

The Nippon Foundation MEGURI 2040 Fully Autonomous Ship Program

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1. Introduction

With Japan today experiencing a contracting, aging population, shortages of human resources are emerging in a wide variety of fields. Coastal shipping, with its challenging work environment, is no exception, and with more than half of coastal shipping crew members over the age of 50, this is becoming a major issue. In addition, Japan has roughly 400 inhabited offshore islands, many of which are visited by ships only twice a day, in the morning and evening. Maintaining these offshore routes has therefore become a critical issue in the daily lives of those inhabitants. In addition, human error is said to be involved in 70-80% of maritime accidents, making accident reduction an issue as well.

We believe that fully autonomous navigation is one way to address these social issues.

These demonstration tests have the following specific objectives, and are also expected to revitalize and enhance the competitiveness of the shipping industry and related industries.

- (1) Advance the technological capabilities of related industries (including through participation from other fields)
- (2) Play a leading role in establishing international standards for fully autonomous navigation
- (3) Create a greater sense of security (social acceptance) toward fully autonomous navigation (including giving children of the future dreams of working in maritime industries)

Meaning of ‘MEGURI2040’

Practical implementation of fully autonomous navigation will improve the flow of goods, people, costs, and traffic, thereby creating greater convenience. The program’s name conveys the concept of “Improving Japan’s circulation,” which is seen as the program’s main benefit, and the name ‘Meguri’ is a Japanese word for “circulation”.



Aiming for practical implementation by 2025

Demonstration testing of autonomous driving has been moving forward, primarily in the automotive sector, but sea navigation presents technological challenges in terms of telecommunications infrastructure between land and sea and obstacle avoidance, as well as the economic challenge of high development costs, and as a result there has been almost no development to date in the field of fully autonomous navigation for seagoing vessels. At the same time, Japan has advantage in terms of technologies in areas including the internet of things (IoT), artificial intelligence (AI), and image analysis. Therefore, joint technological development by multiple private-sector companies that possess these technologies opens up possibilities for

dramatic advances in technological development for fully autonomous navigation.

2. Outline of Demonstration Tests

The demonstration tests were carried out by 5 consortia with the 6 existing domestic navigation ships which were installed navigation system installed.



Fig 1. Five consortia and routes of six ships



Fig2. Autonomously operated 6 ships and Remote Operation Center

The above ships proved autonomous navigation with the following features through the demonstration tests.

- (1) Navigation through congested area (Tokyo Bay)
- (2) Long-distance, extended (over 12 hours) navigation
- (3) Large ship (over 200 meters long)
- (4) High-speed operation (26 knots, approx. 50km/h)
- (5) Use of drones for mooring support
- (6) Container ship
- (7) Small tourist boat
- (8) Amphibious ship

3. Results from the Demonstration Tests

All demonstration tests of autonomous navigation were

successfully completed in the beginning of 2022, and showed the good performance of autonomous navigation including collision avoidance, while the tests identified some issues, such as deep learning and communication system, to be improved for practical implementation by 2025.

4. Conclusions

Now the Nippon Foundation and MEGURI 2040 member companies are preparing for launching 2nd stage of MEGURI 2040 to prove practical implementation of fully autonomous navigation by 2025.



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