Scope

Kawasaki Heavy Industries Quarterly Newsletter

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in this issue...

About the Cover
The cover is a close-up of 48 GIGACELL modules connected in series. This issue's Frontline features a story on alternative energy and the potential of Kawasaki's nickel-metal hydride battery.

KAWASAKI HEAVY INDUSTRIES, LTD.

Scope

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Dawn of a New Era in Electrical En
Renewable Energy

Today, the way we use energy is being reconsidered. Further implementations of renewable energies such as photovoltaic and wind power generation are occurring, and demonstration tests for smart grids and smart communities are moving forward.

However, the output of electric power generated by renewable energy sources is susceptible to sudden fluctuations due to the weather, which could adversely affect the quality of electricity due to fluctuations in

ergy Part 3

and the GIGACELL

frequency when integrated on a large scale.

Kawasaki's high-capacity nickel-metal hydride battery GIGACELL®, capable of rapid, instantaneous charging and discharging, can stabilize output.

Renewable energies and the GIGACELL: This issue's Frontline takes you behind the scenes of pioneering research on an electric power supply-and-demand control system utilizing the GIGACELL that Kansai Electric Power Co., Inc. (KEPCO) is currently testing.

* GIGACELL is a trademark or registered trademark of Kawasaki Heavy Industries, Ltd. in Japan and the U.S.A.

Supply-and-Demand Control Systems for Tomorrow

● Preparing for large-scale integration of PV power generation

KEPCO's Ishizugawa Substation in Sakai, Osaka Prefecture, is a distribution substation that provides electric power to factories and homes in the surrounding areas. It is here that research on an electric power supply-and-demand control system using the GIGACELL is currently underway.

The Japanese government plans to increase photovoltaic (PV) power generation from 2.62 million kW in 2009 to 28 million kW by around 2020, and to 53 million kW in 2030. PV power fluctuates significantly over short periods due to weather factors, and electricity demand also fluctuates significantly over the course of a day, especially during daytime hours. Electric power companies adjust their output of thermal and pumped-storage hydroelectric power to ensure that supplies meet the demand.

What will occur when large-scale PV power is integrated, in line with the government's plans?

The weather causes rapid and dynamic PV power fluctuations regardless of electricity demand. Since there is always a need to balance power consumption with generation, measures must be taken to manage abrupt fluctuations. Existing thermal and pumped-storage hydroelectric power alone may be insufficient to cope with increased fluctuations in the future.

New technologies that can substitute the regulating function done for existing power supplies are needed, and battery technology is a candidate for controlling sudden and large fluctuations.

● Ishizugawa Substation connects to 10 MW Sakai Solar Power Plant

KEPCO's research at Ishizugawa focuses on developing a supply-and-demand control system that can stabilize the power grid's frequency even with large-scale implementation of photovoltaic power.

Frequency is one indicator of power quality, demonstrating the balance between electricity generated and used. To maintain frequency while coping with output fluctuations, one method is to control the fluctuations at each plant. However, since output varies from one region to the next, it is generally believed that a centrally controlled system is the most efficient and economical approach. To achieve this, a large and safe battery storage system is needed. Kawasaki's GIGACELL met such requirements, and was selected for participation in KEPCO's demonstration test.

The Ishizugawa Substation is connected to

A container outfitted with an electric power supply-and-demand controller for research.

Inside the container, 48 GIGACELL modules are connected in series and record important data.

Sakai Solar Power Plant, connected to the Ishizugawa Substation (photo courtesy of KEPCO).

the 10 MW Sakai Solar Power Plant, which was jointly constructed by KEPCO and Sakai City. KEPCO is utilizing the plant's output data to develop the supply-and-demand control system, which will stabilize the entire power grid's frequency by the charging and discharging of batteries, to accommodate large-scale integration of PV power.

● Assessment tests to continue until 2013

The system consists of a string of 48 GIGACELL modules (output: 250 kW, capacity: 102 kWh). Utilizing the GIGACELL's capability to charge and discharge at high speeds, it will balance supply and demand, which is partly due to the large fluctuations occurring at the solar plant. When frequency rises, the system will charge the batteries, and when frequency falls, it will discharge them. The state of charge (SOC) of the batteries is also a factor. They cannot be charged when the SOC is too high, and vice-versa. Therefore, to maintain the batteries in a state in which they can always be used, research is also underway to combine the system with other existing power sources and appropriately control the SOC.

Assessments are being made about the control program, which combines data on the frequency, demand trends and solar plant output, with the fast and powerful response characteristics of the GIGACELL, while at the same time keeping the SOC in an appropriate range.

■ Microgrid on the roof of an office building

GIGACELL currently serving as indispensable battery

The combined power generation microgrid system installed on the roof of the new office building at Kawasaki's Kobe Works commenced operation in April 2012.

The main components of this system are a 5 kW vertical-axis AC wind power generator developed by Kawasaki group company NIPPI Corporation, a 20.4 kW photovoltaic power generation system and a 54 kWh GIGACELL system. The vertical-axis wind power system has an internal converter that adjusts frequency.

Electric power generated by wind is used in the new building. Based on renewable power generation conditions and information on the building's purchased utility power, the microgrid system controller commands the Kawasaki Hybrid Power Conditioner to charge or discharge the GIGACELL. This makes it capable of stabilizing electric power generation output, peak cutting of purchased power and leveling of electric power demand in the building, as well as supplying power in times of disaster.

The GIGACELL incorporated in the microgrid system on the roof.

Photovoltaic power generation system.

The vertical-axis wind power generation system is able to generate electric power efficiently using wind from any direction.

Valuable data is currently being collected at KEPCO's Ishizugawa Substation through the efforts of researchers. Evaluations are being conducted to find suitable characteristics of batteries, including their lifecycles, for supply-and-demand systems. The research will also cover optimal battery storage capacity for regulating PV power fluctuations. This demonstration, running from FY2010 to FY2013, aims to construct a model of a power supply-and-demand system for the future, and THE GIGACELL is sure to play a vital role.

Supporting a New Era of Energy

Achieving scalability through the GIGACELL's unique structure

The most notable feature of the GIGACELL is its ability to charge and discharge rapidly. In conventional cylindrical nickel-metal hydride batteries, the structure makes it difficult to release heat during rapid charging and discharging, and energy loss occurring in cable connections between individual cells has limited their scalability.

Kawasaki's proprietary technology led the GIGACELL to achieve superior scalability. Inside each cell of the GIGACELL, positive and negative electrodes are alternately inserted into a pleat-folded separator, forming a bipolar structure* where the front and rear surfaces of the cell become positive and negative electrodes, respectively. Because all the cells in a GIGACELL module are in direct contact, there is no need to connect cables between the cells, minimizing energy loss. The cells are compact, contributing to the large capacity of the module.

The GIGACELL also has a highly efficient heat sink, so there is little temperature increase when the module is charging and discharging at significant outputs. This contributes to less deterioration and longer life. The battery is safe, since noncombustible, water-based electrolyte is used. In addition, it is non-welded, facilitating the recycling process, and it uses no toxic materials — such as lead, sodium or lithium — so it is a safe and eco-friendly battery.

KEPCO's research with the GIGACELL has been targeted to providing efficient power supplies, as battery technologies can perform a crucial role in smoothing the output of new energies and in maintaining electric power quality. Demand for this is expected to grow significantly in the future.

*Also referred to as a bipolar 3D structure because of the ability to easily expand the module by increasing the three-dimensional (3D) elements of the electrodes (height, width and quantity).

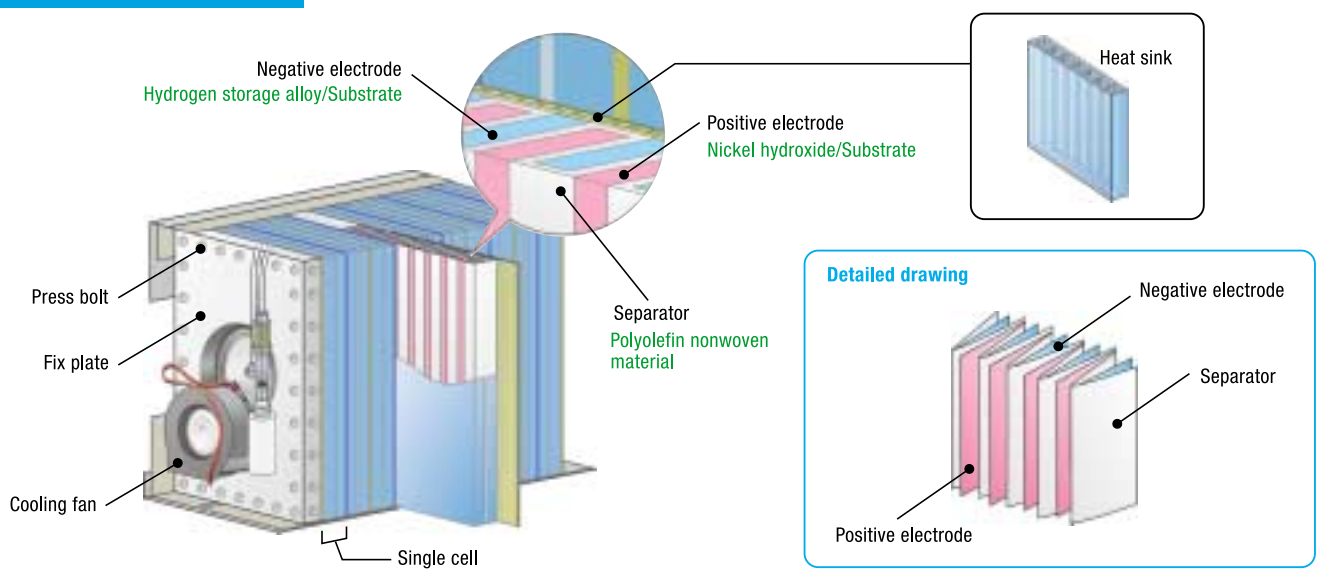
Wind power output smoothing tests to begin on remote islands

The range of applications is expanding for the GIGACELL, with its rapid charging and discharging capability.

Output from PV and wind power requires smoothing, and the wind power stabilization system at Win Power Co., Ltd.'s Nishime Wind Farm in Yurihonjo, Akita Prefecture, is one example. Kawasaki is jointly developing technology with Fuji Electric Co., Ltd. for the stable transmission of electricity to the power grid. The 102 kWh capacity GIGACELL, 750 kVA power conditioner and controller enable the charging and discharging of power at optimal rates according to wind velocity and direction.

Another example is a combination of the GIGACELL with two 245 kW wind turbines and a diesel-powered generator owned by the Okinawa Electric Power Co., Inc. located

■ Structure of the GIGACELL



Wind power generator at Win Power Nishime Wind Farm.

GIGACELL

at Minami-Daito, Okinawa Prefecture. In February 2013, Kawasaki is scheduled to install a GIGACELL system at this facility and begin conducting a demonstration test to control frequency fluctuations. The GIGACELL will also serve as a backup power source during the diesel generator's 15-minute start-up time in the case of a sudden cut-off in wind power generation. This is a project funded by Japan's New Energy and Industrial Technology Development Organization (NEDO).

● Participation in smart-grid and smart-community demonstrations

A network of multiple power sources within a given area forms a microgrid. GIGACELLs, which are capable of responding to sudden fluctuations in demand, can supply stable power to meet demand within a microgrid system, which is separated from the main power grid. The Shimizu Corporation Technical Research Center's microgrid, which commenced operation in early 2011, combines gas turbine engines and the GIGACELL (81.2 kWh) to provide a stable power supply to all laboratory buildings within the center.

The GIGACELL is also being used in a smart-grid demonstration test by Mitsubishi Electric Corporation. It is currently underway at Mitsubishi Electric's Amagasaki test site, where a system comprised of the GIGACELL (38 kWh) and a power conditioner is connected to a 4 MW photovoltaic power system and a test facility that simulates thermal power generation, pumped-storage hydroelectric power generation and grid load. The test will evaluate the GIGACELL system's ability to maintain power quality, such as suppressing fluctuations in the frequency of the grid, under substantial penetration of PV power.

Kawasaki is also participating in the Kashiwa Smart City Project, launched in September 2009 by the Future Design Center as a joint effort by eight of the world's leading firms. Kawasaki joined the project recently along with five other firms.

In addition to the GIGACELL, Kawasaki intends to contribute to the establishment of smart communities through systems that utilize renewable energy equipment (small hydroelectric generation, biomass generation, etc.) as well as Kawasaki Green Gas Engines, which boast the world's highest level of power-generating efficiency.

● Providing systems solutions for electricity issues

In addition to the GIGACELL, Kawasaki develops and manufactures power generation equipment such as gas turbines and gas engines and has accumulated extensive know-how in technology for connecting them to power grids. Kawasaki intends to provide not only battery technology but also integrated, system-level solutions in these areas.

Given the recent trends in renewable energy expansion, Kawasaki's GIGACELL production plant at the Akashi Works in Hyogo Prefecture is abuzz with activity.

The GIGACELL system used in the microgrid of the Shimizu Corporation Technical Research Center consists of a string of 16 modules.

Providing Safe Transport and Maximum Cargo Capacity: The Structure of the Next-Generation LNG Carrier

Versatility as an Essential Feature

As the world grows increasingly wary of its reliance on nuclear power, producers seeking a clean alternative energy source are flocking to natural gas. LNG is a form of natural gas that has been cooled to -162 ˚C and turned into a liquid. This process reduces natural gas to 1/600th of its original volume, making it easier to store and transport.

LNG carriers are vessels specially designed for transporting LNG, and in the past were mostly built for regular service between specific LNG terminals. Today, however, LNG suppliers are more diversified, and spot charters have become more common. These changes have led to increased demand for LNG carriers capable of entering a greater number and variety of LNG terminals around the world.

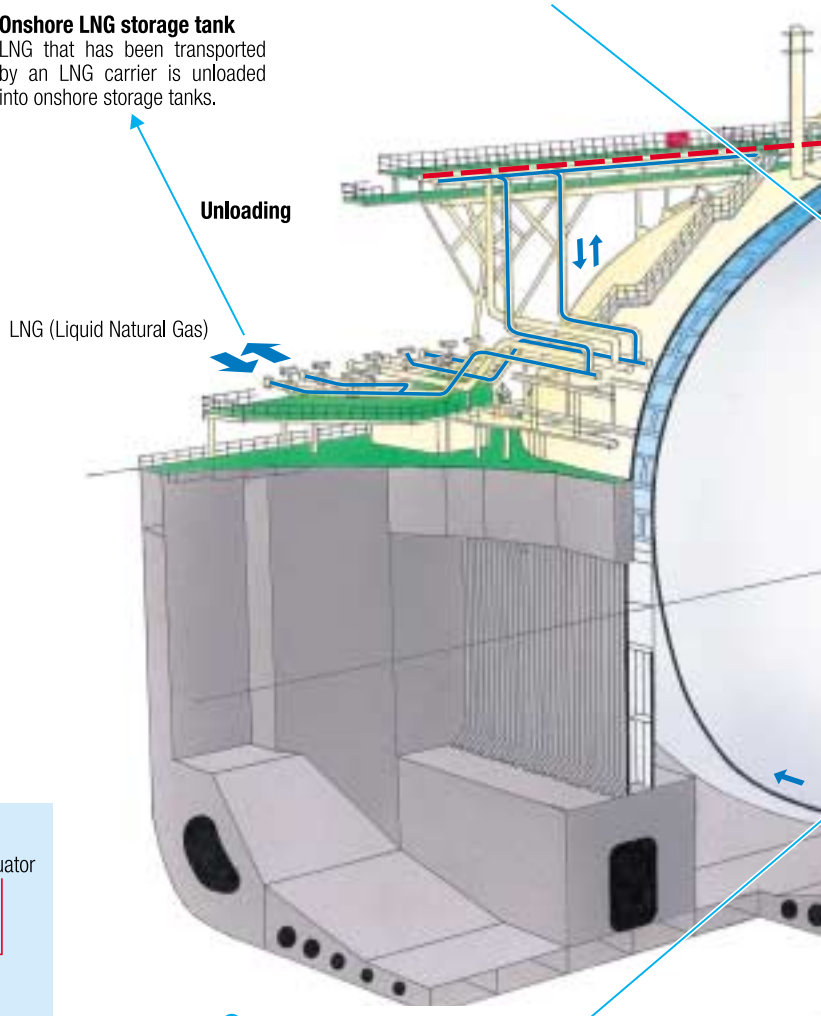
Powered by a Reheat Steam Turbine Plant

In September 2011, Kawasaki completed its first next-generation 177,000 m^3 LNG carrier, called *Energy Horizon*, for Tokyo Gas and NYK Line. A second vessel of the same type is currently under construction at the Sakaide Shipyard.

It is the largest carrier that can enter major LNG terminals in the Asia-Pacific region (called "Pacific Max"), and is also compatible with major terminals in regions from North America to the Middle East and Europe. The new vessel offers a 20% increase in cargo capacity over the previous design, making it the world's largest Moss LNG carrier. It is also the world's first LNG carrier with a reheat steam turbine plant (Kawasaki URA Plant) as the propulsion system, saving fuel consumption by approximately 15% over a conventional steam turbine plant.

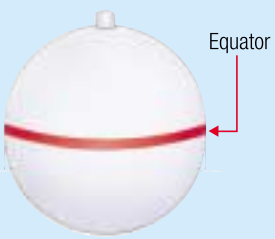
Onshore LNG storage tank
LNG that has been transported by an LNG carrier is unloaded into onshore storage tanks.

Tank insulation
The cargo tanks are covered with thermal insulation panels developed by Kawasaki (Kawasaki Panel System). These feature a double-layer structure consisting of phenolic resin foam on the tank side and polyurethane foam on the outer side, which is overlaid with aluminum film. The panels, which are approximately 200 to 350 mm in thickness, keep the boil-off rate to a minimum of 0.08% per day. Other shipbuilders have also adopted the Kawasaki Panel System in their LNG carriers to take advantage of its excellent insulation performance.



Pipe tower
A pipe tower, equipped with pipes, cargo pumps, a staircase, instrumentation and other devices, is installed at the center of the tank. A cargo pump is installed at the bottom of the tower for optimal unloading performance.

Stretched tank
This tank was developed to maximize cargo capacity for LNG carriers with a size limit. The middle portion of the spherical tank, called the equator, is stretched to the fullest extent in the vertical direction to increase capacity.



The versatile next-generation LNG carrier *Energy Horizon* (illustration) measures 300 m in length overall, 52.0 m in breadth and 11.5 m in draft (full draft: 11.9 m).

Compatibility with the new Panama Canal

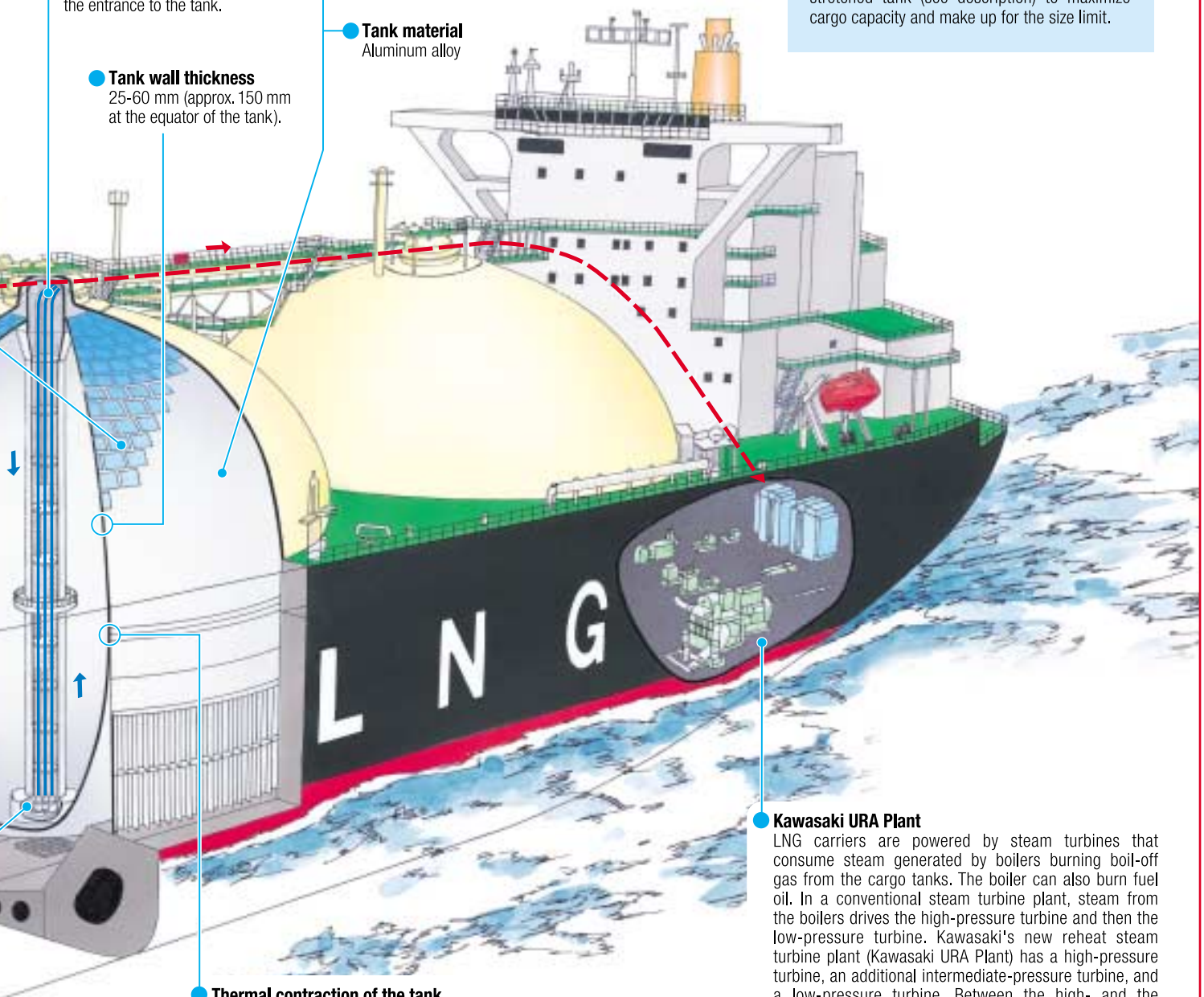
The maximum breadth of a ship that can pass through the Panama Canal (approximately 80 km length), is referred to as "Panamax" (32.3 m). The canal is currently undergoing construction to build a new set of locks that are wider than the old ones and to expand narrow sections of the channels. When the project is completed as scheduled in 2014, the new Panamax will be 49.0 m. Kawasaki responded early to the new Panamax standard by developing a 165,000 m^3 LNG carrier that is 49.0 m in width. It features a stretched tank (see description) to maximize cargo capacity and make up for the size limit.

Tank dome
Mounted on the top of the tank, the tank dome is fitted with piping and also provides the entrance to the tank.

Moss spherical tank
This spherical tank features a very robust structure without the stress concentration points that cause cracks.

Tank material
Aluminum alloy

Tank wall thickness
25-60 mm (approx. 150 mm at the equator of the tank).



Thermal contraction of the tank
A cargo tank containing LNG, which has been cooled to -162°C, shrinks from its initial diameter by approximately 150 mm due to thermal contraction. The skirt structure supporting the tank is designed to absorb this by contracting along with the tank when it is cooled down.

Kawasaki URA Plant
LNG carriers are powered by steam turbines that consume steam generated by boilers burning boil-off gas from the cargo tanks. The boiler can also burn fuel oil. In a conventional steam turbine plant, steam from the boilers drives the high-pressure turbine and then the low-pressure turbine. Kawasaki's new reheat steam turbine plant (Kawasaki URA Plant) has a high-pressure turbine, an additional intermediate-pressure turbine, and a low-pressure turbine. Between the high- and the intermediate-pressure turbines, steam is returned and reheated through the additional reheater integrated in the boilers.The Kawasaki URA Plant will be described in the next issue of *Scope*.

Partnership for Modular GTL Plant Business

Kawasaki recently acquired a 2.2% share in CompactGTL plc, a British company that has developed and successfully demonstrated the world's first modular gas-to-liquids (GTL) plant. Up to now, most of the associated gas released from oil drilling in remote and deepwater oilfields has been processed by continuous flaring, for lack of a viable processing method. From the standpoint of effective resource utilization and environmental protection, a solution to the wasteful flaring had long been in demand.

Modular GTL plants use a reactor filled with catalysts to reform and synthesize the gas and convert it to liquid fuel, thus making possible the offshore and on-board processing of associated gas, along with the optimization of facility capabilities based on oilfield size.

Last year, following the successful testing of the world's first modular GTL facility, constructed on the premises of Petroleo Brasileiro S.A. (Petrobras) in Brazil, CompactGTL won approval for the commercial deployment of the technology from Petrobras.

With Kawasaki's investment in CompactGTL, it formed a strategic partnership with the company, Sumitomo Corporation and Sumitomo Precision Products Co., Ltd. (SPP), and will undertake the development of reactor modules for GTL plants. After reactors are constructed at SPP's main plant in Amagasaki, they will be transferred to Kawasaki's Harima Works, where reactor modules will be produced.

In partnership with CompactGTL, Sumitomo Corp. and SPP, Kawasaki will play an active part in securing orders for the world's first modular GTL commercial scale plants.

First Order Received for 164,700 m³ LNG Carrier

Kawasaki recently concluded its first contract for the newly developed 164,700 m³ LNG carrier with Mitsui O.S.K. Lines, to be used for transporting LNG for The Kansai Electric Power Co., Inc. The ship will be built at Kawasaki's Sakaide Shipyard and commissioned for service in 2016.

The order is for the newly developed MOSS-type LNG carrier with a cargo tank capacity of 164,700 m³. It is the largest of its type that can pass through the new Panama Canal, which is scheduled to open in 2014, while also being compatible with the world's major LNG terminals. With its highly versatile design, the ship is an ideal solution for operators with a need to diversify their LNG trade.

The carrier comes equipped with a cargo tank that has approximately 18,000 m³ more volume than the existing 147,000 m³ variant. In addition, it features a fully optimized hull structure for reduced weight, as well as a hull shape that is optimized below the waterline for the maximum propulsion performance. The main engine is equipped with the Kawasaki Advanced Reheat Turbine Plant,* which is proven to improve transport efficiency by over 25%.

LNG carriers are generally fueled by natural gas that evaporates during transport (boil-off gas). While recent technological advances have reduced the amount of fuel consumption, they gave rise to a new problem of excess boil-off gas that is left behind without being consumed as fuel.

Kawasaki's LNG carriers feature the proprietary thermal insulation system—the Kawasaki Panel System—with an excellent track record spanning over 30 years. The panel system has been further improved for the new ship to achieve the world's lowest boil-off rate, at 0.08% per day. With this improvement, the ship is able to minimize unused boil-off gas for outstanding environmental performance and economic efficiency.

Kawasaki will actively pursue shipbuilding opportunities in light of the expected rise in demand for LNG and other clean energy fuels.

*Kawasaki Advanced Reheat Turbine Plant: This steam turbine plant achieves a dramatic increase in thermal efficiency by utilizing a reheat cycle whereby steam that was used to drive a high-pressure turbine is returned to the boiler to be reheated, and then sent back to the medium-pressure turbine. The first LNG carrier equipped with the plant was commissioned in September 2011. The plant powering the newest LNG carrier has been further improved using data obtained through sea trials and actual operation of the first plant.

LTA Singapore Orders 132 MRT Cars

Kawasaki was recently awarded a 17.7 billion yen contract, along with Kawasaki Heavy Industries (Singapore) Pte. Ltd. (KHI-SIN) and CSR Qingdao Sifang Locomotive and Rolling Stock Co., Ltd. (Sifang), from the Land Transport Authority (LTA) of Singapore. The three companies are working together to supply 132 train cars to the Singapore Mass Rapid Transit (MRT) system.

Kawasaki is responsible for the overall project management, design, manufacturing of bogies and procurement of major components, with KHI-SIN responsible for the delivery of complete MRT trains to the depot, on-site testing and commissioning. Sifang is in charge of manufacturing, final fitting and assembly of complete MRT trains and factory testing. The new MRT trains are scheduled for delivery to Singapore between 2015 and 2016, and will be deployed on the MRT's existing North-South and East-West Lines, where they will increase rider capacity, and also on the Tuas West Extension.

Kawasaki supplied LTA with 396 cars for MRT trains between 1986 and 1989, 126 cars between 1999 and 2001, and 132 cars between 2011 and 2012, some of which were delivered through joint contracts with other companies. An additional 78 cars are to be delivered by 2014.

The history of cooperation between Kawasaki and Sifang goes back to 1985, when they signed a friendship agreement. Since then, the two companies have built up a solid track record within China, including joint contracts for linear motor MRT trains for Guangzhou Metro Lines 4 and 5 and for high-speed trains from the Ministry of Railways. The combination of Kawasaki's extensive experience in overseas projects and expertise in MRT trains with Sifang's large-scale production capacity led to the earlier LTA orders. This is the second joint contract for Kawasaki and Sifang in an overseas market outside Japan and China.

Kawasaki will continue to expand its rolling stock business in Asia as well as in other global markets.

Japan's First 110 MW Gas Engine Power Plant Delivered

Kawasaki recently delivered Japan's first 110 MW gas engine power plant to Nihon Techno Co., Ltd., a power producer and supplier,* for Nihon Techno's Sodegaura Green Power Project. The plant, constructed in Sodegaura, Chiba Prefecture, consists of 14 Kawasaki Green Gas Engines with a unit capacity of 7,800 kW and the world's highest generating efficiency of 49.0%. Kawasaki handled everything from plant design to supply and installation of plant equipment, as well as civil works. The delivery was completed in less than 10 months.

Kawasaki's proprietary Green Gas Engines come in two types, a standard model with an electric efficiency of 48.5% and a high-efficiency model with an efficiency of 49.0%. Providing superior economic and environmental performance, both types boast low NOx emissions (less than 200 ppm at 0% O_2) and cut fuel costs by more than 5% over existing gas engines in their class. Thanks to their low-NOx emissions, the engines require no additional de-NOx system in most areas of Japan. Equipped with electric spark ignition systems, they also do away with the need for liquid fuel.

The Nihon Techno order is testimony to the outstanding electric efficiency and environmental performance of the Kawasaki Green Gas Engine, as well as features that include fast start-up and loading capability, attaining maximum load within only 10 minutes. A multi-unit configuration enables highly reliable plant operation, minimizing unexpected power output, and provides superior flexibility, realizing high electric efficiency at various partial loads. Easy operation with the DSS (Daily Start and Stop) system is also a feature that sets this engine apart.

The demand for distributed power systems, including small- and medium-scale utility and captive power plants, is increasing to ensure a stable power supply. Kawasaki is continually meeting these needs and further growing its energy and environmental business through the marketing of its innovative gas engines and other power systems.

*A power producer and supplier (PPS) is defined under Japanese law as a type of independent electricity producing company that produces over 50 kW of high-voltage power and supplies it to factories and large-scale retail stores via the power grids of utility companies.

Z800, Other Models Debut at INTERMOT 2012

Kawasaki exhibited three new models for the European market at INTERMOT 2012, one of the largest motorcycle shows in Europe, held in Cologne, Germany from October 3 - 7. The Z800 was unveiled as the successor to the Z750, a naked sport bike that is very popular in the European market. The aggressive appearance of the Z800's front face and the sharp design of body parts make for a style that creates an impact. The greater power delivered by the displacement increase, from 748 cm^3 to 806 cm^3, and the mature design of the chassis ensure a ride that is more exhilarating than ever.

Also making its debut was the Ninja ZX-6R, a fully revamped supersport model that commands a striking presence on racetracks around the world. The engine displacement has been increased from 599 cm^3 to 636 cm^3 to deliver superior performance across all rpm. Improved handling performance, advanced suspension and state-of-the-art electronic control technology, organically combined for optimal performance, ensure the new Ninja ZX-6R will provide the perfect ride in every situation—from the circuit to winding country roads to city streets.

A full faring sport model from the same series, the Ninja 300 was added to the lineup as a full model change of the Ninja 250R. The larger-displacement 296 cm^3 engine delivers greater power, and the aggressive design of the body is true to its lineage as a Ninja bike. Demonstrating Kawasaki's attention to the smallest details and commitment to the highest standards of workmanship, this is a model that will satisfy a wide range of users, from novices to accomplished riders.

Z800

Ninja ZX-6R

Ninja 300

Kawasaki

Kawasaki Gallery

Heizo Kanayama's World

Kite-flying, 1957-60, 37.3 x 45.4 cm, oil on panel, from the collection of Kawasaki Heavy Industries, Ltd.

A masterpiece reflecting the painter's interpretation of the world, based on Nagasaki's kite-flying festivals

Shusaku Sagara, Associate Curator, Hyogo Prefectural Museum of Art

This work was shown in the *Kanayama Heizo Shibai-e to Kinsaku Ten* (Heizo Kanayama Exhibition of Shibai-e and Recent Works), which was sponsored by the Asahi Shimbun Company and hosted at Takashimaya Department Store in Nihonbashi in August 1960. The exhibition included Kanayama's recent works, painted after the epoch-making celebration of his 50th year as a painter, the *Kanayama Heizo Gagyo Gojunenten* (Heizo Kanayama 50th Anniversary Exhibition) in 1956. The following year, Kanayama had chosen Nagasaki as his new workplace, and between 1957 and 1960, visited the city every spring to paint.

Kite fighting is called "*hata-age*" in Nagasaki, which continues to host such events, in which fliers attempt to cut each others' strings, quite often. The sky is filled with countless diamond-shaped kites in red, blue and white, and this is a common scene in April. The designs of the kites painted by Kanayama, as well as the kite painted on the back of the figure wearing a *haori* coat in the center of the painting, are almost identical to those found in Nagasaki. Therefore, this work is assumed to be a depiction of the *hata-age* in Nagasaki.

It is an unusual work for Kanayama, who always paid a great deal of attention to creating a well-balanced design. Here, the complex mobility of countless numbers of kites flying around the blue sky occupying most of canvas stands out. Considering that kites are controlled by people but gain mobility by the wind, this painting can be seen as the culmination of Kanayama's lifework expressing the acts of nature and humans. Therefore, it can be said that this is a masterpiece, although minor, which reflects much of the artist's interpretation of the world.

Heizo Kanayama and Kawasaki

Heizo Kanayama (1883 -1964) went to Europe in 1912, after graduating at the top of his class from the Tokyo University of the Arts. He won the second prize at the Ministry of Education Art Exhibition in 1916, and went on to create many masterpieces in which nature is a recurring theme. Kanayama left an indelible imprint on the history of modern art in Japan.

The Shipyard, exhibited at the Ministry of Education Art Exhibition in 1917 (and featured in *Scope 83*), is the work that first brought Kawasaki and Kanayama together. Toward the end of Kanayama's life, Kawasaki agreed to the artist's request to permanently house 138 pieces of his artwork. Kawasaki has since donated a major portion of this collection to the Hyogo Prefectural Museum of Art.