



Australian Government

MARF059 Apply knowledge of Autonomous Surface Vessels (ASV) technical management

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Application

This unit involves the skills and knowledge required to apply knowledge of Autonomous Surface Vessels (ASV) technical management.

This includes demonstrating technical management of ASV systems, operations and systems, systems in design and execution of diagnostic missions, and conducting technical post-mission analysis and vehicle performance analysis.

This unit applies to people working in the maritime industry in the capacity of:

- ASV Technician.

This unit applies to ASV operations being conducted in Near Coastal (NC) waters within the limits of the operators AMSA Certificate of Competency.

Licensing/Regulatory Information

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

MARH031 Apply knowledge of core Autonomous Surface Vessels (ASV) operations

MARH033 Conduct advanced Autonomous Surface Vessels (ASV) operations

MARH034 Demonstrate fundamental knowledge of Autonomous Maritime Systems (AMS) operations

MARH035 Demonstrate fundamental knowledge of Autonomous Maritime Systems (AMS)

Competency Field

F – Operational Quality and Safety

Unit Sector

Maritime Sector

Elements and Performance Criteria

ELEMENTS

PERFORMANCE CRITERIA

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Demonstrate technical management of ASV systems

- 1.1** ASV battery performance is logged and assessed according to operating procedures
- 1.2** ASV ground fault detection procedures are conducted
- 1.3** ASV calibrations, pitch-fin and rudder-fin control is conducted

2 Apply technical knowledge of ASV operations and systems

- 2.1** Technical analysis of ASV radio frequency (RF) communications systems is conducted
- 2.2** Technical analysis of ASV networks and security systems is conducted
- 2.3** Technical analysis of an ASV's internal state and decision-making processes is conducted
- 2.4** Advanced principles of electromagnetic (EM) and RF communications are outlined

3 Apply technical knowledge of ASV systems in the design and execution of diagnostic missions

- 3.1** ASV mission with faulty navigation involving RF and global positioning system (GPS) is conducted and diagnosed
- 3.2** ASV mission with faulty control is conducted and diagnosed
- 3.3** ASV mission with poor hydrodynamics is conducted and diagnosed
- 3.4** ASV mission with untuned proportional-integral-derivative (PID) control is conducted and diagnosed

4 Conduct technical post-mission analysis and vehicle performance analysis

- 4.1** Technical post-mission analysis and vehicle performance analysis is conducted using graphical and numeric analysis

- 4.2** Technical reports for diagnostic missions are completed according to operational procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the MAR Maritime Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No equivalent unit.

Links

Companion Volume Implementation Guides are found in VETNet -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

Assessment Requirements for MARF059 Apply knowledge of Autonomous Surface Vessels (ASV) technical management

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include:

- completing numerical and graphical analysis of Autonomous Surface Vessels (ASV) technical operation data to assess performance against ASV benchmarks
- following operational procedures
- planning, executing and analysing five diagnostic ASV missions in Near Coastal (NC) waters, including a minimum of:
 - one mission that is conducted using faulty navigation involving radio frequency (RF) and global positioning system (GPS)
 - one mission that is conducted using faulty control
 - one mission that is conducted using poor hydrodynamics
 - one mission that is conducted using untuned proportional-integral-derivative (PID) control
- completing a post-mission analysis and vehicle performance analysis which includes a diagnostic report for each mission.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- ASV calibrations, including:
 - pitch-fin control
 - rudder-fin control
- battery technology, including:
 - battery maintenance
 - process for assessing battery performance
 - process for logging battery performance
- design principles and process for executing diagnostic ASV missions
- diagnostic missions to identify problems and improve performance, including:
 - identifying faulty control

- identifying optimal hydrodynamics
- improving navigation involving RF and GPS
- tuning PID control
- ground fault detection procedures
- process for completing technical reports for diagnostic missions as part of the post-mission analysis and vehicle performance analysis
- technical details of ASV systems, including:
 - internal state and decision-making processes
 - networks and security
 - RF communications
- use of graphical and numerical analysis to inform technical post-mission analysis and vehicle performance analysis.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations, and where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Simulated workplace may be used to augment real-world operational situations and does not replace real-world operations in prescribed water conditions.

Resources for assessment must include access to:

- applicable documentation such as workplace procedures, regulations, codes of practice, operation manuals, manufacturer instructions and procedures
- tools, equipment, machinery, materials and relevant personal protective equipment (PPE) currently used in industry, including:
 - ASV aligned with the required size and class that a seafarer will need to operate
 - ASV with dual-propulsion and an integrated obstacle avoidance system
 - water conditions consistent with mission requirements as outlined in this unit of competency and must include access to water in excess of 100 m, high energy tidal waters and permanently stratified waters.

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