

## Imabari completes 20,000TEU container carrier, MOL TRUTH



Imabari Shipbuilding Co., Ltd. has delivered the mega-container carrier, MOL TRUTH, to Mitsui O.S.K. Lines, Ltd. (MOL), one of two ship construction orders placed by MOL. The carrier is now operated by The Alliance (a joint operator of container ships consisting of five companies including MOL) on the Asia and Euorope route FE2. Imabari also completed the large building dock No. 3\* (610m long x 80m wide) at its Marugame Headquarters in September last year, where the second container carrier for MOL was launched and is scheduled for delivery in January 2018. (\* Refer to SEA-Japan No. 386.) Both container carriers are the largest of this type ever constructed in Japan. The MOL TRUTH measures 400m in overall length and 58.5m in width, and can load containers in 11 tiers and 23 rows on the upper deck.

These large capacity ships are designed with high safety standards and adopt high-tensile heavy steel plate and advanced energy-saving systems to meet the cost competitiveness and increased environmental protection requirements on European sea lanes. For example, two of four electric generators use an exhaust gas economizer that permits recovery of heat energy from exhaust gas and save fuel, and some auxiliary equipment such as pumps employ an inverter control system to adapt to ship operation conditions, and to save electric power and/or fuel. Other measures for increased ship performance include adop-

tion of the highly efficient propeller and low-friction paint. The large capacity results in lower CO<sub>2</sub> emission per container by about 20% compared with the 14,000TEU-class container carrier in service at present.

Imabari has completed several designs for coping with the strict SO<sub>x</sub> (sulfur oxide) regulations in 2020. LNG fuel tanks can be arranged at the fore side of the engine room, and design to install a scrubber has also been completed. Both systems can satisfy the SO<sub>x</sub> regulations, and installation can be achieved in a short time.

The stern hull form has been rounded to increase propulsion efficiency under full load navigation. The propeller shaft end has adopted PBCF (propeller boss cap fins) for reducing propulsion energy loss.

Moreover, the hatch coaming section, important to maintain the hull strength, uses high-tensile heavy steel plate manufactured in Japan. The plate thickness is 80mm, 5mm thinner than those used in the same type of container carrier, but the hull strength has been ensured with a special design.

The MOL TRUTH is 400m long, 58.5m wide, and 16.0m deep at full load. The main engine is the MAN B&W 11G95ME-C9.5 type; container carrying capacity, 20,182 TEUs; and the classification, LR. The carrier is registered in Panama.



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## Kawasaki successfully completes AUV verification test in UK

Kawasaki Heavy Industries, Ltd. has succeeded in a verification test for an autonomous underwater vehicle (AUV) in UK waters. With the growing demand for pipeline maintenance in offshore oil and gas fields, Kawasaki has been developing leading-edge component technologies of AUVs utilizing advanced underwater vehicle technologies fostered in-house over the years, with support from a subsidization project by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT).

An AUV can autonomously assess and act according to its surrounding conditions and events while carrying out preassigned missions, in contrast to the more widely used remotely operated vehicle (ROV), which needs a tether cable for operation. As a result, AUVs can be operated without dedicated operators on the mother ship or special onboard equipment. Furthermore, tasks such as charging and transferring collected inspection data to the mother ship can be carried out while the AUV is underwater, which

enables longer deployment time and reduces the frequency of launching and recovery work. These advantages are expected to reduce the burden on the ship crew, offer greater safety, and reduce maintenance-related costs.

The AUV verification test was carried out from November 6 to 20, 2017 at The Underwater Centre, a marine testing and training facility in Fort William, Scotland. Tests at sea used a prototype AUV and a charging station, and included automated docking of the AUV to the charging station, contactless charging, and large-capacity optical communication operations.

During the testing period, representatives from major oil and gas companies, underwater vehicle and equipment operating companies, UK government organizations, UK subsea



scientific societies and other organizations interested in Kawasaki's AUV development efforts were invited to view demonstrations. Kawasaki received high praise from the attendees, with many expressing hope for future commercialization of the AUV.

Kawasaki plans to pursue full-scale development of a pipeline-inspection AUV which utilizes the automated docking and other component technologies tested in Scotland, as well as control algorithms being developed in cooperation with the UK's Heriot-Watt University, with the aim of commercializing the AUV by the end of FY 2020.

## MHI delivers 6,138DWT RO-RO ship, HIMAWARI No. 9

Mitsubishi Heavy Industries, Ltd. (MHI) built the roll on/off cargo ship, HIMAWARI No. 9, at its Shimonoseki Shipyard & Machinery Works, and delivered the ship to the co-owners Nippon Marine Co., Ltd., Nippon Shipping Co., Ltd., and Yamamoto Kisen Co., Ltd. on November 28, 2017. The ship is now plying a domestic route between Tokyo and Hokkaido together with the sister vessel HIMAWARI No. 8 delivered in August 2017.

The HIMAWARI No. 9 is a similar ship to HIMAWARI No. 7 built by MHI in 2013 but incorporates three main changes. The aft space of the No. 2 deck has been built as an open RO-RO cargo space to load specific dangerous cargoes, for which loading in a closed area is forbidden, and a fixed rampway is provided for access to the upper deck. The lifter operating range is extended to the No. 1 deck, and the lifter cover is equipped on the No. 1 deck for more efficient cargo loading.

Trailer capacity is increased from 172 units to 177 units.

Energy-saving equipment, such as an electronically-controlled main engine, reaction

rudder with bulb, and efficient controllable pitch propeller, are fitted as on the previous ship for reducing fuel consumption, and an inverter type seawater cooling pump was added.

### Principal particulars

L (o.a.) x B x D x d: 166.90m x 27.00m x 23.27m (upper deck) x 6.85m  
DWT/GT: 6,138t/10,626 (Japanese tonnage)

Main engine: MAN B&W 9S50ME-C8.5 diesel x 1 unit

M.R.: 14,940kW x 127min<sup>-1</sup>

Speed, service: 23.0kt

CPP: 1 unit

Bow/Stern thrusters: 1/2 units

Stern thrusters: 2 sets

Fin stabilizer: 1 set

Cargo Loading Capacity

Trailer chassis: 177 units

Car: 95 units

Classification: NK

Flag: Japan





## MES delivers KIRISHIMA, 310,000DWT VLCC

—First ship of MES's Eco-Ship "neoVLCC" type—

Mitsui Engineering & Shipbuilding Co., Ltd. (MES) completed and delivered a 310,000DWT VLCC, KIRISHIMA (HN: 1932), at its Chiba Works to ASIASHIP MARITIME S.A., Panama on November 28, 2017. The vessel is a VLCC featuring the largest deadweight and cargo oil tank capacity with dimensions complying with major port restrictions in Japan. The vessel is also the first of the MES "neo VLCC" series featuring excellent fuel efficiency as a next-generation eco-ship and the fifth in the Eco-Ship line-up of the MES "neo series" starting from the "neo66BC," 66,000DWT type bulk carrier.

The vessel "neoVLCC" is the largest class of VLCCs with a deadweight of over 310,000 metric tons and dimensions complying with the major port restrictions in Japan, together with improved propulsion performance and transport efficiency achieved by state-of-the-art energy saving technologies. The latest bow and stern form, high-efficiency propeller and energy saving devices provide higher energy efficiency and environment-friendliness.

Considering environmental protection, low sulphur fuel oil tanks are ar-

ranged with proactive design for future installation of the exhaust gas cleaning system (SO<sub>x</sub> scrubber), according to new SO<sub>x</sub> regulations. and the vessel is equipped with the vapour emission Control System (VECS). Fuel oil consumption of the vessel is further improved by the G-type electronically controlled marine diesel engine, MITSUI-MAN B&W 7G80ME-C9.5. The waste heat recovery system (WHRS) utilizes main engine exhaust gas energy, and the vessel has a turbo generator system and main engine tuned to the optimum condition, which reduces the ship operating costs. Cargo oil tanks and ballast water tanks are coated in accordance with the IMO Performance Standard for Protective Coatings (PSPC), enhancing corrosion resistance.

Navigation support systems are greatly improved by various equipment such as the Integrated Bridge



Console, Fleet Monitor (MES-developed ship operation monitoring system) and the latest energy-saving autopilot system. The vessel complies with IMO Noise Code and ILO/MLC, 2006 (Maritime Labor Convention, 2006), so improving the working environment for the ship's crew. The vessel has accommodations for 36 persons in total, including 6 trainees.

### Principal particulars

Length (o.a.):	339.5m
Breadth (mld.):	60.00m
Depth (mld.):	28.50m
DWT/GT:	312,539t/159,793
Main engine:	Mitsui-MAN B&W 7G80ME-C9.5 diesel x 1 unit
Complement:	36
Classification:	NK

## MHI reorganizes shipbuilding business as two wholly-owned companies —Mitsubishi Shipbuilding Co., Ltd. and Mitsubishi Heavy Industries Marine Structure Co., Ltd.—

Mitsubishi Heavy Industries, Ltd. (MHI) established two new wholly-owned companies in conjunction with reorganization of its shipbuilding business on January 1, 2018. Mitsubishi Shipbuilding Co., Ltd. will primarily undertake construction of ships that require intensive outfitting, and Mitsubishi Heavy Industries Marine Structure Co., Ltd. will mainly engage in the manufacture of large ships and marine structures.



Mitsubishi Shipbuilding Co., Ltd. has consolidated the current capabilities of MHI's various shipbuilding

bases (Shimonoseki, Nagasaki, etc.) and function as a business company exclusively dedicated to shipbuilding. Its corporate name was chosen to reflect MHI's long history and traditions in shipbuilding. Applying MHI's prowess in engineering the new company

will grow business in ships that require intensive outfitting: ferries, vessels used by government agencies, etc. It will also make social contributions in areas impacting the environment, in a quest to achieve sustained development.



### MITSUBISHI HEAVY INDUSTRIES MARINE STRUCTURE

Mitsubishi Heavy Industries Marine Structure Co., Ltd. will construct large ships making use of the premises and human resources of the Koyagi Plant of MHI's Nagasaki Shipyard & Machinery Works. The new company will also expand business in units accommodating new fuels and manufac-

ture of marine steel structures.

MHI will work closely with the two new companies, providing its total support toward the development of their business operations.

For outlines of both companies, refer to <http://www.mhi.com/news/story/1712012094.html>

## Award of AIP for LNG fuelled coal carrier by LR

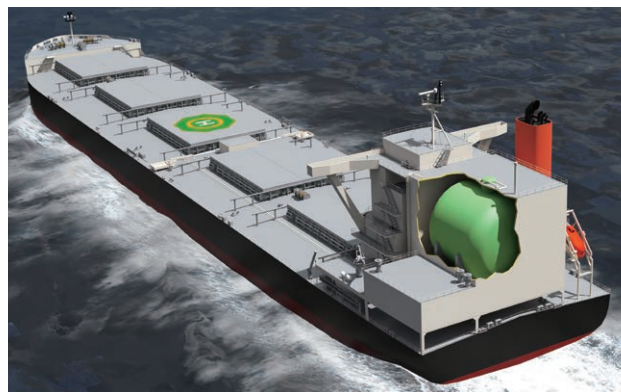
Namura Shipbuilding Co, Ltd has finished the concept design of a 93,000 DWT LNG fuelled coal carrier, which has been jointly developed with Mitsui O.S.K. Lines, Ltd. and Tohoku Electric Power Co., Inc. and obtained AIP\*<sup>1</sup> from Lloyd's Register (LR) on December 6, 2017. The 'natural gas as fuel' basic design was subjected to formal design screening according to key requirements of the IGF Code and LR's classification rules, and risk assessment HAZID\*<sup>2</sup> was performed to satisfy the LR's formal Risk Based Design process. This is the first acquisition of AIP for LNG fuelled vessel in Japan by the joint three companies, shipping company, cargo owner and shipbuilder.

The vessel has the LNG fuel tank located on the stern which allows maintains the conventional hold design without increasing the principal dimensions to accommodate the LNG fuel tank. The LNG fuel tank features the tank cover to protect the LNG tank

from fire and facilitate maintenance work. The Fuel Gas Supply System has been developed with the assistance of Mitsui Engineering and Shipbuilding Co., Ltd. and its subsidiary TGE Marine Gas Engineering GmbH with much experience.

In accordance with stringent international legislation to protect the environment, the International Maritime Organization (IMO) stipulates stepdown emission control from ships i.e. CO<sub>2</sub>, SO<sub>x</sub> and NO<sub>x</sub> which cause global warming, air pollution and acid rain. The vessel can use LNG as fuel so that emissions are much less than with oil fuel in terms of SO<sub>x</sub> as well as NO<sub>x</sub> and CO<sub>2</sub>.

Namura will continue developing further environmental friendly ships



in corporation with shipping companies and cargo owners.

### \*1 AIP (Approval in Principle)

Approval in Principle is an independent assessment of a concept within an agreed framework, confirming that the design is feasible and no significant obstacles exist to prevent the concept from being realized. The AIP is typically carried out at an early stage of a project to confirm its feasibility and expected to develop to detail design.

### \*2 HAZID (Hazard Identification Study)

A component of risk assessments used to identify and mitigate hazards to help to prevent and reduce injury to personnel, damage to or loss of property or the environment through discussions by relevant experts.

## Naikai completes passenger/car carrier, AKEBONO MARU

Naikai Zosen Corporation completed construction of the 2,700GT passenger/car carrier, AKEBONO MARU, for the joint owners of the Japan Railway Construction, Transport and Technology Agency (JRJT) and Uwajima Transportation Co., Ltd. on December 13, 2017.

The carrier is propelled with the twin-engine and twin-propeller system. Safe ship maneuverability when entering and leaving a port can be ensured by two bow thrusters, twin

Schilling rudders with maximum rudder angle of 70 degrees effective at slow speed, and controllable pitch propellers.

The ship hull has a bulbous bow, and the stern is the catamaran-type. This hull form greatly improves propulsion performance and seaworthiness. The fin-stabilizers attached to both sides of the ship mid section alleviate ship rolling under rough sea conditions. Particularly, use of the eco-cap as an energy-saving device, energy-saving fins attached to the Schilling rudders, and stern fins further increase propulsion efficiency, while saving energy.

For convenience of passengers, an elevator

is provided at the starboard side as a barrier-free transferring method, which allows the aged and the disabled to transfer from the car decks to promenade deck No. 1. Vehicles embark through the bow and aft ramp doors as well as inboard rampways and are accommodated on the car decks.

### Principal particulars

L (o.a.) x B x D x d: 121.41m x 16.00m x 10.60m x 4.45m

DWT/GT: 1,398t/2,694

Passenger/cargo capacity

8t trucks: 38 units

Passenger cars: 28 units

Passengers: 546 people

Complement: 14

Main engine: Daihatsu 6DKM-36e diesel x 2 units (2 propellers)

MCO: 3,310kW x 600/215min<sup>-1</sup> x 2

Speed, service: about 20.2kt

Classification: JG (Limited to coastal areas)

Completion: December 13, 2017





## Mitsubishi Heavy Industries Marine Machinery & Equipment and Wartsila to collaborate on improved power and propulsion solution

Mitsubishi Heavy Industries Marine Machinery & Equipment Co., LTD (MHI-MME) and the smart technology group Wartsila have signed a Memorandum of Understanding (MOU) regarding the commercial marketing of a new energy solution for ships which combines innovative technologies from both companies to produce greater power generation capacity and higher propeller propulsion for marine vessels. Integration of MHI-MME's waste heat recovery and energy saving power generation system (WHRS) with Wartsila's operational control technology for shaft generator systems will achieve more energy efficient ship navigation and improved Energy Efficiency Design Index (EEDI).

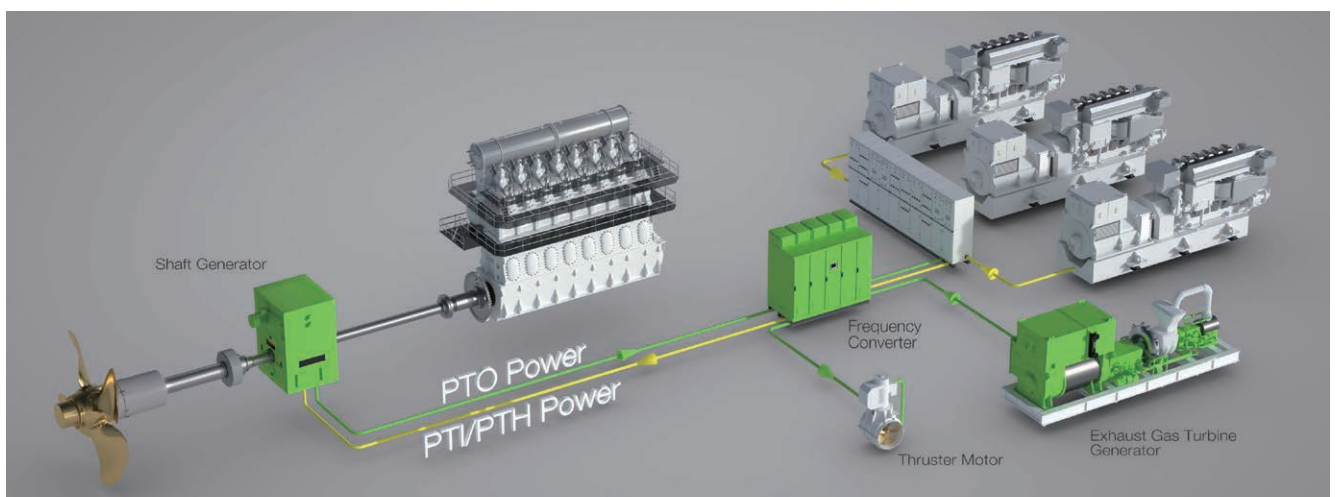
A notable innovation is the combination of a power take off/take in (PTO/PTI) shaft generator system with WHRS to improve the stability of the WHRS. Depending on the load of the main engine and the ship's net-

work, the WHRS sometimes produces electrical energy in excess of that needed by the network. Such energy can be utilised via the PTO/PTI generator to drive the propeller shaft. The surplus energy can be used to assist the ship's drive under full load by direct application to the propeller shaft. The WHRS can be operated in parallel with a diesel generator set under low main engine load. Parallel operation with a shaft generator via PTO operation is also easily implemented.

The patented design connects the WHRS generator into the DC link circuit of the PTO/PTI shaft generator rather than directly into the main circuits. This allows operation of the WHRS at reduced speed to create higher efficiency of the turbine system under part load. This avoids the necessity of speed regulation valves, which cause throttle or bypass losses. MHI-MME has various energy saving technologies which are all adaptable for this new solution. One example is

integration with MHI-MME's power turbine generator which enables supply of electricity across a range from approximately 500 to 2,000 kilowatts (kW), driven by gas extracted from a 2-stroke main engine, via the PTO/PTI generator.

MHI-MME's solutions have previously consisted of waste heat recovery systems and Organic Rankin Cycle (ORC) systems, which are small-scale binary power generation systems that efficiently recover and use extremely low-temperature heat sources. These applications have primarily focused on large container ships. Now, with addition of the latest solution, MHI-MME will offer an even wider array of energy-saving solutions for ships that have conventionally employed shaft generators, to help them comply with the more stringent environmental regulations to go into effect in the near future.



*Configuration image*

### To our readers

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**CORONA WISDOM**

Owner: Kawasaki Kisen Kaisha, Ltd.  
 Builder: Imabari Shipbuilding Co.,  
 Ltd./Shin Kasado Dockyard Co.,  
 Ltd.

Ship type: Bulk carrier

L (o.a.) x B x D: 229.9m x 38.0m x  
 19.90m

DWT/GT: 88,000t/49,900

Main engine: 6S60ME-C8.5 diesel x  
 1 unit

Speed, service: 14.5kt

Classification: NK

Completion: January 19, 2018

**SAGA FREYA**

Owner: Saga Shipholding (Norway)  
 AS

Builder: Oshima Shipbuilding Co.,  
 Ltd.

Hull No.: 10631

Ship type: General cargo carrier

L (o.a.) x B x D x d: 199.9m x 32.26m x  
 19.5m x 13.323m (ext.)

DWT/GT: 55,807t/37,441

Main engine: Diesel United  
 WARTSILA 6RT-flex50D diesel x  
 1 unit

Speed, service: 15.0kt

Registry: Hong Kong

Classification: DNV GL

Completion: October 27, 2017

**SEACLAM**

Owner: Fisher Maritime Company  
 Builder: Sumitomo Heavy Industries  
 Marine & Engineering Co., Ltd.

Hull No.: 1389

Ship type: Tanker

L (p.p.) x B x D: 228.97m x 44.00m x  
 21.8m

DWT/GT: 112,000t/60,200

Main engine: Mitsui MAN B&W  
 6G60ME-C9.2 diesel x 1 unit

Speed, service: about 15.2kt

Classification: LR

Completion: September 12, 2017

**AZALEA**

Owner: AKK Shipping Co., Ltd. S.A.  
 Builder: Kanda Shipbuilding Co., Ltd.  
 Hull No.: 577

Ship type: Fly ash carrier

L (o.a.) x B x D x d: 110.0m x 20.00m x  
 9.85m x 5.80m (ext.)

DWT/GT: 5,727t/5,997

Main engine: 6UEC33LS II diesel x 1  
 unit

Speed, service: 13.0kt

Registry: Panama

Classification: NK

Completion: September 29, 2017

**ARISTARCHOS**

Owner: Dauntless Marine S.A.

Builder: Onomichi Dockyard Co., Ltd.

Hull No.: 742

Ship type: Product tanker

L (o.a.) x B x D x d (ext.): 212.92m x  
 38.00m x 19.50m x 13.80m

DWT/GT: 79,905t/44,389

Main engine: Mitsui MAN B&W  
 6S60ME-C8.5 diesel x 1 unit

Speed, service: 14.7kt

Registry: Nassau, Bahamas

Classification: ABS

Completion: September 14, 2017

**ENSEMBLE**

Owner: MOL Chemical Tankers Pte.  
 Ltd.

Builder: Shin Kurushima Dockyard  
 Co., Ltd.

Hull No.: S-5901

Ship type: Chemical tanker

L (o.a.) x B x D: 172m x 27.4m x  
 16.3m x 10.02m

DWT/GT: 35,058/21,316

Main engine: B&W6S46ME-B8.3 die-  
 sel x 1 unit

Speed, service: 14.00kt

Registry: Panama

Classification: NK

Completion: October 25, 2017

