

Kawasaki delivers LPG-fueled LPG carrier, CRYSTAL OASIS



Kawasaki Heavy Industries, Ltd. has delivered the 84,000m³ capacity liquefied petroleum gas (LPG) carrier, CRYSTAL OASIS (Hull No. 1752) for Kumiai Navigation (Pte) Ltd. This is the 67th LPG carrier built by the company. This dual-fuel LPG carrier uses LPG and low-sulfur fuel oil, and is the fourth Kawasaki 84,000m³ LPG carrier adopting a dual-fuel main engine.

In recent years, more vessels have adopted liquefied gases as an alternative to heavy fuel oil on a global scale to effectively reduce emissions of greenhouse gases (GHG) from international shipping. This very large LPG carrier is powered by LPG, which reduces GHG emissions and is expected to significantly reduce environmental impacts, based on the Kawasaki Group's accumulated knowledge in building LPG and liquefied natural gas (LNG) carriers, and LNG-fueled vessels.

Use of LPG as fuel greatly reduces emission volumes of sulfur oxides (SO_x), CO₂ and other pollutants compared with use of marine fuel oil. The new vessel will meet SO_x emission standards strengthened in January 2020, and EEDI Phase 3 regulations. To satisfy the restrictions of the IMO NO_x Tier III, the main engine and generator are equipped with a Selective Catalytic Reduction System to reduce NO_x emission. This allows the ship to navigate in Emission Control Areas.

Installation of LPG fuel tanks on the ship's upper deck allows loading of fuel-use LPG separate from the ship's cargo LPG. Moreover, a piping system connecting the LPG fuel tanks and LPG cargo tanks enables transferring of extra LPG to the LPG fuel tanks if necessary.

This vessel has successfully implemented a very flexible and practical design through the combination of shallow draft hull form and high compatibility with terminals and land facilities as the result of complying with the OCIMF Mooring Equipment Guidance 4th Edition and ExxonMobil Criteria MESQAC 2017 as far as possible.

This vessel adopts the Kawasaki rudder bulb system with fins (RBS-F) and the semi-duct system with contra fins (SDS-F) which contribute to reducing fuel consumption.

Principal particulars

L (o.a.) x B x D x d:	229.90m x 37.20m x 21.90m x 11.60m
DWT/GT:	55,090t/49,943
Cargo tank capacity:	84,244m ³
Main engine:	Kawasaki-MAN B&W 7S60ME-C10.5-LGIP diesel x 1 unit
Speed:	Approx. 17.0kt
Complement:	29
Classification:	ClassNK
Registry:	Singapore
Delivery date:	June 29, 2022



For further information please contact:

Website: <http://www.jsea.or.jp>

JAPAN SHIP EXPORTERS' ASSOCIATION

15-12, Toranomon 1-chome, Minato-ku, Tokyo 105-0001 Tel: (03) 6206-1661 Fax: (03) 3597-7800 E-Mail: postmaster@jsea.or.jp

JMU completes 311,000DWT crude oil tanker, TENSHO

Japan Marine United Corporation (JMU) delivered the TENSHO, a 311,000DWT crude oil tanker, at its Kure Shipyard on June 24, 2022. This is the sixteenth vessel of the newly developed eco-type Malaccamax VLCC.

Principal particulars have been optimized for transportation between the Middle East and Japan, as well as satisfying the restrictions of domestic ports. Various and latest technologies developed through JMU's extensive experience in building tankers have been incorporated into the vessel.

High propulsion performance was achieved by application of a lower resistance and high efficiency hull form, and optimized energy saving devices such as the Super Stream Duct®, SURF-BULB® and ALV-Fin®. In ad-

dition, excellent seaworthiness was achieved by adoption of the low wind resistance super-structure and unique bow shape called the "SP-Bow." Fuel oil consumption was further improved by the use of a new electronically controlled marine diesel engine, low friction paint and large diameter propeller. In addition, this vessel is equipped with a SO_x scrubber to comply with MARPOL ANNEX VI Regulation 14.

Principal particulars

L (o.a.) x B x D x d: 339.50m x 60.00m



x 28.50m x 21.05m
 DWT/GT: 310,924t/160,698
 Main engine: WinGD W7X82 diesel x 1 unit
 Speed, service: 15.40kt
 Complement: 34
 Classification: ClassNK
 Registry: Liberia

Namura completes next generation coal carrier, ENERGIA AZALEA

Namura Shipbuilding Co., Ltd. delivered the ENERGIA AZALEA, a 99,965DWT bulk carrier, at its Imari Shipyard & Works on June 14, 2022. The vessel is a newly-developed 100,000DWT type bulk carrier with the following features.

The vessel has the most suitable principal dimensions that satisfy the restrictions of Japanese power plants and is suitable to carry bulk cargoes such as coal, iron ore, and grain. Adoption of a double-hull structure eliminates filling of ballast water into cargo holds. In addition, the box shape of the holds can achieve more efficient cargo handling.

Further improvement of propulsion

performance and fuel saving can be achieved with adoption of energy saving devices such as the Namura flow Control Fin (NCF), the Rudder-Fin and the additional fins behind NCF developed by Namura, an electronically controlled main engine, the high efficiency propeller, and low friction type anti-fouling paint.

For environmental protection, the vessel is equipped with a main engine and generator engines compliant with Annex VI of the MARPOL 73/78 regulations to reduce NO_x emissions, and an air seal type stern tube sealing device is adopted to reduce the risk of oil leakage. In addition, the vessel also complies with the SOLAS Chapter II-1

Regulation 3-12, Code on noise levels onboard ships to improve the environment of onboard living quarters.

The centralized fresh water cooling system adopted for the machinery space

equipment contributes to the easy maintenance. The ballast water treatment system to control the quality of ballast water is equipped for protection of the marine environment to comply with the International Convention for the Control and Management of Ships' Ballast Water and Sediments. The vessel has class notation "IHM (Inventory of Hazardous Materials)" for compliance with the ship recycle convention according to the Guidelines for the Inventory of Hazardous Materials.

The vessel has several storage tanks for appropriate management and discharge of drainage, sewage, rain water, and water used for cleaning cargo holds. This will satisfy port restrictions on such discharges.

Principal particulars

L (o.a.) x B (mld.) x d (mld.): 234.92m x 43.0m x 13.58m
 DWT/GT: 99,965t/58,773
 Main engine: MAN B&W 6S60ME-C10.5-EGRBP diesel x 1 unit
 Complement: 25
 Classification: ClassNK
 Registry: Republic of Liberia
 Completion: June 14, 2022



Mitsubishi acquires AiP from BV for spherical LCO₂ cargo tank

Mitsubishi Shipbuilding Co., Ltd., a part of Mitsubishi Heavy Industries (MHI) Group, has acquired Approval in Principle (AiP) from the French classification society Bureau Veritas (BV) for a spherical cargo tank system designed for liquefied CO₂ (LCO₂) carriers. A presentation ceremony was held on June 7 at the Metropolitan Expo exhibition center in Athens, Greece, during the international shipping exhibition Posidonia 2022. LCO₂ carriers transport liquefied CO₂ gas in cargo tanks in a low-temperature, high-pressure state. For that reason, independent Type C tanks as defined by the IGC Code are typically used for the cargo tank system of such vessels. Until now, various tank structures have been available, including cylindrical, bilobed and trilobed designs. Now, Mitsubishi Shipbuilding has succeeded in developing a spherical cargo tank system for LCO₂ carriers, applying its advanced technologies in structural analysis and material evaluation acquired through the design and construction of liquefied natural gas (LNG) carriers equipped with spherical tanks. Development of the new spherical structure for LCO₂ carriers resulted in acquisition of the AiP from BV.

Compared with cylindrical, bilobed, and trilobed options, spherically shaped tanks offer greater structural strength against the internal pressure of the tank. The adoption of Mitsubishi Shipbuilding's spherical cargo tank system is expected to further optimize ship arrangements and enhance the economic performance of LCO₂ carriers.

As part of the energy transition strategy being promoted by MHI Group, Mitsubishi Shipbuilding has established a growth strategy called "MARINE FUTURE STREAM vision for 2050." The strategy focuses on two overarching targets: "decarbonization

of the maritime economy" through use of renewable energies and carbon recycling, and "safe and secure future



AiP presentation ceremony held at POSIDONIA 2022

for society" through autonomous operation and electrification. The company seeks to achieve these dual goals through creation and implementation

of marine-related innovations. With the acquisition of the new AiP for its spherical cargo tank system for LCO₂ carriers, Mitsubishi Shipbuilding will ever more actively pursue the development of LCO₂ carriers and related businesses as a marine system integrator. At the same time, the company will also dedicate its full resources to developing and providing technologies to respond flexibly to the diverse LCO₂ carrier needs of the market to build a CCUS* value chain, with the ultimate goal of achieving a CCUS value chain straddling land and sea, to realize a decarbonized society. (CCUS* stands for Carbon Capture, Utilization and Storage.)

SHI-ME obtains factual statement of Cyber SECURITY Capability for data monitoring system from LR

Sumitomo Heavy Industries Marine & Engineering Co., Ltd. (SHI-ME) has received the factual statement of "ShipRight Cyber SECURITY Capability (Level 1: Established)" from Lloyd's Register.

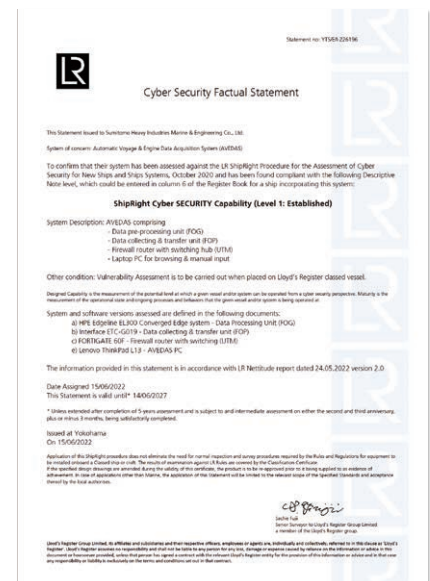
Due to the development in satellite communications, demand is growing for security capabilities to address the risks of cyber attacks.

To verify that SHI-ME's digitally connected vessel monitoring system, the Automatic Voyage and Engine Data Acquisition System (AVEDAS), has sufficient and efficient security measures against cyber threats, SHI-ME implemented a risk assessment and obtained approval from Lloyd's Register and Nettitude Inc.

Lightwell Co., Ltd., rendered significant assistance to SHI-ME in the development of the AVEDAS, and an inboard data-collection platform of Furuno Electric Co., Ltd. (FURUNO Open Platform, FOP) has been adopted for the AVEDAS.

Cyber security and risk manage-

ment must be carefully considered by shipowners. SHI-ME will continue enhancing its protective measures through collaboration with shipowners and all maritime stakeholders and contribute to establishing sustainable shipping by providing safer ships.



Factual Statement of ShipRight Cyber SECURITY Capability (Level 1: Established)

Tsuneishi completes first of a new model series WIDE KAMSARMAX

Tsuneishi Shipbuilding Co., Ltd. completed the 88,000DWT bulk carrier, **PERSISTENCE DIVA**, on July 28, 2022 at the Tsuneishi Factory, which is the first of Tsuneishi's new model series WIDE KAMSARMAX. Over 300 vessels of the best-selling KAMSARMAX type have been built, whereas the WIDE KAMSARMAX is a new eco-ship design that retains its versatility with higher cargo loading capacity.

The WIDE KAMSARMAX has approximately 6,000MT more deadweight tonnage than the KAMSARMAX for increased transport efficiency. Cargo capacity was also increased by approximately 5,300m³, enabling large-volume loading of low-density cargo, such as grains. To retain versatility, the length remains at 229m, (same as the KAMSARMAX), whereas breadth is 36m, allowing entry to approximately 90% of the ports that KAMSARMAX ships have called at to date.



Compared to the KAMSARMAX, fuel consumption per ton-mile is improved by approximately 5% with the application of the unique MT-FAST energy-saving technology, an energy-saving device that improves propulsion efficiency by approximately 3 to 5% by attaching multiple fins in front of the propeller to adjust water flow, which won the Japanese Environment Minister's Award in 2018. The international NO_x emission Tier III

regulations are met with the use of a full-double fuel tank to prevent oil leakage, combining reduced environmental burden with economy from excellent fuel efficiency.

Principal particulars of PERSISTENCE DIVA

L (o.a.) x B x D x d: Approx. 229m x 36m x 20m x 14.45m
DWT/GT: Approx. 88,900t/47,000
Cargo hold capacity: Approx. 103,500m³

Naikai delivers Ro/Ro cargo ship, YONE MARU

Naikai Zosen Corporation delivered the **YONE MARU**, a Roll-on/Roll-off cargo ship, to the co-owner Nansei Kaiun Co., Ltd. and the Japan Railway Construction, Transport and Technology Agency (JRJT) at the Setoda Shipyard on June 30, 2022.

The **YONE MARU** can accommodate such cargoes as chassis, passenger automobiles, and containers. The cargo decks consist of four decks: two decks for chassis, passenger automo-

biles, and containers, one for chassis and passenger automobiles, and one for passenger automobiles. Cargo vehicles can embark and disembark through the shore-rampway at the starboard bow and stern, and inboard rampways permit the vehicles go to the required position.

The main engine uses an electronically-controlled diesel engine (ME-B type) to reduce the fuel consumption and improve combustion status at

low-load conditions. The ship employs fin-stabilizers to suppress rolling motion during navigation, and the bow and stern thrusters improve berthing and unberthing maneuvers.

Principal particulars

L (o.a.) x L (b.p.) x B x D x d: 154.63m x 144.00m x 25.00m x 21.40m x 6.60m
GT: 8,704
Vehicle-loading capacity (Without containers)
92 chassis (L/B: 13m/2.5m)
100 cars (L/B: 4.9m/1.83m)
Container-loading capacity (Priority to containers)
21 10ft containers
123 20ft containers
Main engine: Makita-Mitsui-MAN
B&W 8S46ME-B8.5 diesel x 1 unit
Normal output: 9,384kW x 122.2min⁻¹
Speed, service: 21.0kt
Classification: ClassNK
Registry: Naha, Okinawa
Delivery: June 30, 2022



Kawasaki completes world's first basic engineering works for hydrogen marine main boiler

Kawasaki Heavy Industries, Ltd. has completed the world's first basic engineering works for a hydrogen marine main boiler.

Kawasaki has delivered many propulsion marine main boilers for liquefied natural gas (LNG) carriers. Based on these technologies, its own hydrogen combustion technology was developed for the new hydrogen marine main boiler. The boiler design incorporates specific technologies required for marine main boilers such as structural design for vessel motion and compactness, compared to the small once-through hydrogen boiler designs for land use. Kawasaki has already obtained approval in principle (AiP) from Nippon Kaiji Kyokai (ClassNK) for liquefied hydrogen (LH₂) carriers equipped with this boiler as the propulsion system.

As a demonstration of one of the core technologies of this boiler, Kawasaki conducted a combustion test at a full-scale burner test station in 2021. This demonstration verified the high turndown ratio compared with conventional LNG combustion burners. Turndown ratio is a key metric of burner performance. A burner with a high turndown ratio offers stable, controlled combustion over a wide range.

The main features are as follows:

1 Reliable and stable operation

The basic design of the boiler furnace utilizes the combustion properties of hydrogen (high combustion tempera-

ture and speed), while applying the existing proven technical design of LNG-fired propulsion marine main boilers. Therefore, this boiler delivers reliable, long-term stable operation without requiring specific additional operations.

2 Flexible response to load changes

Marine main boilers must offer flexible operation under changing load to match fluctuations in sailing speed. This boiler features Kawasaki's outstanding hydrogen combustion technologies and know-how including combustion analysis refined through the development of hydrogen gas turbines.

3 Flexible operation with several fuels

The fuel of the boiler can be changed according to vessel operation mode, so allows mono-firing of hydrogen or lowsulfur fuels, as well as dual-firing.

4 Safe and stable operation

The technical advantages of Kawasaki's original hydrogen combustion burner ensure safe and stable operation of the hydrogen boiler. The burner design is based on a proven burner for LNG combustion, and ensures specified hydrogen-specific combustion properties, with safety considerations to prevent burnout and backfire.



Simulated appearance of the completed 160,000m³ LH₂ carrier

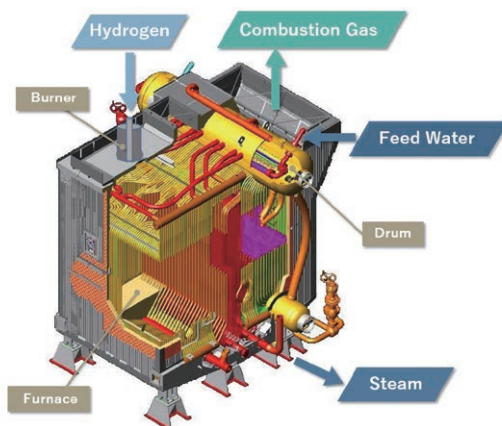
meet the growing demand for hydrogen in order to realize a sustainable and secure energy transition.

Furthermore, this marine main boiler technology can be used to upgrade gas-fired land boilers that use LNG, as well as several types of gases such as low calorific gas, BFG/COG, sour gas or associated gas. Hydrogen is expected to become a key energy source in many industries including oil & gas and chemicals, both in Japan and around the world, to decarbonize economic systems in the near future. For these industries, Kawasaki will propose power systems utilizing its hydrogen fired boiler technologies for large-scale boiler plants, hydrogen mono-fired or dual-fired with LNG.

Kawasaki is paving the way for the hydrogen supply chain encompassing production, transportation, storage and utilization. This boiler will help realize the transportation and utilization of hydrogen. Kawasaki will continue to drive the technological development of the hydrogen society to promote the use of hydrogen energy and thus help to achieve decarbonization, working as one for the good of the planet.

Main specifications of Kawasaki's hydrogen marine main boiler

Quantity:	2 units per vessel
Steam quantity:	70t/h per unit
Steam pressure:	5.9MPaG
Steam temperature:	530°C
Fuel:	Hydrogen, fuel oil/mono-firing or dual-firing



Schematic of the completed marine main boiler

This boiler, together with the steam turbine plant and fuel supply system, will be used in the dual fuel propulsion system of large LH₂ carriers. The boiler can efficiently use boil-off gas (BOG) as fuel, which is generated by heat ingress during bulk transport of cryogenic liquefied hydrogen. Kawasaki plans to release this boiler for large LH₂ carriers by the mid-2020s, and will continue to offer optimal boiler solutions to

SHURI

Builder: Imabari Shipbuilding Co.,
Ltd./I-S Shipyard Co., Ltd.
Ship type: 15,816GT Ro/Ro cargo ship
L (o.a.) x B x D: 180.32m x 27.0m x
23.27m
DWT/GT: 7,073t/15,816
Main engine: 9S50ME-C8.5 diesel x
1 unit
Speed, service: 21.10kt
Classification: ClassNK
Completion: July 25, 2022

**CAPE ELIANTO**

Owner: STC Shipping Pte. Ltd.
Builder: Japan Marine United Corpo-
ration
Hull No.: 5190
Ship type: Bulk carrier
L (o.a.) x B (mld.) x D (mld.) x d (mld.):
292.00m x 45.00m x 24.55m x
18.234m
DWT/GT: 182,328t/93,297
Main engine: MAN-B&W 7S65ME-
C8.5-HPSCR diesel x 1 unit
Speed: 15.05kt
Complement: 25
Classification: ClassNK
Registry: Republic of Singapore
Completion: July 25, 2022

**SEASTAR HAWK**

Builder: The Hakodate Dock Co., Ltd.
Hull No.: 911
Ship type: Bulk carrier
L (o.a.) x B (mld.) x D (mld.) x d (mld.):
about 179.90m x 31.60m x 14.80m
x 10.37m
DWT/GT: 40,355t/24,439
Main engine: MAN B&W 6S46ME-
B8.5-HPSCR diesel x 1 unit
Speed, service: about 14.0kt
Classification: ClassNK
Registry: Panama
Completion: August 19, 2022

**CLIMATE RESPECT**

Owner: Lofou Shipping Corporation
Builder: Oshima Shipbuilding Co., Ltd.
Hull No.: 11013
Ship type: Bulk carrier
L (o.a.) x B x D x d (ext.): 228.410m x
36.500m x 20.390m x 14.348m
DWT/GT: 87,290t/48,233
Main engine: Mitsui-MAN B&W
5S60ME-C10.5-EGRBP diesel x
1 unit
Speed, service: 14.30kt
Classification: ClassNK
Registry: Cyprus
Completion: July 29, 2022

**DANAE**

Builder: Shin Kurusima Kochijyuko
Co., Ltd.
Hull No.: S-6152/S-7368
Ship type: Open hatch bulk carrier
L (b.p.) x B x D: 179.95m x 31.00m x
14.70m
DWT/GT: 40,015t/25,012
Main engine: Makita-Mitsui-MAN
B&W 6S46ME-B8.5-HPSCR diesel
x 1 unit
Speed, service: 14.0kt
Classification: ClassNK
Registry: Panama
Completion: September 8, 2022

**Information
from JSEA**

Our news letter, SEA-Japan,
is now available as e-mail. If any-
one wishes to receive the digital
edition (pdf format), please con-
tact sea-japan@jsea.or.jp with the
following information for identi-
fication:

1. Your full name
2. Your company name/occu-
pation, or freelance/others
3. Your company address, or your
country
4. E-mail address

You can also find back issues
of SEA-Japan at our website:
<https://jsea.or.jp>