Australian Government

Department of Education, Employment and Workplace Relations

MEM14084A Apply avionic engineering fundamentals to support design and development of engineering projects

Release: 1

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Modification History

Not applicable.

Unit Descriptor

This unit of competency covers engineering fundamentals required to support avionic and manufacturing pro
service design, development and improvement.
Control, data collection and supervisory systems are selected and implemented with technical assistance.

Application of the Unit

Competency in this unit requires significant application of aerospace avionic engineering fundamentals in su
product, process, system or service design, development or improvement.
Control, data collection and supervisory systems may be selected and implemented with technical assistance
application of integrated logistic support (ILS).
The candidate should provide significant support to the design and development process as a member of a de
or engineering support team.
Design, development and improvement activities apply to selection and implementation of human resources,
equipment, materials, components and systems, support structures, power supply and control, data collection
systems (with technical support).

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEA272A	Apply basic scientific principles and techniques in avionic engineering situations
MEM16008A	Interact with computing technology
MEM30012A	Apply mathematical techniques in manufacturing, engineering or related situations

Employability Skills Information

This unit contains employability skills

Elements and Performance Criteria Pre-Content

Not applicable.

Elements and Performance Criteria

1	Research, evaluate and support implementation and report on designing and development processes within an industrial context	1.1	Research and evaluate applications for problem solvin improvement processes, philosophies and techniques, solving, brainstorming, decision-tree, trade-off tables, management (TQM) and tools of TQM
		1.2	Support implementation and report on engineering pro problem solving, improvement processes, philosophie
		1.3	Research, evaluate and report on case studies involvin
2	Identify resources, skills, knowledge and techniques required by engineering applications	2.1	Identify resources, skills, knowledge and techniques f applications
		2.2	With the help of others, identify control and supervisc by particular applications
		2.3	Identify functional attributes of components and syste engineering projects
3	Identify and use sources of information on resources, skills and knowledge for engineering projects	3.1	Identify and use appropriate sources of information or knowledge and techniques for engineering projects
		3.2	Use trade language and descriptions of resources and t appropriate
		3.3	Implement appropriate computing techniques in the pr categorising, cataloguing and reporting on resources s engineering applications
4	Apply engineering fundamentals in support of selection of resources for engineering applications	4.1	Apply appropriate basic scientific principles and techr selection of resources for engineering applications
		4.2	Use appropriate calculations and assumptions to enabl for engineering applications
		4.3	Apply appropriate materials properties, methods and p support of selection of resources for engineering appli

		4.4	Select appropriate resources for the engineering applic functional or performance specification of system and application
5	Specify resources, and technical support for engineering applications	5.1	Specify resources, and technical support for engineeri sufficient to facilitate their identification and supply
		5.2	Identify suppliers of resources and technical support
6	Assist with design specifications and development procedures for engineering applications	6.1	Contribute significantly to the creation of design, impl installation, commissioning and maintenance procedu specific engineering applications
		6.2	Implement appropriate computing and programming t process of development of design specifications and d specific engineering applications
		6.3	Create and file design graphics and documentation sui development process of the application or project in a organisational and contractual requirements
7	Assist with implementation of design and development	7.1	Assist significantly with implementation of design, de commissioning and maintenance in accordance with r specifications and documentation for specific avionic applications
8	Review and report on design implementation	8.1	Review design implementation
		8.2	Report on and record results of design, investigation, s and implementation, installation, commissioning and

Required Skills and Knowledge

Required knowledge includes:

- problem solving, implementation and improvement processes, philosophies and techniques including prob brainstorming, decision-tree, trade-off tables, Kaizen, TQM and tools of TQM
- implementation of specific avionic engineering projects incorporating problem solving, improvement proc and techniques, including ILS
- continuous, mass, batch, jobbing or prototype production processes, sequential and cellular manufacture a competitive (lean) manufacturing
- implementation of specific avionic engineering projects within continuous, mass, batch, jobbing or prototy processes, sequential and cellular manufacture and assembly, JIT, competitive (lean) manufacturing, desig optimum maintenance and computer-managed maintenance
- significance and characteristics of software, test and analysis equipment, materials, components and syste power supply, methods and processes, principles and techniques, control and supervisory systems to the a explained
- functional attributes of resources
- relationship of essential attributes to application function
- classification of attributes as essential versus desirable
- the value of desirable attributes
- methods of accessing and using alternative information sources
- appropriate sources of information
- trade language and descriptions
- reasons for using particular hardware and software
- methods of using hardware and software
- avoidance of electromagnetic interference problems
- the reasons for using particular scientific principles
- reasons for using particular calculations and assumptions
- reasons for providing for particular materials properties in the engineering application
- reasons for selecting resources with reference to functional or performance specification of system and co application
- trade language descriptions used in specification
- procedural steps for implementation, commissioning and maintenance purposes
- graphical and documentary options
- rationale for graphics and documents raised can be explained in the context of application, project and cor
- implementation of design, development, installation, commissioning and maintenance procedures in the c application
- installation, programming, commissioning and maintenance of computer and control hardware and softwa specific application
- design implementation review procedures

Required skills include:

- researching, evaluating and implementing f specific avionic engineering projects using ILS processes that problem solving, implementation and improvement processes, philosophies and techniques including prob brainstorming, decision-tree, trade-off tables, Kaizen, TQM and tools of TQM

- researching, evaluating and implementing specific avionic engineering projects within continuous, mass, prototype production processes, sequential and cellular manufacture and assembly, just in time (JIT), com manufacturing, design for reliability, optimum maintenance and computer-managed maintenance
- selecting test and analysis equipment, materials, components and systems, support structures, power supp appropriate to particular engineering applications
- identifying functional attributes of test and analysis equipment, materials, components and systems, suppo supply and control systems
- identifying essential attributes and desirable attributes in preparation for investigation, research and sourc
- establishing provision for control systems from expert advice
- using computer hardware and software for gathering and analysing information
- applying scientific principles in the choice of test and analysis equipment, materials, components and syst structures, power supply and control systems
- making assumptions and calculations to justify choice of test and analysis equipment, materials, compone support structures, power supply and control systems
- selecting materials properties for the engineering application
- selecting test and analysis equipment, materials, components and systems, support structures, power supp appropriate for the engineering application
- using relevant trade language
- specifying appropriate technical support
- specifying implementation, installation, commissioning and maintenance documentation and procedures
- providing for control system requirements
- using computer hardware and software and effectively in the design and development process of the engi
- preparing design graphics and documentation to satisfy application and contractual requirements
- giving feedback on variations
- ensuring provision for control systems
- completing reports, records and design documentation

Evidence Guide

Overview of assessment	A person who demonstrates competency in this unit must be able to apply avionic engineering fundamentals to support design and development of projects for a range of engineering applications and within the application of ILS. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts. Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.
Context of and specific resources for assessment	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 an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Method of assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying avionic engineering fundamentals to support design and development of projects or other units requiring the exercise of the skills and knowledge covered by this unit.
Guidance information for assessment	

Range Statement

Kaizen	Kaizen, as applied to engineering refers to: • gradual and continual improvement to products, processes, systems and services
TQM	TQM refers to: • a customer driven amalgamation of quality assurance, quality control and quality improvement which in aeronautical engineering may be applied as part of ILS
Tools of TQM	Tools of TQM include: • flow charts • Pareto • Ishikawa (cause and effect) • process capability analysis • sampling and control charting • run charts • correlation analysis
Production processes may include	Production processes may include: • continuous, mass, batch, jobbing or prototype • competitive (lean) manufacturing, including sequential and cellular manufacture and assembly, JIT, design for reliability, optimum maintenance, and computer-managed maintenance
Competitive (lean) manufacturing principles and techniques	Competitive (lean) manufacturing principles and techniques includes: • sequential and cellular manufacture and assembly with multi-skilling of work teams, workplace improvement, TQM, including use of TQM tools, JIT, quick changeover, process and productivity improvement, cost reduction, supply and demand chain management, quality optimisation, design for reliability, optimum maintenance, and computer-managed maintenance
Resources, skills, knowledge and techniques for engineering applications	Resources, skills, knowledge and techniques for engineering applications may include: • human resources • software • test and analysis equipment • materials, components and systems • support structures • power supply • methods and processes

	• principles and techniques • control, data collection and supervisory systems Techniques include those required to: • select, manufacture, install, commission, test and maintain components and systems

Components and systems	Components and systems include: • electrical systems and related wiring and components (power generation, distribution, control interfaces with hydraulic and pneumatic systems, and caution and warning systems) • mechanical and electro-mechanical flight instruments and indication systems (quantity, pressure, temperature, position) and components, automatic pilot systems, electronic systems and components (communications, radio navigation, pulse, display, automatic flight control, flight management, and engine management), and automatic test stations, adapters and software
Avionic engineering	Avionic engineering refers to: • the engineering discipline concerned with the conceptual development, research, design, manufacture, implementation, installation, commissioning and maintenance of aerospace electrical, instrument, radio and electronic systems and components and related test equipment for civil and military applications
Sources of information	Sources of information may include: • manufacturer catalogues • websites • texts and technical journals • use of phone, email and fax information gathering Information sought includes: • human resources • software, test and analysis equipment • materials, components and systems • support structures, power supply, methods and processes • principles and techniques • control and supervisory systems
Implementation process	Implementation process may include: • monitor failure patterns and modes • develop/document revisions to maintenance schedules • investigate, develop and implement maintenance test procedures • revise test and maintenance procedures, including associated software • propose amendments to test and maintenance

	procedures • develop and propose modifications to improve performance and/or reliability • establish weight and balance effect of modifications • ensure electromagnetic interference requirements are met
Regulatory requirements	Regulatory requirements may be specified in: • Civil Aviation Regulations or Civil Aviation Safety Regulations • Australian Defence Force AAP7001.053 Technical Airworthiness Maintenance Manual • United States Federal Aviation Regulations • European Aviation Safety Regulations • Transport Canada CTA Rules

Unit Sector(s)

Planning

Custom Content Section

Not applicable.