

MASS Trials in Singapore: Challenges, Opportunities and the Future

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MASS Pilot Projects – Harbour Tugs



**Smart Maritime
Autonomous Vessel**
with ST Engineering Marine, POSH,
ABS, M1, MPA



IntelliTug
with Wartsila, PSA Marine, Lloyd's
Register, TCOMS, MPA



Project MINERVA
with Keppel, ABB, ABS, TCOMS, MPA

IntelliTug

Wartsila, PSA Marine, Lloyd's Register, TCOMS, MPA

- Supervised autonomous control with on-board Master
- Autonomous navigation with optimised passage planning
- Real-time collision detection and collision avoidance



On-board Tug Master monitoring on-board console for how the smart navigation system manoeuvres the harbour tug during sea trials

**Picture provided by Wartsila and PSA Marine*

Smart Maritime Autonomous Vessel

ST Engineering Marine, POSH, ABS, M1, MPA

- Shore command centre capable of:
 - Remote control
 - Health monitoring of shipboard systems
- Autonomous waypoint navigation
- Real-time collision detection and collision avoidance



Set-up of shore command centre

**Picture provided by ST Engineering Marine*

Project MINERVA

Keppel, ABB, ABS, TCOMS, MPA

- Shore command centre capable of:
 - Remote control
 - Monitoring of vessel's engine and thruster
- Autonomous waypoint navigation
- Real-time collision detection and collision avoidance



Set-up of shore command centre

**Picture provided by Keppel Offshore and Marine*

Key Challenges



Connectivity



Communications

Opportunities



Singapore: Future Ready Port for MASS operations





M P A
S I N G A P O R E



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