

Conducting Global Intellectual Property Activities and R&D That Support MHI's Business Strategies

Manufacturing technologies are the source of value creation for the MHI Group, and intellectual property activities and R&D are the bedrock of its business. Supporting our business strategies for growth, we are promoting the construction of a global system, led by the chief technology officer (CTO), who is the head of technology.

An Integrated Approach Linking Businesses, Intellectual Property, and R&D

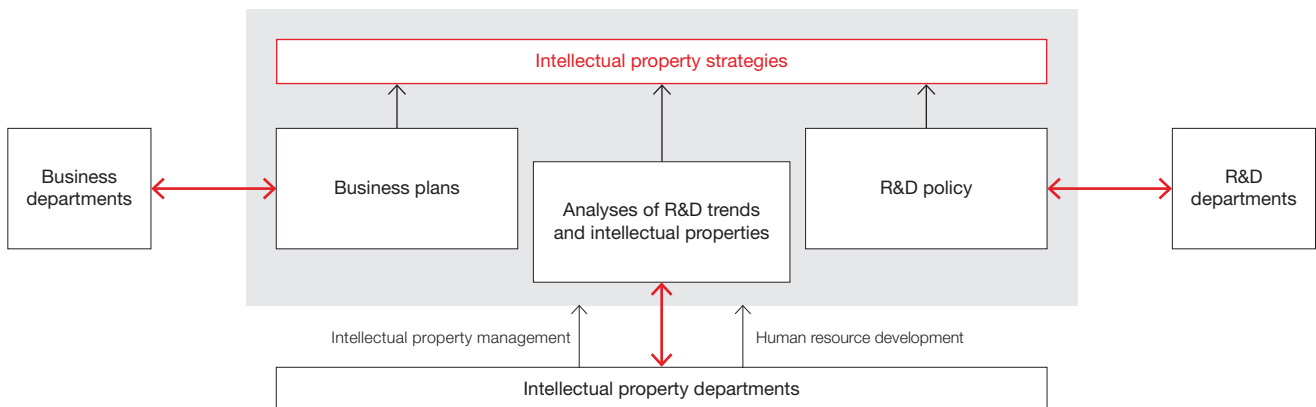
The MHI Group integrally develops its business, intellectual property, and R&D strategies. The MHI Group defines intellectual property strategies centered on the guiding policies of each business segment, with business, intellectual property, and R&D departments working closely together to implement these

strategies. By having the intellectual property departments coordinate the intellectual property strategies of all business segments, the MHI Group strives to realize the intellectual property strategies of the Group and further enhance its corporate value.

Intellectual Property Activities Structure

The MHI Group has shifted from a Business Headquarters Structure to a Business Domain Structure. This transformation was aimed at consolidating and restructuring Group businesses from the standpoint of similarities of the market, customer, core technology, and business strategies.

Intellectual property departments, which are part of the corporate division, have built domain-based activity structures and contribute to planning intellectual property strategies as well as strengthening the support functions related to intellectual property.



Intellectual Property Activities Policy

The MHI Group strives to increase the competitiveness of its intellectual property in line with its basic policy of “globalization of intellectual property strategies and intellectual property activities” and the “utilization of intellectual property.”

Because the MHI Group’s R&D bases and the locations of intellectual property utilization are expected to spread out further around the world, the MHI Group is stepping up efforts to secure overseas intellectual property, in particular, and strengthening its global intellectual property management system.

To establish a competitive advantage, by securing the intellectual property that meets the purpose of intellectual

property utilization, such as blocking other entrants and market expansion that incorporates an open strategy, the MHI Group seeks to create an optimal intellectual property portfolio that will support the development of the Group’s business.

To encourage invention and creativity, MHI has set up a reward system for employees who come up with inventions or generate new ideas. The MHI Group revises this system to keep pace with legal revisions and growing public regard for intellectual property. Through efforts such as these, the MHI Group tries to stimulate the intellectual property activities of the entire Group.

Risk Management Related to Intellectual Property

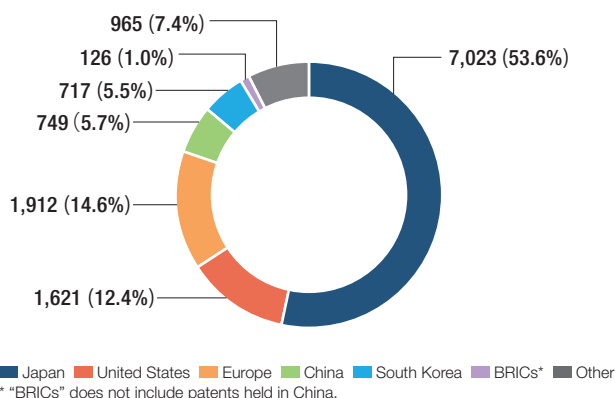
The MHI Group respects the valid intellectual property of others and, at the same time, promotes the appropriate protection and active use of intellectual property.

To accelerate global development, the MHI Group actively pursues overseas M&A and alliance initiatives and builds bases in other countries. Along with the growth in global M&A activities,

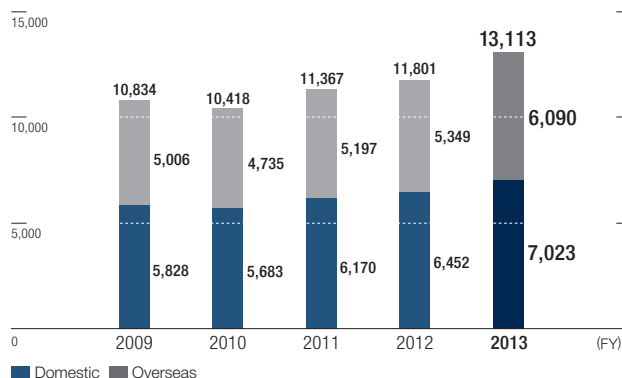
the external environment and risk factors related to intellectual property are changing rapidly. Even under these circumstances, when developing its business the MHI Group makes every effort to ensure it respects the intellectual property of others by

considering the intellectual property rights of others at every product stage, from basic planning and design to production. In these ways, the MHI Group strives to prevent international intellectual property difficulties from arising.

FY2013 Patents by Region



Number of Domestic and Overseas Patents



Research and Development

The MHI Group maintains close ties between its R&D centers and its business domains. This focus enables us to enhance product competitiveness in the Energy & Environment domain and other fields as well as intensify R&D with a view to future business expansion.

We are working toward the globalization of our R&D structure, and as part of these efforts we are dispatching specialist engineers from five research centers to our bases in the United Kingdom, Singapore, and the United States. We are making efforts to secure leading global technologies,

information, and human resources, while conducting research and providing technological support that is closely aligned with market needs.

Some of our major R&D projects in fiscal 2013 are described in the following pages.

More detailed information on our technology is available for viewing on the website.

 <http://www.mhi-global.com/company/technology/index.html>

TOPICS

Thomson Reuters Corporation* Names MHI among "Top 100 Global Innovators" in 2013

In October 2013, MHI was named one of the world's 100 most innovative companies of 2013 by New York-based Thomson Reuters Corporation for the second consecutive year. MHI received high marks for its innovations and intellectual property activities in each of the "Top 100 Global Innovator" program's four categories: patent approval success rate, global reach of patent portfolio, patent influence in literature citations, and overall patent volume.

Thomson Reuters annually selects what it considers to be the world's most innovative companies or research institutes based on an analysis of its own patent database. The 100 companies and research institutes honored are recognized as "top global innovators" for the impact of their valuable inventions

on the global market, their appropriate protection of intellectual property rights, and the global development that results from their commercialization.

This prestigious award reflects a firm commitment by MHI to continuing its proactive pursuit of innovative technology developments and its quest to actively protect the resulting intellectual property and apply its innovations in the global market.

* Thomson Reuters is a New York-based global information services company. It was established in 2008 when the Thomson Corporation, a Canadian information services provider, purchased Reuters Group PLC, the British communications giant. Presently, Thomson Reuters has approximately 60,000 employees working in more than 100 countries worldwide.



Principal R&D Activities

Development of gas turbine technologies with inlet temperatures in the 1,700°C class

The thermal efficiency of GTCC power generation increases along with the temperature increase at the inlet of the turbine (combustor outlet). MHI has been engaged in developing a 1,700°C-class gas turbine as part of a national project to improve energy efficiency since 2004 and has been working on technology development for such factors as the combustor, compressor, turbine, cooling, and heat shield coating, with a target combined-cycle efficiency of 62% to 65% (lower heating value). (Energy & Environment domain)

Expanding the flexibility of fuels at integrated coal gasification combined-cycle (IGCC) power plants

Among power generation technologies that employ coal, IGCC is heralded for its ability to make use of sub-bituminous coal, which has proven difficult in the past. We have also developed a system for drying lignite, which contains more than 50% water, consuming less energy than was previously needed. Making use of this system at IGCC plants substantially boosts power generation efficiency and aims to contribute toward significantly lowering CO₂ emissions in coal-producing countries. (Energy & Environment domain)

Development of CO₂ capture technologies for coal-fired power plants

MHI is pursuing a joint carbon capture and sequestration (CCS) demonstration project with Southern Company, a major U.S. electric utility. Having confirmed high-performance, continuous, and stable operation of a large-scale CO₂ recovery plant, MHI concluded its initial planned testing in December 2013. Based on these results, the Company plans to accelerate its commercialization of CO₂ capture technologies for coal-fired thermal power plants, whose emissions tend to include substantial impurities.

(Energy & Environment domain)



CCS demonstration plant

Development of a high-pressure LNG fuel supply system to allow ships to operate on LNG

Using LNG to fuel ship engines designed to operate on diesel requires the practical application of technologies to inject LNG vapor at high pressure as well as heat exchange technologies. Currently, we are also working on ways to extend service intervals and improve operability.

(Commercial Aviation & Transportation Systems domain)

Development of the MRJ, a cutting-edge regional aircraft

The Mitsubishi Regional Jet (MRJ) employs a leading-edge engine, state-of-the-art aerodynamics, and acoustic analysis technology to drastically reduce fuel consumption, noise, and emissions. Presently, MHI is conducting final assembly with a view toward a maiden flight in 2015; as of the end of June 2014, we completed the wing-body combination and engine installation.

(Commercial Aviation & Transportation Systems domain)



MRJ

Development of guidance control and manufacturing technologies that help to reduce costs and improve reliability for new flagship launch vehicles

Various technologies are under development as part of the development of an internationally competitive new launch vehicle. In March 2014, MHI was selected by the Japan Aerospace Exploration Agency (JAXA) to serve as the prime contractor in charge of the development and provider of launch services for a new flagship launch vehicle.

(Integrated Defense & Space Systems domain)

Satellite Launch Services for Future Space Development

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Production of the Advanced Technology Demonstrator prototype

Aiming to acquire technologies necessary for developing a next-generation indigenous fighter aircraft, MHI developed a supersonic stealth prototype aircraft with high maneuverability, which conventional fighter aircraft have never been able to achieve.

(Integrated Defense & Space Systems domain)

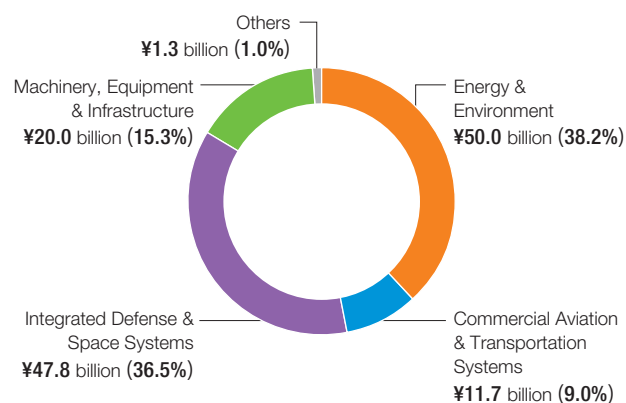
Development of a highly efficient turbocharger that enhances engine fuel efficiency

MHI has developed a turbocharger that boosts engine fuel efficiency through the combination of a low-noise, high-efficiency bearing, as well as a highly efficient turbine and compressor. (Machinery, Equipment & Infrastructure domain)

Development of the MVR-Ex Series for high-accuracy machining

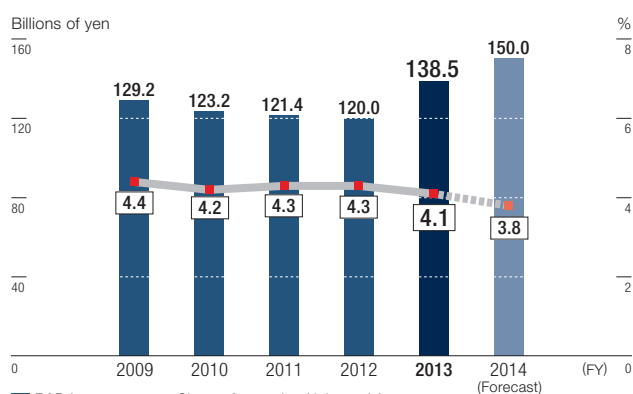
Based on its experience in the production of 1,000 units of the MVR—a best-selling double-column, five-face milling machine—MHI has developed a new model, the MVR-Ex. Equipped with the latest CNC controller functions as well as state-of-the-art technologies, this model is suitable for high-end users who are keenly interested in high-performance machines. In particular, the winning combination of internal cooling spindle and special columns with thermo stabilizer functions realizes high accuracy and powerful machining for true machinists. (Machinery, Equipment & Infrastructure domain)

FY2013 R&D Investment by Business Segment



Note: The figures above exclude ¥7.4 billion for expenses related to reinforcing the MHI Group's common technological base.

R&D Investment and Share of Net Sales



Note: The figures above for R&D investment include expenses related to R&D under contract.

TOPICS

Research activity on an innovative elemental transmutation method

MHI is pursuing research on a fundamental technology called “new elemental transmutation reaction.” In the field of physics, it has always been known as a matter of course that the use of a nuclear reactor or an accelerator is necessary to achieve elemental transmutation. This new method enables us to transmute elements with relatively simple equipment and using little energy.

The transmutation method involves forming a specialized palladium film on the element to be transmuted and then permeating the film with deuterium. The element then reacts with the deuterium, undergoing elemental transmutation. The transmutation mechanism is not understood at present, but MHI has confirmed conversions of cesium to praseodymium, strontium to

molybdenum, calcium to titanium, and tungsten to platinum. MHI has patented this proprietary technology in Japan and Europe.

Since 1994, MHI has been conducting research in the field of elemental transmutation, which is at the fundamental stage, but the Company is currently increasing the volume of elements that can be transmuted and is at the stage of considering this technology's applicability. One possible application would be in transmuting radioactive cesium into a harmless, non-radioactive element. This application could apply to the inactivation of radioactive waste. A variety of issues need to be addressed before the technology can be applied, but MHI is forging ahead in this direction.