



Australian Government

MARH027 Apply knowledge of dynamic positioning systems

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 dynamic positioning systems, including its uses and applications.

This unit includes explaining dynamic positioning control systems, applying environmental and position reference systems. It also includes explaining:

- acoustic systems
- differential global navigation satellite system (DGNSS)
- frequency-modulated continuous wave (FMCW) radar-based systems
- inertial navigation systems (INS)
- laser systems
- taut wire systems.

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

- Dynamic Positioning Operator.

Work is performed under limited supervision and applies to those responsible for operating dynamic positioning control systems in the work environment and who are responsible for their own work.

Before undertaking this unit, seafarers will need to hold or be working towards the achievement of one of the following:

- Chief engineer officers and second engineer officers on ships powered by main propulsion machinery of 3,000 kW propulsion power or more
- Chief engineer officers and second engineer officers on ships powered by main propulsion machinery of between 750 kW and 3,000 kW propulsion power
- Electro-technical officer
- Master or chief mate on ships of 3,000 Gross Tonnage (GT) or more
- Officers in charge of a navigation watch on ships of 500 GT or more
- Officers in charge of a navigational watch and Masters on ships of less than 500 GT
- Officers in charge of an engineering watch in a manned engine room or designated duty engineers in a periodically unmanned engine room.

Licensing/Regulatory Information

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

Pre-requisite Unit

MARH025 Apply knowledge of dynamic positioning fundamentals

Competency Field

H - Navigation

Unit Sector

Maritime Sector

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Explain dynamic positioning control systems

PERFORMANCE CRITERIA

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

1.1 Architecture of a typical dynamic positioning control systems is described

1.2 Function and components of dynamic positioning control systems are identified and explained

1.3 Achieving redundancy using International Maritime Organization (IMO) requirements and vessel failure modes and effects analysis (FMEA) is described

2 Apply environmental reference systems

2.1 Function of gyro compasses and their redundancy in a dynamic positioning operating system is described

2.2 Process for obtaining pitch, roll and heaving information to input into dynamic positioning system is described

2.3 Rationale for inputting pitch, roll and heave into dynamic positioning system is explained

2.4 Provision of wind sensors in a dynamic positioning system is described

2.5 Wind feed-forward facility and its importance within the dynamic positioning system is described

- 2.6 Limitations of wind sensor inputs, rationale for deselection and consequences of deselecting wind sensor inputs are described
 - 2.7 Method by which the dynamic positioning system determines the value for dynamic positioning current/sea force and the residual error is described
 - 2.8 Reasons for the discrepancy between the displayed value of dynamic positioning current/sea force and the true current or tidal stream value are explained
 - 2.9 External reference systems are determined
- 3 Apply position referencing systems**
 - 3.1 Position reference systems used in dynamic positioning installations are outlined
 - 3.2 Principles of position referencing systems used in dynamic positioning installations are described
- 4 Explain DGNSS systems**
 - 4.1 Principles of DGNSS are described
 - 4.2 Operational of typical commercial DGNSS network using corrections which are delivered by satellite communications are outlined
 - 4.3 Effects on the quality of positioning impacted by error and inaccuracy associated with the DGNSS are described
 - 4.4 Quality data from DGNSS are identified and described
 - 4.5 DGNSS and other position referencing systems are compared and advantages and limitations are identified
- 5 Explain laser systems**
 - 5.1 Principles of position referencing using laser-based systems are described
 - 5.2 Method of setting up a laser system to provide best position information is outlined
 - 5.3 Advantages and limitations of laser-based position referencing systems are outlined
- 6 Explain FMCW radar-based systems**
 - 6.1 Principles of position referencing using FMCW radar-based systems are described
 - 6.2 Advantages and limitations of FMCW radar-based systems are outlined

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| | 6.3 | Principles and operation of Artemis position referencing system are described |
| | 6.4 | Operational advantages and limitations of Artemis position referencing system are outlined |
| 7 Explain acoustic systems | 7.1 | Operation of hydro-acoustic position referencing systems is described |
| | 7.2 | Principles of position-fixing using underwater acoustic systems working in super-short baseline (SSBL)/ultra-short baseline (USBL) and long baseline (LBL) modes are described |
| | 7.3 | Hydro-acoustic transponders, responders and pinger/beacon are described |
| | 7.4 | Layout of hydro-acoustic system, operator station, transceiver, transducer pole and transducer is described |
| | 7.5 | Operational advantages and limitations of acoustic systems as a position reference for dynamic positioning are outlined |
| 8 Explain taut wire systems | 8.1 | Principles of taut wire systems are described |
| | 8.2 | Types of taut wire position referencing systems are outlined |
| | 8.3 | Advantages and limitations of taut wire position referencing systems are outlined |
| | 8.4 | Display of taut wire reference data in dynamic positioning systems are described |
| 9 Explain INS systems | 9.1 | Principles of INS are outlined |
| | 9.2 | Method of using INS enhance existing position referencing system performance is described |
| | 9.3 | Other position referencing systems that can be used in conjunction with a dynamic position system is described |

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>