



Kawasaki completes Japan's first LPG powered LPG carrier



Kawasaki Heavy Industries, Ltd. delivered Japan's first LPG powered LPG carrier, CRYSTAL ASTERIA (HN: 1748), to its owner, Kumiai Navigation (Pte) Ltd., on August 31, 2021. The LPG carrier has a transport capacity of 84,000m³ LPG. The LPG carrier has been designed with a dual-fueled main engine using LPG and low sulfur fuel oil as fuel. This is the first LPG dual-fueled LPG carrier based on the Kawasaki 84,000m³ series and the 64th delivery of Kawasaki LPG carriers.

Vessels operated by liquefied gas fuel instead of heavy fuel oil have been progressively introduced worldwide as an effective measure to cope with exhaust-gas emission regulations for vessels. The CRYSTAL ASTERIA using LPG as fuel can reduce emissions of greenhouse gas (GHG), so reducing the load on the environment as well. The Kawasaki group's expertise that has accumulated through building LPG and LNG carriers, or LNG fuel operated vessels, have been applied to this new carrier.

The Kawasaki electronically controlled LPG-injection diesel engine for marine application (ME-LGIP engine) is used as the main engine. Compared with the use of conventional fuel oil, this engine can greatly reduce SO_x and CO₂ emissions so can comply with SO_x regulations and EEDI Phase 3 applying to ships with building contracts to be concluded in and after 2022.

The applied system is compliant with NO_x Tier III regulations, and the main engine uses an exhaust gas recircu-

lation (EGR) device. The diesel-electric generator combines a selective catalytic reduction (SCR) for denitration. These features allow the ship to navigate emission control areas (ECAs) when operating on conventional low sulfur-content fuel oil. Low fuel consumption can be achieved with the Kawasaki rudder bulb system with fins (RBS-F), and the semi-duct system with contra fins (SDS-F).

Kawasaki will continue to contribute to the realization of a low carbon and decarbonized society by developing and providing environment-friendly marine technologies including various commercial vessels that comply with environmental regulations such as LPG powered LPG carriers, as well as carriers for liquefied hydrogen, which represent a next-generation energy source.

Principal particular

L (o.a.) x B x D x d (mld.):	229.90m x 37.20m x 21.90m x 11.51m
DWT/GT:	54,922t/49,145
Cargo hold capacity:	84,229m ³
Main engine:	Kawasaki-MAN B&W 7S60ME-C10.5-LGIP diesel x 1 unit
Speed, service:	about 17.0kt
Complement:	29
Classification:	ClassNK
Registry:	Singapore
Delivery:	August 31, 2021



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JMU completes 1st J-Series 211,000DWT bulker, DREAM CLOVER

Japan Marine United Corporation has delivered the DREAM CLOVER, the first J-Series 211,000DWT bulk carrier at the Tsu Shipyard on July 28, 2021. This is the newly developed Newcastlemax bulk carrier called J211BC, which features both economical and environmental friendly design.

The J211BC conforms with MARPOL ANNEX VI NO_x Tier III and SO_x emission regulations as well as CSR BC&OT (Common Structural Rules for Bulk Carriers and Oil Tankers). These regulations/rules require shipbuilders to achieve more environmental friendly and secure hull structure designs. On the other hand, these requirements have negative impacts in economical design such as decreases in cargo hold capacity and deadweight, and increase in fuel oil consumption. However, JMU has overcome these negative impacts in design based on the latest JMU technology, and achieved more cargo capacity, deadweight, and lower fuel consumption, compared with the previous Newcastlemax bulk carrier se-

ries called G209BC, and the J211BC is so improved as to be categorized as Phase 2 of EEDI.

The J211BC has larger deadweight and cargo hold capacity suitable for bulk coal and iron ore in the nine cargo holds, achieved by JMU's expertise and vast experience. The SSD[®] (Super Stream Duct[®]) and SURF-BULB[®] equipped fore and aft of the propeller, respectively, greatly improve the propulsion performance. The ALV-Fin[®] (Advanced Low Viscous Resistance Fin) equipped fore of the propeller controls stern water flow to gain better propulsive efficiency. Furthermore, a unique bow shape, LEADGE-Bow[®], can reduce the added resistance due to waves, and the well-refined shape of the superstructure can attain low wind resistance. This vessel is also equipped with a SO_x scrubber to comply with MARPOL ANNEX VI Regulation 14.



In addition, corrosion resistant steel (JFE-SIP[®]-CC) developed by JFE Steel Corporation was adopted for parts of the outer shell, cargo hold frame, and inner bottom shell.

The DREAM CLOVER has obtained the DSS (HM (F+LS, O)) notation for hull monitoring and DSS (EE) notation for energy efficiency analysis function.

Principal particular

L (o.a.) x B (mld.) x D (mld.) x d (mld.):	299.99m x 50.00m x 25.00m x 18.40m
DWT/GT:	212,078t/108,903
Main engine:	MAN B&W 7S65ME-C8.5-HPSCR diesel x 1 unit
Speed:	14.5kt
Complement:	25
Classification:	ClassNK

Tsuneishi Shipbuilding announces new model TESS66 AEROLINE

Tsuneishi Shipbuilding Co. released the details of the new model TESS66 AEROLINE on its website on August 2, 2021. This eco-ship achieves the largest class 66,200DWT of Ultramax category with Panamax breadth. The design features the AEROLINE technology that reduces wind resistance and also complies with EEDI Phase 3 regulations.

Spurred by the increase in cargo volume, ships in the shipping indus-

try are increasing in size in pursuit of transportation efficiency per voyage. With enhanced demand in recent years to address global warming, the growth in size is accelerating to reduce CO₂ emissions per transportation unit as well.

TESS66 AEROLINE, the newest ship model of Tsuneishi Shipbuilding's long-selling TESS* series, achieves the largest class 66,200DWT of the Ultramax bulk carrier category to

maximize transportation efficiency. Furthermore, its outstanding versatility ensures that customer convenience is not compromised as the Panamax breadth is main-

tained along with industry-standard draft.

With the features of fuel-efficiency and environmental performance, such as Tsuneishi Shipbuilding's proprietary AEROLINE technology that reduces wind resistance by approximately 20%, the ship complies with the CO₂ emission regulations, EEDI Phase 3. The ship design has been refined for excellent fuel efficiency under all conditions, from shallow to full load draft.

Note: * TESS (Tsuneishi Economical Standard Ship) series: Tsuneishi Shipbuilding's bulk carrier brand that has evolved and increased variety with over 500 ships completed since the first in 1984.

Principal particulars of TESS66 AEROLINE:

L (o.a.) x B x D x d:	200m x 32.25m x 19.15m x 13.80m
DWT/GT:	66,200t/36,900
Cargo capacity:	81,500m ³



MES-S completes 23rd neo66BC, JAL KALPATARU

Mitsui E&S Shipbuilding Co., Ltd. (MES-S) completed and delivered the 66,000DWT-type bulk carrier, JAL KALPATARU (HN 1967), at its Tamano Shipyard on July 21, 2021. This is the 23rd ship of the neo66BC type, a wide beam shallow draft vessel of the MES-S neo series and the last merchant vessel built under the Mitsui name. The core business of MES-S will shift to engineering services, which will contribute to the growth of maritime industry.



The JAL KALPATARU has four cranes and five cargo holds and retains the superior usability of the Mitsui 56BC type. The vessel is designed with deadweight of more than 66,000 tons and capacity of more than 82,600 cubic meters for loading various cargoes such as coal, ore, grain, as well as lengthy/heavy cargoes such as steel pipes and hot coils.

Research and interviews with ship owners and operators, surveys of ports all over the world, and present trade

patterns suggest that the wide beam (over-Panamax) and shallow draft allow wide flexibility for operations and high transport efficiency. Fuel oil consumption of this vessel is less

than that of a conventional Supramax bulk carrier despite the increased size.

The new hull form maintains good performance under rough sea conditions as well as calm sea conditions and shows better maneuverability. The hatch openings are the largest in this type of vessel for both length and width. The Harmonised Common Structural Rules (H-CSR) are applied. The vessel has multiple fuel oil tanks for switching of fuel oil to satisfy the latest regulations for SO_x emissions.

Principal particulars

L (o.a.) x B x D:	199.99m x 36.00m x 18.45m
DWT/GT:	66,264t/38,234
Main Engine:	MITSUI-MAN B&W 7S50ME-C9.7 diesel x 1 unit
Speed, service:	about 14.5kt
Complement:	25
Classification:	ClassNK
Registry:	Panama
Delivery:	21 July 2021

Namura completes 84,000DWT type bulk carrier, SAIKAI MARU II

Namura Shipbuilding Co., Ltd. (Namura) delivered the SAIKAI MARU II, an 84,121DWT bulk carrier, to Wealth Line Inc. at its Imari Shipyard & Works on June 2, 2021. The vessel is the third of 84,000DWT type bulk carrier series developed by Sasebo Heavy Industries Co., Ltd., and the first vessel constructed by Namura with the following features.

The vessel has been designed with a wide beam and shallow draught and is suitable to carry various cargoes such as coal, ore, grain, and other bulk cargoes. Further improvement of propulsion performance and fuel saving can be achieved with the adoption of two energy saving devices, the Namura flow Control Fin (NCF) and the Namura Rudder-Fin, an electronically controlled main engine, and the latest model of high efficiency propeller.

For environmental protection, the vessel is equipped with a main engine and generator engines compliant with

the Annex VI of MARPOL 73/78 regulations to reduce NO_x emissions, and a SO_x scrubber is installed for reducing SO_x emissions under the policy of IMO-The 2020 global sulphur cap. In addition, the vessel also complies with the SOLAS Chapter II-1 Regulation 3-12, Code on noise levels on board ships to improve the environment of the onboard living quarters.

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 also has several storage tanks for appropriate management and dis-

charge 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.):	229.00m x 38.00m x 13.49m
DWT/GT:	84,121t/47,141
Main engine:	J-ENG 6UEC60LSE-Eco-A2 diesel x 1 unit
Complement:	24
Classification:	ClassNK
Registry:	Panama
Completion:	June 2, 2021



Oshima completes 4,300,000ft³ type woodchip carrier, VANGUARDIA

Oshima Shipbuilding Co., Ltd. delivered the 4,300,000 cubic feet type woodchip carrier Vanguardia to Esteem Maritime Japan Co., Ltd. on August 5, 2021. This vessel has been designed for woodchip transport and has a self-unloading system consisting of three electric deck cranes, four hoppers, and conveyor systems to achieve high unloading efficiency.

Anti-scattering nets and water spraying systems are also equipped at the hoppers to prevent woodchip scattering. Additionally, regenerative electric power during grab bucket lowering is utilized to reduce the electric power demand of the ship and save energy.

This vessel has various eco-friendly features. Measures to prevent marine pollution include a gray water tank for storage of ship's domestic wastewater and collecting tank for storage of water used for cleaning of cargo holds and the upper deck. Moreover, to prevent environmental pollution caused by harmful substances, the in-

ventory of hazardous materials is provided on board the ship, which describes the types and locations of harmful substances. Reduction of SO_x emissions that

cause air pollution is achieved with a SO_x scrubber and the vessel complies with IMO SO_x regulations.

This vessel has been designed to have higher propulsion efficiency to cope with the large cargo hold capacity to load woodchips and adopted an electronically controlled main engine, a high efficiency propeller with larger diameter, and PBCF (Propeller Boss Cap Fins). Furthermore, Oshima's energy saving devices, "Advanced Flipper Fins," "Rudder Fin," and "Seaworthy Bow" are installed for further improvement of propulsion efficiency. Consequently, the vessel has attained



the level of EEDI (Energy Efficiency Design Index) Phase 3 under the current requirements of EEDI Phase 1.

Principal particular

L (o.a.) x B (mld.) x D (mld.) x d (summer/ext.): 209.96m x 37.00m x 22.80m x 11.523m

DWT/GT: 60,306t/49,903

Hold capacity: 4,326,015 cubic feet

Main engine: MITSUI-MAN 6S50ME-C9.6-EGRBP diesel x 1 unit

MCR: 7,430kW at 92.0rpm

Speed, service: 14.20kt

Classification: ClassNK

Completion: August 5, 2021

SKDY-Sanoyas designs CO₂ carrier (Injection Facility Ready)

Shin Kurushima Sanoyas Shipbuilding Co., Ltd. (SKDY-Sanoyas) has obtained an Approval in Principle (AiP) from ClassNK for the design of a "CO₂ carrier (Injection Facility Ready)" as part of the "Sustainable CCS (Carbon Dioxide Capture and Storage) project" by the Ministry of the Environment, Government of Japan. This project is part of the approach to reducing greenhouse gases, and is intended for technical study and verification of CCS, which separates and captures CO₂ in the exhaust gas from thermal power plants and stores the captured gas underground.

The company has developed the CO₂ carrier, under a commission from Uyeno Transtech Limited, a member of the demonstration project consortium, and also carried out the risk assessment (HAZID: Hazard Identification Study) of the "CO₂ carrier (Injection Facility Ready)" in anticipation of future conversion to a CO₂ carrier with injection system, which led to



CO₂ carrier (Injection Facility Ready)

granting of the AiP.

This ship design has been developed to enable CO₂ transportation, and future conversion to injection operation. The space for the injection system including the fitting facility to an offshore storage site has been secured in front of the CO₂ cargo tank as shown in the figure.

This ship has a two-axis azimuth propulsion system and buttock flow stern hull form to reduce hull resistance. As a result, the vessel satisfies the position keeping performance required for CO₂ injection operations on the ocean and ensures propulsion



CO₂ Injection Ship

performance suitable for ocean voyages.

Liquefied CO₂ requires high pressure and low temperature to maintain its liquefied state, which is a strict requirement for the design and manufacture of CO₂ cargo tanks. However, based on the company's accumulated LPG cargo tank design and manufacturing technologies, the company has developed a new TYPE-C tank suitable for receiving, transporting, and supplying liquefied CO₂ at high pressure and low temperature from plants on land.

Onomichi completes 3.6-million ft³ woodchip carrier

Onomichi Dockyard Co., Ltd. delivered the 3,600,000 cubic feet woodchip carrier, PRINCE OF NATURE, to her owner, Tokai Shipping Co., Ltd. (contractor: Pon Shipholding S.A.), at its Onomichi Shipyard. This is the first woodchip carrier built by Onomichi Dockyard.

The PRINCE OF NATURE has six cargo holds capable of loading about 102,000m³ woodchips used as paper raw materials. Three woodchip-unloading units are also installed

on the upper deck to achieve efficient cargo handling.

The main engine uses the first production model of the J-ENG 6UEC50LSH-Eco-C2-EGR diesel engine, which was manufactured by Japan Engine Corporation. The engine is the electronically controlled type that has greatly improved fuel consumption compared to the previous models. The stern is installed with Onomichi Parallel Fins to increase propulsion efficiency. Eco-protection

units are also adapted to the engine plant, the SO_x scrubber to remove sulfur oxides from engine exhaust emissions, and the exhaust gas recirculation (EGR) system for

decreasing NO_x (nitrogen oxides).

Onomichi Dockyard has been constructing product carriers, handy-size bulkers, ferry vessels, and RO/RO ships as a core line of business, and is now expanding the range of ship types to be built. This year the company succeeded in the first delivery of the woodchip carrier.

Principal particulars

Owner: Tokai Shipping Co., Ltd.
Shipbuilder: Onomichi Dockyard Co., Ltd.

Ship type: Woodchip carrier
Hull No.: 776
L (o.a.) x B (mld.) x D (mld.): 199.90m x 32.20m x 22.80m
Deadweight tonnage: 41,151t
Gross tonnage: 49,899
Main engine: J-ENG 6UEC50LSH-Eco-C2-EGR diesel x 1 unit
Output (NCR): 6630kW x 93.8min⁻¹
Classification: ClassNK
Registry: Panama



Mitsubishi Shipbuilding begins verification tests on marine-based CO₂ capture system

Mitsubishi Shipbuilding Co., Ltd., a part of Mitsubishi Heavy Industries (MHI) Group, has been cooperating with Kawasaki Kisen Kaisha, Ltd. ("K" Line) and Nippon Kaiji Kyokai (ClassNK), to conduct test operations and data collection for a small scale demonstration plant of the "Marine-based CO₂ Capture System," in order to verify the equipment's operation. The equipment has now been installed on board the CORONA UTILITY, a coal carrier for Tohoku Electric Power Co., Inc. operated by "K" Line, at MHI's Honmoku Plant at the Yokohama Dockyard & Machinery Works.

This project is being conducted with support from the Maritime Bureau of Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT), as part of its assistance project for research and development of technological advancements in marine resource development. The demonstration involves converting the design of an existing CO₂ capture system for onshore power plants to operation in a marine

environment, and installing the system on board a ship in service. This project, called "Carbon Capture on the Ocean" (CC-Ocean), is intended to achieve the world's first CO₂ capture at sea.

Specialist Mitsubishi Shipbuilding engineers will travel on the ship during its voyage, for commissioning of the compact CO₂ capture demonstration plant, and conducting performance evaluation assessments at sea, as well as analysis of capture CO₂. By the end of fiscal 2021, MHI and "K" Line will conduct verification tests with the ship crew operating the demo plant, and evaluate its safety and operability, with the aim of practical application of the system as a marine-based, compact CO₂ capture system.

This is the world's first demonstration test to be conducted during actual ocean navigation. The

knowledge gained will be used for future development of technologies and systems to capture CO₂ from the exhaust gases of marine equipment and ships. The captured CO₂ can be recycled for use as raw material in synthetic fuel, providing a significant contribution to reductions in greenhouse gas (GHG) emissions.

Mitsubishi Shipbuilding, amid rising awareness of the need for decarbonization globally since the enactment of the Paris Agreement, is continuing its efforts to find solutions for reducing GHG emissions from ships and marine equipment, and to contribute to environmental conservation transition.



Marine-based CO₂ Capture System installed on board the CORONA UTILITY

BELMAR

Builder: Tadotsu Shipyard Co.,Ltd./
Imabari Shipbuilding Co., Ltd.
Ship type: 64,000DWT-type bulk carrier
L (o.a.) x B x D:v199.9m x 32.24m x
19.3m
DWT/GT: 63,500t/36,500
Main engine: 6S50ME-C9.6 diesel x
1 unit
Speed, service: 14.5kt
Classification: ClassNK
Completion: September 16, 2021

**WAN HAI 329**

Owner: Wan Hai Lines (Singapore)
Pte. Ltd.
Builder: Japan Marine United Corporation
Ship type: Container carrier
L (o.a.) x B (mld.) x D (mld.) x d (mld.):
203.50m x 34.80m x 16.60m x
11.50m
DWT/GT: 37,160t/30,468
Main engine: MAN-B&W 7S70ME-
C10.5 diesel x 1 unit
Speed: 21.6kt
Complement: 25
Classification: ABS

**CALYPSO**

Owner: Murano Navigation S.A.
Builder: Sumitomo Heavy Industries
Marine & Engineering Co., Ltd.
Hull No.: 1406
Ship type: Crude oil carrier
L (b.p.) x B x D: 228.96m x 44.00m x
21.80m
DWT/GT: abt. 112,000t/abt. 60,200
Main engine: Hitachi MAN B&W
6G60ME diesel x 1 unit
Speed: 14.9kt
Classification: LR
Registry: Bahamas
Completion: July 14, 2021

**ABILITY**

Owner: Sun Advance Shipping S.A.
Builder: Shin Kurushima Dockyard
Co., Ltd.
Hull No.: S-6111
Ship type: Bulk carrier
L (o.a.) x B x D: 196.50m x 32.26m x
19.40m
DWT/GT: 64,523t/36,757
Main engine: Mitsui-MAN B&W
6S50ME-C9.6-EGRBP diesel x 1
unit
Speed, service: 14.0kt
Classification: ClassNK
Registry: Panama
Completion: July 15, 2021

**MORNING HOPE**

Owner: Trio Happiness, S.A.
Builder: Sasaki Shipbuilding Co., Ltd.
Hull No.: 712
Ship type: LPG carrier
L (o.a.) x B x D x d (ext.): 99.98m x
17.20m x 7.80m x 6.100m
DWT/GT: 4,978t/4,301
Main engine: Makita-MAN B&W
5L35MC6 diesel x 1 unit
Output: 2,750kW at 178rpm
Speed, service: 13.4kt
Classification: ClassNK
Registry: Panama
Completion: May 31, 2021

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from JSEA**

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