



Commercial Aviation & Transportation Systems

By commercializing the MRJ and promoting structural reforms in the commercial ships business, we are concentrating on building the foundations for growth to a business scale of ¥1 trillion.

Yoichi Kujirai

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Strengths

- **Commercial aircraft** Competitiveness through production innovations and supply chain management (SCM) reforms
Design and manufacturing technologies for large composite main wings and other structural components
Complete aircraft (MRJ) offering high levels of efficiency and reliability and outstanding economy
- **Transportation systems** Strong system integration and project management capabilities
- **Commercial ships** Proprietary environmental and energy-saving technologies unrivaled by other companies

Opportunities

- **Commercial aircraft** New demand for nearly 40,000 aircraft over the next 20 years
Expected market scale of ¥350 billion over the next 20 years for aircraft with 70–90 seats
- **Transportation systems** Numerous infrastructure plans, including in urban transport
- **Commercial ships** Growing demand for cruise ships, LNG carriers, energy-efficient vessels, and special-purpose ships for domestic use

Weaknesses

- **Commercial aircraft** Lack of experience in customer support and other aspects of the finished aircraft business
- **Transportation systems** Deficiencies in lineup of core products
- **Commercial ships** Weak cost competitiveness relative to South Korean and Chinese manufacturers

Threats

- **Commercial aircraft** Increasingly severe competition in regional markets
- **Transportation systems** Competition from China and the Big Three
- **Commercial ships** Decline in ship prices due to gap between global supply and demand
South Korean and Chinese manufacturers augmenting their shipbuilding capacity and product quality

Net sales

FY2014

¥529.5 billion

FY2017 (target)

→ ¥700.0 billion

Operating income

FY2014

¥23.4 billion

FY2017 (target)

→ ¥40.0 billion



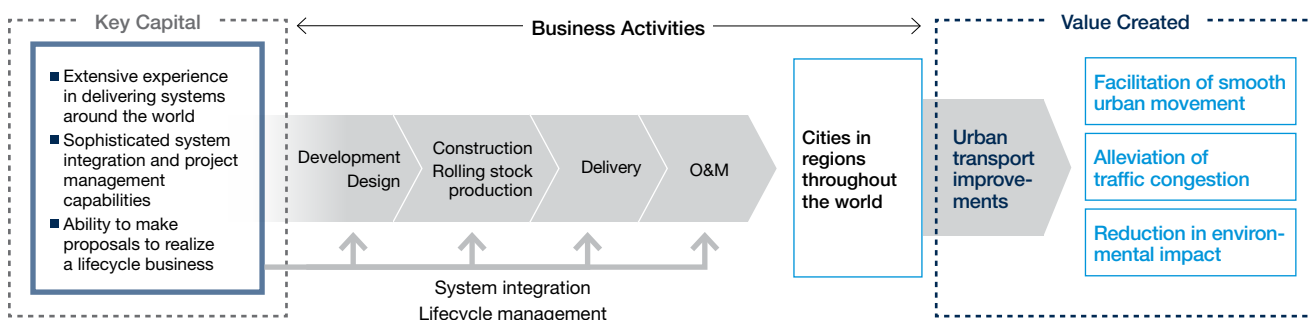
Operating Environment

Due to the combination of replacement and new demand, during the next 20 years the size of the commercial aircraft market is forecast to double, adding nearly 40,000 aircraft and reaching a scale of US\$5 trillion. Orders are expected to be particularly robust for single-aisle aircraft from low-cost carriers (LCC) operating mainly short flights and airlines in emerging countries.

The transportation systems business is estimated to have a current market scale of around ¥22 trillion, expanding at an annual rate of 2% to 3%. In particular, rail transportation is likely to be called upon to address increasingly serious traffic congestion in emerging countries experiencing rapid economic growth, including Asian countries and Brazil, as populations congregate in urban areas.

In the commercial ships business, the market is forecast to remain oversupplied for the foreseeable future, but North American shale gas development is engendering demand for gas carriers, an area where MHI excels. Also, the market for cruise ships is expected to grow steadily. In addition, in Japan we anticipate robust replacement demand for large-scale ferries and demand from the public sector for training ships and research vessels.

Sample Business Model: Transportation Systems



Focus Strategies of the 2015 Medium-Term Business Plan

While increasing profitability, chiefly in the commercial aircraft products business, we will create new business models in the MRJ, transportation systems, and commercial ships businesses. We are thus building the foundations for growth that we expect to boost this domain's scale of operations to more than ¥1 trillion during the period of the next medium-term business plan, with operating income in excess of ¥100 billion.

In the commercial aircraft business, we will restructure manufacturing bases and promote production process reforms. In the aircraft engines segment, we established Mitsubishi Heavy Industries Aero Engines, Ltd., in October 2014 to reinforce our financial and manufacturing bases. The new company will drive our efforts to form a manufacturing cluster that we expect to dramatically reduce administrative expenses and fixed costs by making use of partners' factories and facilities. We will also bolster our manufacturing capabilities and profitability through a cooperative production effort with IHI Corporation. The MRJ business is in a period of up-front investment as we work toward our first delivery. In addition to development, we will build our mass production and customer support systems in this business.

In the transportation systems business, based on our strengths in engineering and system integration we will strive to attract orders for urban transport projects especially in the Middle East and in Southeast Asia, which is slated for future growth. In autumn of 2014, we opened the MIHARA Test Center, MIHARA being an acronym for Multipurpose Integrated Highly Advanced Railway Applications, to spearhead our development of a total solutions business. Furthermore, in the life-cycle management services business we aim to expand our operations in the categories of operational monitoring, as well as maintenance leveraging our global network.

In the commercial ships business, availing of our expertise in shipbuilding engineering we will pursue business in such areas as LNG carriers, special-purpose ships for the public sector, and domestic ferries. In this way, we will focus on areas in which we can differentiate ourselves by virtue of the technologies we possess. The newly restructured Engineering Department will handle business involving cruise ships, and we are creating a business model based on the integration of engineering, procurement, and construction (EPC) and shipbuilding.

Furthermore, from a medium-to-long-term perspective we will cultivate synergies among domains to build a new infrastructure export model.

R&D Case Study: High-Speed AGT

MHI has developed a high-speed automated guideway transit (AGT) system with a maximum speed of 120 km/h, approximately twice as fast as existing AGT systems. To date, AGT systems using rubber tires have been introduced around the world because of the advantages they offer in terms of flexible route planning, short construction periods, low costs, and low vibration and noise. These systems are expected to help

alleviate urban congestion in emerging countries experiencing rapid economic growth, such as Southeast Asian countries. The new high-speed system has been developed to expand the market beyond urban transport to include suburban lines requiring no transfers, increasing convenience to commuters and numerous other passengers, and providing an effective solution to urban crowding.

■ Main Projects

Announcement	Delivery	Project
June 2015	–	Participation in the joint development of a new Rolls-Royce jet engine for Airbus aircraft
May 2015	2018	Order received for two <i>Sayaringo STaGE</i> next-generation LNG carriers
February 2015	2019	Order received by five-member consortium including MHI for Qatar's first metro system
January 2015	2019	Order received from Mitsubishi Corporation for two next-generation LNG carriers to export shale gas from fields in North America
January 2015	2021	Order received from Japan Airlines for 32 MRJ aircraft
August 2014	2020	Received first order from Latin America to construct an automated unmanned railway system for the São Paulo Metro
July 2014	2018	Order received to supply an AGT system, including 18 train cars, for Orlando International Airport in the United States
July 2014	2018	Order received to supply up to 10 MRJ90 aircraft to Air Mandalay Limited in Myanmar
July 2014	2019	Signing of memorandum of understanding on delivery of up to 40 MRJ90 aircraft to Eastern Air Lines Group, Inc., of the United States
June 2014	–	Signing of memorandum with The Boeing Company to participate in development and production of 777X aircraft

ONE HIGHLIGHT

Introducing Structural Reforms in the Commercial Ships Business in the Nagasaki Region

On October 1, 2015, MHI established two new wholly owned Group companies at the Koyagi Plant of its Nagasaki Shipyard & Machinery Works—one to undertake ship construction and the other to manufacture hull blocks. The construction of cruise ships will be operated within the Commercial Aviation & Transportation Systems domain's newly launched Engineering Department.

Of the two new entities, the ship construction company will undertake sales, engineering, procurement, manufacture, and repair services. New ship construction will focus on gas carriers, an area in which medium-term demand is expected to be strong and where MHI excels. The overarching goals are to strengthen cost competitiveness by streamlining production through continuous construction, enhancing efficiency through organizational downsizing, and rationalizing administrative processes.

The second company will specialize in large-scale hull blocks, an area of expertise for the Koyagi Plant, and will pursue enhanced productivity primarily through continuous construction and refurbishing of its physical plant. In addition to supplying blocks to the new ship construction company, the second company will promote their sale to customers outside the MHI Group. Plans also call for annual production volume to be progressively expanded.