

# PROJECT **MEET** NEWS

Mitsubishi Marine Energy & Environment Technical Solution-System

# 26

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29th Committee of Taiwan Maritime Technicians



# Special Feature

# The Path to Decarbonization of the Maritime Industries

- Season 8 -

## Participation in Global Conferences

### Participation in the AVL(\*1) High Power System Conference

Between April 17 and 18, 2024, Mitsubishi Heavy Industries Marine Machinery & Equipment participated in the technical conference organized by AVL, which is held once every three years in Graz, Austria.

At this conference, experts from various industries gather to exchange visions, announce the latest technologies and, in the process, chart a course towards a decarbonized and sustainable future. We also took the stage to give a lecture on “the International Maritime Organization (IMO)’s GHG reduction targets and the maritime industry’s ability to accommodate alternative fuels.”

We explained the importance of improving the energy efficiency of ships in service and accelerating retrofit business such as energy-saving devices in order to achieve the 2030/2040 mid-term targets set by IMO.

Throughout the conference, there were strong opinions that methanol and ammonia would continue to constitute mainstream decarbonized fuels in the maritime industry. Regarding hydrogen, while progress is being made in the development of related systems, the majority opinion was that it would take a little more time.

(\*1) AVL: A world-leading mobility technology company in the automotive, railway, marine and other fields.

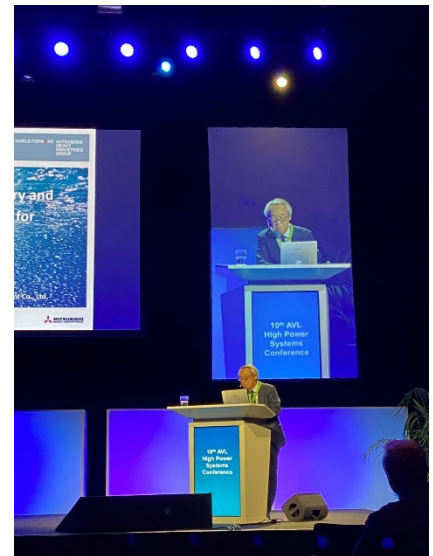


Photo of the conference

### Attendance the MMMCZCS (\*2) Accelerate Partner Summit

Attending this summit held in Copenhagen, Denmark between May 15 and 16, 2024 were six members from the MHI Group, a core strategic partner of the MMMCZCS. Approximately 400 management executives from global companies across the entire value chain, including those from upstream companies, gathered to verify their current positioning with respect to targets to achieve ahead of the goal of zero emissions in the maritime industry by 2050 formulated by the IMO in July 2023 as well as to exchange opinions and hold discussions on areas such as challenges in achieving those targets, including those at intermediate points of 2030 and 2040; initiatives geared towards addressing those challenges; and the priority of those initiatives. There, discussions and networking took place in the form of lectures, panel discussions and workshops.

Where alternative fuels are concerned, there has been a steady and gradual increase in projects surrounding green/e-methanol, blue/e-ammonia, biofuels and biomethane. We got the impression that a general path for the transition of marine fuels has come into view.

On the other hand, we also confirmed that it would take some time for the stable supply, and prices of these alternative fuels becomes affordable to be spread, and in the meantime, retrofit projects related to energy saving and fuel conversion of ships in service, including propellers and main engines (turbochargers), would go on to increase.

(\*2)MMMCZCS (Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping) :

A research center based in Copenhagen that accelerate decarbonization in the maritime industry.



Photo of the summit



# Initiatives for Energy-Saving Device

## Collaboration with Mitsubishi Shipbuilding (MHIMSB) on energy-saving device (ESD)

In the maritime industry, environmental regulations are being increasingly reinforced not only for new ships but also for those already in service with a view to achieving zero emissions by 2050. In addition to the introduction of the Carbon Intensity Indicator (CII), which was initiated in 2023 to check and evaluate yearly fuel efficiency results, the European Union Emissions Trading System (EU-ETS) was introduced in the EU in 2024 for marine transportation as well, making measures for ships in service an urgent issue.

In addition, building new ships with superior environmental performance is also difficult due to building slots at shipyards being almost fully booked until 2027-28. Due to this situation, the need for measures to improve propulsion performance and reduce GHG emissions for ships already in service is anticipated to continue to increase going forward for the purpose of achieving the GHG reduction targets set by the IMO.

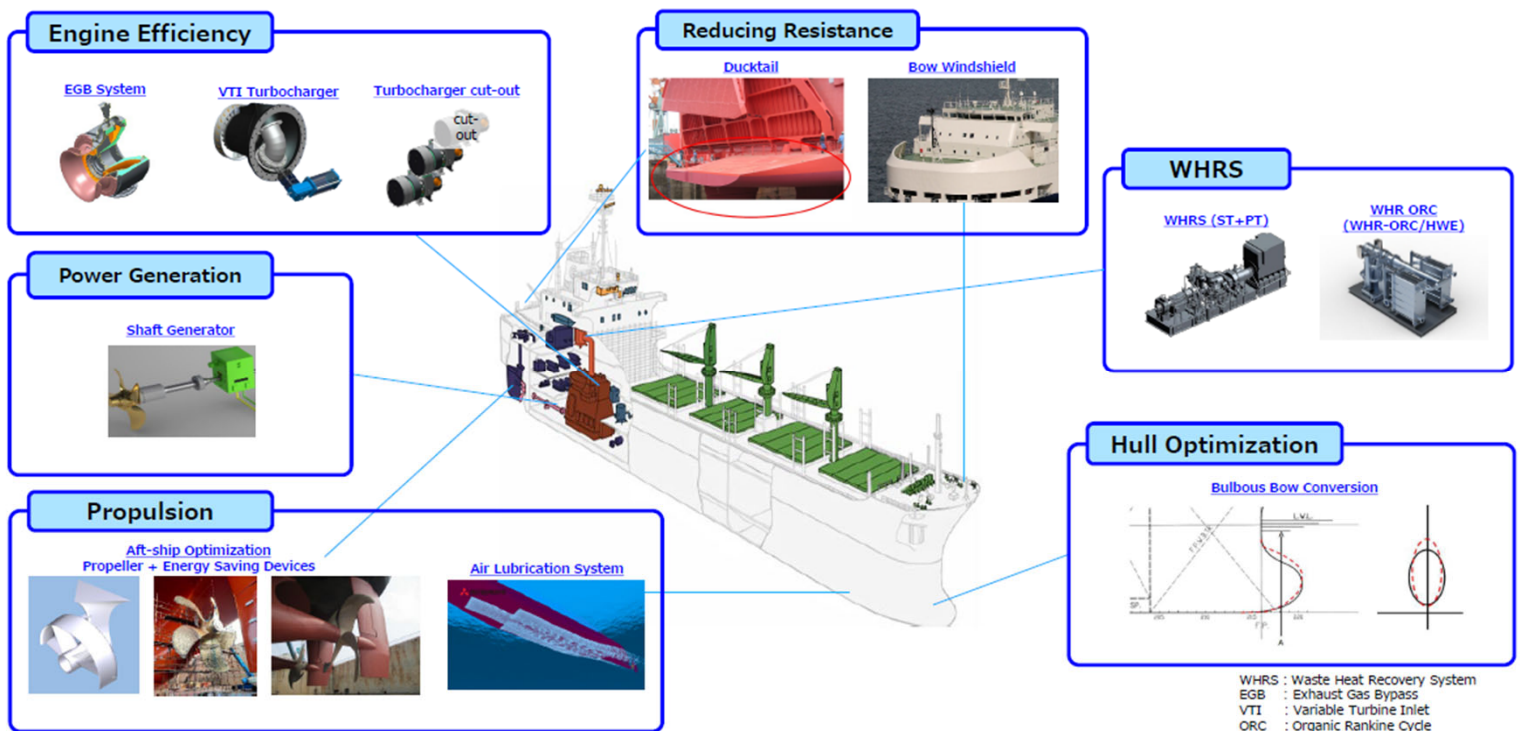
Under these circumstances, we will do our part for the decarbonization of the maritime industry by cooperating with Mitsubishi Shipbuilding in a manner that leverages the strengths of both companies, which conduct related businesses in the MHI Group. Those strengths include our advantages of customer channels mainly consisting of overseas shipowners and know-how cultivated in retrofitting operations through Mitsubishi Heavy Industries Marine Machinery & Equipment's propeller retrofit business and Mitsubishi Shipbuilding's advantages of engineering resources that enable highly specialized technical reviews and know-how related to propulsion performance and energy-saving.

More specifically, in addition to the energy-saving solutions using turbochargers, waste heat recovery systems and propellers that have been proposed, collaborating with Mitsubishi Shipbuilding will enable us to add ducktail, windshield, bulbous bow modification, ducts, rudder bulbs and air lubrication systems to our line-up of ESD solutions for ships in service.

Additionally, If you provide us with the latest ship service data and other information needed for consideration purposes, we will also be able to examine the optimal ESD solutions for each ship.

Going forward, we will continue our efforts so that we may provide more attractive solutions based on changes in the market environment, starting with the decarbonization of the maritime industry, and on your increasingly diverse needs.

(Related link: [https://www.mhi.com/products/ship/engineering\\_development.html](https://www.mhi.com/products/ship/engineering_development.html))



## Attended a Seminar Organized by IMarEST in the UAE

On April 19, 2024, Mitsubishi Heavy Industries Marine Machinery & Equipment attended a maritime seminar hosted by IMarEST(\*1) in Dubai, UAE.

This seminar is held regularly by IMarEST for maritime industry-associated parties in the Middle East. This time, with the cooperation of locally-based MET turbocharger ARA(\*2) Gulf Turbo Solutions, approximately 150 maritime industry-associated parties from across the Middle East were invited to attend the seminar, whose main subject was our products.

Due to the heavy rain that hit Dubai right before the seminar, there were concerns about whether it would be held on the scheduled day. In the end, however, over 100 visitors were in attendance, and we gave presentations centered on the maintenance of MET turbochargers and steering gears and introductions of the latest associated technology.

We received a lot of questions and feedback not only during the Q&A session that followed our presentation but also at the reception, giving us valuable opportunities to converse with many of our customers.

Located on the main shipping route of tanker fleets, the Middle East hosts numerous dry docks, ship management companies and repairers as a global ship repair base. Using this holding of the seminar as a springboard, we will proceed to work towards further strengthening our relationships with customers in the Middle East as well.

(\*1) IMarEST: The Institute of Marine Engineering, Science and Technology

An international professional organization and academic association for marine-related specialists.

(\*2) ARA: Authorized Repair Agent



Photo from our presentation on MET turbochargers



Group photo following the seminar (from the related article posted on IMarEST's website)



## Expanding the Licensed Production of MET-MBII Turbochargers

Mitsubishi Heavy Industries Marine Machinery & Equipment has newly added all models of the MET-MBII series to the lineup of models contracted to its South Korean licensees after doing the same for Japanese licensees.

In line with this, licensed production of the MET-MBII series is currently underway at two companies: Hanwha Engine and HD Hyundai Heavy Industries.

The decision to begin licensed production of the MET60MBII at Hanwha Engine was followed by the decision to successively produce the MET66MBII, 71MBII and 83MBII at HD Hyundai Heavy Industries as well.

Since being launched in 2020 as a new type of turbocharger, the MET-MBII series has been favorably received for its lightweight design through downsizing and its lower initial and maintenance costs, among other elements.

The cumulative number of orders for the MET-MBII series has exceeded 400 units (as of September 2024). Among these units, those produced under license in South Korea has reached 30 units. This figure is anticipated to further increase in the future.

We will endeavor to collaborate with our South Korean licensees to further develop the MET turbocharger.

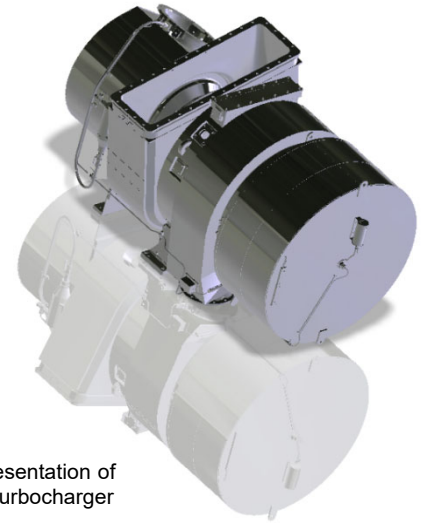


Image representation of MET-MBII turbocharger

## JICEF ACTIVITIES

### Japan Internal Combustion Engine Federation 70th Anniversary Event

Mitsubishi Heavy Industries Marine Machinery & Equipment attended the Japan Internal Combustion Engine Federation 70th Anniversary Event held at the Industry Club of Japan on July 2, 2024.

The Japan Internal Combustion Engine Federation (JICEF) is an organization that is responsible for various projects related to the International Council on Combustion Engines (CIMAC). It has been cooperated to the Japanese Industrial Standards (JIS) with respect to the Technical Committee on Internal Combustion Engines [ISO / TC70 (reciprocating engines) and ISO / TC192 (gas turbines)] in the work of International Organization for Standardization (ISO). In addition, the organization contributes to the promotion of Japan's combustion engine industry. The MHI Group, have played an important role in JICEF since its establishment.

At this 70th Anniversary Event, individuals who have made distinguished contributions to the operation of JICEF were honored. These included four members from the MHI Group. We will continue to contribute to JICEF going forward.



The next CIMAC Congress is scheduled to be held in Zurich, Switzerland in May 2025. There, we are also slated to give a presentation on the latest technology trends.



## Cumulative Orders Received for Retrofit Propellers Reached 250 units - Growing Interest in Reducing GHG Emissions -

Mitsubishi Heavy Industries Marine Machinery & Equipment has achieved 250 units in orders received for retrofit propellers, which it commenced deliveries of in 2013. This achievement took only two and a half years after we recorded 100 units in orders received in December 2021.

Behind this, there is the enhancement in environmental awareness in the market. Since a consensus was reached on the target of “achieving zero net GHG emissions by 2050” at the 80th session of IMO’s Marine Environment Protection Committee (MEPC80) held in July 2023, companies’ awareness of GHG reductions has grown even stronger than before. This is reflected in the increasing number of retrofit inquiries we have received since MEPC80.

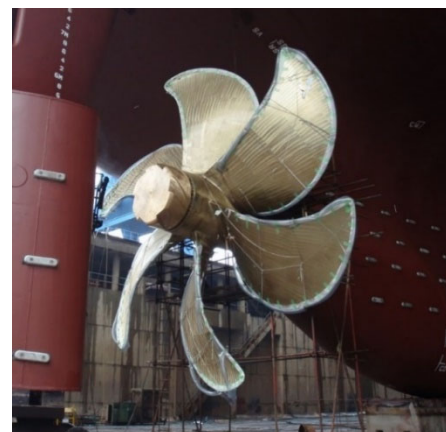
The propeller retrofit solution involves optimizing the design to match the main engine load limit during slow steaming to realize reduced fuel consumption. It contributes directly to GHG reductions.

This solution has been mainly adopted on container ships which apply large main engine power limitation.

Today, it has been expanded on all kinds of ships, including car carriers.

We are endeavoring to offer trade-ins of propellers after replacement, provide support for propeller replacement work and maintain a stable supply structure even with the rising cost of materials. We will continue to propose propellers for retrofitting in order to meet the needs of the market, such as lower fuel consumption and reduced GHG emissions.

Please submit any inquiries to [marine.machinery.service@mhi.com](mailto:marine.machinery.service@mhi.com).



## BOILER/TURBINE CONTROL SYSTEM

### DCS (Distributed Control System) Replacement on Old LNG Carriers

Mitsubishi Heavy Industries Marine Machinery & Equipment received two orders for work to replace the Distributed Control System (DCS) on two LNG carriers built at the Nagasaki Shipyard & Machinery Works of Mitsubishi Heavy Industries. We are currently working on their design and manufacture to have them ready for delivery in April and August 2026, respectively.

To ensure the safe operation of the boiler and turbine control systems (Boiler ACC BMS: Automatic Combustion Control Burner Management System; Turbine MTRCS: Main Turbine Remote Control System) installed on LNG carriers over the long term, we recommend replacing control systems that have become obsolete.

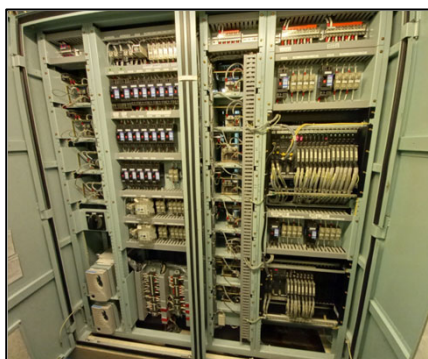
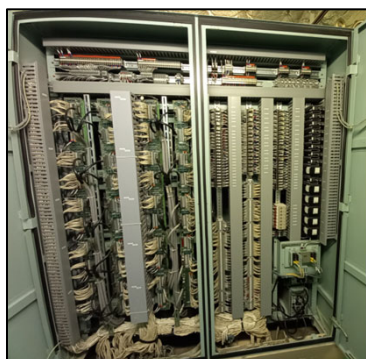
For LNG carriers that DCS control is installed, we can help by carrying out to separate our boiler and turbine controllers, which use control systems incorporated into a DCS into standalone systems, in cases where the DCS supplier no longer offers service support or it is difficult for them to replace the system. As another option, we have begun to propose replacing entire control systems incorporated into a DCS in cooperation with DCS manufacturers.

LNG is currently the subject of attention as a transition energy geared towards carbon neutrality.

We have delivered a large number of main steam engine plant control systems for LNG carriers, and are actively engaged in the maintenance of our equipment that is in operation around the world.

In order to maintain the stable marine transportation of energy resources in Japan and abroad, using the experience and technology we have cultivated, we will continue to provide solutions for control system modification and replacement tailored to your needs.

Please submit any inquiries to [marine.machinery.service@mhi.com](mailto:marine.machinery.service@mhi.com).



DCS systems that have become obsolete

## Recommendation of Chemical Cleaning of the Inside of Boilers (the Water-Side Heat Transfer Surface)

The main boiler loaded on LNG carriers is an important equipment that supplies steam to turbines for propulsion.

While boilers made by Mitsubishi Heavy Industries Marine Machinery & Equipment are highly reliable, depends on the water quality management in the boiler, layers of scales (hard, grayish, chalky deposits) may form on the inside of the boilers (on the water-side heat transfer surface).

Due to their low thermal conductivity, scales can cause the thermal efficiency of boilers to drop, resulting in energy loss and decreased durability.

Moreover, overheating resulting from heat transfer inhibition can cause damage to appear on the heat transfer surface and, in some cases, holes to form on heat transfer tubes, resulting in leaks.

Given that, we propose the chemical cleaning of the inside of boilers (the water-side heat transfer surface) to remove the layers of scales that have accumulated due to operation over time and return the heat transfer surface to its proper state.

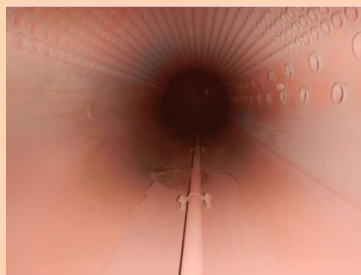
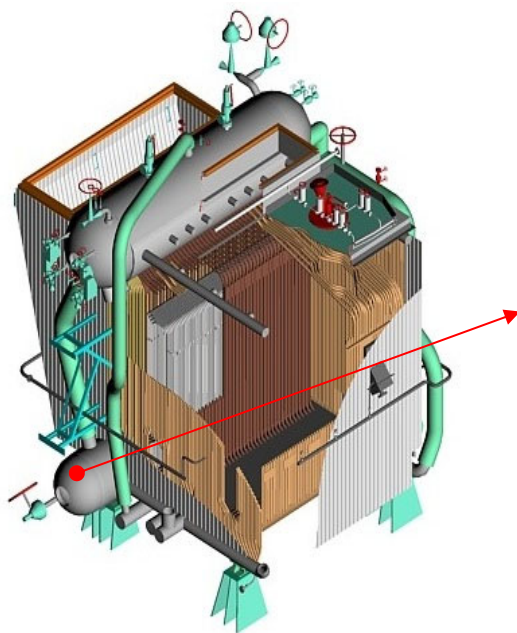
The inside of the heat transfer surface before and after chemical cleaning is as shown in the photos below (Photo of the water drum are shown as an example).

Performing chemical cleaning results in the removal of layers of scale that have accumulated over time and the restoration of heat transfer surfaces to a clean state.

The cleaning method we propose involves a neutral, ambient temperature chemical cleaning method that does more than other chemical cleaning methods to remove scales while keeping the base material itself from dissolving.

For boilers that have been in operation for a certain period of time, we encourage you to consider performing chemical cleaning to reduce the possibility of leaks occurring in the future.

Please submit any inquiries to [marine.machinery.service@mhi.com](mailto:marine.machinery.service@mhi.com).



Before Cleaning



After Cleaning



## Participated in Various International Exhibitions

Mitsubishi Heavy Industries Marine Machinery & Equipment actively participated in the following international exhibitions.

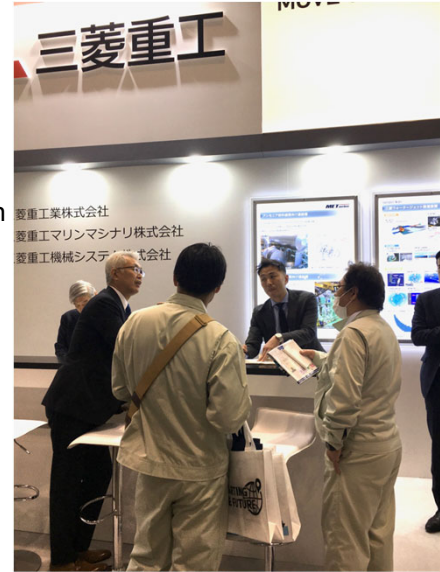
We had a booth presence at SEA JAPAN 2024, which was held at Tokyo Big Sight from April 10 to April 12 on a larger scale than ever before.

From June 3 to June 7, we had an exhibit at the Posidonia 2024 event in Athens, Greece, where we gave presentations titled "Application of turbocharger for new fuels and Solution of energy saving technology" and "IMO GHG Reduction Trajectory and Maritime Industry Readiness for Alternative Fuels". In addition, one of our executives was interviewed on Posidonia TV.

[https://www.linkedin.com/posts/mitsubishi-heavy-industries\\_posidonia-posidoniav-tradewinds-activity-7215895003133280256-IOqt/?utm\\_source=share&utm\\_medium=member\\_ios](https://www.linkedin.com/posts/mitsubishi-heavy-industries_posidonia-posidoniav-tradewinds-activity-7215895003133280256-IOqt/?utm_source=share&utm_medium=member_ios)

From September 3 to September 6, we had a booth at SMM 2024 in Hamburg, Germany. The exhibition was a great success with the highest attendance ever.

The next exhibition we will be exhibiting at is BARI-SHIP MARITIME FAIR 2025 (Imabari) in May 2025, and we look forward to seeing you there.



Sea Japan 2024



Posidonia 2024



SMM 2024

# SEMINAR ACTIVITIES

## Participation in the 29th Committee of Taiwan Maritime Technicians

Mitsubishi Heavy Industries Marine Machinery & Equipment participated in the 29th Committee of Taiwan Maritime Technicians held in Taipei on September 20, and we made a presentation on "MHI-MME's Proposal for Requirements to Reduce CO<sub>2</sub> Emissions and Use New Fuels in the Maritime Industry".

This event provided us with valuable opportunities to interact directly with our Taiwanese customers.

Having gained a sense of the high expectations of Taiwanese customers, we will continue endeavoring to make proposals that meet their needs in order to fulfill these expectations as we move forward.

