【欧州】【海事】

Maritime Issues - Autonomous ships: IMO MSC's steps forward on revising international regulations for including maritime autonomous surface ships (MASS)

Andrea Antolini Former Researcher JTTRI

【概要：Summary】

In recent years, road transport underwent an accelerated development toward automation, but also in the maritime transport sector, the development of autonomous shipping is accelerating. Maritime Autonomous Surface Ships (MASS) are seen as a key element for a competitive and sustainable shipping industry of the future. Small autonomous vessels below 24 meters have reached their 2nd or 3rd or later generation of automation. However, in order to integrate autonomous ships into international maritime transport, currently existing regulations need to be reviewed and revised in order to taking account of the new autonomous and remote controlled ship technology. However, the preparation or revision of the necessary legislative basis for the utilisation of automated ships in international maritime transport is increasingly lagging behind the technological development. Existing international regulations and conventions will have to be revised. Moreover, regulations should also be made more flexible to allow for a support of the development of autonomous ships.

At its 98 session, the International Maritime Organisation (IMO)'s Maritime Safety Committee (MSC) recognized that the IMO should take a proactive and leading role in determining the safe, secure and environmentally sound operation of MASS. The MSC 99 established a correspondence group to test the framework of the regulatory scoping exercise and, in particular, the methodology on MASS. This included the set up of preliminary definitions of MASS and degrees of autonomy, as well as a methodology for conducting the exercise and a plan of work. However, since the IMO has not set up any timeline for introducing new legislation or for finalising the revision of existing laws, it could lead to a situation in which MASS will already operate in national waters long before the utilisation of MASS will be possible at international level, due to the lack of IMO regulations on MASS operations. This could cause a delay in long-term investments and market development for MASS, as ship owners might want to wait for the introduction of international maritime legislation before investing into this new MASS technology.

【記事：Article】

1. The possible advantages of maritime autonomous surface ships (MASS)

In the transport sector in general and also in maritime transport, the aspects of autonomous transport are discussed intensively. Regarding the maritime transport, remotely controlled and autonomous ships, so-called maritime autonomous surface ships (MASS), are expected to be safer, more efficient, and cheaper to run than manned ships. They are also considered being able to reduce the risk of

human errors. Even regarding the threat of pirates, autonomous ships could have advantages, as access to the ship's control could be made unavailable and crew could not be kidnapped for ransom payments. Autonomous ships would also provide owners and operators with a solution to respond to the general problem of a growing shortage of seafarers. However, protecting the ship's data streams and the IT systems from hackers would be crucial for MASS. The shipping industry's main goal from this technology is to eliminate the requirement that humans are physically present on the vessels at all times.

2. Preparation work on international legislation related to MASS at the IMO's MSC 98, 99 and 100

The aspects of MASS in maritime transport were discussed at the IMO's MSC 98 in June 2017 in order to prepare the necessary rules that would regulate all aspects of the operation of MASS. The MSC 98 agreed that the IMO should take a proactive and leading role in determining instruments for the safe, secure and environmentally sound operation of MASS. Since for each instrument related to maritime safety and security, and for each degree of autonomy, provisions will have to be identified at international level, all the IMO instruments will have to be checked regarding the utilisation of MASS and how it affects them. Proper consideration should be given to all legal aspects of commercially operated ships in autonomous/unmanned mode, including the question of responsibility in case of an accident involving a MASS.

In April 2018, the IMO's Legal Committee introduced a work programme on MASS, with a target of completion in 2020. The aim of the IMO Legal Committee is to do a gap analysis of liability and compensation treaties and to scope the work required for MASS. This complements the work being done by the IMO's MSC on autonomous vessels.

The MSC 99 meeting from 16 to 25 May 2018 started its work how to integrate the MASS operations into the safety, security and environment related IMO instruments. The MSC 99 established a correspondence group on MASS to test the framework of the regulatory scoping exercise agreed at the session and, in particular, the methodology. The scoping exercise will consider an extensive range of issues, including the human element, safety, security, interactions with ports, pilotage, responses to incidents and protection of the marine environment.

Regarding the regulatory scoping exercise, the MSC also agreed on preliminary definitions of MASS and degrees of autonomy. MASS are ships, which, to a varying degree, can operate independently of human interaction. In order to facilitate the progress of the regulatory scoping exercise, the degrees of autonomy are organized (non-hierarchically). The MSC identified four degrees of autonomy for the purpose of the scoping exercise. Firstly, a MASS could be a ship with automated processes and decision support. Seafarers are on board to operate and control shipboard systems and functions, while some operations may be automated. Secondly, a MASS could be a remotely controlled ship with seafarers on board. However, the ship is controlled and operated from another location, while seafarers are still on board. Thirdly, a MASS is a remotely controlled ship without seafarers on board. It is a ship solely controlled and operated from another location. Finally, the fully autonomous ship is a ship with an operating system that is able to make decisions and determine actions by itself.

As a first step, the scoping exercise identifies current provisions in an agreed list of IMO instruments and assesses how they may or may not be applicable to ships with varying degrees of autonomy and/or whether they may preclude MASS operations. As a second step, an analysis is conducted to determine the most appropriate way of addressing MASS operations, taking into account the human element, technology and operational factors.

The correspondence group on MASS had to report back to the MSC 100. Also the IMO member states and international organizations were invited to submit proposals related to the development of interim

guidelines for MASS trials to the MSC 100 from 3 to 7 December 2018.

The MSC 100 received the correspondence group's report on the testing of the proposed methodology for the regulatory scoping exercise on autonomous surface ships, taking into account different levels of autonomy. The correspondence group on MASS considered the treaties including those covering safety (SOLAS); collision regulations (COLREG); loading and stability (Load Lines); training of seafarers and fishers (STCW, STCW-F); search and rescue (SAR); tonnage measurement (Tonnage Convention); and special trade passenger ship instruments (SPACE STP, STP). The MSC 100 also approved the regulatory scoping exercise on MASS. The initial review of the IMO's instruments was expected for the first half of 2019.

3. Decisions on MASS at the IMO's MSC 101 session

At its 101st session from 5 to 14 June 2019, the IMO's MSC 101 was updated on the scoping exercise's progress regarding the safe, secure and environmentally sound operation of MASS. Provisional principles for the development of such guidelines were discussed. The MSC decided on further aspects of the utilisation of autonomous ships and developed a framework for analysing applicable IMO regulations and the possible gaps between current regulations and the technological development. The MSC 101 made progress on the scoping exercise in order to develop a regulatory overview on the necessary revisions in order to establish a safe, secure and environmentally sound operation of MASS within the IMO instruments. The first step is underway - identifying, in the relevant treaties, provisions which: apply to MASS and prevent MASS operations; or apply to MASS and do not prevent MASS operations and require no actions; or apply to MASS and do not prevent MASS operations but may need to be amended or clarified, and/or may contain gaps; or have no application to MASS operations. Once the first step is completed, a second step will be conducted to analyse and determine the most appropriate way of addressing MASS operations, taking into account, the human element, technology and operational factors. A framework was approved and active participation in the current regulatory scoping exercise (RSE) on the use of MASS was encouraged. Until the next meeting of the MSC in December 2019, the framework will be tested on a selected few rules under the supervision of the Finnish delegation.

The most important outcome of the MSC 101 was the approval of an initial set of guidelines for conducting trials with autonomous ships. The trials should be conducted with at least the same degree of safety, security and protection of the environment as provided by the relevant instruments. Furthermore, the risks associated with the trials should be appropriately identified and measures to reduce the risks should be put in place. On-board or remote operators of MASS and any personnel involved in MASS trials should be appropriately qualified and experienced to safely conduct the MASS operation in the trial, among others. Furthermore, appropriate steps to ensure sufficient cyber risk management of the systems should be taken.

Before the next MSC in December 2019, an intersessional working group meeting will be held in September 2019 to consider the results of the first step; to consider themes and/or relevant findings identified during the first step, to consider how the outcome of the second step should be reported to MSC 102 and to provide a report to MSC 102 in May 2020. The aim is to completing the regulatory scoping exercise in 2020. However, IMO's Secretary-General Kitack Lim stated that there is no timeline for rules governing autonomous ships and it could take up to 10 years before all necessary rules are adopted. Therefore, the autonomous shipping technology could be ready long before the IMO's regulations would be implemented.

4. Conclusion and outlook

Remotely controlled and autonomous ships are expected to be safer, more efficient, and cheaper to run than manned ships. They are also considered being able to reduce the risk of human errors. Therefore,

autonomous and unmanned vessels are seen as a key element for a competitive and sustainable shipping industry of the future. Considering the latest development regarding MASS, the main conclusion is that remotely controlled ships will be used in future. Based on their advantages regarding the expected higher level of safety, greater efficiency and cheaper operation, there is no doubt that autonomous shipping will continue to develop throughout the maritime transport industry at global level. As a first step, it is expected that a larger number of minimally manned and unmanned ships will come into operation in the next years.

However, the introduction of MASS needs an adaptation of the respective legislation at international level, which seems to be lagging behind. The two-year IMO regulatory scoping exercise for MASS is underway to determine how existing IMO instruments can be revised in order to cover autonomous ships. The MSC's scoping exercise for MASS includes the initial review of the IMO's instruments and the MSC working group should complete the regulatory scoping by 2020. The overall approach is to regulate autonomous vessels in a way that they reach at least the safety levels of conventional ships. The shipping industry considers it as important that regulations adjusted for the autonomous ships' technology should not be a hindrance to further advances in this technology. Regulations should also be made more flexible to allow for a support of the development of autonomous ships.

However, the regulation for autonomous ships could still be years away since the establishment of safety rules for autonomous ships is a lengthy process, while the IMO has not set any timeframe to finalise the adaptation of regulations. Countries including Finland, Japan, South Korea and the United Arab Emirates — as well as the trade body BIMCO — have already expressed their worries that IMO might not have guidelines ready before the technology is implemented.

On the other hand, trials of autonomous vessels are already taking place at national level, as autonomous ships that carry out short trips on national waters will only need approval by local regulators. In Europe, in particular Norway is supporting the development of MASS operations and Norway has already dedicated some sea areas for MASS testing. The 80 m long Yara Birkeland autonomous container ship is due to be launched in 2019 and following trials with a small crew on board, it will be operating autonomously by 2020. The autonomous container ship is planned to sail between Yara's Norwegian production facilities at Herøya and the ports of Brevik and Larvik in Norway. Furthermore, in April 2019, Wilhelmsen and KONGSBERG established the first autonomous shipping company named "Massterly". Wilhelmsen and KONGSBERG are joining forces to take the next step in autonomous shipping by offering a complete value chain for autonomous ships, from design and development, to control systems, logistics services and vessel operations.

Since IMO Secretary General, Kitack Lim noted that there is no timeline for when crewless ships will get permission for international maritime transport and that any new legislation would be based on current practices for safe navigation, it could well lead to a situation in which MASS will already operate in national waters before the international regulations have been revised to allow for MASS operations. In this context, the concern is that long-term investments in MASS could be held back as ship owners might wait for the IMO's maritime rules to catch-up to the new generation of vessels. Therefore, regulators will need to move quicker in their revision work because the technology is advancing rapidly and ship owners will want to have clarity on the regulation before investing in the technology. More national authorities could approve MASS operations in national waters, but it will need the IMO to introduce adaptations on MASS within the global regulation instruments in order to open the global shipping market for MASS operations.

References:

https://ww2.eagle.org/content/dam/eagle/regulatory-news/2019/msc101-brief.pdf, retrieved 18 June 2019

http://www.imo.org/en/MediaCentre/PressBriefings/Pages/08-MSC-99-MASS-scoping.aspx, 25/05/2018

http://www.imo.org/en/MediaCentre/MeetingSummaries/MSC/Pages/MSC-100th-session.aspx

Maritime Safety Committee (MSC), 99th session 16-25 May 2018. In:

http://www.imo.org/en/MediaCentre/MeetingSummaries/MSC/Pages/MSC-99th-session.aspx, retrieved 18 June 2019

http://www.imo.org/en/MediaCentre/WhatsNew/Pages/default.aspx, 04/12/2018

https://lloydslist.maritimeintelligence.informa.com/LL1127790/Japan-looks-to-unmanned-ships-to-offset-labour-shortage

https://safety4sea.com/regulation-for-autonomous-ships-could-be-years-away/, 10/06/19, retrieved 18 June 2019

https://worldmaritimenews.com/archives/252699/autonomous-ships-to-take-the-spotlight-at-imo-meeting/, 18 June 2019, retrieved on 15 June 2019

IMO: IMO takes first steps to address autonomous ships. Briefing: 08 25/05/2018. In:

http://www.imo.org/en/mediacentre/pressbriefings/pages/08-msc-99-mass-scoping.aspx, retrieved 18 June 2019

IMO Moves Forward to Address Autonomous Ships. In:

https://worldmaritimenews.com/archives/253639/imo-moves-forward-to-address-autonomous-ships/, retrieved 18 June 2019

IMO'S MSC Meeting Preview. In:

http://www.imo.org/en/MediaCentre/IMOMediaAccreditation/Pages/MSC-101-preview.aspx, 2019-05-29, retrieved 6 June 2019

IMO's MSC Approves Measures To Improve The Safety For Seafarers When Mooring Ships. In:

https://www.marineinsight.com/shipping-news/imos-msc-approves-measures-to-improve-the-safety-for-seafarers-when-mooring-ships/, June 14, 2019, retrieved 18 June 2019

Maritime Safety Committee (MSC) is meeting for its 101st session. In:

https:/shipip.com/new/maritime-safety-committee-msc-is-meeting-for-its-101st-session/, June 13, 2019, retrieved 18 June 2019

Maritime Safety Committee (MSC), 101 session, 5-14 June 2019. In:

http://www.imo.org/en/MediaCentre/MeetingSummaries/MSC/Pages/MSC-101st-session.aspx, 14/06/2019, retrieved 18 June 2019

Maritime regulators must move faster to bring about autonomous ships. In:

https://www.ship-technology.com/comment/autonomous-shipping-2019/, 11 June 2019, retrieved 18 June 2019

MSC 101 Brief. In:

https://ww2.eagle.org/en/rules-and-resources/regulatory-news/regulatory-news/msc-101-brief.html, retrieved 18 June 2019

Report Autonomous shipping. In:

http://www.imo.org/en/MediaCentre/HotTopics/Pages/Autonomous-shipping.aspx, 6 June 2019, retrieved 18 June 2019

Wiese Bockmann, Michelle: IMO in race against technology to develop autonomous shipping guidelines In:

https://lloydslist.maritimeintelligence.informa.com/LL1127786/IMO-in-race-against-technology-to-develop-autonomous-shipping-guidelines, 05 Jun 2019, retrieved 6 June 2019

Wilhelmsen and KONGSBERG establish world's first autonomous shipping company. In:

https://www.kongsberg.com/news-and-media/news-archive/2018/wilhelmsen-and-kongsberg-establish-worlds-first-autonomous-shipping-company/, 3.4.19, retrieved 24 June 2019