

# Full steam ahead: Recent developments in maritime autonomous technology

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Autonomous technology is advancing in every sector, and the maritime industry is among those at the forefront.

Much of the focus in shipping has been on using autonomous technology on commercial vessels and perfecting remote navigational systems for ocean carriage. There have, however, been several recent advancements in further automating the industry as a whole. These advancements include automated container operations, autonomous technology for inland routes and the creation of standard contracts for autonomous vessels. In this edition of *The Sensor*, we review the potential of these latest developments and the hurdles that still need to be overcome.

## Automated container operations

While many ports already incorporate automation, there is room for expansion and connection with other aspects of autonomous vessel technology.

Partnering automated crane-equipped container ships with autonomous port vehicles to facilitate a faster and more reliable transfer of containers from vessels to trucks and other inland transportation is one suggestion. Automated cranes are currently used at numerous ports. Onboard deck-mounted cranes could be used to self-load and self-unload vessels in other areas of the port where cranes are absent. In addition, the use of autonomous port vehicles in connection with on-board automated cranes could reduce the wait time for manually-operated trucks and their drivers, as well as human error.

This partnered technology could potentially increase the efficiency of smaller international ports that face delays in transfer time between their inland terminals. For example, the Port of Halifax is considering the development of new container transfer technologies, including the paired use of automated cranes and semi-autonomous container trains to shorten loading, unloading and transfer time between terminals.<sup>1</sup> Similarly, the Cast Container Terminal in Montréal recently ordered several ship-to-shore container cranes to be delivered this year.<sup>2</sup>

These ports are not alone. A 2017 survey of the top ports in China, Europe, the Middle East, Singapore and the United States found that 80 per cent of respondents expected that at least half of all greenfield port projects would be semi- or fully automated within the next five years.

While increased automation may reduce operating costs and increase productivity, there are still major barriers to implementing this technology.<sup>3</sup> These barriers include finding experienced personnel to fill the specialized technical positions required to operate the technology, establishing a data infrastructure sufficient to monitor the automated operations and the tendency to develop siloed automated operations instead of collaborative and integrated systems.<sup>4</sup> It is also important to acknowledge the impacts of automation on the current shore-side workforce, and the potential for labour opposition and disruption, such as that currently being experienced in the Port of Melbourne.<sup>5</sup>

## **Autonomous technology for inland routes**

While there has been significant focus on using autonomous navigation technology for ocean carriage, an area that has received less attention is inland shipping. These routes present different challenges compared to ocean carriage due to their more narrow and shallow channels and increased traffic.

The Port of Antwerp is working with University of Antwerp to develop specialized navigation technology for inland routes. The proposed technology would employ echolocation through 3D sonar sensors, paired with sophisticated waterproof microphones. Like the echolocation used by bats or marine mammals, the microphones would emit sound waves, which produce echoes when they come into contact with objects. Those echoes are then interpreted by the 3D sonar sensors and used to avoid obstacles.

Other inland navigation systems have attempted to use cameras, but such technology presents difficulties in poor visibility, including murky waters or fog. Sonar sensors remain fully functional in such conditions. This technology had its first successful test run in the Port of Antwerp in December 2020 and further pilot projects are set to occur in 2021.<sup>6</sup> **Specialized navigation technology could be particularly useful in Canada's inland waters, especially in the Saint Lawrence Seaway.**

## **Standard contracts for autonomous vessels**

Despite the push to make autonomous vessels operational, there has been little discussion on how contractual relationships may change with these new vessels. Beginning in late 2020, the Baltic and International Maritime Council (BIMCO), the largest of the international shipping associations, began drafting a standard contract for autonomous vessels. This standard contract, which is adapted from their widely-used SHIPMAN 2009 agreement, will include provisions for autonomous vessel-related services and the operation of a remote control centre.

BIMCO anticipates that, in most cases, operating autonomous vessels will involve third-party ship managers acting as technical managers for the vessel and providing the remote control centre and personnel to operate the vessel. The new standard contract,

titled AUTOSHIPMAN, is expected to be published in 2021. However, BIMCO recognizes that the initial draft of the AUTOSHIPMAN contract will likely be subject to revisions as the industry becomes a reality.<sup>7</sup>

## Takeaways

These advancements demonstrate that all aspects of the maritime industry are moving towards automation and embracing autonomous technology. Though the technology continues to push forward, there are still unanswered questions about what this new industry will look like and how it will be governed.

Many international conventions and domestic laws have not been updated to address autonomous technology. It remains unclear how autonomous vessels could comply with some of the current legislation, particularly those that go beyond safe operation of the vessel. Other concerns include the long-term impact of autonomous technology on maritime industry jobs, the implications for insurers in the absence of updated legislation that can address issues surrounding liability, and the heightened threats of cyber hacking and terrorist takeover of autonomous vessels.

Although it is difficult to predict how the future of autonomous vessels and technology will unfold, the voyage will certainly be an interesting one.

<sup>1</sup> Valentine, Harry, “Increasing Future Container Transfer at the Port of Halifax,” *The Maritime Executive*, 17 January 2021.

<sup>2</sup> Port Technology International Team, “Montreal Gateway places order for Liebherr ship to shore cranes,” *Port Technology*, 23 January 2020.

<sup>3</sup> Chu, Fox, Sven Gailus, Lisa Liu, and Liumin No, “The Future of Automated Ports,” *McKinsey & Company*, 4 December 2018.

<sup>4</sup> *Ibid.*

<sup>5</sup> “VICT Strikes Are Attacking Automation,” *Port Strategy*, 15 February 2021.

<sup>6</sup> “Autonomous Shipping Research using 3D Sonar at Port of Antwerp,” *The Maritime Executive*, 8 January 2021.

<sup>7</sup> Hunter, Grant, “First Ever Standard Contract for Autonomous Ship Operation Underway,” *Baltic and International Maritime Council*, 6 November 2020.

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