



Australian Government

MEA311D Inspect and repair/modify aircraft structures

Release: 1

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Modification History

Knowledge requirements and Range Statement revised to include additional inspection coverage - equivalent to previous version.

Unit Descriptor

This unit of competency is part of the Mechanical Certificate IV (Aircraft Maintenance Stream) training pathway. It covers the competencies required to inspect, repair and modify aircraft structure and structural components. The unit is used in workplaces that operate under the airworthiness regulatory systems of the ADF and CASA.

Where a CASA licensing outcome is sought this unit forms part of the CASA requirement for the granting of the chosen maintenance certification licence under CASR Part 66, in accordance with the licensing provisions in Section 3, Assessment Guidelines.

Application of the Unit

This unit requires application of hand skills, applicable tools, maintenance publications and repair drawings to inspect and repair/modify aircraft structure, including the replacement of primary structure components.

Applications include both fixed and rotary wing aircraft.

Licensing/Regulatory Information

Refer to unit descriptor

Pre-Requisites

MEA304C Remove and install non-pressurised aircraft structural and non-structural components

OR

MEA317C Remove and install pressurised aircraft structural and non-structural components

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

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| 1 Inspect aircraft structure | <p>1.1 Relevant maintenance documentation and modification status, including defect reports, where relevant, are used to identify <i>specific inspection requirements</i></p> <p>1.2 Appropriate preparation and access to the aircraft structure is undertaken to allow for proper inspection in accordance with maintenance documentation</p> <p>1.3 Aircraft structure is visually or physically checked for signs of deformation defects or damage in accordance with maintenance documentation and approved procedures</p> <p>1.4 Damage or defects are assessed against damage or wear limits specified by structural repair manual or other approved data to determine if repair or replacement is required</p> |
| 2 Prepare to undertake repair | <p>2.1 Extent of damage is correctly assessed to assist in determining <i>repair</i> procedure</p> <p>2.2 Structure is supported and prepared, in accordance with the applicable maintenance manual, to ensure personnel safety and freedom from damage</p> <p>2.3 Jigs, fixtures or bracing are used, as required, to maintain shape and/or alignment</p> <p>2.4 Appropriate modification or repair scheme is identified in accordance with structural repair manual and/or approved data</p> <p>2.5 Specialist advice is obtained in establishing an approved repair scheme where a standard repair scheme cannot be identified or where damage is beyond specified limits</p> <p>2.6 All materials and equipment required are organised</p> |

- 3 Repair/modify aircraft structure
 - 3.1 Required maintenance/repair documentation is accurately completed and correctly processed
 - 3.2 Structural repairs/modifications are performed, in accordance with approved repair scheme, ensuring that aircraft standard practices are used and process requirements are carried out
 - 3.3 Work area is cleaned of all waste material or contaminants
 - 3.4 Required mensuration/alignment checks are completed and components are adjusted, where necessary, to operate within prescribed specifications
 - 3.5 Repaired components or assemblies are tagged, sealed and packaged or cradled in accordance with specified procedures, where required
 - 3.6 Required maintenance documentation is completed and processed in accordance with standard enterprise procedures

Required Skills and Knowledge

Look for evidence that confirms knowledge of:

- aircraft construction principles and structural component attachment methods:
 - types of aircraft structure
 - structural loads
 - loads under various conditions of flight
 - causes of structural failure
 - attachment methods:
 - bolts and screws
 - solid and blind rivets
 - close tolerance fasteners
 - bonding
- the construction methods used in:
 - fuselage sections
 - wing sections
 - engine nacelles and mounts
 - windows and window frames
 - doors, locks and access panels in pressurised and non-pressurised aircraft
- describing various aircraft metals and their basic properties:
 - ferrous
 - non-ferrous
- aircraft plastic transparency construction methods and common defects
- glass windscreen basic constructional features and common defects
- composite materials:
 - terminology
 - materials used for minor repairs
 - OHS requirements
- aircraft structure inspection requirements:
 - metallic structure
 - non-metallic/composite structure (other than wood and fabric)
 - ageing aircraft inspection requirements
 - safe life structure
 - damage tolerant structure
 - fail safe structure
- NDT methods and application of the various techniques
- assessment of structural damage:
 - types and classes of mechanical damage
 - types of corrosion and determining the extent of damage
 - relevant documentation and manuals

- damage limits and repair schemes for metallic and non-metallic structure
- procedures for the fabrication and fitment of metal repairs:
 - scab patch
 - flush patch
 - splice
 - lap
 - formed section
- corrosion removal and passivation
- procedures for performing composite repairs:
 - external patch
 - scarf patch
 - stepped repairs
- procedures for replacement of primary structure components, such as:
 - fuselage frames and longerons
 - wing spars or spar caps
 - wing-to-fuselage attachment fittings
 - tailplane attachment fittings
- aircraft mensuration checks – when required and methodology
- repair of integral fuel tanks and sealing of faying surfaces, including specific OHS and PPE requirements
- surface finishes and methods of restoration
- how to obtain MSDS
- relevant maintenance and structural repair manuals
- relevant regulatory requirements and standard procedures

Look for evidence that confirms skills in:

- applying relevant OHS regulations and practices, including the use of MSDS and PPE
- using approved maintenance documentation and aircraft publications relating to aircraft structure
- demonstrating appropriate cleaning procedures to enable structure inspection
- demonstrating correct inspection procedures, in particular pressurised aircraft, in accordance with aircraft and procedures manuals
- identifying damage to aircraft metallic (ferrous and non-ferrous) structures and/or components by way of:
 - impact
 - fatigue
 - corrosion
- identifying the various forms of structural corrosion, stating the causes and structural effects of corrosion on aircraft
- identifying composite materials used in aircraft construction, associated safety precautions and hazard
- inspecting damage and assessing composite components/structures

- handling and storing aircraft metals and composite materials, including sealing agents, to industry standards
- identifying aircraft structural assembly fasteners (metal and composite) by interpretation of markings, numbering systems, size, shape and colour
- correctly interpreting and/or producing repair scheme/modification drawings, including third angle projection, isometric, sectional formats and hand sketches
- using appropriate hand tools and machines to remove and assemble aircraft structural components, parts, sections and skin, including riveting equipment, drilling equipment, aligning tools and material fasteners (grip pins)
- applying correct removal, installation and repair techniques for:
 - a range of rivets (blind and solid) using hand, squeeze and pneumatic situations
 - a range of close tolerance fasteners (standard and oversize – hillocks and taper locks), including hole preparation
 - threaded devices, including internal and external thread cutting, Helicoil inserts and damaged stud replacement
 - hardware assembled by close tolerance fits using heat, cooling and force methods, including bearings, bushes and inserts
- correctly supporting the aircraft structure by jacking, trestling and/or jiggling methods
- performing a range of metal structure and composite material repair techniques, including:
 - metal scab patch, flush, splice, lap and formed section repair
 - composite external patch, scarf and stepped repairs
 - metal to metal and metal to composite bonding
- applying structural corrosion removal/treatment techniques
- restoring aircraft structure sealing and surface finishes

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	A person who demonstrates competency in this unit must be able to use maintenance manuals, repair scheme drawings and applicable tools to inspect and repair/modify aircraft structure while observing all relevant safety precautions.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	The underlying skills inherent in this unit should be transferable across a range of inspection, testing and repair applications associated with aircraft maintenance. It is essential that the procedures take into account all aircraft and personal safety precautions relating to aircraft structure. Evidence of transferability of skills and knowledge related to inspection, testing and repair of aircraft structure is essential. This may be demonstrated through application across a number of aircraft systems or aircraft types. Ability to interpret inspection and repair procedures and specifications and apply them in practice is critical. The application of the procedures should also clearly indicate knowledge of structural flight loads and aerodynamic requirements. A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements of the unit of competency are being achieved under routine supervision on at least one inspection task from each of Groups 1 to 8 and at least one repair task from each of Groups 9 to 17, as listed in the Range Statement. This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.
Context of and specific resources for assessment	Competency should be assessed in the work environment or simulated work environment using tools and equipment specified in maintenance documentation. It is also expected that general purpose tools and test equipment found in most routine situations would be used where appropriate.
Method of assessment	
Guidance information for	Individuals being assessed who have already attained

assessment	MEA339C Inspect, repair and maintain aircraft structures or MEA363B Inspect, repair and maintain structures and related components of non-pressurised small aircraft, will have met the requirements of the Performance Criteria and Range Statement variables for Elements 1 to 3 for common Range Statement variables. Those who have attained MEA401C Inspect aircraft structures, will have met the Performance Criteria and Range Statement variables requirements for Element 1. Log of Industrial Experience and Achievement records relating to MEA339C Inspect, repair and maintain aircraft structures, MEA363B Inspect, repair and maintain structures and related components of non-pressurised small aircraft, and MEA401C Inspect aircraft structures, may be accepted as also meeting the evidence requirements for this unit in the applicable areas.
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Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Note

Range statements listed below are numbered to facilitate specification of the assessment requirements included in the Evidence Guide

Specific inspection requirements and repair tasks

Specific inspection requirements may cover:

1. Non-ferrous and ferrous alloys and composite (FRP) materials used in aircraft construction
2. Structural fastening and attachment hardware and/or devices
3. Seals and sealants
4. Glass and moulded plastics
5. Application of NDT techniques
6. Doors, hinges and locking mechanisms for damage/misalignment
7. Inspections applicable to each of safe life, damage tolerant and fail safe structure relevant to enterprise
8. Ageing aircraft inspection programs

Repair tasks may include:

9. Removing corrosion by chemical and mechanical methods
10. Restoring protective coatings
11. Applying sealants and jointing compounds
12. Freehand precision hole generation
13. Removing and installing structural hardware and fastening devices
14. Removing and replacing bushes, bearings and bearing surfaces
15. Removing and repairing damaged sections and reinstalling
16. Repairing by replacement major load-carrying structural members, i.e. skins, longerons, spars, frames

	and bulkheads 17. Minor repairs to non-metallic materials
Inspection techniques	Inspection techniques may include: • visual inspection • physical checks • mensuration and alignment
Assembly stress defects	Assembly stress defects can refer to: • oil canning • buckling • contour misalignment
Application	Application of this unit may relate to: • scheduled or unscheduled maintenance activities, and includes special inspections required after events, such as heavy landings, overstress or flight through heavy turbulence • individual or team-related activities
Procedures and requirements	Refer to industry standard procedures specified by manufacturers, regulatory authorities or the enterprise

Unit Sector(s)

Aviation maintenance

Custom Content Section

Not applicable.