Japan's effort for practical use of Maritime Autonomous Surface Ships

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Ministry of Land, Infrastructure, Transport and Tourism

Japan's effort for practical use of Maritime Autonomous Surface Ships (MASS)

Problems to be solved

• Approximately 70%* of marine accident arises from human error

(*Statistics made by Japan Coast Guard (2013-2022))

 Reduction of seafarer's burdens necessary for preventing human error

Innovation for maritime traffic

- Development of maritime communication technology
- Rapid progress in the field of IoT/AI technology
- Growing availability of Automatic identification system (AIS) and Electronic Navigational Chart



MASS as a solution

- Reduction of marine accident arising from human error
- Enhancing safety of maritime traffic especially in narrow waterways
- Improvement of working conditions for seafarers



Phased approach of MASS development

- MASS is being developed in a step-by step (phased approach) way in association with technological development
- Though area for autonomous decision is being extended, decision made by seafarers are still important for safety operation of ships
- Japan has developed a roadmap for practical use of phase II MASS
- Transmitting data collected from sensors using onboard network system
- Suggesting optimal route based on analysis of collected data
- Supporting decision making by providing operational information
 (e.g. engine malfunction)



- Operable accordingly even at auto berthing and un-berthing in any weather condition
- Highly autonomous system capable of making final decision in some area of operation of ships

Target year: 2025

Phase II MASS

- Providing concrete proposal for seafarers' decision using advanced technology of data analysis and AI
- Using visual and aural aid when providing information

Phase I MASS

Onboard equipment capable of land-based operation

Trials for the development of MASS

- Since 2018, government of Japan has conducted first serious trials of MASS to improve the environment for its development such as establishing safety requirements, which is needed to put MASS into practical use.
 - > In 2018 : simulation testing to collect data for safety validation
 - > In 2019 : checking simulation data against the actual ship testing data
 - > In 2020 : development of safety guidelines, as well as actual ship testing

Autonomous Operation Function

Accumulating knowledge for ensuring safety of autonomous operation system (e.g. requirements of user-friendly human-machine interface) Trial with an advanced battery powered ship equipped with autonomous operation function





Remote Control Function

Accumulating knowledge for remote control (e.g. the kind and amount of data needed onshore) Trial of remote control from 400km away onshore facility



Auto Berthing&Un-Berthing Function

Accumulating knowledge for auto (un-)berthing (e.g. evaluation methods of the soundness)

Trial of auto berthing with a large vessel(11,410GT)





Realizing phase-II autonomous ship by 2025

MEGURI2040 Fully Autonomous Ship Project



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MEGURI2040 Second Stage

2.30 NM

2.75 NN

 On 20th July in 2023, following the success of demonstration tests in the First Stage, the Nippon Foundation announced it commenced the Second Stage of MEGURI2040 toward 2025, which intends to put autonomous ships into practical use.

LASS - CORRESPONDED - ST. MARKEN



① Technology (Autonomy level: fully autonomous operation is possible in part)

- <u>Automatic Steering Technology</u> in <u>congested</u>
 <u>sea area</u>
- <u>Automatic berthing/ Un-berthing and mooring</u>
- <u>Support and control multiple ships</u> in Fleet Operation Centers
- <u>Continued Cybersecurity</u> measures





③ Social Awareness

Realizing the <u>continued social implementation</u> and <u>enhance the international competitiveness</u> through contributing international standardization

2 Rules

Foster the understanding of fully autonomous ships through <u>educational activities for future</u> <u>generations</u>

