

## SKDY delivers Japan's 1st LNG-fueled PCTC, SAKURA LEADER



Shin Kurushima Toyohashi Shipbuilding Co. Ltd., a group company of Shin Kurushima Dockyard Co., Ltd. (SKDY), has completed construction of the SAKURA LEADER, a pure car and truck carrier (PCTC) capable of carrying 7,000 units, for Nippon Yusen Kabushiki Kaisha (NYK). The SAKURA LEADER is designed for the next generation of vehicle transport and is the first large LNG-fueled PCTC built in Japan.

The main engine is the dual-fueled type, which can achieve reduction of CO<sub>2</sub> emissions by 30% or more compared with the conventional oil-fired engine. Moreover, SO<sub>x</sub> emissions are reduced to approximately zero, thus achieving environmentally friendly characteristics for the ship.

The overall length is maximized up to 200 meters, and the beam is 38.0 meters equivalent to the overPanamax type, wider than that of the conventional Panamax. These dimensions increase the loading capacity of vehicles, so fuel efficiency per vehicle is improved over existing vehicle carriers. Various energy saving devices including those developed by Shin Kurushima Dockyard are also installed to lower fuel consumption, save energy, and take measures for environmental conservation.

Partial bulkheads have been removed from the inside of cargo holds for linear arrangement of inboard ramps to go to each car deck directly and to improve vehicle-handling

efficiency. Shore rampway doors have been installed at the midship and stern. The midship rampway on the starboard side is 22.0m long and 4.3m wide and capable of bearing a 15-ton truck, and the stern rampway on the starboard side is 35m long and 13.2m wide (up to a 30-ton truck).

The wheelhouse is the all-weather type to improve berthing and unberthing as well as to maintain watch considering operability and safety. In the center area of the wheelhouse, a console is installed considering the flow line of operators and the wheelhouse arrangement, and ship operation equipment necessary for ship maneuvering, watch-keeping, and course-keeping can be handled easily and effectively.

### Principal particulars

Owner:	Nippon Yusen Kabushiki Kaisha (NYK)
Builder:	Shin Kurushima Toyohashi Shipbuilding Co., Ltd.
Hull No.:	S-6067/S-3735
Ship type:	PCC
L (o.a.) x B x D:	199.96m x 38.0m x 35.54m/14.23m
DWT/GT:	17,330t/72,285
Main engine:	DU/WinGD 8X52DF diesel x 1
Speed, service:	about 18.0kt
Classification:	ClassNK
Registry:	Tokyo
Completion:	October 28, 2020



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## JAPAN SHIP EXPORTERS' ASSOCIATION

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# Kawasaki builds World's first LH2 carrier, SUIISO FRONTIER

— For an international H2 energy supply chain aimed at Carbon-free society —

Kawasaki Heavy Industries, Ltd. launched the SUIISO FRONTIER (Kawasaki HN: 1740), the world's first liquefied hydrogen (LH2) carrier at its Kobe Works on December 11, 2019. This vessel was developed to provide a means of transporting liquefied hydrogen at 1/800 of its original gas-state volume, cooled to -253°C, safely and in large quantities over long distances by sea. Kawasaki plans to install a 1,250m<sup>3</sup> vacuum-insulated, double-shell-structure LH2 storage tank, manufactured at Harima Works, on the ship and complete the vessel's construction by the end of Japanese FY 2020. Once complete, the SUIISO FRONTIER will be used for technology demonstration testing in FY 2020 aimed at the establishment of an international hydrogen energy supply chain\*1 in which liquefied hydrogen produced in Australia will be shipped to Japan.

Hydrogen is gaining popularity as a key next-generation energy source to combat global warming. It does not emit CO<sub>2</sub> or other greenhouse gases during use, and expected applications include power generation, fuel cell vehicles and more. With the goal of making hydrogen just as common a fuel source as petroleum and natural gas, Kawasaki joined together in 2016 with Iwatani Corporation (Iwatani), Shell Japan Limited, and Electric Power Development Co., Ltd. (J-POWER) to form the CO<sub>2</sub>-free Hydro-



gen Energy Supply-chain Technology Research Association (HySTRA).\*2 This organization has, with the support of NEDO,\*3 been pursuing technological development aimed at building an energy supply chain enabling economical and reliable sourcing of hydrogen in large volumes. In addition to this latest liquefied hydrogen carrier, a liquefied hydrogen unloading terminal was built in Kobe City, Hyogo Prefecture, and a brown coal gasification facility was constructed in Australia. In addition, a consortium\*4 comprising Kawasaki, Iwatani and J-POWER along with Marubeni Corporation and AGL Loy Yang Pty Ltd, was formed in 2018 and has received financial support from the Australian and Victorian governments to build a gas refining facility, hydrogen liquefaction & loading terminal and more.

Kawasaki is pursuing this hydrogen business as part of its efforts toward sustainable development goals (SDGs), carrying out development projects in every phase including production, storage, transportation, and utilization. In 1981, Kawasaki became the first Asian company to manufacture a liquefied natural gas (LNG)

carrier, and now as the world's first company to complete a liquefied hydrogen carrier it will further its efforts toward achieving a Hydrogen Society.

## Specifications of SUIISO FRONTIER

L (o.a.) x L (b.p.) x B (mld.) x D (mld.) d (mld.): 116.0m x 109.0m x 19.0m x 10.6m x 4.5m

Gross tonnage: Approx. 8,000

Tank cargo capacity: Approx. 1,250m<sup>3</sup>

Propulsion system: Diesel electric propulsion

Sea speed: Approx. 13.0kn

Complement: 25

Classification: ClassNK

Registry: Japan

Ship owner: CO<sub>2</sub>-free Hydrogen Energy Supply-chain Technology Research Association (HySTRA)

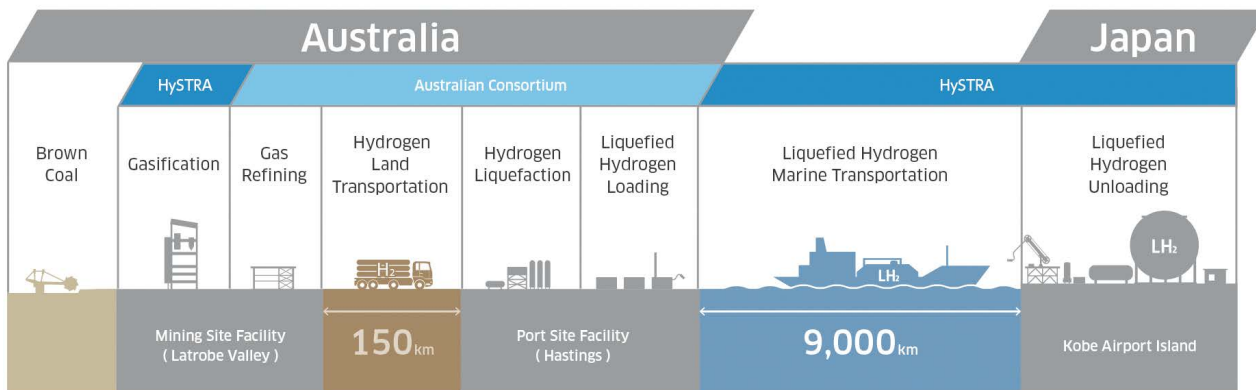
### Note

\*1 Planned implementation as part of NEDO's Demonstration Project for Establishment of Mass Hydrogen Marine Transportation Supply Chain Derived from Unused Brown Coal.

\*2 Established primarily to achieve technologies and carry out demonstration of everything from production of hydrogen via effective use of brown coal through to transportation and storage of said hydrogen, aimed at the cultivation of a CO<sub>2</sub>-free hydrogen supply chain and its commercialization. Marubeni Corporation joined HySTRA as a new member in 2018, and JXTG Nippon Oil & Energy Corporation in August 2019.

\*3 New Energy and Industrial Technology Development Organization

\*4 Sumitomo Corporation joined as a new member in October 2019.



Supply chain demonstration framework



## MSB completes 6,200GT cargo-passenger ship, SALVIA-MARU

Mitsubishi Shipbuilding Co., Ltd. (MSB) delivered the SALVIA-MARU, a 6,200GT cargo-passenger ship to the co-owners, Japan Railway Construction, Transport and Technology Agency and Tokai Kisen Co., Ltd. on June 5, 2020.

The vessel was designed and built at the Shimonoseki Shipyard of MSB, and is now plying an island route between Takeshiba and Kozushima, as well as servicing the Tokyo Bay Night Cruise "Tokyo wan Nouryousen" in summer.

The vessel employs a tandem-hybrid contra-rotating propeller (CRP) propulsion system developed by MSB. The system consists of single-shaft propulsion propellers driven by a low-speed marine diesel engine and electric-drive azimuth propulsion propellers that enable the direction of propulsion power to be freely changed. In comparison with the conventional twin-shaft propulsion system, the new system requires fewer appendages for propulsion systems such as skegs, shaft brackets, and rudders, so reducing water resistance. Energy-saving is also improved by allowing the use

of only fuel-efficient low-speed diesel power in bays and channels where slower navigation speeds are required.

The propulsion system can deliver the required power using only a single-shaft configuration, with the load shared between a single diesel engine and an electric drive system, so higher passenger comfort is ensured by reducing both noise and vibration. In addition, the electric-drive azimuth propulsion system can be used as a stern thruster in combination with the bow thruster to enhance safety and speed when approaching or departing a pier.

### Principal particulars

L (o.a.) x L (b.p.) x B (mld.) x D (mld.) x d (mld.): 118.09m x 109.20m x 17.00m x 9.00m x 5.40m  
Gross tonnage: 6,099 (Japanese tonnage)  
Speed, service: 20.0kt



Cargo loading capacity: 38 units of containers  
Complement: 1,343 passengers (Coasting service)  
693 passengers (Restricted Greater Coasting Service)  
41 Officers and crew  
Machinery (Diesel propulsion)  
Main engine: Mitsubishi 6UEC35LSE-Eco-B2 diesel x 1 unit  
MR: 5,220kW  
Propeller: CPP x 1 unit (Electric propulsion)  
Electric motor: 1,500kW x 1 unit  
Azimuth propeller: 1 unit  
Classification: JG  
Registry: Japan (Tokyo)

## MES-S completes 1st ship of Eco-Ship neo87BC series, OCEAN GOLD

Mitsui E&S Shipbuilding Co., Ltd. (MES-S) completed and delivered an 87,000DWT-type bulk carrier, OCEAN GOLD (HN: 1988), at its Chiba Shipyard on November 16, 2020 to Ocean Gold Pte. Ltd., Republic of Singapore. This is the first vessel of the neo87BC series, the seventh

Eco-Ship of the MES-S neo series.

The vessel is intended for the grain trade, especially in shallow-water ports in North and South American continental rivers, but can also handle trade in coal, iron ore, and bauxite. Thus, the vessel provides excellent flexibility in ship allocation.

The electronically controlled main engine complies with the MARPOL NO<sub>x</sub> restriction (Tier-III). The vessel has multiple fuel oil tanks for switching of fuel oil to satisfy the strengthened restrictions

for SO<sub>x</sub> emissions. The newly developed hull form and energy-saving device achieve high transport efficiency. This is the first neo series to apply the Harmonised Common Structural Rules (H-CSR). Compliance with the SOLAS Noise Code contributes to improved crew working and living environments.

### Principal particulars

L x B (mld.) x D (mld.): 228.99m x 36.94m x 19.95m  
DWT/GT: 87,635t/48,245  
Main engine: MITSUI-MAN B&W 6S60ME-C10.5-HPSCR diesel x 1 unit  
Speed, service: about 14.5kt  
Complement: 25  
Classification: NK  
Registry: Singapore  
Delivery: November 16, 2020



## JMU completes 3rd 3,055TEU-type container ship, WAN HAI 323

Japan Marine United Corporation (JMU) delivered the WAN HAI 323, a 3,055TEU container ship, to Wan Hai Lines (Singapore) Pte. Ltd. at its Kure Shipyard on December 9, 2020. This is the third vessel of a new class of 3,055TEU-capacity container ship constructed by JMU. The vessel can load containers in 12 rows across and six tiers high in the cargo hold, and 14 rows across and 7 tiers high on the deck, with a total of 3,055TEUs.

The vessel is optimally designed for the medium to long distance trade as the amount of seaborne trade to and from Asia and within Asia is increasing, and achieves significantly improved environmental and operational performance compared with conventional vessels, with both high loading capacity and excellent navigation performance using JMU's latest technology.

The vessel achieves high propulsion efficiency through its advanced lower resistance hull form and JMU energy saving devices such as the ALV-Fin®

(Advanced Low Viscous resistance Fin). The latest MAN-B&W's Mark 10.5 electronically controlled main engine and inverter controlled cooling sea water pump reduce the fuel oil consumption.

The Energy Efficiency Design Index (EEDI), Phase 3, will be enforced on ships ordered on and after January 2022. This vessel has already achieved this standard.

Safety and convenience for steering during voyage and reaching/leaving the pier are improved by adopting the INS (Integrated Navigation System) and full enclosed navigation bridge. Voyage assistance and monitoring of the engine room by a CCTV camera system improves safety. This is the first class of vessels in Japan to



obtain the DNVGL SmartShip Notation which is granted to vessels fitted with smart technology such as the monitoring system.

### Principal particulars

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/30,676
Main engine:	MAN-B&W 7S70ME-C10.5 x 1 unit
Speed:	21.6kt
Complement:	25
Classification:	DNVGL

## Oshima completes 56,000DWT box shaped bulk carrier, ORCHID TIGER

Oshima Shipbuilding Co., Ltd. delivered a 56,000DWT-type box shaped bulk carrier to Maclin Spring Maritime S.A. on September 29, 2020. This vessel was developed an optimized ship type to transport various cargoes such as grain, coal, ores, hot coils, cement, wooden pulp and dangerous cargoes, and designed to achieve larger cargo hold capacity and deadweight with shallower draft. Since the hatch opening width is as large as about 26m and there is no top side tank, damage to the cargo can be prevented during handling by loading

directly with a crane.

This vessel has various eco-friendly features. To prevent marine pollution, a gray water tank storing domestic wastewater and a collecting tank storing water used for cargo hold and deck cleaning are installed. The inventory of hazardous materials is provided, which includes their types and loaded places. This will prevent environmental pollution caused by the substances if the ship is damaged in an accident. The safety and health of the crew will also be ensured.

The vessel has been designed to comply with the IMO SO<sub>x</sub> regulations and is mounted with an SO<sub>x</sub> scrubber for reducing SO<sub>x</sub> emissions from the main engine, an electronically controlled diesel

engine to gain higher propulsion efficiency together with a high performance propeller.

Furthermore, Oshima originally developed energy saving devices have been installed, including the Advanced Flipper Fins, Rudder Bulb, and Seaworthy Bow to improve the propulsion efficiency. The vessel has already achieved over 20% less from the IMO reference line of EEDI (Energy Efficiency Design Index), which means less CO<sub>2</sub> emissions per deadweight and nautical mile.

### Principal particulars

L (o.a.) x B x D x d:	189.99m x 32.26m x 17.87m x 12.569m
DWT/GT:	55,578t/32,045
Hold capacity:	64,354m <sup>3</sup>
Main engine:	Mitsui-MAN B&W 6S50ME-C9.6 diesel x 1 unit
MCR:	7,260kW at 99.0rpm
Speed, service:	abt. 14.30kt
Classification:	ClassNK
Completion:	September 29, 2020





## Sanoyas completes Panamax bulker, BRILLIANT SAKURA

Sanoyas Shipbuilding Corporation delivered the Panamax bulk carrier, BRILLIANT SAKURA, built at the Sanoyas Mizushima Shipyard on October 8, 2020. This is the first vessel of a series of the Sanoyas newly developed 82,000DWT-type Panamax bulk carrier. The vessel not only satisfies the latest rules such as the CSR B&T and NO<sub>x</sub> Tier III regulations, but also has the equivalent level of deadweight with shallower draft than the builder's previous design. The vessel exceeds 20% reduction of CO<sub>2</sub> emissions by IMO's EEDI (Energy Efficiency Design Index: grams CO<sub>2</sub> per ton nautical mile) regulation in advance and mostly approaches the 30% reduction that will apply to ships for which the building contract is placed on or after 2025.

To improve propulsion efficiency, the vessel is equipped with a low-speed & long-stroke electronically controlled main engine combined with a



high-efficiency propeller and rudder appendages. Furthermore, Sanoyas patented energy saving devices such as the Sanoyas developed STF (Sanoyas-Tandem-Fin) and ACE DUCT (Sanoyas Advanced flow Controlling and Energy saving DUCT) are applied. These energy saving devices

have achieved about 8% reduction in energy consumption and CO<sub>2</sub> emissions.

Various eco-friendly features are included such as the main engine with SCR compliant with NO<sub>x</sub> emission Tier III limit for the prevention of air pollution, SO<sub>x</sub> scrubber for SO<sub>x</sub> emission control in global areas and dedicated low sulphur gas oil tank to cruise in ECAs (Emission Control Areas). In addition, various countermeasures such as a Ballast Water Treatment System and independent holding tanks for rainwater on the upper deck for protection of the marine environment are also incorporated.

Furthermore, for improvement of maintenance, access trunks are arranged to allow access from the upper deck to the double bottom even under the laden condition. Accommodation complies with the latest IMO noise reduction regulation to improve the working and living environments for officers/crews of the vessel.

### Principal particulars

HN:	1,370
L (o.a.) x B x D x d:	229.00m x 32.24m x 20.15m x 14.594m
DWT/GT:	81,800t/43,509
Cargo hold capacity:	97,034m <sup>3</sup> (grain)
Speed, service:	about 14.2kt
Complement:	24
Classification:	ClassNK
Delivery:	October 8, 2020

### First ACE DUCT adoption for the BRILLIANT SAKURA

The BRILLIANT SAKURA is the first ship adopting the ACE DUCT for energy saving. The ACE DUCT is installed forward of the propeller, and consists of a semicircular duct, horizontal struts, and vertical strut.

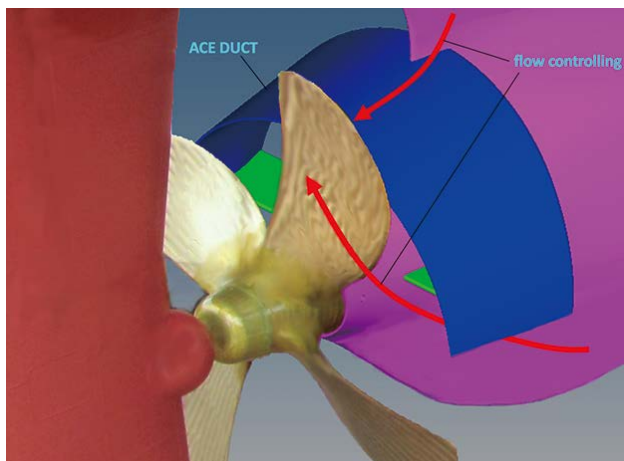
The semicircular duct is an airfoil to assist in water-flow distribution in the turbulent flow field around the propeller and to increase the thrust force of the ship. Effective flow distribution can be obtained by adjusting the instal-

lation angle of the duct to the ship level. Moreover, the ACE DUCT can reduce cavitation risk by installation at a relatively low position and optimizing the shape of the horizontal struts.

Sanoyas has optimized the shape of the ACE DUCT using computational fluid dynamics (CFD) simulations. The CFD study showed that the horizontal struts obstructed the water flow from the ship bottom around the propeller. Therefore, the shape of the

horizontal struts is a significant factor to achieve superior propulsion efficiency.

The energy saving effect can be expected to decrease by about 8% in fuel consumption when combined with other energy saving devices.



Flow control image

## EVER CROWN

Builder: Imabari Shipbuilding Co., Ltd.  
 Ship type: 1,900TEU-type container carrier  
 L (o.a.) x B x D: 171.98m x 28.4m x 14.5m  
 DWT/GT: 22,363t/18,658  
 Main engine: 6S60ME-C10.5 diesel x 1 unit  
 Speed, service: 19.5kt  
 Classification: ClassNK  
 Completion: November 25, 2020



## WAN HAI 325

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/30,676  
 Main engine: MAN-B&W 7S70ME-C10.5 x 1 unit  
 Speed: 21.6kt  
 Complement: 25  
 Classification: DNVGL/CR



## SUSANOO HARMONY

Owner: RISHIRI MARINE S.A.  
 Builder: Onomichi Dockyard Co., Ltd./ Saiki Heavy Industries Co., Ltd.  
 Hull No.: 738  
 Ship type: Log blker  
 L (o.a.) x B x D x d (ext.): 174.44m x 30.00m x 15.10m x 10.50m  
 DWT/GT: 37,140t/23,770  
 Main engine: MAN B&W 6S46ME-B8.5 diesel x 1 unit  
 Speed, service: 14.1kt  
 Classification: NK  
 Registry: Liberia  
 Completion: October 30, 2020



## PRISCILLA

Owner: Chijin Shipping S.A.  
 Builder: Tsuneishi Shipbuilding Co., Ltd.  
 Hull No.: 1596  
 Ship type: Bulk carrier  
 L (o.a.) x B x D : 229.00m x 32.26m x 20.15m  
 DWT/GT: abt. 82,300t/abt. 44,000MT  
 Main engine: MAN B&W 6S60ME-C10.5 diesel x 1 unit  
 Speed, service: 14.30kt  
 Classification: LR  
 Registry: Liberia  
 Completion: September 24, 2020



## EVER FAR

Builder: Imabari Shipbuilding Co., Ltd.  
 Ship type: 11,000TEU-type container carrier  
 L (o.a.) x B x D: 333.95m x 48.4m x 26.8m  
 DWT/GT: 130,573t/116,295  
 Main engine: 9S90ME-C10.5 diesel x 1 unit  
 Speed, service: 23.0kt  
 Classification: ABS  
 Completion: December 15, 2020



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