April 1, 2025

The University of Osaka
Imabari Shipbuilding Co., Ltd.
Japan Marine United Corporation
Nihon Shipyard Co., Ltd.
Nippon Kaiji Kyokai (ClassNK)
MTI Co., Ltd.

Enhancing the Global Competitiveness of Japan's Maritime Industry

Establishment of the Open Collaboration Laboratory for Enabling Advanced Marine Systems (OCEANS) at The University of Osaka in April 2025

❖ Summary

The University of Osaka(President: Atsushi Kumanogoh), in collaboration with Imabari Shipbuilding Co., Ltd. (President: Yukito Higaki, "Imabari Shipbuilding"), Japan Marine United Corporation (President: Takashi Hirose, "JMU"), Nippon Kaiji Kyokai (President & CEO: Hayato Suga, "ClassNK"), and MTI Co., Ltd. (President: Hideki Suzuki, "MTI") will establish the Open Collaboration Laboratory for Enabling Advanced Marine Systems (OCEANS) at the Techno Alliance Building within the Graduate School of Engineering at The University of Osaka in April 2025. In addition, Nihon Shipyard Co., Ltd. (President: Kiyoshi Higaki, hereinafter referred to as "NSY"), a sales and design company owned by Imabari Shipbuilding and Japan Marine United Corporation (JMU), will also cooperate with this program. NSY will actively participate in the design and engineering research activities led by OCEANS.

This initiative aims to promote the global competitiveness of Japan's maritime industry. Your attention to the OCEANS initiative is greatly appreciated.

The Techno Alliance Building at The University of Osaka, where the collaborative research laboratory will be established.

❖ Background and Objectives of Collaboration

In an era of unprecedented change, driven by rising geopolitical risks, growing awareness of economic security, climate change, the rapid development of technologies such as AI and their social impact, and the aging population in developed countries, the Japanese maritime industry is being called upon to make revolutionary transformation. A major revolution in design and manufacturing processes is needed to quickly supply high-performance next-generation ships that embody innovative functions, excellent environmental performance and safety features, to customers.

This collaboration, established under the “Industry on Campus” program promoted by The University of Osaka, integrates diverse engineering fields such as ship hydro and structural dynamics, propulsion, electrical systems, and control systems. Leveraging advanced systems engineering and cutting-edge AI technologies, this initiative also serves as a hub for education and training of the next generation of talent.

For Japan, which is surrounded by sea, the maritime industry, that supplies and operates ships for marine transportation is fundamental for social and economic stability and people’s living. Japan’s shipbuilding industry is highly regarded worldwide for its design and construction technologies. The shipping industry has one of the world’s largest fleets and excellent safe and efficient transportation

technologies. The classification society develops classification rules and conducts certification services for safe and efficient marine transportation, and the number of ships certified by it is one of the highest in the world.

The Graduate School of Engineering at The University of Osaka, particularly its Department of Naval Architecture and Ocean Engineering, has achieved global recognition for its research on ships and marine structures. The department has contributed significantly to international maritime safety standards and criteria, collaborating with leading companies and fostering interdisciplinary, advanced research.

International shipping has set a goal to achieve net-zero greenhouse gas (GHG) emissions by around 2050, with Japan's maritime industry expected to play a crucial role in achieving this target. In addition to the essential transition to alternative fuels for GHG reduction, advancements in ship automation technologies are anticipated to progress further. This will undoubtedly lead to increased complexity in the processes of design, construction, certification, and operation. To address these challenges, innovative systems engineering leveraging cutting-edge technologies such as AI will be indispensable for the future of the maritime industry. This research laboratory will undertake these studies, contributing to the enhancement of the global competitiveness of Japan's maritime industry.

This collaborative research program leverages the strengths of Japan's world-renowned maritime industry cluster, including shipbuilding, shipping, and ship classification. By deepening industry-academia collaboration, it aims to enhance international competitiveness, advance world-class research, and foster talent development. The ultimate goal is to establish itself as a leading research and educational hub that drives the global maritime industry forward.

❖ **Overview of the Laboratory**

Name: Open Collaboration Laboratory for Enabling Advanced Marine Systems (OCEANS)
Duration: April 1, 2025 – March 31, 2030 (5 years)
Location: Techno Alliance Building A804-806, The University of Osaka

Faculty and Research Team (As of April 1, 2025)

- Full-Time Faculty: Specially Appointed Assoc. Prof. Yasuo Ichinose, Specially Appointed Asst. Prof. Kouki Wakita
- Part-Time Faculty: Prof. Atsuo Maki, Prof. Kazuhiro Iijima, Prof. Munehiko Minoura, Prof. Naoki Osawa, Assoc. Prof. Akira Tatsumi, Assoc. Prof. Masahiro Sakai, Asst. Prof. Takayuki Takeuchi
- Visiting Faculty: Visiting Prof. (currently being selected), Visiting Assoc. Prof.

(currently being selected)

- Researchers from participating companies: Approximately 10 researchers

❖ Research Focus Areas

1. Basic research on innovative systems engineering and design automation
   A) Resilience of supply chain for stable marine transportation
   B) Application of AI in ship basic design, function design and certification
   C) Production design and digital shipyards
   D) Digital twin technologies in ship operation and maintenance
2. Individual studies on design, construction, operation, and certification, including both open and closed research projects
3. Education and training for the next generation of maritime industry experts

❖ Contact Information

For inquiries regarding the research activities of OCEANS, please contact
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