



Working Group examines impact of autonomy on IMO conventions

In September 2019, experts from around the world gathered at the IMO headquarters to discuss how to proceed on the topic of Maritime Autonomous Surface Ships (MASS). The main goal of the 1st Intersessional Working Group (WG) on MASS was to consider the results of reviews undertaken by IMO member States and to prepare a report for submission to Maritime Safety Committee (MSC) ahead of its 102nd session planned for May 2020.

Regulatory Scoping Exercise (RSE)

To facilitate the process of the RSE, the degrees of autonomy have been agreed in MSC 100 to:

Degree 1 – Ship with automated processes and decision support. Seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated and at times be unsupervised but with seafarers on board ready to take control.

Degree 2 – Remotely controlled ship with seafarers on board. The ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions.

Degree 3 – Remotely controlled ship without seafarers on board. The ship is controlled and operated from another location. There are no seafarers on board.

Degree 4 – Fully autonomous ship. The operating system of the ship is able to make decisions and determine actions by itself.

From the start of this meeting, the focus was on understanding potential gaps in the RSE. In particular, the applicability of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) was scrutinized. Notably, a series of assumptions were made to ensure the review focused on the content of the STCW Convention and Code and not on the operational and equipment carriage requirements from other Conventions. Those assumptions included:

1. the applicability of the Convention;



2. the definition of the term 'seafarer';
3. the definition of the term 'remote operator'.

The review found:

- The STCW Convention only applies as long as seafarers are onboard.
- The STCW Convention must be amended to reflect the changing skills requirement as a result of technological progress.
- The STCW Convention would still apply to security functions.
- The 'remote operator' training definition will be deferred to future sessions.

Interestingly, the STCW is normally the last instrument to be considered when implementing new amendments, yet in the case of MASS it sits at the front of the queue even though the role and competencies of 'remote operator' are still to be fully defined.

The WG agreed that the term 'potential gaps' will be used to determine where there is likely to be a gap between the current legislation and the expected requirement. The discussion identified that a legal framework for the 'remote operator' will highlight significant gaps between the Convention and MASS operation. The regulations relevant to MASS may need to be revisited if remote control operators are recognized as seafarers and thus subject to the Convention. Moreover, regulations of chapters II, III and IV contain gaps for MASS operation under the degrees of autonomy 1 and 2 considering the necessity to add relevant KUPs (Knowledge, Understanding and Proficiency) when new technologies or automated processes are introduced on board. Discussion to clarify whether seafarers would be available only during emergency operations concluded this would not be the case.

STCW-F 1995 – a separate version of STCW for personnel on fishing vessels >24m in length – is currently undergoing comprehensive review, which is expected to bring it more in line with the structure of STCW 1978 and the STCW Code. Therefore, it is recommended that the RSE for the STCW 1978 and STCW Code to be given immediate priority.

SOLAS Chapter VII - IMDG Code - IBC Code

Discussions pertaining to ships carrying dangerous chemicals in bulk revolved around clarifying roles onboard including the definition of the role of Master and crew; certain manual operations and tasks; and emergency response. It was concluded autonomous vessels would have to adopt appropriate alternative safety measures so as to achieve the functionalities intended by the existing regulations. Future work will look to develop an understanding of the level of risk owing to absence of persons on board.

Establishing emergency procedures to deal with leakages, spillages or fires involving cargoes was identified as a major challenge – particularly in terms of preventing harmful substances entering the marine environment.

At this stage it is understood that seafarers onboard will take control at autonomy levels 1 or 2 but it remains unclear what their role will entail.

SOLAS Chapter III on Life Saving Appliances (LSA)

SOLAS Chapter III and LSA Code relates to when passengers are transported onboard. As regulations stand seafarers will still be required on board for the foreseeable future in accordance with SOLAS regulation III/10. The purpose is to assist and/or evacuate passengers in an emergency situation. Technology and appropriate safety cases must be developed to fill this gap before autonomy levels 3 and 4 are realised. Greater clarity is also needed on the roles and responsibilities of MASS during man overboard situations. Further work will concentrate in these areas.

Crew to board a vessel will always require LSA. Further investigation is necessary for personnel boarding a vessel in port where they could be provided with LSA. As a result, training of personnel onboard to deal with emergency situations will still be required.

SOLAS Chapter II-1 on construction - 1/2/1

At autonomy level 3 and 4, the impact on personnel other than seafarers on board such as specialists or maintenance personnel will be reviewed. This may call for a new code rather than a chapter amendment.

SOLAS Chapter V on safety of navigation – 1/2/16

The question of excluding passenger vessels from autonomy levels 3 and 4 will be addressed during phase 2 of RSE.

Whilst a new mandatory Code for autonomy levels 3 and 4 may have to be developed alongside ISM, discussion suggests that SOLAS Chapter IX on the management for the safe operation of ships and the ISM may be the key instrument in MASS moving forward.

SOLAS Chapter XI-1 on special measures to enhance maritime safety and associated codes. So far, the associated codes that have been reviewed are the International Code on The Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers, 2011 (2011 ESP Code), the Code for Recognized Organizations (RO Code) and the Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code).

The outcome was that certificates and manuals onboard require further clarification under autonomy 3 and 4. This is to include functions, rights and responsibilities as required by remote operating centres, including personnel. While the WG was tasked to consider if the issue of onboard certificates is already solved by the e-certificate policy, the rights and responsibilities of remote operating centres are part of a broader discussion relating to the overriding issue of the definition of Master on degrees of autonomy 2, 3 and 4.

Annex of SOLAS Chapter XII on additional safety measures for bulk carriers. There are some provisions which require actions by personnel onboard. Examples include

onboard maintenance, and provisions on alarms and accessibility. Appropriate alternative safety measures should be adopted to achieve the equivalent functionalities intended by the existing regulations.

SOLAS Chapter XIV on safety measures for ships operating in polar waters and the International Code for Ships Operating in Polar Waters (Polar Code). Functions, rights and responsibilities of remote operating centres is part of the broader discussion which also relates to the overriding issue of the definition of Master on degrees of autonomy 2, 3 and 4.

COLREGs

The terminology related to a human centric approach will have to become less human-centric. This includes revising terms such as 'ordinary practice of seaman', 'good seamanship', 'sight and hearing' among others, as well as considering the potential reduction of the level of human interaction.

The role of the Master in relation to rule 2 (Responsibility) requires clarification particularly when in control of a vessel with no Master onboard.

Lights, shapes and sound signals will also have to be revisited going forward.

COLREG compliance will require a lot of work in the future. Some IMO members States, during both the initial review and the commenting stage, highlighted that MASS should comply with the COLREGs in their current form. However, there was some objection from the floor that over-regulating at this point may stifle the necessary technological development by the industry. It was countered that work must remain technology neutral and not swayed by the limitations of current technology.

IMO's Global Integrated Shipping Information System (GISIS) informed much of the work carried out during the initial phase and this should be utilised as a basis to guide the work of the second phase where possible. However, it remains unclear from this initial review as to which recommended route would represent the best way to address MASS operations.

Development Guidance for second phase

The intersessional WG on MASS will be submitting the results of phase one to MSC 102. Perhaps the most significant outcome is that MASS could utilize new technologies to reduce risks to safety brought by traditional ship operations such as the negative effects associated with the human element. However, MASS could also introduce new risks to maritime safety, security and environment that are not yet understood. MASS should be treated as an evolving technology so that requirements can be maintained with greater agility. In this regard, the next steps should be based on the three principles: flexibility, integrity and efficiency.

It is important to prioritize areas of focus. For any regulations produced in the future, the approach should be to look into the easiest way entering into force. A further

suggestion was shifting the rhetoric from talking about autonomous ships to talking about autonomous functions.

The results of the second phase are expected to provide suggestions on how to progress the work after MSC 102, especially on the priorities of future actions. Meanwhile, it would be helpful to highlight the uncertainties and challenges faced in the second phase, if any.

A review in the definitions of autonomy will likely follow the RSE.

IMarEST future engagement

IMarEST will continue its involvement within the Intersessional WGs and will participate in the forthcoming discussions.

The [MASS Special Interest Group \(SIG\)](#) is considering the future of Education and Training as well as the UN Sustainable Development Goals (SDGs), the technological progression and the ethical use of technology for the betterment of human beings. This also includes recommendations on the training requirements for the future 'remote operator'. The MASS SIG will more closely engage with representatives from member States to further investigate which competency requirements should and could be removed from the STCW and STCW-F as well as to encourage the standardization of remote and autonomous vessel operations.

To get involved or to understand more on the issue of maritime autonomous surface ships, please join the [MASS Special Interest Group \(SIG\)](#)