Engineers' Relay: An Ongoing Passing and Receiving of the Technology Baton

— Development and Popularization of Coal Gasification Technology, an Alternative Energy —

Coal gasification technology converts coal into a syngas with low emissions of CO_2 and other air pollutants for use in power generation and production of chemical products. MHI's integrated coal gasification combined cycle (IGCC*1) demonstration plant*2 achieved 2,000 hours of continuous operation, and MHI has successfully developed the world's only gasification technology that can accommodate both air-blown and oxygen-blown agents*3. The 25 years of unstinting effort by its engineers have yielded huge rewards. This May, MHI was awarded a contract to perform the front-end engineering and design (FEED) services for the gasification and power island of the Hydrogen Energy California (HECA) project*4. This marks a new step on the road to the company's long-held dream of commercializing IGCC. In this issue, MHI focuses on the passion of engineers like Yasunari Shibata and Takashi Iwahashi who embrace a mission to develop new energies for the future and promote their adoption worldwide.

Photo left : Takashi Iwahashi, Senior Engineer, IGCC Process Engineering Group, Power Systems Project Engineering Department, Power Systems Project Management Division, Engineering Headquarters
Photo right : Yasunari Shibata, Manager, IGCC Team, Boiler Engineering Section, Boiler Engineering Department, Power Systems

Drawn to Development by the Potential of Gasification

In 2008, MHI's IGCC demonstration plant achieved 2,000 hours of continuous operation, its reliability verified to prepare for commercialization. Shibata, who was in charge of design during this test phase, has had a passionate interest in coal gasification technology since before he joined the company. "I majored in information engineering, but while still in school I started to think that I wanted to be more involved in energy technology, a fundamental aspect of daily life. While I was researching related theses, I came across one that had been written by an MHI employee, and I decided I also wanted to contribute to the development of IGCC. I felt so strongly that, even at my job interview, I told MHI that this was what I wanted to do."

Iwahashi also joined the company with a passion for this technology. Today, as engineering manager for the front-end engineering design on the HECA Project in preparation for implementation, he probes the plant design requirements of the customer, coordinates with the relevant parties both in-house and externally, and pulls the technology together. Iwahashi aspired to create new markets through technology development, and then he learned about MHI's coal gasification technology at an academic conference. He says he was eager to popularize this advanced technology — the first in Japan — as quickly as possible, and contribute to the resolution of global energy and environmental issues.

Today, Shibata and Iwahashi are both working at the forefront of commercializing IGCC technology.

Steady Effort Opened the Way

MHI began developing coal gasification technology in 1983, but the path was far from smooth. Shibata joined the company in 1997 around the time deregulation of the power industry was being debated, and conditions for investment in development were not favorable. "The demonstration plant project hit a snag, and the whole company felt on edge. We felt that if we were to lose our customers' trust at that point, we wouldn't be able to continue development. Under the circumstances, we couldn't afford mistakes, and the thoughts that my predecessors had about the development were so focused they were almost palpable. At work, and even after work, we often talked about how, given that Japan is a resource-poor country, it's up to us to make IGCC a reality." Through all this, MHI never stopped development work, and a gasifier was built in-house. "I looked at my predecessors, and at how they believed in themselves and put ideas into action. That was when I learned what it means to have a passion for *monodzukuri*, for manufacturing." According to Shibata, his experiences at that time helped him grow into a true developer.

With continuation of the project still uncertain, Shibata and his colleagues conducted verification in-house on the assumption that a demonstration plant would go ahead, and they achieved solid results. Their efforts paid off, and the IGCC demonstration plant project began. However, the test brought daily pressure for Shibata. "I stayed at the site from the trial operation stage onwards; I was covered in coal and sweat, black from head to toe as I inspected and analyzed various potential scenarios. I kept working even in my dreams. And even though we had planned so carefully, when we ran a test, we would find issues. The design, R&D, trial operation and construction supervisors all came together and resolved those issues so we could keep moving forward." Finally, they set that fantastic record: 2,000 hours of continuous operation. At the time, Shibata says, he and all the people who had worked so long and hard together were overjoyed. They were on the road to commercialization achieved through 25 years of sustained efforts and labor by Shibata and the rest of the "challengers."

Now that commercialization is finally a realistic possibility, Iwahashi is in charge of the first step, the HECA Project. "This project can surely expect to attract widespread attention and lead to popularization, and that's why I feel a sense of mission — that we must make it a success." Iwahashi is tackling the project with enthusiasm, and every day he emphasizes the value of free and open communication. "IGCC is composed of numerous systems, and there is a wide range of fields involved, so in order for everyone involved to carry out their duties toward the same goal, we must have unity of purpose. To achieve it, we consider it very important to interact closely with our customers and partners, to communicate face-to-face in order to align our mutual vectors toward plant completion. So even when issues crop up, sales, design, manufacturing, construction, R&D and the rest can all come together and promptly deal with them." As technology advances with each new day, and other companies follow, Iwahashi is looking forward to the project's success.

Opening Up a Limitless Future with Gasification Technology

Now that their efforts have borne fruit and commercialization is just around the corner, Iwahashi pictures a future in which coal gasification technology is increasingly adopted. "Today, renewable energy is getting all the attention, but thermal power generation is vital for a stable power supply. Coal deposits are abundant and the price is stable, but coal produces more CO_2 emissions than other fuels. Coal gasification technology is the way to resolve this issue: it generates power more efficiently than conventional thermal power generation, and uses coal cleanly while keeping CO_2 emissions down. Also, we can manufacture chemical products such as fertilizers and fuel as we generate power. Being in charge of an important technology that will support everyday life in the future — at the forefront of a business in the global spotlight — is more than any engineer could hope for."

"I believe gasification technology can contribute to the resolution of food supply issues as well," adds Shibata. "Energy from livestock manure can be gasified to create fertilizer, and the CO_2 recovered during the process can be used to promote photosynthesis in crops. I want to have a hand in the creation of that sort of sustainable society. At this point it's still just theory, but in the future I'd like us to be able to provide various technologies as a set, and resolve with one stroke various problems faced by Japan and countries around the world." His dreams know no bounds.

Through steady, concerted efforts, engineers like Shibata and Iwahashi have developed technology once thought impossible. They will continue working to broaden the potential of coal gasification technology, passing the baton on to tomorrow.

*1: In this highly efficient combined cycle power generation system, coal is gasified for the first power generation cycle, which is performed using a gas turbine; the exhaust heat from that process is then used to run a steam turbine for the second cycle.

*2: Delivered to Clean Coal Power R&D. (CCP) in Nakoso, Iwaki City, Fukushima Prefecture. MHI did more than simply supply the gasifier and other major IGCC equipment: it coordinated all aspects of the plant's creation under a full turnkey contract. The company was also in charge of various verification operations after completion.

*3: In coal gasification, MHI's technology allows both air and oxygen to serve as the gasification agent.

*4: A project to provide a combined cycle power generation plant that includes an IGCC plant to gasify coal and generate power, a plant to manufacture fertilizer from coal gas, and an enhanced oil recovery (EOR) facility that uses the CO_2 recovered from coal gas. It could be one of the world's first commercial-scale IGCC power generation plants with 90% or greater carbon capture and storage (CCS) function.

Planned HECA Project in Bakersfield, California, U.S.

Project team members at MHI's demonstration plant elated at the record achievement

The history of this 25-year challenge can be read in detail on the MHI website: >>> **"A Story of Innovating Challengers – Coal Gasification Technology – 'Create new energies to safeguard the future'"**

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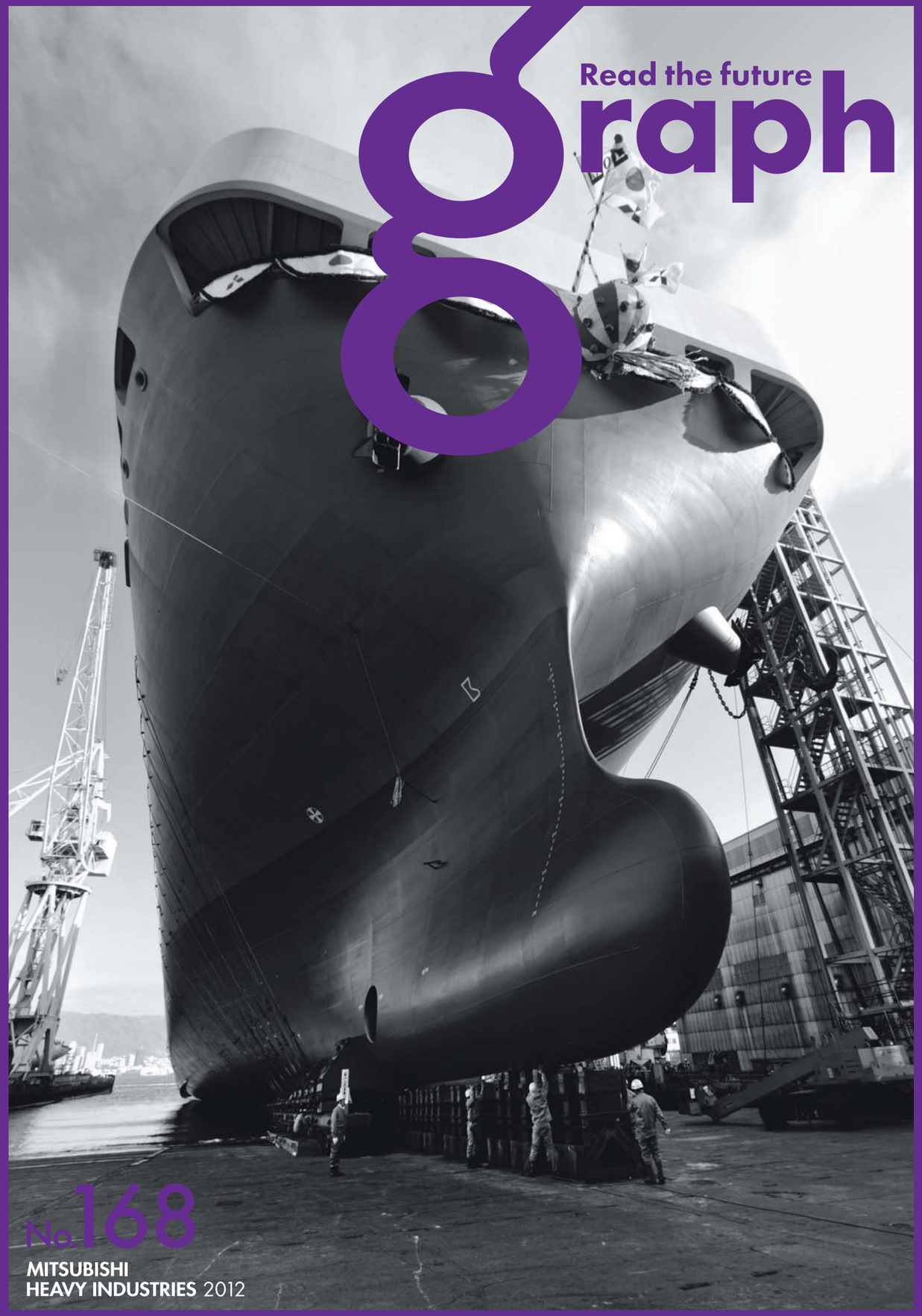

Special Feature

CHARTING NEW WATERS IN SHIPBUILDING

Tradition and Technology — The Fair Winds to Future Expansion

The SUZURAN and SUISEN, high-speed ferry ships (overall length 224.82m and gross tonnage 16,810t), use CRP pod propulsion technology to integrate a propeller directly connected to the diesel engine with an electric pod propulsion unit. Delivering high energy-saving benefits and outstanding ship maneuverability, the CRP propulsion system (photo below) was adopted for the first time in the world in the sister ships HAMANASU and AKASHIA, in 2004.
〔Nagasaki Shipyard & Machinery Works, Nagasaki Prefecture, Japan〕

HAKUREI (2012), a marine resources research vessel that searches for rare metals and other resources in the waters off Japan. It is fitted with excavation machinery and various cutting-edge investigative devices.
〔Shimonoseki Shipyard & Machinery Works, Yamaguchi Prefecture, Japan〕

(Photo courtesy of JAMSTEC)

The YUMEIRUKA (2012) autonomous underwater vehicle (AUV) can be used at depths up to 3,000m. Capable of remaining underwater for up to 16 hours, it is designed to capture high-resolution deep sea images using sound waves. MHI concurrently completed another AUV called JIMBEI, which can measure water depth, temperature, salinity and pH. (lower left in photo).
〔Kobe Shipyard & Machinery Works, Hyogo Prefecture, Japan〕

(image)

Large LNG carrier with the recently developed "SAYAENDO" continuous integrated tank cover. Fitted with a highly efficient ultra steam turbine (UST) plant, this ship is expected to come into active use worldwide in tandem with dramatic increases in shale gas production.
〔Planned for building at Nagasaki Shipyard & Machinery Works, Nagasaki Prefecture, Japan〕

MHI's ships have always responded to the needs of their times. Shipbuilding is the cornerstone of MHI craftsmanship.

MHI's shipbuilding history began in 1857, four years after the arrival of Commodore Perry's "black ships." Ever since, shipbuilding has remained the cornerstone of the company's technology and craftsmanship, and more than 5,400 ships have been constructed to date. Through more than 150 years, MHI's ships have continuously evolved to meet the changing needs of the times.

Between the opening of Japan and the beginning of World War II, ships played an important role connecting Japan to the rest of the world. As the country pressed forward with modernization, demand grew for vessels that could serve overseas routes, such as the TENYO MARU luxury cruise ship (1908*) and emigrant ships. The subsequent emergence of geopolitical tensions shifted focus towards warships. MHI drew on its shipbuilding technology to build a string of warships, including the majestic MUSASHI battleship (1942).

After World War II, MHI's robust shipbuilding activities contributed to earning the foreign currency that Japan needed for its economic recovery. When the country entered its era of rapid economic growth, MHI supported its leap to economic superpower status by building state-of-the-art ships such as Japan's first container carrier, the HAKONE MARU (1968), and VLCCs.

Building ships with high added value, instead of vessels just serving as transport for people and goods

MHI's stance of building ships that respond to the trends of the age remains unchanged today. Global demands for more environmentally responsive and economical products are being met by the OPAL ACE (2011), a car carrier that combines fuel efficiency and environmental advances, the SUZURAN and SUISEN, high-speed ferries fitted with a revolutionary hybrid CRP (contra-rotating propellers) pod propulsion system, and a large LNG carrier equipped with a peapod-shaped tank cover and fuel-efficient turbine plant (scheduled for completion in 2014). As the only company in the world capable of integrated production of not just ships but also engines, high-performance turbine and marine machinery, MHI is now presented by the tide of the times with a glorious opportunity to deploy the full range of its technological and manufacturing powers.

In addition to enhancing fuel efficiency and pursuing increased environmental consciousness, MHI's shipbuilding business is shifting its focus towards high-value-added ships for niche markets. This is best exemplified by the development of the HAKUREI, a marine resources research vessel, and the YUMEIRUKA, a deep sea unmanned exploration vessel.

MHI's shipbuilding business is about to change course towards manufacturing products that deliver ever more value to society.

* Throughout this article, all years in parenthesis refer to year of ship completion.

〔Cover, p4-8: Kobe Shipyard & Machinery Works, Hyogo Prefecture, Japan〕

Giant Structure Assembled with Minute Precision

Achieved through meticulous design, abundant resourcefulness and close cooperation

At MHI, merchant shipbuilding begins with a design phase lasting more than a year. The enormous volume of drawings created during this period form the basis for sculpting the steel plates during hull work.
These plates are then welded together to form the “blocks” that will then be erected to form the skeleton and shape of the ship. While pipes and equipment are attached in the outfitting process, adjustments and finishing are applied to the engine and other inboard equipment.
The ship is then completed after a series of sea trials.
Construction of a 200m long car carrier involves more than 1,000 personnel working in various areas and takes almost two years from order placement to delivery.
A ship fully equipped with an engine room, cargo space and living quarters is in effect a giant building created to travel the high seas. Realization of production plans based on detailed designs and extensive knowledge therefore requires close cooperation among workers who process more than 100,000 parts.

Large cranes load blocks onto the building berth where they will be welded together to form the hull. It takes only 60 days for the ship to take shape. Aligned slabs of inanimate steel may be a scene representative of shipyards, but the sight of a fully assembled hull is equally awe-inspiring.

This massive block will form the stern of a car carrier. It contains the engine room and the propeller shaft that requires high-precision fitting. Another nearly 400 blocks of varying sizes will also be brought to the building berth for erection.

Blocks have been upsized in order to increase shipbuilding efficiency by reducing work time on the building berth . Here, a 2,100t block is being lifted onto the building berth by a giant marine crane.

A marine crane is used to transfer a giant 20,000 horsepower diesel engine from the yard’s engine plant to the engine room. This enables even more efficient building.

A block being hoisted by a jib crane for slotting into the side of the hull.
A ship is like a jigsaw puzzle composed of many different-shaped blocks.

Ships Sculpted by Exquisite Craftsmanship

MHI's workmanship cultivated over many years is beyond compare.

Creating a hull out of massive pieces of steel requires the human touch at the end.
For example, the design enabling a ship's beautiful shape is based on the latest achievements in fluid dynamics.
However, craftsmanship in plate forming is indispensable to the actualization of this design.
The shaft supporting the heavyweight propeller also has to be fitted with micrometric precision.
And skill and experience are needed to be able to predict the hull shrinkage caused by temperature changes and the influence of deformation after launching.
In these and other ways, these giant structures are ultimately products of human craftsmanship.

B

C

A: An enormous 26t propeller with a diameter of 6.6m, made at the Nagasaki Shipyard & Machinery Works, being fitted to its shaft. The beautifully finished gleaming propeller has to be handled with the utmost care. The shaft, which transfers power produced by the engine (left photo) to the propeller, is more than 20m long and with a diameter of only about 60cm needs to be fitted to its bearing (right photo) within a tolerance of 0.01mm or less.

B: The hull's outer plates are molded into the shape specified by the design drawings using burners (to cause expansion) and water cooling (to induce shrinkage). At least ten years of experience are required to create the correct bend in accordance with the detailed design specifications.

C: Welding plays an indispensable role in assembling steel plates into blocks and in the erection of these blocks in the building berth. A 200m long car carrier entails a total welding distance of about 440km. Efficiency is considerably increased by automated welding, but the skills of an experienced welder are called upon for difficult sections that cannot be suitably performed by machine.

Setting off on a New Voyage

A car carrier is launched by sliding down the sloping building berth into the sea. The launching ceremony is enjoyed both by the local community and by all those involved in shipbuilding like the long-awaited birth of a precious baby. After the launch, the ship undergoes outfitting in preparation for its many long voyages on the high seas.

Technology accumulated through the years is now being applied to chart a new course for MHI's shipbuilding business.

In 2012 the Kobe Shipyard & Machinery Works ceased merchant shipbuilding activities after 107 years of service due to reorganization of MHI's Shipbuilding & Ocean Development business segment. It will now specialize in other vessels such as submarines, submersibles and marine structures, and the shipbuilding technology and knowledge accumulated here to date will be applied to the development and production of those products, as well as to merchant ship production carried on at MHI's shipyards in Nagasaki and Shimonoseki. The scope of this technology transfer extends well beyond shipbuilding, as the welding technology and mega-block construction method have already been utilized during the construction of power generation plants. MHI's shipbuilding business has thus set sail for fresh waters on a global scale, embarking on new projects to benefit the planet and all human life on it.

MHI's Ships Respond to the Needs of the Age

Their important role in diplomacy and trade initially transformed oceangoing vessels into mirrors reflecting their times. But as times have changed, the usages and performance of ships have diversified. MHI, a rich repository of superior shipbuilding technology, has continuously created ships that meet the requirements of their time. The underlying spirit and yearnings of each age have always been expressed in MHI's ships – and will continue to do so long into the future.

The beginning of modern marine transport

For Japan, a country surrounded by sea on all sides, the ship was for a long time its only means of trading and exchanging culture with the outside world. After the country fully opened its doors, sea routes were developed and the construction of passenger and other types of vessels flourished. The outbreak of World War II increased the number of warships being built.

TENYO MARU [luxury cruise ship] (1908*1)
Japan's first large passenger ship, exceeding 10,000t.

ASAMA MARU [luxury cruise ship] (1929)
Sailed on the San Francisco route. Also called "Queen of the Pacific."

MUSASHI [battleship](1942)
Incorporating the essence of contemporary naval technology, this was the world's largest battleship at the time.

The postwar years and rapid economic growth

Shipbuilding flourished after the war thanks to its strategic role in Japan's policy for economic recovery. As Japan's growth took off, trade volumes ballooned, increasing demand for large vessels capable of transporting huge quantities of containers and energy resources. MHI responded to these changing needs by accelerating its construction of specialized vessels.

BRAZIL MARU [emigrant ship](1954)
Built as Japan's first full-scale postwar passenger vessel, it also was the last ship to carry Japanese emigrants to South America.

HAKONE MARU [container carrier](1968)
Japan's first container carrier marked the dawn of the mass cargo transport age.

DAVID PACKARD [tanker](1977)
Ultra Large Crude Carrier built at Nagasaki Shipyard & Machinery Works.

Creation of a sustainable society

We live in an age that imposes increasingly strict environmental regulations on marine transportation, while also demanding improved energy efficiency. Today, besides transporting people in comfort, passenger ships and ferries are expected to deliver excellent environmental performance. Also, whereas until now shipbuilding technology that has been applied to carrying natural and energy resources, going forward it will be used to search for and exploit new resources.

CYGNUS PASSAGE [Moss type LNG carrier] (2009)
Superior reliability, navigable in frozen waters, e.g. between Japan and Sakhalin.

MOL MAESTRO [container carrier](2009)
Low fuel consumption and outstanding cargo capacity, equipped for high environmental performance.

ASHIGARA [DDG] (2008)
State-of-the-art Aegis warship with top-class air defense capabilities.

OPAL ACE [car carrier] (2011)
Low fuel consumption and decrease in risk of fuel spillages.

MALS*2 [Mitsubishi air lubrication system] Developed in 2010
Uses air bubbles to reduce friction between the seawater and the hull, contributing to higher fuel efficiency.

HAKURYU [submarine] (2011)
Conventionally powered submarine with world-class submergence capability and quiet performance.

SAYAENDO *2 [LNG carrier] Scheduled for completion in 2014
Highly efficient ship equipped with continuous tank cover integrated with the hull structure.

Licensing of technology

Cooperation with domestic and overseas companies
MHI provides support in shipbuilding technology and conceptual designs for merchant shipbuilding.

Quest for enhanced comfort and pleasure

DIAMOND PRINCESS [cruise ship](2004)
New-generation cruise ship equipped with environmentally conscious power generation and propulsion system.

ISHIKARI [ferry](2011)
Endowed with an array of public spaces, achieving luxury on a par with passenger ships.

Next-generation ferries*2
Adoption of Mitsubishi Air Lubrication System (MALS) and gas fuel for enhanced environmental performance.

Large luxury cruise ships*2
Enhanced security and comfort with refined design and advanced energy conservation.

Quest for new resources and energy sources

SHINKAI 6500 [deep submergence research vehicle](1989)
The world's deepest class of manned deep submergence research vehicles capable of diving to a depth of 6,500m.

CHIKYU [deep sea drilling vessel](2005)
The world's first vessel for extreme depth drilling in the earth's mantle and in earthquake zones.

HAKUREI [marine resources research vessel](2012)
Explores for rare metals and other resources in the waters off Japan.

Resource research vessels*2
For accurate analysis of the surface and substructure of large areas of the seabed in 3D.

Offshore wind turbine*2

Offshore wind turbine installation vessel*2

Exploiting untapped value at sea through integration of wind power generation and a marine structure.

*1 : Throughout this article, all years in parenthesis refer to year of ship completion.
*2 : Conceptual image

MHI IN THE WORLD

From Australia DIRECT
Australia Shares a Story with the World

Aiming for Greater Market Share in Eco-Conscious Australia

Through Development of High-Performance Air Conditioners Meeting Local Demands

Based in Sydney and with locations in Melbourne and other areas throughout the country, MHIAA supplies commercial-and residential-use air-conditioner products.

Worldwide, tighter regulations on electrical products are being enacted as part of efforts to combat global warming. One direct result is that inverters — devices that control a motor's rotational speed as a way to achieve more efficient power consumption — are attracting greater attention in the current market for air conditioners. Although their use today is nearly universal in Japan, inverter usage of all air-conditioning units in Europe remains below 50% and is virtually nonexistent in the U.S. Australia is an exception, however, with more than 90% of air conditioners sold domestically incorporating inverters.

Australia's Market Driven by Strong Demand for Green Technologies

Australia has one of the world's most beautiful natural environments and is home to myriad indigenous species. To protect this rich environment, more than 10% of the country's territory is administered as national parks and nature reserves, and strict quarantine procedures are in place at airports to protect the ecosystem. In addition, many people are involved in tourist-related industries, including eco-tourism, which capitalize on nature as a resource. As a result, Australians manifest extremely high environmental awareness in their daily lives. At the national level, the government has set a goal of reducing greenhouse gas emissions to 60% of their 2000 level by 2050, and it is asking for the cooperation also of ordinary households. As the trend toward household energy conservation grows, attention is turning to the relative performance of air conditioners in terms of energy savings.

Against this background, MHI has designated Australia as one of the most important countries in its global strategy for its air-conditioner business. Under the leadership of its local subsidiary, Mitsubishi Heavy Industries Air-conditioners Australia (MHIAA)*, major advances are being made in product planning and marketing, enabling solid growth in sales every year.

Australia currently has strict minimum energy performance standards (MEPS) in place for air conditioners and other electrical appliances, and demand for highly energy-efficient air conditioners is increasing annually. Inverter air conditioners meet these standards and play a leading role in the market, with products from technologically superior Japanese air-conditioner manufacturers proving especially popular. Most notably, MHI has applied its jet engine airflow analysis technology, originally developed for aircraft, to create unique air conditioners designed to deliver enhanced airflow performance, and these have been well received. These designed-in-Japan products are manufactured and supplied by Mitsubishi Heavy Industries–Mahajak Air Conditioners (MACO), a joint venture based in Thailand. Reliance on this JV provides added price-competitiveness to the high-performance, energy-saving air conditioners originally created for the Japanese market. It is symbolic of how MHI is setting in place a supply system capable of offering globally responsive models for worldwide markets including Australia, Europe, and Asian countries.

* A local subsidiary headquartered in Sydney. In 1999, direct sales were initiated through Mitsubishi Heavy Industries Australia (MHIAU), a wholly owned MHI subsidiary. In 2008, the air conditioner division was spun off and established as the separate entity MHIAA. MHIAA undertakes locally rooted sales promotion and customer development by offering innovative new products that reflect Australia's needs and incorporate MHI's rich experience in countries around the world.

Meeting Diverse Market Needs with Locally Targeted Products

Simultaneous with its development of inverter air conditioners for global markets, MHI is also developing and launching products specifically targeted at responding to local market needs.

The average size of a room in Australian homes is larger than the average in Europe or Japan. As a result, large wall-mounted air conditioners with good heating and cooling capabilities are preferred. Furthermore, in line with Australian architectural styles, demand is growing for duct-connected air conditioners in which the indoor units are installed above room ceilings.

In developing products tailored for this Australian market, MHIAA and product planning staff and design engineers from Japan inspected local houses and, gathering feedback directly from sales agents and installation engineers, considered product concepts matching all these requirements. Taking all perspectives into view, this market intelligence is being applied to product development.

Market development initiatives are also under way promoting adoption of multi split-system air conditioners that incorporate three to four indoor units controlled by one outdoor unit, for residential use in high-rise condominiums and apartment complexes. The idea for this product came from the European market, which tends to value preservation of the external appearance of buildings and limits installation space for outdoor units; but with the accelerating construction of condominiums in Australia, its popularity in this market is also growing.

In these ways, by gathering information on local needs, creating products to meet them, and then marketing those products internationally, MHI is forging a structure for expanding global markets for new products that incorporate innovative new technologies and ideas.

Sales Network Expanding Through Collaboration with Actrol, the Domestic Leader

In conjunction with these business activities, in 2003 MHIAA entered a partnership with Actrol, Australia's largest independent wholesaler of air-conditioning and refrigeration equipment and parts. Actrol handles all piping materials, refrigerants and accessories vital to installation not only of air conditioners but other types of equipment as well, all backed by an extensive domestic sales network. Complementing its broad range of products is the company's broad customer base, and Actrol strives to provide high-quality solutions to satisfy both residential and commercial needs throughout the Australian continent.

For MHIAA, with its business focus on air-conditioning equipment, Actrol's operating format makes for an ideal partnership that benefits both parties. Users rate MHI's air conditioners highly in terms of both technology and functionality. When that high reliability meshes with the convenience of Actrol, which can offer retail stores and installation firms everything they need, MHI gains a great advantage over other companies. Furthermore, with respect to marketing, in recent years MHI has begun launching models exclusively for Actrol. The companies' relationship is thus not limited to that of a simple supply chain, and discussions on further sales expansion will continue in the future.

Environmental performance will remain an important factor when purchasing an air conditioner, and expectations for Japan's energy-saving air conditioners, which are among the most advanced in the world, are likely to rise even higher. Given MHI's wide range of environmentally conscious products for the air-conditioner market plus, through MHIAA, the sales network of its local partner Actrol, the company is surely poised to expand its business even further in the years ahead.

Compared to wall-mounted units that cool or warm the air from one spot, in recent years demand has been increasing for duct-connected air conditioners due to their more widely dispersed air control capability (FDUA series — originally targeted for Australian market).

A Popular Brand Backed by Outstanding Energy-Saving Technology and High Reliability

In the 60 years since its establishment, Actrol has grown to be the largest independent wholesaler of refrigeration and air-conditioning equipment. For 10 years now, we have been building a close partnership with MHI, and together we are expanding our market share. MHI's energy-saving technology was already advanced when we began working together, and the fact that they could provide a stable supply of high-quality air conditioners was also important. Today, I truly believe MHI is the leading brand in the air-conditioner market.

Currently, demand is driving rapid expansion of our air-conditioner business, and product lines for both residential and commercial use continue to mark strong growth. Along with increasing demand, our marketing strategy is now focusing on expanding and strengthening our product range. MHI makes it possible to develop products appropriate to the diverse needs that result from Australia's extremely varied climate, which makes the company a powerful partner for Actrol. Now in particular, with duct-connected air conditioning displaying sudden growth in the commercial-use market, we are jointly promoting a sales strategy for ready-made products as a way of expanding our market share.

In addition, the tightening of power consumption standards has proven to be a favorable wind for both companies. Instead of simply complying with present standards, we are working together toward meeting anticipated tightening of regulations in the future, and I believe we will be able to acquire an even larger share in a market growing ever more energy conscious.

Units manufactured by MHI make up the greater part of the air conditioners we handle, and of course we recommend them to our customers as a leading brand. However, this is hardly necessary: MHI's air conditioners already enjoy a strong reputation among our customers. In particular, we get many satisfied comments from customers about how they were able to purchase an energy-saving air conditioner with excellent performance while staying within their budget, and we are acquiring more repeat customers. MHI's technological strength and reliability have cemented the company's current position as a supplier of today's most popular brand of air conditioners. We are certain that together with MHI we will continue to provide the market with advanced energy-saving air conditioners, and that we will further raise our growth rate in the market.

Andrew Leach
National Sales and Marketing Manager
Actrol