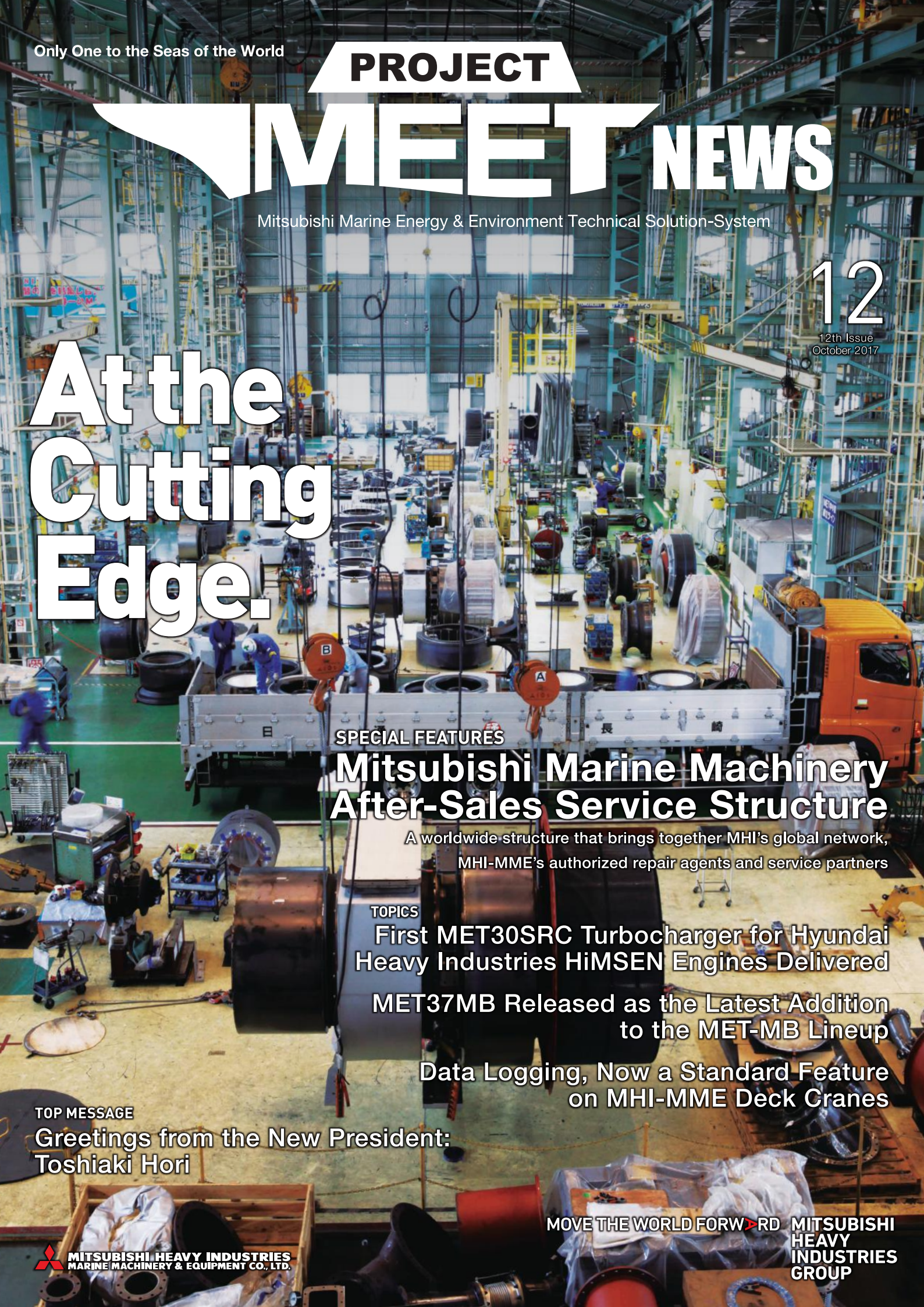


Only One to the Seas of the World

PROJECT MEET NEWS

Mitsubishi Marine Energy & Environment Technical Solution-System

12
12th Issue
October 2017

At the Cutting Edge.

SPECIAL FEATURES

Mitsubishi Marine Machinery After-Sales Service Structure

A worldwide structure that brings together MHI's global network, MHI-MME's authorized repair agents and service partners

TOPICS

First MET30SRC Turbocharger for Hyundai Heavy Industries HiMSEN Engines Delivered

MET37MB Released as the Latest Addition to the MET-MB Lineup

Data Logging, Now a Standard Feature on MHI-MME Deck Cranes

TOP MESSAGE

Greetings from the New President: Toshiaki Hori

MITSUBISHI HEAVY INDUSTRIES
MARINE MACHINERY & EQUIPMENT CO., LTD.

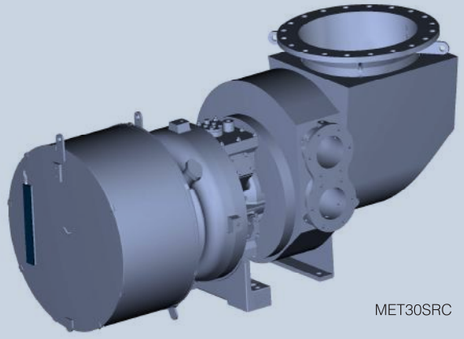
MOVE THE WORLD FORWARD MITSUBISHI HEAVY INDUSTRIES GROUP

First MET30SRC Turbocharger on Hyundai Heavy Industries(HHI) HiMSEN Engines

MHI-MME received an order from HHI for MET30SRC radial-type turbochargers to be mounted on HHI's HiMSEN 6H32/40 medium-speed four-stroke engines (2,704 kW), and already completed delivery of the first turbochargers. Substantial effort were made for the successful delivery of the very first MHI-MME radial turbochargers to be mounted on HiMSEN engine.

HiMSEN engines mounted with the MET30SRC will be installed as generator engines on four 3,300TEU containerships (with an option for four more vessels) being ordered by the French owner. Four of these engines will be installed per vessel.

MHI-MME's MET-SRC turbochargers have been earned high marks as a series designed primarily for four-stroke engines. It covers a wide range of engine output, from 400 kW to 4,400 kW. Technology that was cultivated through experience in axial-type turbochargers for two-stroke engines was utilized to achieve high efficiency and high durability in addition to ease of maintenance. Currently, the MET-SRC series is primarily manufactured for Japanese four-stroke engine manufacturers. Going forward, MHI-MME will proactively expand overseas sale of the MET-SRC series.



MET30SRC

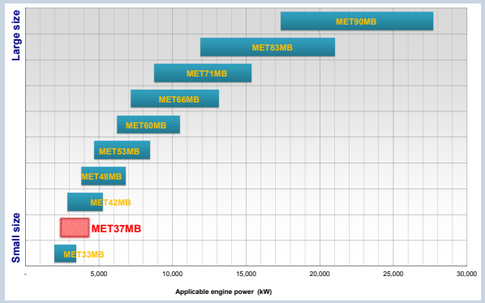
NEW LINEUP MET37MB LAUNCHED

MET37MB Released as the Latest Addition to the MET-MB Lineup

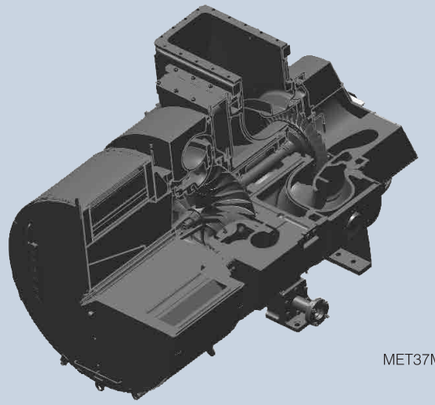
MHI-MME has been offering nine types of turbochargers in the MET-MB series lineup. From the MET33MB, for smaller engines, to the MET90MB, for large engines, the series was developed as axial-type turbochargers for use with main engines of various outputs.

MHI-MME has now developed the MET37MB turbocharger as a new addition to the MET-MB lineup. This turbocharger is intended for engines with outputs of between 2,500 kW and 4,300 kW, falling between the MET33MB and MET42MB turbochargers in terms of the air flow covered. The MET37MB will enable even more detailed response to engine needs.

The first MET37MB turbocharger will be installed on China Shipbuilding Industry Corporation Diesel Engine Co.,Ltd. (CSE) made 6UEC33LSE-C2 engine which was developed by Japan Engine Corporation. The turbocharger is already under manufacturing by MHI-MME and is scheduled for delivery in October, 2017. MET37MB is also expected to installed on MAN Diesel & Turbo SE (MDT) and Winterthur Gas & Diesel Ltd. (WinGD) two-stroke engines, enabling us to respond to the needs of an even greater variety of engines.



Diesel engine output range covered by the MET-MB Series



MET37MB

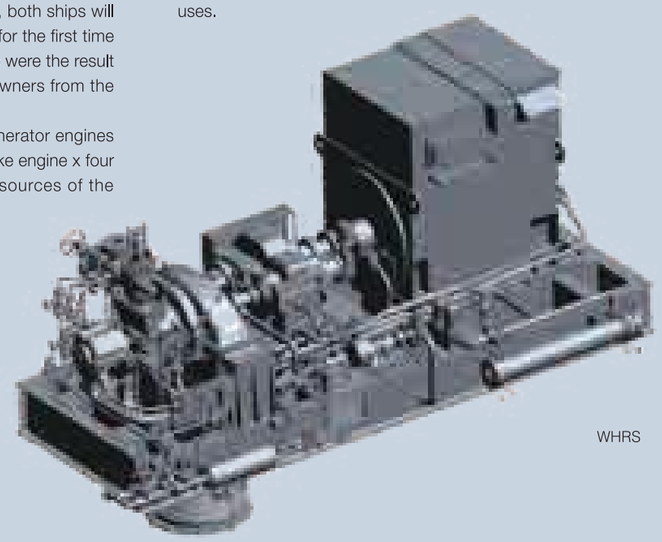
WHRS Orders Received for Four-Stroke Dual-Fuel Generator Engines of a Cutter Suction Dredger and Offshore Work Vessel

MHI-MME received an order for a Waste Heat Recovery System (WHRS) to be installed on one of the world's largest cutter suction dredgers, scheduled to be built for a Belgium's shipping company. We also received a WHRS order for an offshore work vessel. Both ships are scheduled for delivery in 2019.

Under the concept of environmental friendliness, both ships will be LNG-powered, and a WHRS will be adopted for the first time on a dredger and an offshore work vessel. These were the result of our promotion of WHRS technology to shipowners from the early stages of ship design development.

The two ships will have four-stroke dual-fuel generator engines for marine application (Wartsila 9L46DF four-stroke engine x four units, for a total output of 44 MW) as power sources of the motor for driving the propeller as well as the dredging or offshore operations. The waste heat of the engines will be used to generate 1,900 kW and 1,600 kW of electricity, respectively. A WHRS model with a simple structure and an extensive track record was selected for the ships in consideration of the fact that this will be the first time that WHRS will be used on a dredger or an offshore work vessel. In addition to supplying the WHRS equipment, MHI-MME will also provide dynamic simulators for monitoring the connection with major equipment.

In recent years, our WHRSs were primarily installed in ultra-large containerships. These recent orders mark a significant step forward in the application of WHRSs to new vessel types and uses.



WHRS

BACK TO THE ORIGINAL CONDITION

Refreshed boilers and economizers as same as ones at new building

MHI-MME carried out life extention work on the main boilers installed on the 20-year-old LNG tanker, S.S.AMAN SENDAI (Shipowner: MISC Berhad), from May through October this year. We replaced the superheater, economizer and steam generation tubes, which had thinned over the years. Also, the desuperheaters and control desuperheaters were renewed due to the possibility of degradation with age. The completed work will contribute to the long-term safe operation of the ship going forward.

During her dry-docking, we also exchanged the burners into that which can burn both low sulfur marine gas oil (LSMGO) and ultra-low sulfur heavy fuel oil (ULSHFO). During her next dry docking, we will install additional piping for LSMGO and modify control system, making the ship compliant with SOx global cap from 2020. This will enable the S.S. AMAN SENDAI to navigate all areas.

Superheater tube replacement work

Economizer tube replacement work

Propellers Manufactured by CZZH of China Used in Retrofit for NGSCO

In May this year, we received an order the four retrofitting propellers for LNG carriers from the National Gas Shipping Company Ltd. (NGSCO) of Abu Dhabi. The propellers were manufactured by Changzhou Zhonghai Marine Propeller Co., Ltd. (CZZH), a partner with whom we tied a license agreement in 2014.
NGSCO needed to reduce the fuel consumption of their LNG carries. We proposed a highly-efficient propeller of a new design (MAP Mark-W). NGSCO decided to adopt the propeller after about a year of deliberations and review. Work to retrofit the new propeller will take place sequentially this year during autumn docking. Two representatives from NGSCO visited China between July 18 and 19 to attend inspection of the first completed propeller.
The guests from NGSCO toured the CZZH factory, and we received high praise from them in regard to CZZH General Manager Jang Jun Hong and staff, the quality control framework, partnership with MHI-MME, and our retrofit proposal.
This propeller brought the number of propeller for retrofitting to 53 since MHI-MME began delivering such retrofitting propellers in 2013. We also help customer's maritime energy-saving and environmental conservation needs.

Yoowon Industries Ltd. of South Korea Celebrates 40th Anniversary

MHI-MME developed its first steering gear in 1935 and has been carrying out the manufacture and sale of steering gears, inclusive of licensed-manufacturing, in the major shipbuilding markets of Japan, South Korea and China.
Yoowon Industries, located in Busan, South Korea, is a company that designs, manufactures and sells marine machinery, such as steering gears, deck gear and Oil filters. They are installed on commercial vessels and naval vessels. Yoowon Industries was founded in February 1977 and celebrated its 40th anniversary this year.
In August 1993, MHI-MME tied a license agreement with Yoowon Industries for Rapson-slide steering gears. The two companies have since been enjoying a long, friendly partnership of 24 years. Yoowon Industries primarily carries out its steering gear sales activities in South Korea, China and Taiwan. They handle between 150 and 200 orders each year for steering gears, and they have achieved a cumulative total of about 3,000 steering gears to date. The company is characterized by reliable quality, backed by many years of experience. Another characteristic is their ability to respond coherently, irrespective of the size of the steering gear (torque ranging from 225 kN-m to 11,307 kN-m). Many of Yoowon Industry-made steering gears have been installed in large, 20,600 TEU-class container ships.
When the company was first founded, it started by manufacturing small steering gears with a torque of 0.98 kN-m. As mentioned above, it has since grown to manufacture some of the world's largest-size steering gears.

In 2006, Yoowon Industries began the manufacture and sale of rotary vane steering gears, developed through original technology. It is used on bulk carriers and other vessels.
MHI-MME will continue to join hands with Yoowon Industries while utilizing the cooperative relationship built over many years in the alliance, and the knowledge gained from each market. We will continue to offer the technology and after-sales services that meet the various needs of our customers.

Data Logging System, Adoption of New Technology for Deck Crane

Data logging system is adopted as standard for Mitsubishi Deck Cranes shipped after November 2016. Programmable logic controller (PLC) is adopted in place of conventional printed circuit board, achieving higher functionality of indicators on control panel, and with SD memory card, operation data (running hours, activation of limits, etc.) can be recorded.
By adding extra sensors (option), oil pressure and operation speed also can be measured and recorded, which enables vessel's crew to check performance of hydraulic component periodically, and at the time of trouble, it helps vessel's crew to solve the problem swiftly, with better understanding of the condition of components.
Trough adoption of cutting-edge technology and with our enhancing support, we will contribute to safe and stable operation of deck cranes.

・Electric motor start/stop ・Operation mode ・Steering
・Limit actuation ・Hours of electric motor operation
・Hours of operation according to movement

Options
・Hydraulic pressure of hoisting circuit
・Hydraulic pressure of elevation and rotary circuits
・Hoisting speed ・Elevation speed ・Rotation speed

Accurate grasp of status | Swift identification of cause ▶ Swift arrangements and recovery
Reduction of shipowner losses

Enhancement of asset value (Increased functionality)
Reduction of lifecycle costs
Improved reliability
Crew member support Reduction of inspection costs


Pressure pickup


Proximity switch for measuring speed

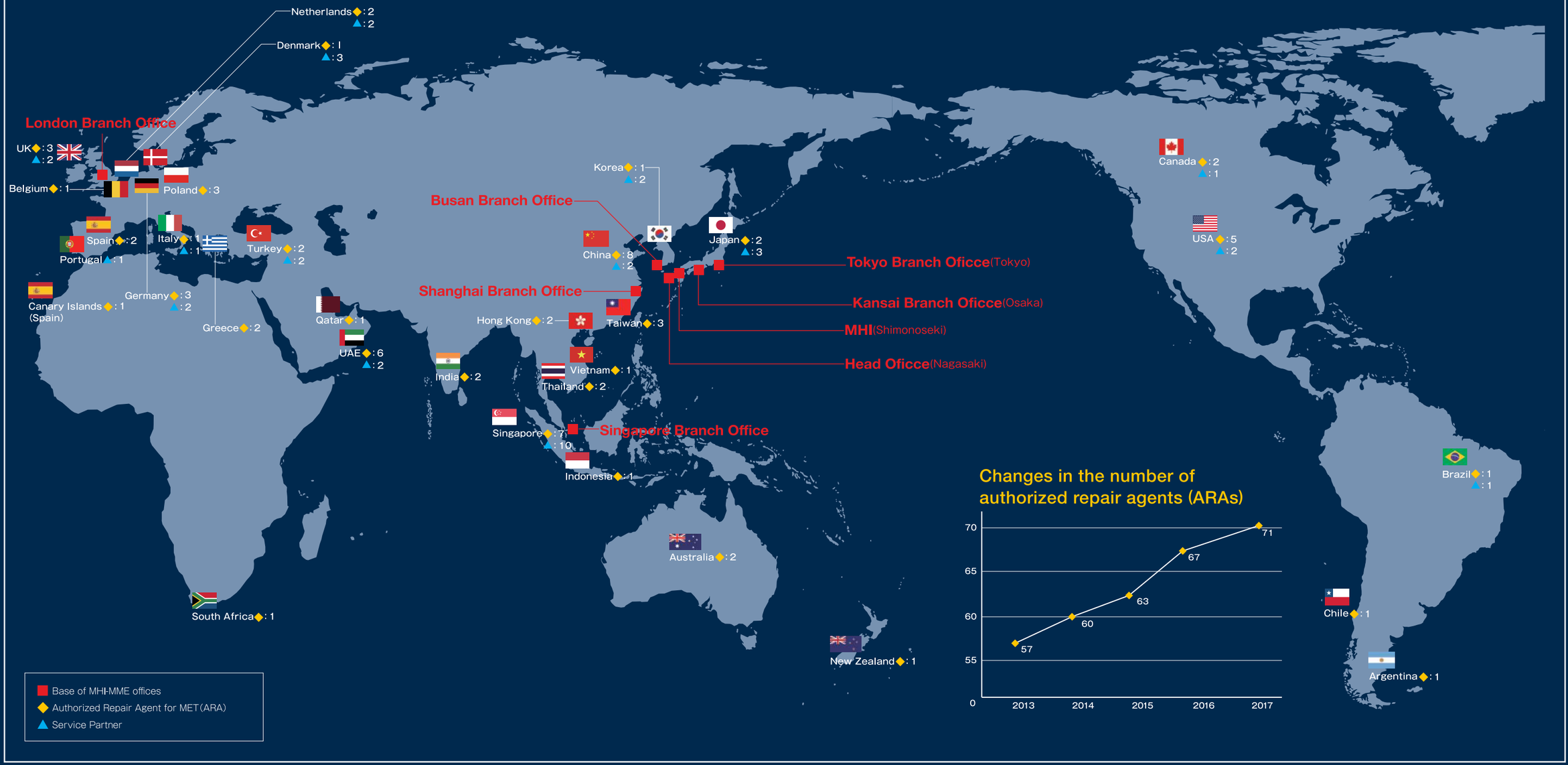
*Various after-sales service menus have been developed. Please inquire at an after-sales services contact point.

Jiangsu Masada of China Granted License for the Manufacture and Sale of Hose Handling Cranes and 45T Slim Deck Cranes

Mitsubishi Heavy Industries Machinery Systems, Ltd. has granted Jiangsu Masada Heavy Industries Co., Ltd. a license for the manufacture and sale of hose handling cranes and 45T slim deck cranes. Three series of hose handling cranes, used primarily on medium range or larger tankers, are being licensed to Jiangsu Masada: 10T, 15T and 20T. Meanwhile, the 45T slim deck cranes are mainly installed on feeder container ships. They are made more compact than ordinary deck cranes to allow for greater space and loading of larger numbers of containers. The granting of this license is the latest in MHI group licenses granted to Jiangsu Masada, following deck cranes in 2008, and deck machinery and steering gears in 2012. We will respond to the diverse needs of customers in the Chinese market through an even more extensive product lineup.

Mitsubishi Marine Machinery After-Sales Service Structure

MHI-MME's after-sales services are provided through an extensive worldwide network comprising the Mitsubishi Heavy Industries Group's global network, authorized repair agents (ARA) and service partners. It is a reliable structure through which customers can receive swift and appropriate servicing throughout the world. Going forward, we will continue strengthening and expanding our global after-sales service network through collaboration with ARA and service partners.
MHI-MME employees are stationed in major overseas bases (London, Singapore, Busan and Shanghai) to serve as contact points for customers in various locations, provide after-sales services, and technical support for our ARA. For details on our after-sales services bases, please see the After-Sales Services page on our website at the following URL: https://www.mhi-mme.com/services/index.html.



Changes in the number of authorized repair agents (ARAs)

Message
from the President & CEO

My name is Toshiaki Hori. I was appointed as new president to succeed Mr. Soma in the general meeting of shareholders held on June 23, 2017.

When the engine business was split off on April 1, we changed our company name from Mitsubishi Heavy Industries Marine Machinery & Engine to Mitsubishi Heavy Industries Marine Machinery & Equipment (MHI-MME). We have taken a fresh start as a manufacturer located in Nagasaki that specializes in marine machinery. With the change of the company president, we also changed how we group the products that we handle. Effective July 1, we have reorganized the business divisions into the Marine Machinery Division (which will handle marine boilers and turbines as well as auxiliary marine equipment) and the Turbocharger Division (which will specialize in MET turbochargers). The two divisions will have their own sales, design and service units. Through an operational framework that will strengthen strategic and agile execution of business, we will aim for even closer relationships with our customers in addition to speedier response.

Our marine machinery and Waste Heat Recovery Systems (WHRS), with their rich track record, will be the backbone of MHI-MME's marine machinery business. To this will be added new energy-conservation and environmentally-friendly solutions proposals. As Mitsubishi Heavy Industries' arm, inclusive of overseas licensees, for marine machinery and equipment, we will aim to offer peace of mind to shipping lines through reliable, highly competitive products and excellent services.

In regard to the turbocharger business, MHI-MME and two other major brands continue to dominate and split global shares of the two-stroke marine engine market amongst us. Going forward, we will work to continue to secure and expand shares through the launch of attractive new products. At the same time, we will strengthen our business in turbochargers for four-stroke main and auxiliary engines for marine application, and furthermore, launch a challenge to advance into the field of turbochargers for land-use engines.

We will carry on the provision of easy-to-maintain designs and structures, which are thought of highly by our customers, and supply highly efficient, highly reliable products. In addition to this, MHI-MME will further reinforce its after-sales service structure and pursue the provision of peace of mind to shipowners and ship management companies.

Our customers in the maritime shipping and shipbuilding industries are operating in harsh business environments. Amid such circumstances, they are fighting for survival by developing measures for recovering profitability, such as through mergers and alliances with competitors and restructuring.

MHI-MME, too, will aim for survival by responding swiftly and flexibly to changes in our customers and the market. We strongly reaffirm that our only path to survival is to continue being a company that is needed and trusted by customers through the provision of high quality products and services. With this conviction, we will meet the harsh business environment head-on and without hesitation to the changes taking place around us and within our company.

President & CEO
Toshiaki Hori

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