

December 14, 2021

**Project for Evaluating and Verifying the Automatic Navigation System and
Developing Element Technologies Started
- Toward Faster Development of Safer Autonomous Ships -**

MTI Co., Ltd.
Tokyo Keiki Inc.
Japan Marine Science Inc.
NYK Line
Furuno Electric Co., Ltd.

A technology development project on autonomous ships - Establishment of a Development Platform for an Automatic Navigation System and Development of Element Technologies for the Automatic Navigation System - in which Tokyo Keiki Inc., Furuno Electric Co., Ltd., the NYK Group's MTI Co., Ltd., and Japan Marine Science Inc. have participated, in cooperation with companies including NYK Line, was selected by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) for the "2021 Support Project for R&D in Promoting Aggregation and Cooperation in the Maritime Industry,"* and the companies have just started the activities.

Autonomous ships, which are rapidly being developed worldwide in recent years, involve multiple devices and systems responsible for recognizing surrounding information, determining avoidance routes, and avoiding other ships. Therefore, the organization, method, and evaluation axis for verifying and evaluating the safety and economic efficiency of autonomous ships have become complicated, and so their organization/maintenance has become an urgent task.

In this project, the above four participating companies and cooperators, including NYK Line, aim to establish verification and evaluation systems that utilize simulation technologies for enabling shipyards and maritime equipment manufacturers and such to promote the

development of autonomous ships much faster. In addition, for improving safety of the automatic navigation system, we are to improve the recognition and judgement functions, which are element technologies that have been worked on so far, and the demonstration tests will also be conducted on actual ships.

1. Overview of the project

We will mainly conduct R&Ds for the following items.

		Target of development	Expected effect
1	Establish verification and evaluation systems for the autonomous navigation system	Establish simulation systems that can verify and evaluate all modules working on software and consisting of the automatic navigation system	<ul style="list-style-type: none"> - Realizing much faster development of the automatic navigation system - Reducing the workload of verification and evaluation of the automatic navigation system - Creating highly reliable modules of the automatic navigation system
2	Improve element technologies – recognition, judgement, and responding functions – and conduct demonstration tests on actual ships	Commercialization of <ul style="list-style-type: none"> - Display function of collision-alert area - Recognition function of surrounding information of own ship - Functions of avoiding collision risk, of judging such options as creating evasion routes, and of responding to evasion navigation 	<ul style="list-style-type: none"> - Reducing human errors and workloads by introducing the products - Realizing much faster development of the automatic navigation system by establishing a product-evaluation process utilizing a simulator - Improving usefulness of the simulator by comparing results of onboard tests with simulator tests

2. Roles of each company participating in the project

MTI Co., Ltd.	<ul style="list-style-type: none">- Establish verification and evaluation systems for the autonomous navigation system- Prepare the deployment of developed devices- Evaluate and supervise the above items
Tokyo Keiki Inc.	<ul style="list-style-type: none">- Establish verification and evaluation systems for the autonomous navigation system
Japan Marine Science Inc.	<ul style="list-style-type: none">- Establish verification and evaluation systems for the autonomous navigation system- Verify and evaluate developed devices
NYK Line	<ul style="list-style-type: none">- Provide the test environment and accumulated knowledge as a shipping company
Furuno Electric Co., Ltd.	<ul style="list-style-type: none">- Establish verification and evaluation systems for the autonomous navigation system- Improve recognition, judgement, and response functions

3. Overview of each company

MTI Co., Ltd.

Headquarters: Tokyo

President: Kazuo Ishizuka

Website: <https://www.monohakobi.com/en/>

Tokyo Keiki Inc.

Headquarters: Tokyo

Representative Director, President & CEO: Tsuyoshi Ando

Website: <https://www.tokyokeiki.jp/e/>

Japan Marine Science Inc.

Headquarters: Kanagawa

CEO: Koichi Akamine

Website: <https://www.jms-inc.jp/general/top/en>

NYK Line

Headquarters: Tokyo

President: Hitoshi Nagasawa

Website: <https://www.nyk.com/english/>

Furuno Electric Co., Ltd.

Headquarters: Hyogo

President and CEO: Yukio Furuno

Website: <https://www.furuno.co.jp/en/>

* 2021 Support Project for R&D in Promoting Aggregation and Cooperation in the Maritime Industry

MLIT's project started this fiscal year to support technology developments for strengthening the technological capabilities of the Japanese maritime industry. The project aims to facilitate shipyards and maritime equipment manufacturers in their coming together for work on next-generation ship technologies, to foster Japanese system integrators, to make the industry's structural shift, and to further strengthen the technological capabilities.

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