

MARITIME SAFETY COMMITTEE  
100th session  
Agenda item 5

MSC 100/5/2  
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**REGULATORY SCOPING EXERCISE FOR THE USE OF  
MARITIME AUTONOMOUS SURFACE SHIPS (MASS)**

**Interim guidelines for MASS trials**

**Submitted by Norway and BIMCO**

**SUMMARY**

*Executive summary:* The need for the development of interim guidelines on MASS trials was expressed at MSC 99. In order to gather information and experience, and to ensure safe operations, precautionary safety measures are needed. The proposal contained in this document could enhance such measures.

*Strategic direction,  
if applicable:* 2

*Output:* 2.7

*Action to be taken:* Paragraph 13

*Related documents:* MSC 98/23; MSC 99/5/3, MSC 99/5/7, MSC 99/5/9, MSC 99/INF.3, MSC 99/INF.8, MSC 99/INF.14, MSC 99/WP.9, MSC 99/22 and LEG 105/14

**Background**

1 The Maritime Safety Committee, at its ninety-eighth session, agreed on an output for the "Regulatory scoping exercise for the use of Maritime Autonomous Surface Ships (MASS)", with a target completion date of 2020. In doing so, the Committee encouraged Member States and international organizations to submit relevant proposals and comments to MSC 99.

2 MSC 99 gave preliminary consideration to the matter and invited interested Member States and international organizations to, inter alia, submit proposals to MSC 100 related to the development of interim guidelines for MASS trials (MSC 99/22, paragraph 5.27.2), with the aim of establishing a harmonized international framework to test MASS operations.

## Introduction

3 MASS operations might be considered as a disruptive development, where technology precedes regulation. There is therefore a need to take a precautionary approach by, inter alia, developing guidelines for MASS trials. This will enable the collection and sharing of information, so that the potential of MASS operations in international waters may be explored.

4 Work is already in progress, and both Finland and Norway have established areas for the testing of MASS operations. In this context, Norway has taken an initiative to establish an informal correspondence group to draft interim guidelines for MASS trials.

5 A number of Member States and classification societies have responded quickly to the fast-moving development of MASS by designating national waters where tests could be carried out and developing verification standards for MASS. In other transportation areas like automobiles, national policies and guidelines are issued to specify safety requirements for on-road trials. It is suggested that IMO should provide similar guidance to allow tests of MASS in international voyages and to ensure that MASS is at least as safe as manned ships, with full consideration of the safety risks and human element (see document MSC 99/5/7, paragraph 12.3).

6 Due to a gap in existing regulatory requirements with regard to autonomous operations, operational statistics and information for autonomous systems and ship operations, as well as test models to evaluate such ships, are needed. An important input to the development of the international regulatory regime for MASS is practical experience and lessons learned from trials. This experience will highlight the aspects of risk and safety that should be reflected in the regulatory regime governing MASS.

7 Given the circumstances that these guidelines may include both test trials and test areas, it may be necessary to consider the development of separate guidelines for these two issues, namely one set of guidelines for Administrations and one for the industry.

## Interim guidelines for the MASS trials

8 As indicated above, work is already in progress, as both Finland and Norway have established test areas to operate MASS. Norway has started to work on existing test areas for MASS and similar projects and has taken an initiative to establish an informal correspondence group to develop a draft framework for an interim guideline on test trials for MASS. The draft framework is set out in the annex.

## Information sharing

9 Data generated during tests and operations is not only vital for the technical development of MASS but also essential to identify and mitigate its safety risks. As a cooperation platform, IMO has always promoted information sharing, which is extremely crucial for the development of MASS. Therefore, it is suggested to develop a long-term mechanism for sharing data and lessons learned regarding projects and applications of MASS (see documents MSC 99/22, paragraph 5.25.3, and MSC 99/22, paragraph 5.17).

10 MSC 99 agreed that sharing of information and lessons learned with other United Nations bodies, such as the Division for Ocean Affairs and the Law of the Sea of the United Nations Office of Legal Affairs (OLA/DOALOS) and the International Labour Organization (ILO), and international organizations, including the International Hydrographic Organization (IHO), the International Association of Marine Aids to Navigation and Lighthouse

Authorities (IALA) and the International Organization for Standardization (ISO), as proposed in document MSC 99/5/7, was essential. This information sharing mechanism should be reflected in these guidelines (see document MSC 99/22, paragraph 5.17).

### **The way forward**

11 It is of great importance that the work related to test trials is conducted as scheduled. These matters need to be specified in a clear mandate or terms of reference directly related to MASS. Further investigation should not be delayed due to the extensive work to be done with regard to the regulatory scoping exercise on MASS.

12 The draft guidelines on MASS trials set out in the annex provides a possible way forward and may assist the Committee in finding a common approach.

### **Action requested of the Committee**

13 The Committee is invited to:

- .1 note the progress made on the proposed interim guidelines for MASS trials;
- .2 consider instructing the working group on MASS, if established, to consider the draft guidelines with a view to further development, together with an instruction to clarify the way forward;
- .3 consider if two separate guidelines would be required (i.e. one for Administrations and one for the industry); and
- .4 take any other necessary actions, as appropriate.

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## ANNEX

### INTERIM GUIDELINES FOR MASS TEST AREAS AND TRIALS

#### 1 PURPOSE

##### Introduction

These guidelines have been developed to assist operators and users of MASS test areas and trials in defining services and rules for the use of test areas and trials.

#### 2 SCOPE

#### 3 APPLICATION

##### Test areas

- 3.1 In this document, it is assumed that the test areas may have two distinct functions:
- .1 they are a facility for carrying out in situ tests of MASS and MASS systems which may or may not be open for any user; and
  - .2 they can also be a source of historical data sets, e.g. covering MetOcean, traffic density, sensor data recordings or others that can be of use to developers of MASS or MASS systems. Again, this may or may not be available to any users.

##### *General system architecture for a test area*

- 3.2 In general, a test area can be configured with one or more of the facilities listed below:
- .1 the physical area where tests can be made;
  - .2 various infrastructure for use by test vessels, for example:
    - .1 communication;
    - .2 radar, video or other land-based sensors; and
    - .3 planning and control systems, including office spaces and similar;
  - .3 services related to risk assessment, reporting and approval of tests. This may include warning systems for other ships, leisure craft or others;
  - .4 historical data provision services for analysis and planning of test runs. This would mainly be bathymetric data, AIS data, charts, MetOcean, etc.; and
  - .5 historical data provisions for calibration or test of sensor processing or navigation systems. This requires standardized media formats for AIS, MetOcean, video, radar or other data sources.

### ***Historical data collections [Information sharing]***

3.3 A test area can also be a valuable source of data, either for planning of tests or for verification of new algorithms, e.g. for object detection or classification or for manoeuvring. Data types that may be useful are:

- .1 video recordings from tests in the area. These can be used to check object detection or classification algorithms. This may be visual light recordings or various forms of low light or IR recordings;
- .2 radar recordings from same type of test runs. This has similar applications as previous. It is also interesting if simultaneous recordings of video and radar are available;
- .3 AIS data from various periods. Should probably have anonymized ship identities. This can be used to test manoeuvring algorithms, possibly in conjunction with video or radar data;
- .4 MetOcean data; and
- .5 charts and bathymetric data.

### ***General description formats for test areas***

3.4 It is useful if a general description of test areas is available to prospective users locally or in other regions, if the area has resources or test possibilities for the larger community. Information that should be available is:

- .1 location and extent of area;
- .2 types of tests that are allowed;
- .3 requirements for use of area, application procedures if relevant;
- .4 availability of infrastructure and services;
- .5 availability of historical data; and
- .6 contact point.

## **Test trials**

### ***General description for test trials***

3.5 To execute autonomous trials we need precautions and requirements that fulfil a safety level which is equal to or higher than conventional operations and sailing conditions. A trial may be defined as one singular dedicated voyage from berth to berth, or from a dedicated geographical point to end of passage (end coordinate).

### ***General system architecture for a test trails***

3.6 In general, a ship that intends to proceed on an autonomous trial (voyage or part of voyage) must be equipped and suited for the intended sailing passage (voyage) as a conventional ship. Certification and seaworthiness must be accomplished at any time of the planned route or trail.

## 4 COMMUNICATION

4.1 To conduct an autonomous trial, the Company and vessel must have obtained contact and dialogue with relevant stakeholders and informed them about the intended operation. Relevant and affected stakeholders, such as coastal administrations, maritime authorities, coast guard, and port and harbour authorities, if relevant, should be involved. A single point of contact to national governmental stakeholders in the planned route should be established.

## 5 REGULATORY REQUIREMENTS

Regulatory requirements are as follows:

- .1 tests should be in accordance with COLREG;
- .2 for each test activity, it should be considered whether the activity affects the safety and the accessibility of the waters and if the activity requires a separate permit from the coastal administration;
- .3 safety for crew, environment and ship shall be ensured and in accordance with current regulations and standards. Any regulatory deviations must be approved by the Flag and Coastal Administrations, as appropriate;
- .4 a responsible person for the operation should be designated in advance to ensure the safety of the operation. The designated person should have authority to interrupt the test activities;
- .5 before the operation is initiated, it should be subject to a risk assessment. All personnel involved in the operation should be familiar with the results of the risk assessment, and be qualified for the assessment with regard to operation;
- .6 when testing autonomous solutions, there must be an opportunity to take local control of the vessel. For remote-controlled solutions where there are no personnel on board, solutions that ensure that the vessel does not expose its own or other ships to danger of loss of control and signal should be implemented;
- .7 the coastal and maritime administrations should be notified of test activities before they take place, including a geographical indication of the specific area that will be used, the duration of the activity, and contact information; and
- .8 based on the risk assessment, the need for separate lantern management (e.g. "limited manoeuvrability"), clear labelling of test vessels, and the need for general notification of the activity of other vessels in the area (e.g. on maritime VHF) should be considered. The Maritime Traffic Center shall always be notified in advance when test activities are to take place within its service area.