



MARITIME AUTONOMOUS SURFACE SHIPS - THE RISE OF THE MACHINE

In our April 2017 briefing, we discussed the rise of autonomous technology at sea; one month later we saw Yara and Kongsberg announce their partnership to build world's first autonomous and zero emissions ship. The operation of the vessel *YARA BIRKELAND*¹ is planned to start in the latter half of 2018.

1. 3D render image of the *YARA BIRKELAND*
<http://hugin.info/134793/R/2103105/797687.png>

“...one of the benefits of these collision avoidance systems is their potential to be integrated with existing systems on conventional ships to assist bridge awareness. Surely something for ship owners to investigate if it means potentially reduced insurance premiums and accidents?”

More recently, Kongsberg have also been named as the primary technology partner of Bourbon in an agreement which will see the world's first autonomous, fully-automated prototype offshore vessel being built. In our initial briefing, we observed that the biggest hurdle facing developers was not the technology itself, but regulatory issues. Three months on and the Maritime Safety Committee (MSC) – the highest technical body of the International Maritime Organization (IMO) – has now approved a scoping paper² to address how existing IMO regulatory instruments can be applied to the safe, secure and environmentally sound operation of maritime autonomous surface ships (MASS).

IMO scoping exercise

The scoping exercise, which is likely to require two sessions of the MSC, will consider those IMO instruments that currently preclude the operation of MASS and those IMO instruments that require amendment or supplement. Once the scoping exercise is complete, and subject to the agreement of the IMO countries, work is likely to begin on revising regulations, although it is understood that the IMO's intention is for the existing international framework to remain intact³. The organisations behind the scoping paper are

hopeful that a regulatory framework incorporating MASS will be in place by about 2028.

Conventional ships will not disappear completely, and the future scenario is that they and MASS will coexist and share the same waters. But if MASS are to be successful on a global scale, a number of hurdles will have to be overcome, such as: defining what a MASS is; liability issues; cyber security; maintenance and operation; and the human element, (including autonomous and remote-controlled vessels). This will entail experts harvesting the various autonomous initiatives currently underway, so that technical experts can deal with challenges to ensure the safety and security of the marine environment.

Collision Avoidance Systems

For MASS to operate effectively they will require collision avoidance systems that are compliant with the International Rules for the Prevention of Collisions at Sea 1972 (COLREGS). While a number of companies have developed effective collision avoidance systems, as we pointed out in our April 2017 briefing, full compliance with the COLREGS is difficult because this requires real-time human judgment to consider making a departure from the Rules necessary to avoid immediate danger.

Nevertheless, some companies have demonstrated collision avoidance systems that can operate on autonomous testbeds in complex waters in compliance with the manoeuvring rules of the COLREGS. These collision avoidance systems generally use a combination of sensors such as fused AIS, LIDAR (Light Detection and Ranging), Infrared Cameras and radar to support the detection of objects. While the detection of vessels is straightforward, automatically classifying vessels to act in accordance with the COLREGS can be challenging, particularly small vessels not using AIS.

But one of the benefits of these collision avoidance systems is their potential to be integrated with existing systems on conventional ships to assist bridge awareness. Surely something for ship owners to investigate if it means potentially reduced insurance premiums and accidents?

IACS: On Board Use and Application of Programmable Electronic Systems (E22)

The International Association of Classification Societies (IACS) has mandated that all of its members shall implement a unified requirement in relation to the

2. The scoping paper was submitted at the 98th session of the MSC by Denmark, Estonia, Finland, Japan, the Netherlands, Norway, South Korea, the UK and US.

3. For example, the IMO has said that it will not carry out an overhaul of the International Rules for the Prevention of Collisions at Sea 1972.



on board use and application of computer-based systems on new build vessels. The requirements in E22 apply to design, construction, commissioning and maintenance of computer-based systems where they depend on software which controls various functions and systems on board the ship. For example, the rules will apply to monitoring functions for information and administrative tasks, alarm and monitoring functions of manned and unmanned spaces, and control functions that are necessary to maintain the ship during normal operating conditions.

E22 also deals with who is responsible for the coding of any computer or control system that is installed on board the vessel, and ongoing responsibility for maintaining the system once it has been handed over to the owner upon delivery.

The Code is generally considered as the first step in paving the way for greater autonomy in remote control on board ships.

MASS: what next?

Given that an international regulatory framework is unlikely to be in place until 2028 at the earliest, we are unlikely to see fully autonomous vessels carrying goods between continents until at least 2030, if not later. That said, hardly a day goes

by without a new initiative or the aspirations of some companies being announced in the press. Indeed the biggest driving force in the development of MASS and remote-controlled ships is coming from the cargo industry rather than ship owners. Take for example the mining giants BHP Billiton and Rio Tinto, both of which recently announced that they are seeking strategic partners to use MASS to transport their dry bulk cargo around the world within a decade.

But while MASS operating globally might seem a long way off, in the shorter term we will see MASS operating in national waters, such as autonomous offshore support vessels which we discussed in our April 2017 briefing. However, perhaps one of the most exciting projects currently in development is the link-up between the Norwegian maritime technology firm Kongsberg and the Norwegian fertilizer company Yara to develop and build what is claimed will be the world's first fully electric and autonomous container ship, with zero emissions. Yara claims that the vessel will remove up to 40,000 truck journeys in populated urban areas and will be manned initially, before moving to remote operation in 2019 and being capable of operating autonomously from 2020⁴.

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4. <https://www.km.kongsberg.com/ks/web/nokbg0238.nsf/AllWeb/98A8C576AEFC85AFC125811A0037F6C4?OpenDocument>

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