

IN FOCUS: Autonomous Vessels

There is growing interest in the development of autonomous vessels. Norway is taking the lead in this cutting-edge sector.

A small number of projects have got the shipping sector thinking about the future of vessel design and the possibilities beyond manned vessels. This In Focus highlights what is happening within this niche sector and provides insight in to who is doing what and where.

As we know the future is an ever-changing horizon of technological development and breath-taking engineering. We at Ocean Shipping Consultants enjoy hearing about new technologies and potential developments within the port and shipping sectors.

In recent years there have been massive advancements in technology occurring within the land-based autonomous vehicle sector that make driverless cars a real possibility in the next few years. Technical and legislative hurdles still need to be overcome/rewritten for fully automation of the vehicle landscape, but it is only a question of when this will happen rather than if it will happen.

Similarly, it seems this is now true within the shipping sector. The development of autonomous vessels is being taken seriously and test vessels are about to hit the water. As with the development of software within cars during the 2000s, the march towards autonomous shipping is a development of current systems on-board with added sensors (and significant software development).

There are a few autonomous vessels in development, with the most advanced currently being the *YARA Birkeland*. The project is being developed by two Norwegian partners: Yara, a leading crop nutrition and nitrogen producer and Kongsberg, a technological solutions provider to the marine industry. The design is a 120 TEU open-top container vessel with full electric propulsion.

Autonomous vessel: YARA Birkeland



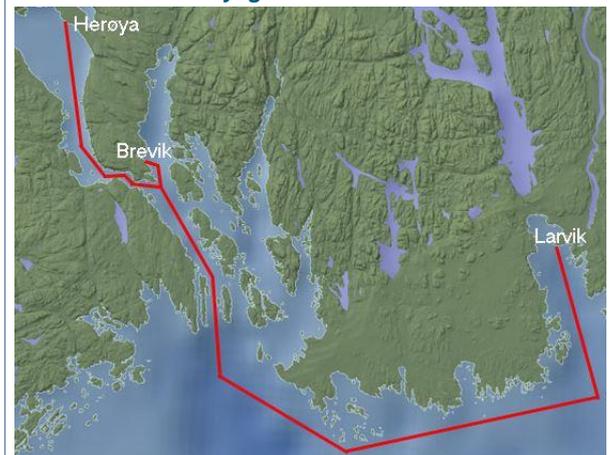
© Kongsberg

The *YARA Birkeland* will transport fertilizer products from Yara's production plant in Porsgrunn, southeast Norway, to both Brevik and Larvik for onward distribution.

The distance between the production plant in Porsgrunn to

the Port of Larvik is approx. 30 km and 58 km (32 nautical miles) by sea. Currently around 100 twenty-foot containers of fertilizer product are transported by truck from Porsgrunn to the ports. By utilising the *YARA Birkeland*, there will be a significant reduction in the number of truck journeys. Even though the voyage is longer than the road route, it will significantly reduce NO_x and CO₂ emissions, as well as improve road safety in the region by eliminating 40,000 truck journeys.

YARA Birkeland Voyages



© Kongsberg

In addition to the *YARA Birkeland*, being the first fully-electric autonomous vessel. The vessels batteries will get their energy from clean Norwegian hydropower, and be charged during loading and unloading. This will mean that the vessels will consume zero fossil fuels during its life time. In addition, the land side operations of loading and unloading will be undertaken via electric cranes and other machinery.

Full autonomous operations will be rolled-out in several phases, which will give Yara and Kongsberg time to test the advanced systems that enable operations without a crew on board. The vessel is scheduled to sail during 2018, and will be initially operated with a crew. Then through 2019 it is expected to be remotely operated. During 2020, it is anticipated that the vessel will be fully autonomous.

All this new technology comes at a cost, with the development and construction of the vessel being significantly higher than for a conventional ship of similar size.

However, there are indirect savings, such as by replacing truck transport and utilising electric power. Also, there are substantial savings throughout the lifetime of the vessel by eliminating the need for crew and accommodation areas. This will help reduce CAPEX at the design and build phase and will also provide a reduction in OPEX.

The small area in which the vessel will operate provides an ideal platform to introduce full maritime autonomy. The vessel will sail within 12 nautical miles of the coast, between selected ports. The whole area is covered by the Norwegian Coastal Administrations' Vessel Tracking System (VTS) located in Brevik. There will be three centres that will handle different aspects of the operational profile of the vessel. These centres will focus on the emergency and exception handling, condition and operation monitoring, decision support, surveillance of the ship and its surroundings, and all other safety related considerations. Yara will also build a mission management/logistic centre in Prosgrunn, while Kongsberg Maritime will establish a shore control centre to monitor the ship's autonomous operations.

This development highlights that there are no longer any technical limitations to constructing relatively large, unmanned autonomous vessels. The key obstacles are mostly legislative and regulatory, although for this project there has been good collaboration within the various Norwegian governing bodies and authorities.

Whilst YARA *Birkeland* is by far the most advanced autonomous vessel, there are others that will be close behind it. Kongsberg is also working with Bourbon of France and Automated Ships Ltd of the UK on an offshore support vessel.

The *Hronn* – as the vessel is known, is a light-duty, offshore utility ship servicing the offshore energy, scientific / hydrographic and offshore fish-farming industries. It is intended to be used for survey, remotely operated vehicle systems deployment, touch-down monitoring, unmanned underwater vehicle launch, recovery and monitoring, light intermodal cargo delivery and delivery to offshore installations, and open-water fish farm support.

Hronn – Autonomous Offshore Vessel



© Hronn Project

In addition, Kongsberg signed a Research & Innovation (R&I) contract with PILOT-E for the development of a zero-emissions, full-electric, autonomous ferry concept. This project is in the early stages, but will incorporate many innovative companies in Norway that are investing in autonomous technology.

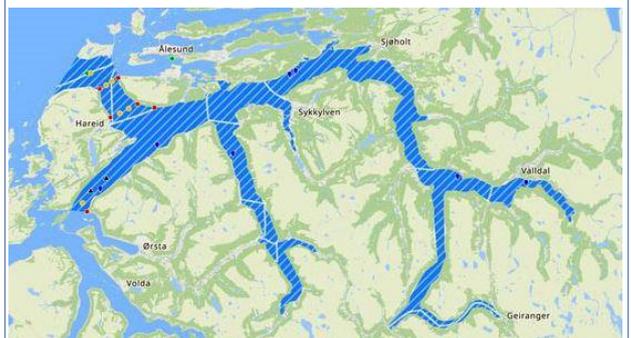
PILOT-E Ferry Project



© Kongsberg

Such is the belief in autonomous vessels in Norway, that there are already two areas for testing autonomous vessels. The first was the area of Trondheimsfjord, which became the world's first such designated area for the testing of autonomous ships in 2016. Then in September 2017 Storjord became the second area for testing autonomous ships.

Storfjord Autonomous Vessel Test Area



© Rolls-Royce Marine

As was the case with LNG as a fuel a decade ago, Norway seems to be leading the rest of the world in autonomous shipping. Whilst we are several years away from fully automated vessel movements, it is only a question of time before the real impact is felt within the larger shipping and port community. How will this impact the industry? How will ports develop and enable autonomous vessels to call? Which vessel type will be the first to be built? Which port will have the first vessel call? All these questions are to be answered in the future, but for now we look forward to seeing how this incredibly interesting and cutting edge sector develops.



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David Bull has over 18 years' experience of the maritime sector having worked for Lloyd's List, Drewry and Braemar Seascope shipbrokers. As a Principal Consultant and Project Manager at OSC, David's main work lies in providing analysis, market insight for due diligence, economic feasibility and trade and traffic forecasting models. His main focus is on the energy sector. He specialises in services for the LNG, offshore and liquid bulk markets. David has a BSc in Geography and holds a CFA Investment Foundation certificate.

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