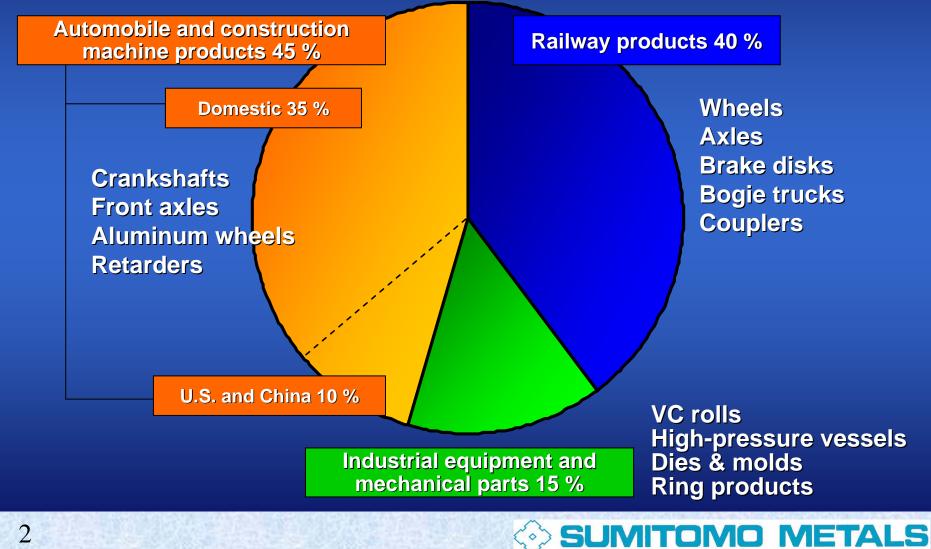
## Railway, Automotive & Machinery Parts Business Strategy

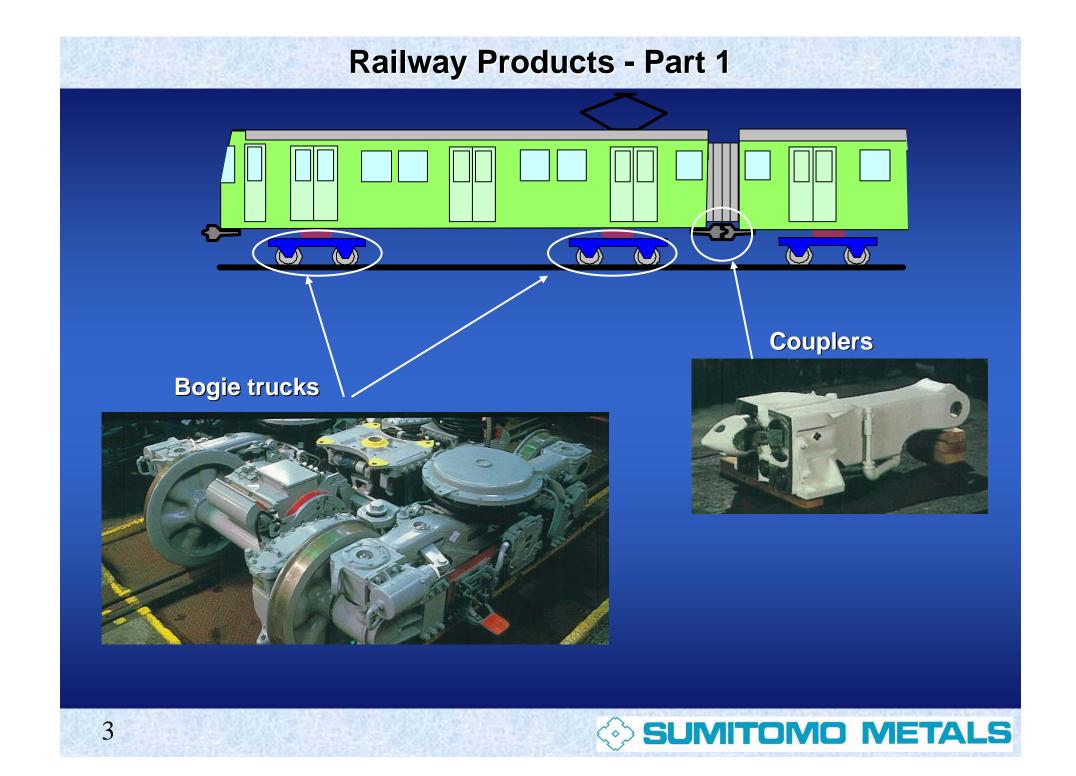
# Accelerating Distinctiveness –



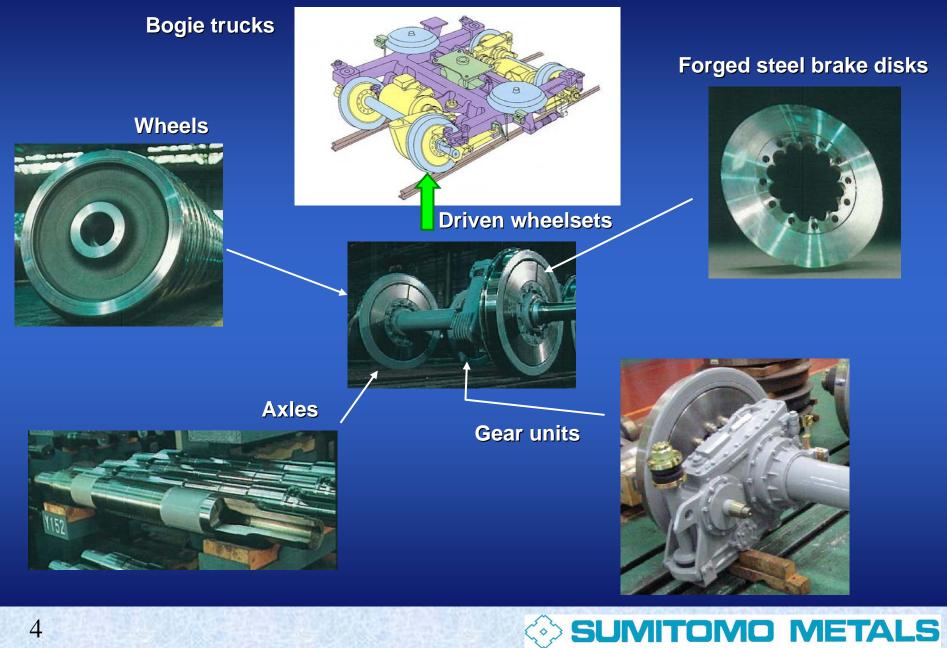
## **Consolidated Sales by Each Sector**

### Sales target for FY 2006: Consolidated total sales of 100 billion yen





## **Railway Products - Part 2**



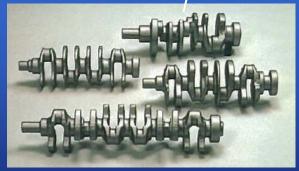
## **Automobile and Construction Machine Products**

Engines for automobiles (cross section)









Small-size crankshafts for passenger cars



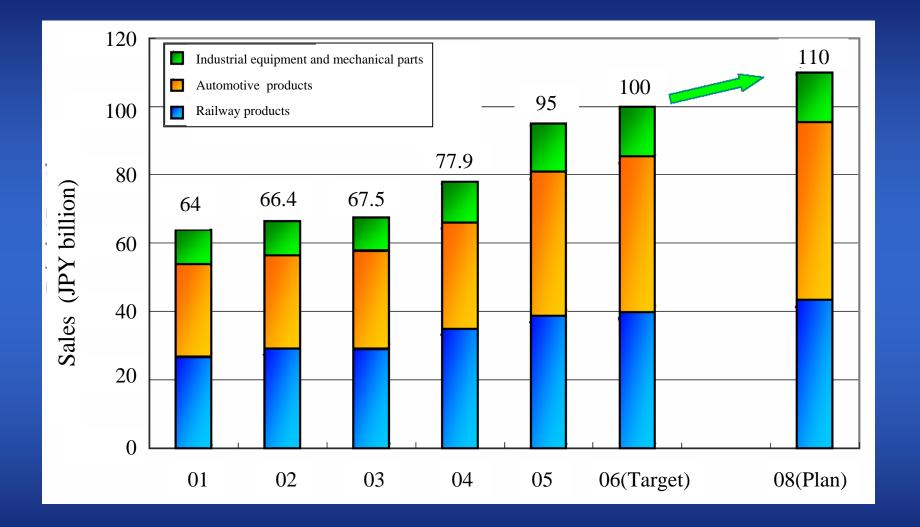
Large-size crankshafts for trucks and buses

Front axles for trucks



Domestic Market Share of Products (Based on our estimation					
	Products	Products Market share			
Railway products	Wheels	100 %	No. 1		
	Axles	100 %	<b>No.</b> 1		
	Forged steel brake disks	100 %	No. 1		
	Gear units	60 %	No. 1		
	Couplers	80 %	No. 1		
	Bogie trucks	25 %	No. 1		
Automobile	Small-size crankshafts for passenger cars	20 %	No. 1		
and construction machine products	Large-size crankshafts for trucks and buses	75 %	No. 1		
Over 80 % of our whole sales have top shares of the respective markets					
6 SUMITOMO METALS					

### Growth of Sales Amount and Medium-Term Business Plan (Consolidated)

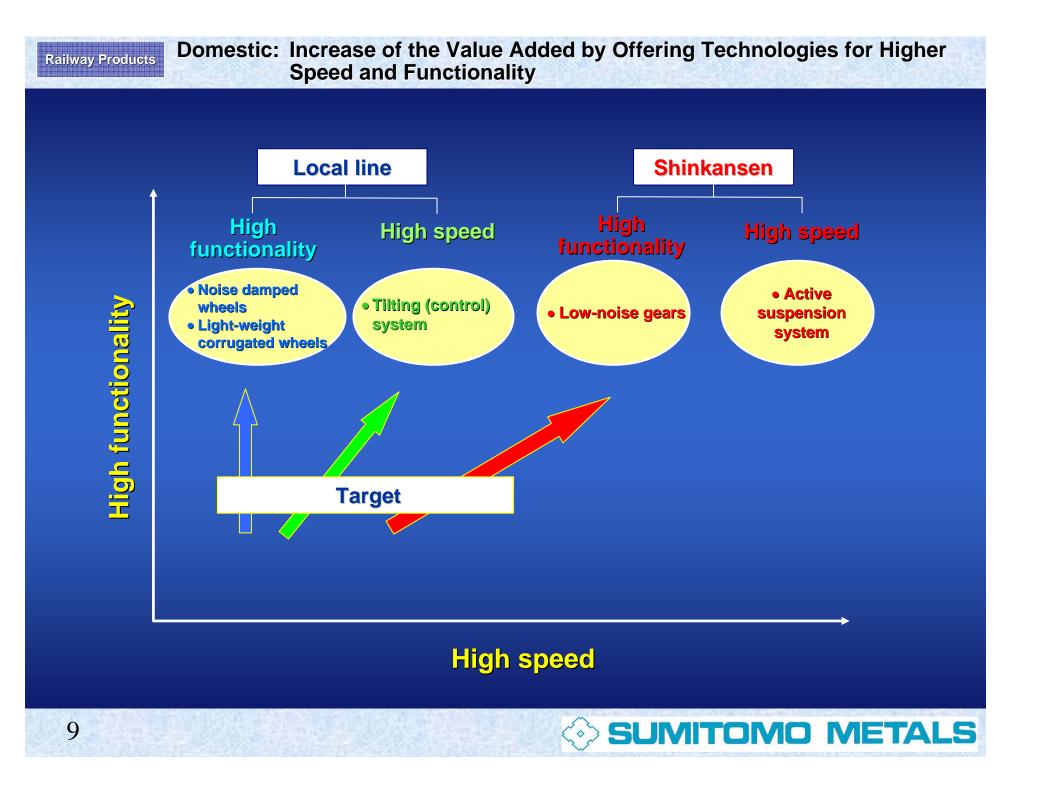




## **Strategies of Railway Product Business**

New technologies to domestic markets
Approach to overseas markets



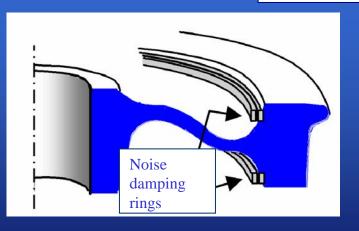


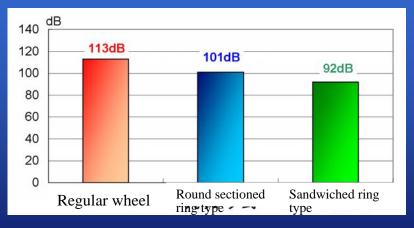
## **Highly Functional Products for Local Lines**

## Light-weight corrugated wheels



### **Noise damped wheels**





Effect of noise reduction by 10 to 20 dB

**SUMITOMO METALS** 

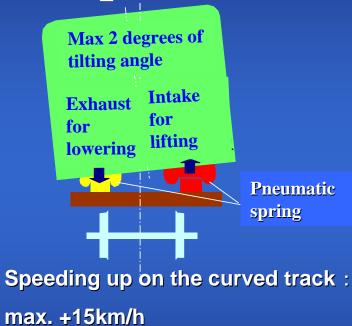
Railway Products

## **Technology for Higher Speed for Local Lines**

## Pneumatic spring tilting system



**Meitetsu Airport Limited Express** 



•Customer's top priority: traveling from Nagoya station to the Airport "within 30 min. ! "

• Achievement of 28 min. by our new technologies

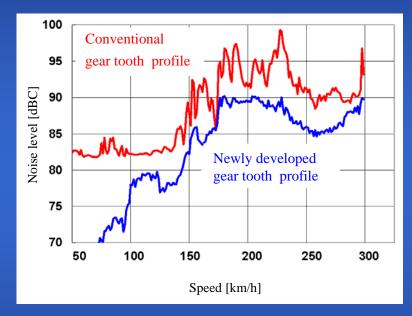


### **Technology for Higher Functionality for Shinkansen**

### **Development of low-noise gears by our unique load tester**



- World's only gear unit load tester in the anechoic room
- •Max turning speed: 10,000rpm
- (equivalent to 500km/h)

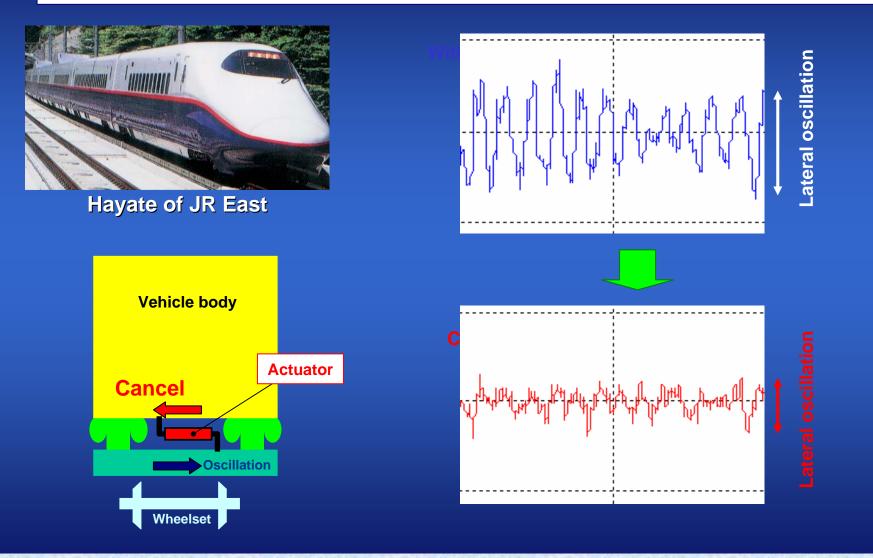


 Effect of noise reduction with newly developed gear tooth profile (patent pending)



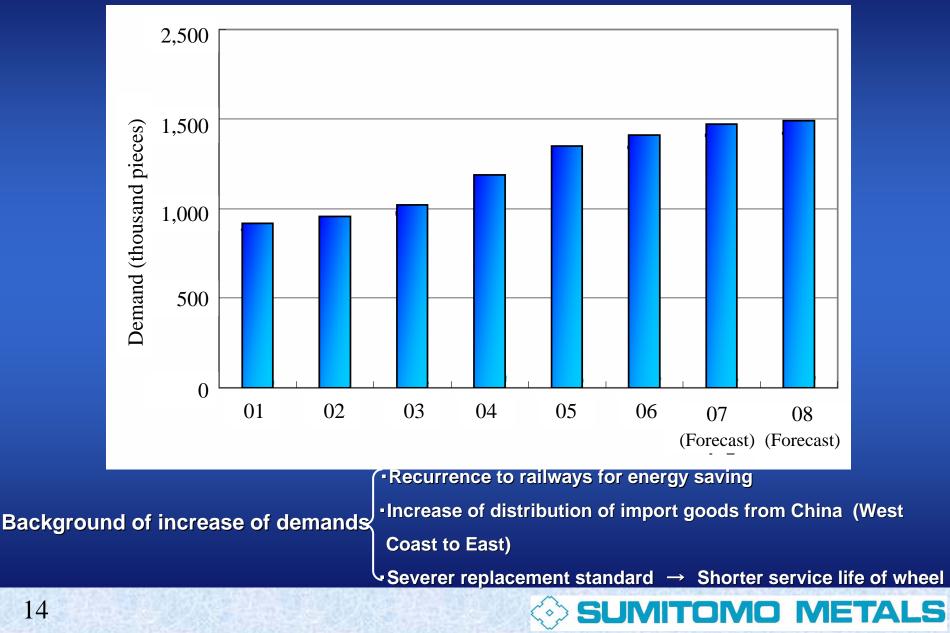
## Railway Products Technology for Higher Speed for Shinkansen

### Active suspension system: World's first success in practical use

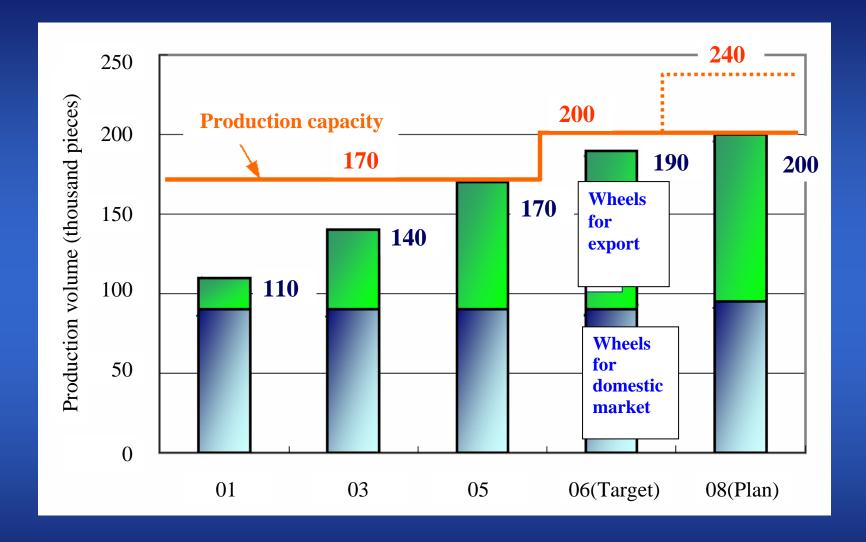


♦ SUMITOMO METALS

## **Overseas - Part 1: Trend in Demand for Wheels in U.S.**



### **Capacity Expansion of Wheel**

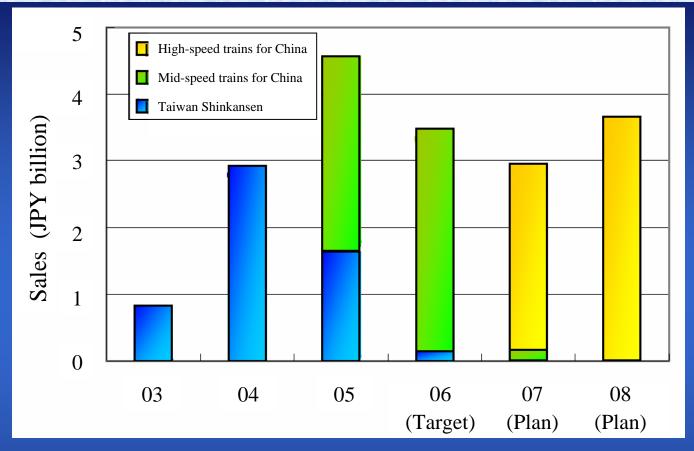


Increase of our production capacity to meet the robust demands for wheels in U.S.



### **Overseas - Part 2:Shinkansen Projects in Taiwan and China**

(Based on our estimation)



 Delivery of the parts to be installed in Shinkansen-type vehicles such as wheels, axles, gear units and couplers

-Taiwan Shinkansen: Completion of the delivery of parts for new vehicles

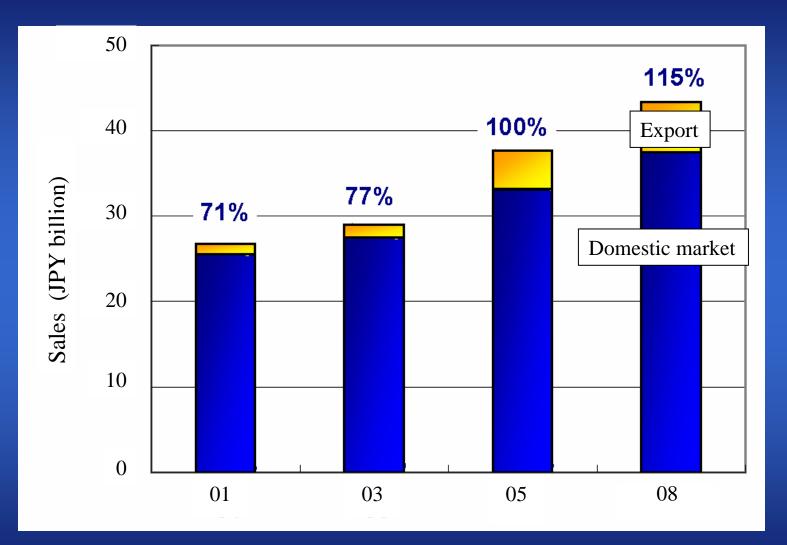
•High-speed railway network in China: Plan to manufacture five thousand new vehicles in three years.

(Number of Shinikansen vehicles in service in Japan: approx. four thousand vehicles)



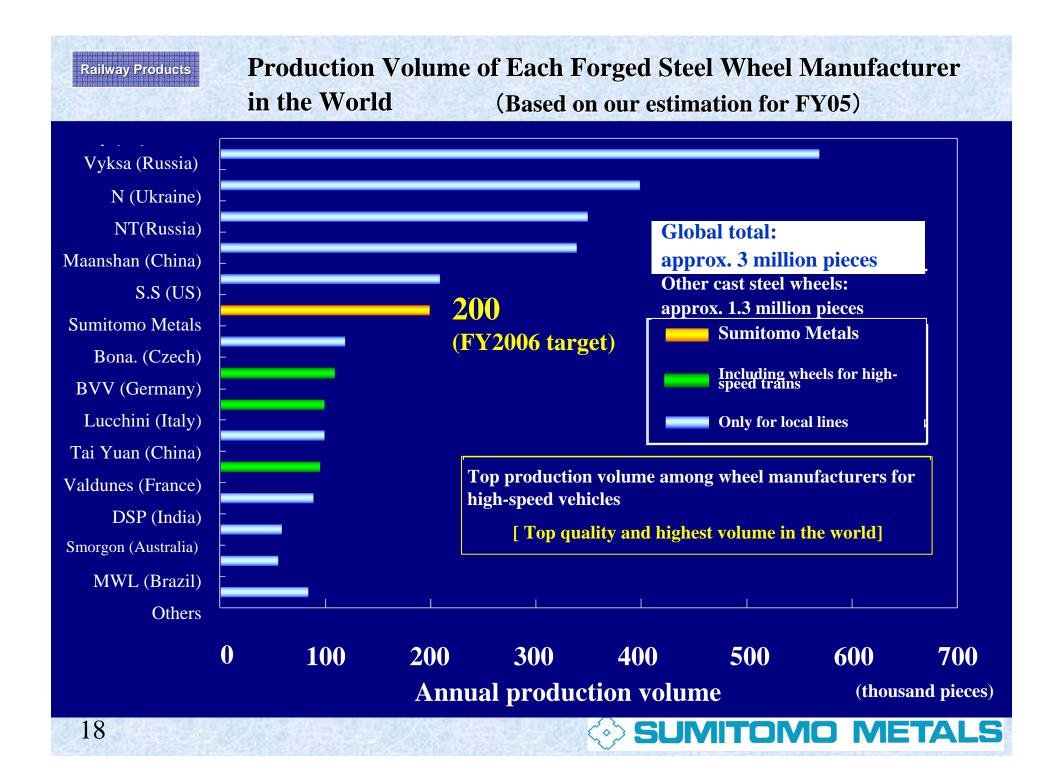
**Railway Products** 

## **Target for Sales of Railway Parts**





Railway Products



## Railway Products Summary of Railway Product Business Strategy

### **1. Expansion of domestic railway business**

 Promotion of the technologies for higher speed and functionality to increase the value added.

## 2. Approach to overseas markets

- Increase of our production capacity to expand the sales of wheels for U.S. market.
- Participation in the projects in Taiwan and China.
- 3. Implementation of the above-mentioned initiatives to increase the sales by 15 % from FY 2005 to FY 2008.



## Strategies of Automobile and Construction Machine Product Business

## [Trend]

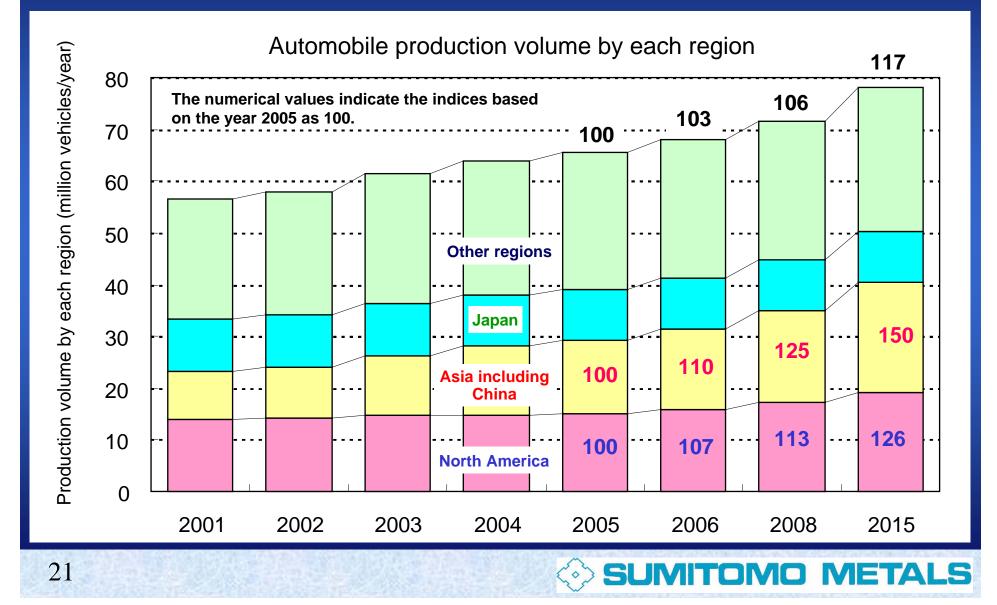
- 1. Worldwide expansion of automobile production volume
- 2. Increase in use of forged steel crankshafts
- 3. Increase of V type-engines



#### Automobile and construction machine products Future Outlook

(Based on our estimation)

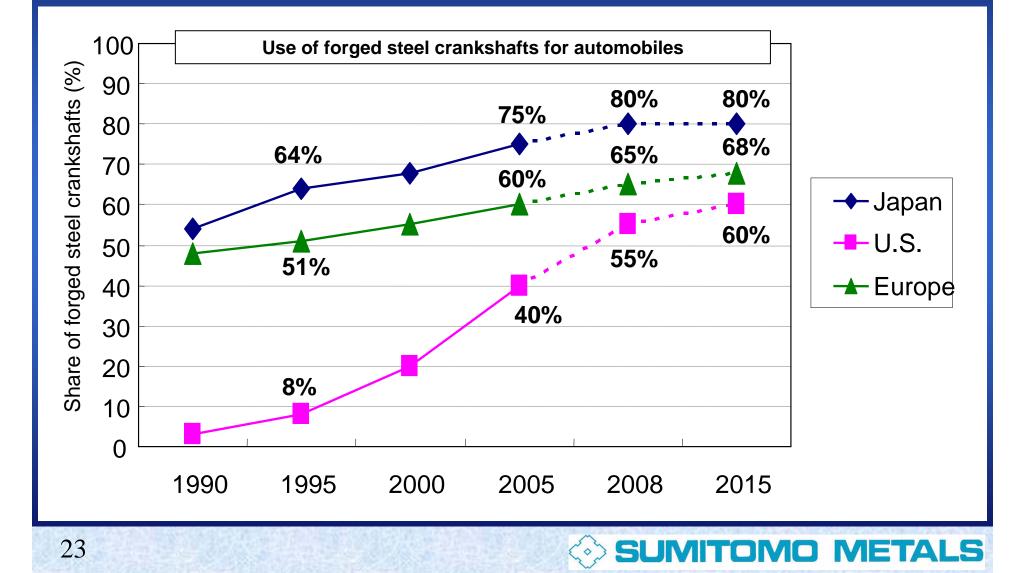
Worldwide automobile production volume: Increase by approx. 17 % (from 2005 to 2015)



Characteristic		Cast iron	Forged steel	Impact factor
Functionality	Strength	0	Ô	Reliability and fuel economy
Functio	Rigidity	$\bigtriangleup$	Ø	Low oscillation and low noise
Machi	inability	0	∆→O	Machining costs
Manufacturing costs		0	$\Delta \rightarrow 0$	Costs



- Smaller, more powerful engine with higher fuel economy ⇒ Expansion of use of forged steel crankshafts
- Increase in use of forged steel crankshafts in North America from 40 % in 2005 to 60 % in 2015



#### **Mass-Production of V-Type Forged Steel Crankshaft** construction machine

#### **Conventional six-cylinder engine**

Automobile and

products



V-type six-cylinder engine

**Conventional crankshaft** (For 3-liter passenger cars)



V-type crankshaft

Gnarled shape - advanced forging technologies are required.

Needs of automobile manufacturers

**Demand for development of V-type** forged steel crankshafts for smaller, more powerful engines Our technologies achieved the world's first success in developing forging technology.

Weight: - 1/3

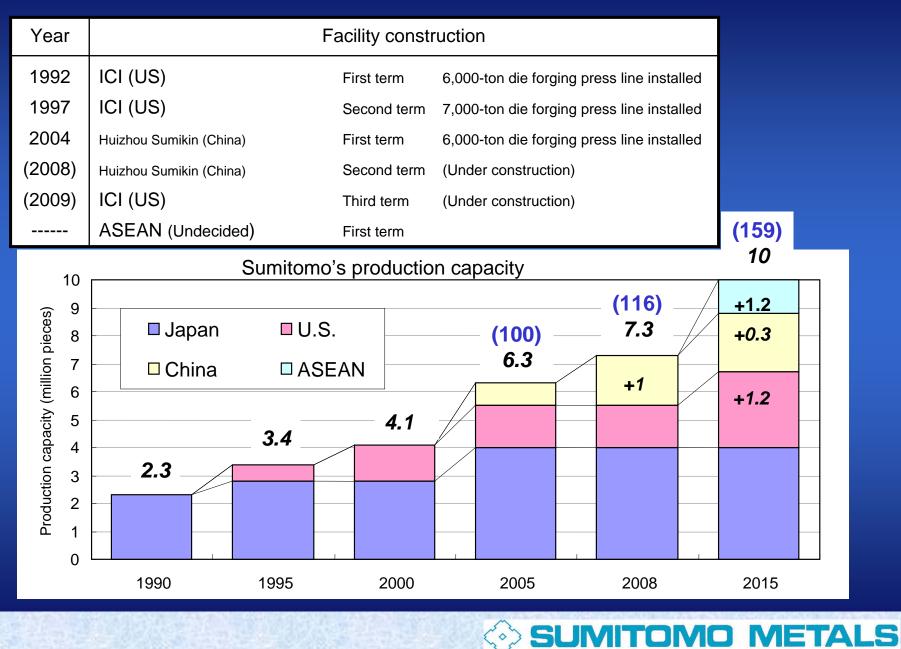
33kg/p $\rightarrow$ 22kg/p

#### World's first success in massproduction

(Award for Excellence in Formings granted by the Minister of International Trade and Industry)

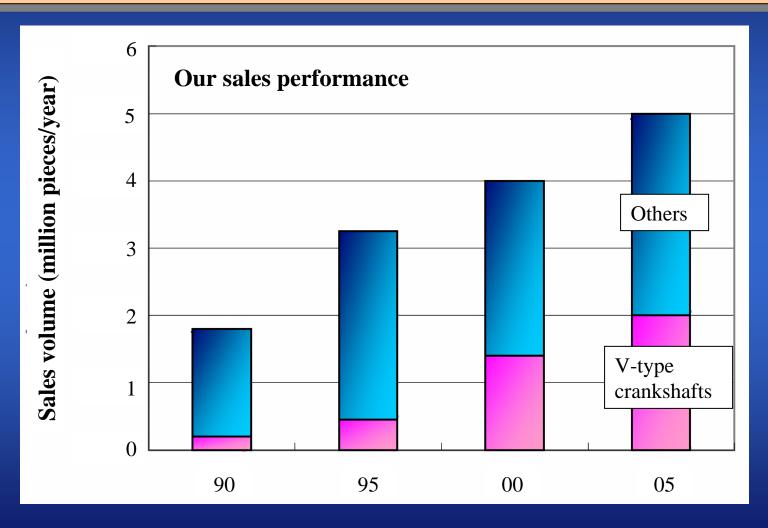


#### **Overseas Crankshaft Business and Production Capacity**

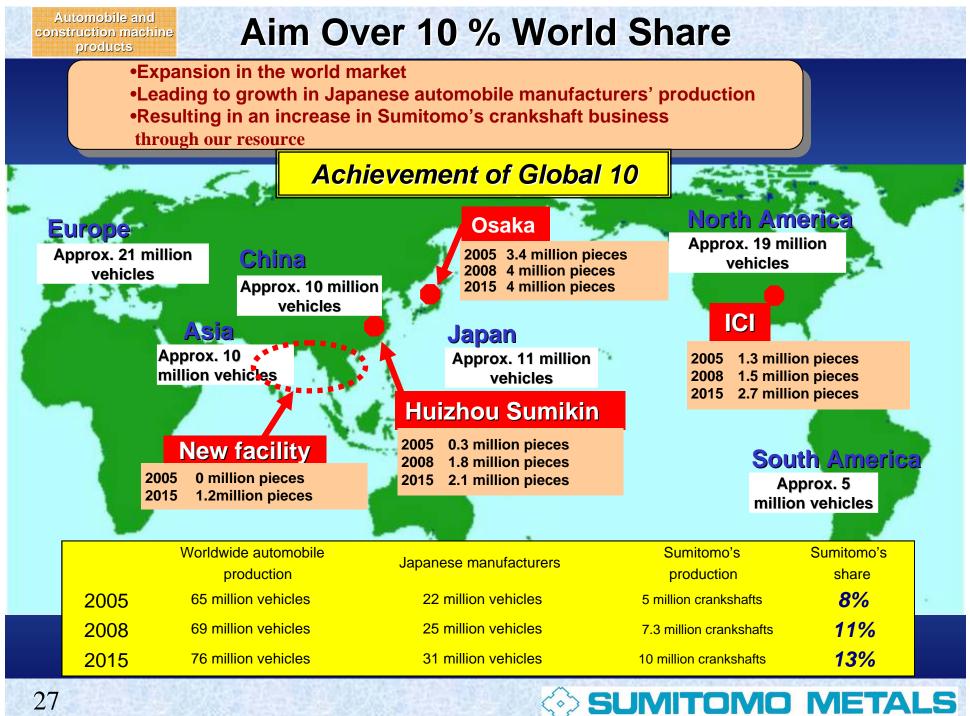


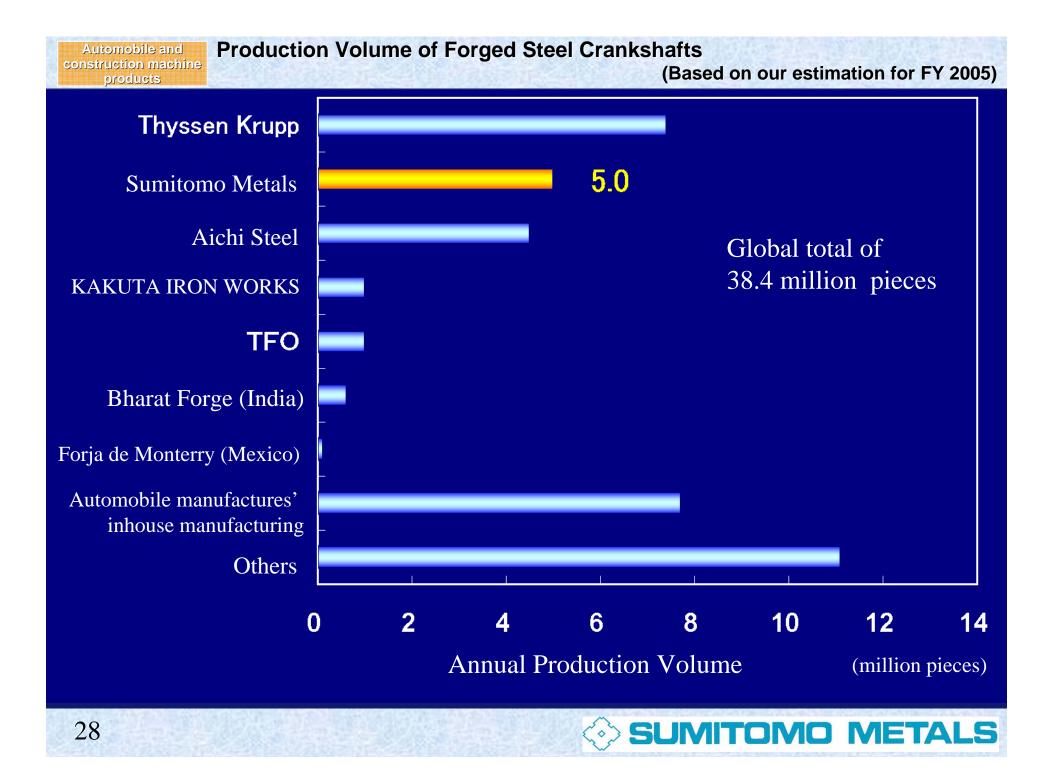
### **Sales Volume of V-Type Forged Steel Crankshafts**

Installation of "Twisters" to meet increase in sales volume of V-type forged steel crankshafts by luxury-oriented trends











## **Crankshaft Business Strategy**

### **Business climate**

- **1.** The automobile production will grow in China and U.S.
- 2. The forged steel crankshafts will be increasingly used.
- 3. The trends in crankshafts will shift to the V-type crankshafts that require advanced forming technologies.

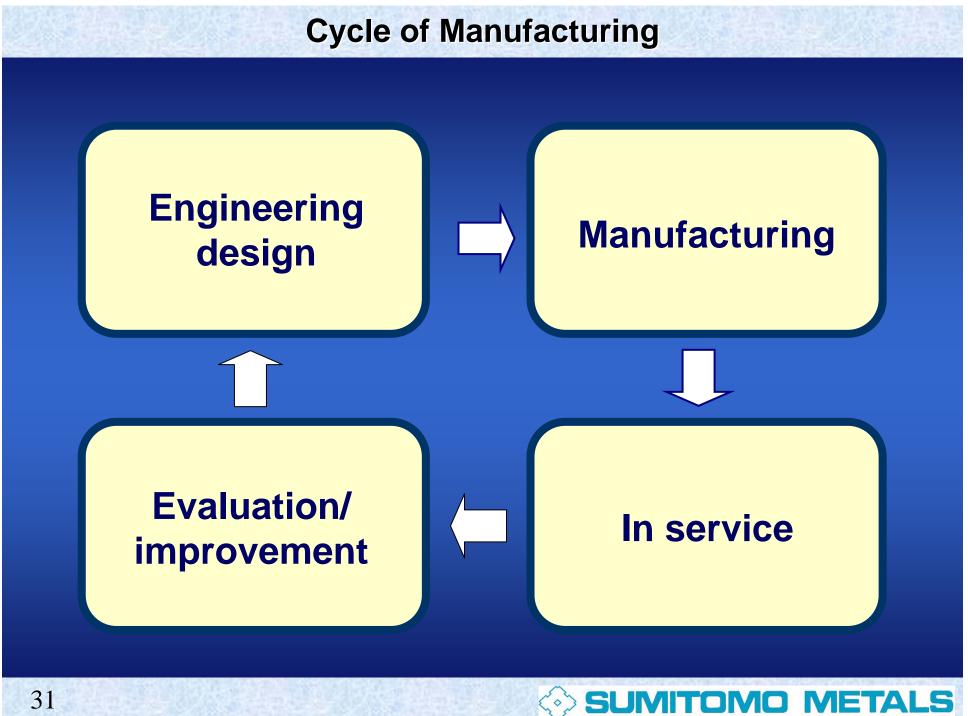
### **Business strategy**

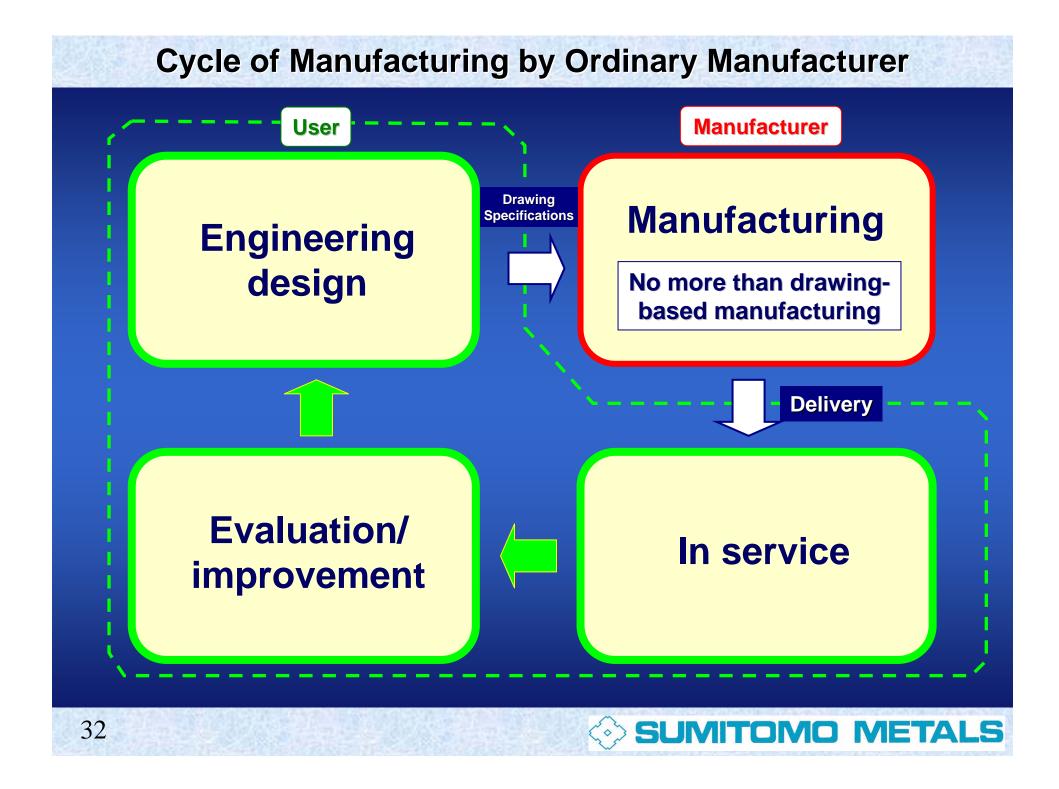
- 1. Active approach to the markets in North America and China
- 2. Focus on high-grade crankshafts and acceleration of distinctiveness at each facility around the world
- 3. Increase of our sales by 17 % from FY 2005 to FY 2008

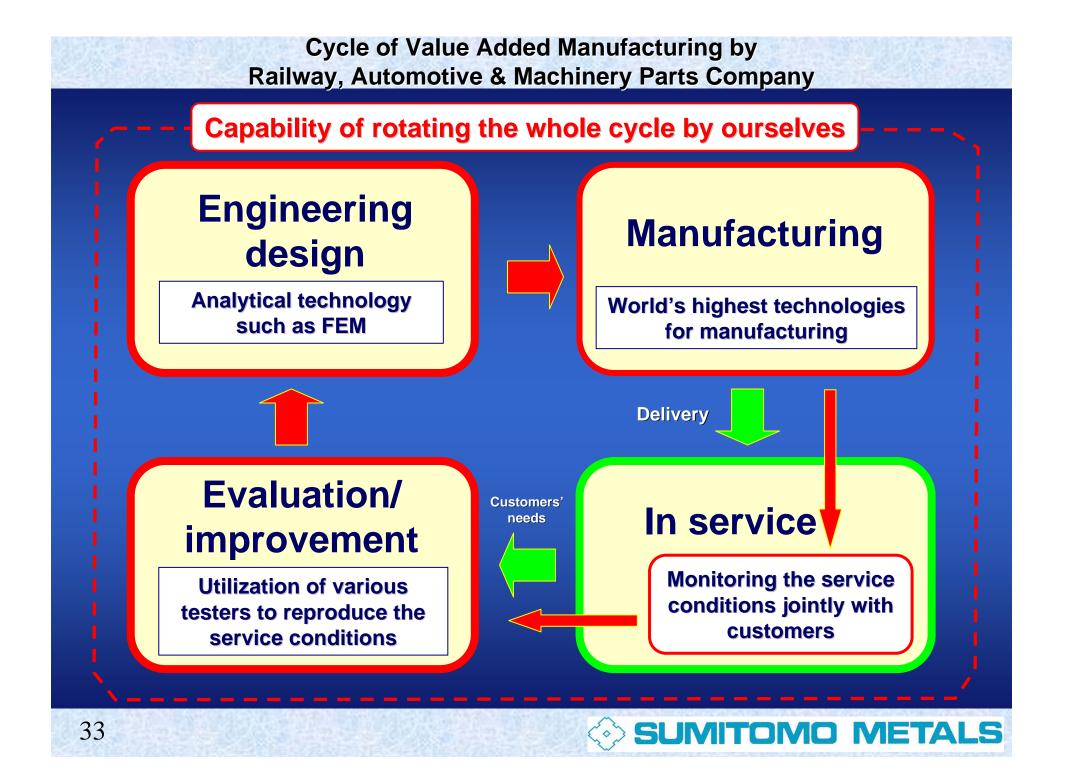


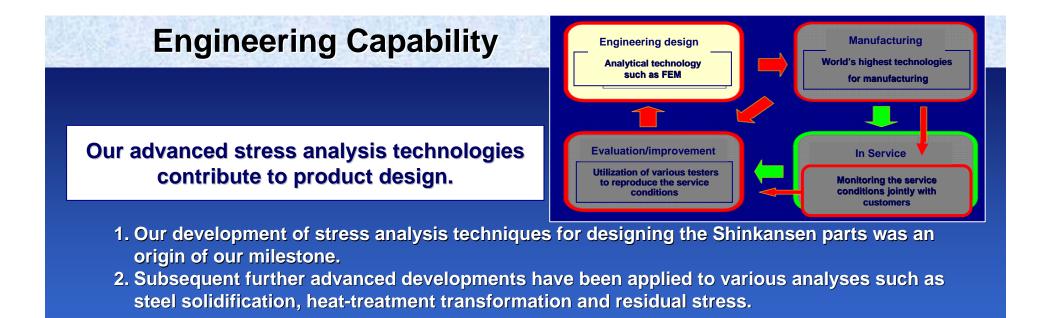
## Source of Strengths and Business Strategies of Railway, Automotive & Machinery Parts Company



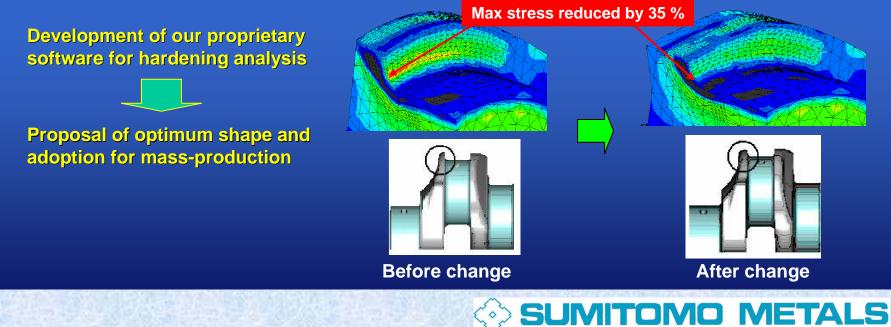








Example of application to heat-treatment analysis on crankshaft





Higher yield and cleanliness

3. Development of ingenious forging facilities

Higher yield and productivity



Manufacturing World's highest technologies

for manufacturing

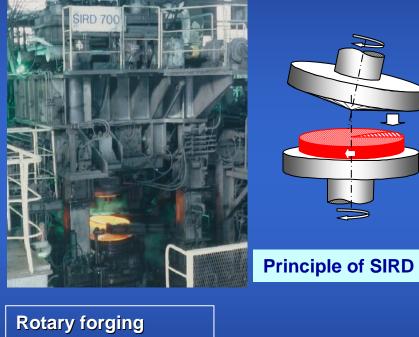
In Service

Monitoring the service

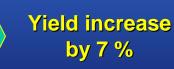
conditions jointly with customers

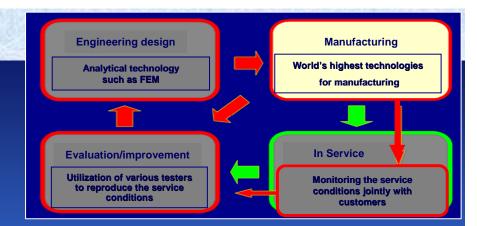
## **Ingenious Forging Facilities**

#### SIRD press for forming the wheels (World's only facility)



- Excellent forging capacity with a smaller force
- Closed die forging





## 5,000-ton full automatic high-speed crankshaft forging line



Production efficiency: 450 P/H Man-power: 2 operators (only for monitoring and die-change)



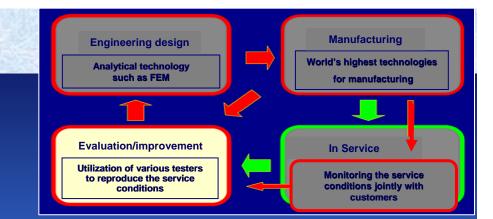
### **Evaluation / Improvement: Testing Facilities**



High-speed bogie testing stand



Brake tester for Shinkansen

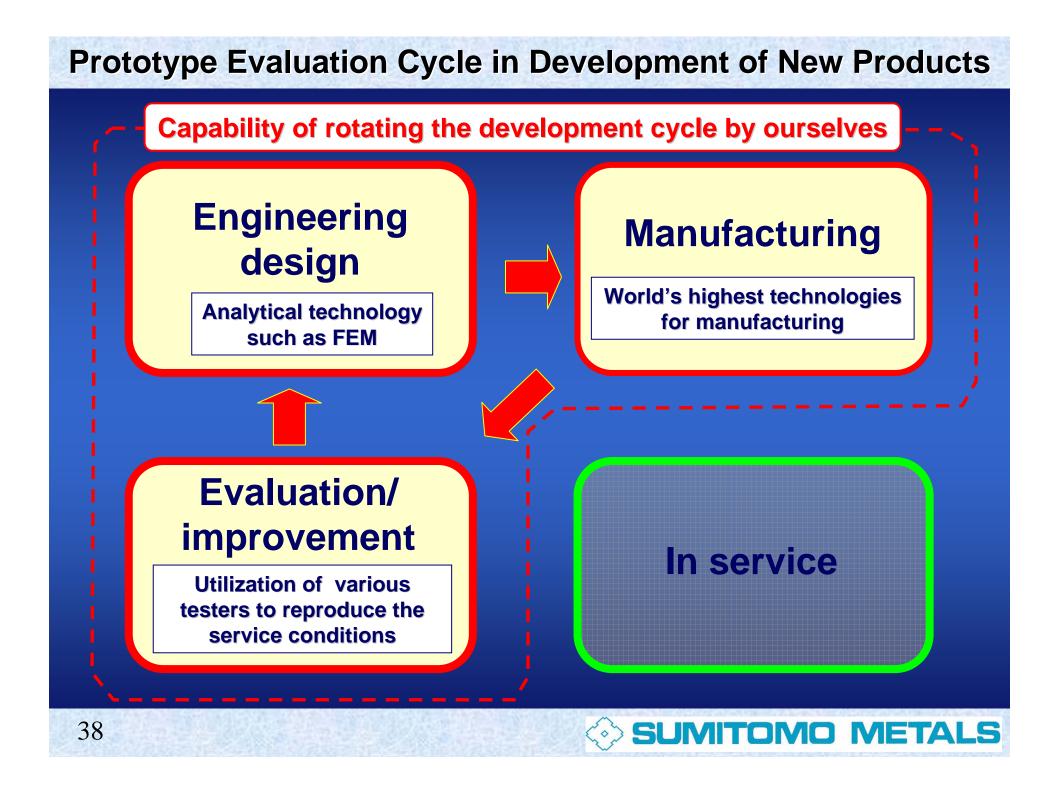


Fatigue tester for the actual size wheels

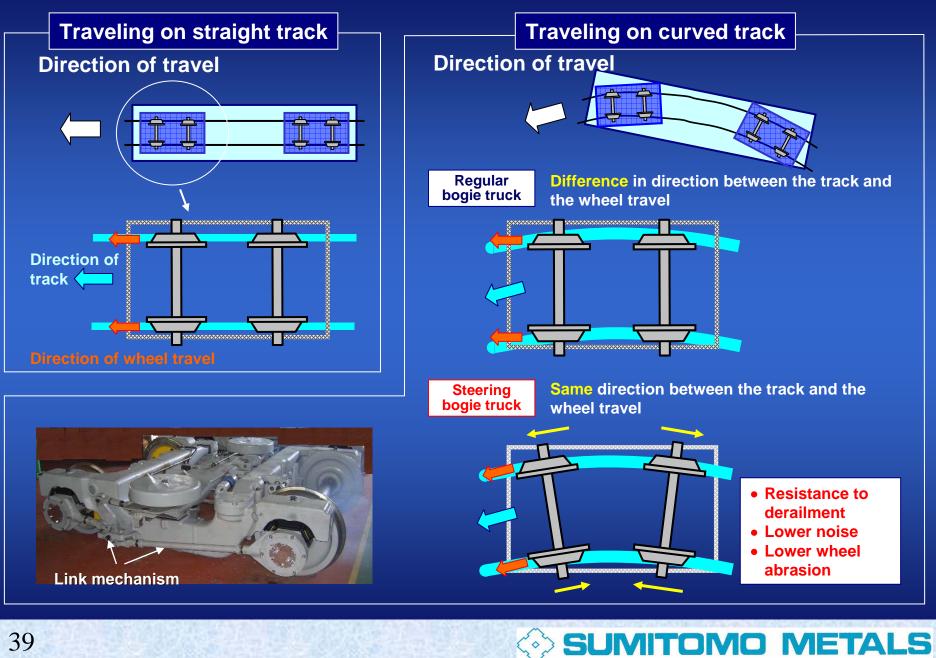


#### **Engine tester**





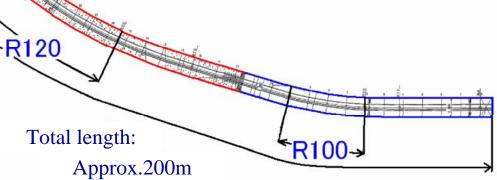
## **Steering Bogie Truck**



## Large-Scale Testing Facility: Small Radius Test Track

- Construction of the small radius test track in our shop
- Three rail track for testing on both narrow and standard gages
- Effective tool for developing the special bogie for a snaked line







# Deliver sustained growth in corporate value by emphasizing quality



# Become a company trusted by all stakeholders

