

## CASE STUDY:

# APPROVAL-IN-PRINCIPLE FOR AUTONOMOUS TUGBOAT



## OVERVIEW

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Autonomous functions have the potential to deliver benefits such as increased safety, enhanced productivity and reductions in operational costs. An autonomous function is defined as a function where systems perform all four stages (monitoring, analysis, decision and action) in the operational decision loop or with humans in the loop in either the decision or action stage.

ABS developed the *Requirements for Autonomous and Remote Control Functions* to support the implementation and recognition of autonomous and remote control functions, informing the Flag Administration and authorities on the technical feasibility of the function.



ABS, together with ST Engineering, PACC Offshore Services Holdings (POSH) and M1 Limited, worked on a project to test autonomous navigation, collision detection and collision avoidance technology for operations in the Singapore Port. This project was supported by the Maritime and Port Authority of Singapore (MPA).

A solution suite, comprising of an autonomous navigation, collision detection and collision avoidance (CDCA) system and Ship Management and Sensemaking System (NERVA SMS2), from ST Engineering was installed onboard POSH Harvest harbor tug. A shoreside control center was established at the MPA's Maritime Innovation Lab in Singapore and communicated with the vessel's onboard systems via cellular network provided by M1. Trials were conducted to test the autonomous navigation and CDCA system responses when confronted with other vessels in the port.



## CHALLENGES

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### **Lack of autonomous regulations:**

The International Maritime Organization (IMO) completed the Maritime Autonomous Surface Ships (MASS) Regulatory Scoping Exercise in May 2021. However, the development of autonomous regulations is still in progress and is estimated that autonomous regulations from the IMO will be ready in 2025.

### **Supporting infrastructure is not fully developed:**

The development of infrastructure to support autonomous operations in port waters is still in its infancy. In contrast to existing vessel operations, autonomous operations require infrastructure such as reliable communication networks and supporting logistics. From the experience and lessons learnt in this project, ABS and the project partners identified critical enablers and areas for improvement. This knowledge was shared with MPA for their consideration as they work towards preparing the Port of Singapore for MASS operations.

### **Busy port waters:**

Singapore is one of the busiest ports in the world. As such, its waters prove a challenging and real-world test environment for MASS operations. This is important for the development of autonomous technology as it must co-exist with conventional vessels for the foreseeable future.



## SOLUTION

ABS worked closely with the project partners to navigate these challenges. The project partners include various key stakeholders in the maritime ecosystem who provided multi-dimensional input from various viewpoints:

- Tug owner and operator, shipyard, system integrator, technology provider, telecommunication services provider, flag administration and port regulator

Given the absence of autonomous regulations from the IMO, and to support the safe implementation and recognition of the POSH Harvest autonomous functions, ABS established a framework for the assessment and recognition of autonomous functions and included it as part of the Class review.

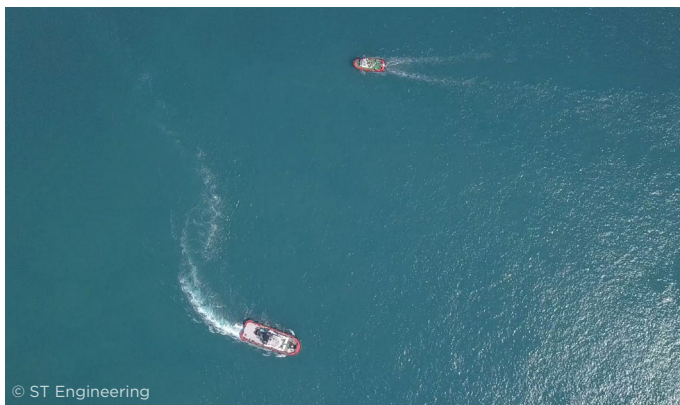
The key checkpoints in the framework are as follows:



Let ABS help you with your autonomy goals. Learn more about autonomy with the *ABS Requirements for Autonomous and Remote Control Functions*.

**Download this document and other guidance today at [www.eagle.org/autonomy](http://www.eagle.org/autonomy).**

The shipyard and technology provider ST Engineering, the tug owner and operator POSH, telecommunication systems provider M1 Limited and ABS collectively worked with the MPA, the flag state of the vessel and port state of operations, to establish test protocols to address challenges and conduct demonstration trials, under its regulatory sandbox framework.



## RESULTS

ABS engineers reviewed and approved the Concept of Operations, risk assessment reports, test procedures and relevant engineering documents. The installation and integration tests were witnessed and validated by ABS surveyors.

Final demonstration trials were successfully carried out in October 2020 in a designated sea area in the Port of Singapore in accordance with three COLREG (Convention on the International Regulations for Preventing Collisions at Sea) scenarios (Overtaking, Head-on and Crossing). Images and data from the tug were streamed live to the shoreside control center and

witnessed by MPA officers and other stakeholders. ABS surveyors witnessed the simulation testing and subsequent demonstration trials from both on board the vessel and at the shoreside control center.

An Approval in Principle (AIP) was awarded by ABS to the autonomous navigation and collision detection and collision avoidance technology in the POSH Harvest autonomous tug project.



### WORLD HEADQUARTERS

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