

Message

from the President and CEO

Mitsubishi Heavy Industries Marine Machinery & Equipment Co., Ltd. (MHI-MME) reached its fifth anniversary on October 1, thanks to our customers and partners.

Our history can be traced back to Nagasaki, the location of our head office, and the Nagasaki Forge that the Tokugawa Shogunate began building in 1857, near the end of the Edo Period. Later, in 1884, Nagasaki Shipyard & Machinery Works took charge of the business. Our history now spans more than 130 years, and in 2015, the UNESCO World Heritage Committee registered Mitsubishi's giant cantilever crane and other assets as World Cultural Heritages on the list of Sites of Japan's Meiji Industrial Revolution.

The first marine boiler--Mitsubishi's first product--was manufactured in 1885. Since then, the company has manufactured marine turbines, turbochargers, propellers, fin stabilizers, steering gears, and other products, one after another. In 2013, Mitsubishi Heavy Industries Marine Machinery & Engine Co., Ltd. was launched to take over the development, design, sales, after-sales service, and licensing business for the marine machinery and engines produced by Mitsubishi Heavy Industries for more than a century. Then in April 2017, the 2-stroke low-speed engine business was broken off and the name of the company was changed to Mitsubishi Heavy Industries Marine Machinery & Equipment Co., Ltd.

In addition, when the company president changed in July 2017, the company was reorganized to have two business divisions: the Marine Machinery Division and the Turbocharger Division. The Marine Machinery Division handles marine boilers and turbines and auxiliary marine machinery, and the Turbocharger Division specializes in the MET turbochargers. Each division has sales, design, and service functions, thereby strengthening the business execution structure to be strategic and dynamic.

Since the company's founding, we have operated under our vision that "We will aim to become the top marine machinery manufacturer in the world, with energy saving and environmental technologies at the core, and while sharing our knowledge with Mitsubishi Heavy Industries proper. We will contribute to the realization of an even better life for peoples around the globe by providing safe navigation of the seas of the world."

Our motto is to continue being a company that is needed and trusted by our customers, by providing highly reliable products and services.

Our code of conduct is for every employee in the company to work with a shared awareness to provide prompt response from the other person's perspective, sincerely approach customers' requests, and provide appropriate and diverse solutions. We strive to be a company and people our customers feel close to.

This summer, Japan has faced continued severe heat, devastation from torrential rainfall, and abnormal typhoon activity. The topics of weather and natural disaster persist day after day. It seems clear that earth's environment is changing.

As environmental regulations are tightened, we prepare diverse environmentally friendly and energy-saving solutions and continue development and verification so that we can make proposals that meet the needs of our customers and protect the environment in accordance with our corporate vision.

We are also working to improve further the performance and reliability of individual products as well as reduce lifecycle costs and improve other aspects of after-sales service.

In the future, Mitsubishi Heavy Industries Marine Machinery & Equipment will continue advancing toward our 10th anniversary, and then our 100th anniversary, with the motto of being a company that is needed and trusted by our customers, by providing high-quality products and services.



President & CEO
Toshiaki Hori

PROJECT MEET NEWS

Mitsubishi Marine Energy & Environment Technical Solution-System

14
14th Issue
October 2018

TOPICS

Increase of Marine Boilers Modification responded to the 2020 SOx Global Regulation

New Radial Turbocharger MET-ER Series Axial Turbocharger MET-MBII Series

For Safer Operation

-Proposal to store Backup Overhaul Kits-

2018 Exhibition

25th Anniversary of Licensing Yoowon Industries Ltd.

Energy-saving Solutions Seminar Hosted

Increase of Marine Boilers Modification responded to the 2020 SOx Global Regulation

The SOx regulations (0.1% sulfur limit) that began at European ports in 2010 will be further tightened and new global regulation requires 0.5% sulfur limit from 3.5% in all ocean area is scheduled to begin in January 2020.

We made modification to main boilers of approximately 30 ships and auxiliary boilers of approximately 320 ships in service since 2009.

Furthermore, there will be a lot of backorder for reconstruction of boilers, and we plan to make modification main boilers of approximately 80 ships and auxiliary boilers of 10 ships.

There are three ways of boiler modification to cope with the SOx regulation mainly: (1) use of low-sulfur fuel*, (2) use of LNG, and (3) installation of tail gas scrubbers. We can implement boiler modification for any of these methods.*

Currently, modification to use low-sulfur fuel is most common, but we expect an increase in other reconstruction as well in conjunction with the supply of various types of fuel in compliance with the 2020 regulation.

To use these fuels, it is necessary to make modification boiler's combustion equipment and control system, fuel lines, fuel pumps, and fuel tanks, etc.

We are also able to make modification for purpose of using multiple fuels complying with the new regulation and manage modification to meet customer needs.

* The four main types of fuel are as follows.

- Marine Gas Oil (MGO): A distillate oil fuel, with Sulfur content of 0.2% to 0.3%
- Low Sulfur Marine Gas Oil (LSMGO): A distillate oil fuel, with Sulfur content of 0.1% or less
- Very Low Sulfur Heavy Fuel Oil (VLSHFO): A residual oil fuel, with Sulfur content of 0.5 % or less
- Ultra-Low Sulfur Heavy Fuel Oil (ULSHFO): A residual oil fuel, with Sulfur content of 0.1% or less



Fuel pumps that will be modified



Modifying a control system panel



Modifying control system devices

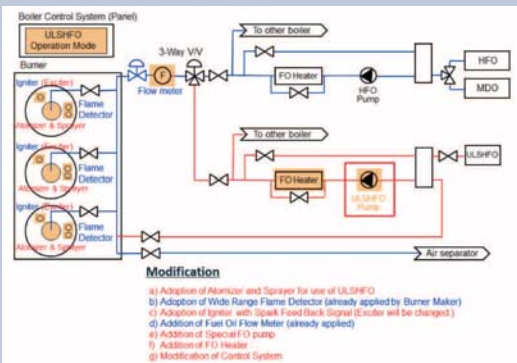


Diagram of Low Sulfur Modification



Installing a combustion equipment sprayer



Sprayer

25th Anniversary of Licensing Yoowon Industries Ltd.

Located in Busan, South Korea, Yoowon Industries Ltd. was founded in February 1977, and for over 40 years has manufactured steering gears and oil purifiers. In August 1993, the company concluded a license agreement with Mitsubishi Rapson-slide steering gears, with this year marking the 25th anniversary of the start of the collaborative relationship between the two companies.

Steering gears produced under license by Yoowon are not only sold to shipyards in South Korea, but also have an abundant track record of sale to Waigaoqiao Shipbuilding, Qingdao Beihai Shipbuilding Heavy Industry, Yangzijiang Shipbuilding, and New Times Shipbuilding in China, and to CSBC in Taiwan

and other major shipyards outside of Korea. For the past few years, approximately 150 to 200 units have been ordered each year, and with a cumulative total of over 2,200 units manufactured and Yoowon is one of South Korea's major steering gear manufacturers.

A commemorative event was held by the two companies at a Yoowon production facilities to mark the milestone of 25 years since the license agreement was concluded.

We will continue our efforts to maintain and strengthen good relationship with Yoowon, and work together to provide our customers with sustainable, high-quality products and services.



the 25th anniversary ceremony



Mr.Kwon,president and Mr.Hori,President & CEO

ENERGY SAVING SOLUTION SEMINAR HELD

Energy-saving Solutions Seminar Hosted

On Tuesday, July 31, 2018, We hosted the "Energy-saving Solutions Seminar" in Shanghai, China. It was the first time to hold a seminar with a theme focusing on energy-saving solutions.

At the seminar, we introduced waste heat recovery systems that has an extensive track record of use mainly on large container ships, and the Organic Rankine Cycle (ORC), a marine-use waste heat recovery binary cycle.

As WHRS is installed in variety of type of ships, we got a lot of questions on its energy saving merit and also on ORC which will be expected to be increasingly installed with the further future strengthening of the environmental regulation.

It was a good opportunity including a lunch party after the seminar to get the participants to understand well our products. We are planning to hold a seminar at other places and looking forward to your participation.



A scene from seminar



External view of the overall ORC system

New Radial Turbocharger MET-ER Series

The MET-SRC/SRII Series radial turbocharger is used in 4-stroke engines for both marine and land use. It reached a cumulative total of 15,000 units produced in 2018.

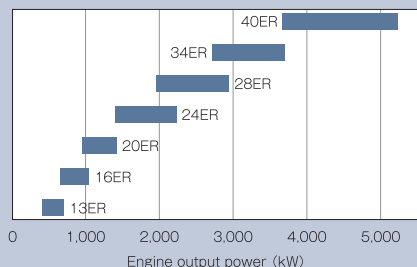
As tail gas regulations tighten in the 4-stroke engine market in the future, a lineup of turbocharger models optimized for engine performance, higher pressure ratios of turbochargers themselves, and reduced costs will be required.

In light of this market environment, we would like to announce

The feature
 Environment-friendly
 Economy
 Excellent performance

Down sizing
 -It becomes more compact
 -reduction of initials cost

The maintenance
 Easy structure to maintenance
 -The number of parts reduction (Δ30%)
 -Condition base maintenance



the MET-ER Series of radial turbochargers for main and auxiliary marine engines and on-land power generation engines that have been newly developed under a three "E" concept.

The MET-ER Series was developed to improve on the performance of our existing MET-SR Series and make it more compact. With it, we will provide turbochargers and service that meet the needs of even more customers.



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MET-MBII SERIES INTRODUCED

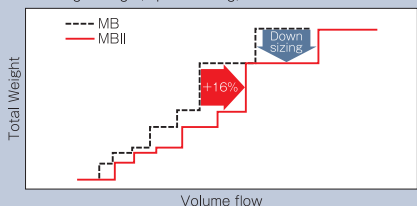
Axial Turbocharger MET-MBII Series

A cumulative total of more than 2,000 units of the MET-MB Series have been produced, with the product providing a high degree of reliability and ease of maintenance as a high-efficiency turbocharger suited to high pressure ratios.

Today, we would like to announce the MET-MBII Series, a new type of axial turbocharger for 2-stroke engines, achieving a further increase in air flow volume while maintaining the reliability and ease of maintenance of the MET-MB turbocharger.

The MBII turbocharger provides air flow volume 16% greater than the MET-MB Series, thereby increasing the possibility of downsizing turbochargers.

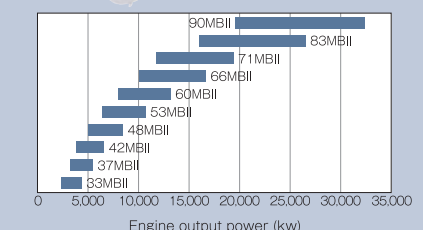
Downsizing in turn enables lower initial costs, reduced turbocharger weight, space-saving, and lower service costs.



The feature
 -A capacity 16% up
 -It's possible to maintain by a crew.
 -High reliability

The maintenance
 -Easy access to internal part
 -Service cost reduction
 -Condition base maintenance

Down sizing
 -The weight decrease
 -It becomes more compact
 -reduction of initials cost



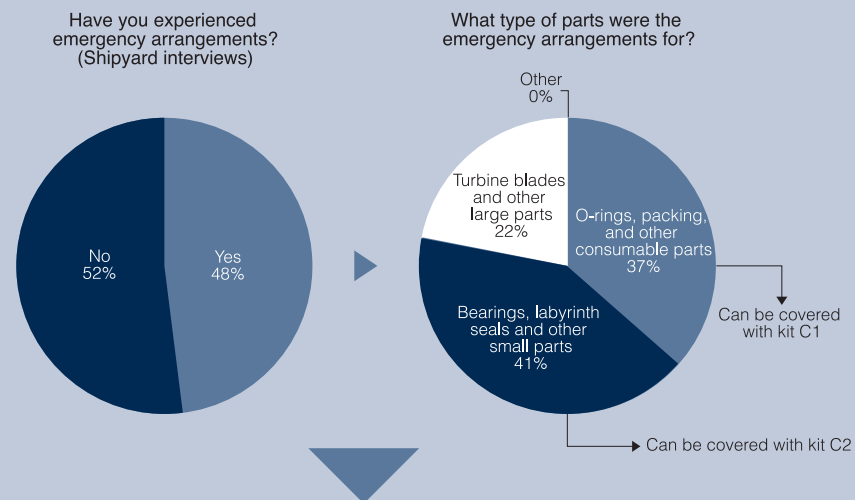
For Safer Operation -Proposal to store Backup Overhaul Kits-

According to the results of a survey of repair and maintenance yards in Japan conducted by us, most cases in which emergency arrangements for parts were made at the time of overhaul inspections of turbochargers involve consumable supplies, bearings, labyrinth seals, and other such small parts.

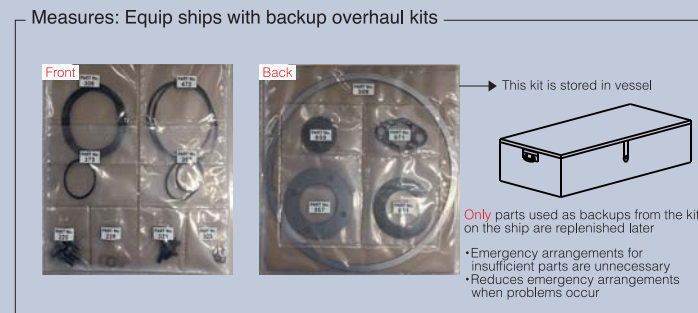
work and handle unforeseen problems smoothly.

The overhaul kit is available with mandatory-replacement C1 parts and C2 parts for which replacement is judged according to the item's condition, and can be purchased in sets or as single items. Feel free to contact us with any questions at a-met-service@mhi-mme.com.

Purchasing these parts in advance as an overhaul kit and storing them on ships as backups makes it possible to conduct



O/H kit	C1	C2
Details	Consumable parts with mandatory replacement	Bearings and other parts for which replacement is judged according to the item's condition



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TOPICS

2018 EXHIBITIONS

2018 Exhibition



SEA JAPAN 2018

April 11 to 13, 2018 (Tokyo Big Sight, Tokyo, Japan)

Sea Japan had a great success with 580 exhibitors and more than 20,000 visitors.

In addition to introducing a wide range of products, technology, and services at our booth, we set up a bar counter where we could communicate with customers in a relaxed atmosphere.

We also displayed a panel introducing our finstabilizers at environmental section of theme zone in japan pavillion.



Posidonia 2018 at Metropolitan Center

June 4 to 8, 2018 (Metropolitan Expo Center, Athens, Greece)

Posidonia 2018 finished a success with more than 2,000 companies and over 22,000 visitors.

We introduced a wide range of products, such as MET turbochargers, boilers, turbines, steering gears, fin stabilizers, propellers, deck cranes, and deck machinery, as well as environmentally friendly and energy-saving solutions.

In addition, we gave an overview of our company and introduced our products at the Japan Seminar hosted by the Japan Ship Machinery and Equipment Association and the Japan Ship Exporters' Association.



Hamburg Messe SMM 2018

September 4 to 7, 2018 (Hamburg Messe, Hamburg, Germany)

We exhibited the MET-SRC turbocharger and other products, and in addition to utilizing virtual reality (VR) and mixed reality (MR) to exhibit a new type of turbocharger, we introduced a wide range of products and environmentally friendly and energy-saving solutions.

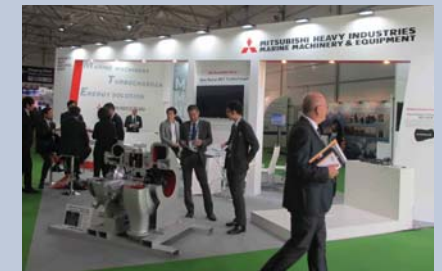
Further, on September 6 we hosted an MET turbocharger seminar in the St. Petersburg Seminar Room located at the venue, and introduced the new turbocharger models MET-MBII and MET-ER. Many people attended, and engaged in lively communication while enjoying refreshments after the seminar.



Image of VR



Seminar Room



Booth

NEW FACE IN LONDON

News from MHI-MME Offices Abroad



London Office

Introduction to Mitsubishi Heavy Industries Europe (London)

Greeting from Koichi Matsushita, General Manager newly assigned.



My name is Koichi Matsushita. This April, I was assigned to the London, England office as General Manager, succeeding Mr. Isao Uchida.

I have had a variety of experiences during the 23 years I have been with the company, including marine boiler design, product development, adjustment delivery, and onboard construction. Ships are in an environment separate from land, but I got a deep sense of the unity between crew members regarding safe operation specifically because of that fact, and of the support from personnel on land.

I will do my best to utilize these experiences and provide the support that is needed to ensure that Mitsubishi's marine machinery can be used with satisfaction. I look forward to working with you.