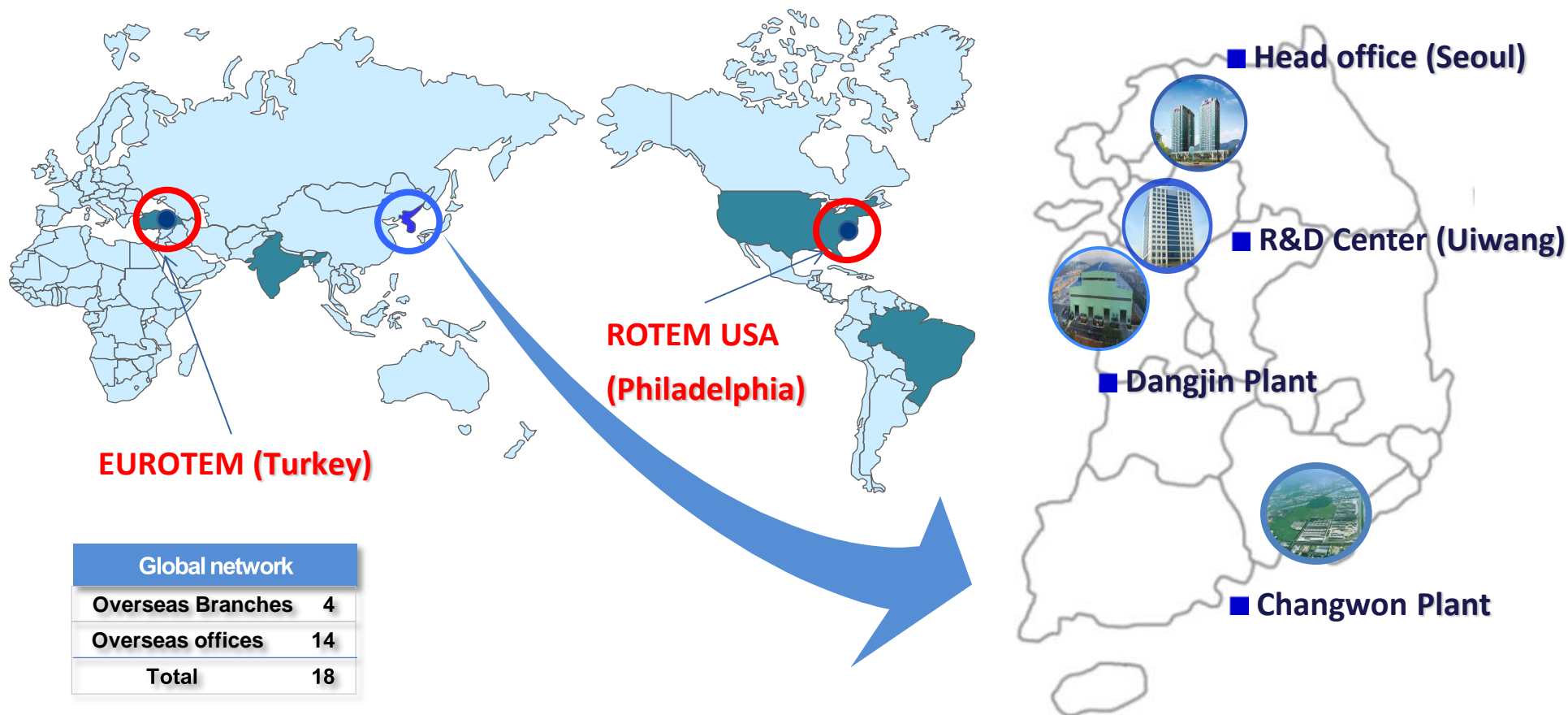
Incheon Airport MAGLEV



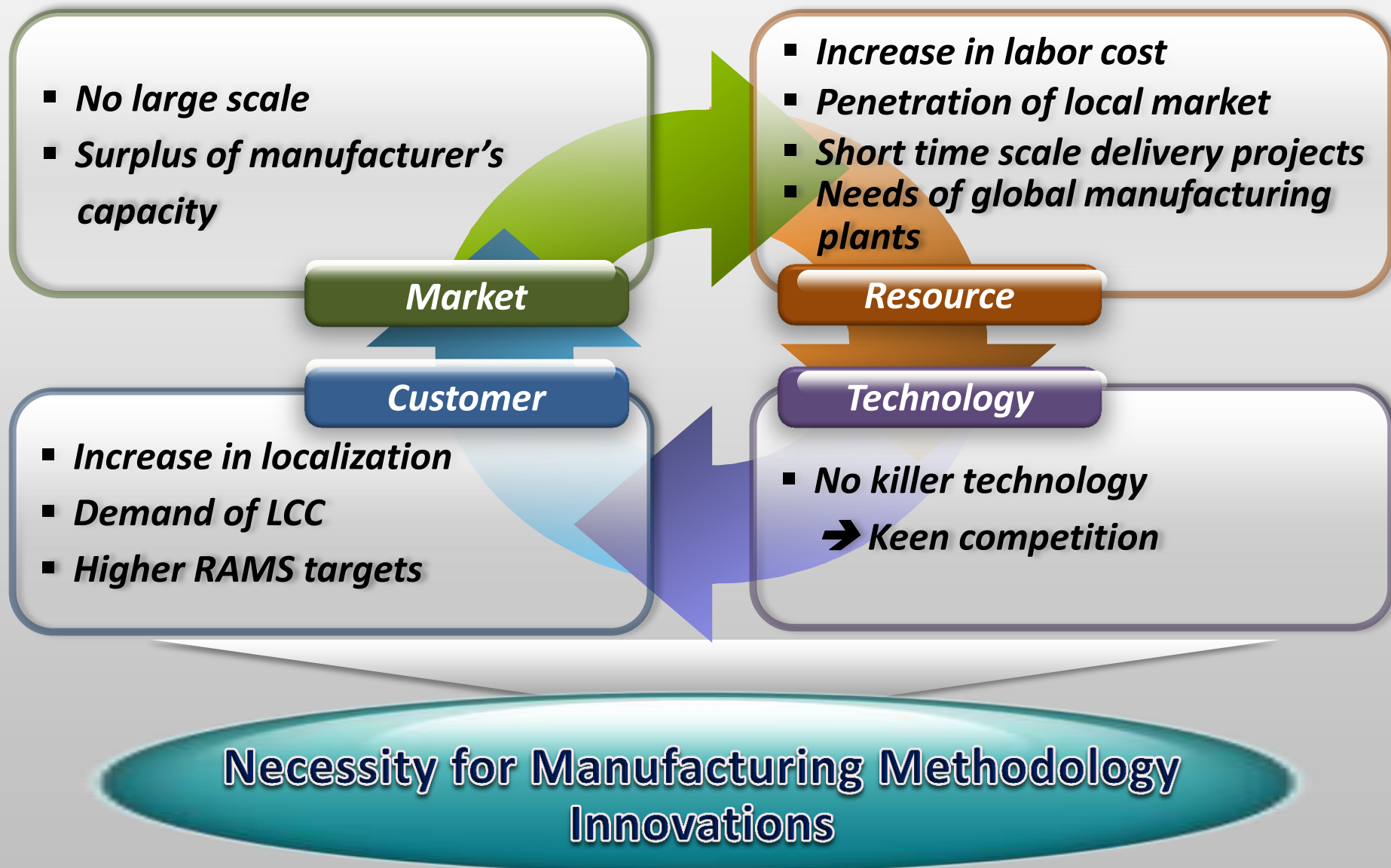
Wireless Hybrid Low Floor Tram

Main Facilities

Technology from around the world to markets around the world



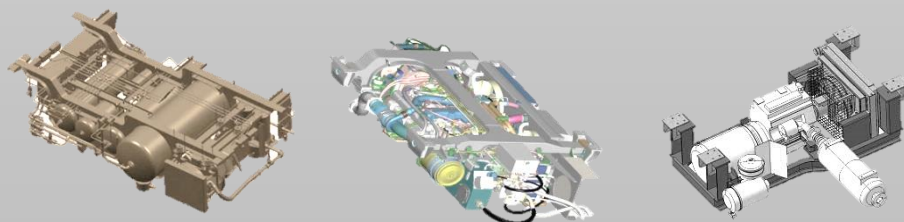
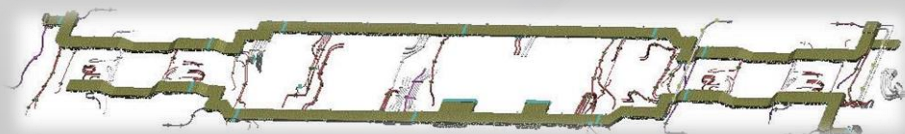
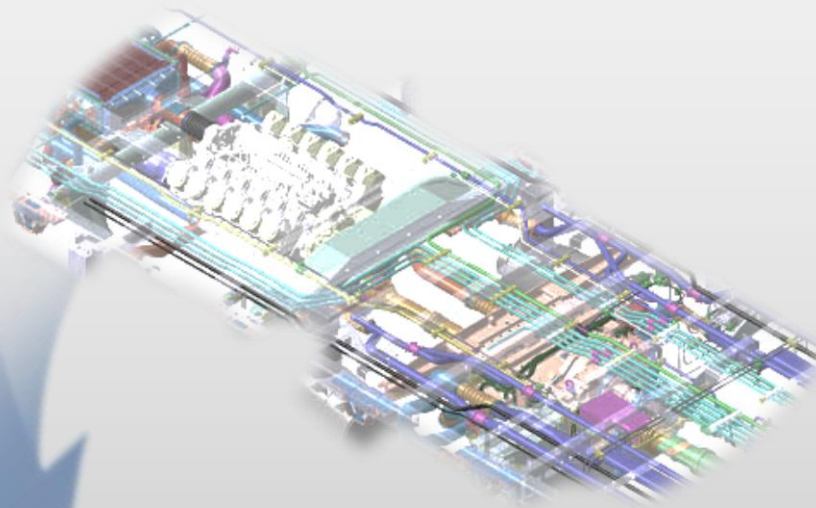
Trend and Needs



How to Innovate?

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

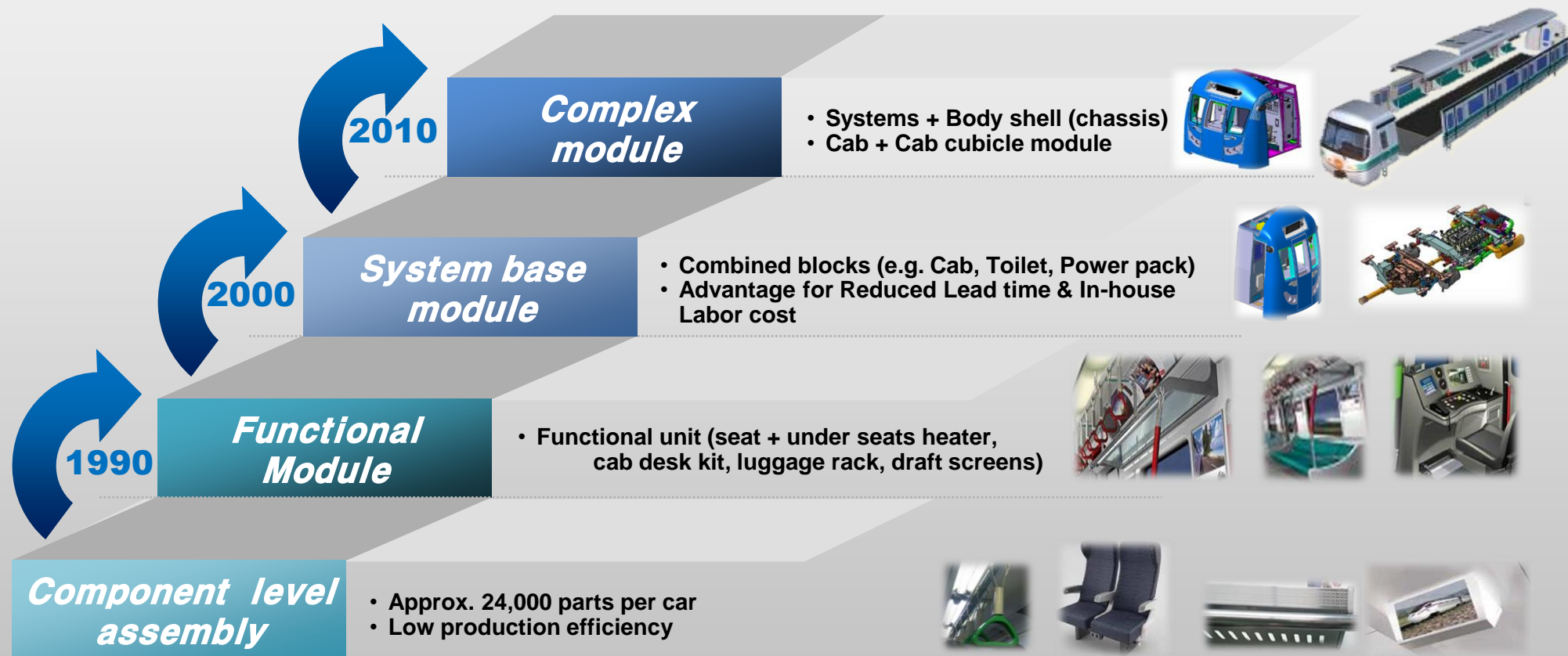
Task



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

Methodology

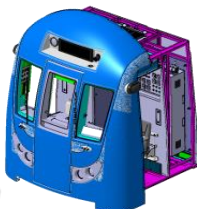
Hyundai Rotem Modular Concept Evolution



Status of Hyundai Rotem Module Scope

① Driver's cab

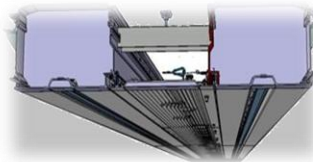
*Cab frame
Desk module
Cab mask
Back wall & D/B
Windshield/Wiper
Lights / Interior trim*



※ D/B : Distribution Board

② Ceiling components

*Insulation
Air flow ducts
Interior panels
Air return grilles*



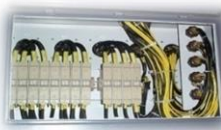
③ Ceiling cable tray

*Cable tray
Wiring
Elec. accessory
Connectors*



④ Elec. Wiring conn.

*Train Inform. Manage. System
Terminal block and connection*

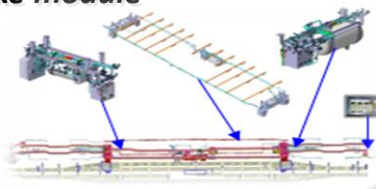


*Brake Elec. Control Unit Terminal
block and distribution box*



⑤ Under Frame module

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



⑥ End Cubicle module

*Distribution board
Elec. equip.*



Interior panels



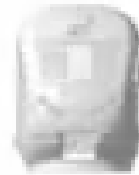
Under Frame Construction with Module

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*

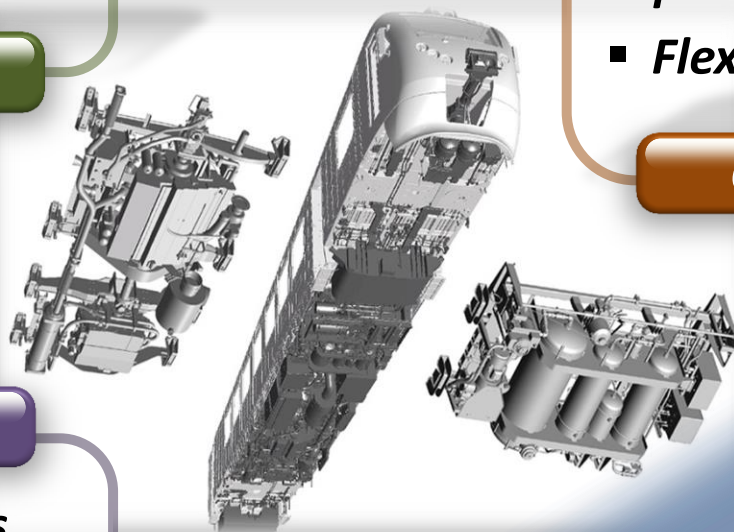
Customer

- *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