



Australian Government

MEA722 Evaluate aircraft piston engine power plants

Release: 1

MEA722 Evaluate aircraft piston engine power plants

Modification History

Release 1 - New unit of competency

Application

This unit of competency applies to aircraft piston engines, engine controls, air inlet, cooling, lubrication and propeller systems, and components thereof. It involves evaluation of power plants and components for compliance with design standards and with airworthiness regulatory requirements within both civil and military environments.

Also covered is documentation of the evaluation process within management systems, such as configuration management (CM) and integrated logistic support (ILS).

It is suitable for people working as paraprofessionals within aircraft design teams, within the engineering departments of aircraft maintenance organisations or employed within Continuing Airworthiness Management Organisations (CAMOs) and Approved Engineering Organisations (AEOs), and for those pursuing qualifications or careers in those fields.

Where the engine is installed in a rotorcraft the interface between the engine throttle/governor and the rotor controls is covered in MEA718 Evaluate rotorcraft flight control system.

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

MEA710	Apply aeronautical system design techniques
MEM23004A	Apply technical mathematics
MEM23007A	Apply calculus to engineering tasks

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.

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|----|---------------------|-----|--|
| 1. | Prepare to evaluate | 1.1 | Confirm and apply safe working practices relating to |
|----|---------------------|-----|--|

piston engine power plant	1.2	aircraft structure
		Determine parameters and context of applications and purpose of evaluation
		Confirm personal functions and responsibilities, team and support functional group interdependencies and communications
		Confirm that tasks and responsibilities are appropriate to qualifications and delegations and that appropriate support, including technical and professional assistance, is available
		Determine chain of responsibility for the activity evaluation, reporting arrangements and timelines
		Identify work health and safety (WHS) and regulatory requirements with particular emphasis on safety, codes of practice and standards, including airworthiness regulatory requirements for aircraft piston engine power plant, risk management and organisational procedures
2. Identify principles and techniques required for evaluation of aircraft piston engine power plant	2.1	Identify features and functions of power plant and related systems
	2.2	Review piston engine and engine system operation, layout and performance
	2.3	Review engine control system design and function, including interface with full authority digital engine control systems
	2.4	Review propeller and propeller control system design and function
	2.5	Review engine air inlet system design and function
	2.6	Review engine cooling system design and function
	2.7	Review engine dry sump lubricating system design and function
3. Evaluate aircraft piston engine power plant and components	3.1	Evaluate proposed modifications and repairs to power plant systems and components
	3.2	Evaluate power plant maintenance requirements
	3.3	Evaluate power plant reliability and defect history

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|----|----------------|---|
| | 3.4 | Evaluate proposed component substitutions |
| | 3.5 | Evaluate for compliance with WHS Acts, regulations, codes, directives and standards/specifications, including those related to risk management |
| 4. | Report results | 4.1 Report results of scoping, principles and techniques identification and evaluation of piston engine power plant systems and system components |
| | | 4.2 Provide documentation, such as modification instructions and drawings and data required by CM and/or ILS, and for compliance with airworthiness regulations |

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.

Aircraft piston engine power plant includes:

- Engine
- Engine control system
- Propeller control system
- Dry sump engine lubricating oil supply and cooling system
- Air inlet system
- Cooling system
- Propeller or rotor

Aircraft piston engine power plant system components include:

- Engine control linkages and/or sensors
- Oil tank
- Oil cooler
- Coolant tank and radiator
- Control valves
- Lubrication oil plumbing
- Air inlet ducting, filters and doors

Aircraft piston engines include:	• Air inlet heating • Propeller hub and blades • Propeller governor • Pitch control • Two and four stroke petrol and diesel engines, including: • the bare engine • carburettor or fuel injection system • supercharging/turbocharging systems • ignition system (petrol engines) • starting system • ancillary gear box • reduction gear and propeller shaft
Standards and guidance material include:	• ADF AAP7001.054 Airworthiness Design Requirements Manual • FAR Part 23 Airworthiness Standards for Airplanes in the Normal, Utility, Aerobatic or Commuter Categories • FAR Part 25 Airworthiness Standards for Airplanes in the Transport Category • FAR Part 33 – Airworthiness Standards: Aircraft engines Subparts A,B, C, D • FAR Part 35 – Airworthiness Standards: Propellers • EASA CS-23 Certification Specifications for Aeroplanes in the Normal, Utility, Aerobatic or Commuter Categories • EASA CS-25 Certification Specifications for Airplanes in the Transport Category • EASA CS-E Certification Specifications for Engines Subparts A, B, C • EASA CS-P Certification Specifications for Propellers • CASA AC21.16(0) Approval of material, parts, processes and appliances • CASA AC21.145(0) Manufacture of parts during the course of maintenance • CASA AC21.601(0) Australian Technical Standards Order Authorisation • CASA CAAP35-7(0) Design approval of modifications and repairs • CASA AC 21-99 Aircraft Wiring and Bonding • FAA AC 43-13-1B Acceptable Methods, Techniques and Practices – Aircraft Inspection and Repair
Configuration management (CM)	• 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)**
- 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:
 - 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
- Appropriate technical and professional assistance includes:**
- 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
 - Civil Aviation Safety Regulations (CASRs)
 - AAP7001.053 ADF Technical Airworthiness Management Manual
 - Overseas airworthiness authorities where applicable e.g. Federal Aviation Administration, Transport Canada, European Aviation Safety Agency

Unit Mapping Information

Release 1 – New unit based on MEM23084A Apply scientific principles and techniques in aeronautical engineering situations and MEM23095A Apply aeronautical system design principles and techniques in aeronautical engineering situations – units not equivalent

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 MEA722 Evaluate aircraft piston engine power plants

Modification History

Release 1 - New unit of competency

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:
- identifying WHS, regulatory and risk management procedures, power plant design and construction principles and maintenance requirements
- determining and confirming:
 - parameters and context of tasks
 - chain of responsibility
 - personal functions and responsibilities
 - team and support functional group interdependencies and communications
 - appropriate qualifications and delegations
- appropriate support, including technical and professional assistance
- investigating associated CM and ILS requirements and drafting required data
- assessing and applying:
 - basic aircraft power plant and power plant system design procedures
 - design standards
 - regulatory requirements
 - graphics skills and techniques
- evaluating proposed modification and power plant maintenance and reliability
- reporting and documenting results of scoping, principles and techniques identification and evaluation of applications.

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:

- aircraft piston engine power plant and power plant system design, function and layout:
 - design standards
 - piston engine types and relative performance
 - system components and hardware
 - construction and assembly methods
 - types of propeller and their applications
- basic design principles for:

- system modifications
- repair schemes
- airworthiness regulator design standards
- compliance requirements of the WHS Act and regulations, codes of practice, standards and risk assessment
- scope of trade, technical and professional support services required in aircraft power plant applications
- management data interface with CM and ILS.

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 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:
 - identify and apply WHS, regulatory and risk management procedures
 - determine parameters and context of tasks, personal, team, technical and professional assistance and support, personnel functions and responsibilities, and chain of responsibility
 - investigate sustainability implications of aircraft piston engine power plants as specified in CM and/or ILS requirements
 - assess and apply basic aircraft piston engine power plant design and maintenance/repair requirements, and graphics skills and techniques
 - evaluate aircraft piston engine power plant components for compliance with WHS and airworthiness regulatory requirements
 - report and document results, including provision of CM and ILS input data.
- 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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