

# Business Briefing on Machine Tool

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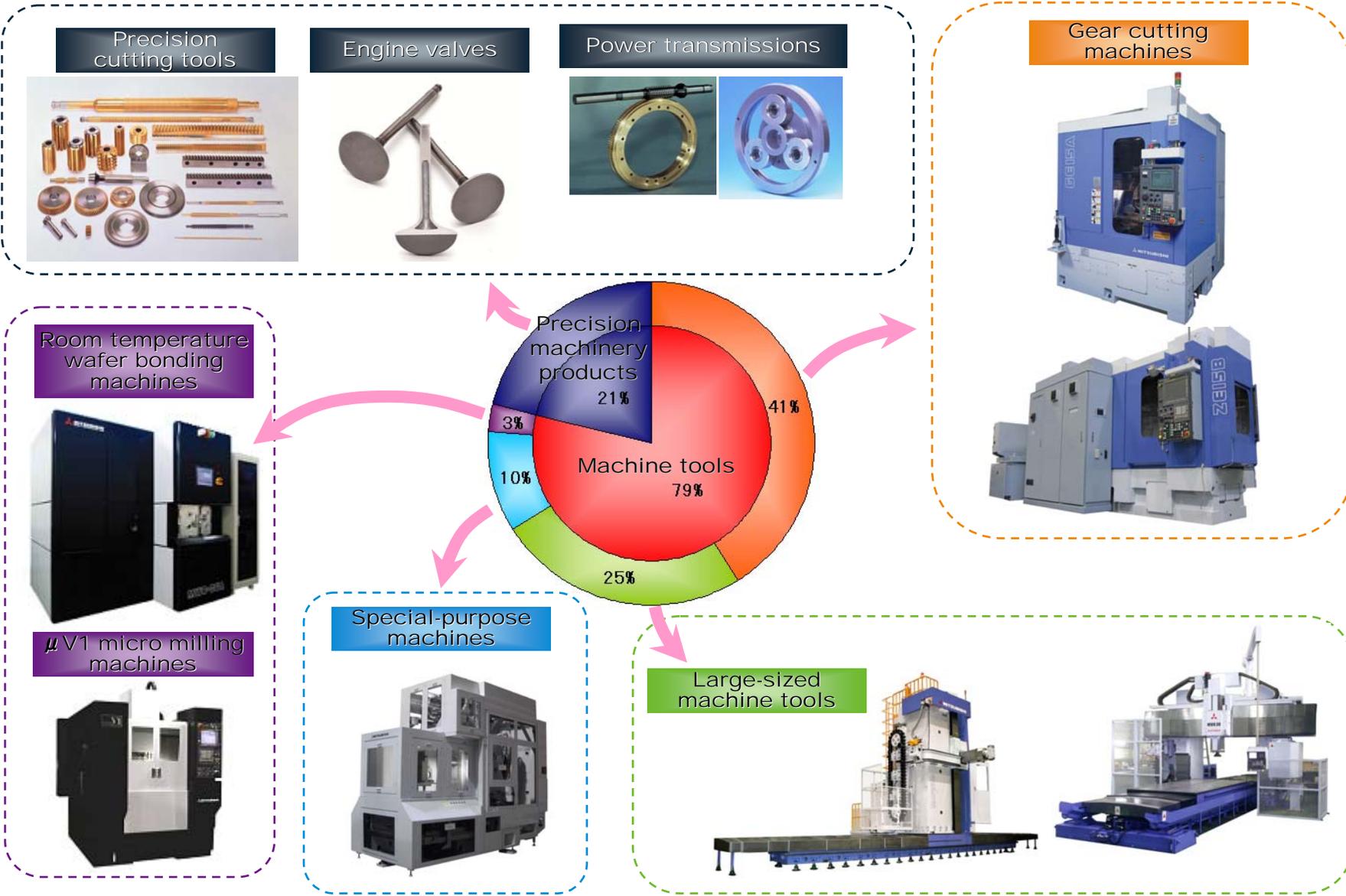
**MITSUBISHI HEAVY INDUSTRIES, LTD.**

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Business domain	Customers/ Markets	Segment					
		Shipbuilding & Ocean Development	Power Systems	Machinery & Steel Infrastructure Systems	Aerospace Systems	General Machinery & Special Vehicles	Others (Air-Conditioning/ Machine Tool)
Energy & Environment	<ul style="list-style-type: none"> <li>• Power companies</li> <li>• Gas companies</li> <li>• Resource companies (oil, chemicals, steel)</li> </ul>		<ul style="list-style-type: none"> <li>• GTCC</li> <li>• Large-scale thermal power plants</li> <li>• Nuclear power plants</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental plants</li> <li>• Chemical plants</li> </ul>			
Machinery, Equipment Systems	<ul style="list-style-type: none"> <li>• Core industries (steel, etc.)</li> <li>• Automotive industry</li> <li>• Logistics, etc.</li> </ul>		<ul style="list-style-type: none"> <li>• Stationary engines</li> </ul>	<ul style="list-style-type: none"> <li>• Compressors</li> <li>• Metals machinery</li> <li>• Crane &amp; material handling systems</li> </ul>		<ul style="list-style-type: none"> <li>• Turbochargers</li> <li>• Forklift trucks</li> <li>• Engines</li> </ul>	<ul style="list-style-type: none"> <li>• Air-conditioning equipment</li> <li>• Machine tools</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Airlines (air)</li> <li>• Shipping companies (sea)</li> <li>• Railways (land), etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial Ships</li> </ul>		<ul style="list-style-type: none"> <li>• Transportation system</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial aircraft</li> </ul>		
Defense & Aerospace	<ul style="list-style-type: none"> <li>• Ministry of Defense (land, sea, air)</li> <li>• JAXA</li> </ul>	<ul style="list-style-type: none"> <li>• Destroyers &amp; submarines for the Ministry of Defense</li> </ul>			<ul style="list-style-type: none"> <li>• Defense aircraft</li> <li>• Missiles</li> <li>• Space Systems</li> </ul>	<ul style="list-style-type: none"> <li>• Special vehicles</li> </ul>	

1. Overview of Machine Tool
2. Review of FY2011 (Review of 2010 Mid Term Business Plan)
3. Target of 2012 Plan
4. Business Strategies
  - (1) Basic Policy
  - (2) Structure of Issues
  - (3) Globalization
  - (4) Expansion of New Growth Business
  - (5) Upgrading Process Technologies
5. Summary

# 1. Overview of Machine Tool: Product Portfolio (FY2011 Net Sales)



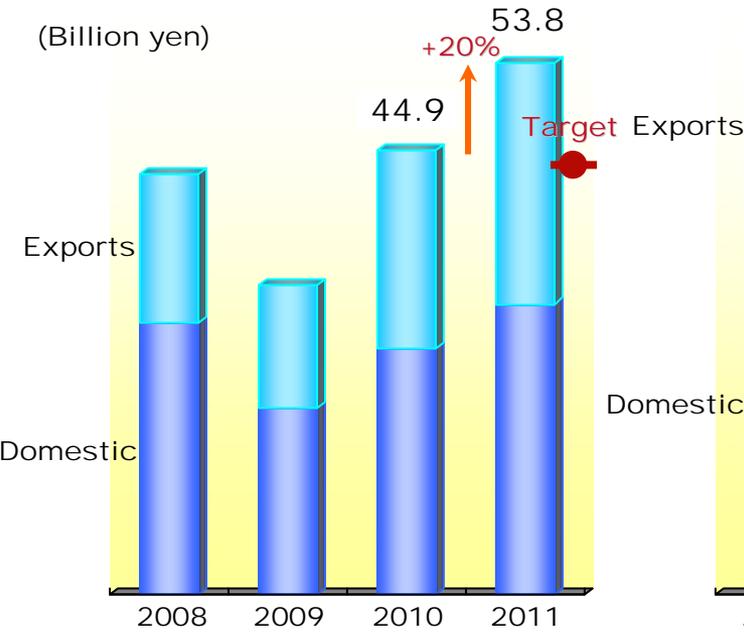
# 1. Overview of Machine Tool: Worldwide Locations

: Manufacturing plants : Sales offices

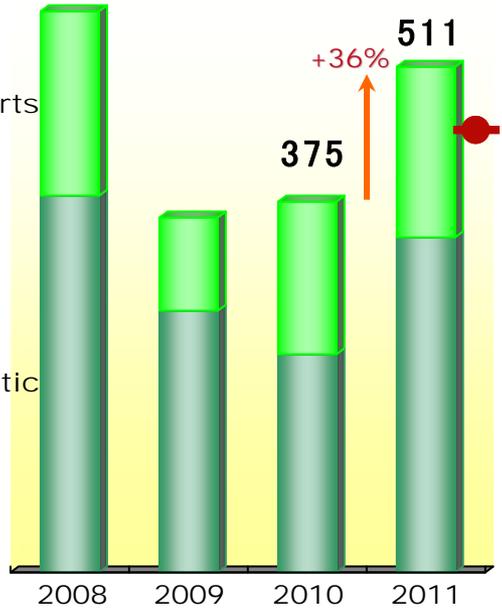


# 2. Review of FY2011: Orders Received and Net Sales (Consolidated)

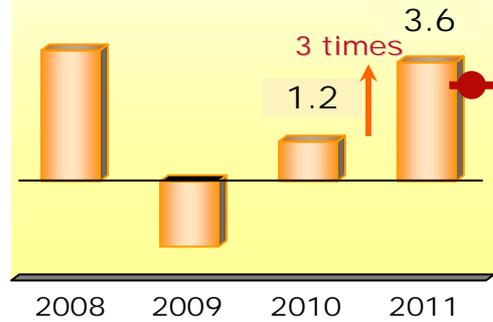
Orders received



Net sales



Operating profit



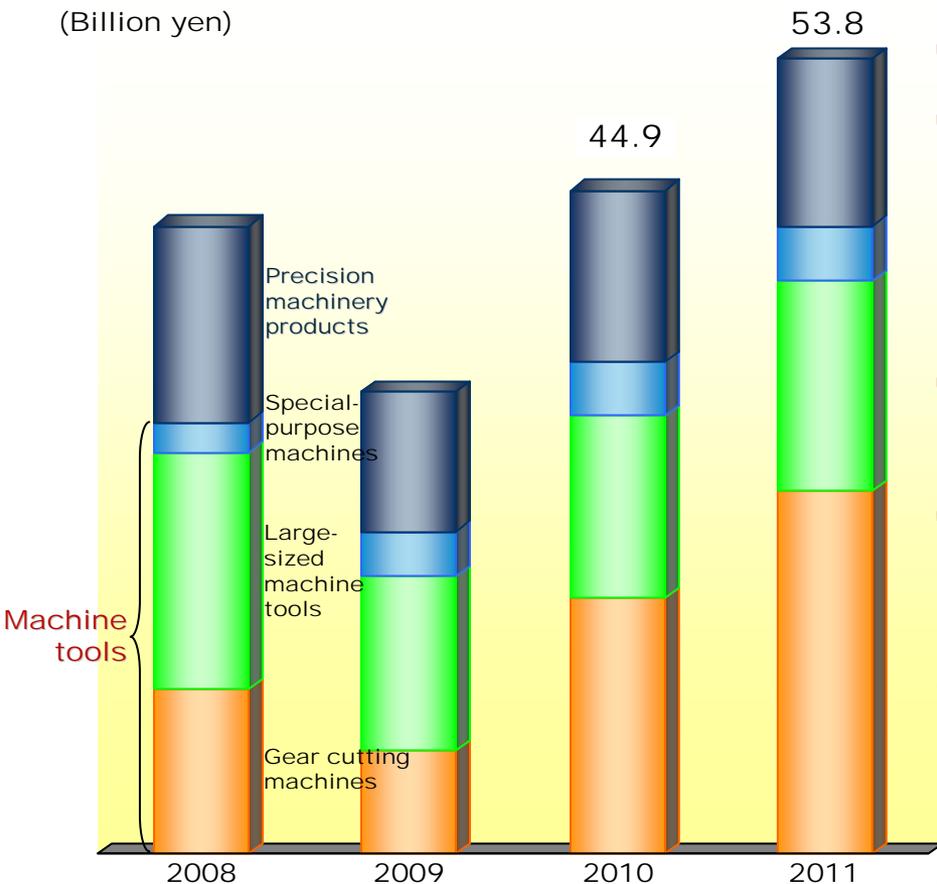
- Won equipment-related demand from the automotive, construction machinery, and energy sectors, resulting in an increase in orders received.
- Won orders related to aggressive overseas investments by domestic customers.
- Demand was strong in China, India, Southeast Asia, and North America.
- Domestic performance recovered due to sales from large-scale works.
- With regard to exports, orders received were strong, returning to the level they had reached before the global financial crisis.
- The profit level also recovered, due in part to increased net sales and improved productivity.

Achieved orders received, net sales, and operating profit far in excess of the targets of the 2010 Plan

## 2. Review of FY2011 by Product (Consolidated)

### Breakdown of orders received by product

(Billion yen)



### 1. Gear cutting machines

- Both domestic and overseas demand were strong. Orders received increased significantly, exceeding the level they had reached before the global financial crisis.
- Won orders related to aggressive investments in emerging countries by domestic customers.
- Overseas demand was also led by emerging countries, including China, India, and Southeast Asian countries. Orders from North America were also secured due to strong demand from the automotive, construction, and energy sectors.

### 2. Large-sized machine tools

- Won a certain level of demand from the construction machinery sector of emerging countries. However, domestic demand was relatively slow and remained at the previous fiscal year's level.
- In emerging countries, competition with competing European manufacturers has grown fierce.

### 3. Special-purpose machines

- Continued to receive orders from overseas automobile manufacturers and the aircraft sector, having secured the previous fiscal year's level of orders received.

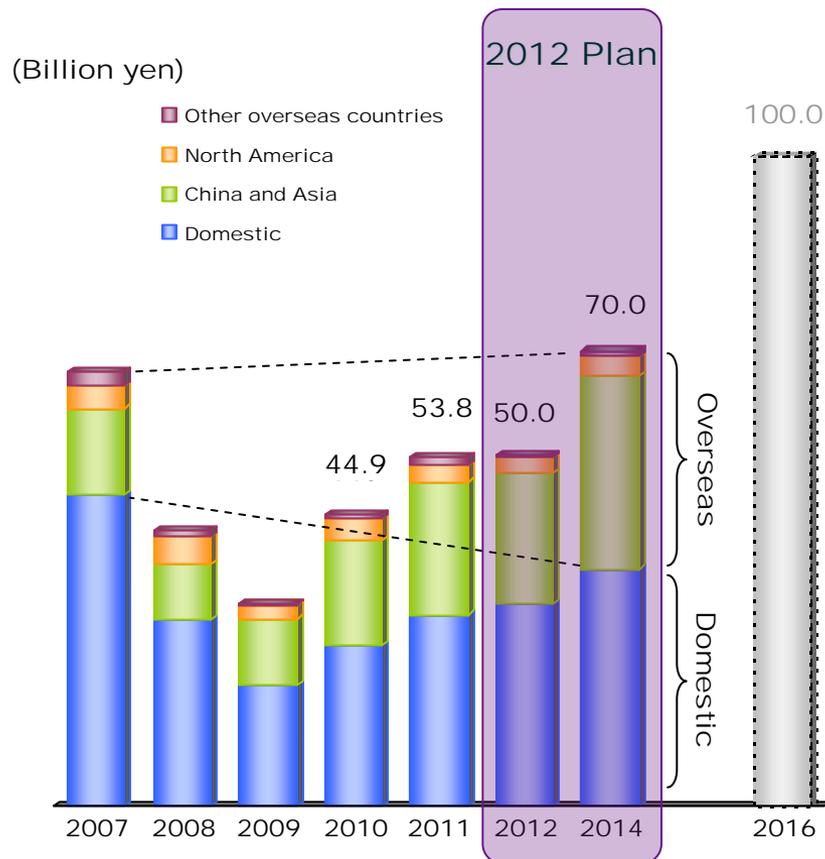
### 4. Precision machinery products

- The automotive sector is the mainstay for both precision cutting tools and engine valves. Orders received remained at the previous fiscal year's level, due in part to the impact of the Great East Japan Earthquake.

### 3. Target of 2012 Plan: Orders Received, Net Sales, and Operating Profit (Consolidated)

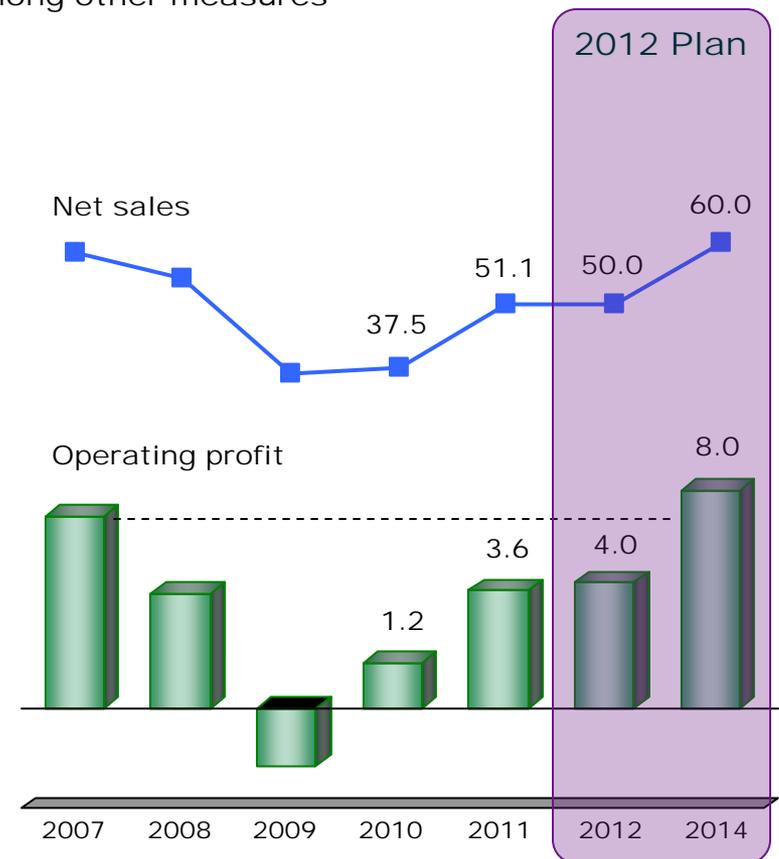
#### Orders received

- Target value for the final fiscal year of the Plan: FY2007 level, which was the peak
- Increase orders for products for overseas markets, including China and Asia
- Aim for a business size of 100 billion yen



#### Net sales and operating profit

- Target values for the final fiscal year of the Plan: FY2007 level, which was the peak
- Aim to significantly increase operating profit by increasing orders received and net sales, establishing the hollow valve business, and increasing the profitability of overseas manufacturing companies, among other measures



Increasing business size and profits by accelerating globalization efforts and increasing added value

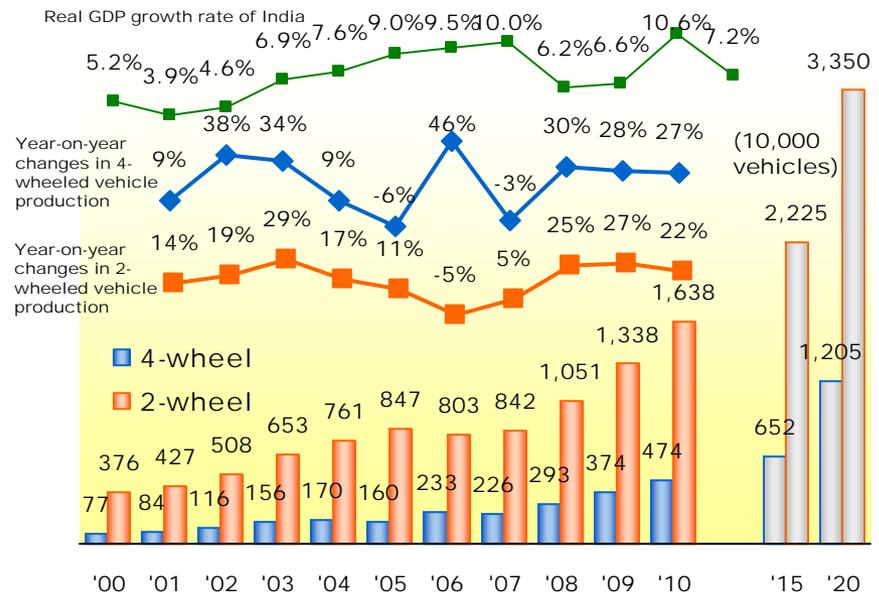
Building a business structure resistant to market fluctuations, based on two businesses with different market characteristics (machine tool and precision machinery)

- Further strengthening businesses as pillars of profit
  - Localizing production, sales, and service
  - Driving M&A and alliances
- Expanding new growth businesses
  - Establishing the hollow engine valve business in earnest
  - Expanding room temperature wafer bonding machines
- Upgrading process technologies
  - Upgrading in-house process technologies and creating new businesses



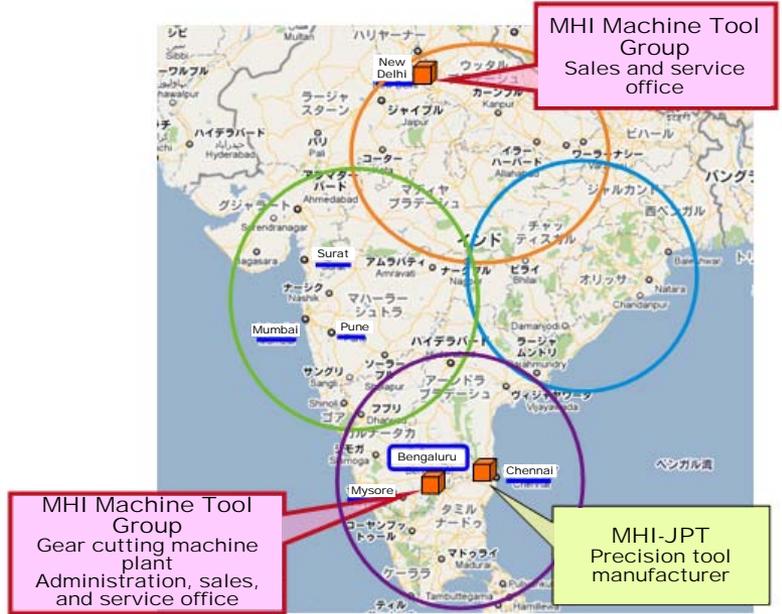
## Expansion of gear cutting machine business in India (1/2)

Past trends and forecast of year-on-year changes in 2-wheeled and 4-wheeled vehicle production in India



- Both 2-wheeled and 4-wheeled vehicles will grow strongly, by more than 20% year on year
- In India, 20 million people join the youngest group of the productive population every year as potential purchasers of the products

Locations of plants of Indian automobile manufacturers and MHI's local production plants



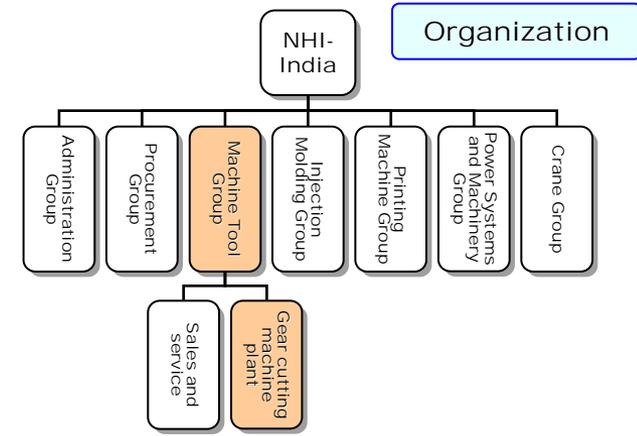
- MHI established a plant in Bangalore, which is attracting automobile manufacturers' plants.

Provide gear processing systems locally in a one-stop manner through cooperation with MHI-IPT (precision tool manufacturer).

## Expansion of gear cutting machine business in India (2/2)

### ● Overview of MHI plant in India

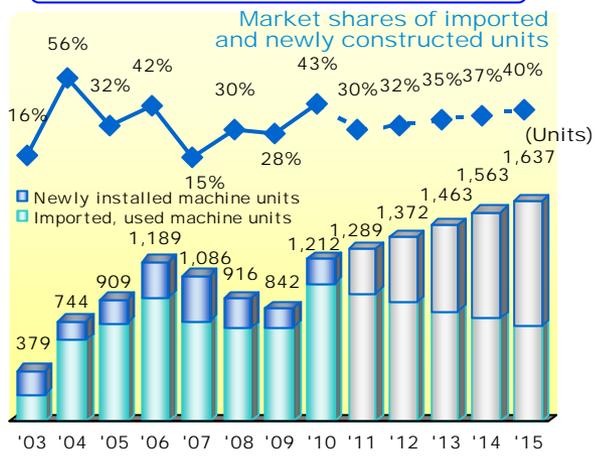
- Establishing the gear cutting machine plant as an organization under the Machine Tool Group of MHI-India.
  - In addition to functions for machine tool sales and service, we will establish functions for gear cutting machine production, showroom functions, training center functions, parts center functions, and procurement functions for all machine tool products.
- Plant site area: Approx. 4,000m<sup>2</sup>
  - Building area: Approx. 2,500m<sup>2</sup>
  - To be completed in October 2012 (commencement of operation)



Exterior view of plant (under construction)



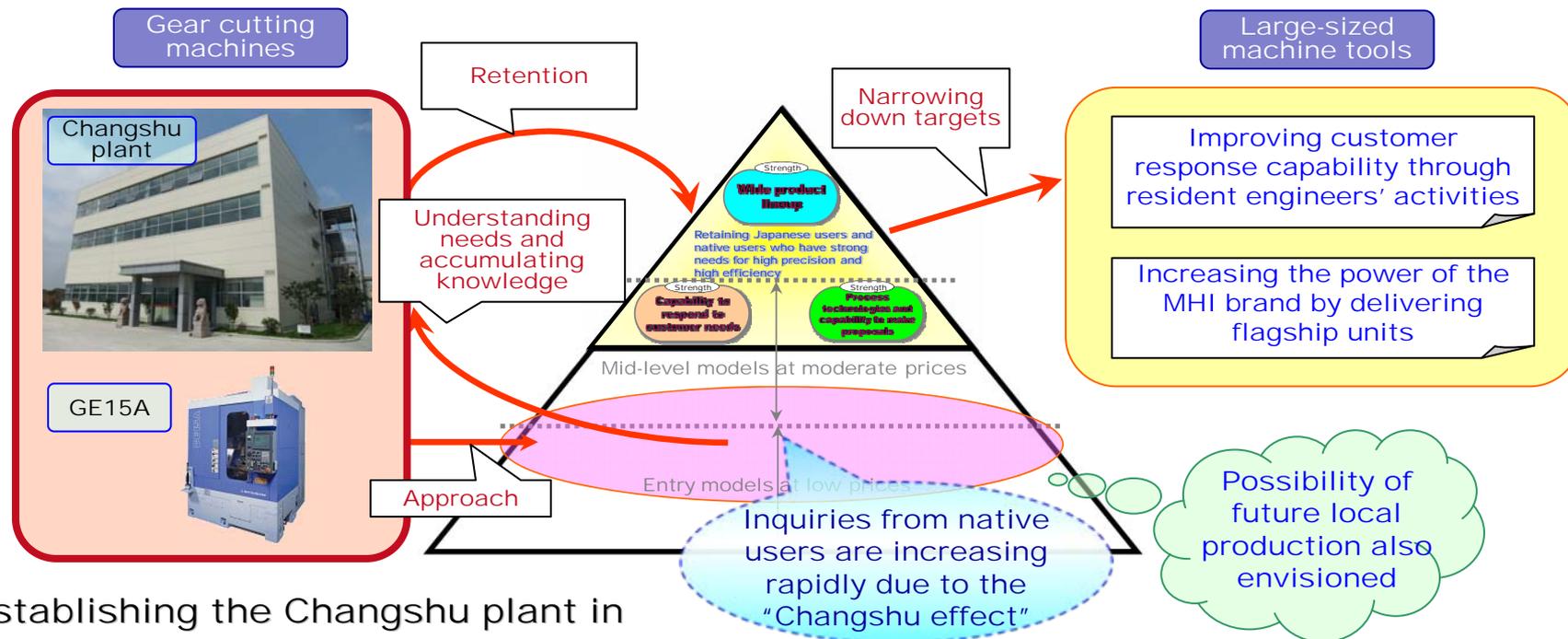
Demand for gear cutting machines in India



Maintain the top market shares for gear cutting machines and precision tools in India, thereby expanding the business.

## Expansion of machine tool business in China

### ● Concept



### ● Establishing the Changshu plant in China as a core plant

- Increase gear cutting machine production capacity: Monthly production at 3 units → 5 units (Oct. 2012) → 10 units (Apr. 2013) → 20 units (Apr. 2014)
- Add production models, GE20A and GE25A - Enhance the showroom function
- Enhance the function for the local procurement of major parts of machine tools (in cooperation with MHI China)
- Consolidate service staff and integrate their activities; add parts center function

Expand the business by getting closer to customers through localization.

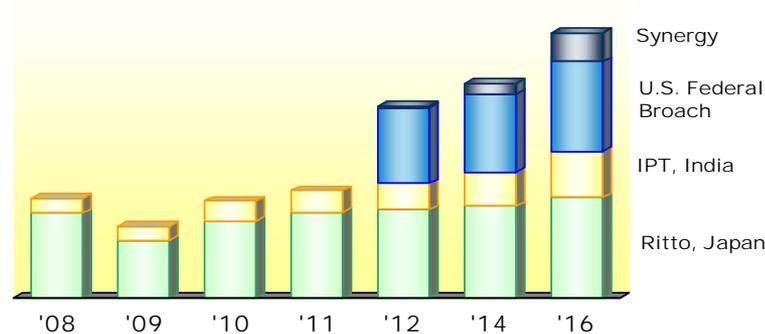
## Global expansion of precision tool business

### ● Collaborations with MHI-IPT (India) and Federal Broach (U.S.)

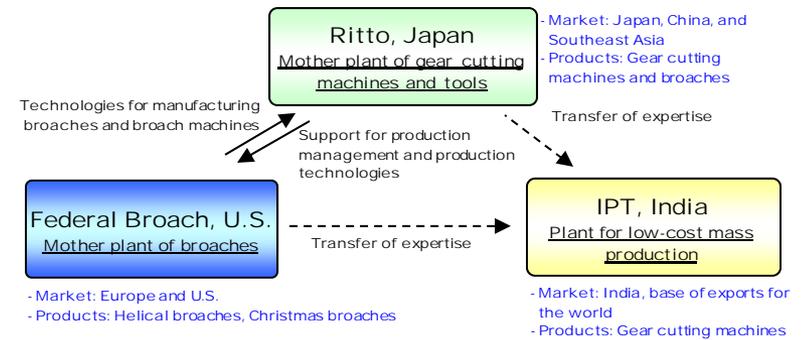
#### (1) MHI-IPT

- Integrated operation with Ritto Machinery Works to make India the core base.
- Secure capacity to export as well, by increasing production capacity through aggressive investments.
- Build an integrated production system by using common facilities for designing, CAM, and processing. Achieve shorter delivery times and production in optimal locations.  
 (Enable the production of the same products anywhere with the same lead times.)

Targeted consolidated net sales of precision tools



#### <Positioning of each plant>



#### (2) Federal Broach

- Enhance its strength further through integrated operation with Ritto.
- Improve its productivity by supporting production technology and production management.
- Increase its production capacity through capital expenditure.
- Boost the appeal of products from Ritto by utilizing the expertise of Federal Broach.

Increase the size of the precision tool business to the 15 billion yen level, to be ranked among the top three in the world.

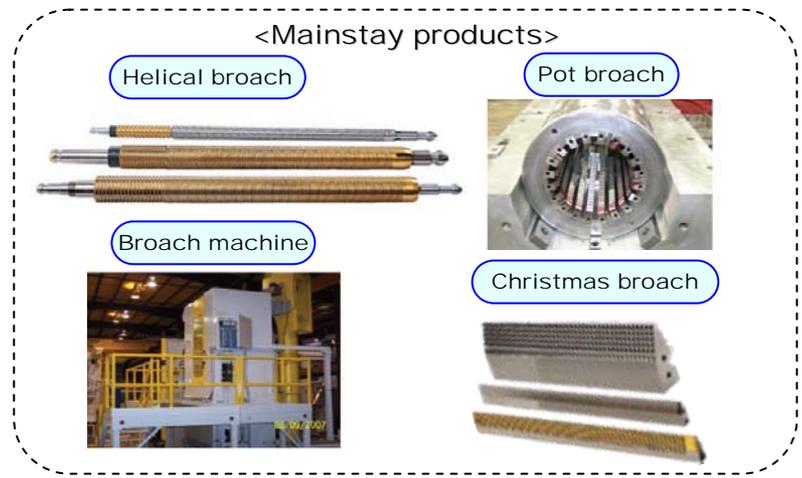
M&A of a U.S. precision tool manufacturer

(1) Overview of Federal Broach & Machine Company

- Established: 1934
  - No. of employees: 192
  - Locations: Harrison, Michigan (Head Office) and three other plants
  - Business descriptions: Broach tools, broach machines
- ➔ A leading broach manufacturer worldwide

Acquired in April 2012

<Plant locations>



(2) Purposes

- Winning new customers, including the U.S. Big 3 (synergy involving machines)
- Strengthening helical broaches and Christmas broaches, which are promising
- Benefiting from strong synergetic effects created by the highly complementary relationship between the two companies in terms of target markets and products

<Comparison of target markets>

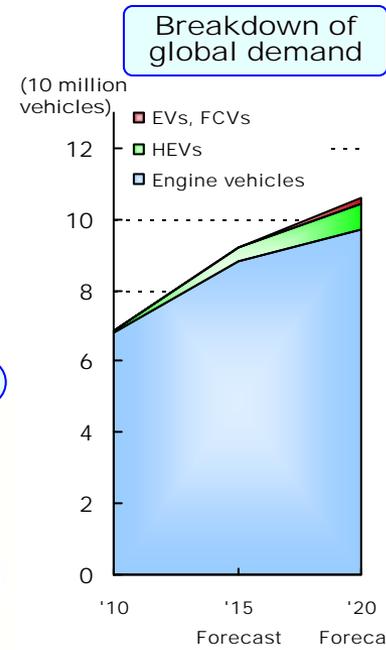
	MHI	Federal Broach
North America	2%	66%
Europe		14%
Asia	98%	20%

PMI\* is being accelerated to maximize synergy. We will continue to drive M&A and alliances.

\*PMI: Post Merger Integration, or management for integrating organizations after M&A

## Establishing the hollow engine valve business in earnest

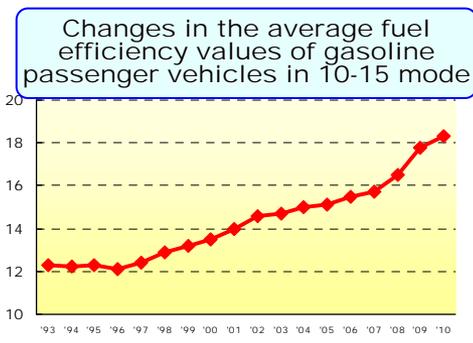
- Demand for engine vehicles will continue to constitute the majority of global demand for all vehicles (2020: 90%, or approx. 98% if HEVs are included)
- Engine performance has improved year after year. Engines are in the process of evolution.
- ➔ Lighter weight and higher combustion efficiency, the features of hollow engine valves fulfill, will be even more important going forward.



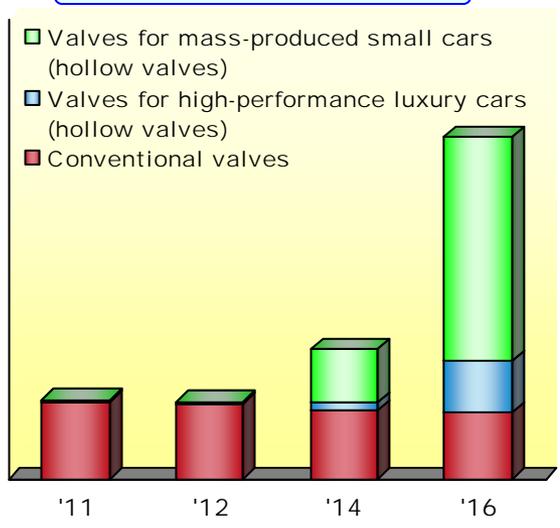
METI finalized the new fuel efficiency standards for passenger vehicles

	FY2009 Actual	FY2020 Target	Fuel efficiency improvement rate
Passenger vehicles	16.3 km/L	20.3 km/L	24.1%

\* JC08 mode



Engine valve business plan



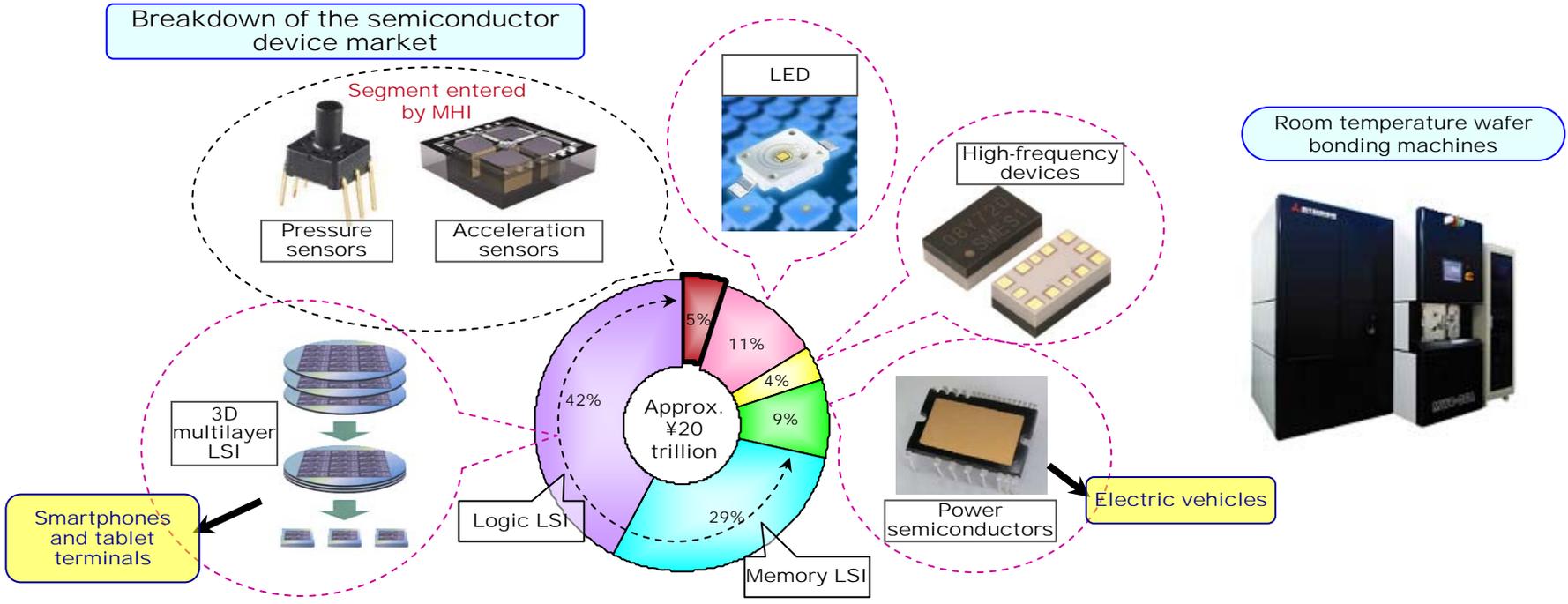
- Commenced mass production and deliveries for high-performance luxury cars in October 2011.
- Performance and durability tests are being undertaken by several major automobile manufacturers.

Increase the business size by getting the valves adopted for mass-produced small cars in addition to high-performance luxury cars.

# 4. Business Strategies: (4) Expansion of New Growth Businesses 2)

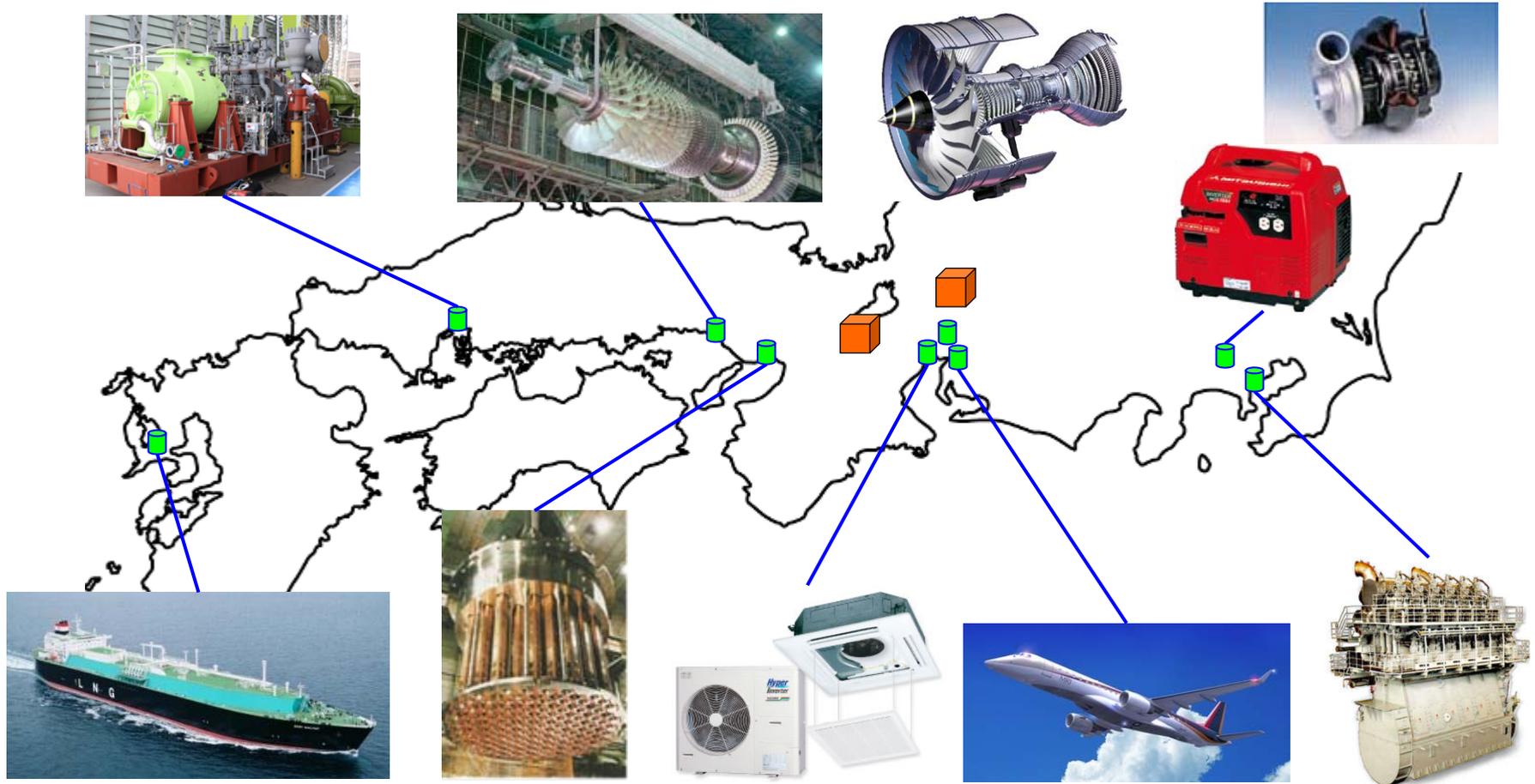
## Increasing the size of the room temperature wafer bonding machine business

- Enhance the features of the room temperature wafer bonding machines, which can be used for bonding a variety of materials
  - Fields of high-frequency devices, light-emitting diodes (LEDs), and power devices → Increase materials that can be bonded and shorten the cycle time
- Cultivating the field of 3D multilayer devices (market size: 14 trillion yen)
  - The market will definitely expand, led mainly by memory LSIs and logic LSIs → Ensuring greater precision and improving bonding reliability



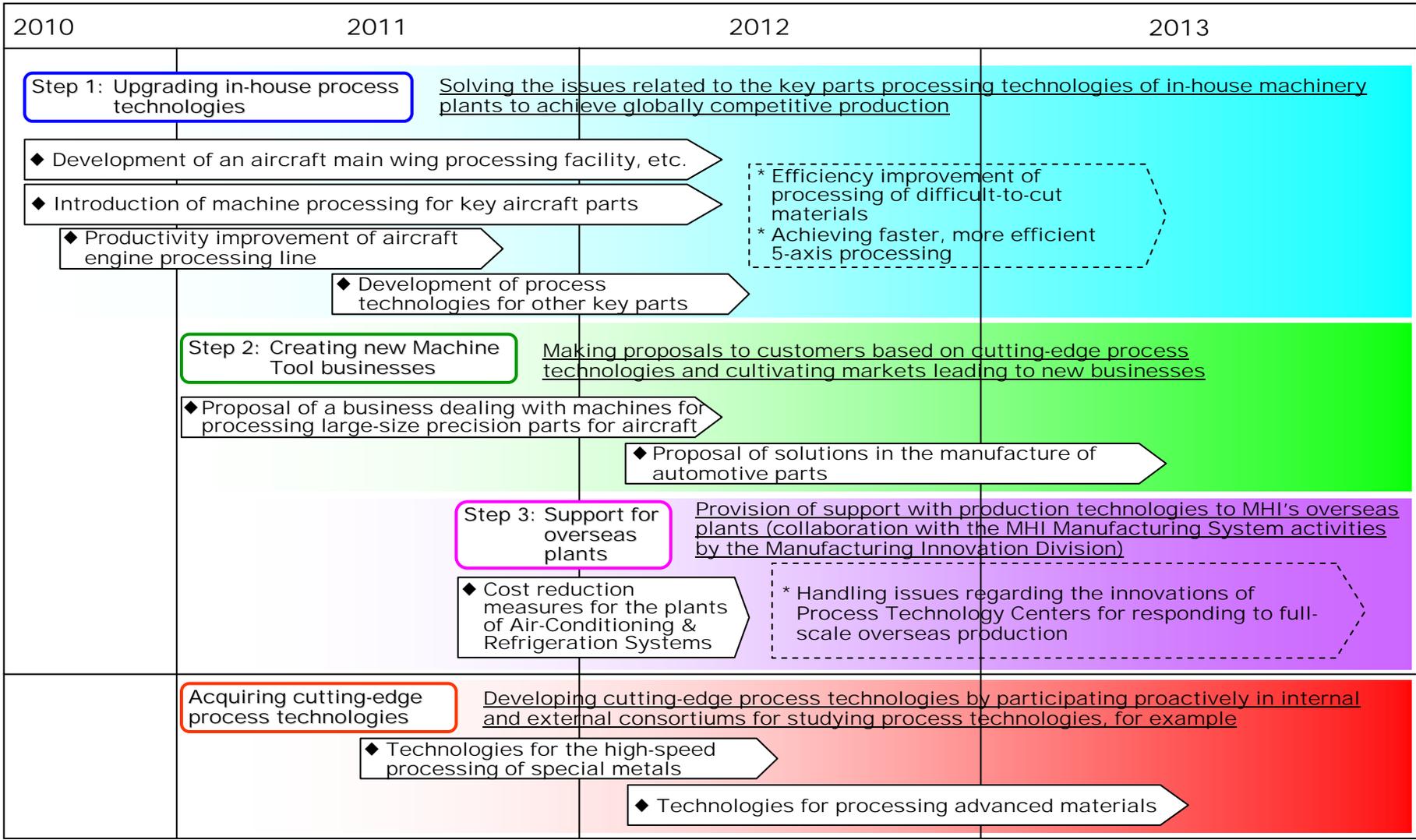
Increase the business size by expanding the subject applications and concentrating development efforts on growth fields.

# Upgrading in-house manufacturing through Process Technology Centers



The processing of key parts is carried out at the Machine Tool facilities.

# 4. Business Strategies: (5) Upgrading Process Technologies 2)



Commercializing cutting-edge process technologies (large-sized special purpose machines).

We are continuing our initiatives with the following key policy:

**Increasing business size and profits  
by accelerating globalization efforts  
and increasing added value**

**Aiming for a 100 billion yen business and the top global market shares for gear cutting machines and large-sized machine tools, we will continue the rapid, steadfast pursuit of the strategies under the 2012 Mid-Term Business Plan.**

Thank you for your attention.



Our Technologies, Your Tomorrow

A red arrow graphic pointing to the right, positioned below the tagline.

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