

## **Annex A - Features of the Maju 510 autonomous tug**

- First vessel in the world to receive Autonomous (NAV, OP1) Notation from ABS classification society
- Capable of autonomous point navigation, collision detection and avoidance. During the sea trial witnessed by MPA, the tug demonstrated autonomous CDCA capabilities with two dynamic objects with varying speeds and headings.
- Equipped with various technologies including a Digital Twin, which simulates vessel behavior in multiple scenarios and optimises vessel operations, as well as data analytics tools to improve the control and response of the tug. This was developed by KMDTech in collaboration with MPA and TCOMS.
- [First in South Asia](#) that can be remotely operated by joystick control. It can be controlled from the shore command centre with a joystick even for complex manoeuvres and is the first in the world to receive the [ABS Remote Control Navigation Notation](#). The vessel received the ABS REMOTE-CON (NAV, OP1) notation in October 2021.
- The remote control feature leverages the ultra-low latency 4.5G network connectivity of M1, another member of the Keppel Group, to establish standards and data transfer links in terms of latency and reliability for the ship to shore communication, and support mission-critical Internet-of-Things maritime applications.
- First vessel to receive the Smart (Autonomous) Notation by MPA. The tug was issued the Smart (Autonomous) D2B Notation, certifying the tug's ability to perform autonomous and remote control navigation in a controlled environment with seafarers on board.
- Features ABB's Ability™ Marine Pilot Vision, which provides the sensor fusion from onboard systems to generate a digital situational awareness, and ABB's Ability™ Marine Pilot Control system, which executes the necessary intelligent maneuvering and control commands.