



Australian Government

**MEM14083A Apply aeronautical
engineering fundamentals to support
design/development of engineering projects**

Release: 1

MEM14083A Apply aeronautical engineering fundamentals to support design/development of engineering projects

Modification History

Not applicable.

Unit Descriptor

This unit of competency covers engineering fundamentals required to support aerospace mechanical and manufacturing product, process, system or 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 aeronautical engineering fundamentals in support of engineering product, process, system or service design, development or improvement.

Control, data collection and supervisory systems may be selected and implemented with technical assistance.

The candidate should provide significant support to the design and development process as a member of a design and development or engineering support team.

Design, development and improvement activities apply to selection and implementation of human resources, software, test equipment, materials, components and systems, support structures, power supply and control, data collection and supervisory systems (with technical support).

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

| | |
|-----------|---|
| MEA349A | Apply basic scientific principles and techniques in aeronautical engineering situations |
| MEM16008A | Interact with computing technology |
| MEM23052A | Apply basic electro and control scientific principles and techniques in aeronautical engineering situations |
| 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 solving, implementation and improvement processes, philosophies and techniques, including problem solving, brainstorming, decision-tree, trade-off tables, Kaizen, total quality management (TQM) and tools of TQM |
| | 1.2 Support implementation and report on engineering projects incorporating problem solving, improvement processes, philosophies and techniques |
| | 1.3 Research, evaluate and report on case studies involving production processes |
| 2 Identify resources, skills, knowledge and techniques required by engineering applications | 2.1 Identify resources, skills, knowledge and techniques for engineering applications |
| | 2.2 With the help of others, identify control and supervisory systems if required by particular applications |
| | 2.3 Identify functional attributes of components and |

systems of aeronautical 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 on resources, skills, knowledge and techniques for engineering projects

3.2 Use trade language and descriptions of resources and techniques as appropriate

3.3 Implement appropriate computing techniques in the process of sourcing, categorising, cataloguing and reporting on resources search results for engineering applications

4 Apply engineering fundamentals in support of selection of resources for engineering applications

4.1 Apply appropriate basic scientific principles and techniques in support of selection of resources for engineering applications

4.2 Use appropriate calculations and assumptions to enable choices of resources for engineering applications

4.3 Apply appropriate materials properties, methods and processes knowledge in support of selection of resources for engineering applications

4.4 Select appropriate resources for the engineering application based on functional or performance specification of system and components of application

5 Specify resources, and technical support requirements

5.1 Specify resources and technical support for engineering applications 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, implementation, installation, commissioning and maintenance procedures, and documents for specific engineering applications

6.2 Implement appropriate computing and programming techniques in the process of development of design specifications and documentation for specific engineering applications

6.3 Create and file design graphics and documentation suitable to the design and development process of the application or project in accordance with

organisational and contractual requirements

- | | |
|--|--|
| 7 Assist with implementation of design and development | 7.1 Assist significantly with implementation of design, development, installation, commissioning and maintenance in accordance with regulatory requirements, specifications and documentation for specific aeronautical engineering applications |
| 8 Review and report on design implementation | 8.1 Review design implementation |
| | 8.2 Report on and record results of design, investigation, selection, specification and implementation, installation, commissioning and maintenance processes |

Required Skills and Knowledge

Required knowledge includes:

- problem solving, implementation and improvement processes, philosophies and techniques, including problem solving, brainstorming, decision-tree, trade-off tables, Kaizen, TQM and tools of TQM
- implementation of specific aeronautical engineering projects incorporating problem solving, improvement processes, philosophies and techniques, including ILS
- continuous, mass, batch, jobbing or prototype production processes, sequential and cellular manufacture and assembly, JIT, and competitive (lean) manufacturing
- implementation of specific aeronautical engineering projects within continuous, mass, batch, jobbing or prototype production processes, sequential and cellular manufacture and assembly, JIT, competitive (lean) manufacturing, design for reliability, optimum maintenance and computer-managed maintenance
- significance and characteristics of software, test and analysis equipment, materials, components and systems, support structures, power supply, methods and processes, principles and techniques, control and supervisory systems to the application can be 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
- 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 components of 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 contractual requirements
- implementation of design, development, installation, commissioning and maintenance procedures in the context of the specific application
- installation, programming, commissioning and maintenance of computer and control hardware and software in the context of the specific application
- design implementation review procedures

Required skills include:

- researching, evaluating and implementing specific aeronautical engineering projects using integrated logistic support (ILS) processes that may encompass problem solving, implementation and improvement processes, philosophies and techniques, including problem solving, brainstorming, decision-tree, trade-off tables, Kaizen, TQM and tools of TQM
- researching, evaluating and implementing specific aeronautical engineering projects within continuous, mass, batch, jobbing or prototype production processes, sequential and cellular manufacture and assembly, just in time (JIT), competitive (lean) manufacturing, design for reliability, optimum maintenance and computer-managed maintenance
- selecting test and analysis equipment, materials, components and systems, support structures, power supply and control systems appropriate to particular engineering applications
- identifying functional attributes of test and analysis equipment, materials, components and systems, support structures, power supply and control systems
- identifying essential attributes and desirable attributes in preparation for investigation, research and sourcing
- 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 systems, support structures, power supply and control systems
- making assumptions and calculations to justify choice of test and analysis equipment, materials, components and systems, 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 supply and control systems 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 engineering applications
- 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

| | |
|--|--|
| <p>Overview of assessment</p> | <p>A person who demonstrates competency in this unit must be able to apply aeronautical 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.</p> |
| <p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p> | <p>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.</p> <p>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.</p> |
| <p>Context of and specific resources for assessment</p> | <p>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.</p> <p>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.</p> |
| <p>Method of assessment</p> | <p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying aeronautical engineering fundamentals to support design and development of projects or other units requiring the exercise of the skills and knowledge covered by this unit.</p> |
| <p>Guidance information for assessment</p> | |

Range Statement

| | |
|---|---|
| Kaizen | Kaizen, as applied to engineering refers to: <ul style="list-style-type: none"> gradual and continual improvement to products, processes, systems and services |
| TQM | TQM refers to: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> human resources software test and analysis equipment materials, components and systems support structures power supply methods and processes |

| | |
|---------------------------------|---|
| | <ul style="list-style-type: none"> • principles and techniques • control, data collection and supervisory systems <p>Techniques include those required to:</p> <ul style="list-style-type: none"> • select, manufacture, install, commission, test and maintain components and systems |
| Components and systems | <p>Components and systems include:</p> <ul style="list-style-type: none"> • aircraft structure and structural components • mechanical systems and components • hydraulic systems and components • pneumatic systems and components • fuel systems and components • fire systems and components • power plant systems and components, and the interface between hydro-mechanical, pneumatic and power plant systems and avionic systems, including automatic flight control, flight management, pressurisation and air conditioning systems and engine management systems |
| Aeronautical engineering | <p>Aeronautical engineering refers to:</p> <ul style="list-style-type: none"> • the engineering discipline concerned with the conceptual development, research, design, manufacture, implementation, installation, commissioning and maintenance of aerospace mechanical, hydraulic, pneumatic, fuel and fire products, processes, systems or services for civil and military applications |
| Sources of information | <p>Sources of information may include:</p> <ul style="list-style-type: none"> • manufacturer catalogues • websites • texts and technical journals • use of phone, email and fax information gathering <p>Information sought includes:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none">• monitor failure patterns and modes• develop/document revisions to maintenance schedules• develop or 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• elimination of electromagnetic interference |
| Regulatory requirements may be specified in | Regulatory requirements may be specified in: <ul style="list-style-type: none">• 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.