



Australian Government

MEA702 Produce avionics engineering related graphics

Release: 2

MEA702 Produce avionics engineering related graphics

Modification History

Release 2. Equivalent to MEA702 Produce avionics engineering related graphics with amended prerequisite codes.

Application

This unit of competency applies to avionic products, projects and related system modifications. It is suitable for people working in avionics related design, drafting and maintenance support at the paraprofessional level.

The unit covers the application of graphical techniques for avionic engineering related purposes. Graphics techniques include sketching, computer graphics and the application of drawing standards.

This unit is used in workplaces that operate under the airworthiness regulatory systems of the Australian Defence Force (ADF) and the Civil Aviation Safety Authority (CASA).

Pre-requisite Unit

MEA162	Write aviation technical publications
MEM30007A	Select common engineering materials
MEM30012A	Apply mathematical techniques in manufacturing, engineering or related situations

Competency Field

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1. Review the fundamentals of engineering graphics for avionic applications		1.1	Review uses for avionic graphics
		1.2	Review engineering drawing standards
		1.3	Review graphical imaging or modelling techniques and conventions

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| | 1.4 | Review conventional representations of mechanical features and components, electrical, electronic and fluid control circuits |
| | 1.5 | Review computer-aided design (CAD) and other related software for currency and relevance |
| | 1.6 | Check and determine relevance of work health and safety (WHS) and regulatory requirements, codes of practice, risk assessment and registration requirements for graphical representation tasks |
| | 1.7 | Confirm the availability and features of a range of standards related to avionic system and component design, maintenance and modification |
| | 1.8 | Review typical criteria for avionic designs |
| 2. | Apply avionic graphics | |
| | 2.1 | Determine engineering graphics required by avionic applications |
| | 2.2 | Apply relevant standards |
| | 2.3 | Represent avionic components and systems with sketching and computer graphical techniques, including orthogonal, three-dimensional imaging, wiring diagrams, circuit diagrams and system schematic drawings |
| | 2.4 | Determine and apply required dimensioning, tolerancing for limits and fits, surface finish, weld symbols, electrical, electronic and other required graphical convention information appropriate to avionic engineering applications |
| | 2.5 | Seek technical and professional assistance or clarification of design information as required |
| | 2.6 | Confirm final graphical representations with professional engineering staff and other stakeholders, including making any required adjustments |
| | 2.7 | Engage appropriate licensed technical and professional assistance for advice as required |
| 3. | Provide final drawings, files and documents | |
| | 3.1 | Provide documentation, graphics, data files and clearances according to job requirements and enterprise drawing management system and procedures |

Foundation Skills

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

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

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| Criteria for avionics designs include: | <ul style="list-style-type: none">• Function• Design authority regulatory requirements• Avionic design specifications• Application of configuration management (CM) and/or integrated logistic support (ILS) requirements |
| Configuration Management (CM) | <ul style="list-style-type: none">• CM is a process for control and documentation of the design and development process and for the management of system, component and software throughout the service life |
| Integrated Logistic Support (ILS) | <ul style="list-style-type: none">• ILS is an integrated approach to the management of logistic disciplines originally developed for the management of military systems from design concept to final disposal at life-of-type. It covers:<ul style="list-style-type: none">• reliability engineering, maintainability engineering and maintenance planning• supply and support• support and test equipment• manpower and personnel• training and training support• technical data and publications• computer resources support• facilities• packaging, handling, storage and transportation• design interface |
| Features, functions and context of engineering graphics include: | <ul style="list-style-type: none">• Uses of graphics for purposes, such as:<ul style="list-style-type: none">• design specifications• production specifications• maintenance procedures• technical specifications and descriptions |

- Graphical representation techniques, including orthogonal, 2-D and 3-D modelling, isometric and mechanical perspective, dimensioning, limits and fits, welding and other standard symbols
 - Role of WHS and regulatory requirements, codes of practice, risk assessment and registration requirements
 - Availability and features of a range of standards related to avionic system design, maintenance and modification
 - Typical criteria for avionic designs
 - Software developments
 - Current graphical methods compared with traditional methods
 - Emerging developments in graphics and related engineering software
- Avionic systems and components include:**
- Electrical power generation and distribution
 - Electrical actuation and/or control associated with mechanical, hydraulic, pneumatic and flight control systems
 - Instruments, including compasses and inertial navigation
 - Radio communications and navigation
 - Pulse including radars and navigation systems
 - Automatic flight control systems
 - Automatic engine control systems
 - Data communications, including in-flight entertainment
- Appropriate licensed technical and professional assistance include:**
- Assistance from individuals with CASA maintenance certification licenses or those with supervisory authorisations in the ADF regulatory system
 - Professional support from engineers employed within:
 - organisations with CASA continuing airworthiness management or maintenance approvals
 - approved engineering organisations under the ADF regulatory system
 - Engineers employed within organisations recognised by overseas airworthiness organisations
- WHS, regulatory requirements and enterprise procedures include:**
- WHS Acts and regulations
 - Relevant standards
 - Industry codes of practice
 - Risk assessments
 - Registration requirements
 - Safe work practices
 - State and territory regulatory requirements applying to electrical work
 - Civil Aviation Safety Regulations (CASRs)

- Relevant standards include:**
- AAP7001.053 ADF Technical Airworthiness Management Manual
 - Overseas airworthiness authorities where applicable e.g. Federal Aviation Administration, Transport Canada, European Aviation Safety Agency
 - AS 1100.101-1992 Technical drawing – General principles
 - AS 1102.101-1989 Graphical symbols for electrotechnical documentation - General information and general index
 - AS/NZS ISO 31000 Set:2013 Risk Management Set
 - AS/NZS 3947.3:2001 Low-voltage switchgear and control gear - Switches, disconnectors, switch-disconnectors and fuse-combination units
 - AS 1403-2004 Design of rotating steel shafts
 - DEF AUST Specifications applicable to avionics
 - British Defence Standard 00-970 Design and Airworthiness Requirements for Service Aircraft
 - US Military Specifications relevant to avionics
 - US FAA design standards for avionics

Unit Mapping Information

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Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ce216c9c-04d5-4b3b-9bcf-4e81d0950371>

Assessment Requirements for MEA702 Produce avionics engineering related graphics

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Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- reviewing avionic engineering applications for required features, functions and context of avionic engineering graphics
- developing orthographic, isometric and other 3-D graphical representations and techniques for mechanical, fluid, electrical and electronic system representation
- representing avionic components and systems using sketching and computer graphics with regard to the following systems:
 - electrical
 - instrument
 - radio
 - automatic flight and automatic engine control
 - data communications
- representing avionic components and features using a comprehensive range of standard conventions and graphical techniques
- representing a range of avionic systems using standard graphical representations for wiring, circuit and schematic diagrams
- engaging appropriate technical and professional assistance for advice as required
- reporting results of review and the application of graphics techniques and providing documentation, images and files according to job, regulatory and enterprise procedures.
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Knowledge Evidence

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

- uses for graphics, such as:
 - design specifications
 - avionic maintenance procedures
 - modification orders and instructions
 - technical specifications and descriptions

- physical arrangement of mechanical, fluid, electrical and electronic systems and components
- diagrammatic layouts of electrical and electronic circuits
- avionic system schematic diagrams
- graphical representation techniques
- role of WHS and regulatory requirements, codes of practice, risk assessment and registration requirements relevant to avionic applications
- availability and features of standards related to avionic systems and component, design, maintenance and modification
- typical criteria for avionic designs
- sketching techniques
- orthographic and 3-D representations
- hole basis, shaft basis and keyway tolerances and fits
- dimensioning conventions
- representing avionic components and systems using sketching and computer graphics
- standard conventions and graphical techniques as specified in standards, such as those listed in the Range of Conditions:
 - hole basis, shaft basis and keyway tolerances and fits
 - dimensioning, tolerancing for limits and fits
 - surface finish
 - weld symbols
 - webs, cross sections and cutting planes
 - chain drives, gear sets, pulley and belt drives
 - threads, fasteners and springs
 - shafts, keyways and splines
 - structural sections
 - surface finishes and welds
 - webs, cross sections, cutting planes
 - electric motors and electrically operated fluid power actuators
 - electrical, electronic, electro fluid (hydraulic and pneumatic) controls
 - electrical and electronic circuit components
- representations of avionic systems and components, including:
 - construction of artwork for printed circuit boards
 - aircraft electrical power generation and distribution
 - control and indication for mechanical, fluid power and flight control systems
 - aircraft instrument systems
 - radio communication and navigation
 - pulse
 - automatic flight and automatic engine control
 - data communications, including in-flight entertainment
- current and traditional methods of documentation generation and control:

- computer library files compared to the use of reference charts and catalogue information
- generation of orthogonal images from models
- manual drawing
- future developments in graphics and related engineering software
- worksite procedures and regulatory requirements for the processing and filing of graphics, specifications and operating and maintenance instructions/manuals, including CM and ILS requirements.

Assessment Conditions

- This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is, the candidate is not in productive work, then a simulated working environment must be used that reflects realistic workplace situations and conditions. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.
- Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.
- Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge.
- Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure its correct interpretation and application.
- Assessment may be applied under project-related conditions (real or simulated) and require evidence of process.
- Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
- Assessors must be satisfied that the candidate can competently and consistently:
 - review features, functions and context of avionic engineering graphics
 - develop orthographic, isometric and other 3-D graphical representations and techniques for mechanical, fluid, electrical and electronic system representation
 - represent avionic components and assemblies using sketching and computer graphics
 - represent avionic components and features using a comprehensive range of standard conventions and graphical techniques
 - represent a range of avionic systems using standard graphical representations for wiring diagrams and system schematic diagrams
 - engage appropriate licensed technical and professional assistance for advice as required
 - report results of review and the application of graphics techniques and provide documentation, images and files.
- Assessment may be in conjunction with assessment of other units of competency where required.

- Assessors must satisfy the requirements of the National Vocational Education and Training Regulator (Australian Skills Quality Authority, or its successors).

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