



Australian Government

MEM05069 Undertake advanced weld repair and maintenance

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Modification History

Release	Comments
2	Unit title for the unit code MEM05061 corrected in the prerequisites.
1	This unit of competency was first released in MEM Manufacturing and Engineering Release 3.0.

Application

This unit of competency was developed for post trade engineering fabrication training and the recognition of post trade skills in advanced weld repairs and weld maintenance.

It defines the skills and knowledge required to restore or extend the original fatigue life of a cracked component including advanced weld repair and maintenance on both ferrous and non-ferrous metals, assessment of cracks or defects, removal of cracks, repair weld preparation and performing repair welds as defined in the unit in combination with its prerequisites.

The unit scope includes required welding and material knowledge and skills, knowledge of relevant welding standards, welding terminology and welder qualification requirements

Where the welding associated with this unit also requires the application of welding to codes and standards, the unit MEM05062 Apply welding and welding related codes and standards must also be selected. Weld repairs and weld maintenance performed using the skills and knowledge in this unit may or may not be performed in accordance with a weld procedure specification (WPS). Where the welding associated with this unit also requires the welding to be undertaken according to a formal WPS, the unit MEM05068 Apply weld procedure specifications must also be selected.

Band: B

Unit Weight: 6

Licensing/Regulatory Information

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite unit(s)

MEM05007 Perform manual heating and thermal cutting

MEM05061 Apply basic metallurgy principles to welding applications

MEM05071 Perform advanced manual thermal cutting, gouging and shaping

MEM05085 Select welding processes

MEM09002 Interpret technical drawing

MEM11011 Undertake manual handling

MEM12023 Perform engineering measurements

MEM12024 Perform computations

MEM13015 Work safely and effectively in manufacturing and engineering

MEM14006 Plan work activities

MEM16006 Organise and communicate information

MEM18001 Use hand tools

MEM18002 Use power tools/hand held operations

Plus one or more of the following units and their prerequisites:

MEM05072 Perform advanced welding using manual metal arc welding process

MEM05073 Perform advanced welding using gas metal arc welding process

MEM05074 Perform advanced welding using gas tungsten arc welding process

MEM05075 Perform advanced welding using oxy acetylene welding process

MEM05084 Perform advanced welding using flux core arc welding process

Competency field(s)

Fabrication

Unit sector(s)

N/A

Elements and Performance Criteria

Elements	Performance criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Assess weld repair requirements	1.1 Check if equipment or section to be repaired is covered by weld repair specifications or repair requires pre-approval 1.2 Identify material type, thickness and weldability 1.3 Identify weld crack or defect parameters 1.4 Identify objective of weld repair
2. Plan weld repair	2.1 Determine depth, length and nature of required repair 2.2 Select methods for removal of existing weld in accordance with standard operating procedures (SOPs)

	2.3 Determine optimum preparation required to complete repair 2.4 Select repair weld process and weld parameters 2.5 Identify any test requirements 2.6 Submit welding repair plan for approval in accordance with SOPs
3. Undertake weld repair	3.1 Prepare material for welding repair including any required gouging, fit up and pre-heating 3.2 Perform weld repair using appropriate welding parameters and consumable selection 3.3 Inspect weld and rectify any discontinuities 3.4 Perform blending and dressing of welds to improve fatigue properties 3.5 Apply post-heat in accordance with SOPs 3.6 Arrange visual and non-destructive tests (NDTs) in accordance with SOPs 3.7 Complete weld records to enterprise and regulatory requirements

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

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.	
Weld repairs covered by repair specifications or pre-approval requirements include one or more of the following:	• original equipment manufacturer (OEM) specific instructions for weld repairs • equipment is covered by regulatory provisions relating to repair and/or inspection procedures • regulatory or customer requirement for repairs to be performed by coded welders

	• material is an alloy steel (high strength and/or high alloy) • material is under high stress and/or load or has no redundancy • the repair is a highly complex/difficult repair.
Weld crack or defect parameters include one or more of the following:	• weld cracks including: ○ fillet weld toe crack or cap crack ○ reinforcement plate or wear plate crack ○ transverse crack through fillet weld ○ multiple, complex or branching cracks ○ internal cracks • crack location and crack dimensions • corrosion • wear.
Weld repair includes one or more of the following welding processes:	• gas metal arc welding (GMAW) • manual metal arc welding (MMAW) • flux core arc welding (FCAW) • gas tungsten arc welding (GTAW).
Basic tests to determine weldability include one or more of the following:	• grinding sparks • hardness • lustre • magnetism.
Weld removal methods include one or more of the following:	• carbon arc gouging • arc gouging • plasma gouging • oxy/fuel gouging • grinding • chipping.
Welding parameters include one or more of the following:	• material preparation • joint detail • position

	• run sequence and pass number • welding process • filler material • flux • current • voltage • polarity • wire feed speed where relevant • travel speed • pre and post-heat input in accordance with SOPs.
Advanced weld repair may be performed on one or more of the following materials:	• cast metal • carbon steel • low alloy steel • stainless steel • aluminium • other non-ferrous metals and alloys.
Blending and dressing of welds:	• blending and dressing of welds means altering the shape of the weld cap and/or toe to provide a smooth contour or transition. This may be done using various abrasive tools such as grinding discs, flap discs, stones, burrs etc.

Unit Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM05069 Undertake advanced weld repair and maintenance		This unit has been created to address a skill or task required by industry that is not covered by an existing unit of competency	Newly created

Assessment Requirements for MEM05069 Undertake advanced weld repair and maintenance

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Performance Evidence

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

- identify at least two types of weld defects or cracks and implications for repair
- identify issues that require escalation or pre-approval due to high risk because of high load, stress, lack of redundancy, or complexity of repair or material
- clean and prepare material for welding
- gouge out at least two existing weld defects or cracks using carbon arc, arc, plasma gouging oxy/fuel or grinding methods
- pre and post-heat base material to specification and maintain correct temperature management during the repair
- assess depth of required repairs including:
 - shallow and partial thickness depths
 - full thickness repairs requiring backing
 - double side access
 - full thickness repairs with single side open root
- perform weld repair using at least one of the following weld processes:
 - gas metal arc welding (GMAW)
 - flux core arc welding (FCAW)
 - manual metal arc welding (MMAW)
 - gas tungsten arc welding (GTAW)
 - oxy/fuel gas.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

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

- safe welding practices and procedures and use of personal protective equipment (PPE)
- materials which are appropriate for weld removal by gouging and/or grinding
- methods of defect removal including gouging, grinding and chipping
- weld preparation methods for ferrous and non-ferrous metals and alloys
- pre-welding and post-welding heating methods including temperature management
- common weld crack or defect causes and procedures to prevent common weld cracks or defects
- procedures to minimise residual stresses
- the effect of hydrogen on welding and procedures to manage hydrogen content.
- procedures for arranging NDT testing by accredited detesting agencies.

Assessment Conditions

- Assessors must:
 - have vocational competency in undertaking advanced weld repair and maintenance at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Assessment must occur in a functioning workplace. Where assessment in the workplace would be unsafe, impractical or threatens the environment, assessment must occur in a sufficiently rigorous simulated environment that reflects the circumstances that would be experienced in a functioning workplace. Assessment must cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills.
- Knowledge assessment may be either verbal or written but must adequately reflect the knowledge requirements of the unit in a functioning workplace.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Link

Companion volumes, including implementation guides, are found on the national training register - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=45a7f1d5-61a5-447a-9688-7abbd7e1a5c7>.