

## Imabari completes “Eco-Mega” containership, MILLAU BRIDGE, for “K” Line



Imabari Shipbuilding Co., Ltd. completed the first of ten 14,000TEU containerships on March 31 in a series to be built for Kawasaki Kisen Kaisha, Ltd. (“K” Line). The carrier is the biggest containership any Japanese shipping company has ever ordered for newbuilding or any Japanese shipbuilder has ever constructed. This newbuilding project not only reflects the worldwide trend to favor larger and larger containerships, but also is characterized by its “eco-mega containership” concept featuring significant saving in fuel consumption, achieved by mobilizing the most up-to-date in energy efficiency technology. Ahead of the completion of the first vessel of the series, Imabari on March 28 invited interested guests to its Hiroshima Works, where the series of containerships are either under or scheduled for construction, and showed them the near-complete vessel.

The new containership has a number of directly visible features. The most obvious feature is a white cover over its bow. Newly developed to reduce wind pressure resistance, this is called the “Bow Cover.” As the mega-containership is designed to carry containers on deck in a greater number of layers, the top and bottom layers of containers will be subject to heavy wind pressure resistances. The Bow Cover is shaped to direct air flow from the bow upward to reduce the wind resistance. Wind tunnel tests demonstrated a 5% reduction of wind resistance. In the past, the idea was proposed to install a streamlined cover over the bow of a large containership, but involved the problem of a significant increase in hull weight and the sacrifice of container carrying capacity. The Bow Cover was developed in search of a shape that would achieve

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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](mailto:postmaster@jsea.or.jp)

## JMU completes 209,000DWT bulk carrier, FPMC B MAJESTY

Japan Marine United Corporation (JMU) has delivered the FPMC B MAJESTY, a 209,000DWT bulk carrier, at the Ariake shipyard on March 24, 2015. This vessel is a Cape-size bulk carrier, called the “G-Series,” which has succeeded in greatly reducing fuel consumption during actual navigation, and is categorized into Phase 2 of the Energy Efficiency Design Index (EEDI) defined in MARPOL Annex VI.

The vessel can achieve impressive hull performance based on the technologies of the advanced lower resistance hull form, optimized energy saving devices of SSD (Super Stream Duct) and Surf-Bulb (Rudder Fin with Bulb) equipped in front of and behind the propeller, respectively, the unique bow shape, called the “LEADGE BOW,” which reduces the added wave resistance both at laden and ballast conditions, and well-refined accommodation house with low air resistance shape. The high efficiency machinery

plant is equipped with an efficient main engine, MAN B&W 7S65ME-C.

With the above fuel consumption benefit, FPMC B MAJESTY is the most competitive and efficient Cape-size bulk carrier with large deadweight at shallow draft, large hold capacity and large cargo hatch opening, thus allowing high flexibility for

port restrictions.

### Principal particulars

L (o.a.) x B x D:	299.99m x 50.0m x 25.0m
DWT/GT:	209,956t/107,026
Main engine:	MAN B&W 7S65ME-C8.2 diesel x 1 unit
Speed:	14.70kt
Complement:	25
Classification:	ABS/CR



*(“Eco-Mega” containership ..... Continued from Page 1)*

large reduction in wind resistance with minimum size increase while ensuring sufficient strength.

Besides the Bow Cover, energy efficiency technology is incorporated in all parts of the vessel. In the engine room, inverter fans are used. The air supply volumes are optimized under automatic control, with a 50% maximum saving in electric power consumption of the fans. Cooling seawater pumps also use the inverter mechanism, resulting in power saving of 70% at the maximum. “Exhaust Gas Economizers” are used not only for the main engine but also for the four generator engines to reduce boiler fuel consumption. The boilers are equipped with water emulsion fuel devices to achieve more efficient combustion.

The propulsion system features an attachment to the propeller, known as the HVFC, which functions to free the propeller from hub vortex. The rudder is a twisted leading edge rudder, which reduces rotational flows to enhance propulsive efficiency. The hull bottom is coated with low-friction bottom paint. The larger hull size inherently reduces the fuel consumption per TEU. With the increased ship size and fuel saving features, the new 14,000TEU containership is expected to consume about 35% less fuel per TEU than the conventional 8,100TEU vessel at the same speed of 22 knots.

The bigger ship size is also accompanied by major changes in hull structure. The bridge and the accommodation quarters are positioned not immediately above the engine room at the stern but amidships, separately from each other so that an adequate field of vision forward can be secured even when the deck is fully loaded with containers. This arrangement, known as the “Two Islander System,” is a common feature of recently built mega-containerships.

A common worry about huge ships is the hull strength, but according to the designers at Imabari, “utmost attention has been paid to increasing the reliability of structural strength, and our analyses assumed severer conditions than for the usual stowage of containers.” A larger number of hull girders (longitudinal frames) are used, and fatigue analyses supposed a 25-year service, instead of the 20-year durability required by design rules.

After the delivery of the first vessel of the series on March 31, Imabari is scheduled to deliver one vessel per one and a half months or five per half year in the future.

### Principal particulars

Overall length:	365.9 m
Breadth:	51.2 m
Depth:	29.9 m
Deadweight capacity:	about 145,000DWT
Main engine:	MAN B&W 11S90ME-C9.2 diesel x 1 unit



## MHI completes development of “Sayaringo STaGE”

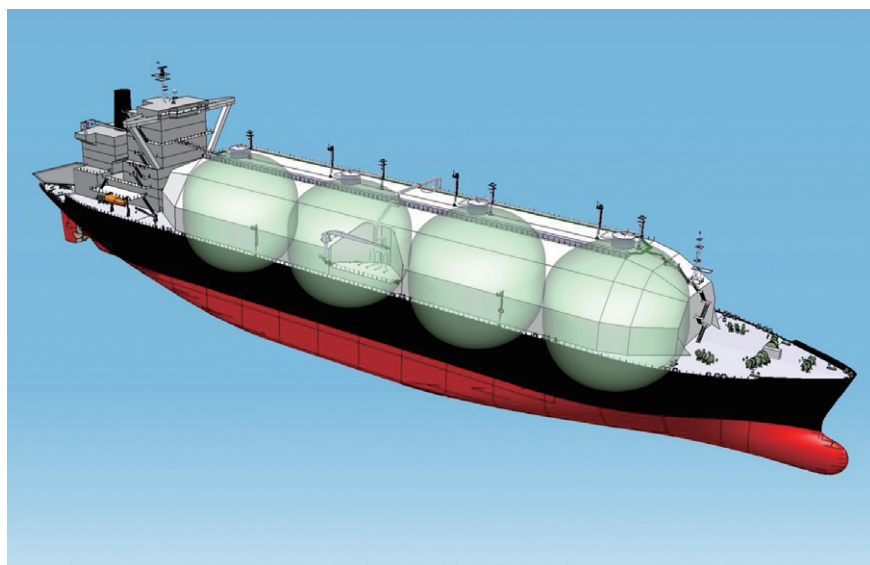
**Next-generation LNG carrier offering superior transport efficiency and fuel performance, engineered for New Panamax requirements**

Mitsubishi Heavy Industries, Ltd. (MHI) has completed development of the “Sayaringo STaGE,” a next-generation LNG (liquefied natural gas) carrier. The Sayaringo STaGE was developed as a successor to the “Sayaendo<sup>1</sup>,” the company’s highly acclaimed LNG carrier evolved from carriers with Moss-type<sup>2</sup> spherical tanks that offer a high level of reliability.

The adoption of apple-shaped tanks (ringo being the Japanese word for “apple”) has enabled a near 16% increase in LNG carrying capacity without changing the ship’s width, while incorporation of a hybrid propulsion system has boosted fuel efficiency by more than 20% compared with the Sayaendo (and more than 40% compared with earlier carriers). Based on the Sayaringo STaGE’s capacity for transporting North American shale gas safely and efficiently, MHI plans to undertake extensive business activities promoting the new vessel as a strategic product among its LNG carrier offerings.

Whereas the Sayaendo has a continuous cover over spherical tanks, the Sayaringo STaGE has apple-like tanks with the upper half bulging more than the lower half. The new apple-shaped tanks are an improved version of the high-reliability Moss-type tanks, and have been adopted on the Sayaringo STaGE as part of MHI’s initiative to develop a vessel in the New Panamax<sup>3</sup> category, i.e. capable of passing through the newly expanding Panama Canal, which is expected to go into service early in 2016. The new structural configuration succeeds in efficiently increasing LNG carrying capacity.

STaGE, an acronym deriving from



“Steam Turbine and Gas Engines,” is a hybrid propulsion system combining a steam turbine and engines fuelled by gas. The components of the Sayaringo STaGE system are the “Ultra Steam Turbine plant” (UST), a highly efficient reheating steam type marine turbine developed independently by MHI, a dual-fuel diesel engine capable of operating on both gas and oil, and an electric propulsion motor. Plant efficiency has been significantly improved through the UST’s effective use of the engine’s waste heat, resulting in a propulsion system enabling high-efficiency navigation throughout a full range of speeds.

The basic design of the Sayaringo STaGE has now been completed, with the LOA (length overall) set at 297.5m, width at 48.94m, depth at 27.0 and draft at 11.5m. Four apple-shaped tanks are featured. The developed design provides 180,000 cubic meters in total LNG tank capacity, but capacity can be set in accordance with the customer’s transport needs.

Since MHI developed the Sayaendo in 2011, orders have been steady, commencing with the first order for two vessels. To date a total of eight vessels have been ordered, including one ordered through MI LNG Company, Limited, a joint venture with Imabari Shipbuilding Co., Ltd. Now, with the

*“Sayaringo STaGE” a next-generation LNG carrier*

Sayaringo STaGE as a successor ship to the Sayaendo offering increased transport capacity and greater fuel performance, MHI aims to conduct brisk marketing activities for its next-generation LNG carriers delivering superlative environmental performance in its quest to make a robust contribution to the global LNG transport industry.

Note:

- 1 “Sayaendo” is named after the peapod-shaped continuous steel cover over its spherical aluminum tanks. Integrated with the ship’s hull, this innovative structure was developed by MHI with technical support from Aker Arctic Technology Inc. of Finland.
- 2 Moss-type LNG carriers use independent spherical cargo tanks to transport LNG. The spherical tanks are supported by a cylindrical skirt integrated with the hull and covered with a hemispherical steel cover attached to the main deck.
- 3 New Panamax indicates the maximum size of ships navigable through the newly expanding Panama Canal. Maximum dimensions are 366m LOA, 49m width, and 15.2m tropical freshwater (TFW) draft.

## MES delivers 66,000DWT bulker, AFRICAN BATELEUR

Mitsui Engineering & Shipbuilding Co., Ltd. (MES) completed and delivered the 66,000DWT type bulk carrier, M.V. AFRICAN BATELEUR (HN: 1879), at its Tamano Works on March 13, 2015 to Lepta Shipping Co., Ltd., Liberia.

This is the seventh ship of our "wide beam shallow draft vessel" called "neo66BC," the new generation ship of MES line up "neo series."

### Special Features

1. The vessel has five cargo holds and four cranes for handling cargo and keeps the superior usability of "Mitsui 56."
2. The ship is designed to have enough deadweight more than 66,000 metric tons and capacity more than 82,800 cubic meters for loading various cargos like coal, ore, grain, as well as lengthy/heavy cargo such as steel pipe and hot coil.
3. Fuel oil consumption is less than that of a conventional Supramax bulk carrier despite its enlargement.
4. As a result of research work of interviews with ship owners and operators, investigations on ports all over the world and present trade patterns, wide beam (over-Panamax) and shallow draft make it possible to have wide flexibility for operations and high transport efficiency.
5. The new hull form makes it possible to keep good performance in rough sea conditions as well as calm sea conditions and shows better maneuverability.
6. The size of hatch opening is the largest for this type of vessel in terms of both length and width.
7. Main engine, MITSUI-MAN B&W Diesel Engine 7S50ME-B9.3, complying with MARPOL NO<sub>x</sub> restriction (Tier-II) for exhaust gas emissions, gives superior fuel oil consumption over wide range of output.
8. Considering strengthened restriction for SO<sub>x</sub>, the ship has low



sulfur fuel oil tanks, which are designed for operation in ECA (Emission Control Areas).

9. The vessel is designed in accordance with IACS Common Structural Rules.

### Principal particulars

L (o.a.) x B x D:	199.99m x 36.00m x 18.45m
DWT/GT:	66,643t/38,203
Main engine:	Mitsui-MAN B&W 7S50ME-B9.3 diesel x 1 unit
MCO:	8,470kW
Speed, service:	about 14.5kt
Complement:	25
Classification:	NK
Registry:	Panama
Delivery:	March 13, 2015

## Namura completes 99,000DWT type bulker, SHIN YAHAGI MARU

Namura Shipbuilding Co., Ltd. delivered SHIN YAHAGI MARU, a 99,323DWT bulk carrier, to Erica Navigation S.A. at its Imari Shipyard & Works on January 22, 2015. This is the first vessel of the series having the most suitable principal dimensions for Hekinan Thermal Power Plant of Chubu Electric Power Co., Inc. The features of this vessel are as follows.

Wide beam and shallow draft design achieve more efficient cargo loading at Hekinan compared with the conventional type. This type of vessel is thus so called "Hekinan-max."

Improved propulsion performance and fuel saving can be attained with adoption of the Namura flow Control Fin (NCF) and Rudder-fin (R-Fin) developed by Namura and an electronically controlled main engine.

For environmental safety, the vessel is equipped with a main engine and generator engine complied with the Annex VI of MARPOL 73/78 regulations to reduce NO<sub>x</sub> emissions, air seal type stern tube oil sealing device to reduce the risk of oil leakage, and adopts the tank arrangement for low sulfur fuel oils to reduce SO<sub>x</sub> emissions.

The centralized fresh water cooling system is adopted for the machinery space equipment to ease maintenance.

The ballast water treatment

system to control the quality of ballast water is equipped for protection of marine environment prior to coming into force of the International Convention for the Control and Management of Ships' Ballast Water and Sediments.

The IMO PSPC (Performance Standard for Protective Coatings) - WBT is applied for corrosion protection of water ballast tank to increase safety of the vessel.

### Principal particulars

L (o.a.) x B (mld.) x D (mld.) x d (mld.):	249.97m x 43.00m x 18.70m x 12.60m
DWT/GT:	99,323t/59,842
Main engine:	MAN B&W 6S60ME-C8.2 diesel x 1 unit
MCO:	10,450kW x 94.5 min <sup>-1</sup>
Speed, service:	About 14.0kt
Complement:	25
Classification:	NK
Registry:	Republic of Liberia





## New JSEA President appointed

The 110th Annual General Meeting of the Japan Ship Exporters' Association (JSEA) selected 27 directors and two auditors in Tokyo on May 27, 2015. Subsequently, the 597th Directors' Meeting selected Mr. Kazuo Tsukuda, Senior Executive Adviser, Mitsubishi Heavy Industries, Ltd., as the new JSEA President. Mr. Tsukuda's tenure will last the usual two years. Mr. Tsukuda will complete a two-year term as Chairman of the Shipbuilders' Association of Japan (SAJ) on June 16, 2015, having held the position since 2013.



Mr. K. Tsukuda

At the same meeting, two Executive Vice Presidents of the JSEA were appointed: Mr. Kazuo Ohmori, Chairman of the Board, Sumitomo Corporation (reappointment) and Mr. Yukito Higaki, President, Imabari Shipbuilding Co., Ltd. (reappointment). Standing officers of JSEA include Mr. Satoshi Ito, Senior Managing Director (reappointment) and Mr. Hidetsugu Ueki, Managing Director and Secretary General.

## Oshima completes OS-MAX60, DACC TIRRENO

### — World's largest Handymax bulker —

Oshima Shipbuilding Co., Ltd. delivered the 60,550DWT type bulk carrier, one of the vessels of the OS-MAX60 series, to Dacc Maritime Limited on March 26, 2015. The OS-MAX60 series was developed by Oshima and has the world's largest deadweight of the Handymax bulk carrier type with shallow draft of 12.82m.

In spite of the large deadweight, the vessel achieves reduction of fuel consumption by a new optimized hull form as well as increased propulsive efficiency by adopting a set of the Advanced Flipper-Fins, Rudder bulb, low friction paint, and electronically controlled main engine. The Seaworthy Bow with excellent seaworthiness is adopted for improving speed performance under rough weather conditions, which can achieve about 5% power saving compared with the ordinary bulbous bow.

The vessel adopts environmental protections such as complying with the IMO regulation of fuel oil tank protection and adoption of ballast water treatment system. Additionally, the vessel is assigned class the ABS Environmental Protection Notation, ENVIRO for new vessels.



For effective

## Sasaki delivers 11,000CBM LPG carrier to Panamanian owner

Sasaki Shipbuilding Co., Ltd. has delivered the EPIC SICILY (HN: 687), a 11,000CBM-type LPG carrier with pressurized containment tank system, to its owner, Southern Pacific Holding Corporation of Panama. The carrier has two pressurized cargo tanks, with total loading capacity of 11,026m<sup>3</sup>. This is the largest capacity of this type so far built in Japan.

For alleviation of the burden on the ship's crew, the carrier is designed with in-depth vibration analyses at the early design stage to suppress vibration as much as possible. The poop deck is the experimental double-shell type. The main engine is an electronically controlled diesel engine capable of using low sulfur fuel (MGO) with an MGO chiller, and a ballast water treatment system is installed for conservation of the marine ecosystem.



To cope with the recent increased demand for marine transport of LPG, Sasaki has received many inquiries for construction of such LPG carriers from shipowners in Europe, Singapore, and Japan. The company has an order backlog for seven more LPG carriers.

### Principal particulars

Ship type:	Liquefied gas carrier (ocean going)
L (o.a.) x L (b.p.) x B x D x d:	119.92m x 114.00m x 20.60m x 9.60m x 6.80m
DWT/GT:	8,130t/7,951
Cargo loading capacity:	11,026m <sup>3</sup>
Main engine:	Hitachi MAN B&W 6S35ME-B9.3C diesel x 1 unit
MCO:	4,170kW
Speed, trial:	15.43kt
Classification:	BV
Delivery:	February 20, 2015

cargo loading/unloading, the vessel has wide hatch openings for the five cargo holds and high performance jib cranes with a hoisting capacity of 30 tons and hoisting speed of 19m/sec.

### Principal particulars

L (o.a.) x L (b.p.) x B x D x d:	199.98m x 196.00m x 32.26m x 18.33m x 12.82m
DWT/GT:	60,550t/34,049
Loading capacity:	76,518m <sup>3</sup>
Main engine:	Kawasaki MAN B&W 6S50ME-B9.3 diesel x 1 unit
MCR:	7,260kW at 99.0rpm
Speed, service:	14.3kt
Classification:	ABS
Completion:	March 26, 2015

**LAKE GENEVA**

Owner: Pental Maritime Inc.  
 Builder: Imabari Shipbuilding Co., Ltd.  
 Ship type: Pure car carrier  
 L (o.a.) x B x D: 199.9m x 32.26m x 21.31m  
 DWT/GT: 13,753t/59,516  
 Main engine: 7UEC60LSE-Eco-A2 diesel x 1 unit  
 Speed, service: 19.85kt  
 Classification: NK  
 Completion: January 27, 2015

**PACIFIC GOLDFINCH**

Owner: Swire Pacific Offshore Operations (Pte.) Ltd.  
 Builder: Japan Marine United Corporation  
 Hull No.: 0083  
 Ship type: Platform supply vessel  
 L (o.a.) x B x D: 84.65m x 18.00m x 7.60m  
 DWT/GT: 4,054t/3,585  
 Main engine: Yanmar 6EY26LW diesel x 2 units (Diesel Electric)  
 Speed, service: 12.00kt  
 Classification: DNV-GL  
 Registry: Singapore  
 Completion: March 11, 2015

**DESERT OSPREY**

Owner: Lazio Shipping and Investment Limited  
 Builder: Mitsui Engineering & Shipbuilding Co., Ltd.  
 Ship type: Bulk carrier (neo 56BC)  
 Hull No.: 1862  
 L (o.a.) x B x D: 189.99m x 32.25m x 18.10m  
 DWT/GT: 55,837t/31,848  
 Main engine: Mitsui-MAN B&W 6S50ME-B9.3 diesel x 1 unit  
 Speed, service: about 14.4kt  
 Complement: 24  
 Classification: ABS  
 Registry: Marshall Islands  
 Delivery: March 31, 2015

**CEPHEUS OCEAN**

Owner: Diamond Star Shipping Pte. Ltd.  
 Builder: Sanoyas Shipbuilding Corporation  
 Hull No.: 1332  
 L (o.a.) x L (b.p.) x B x D x d: 229.00m x 225.80m x 32.24m x 20.20m x 14.668m  
 DWT/GT: 82,072t/43,318  
 Cargo hold capacity: 96,597m<sup>3</sup> (grain)  
 Main engine: MAN B&W 6S60ME-C8.2 diesel x 1 unit  
 MCO: 8,740kW  
 Speed, service: About 14.5kt  
 Complement: 25  
 Classification: ABS  
 Registry: Singapore  
 Delivery: January 15, 2015

**YARRA**

Owner: Lucretia Shipping, S.A.  
 Builder: Sasebo Heavy Industries Co., Ltd.  
 Hull No.: 825  
 Ship type: Bulk carrier  
 L (o.a.) x B x D x d (ext.): 225m x 32.20m x 20.00m x 14.429m  
 DWT/GT: 78,184t/41,650  
 Main engine: MAN B&W 6S60ME-C8.2 diesel x 1 unit  
 Speed, service: 14.4kt  
 Classification: KR  
 Registry: Republic of Liberia  
 Completion: May 13, 2015

**KEY OPUS**

Builder: Tsuneishi Shipbuilding Co., Ltd.  
 Hull No.: 1507  
 Ship type: 81,600MT type bulk carrier  
 L (o.a.) x B x D x d (ext.): 229m x 32.26m x 20.00m x 14.429m  
 DWT/GT: 81,600t/42,999  
 Main engine: MAN B&W 6S60ME-C8.1 diesel x 1 unit  
 Speed, service: 14.5kt  
 Classification: NK  
 Registry: Panama  
 Completion: March 17, 2015

