Australian Government

Department of Education, Employment and Workplace Relations

MEM26016A Select and use joining techniques

Release: 1

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Modification History

Release 1 New unit

Unit Descriptor

This unit of competency covers the skills and knowledge required to join composites to other composite components or other materials, either as part of manufacturing or for a repair. The join will need to conform to the requirements of the job and so may need to be rigid or flexible, water, ultraviolet (UV), chemical or fire resistant, or have other properties, as well as the required strength.

Application of the Unit

This unit covers joining which may include:

- bonding (e.g. adhesive, gluing, methacrylate, sikaflex and epoxy)
- using composite materials (e.g. Probond, Divelett, K-Lite and Eurmere)
- secondary bonding (e.g. cured composite to cured composite)
- using mechanical fasteners (e.g. bolts and rivets).

Selection of the joining technique may typically be undertaken by an individual in liaison with relevant stakeholders or it may be undertaken by a team. Selection may be undertaken in an office environment or at the worksite.
Use of the joining technique may be undertaken by an individual or a team. It may be undertaken in a workshop or factory environment or in the field and may be used to manufacture new products, prototypes and samples, or to make repairs.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

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.

Elements and Performance Criteria

1	Determine characteristics required of the join	1.1	Determine finished application properties
		1.2	Develop required technical specifications of join
		1.3	Identify properties of surfaces to be joined
2	Select most appropriate joining system	2.1	Short list suitable joining techniques and materials
		2.2	Compare technical properties of different joining systems with requirements
		2.3	Check material safety data sheets (MSDS) of joining materials
		2.4	Determine preparation required of surfaces to be joined
		2.5	Select most appropriate joining system
		2.6	Make sample join using the system
		2.7	Conduct/organise for relevant tests
		2.8	Evaluate process evaluation test (PET) results
		2.9	Review match of PET results with product requirements
		2.10	Review fabrication process
		2.11	Make any required changes to system
3	Complete the required join	3.1	Identify and control hazards
		3.2	Prepare surface, as required

3.3 Prepare tools and equipment required for join

3.4 Prepare materials required for join

3.5 Undertake required join

3.6 Minimise waste

3.7 Review joined product compared to requirements

3.8 Review materials and techniques selected

3.9 Identify areas for improvement and take appropriate actions

3.10 Complete any required documentation/reporting

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- preparing surfaces
- using hand and power tools
- applying assembly techniques
- applying bonding techniques
- applying joiner

Required knowledge

Required knowledge includes:

- adhesives (e.g. plexus – methylmethacrylate)
- sealants (e.g. sikaflex – silicon or butyl mastic)
- mechanical joining
- substrates and interactions with joiner
- surface preparation of substrate
- application methods
- clamping forces (minimum and maximum)
- adhesive/sealant thickness
- primers
- design rules around fastening (e.g. minimum area for pop rivets, rivet spacing and rivet patterns)
- edge finish of pilot holes
- quality requirements with the hole preparation
- quality requirements with the installation of fasteners
- radius of edge of laminate
- effect of flatness and smoothness of joining surfaces
- substrate composition in joining area

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.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	It is essential that the process and equipment be understood and that the importance of critical material properties, settings and readings is known. Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate corrective action. Consistent performance should be demonstrated. In particular look to see that: • all reasonably available joining techniques and materials were considered • appropriate techniques and materials have been selected • the reasons for choosing the technique and materials are sound • the product meets its required performance. Competence must be demonstrated in the operation of all ancillary equipment to the level required for this unit of competency.
Context of and specific resources for assessment	Assessment will require the selection of joining methods, justifying the selection made and making a number of joints using both mechanical and adhesive joining techniques. Assessment will occur over a range of situations which will include disruptions to normal, smooth operation.
Method of assessment	A single assessment event is not appropriate. On-the-job assessment should be included as part of the assessment process wherever possible. Where assessment occurs off the job, judgement must consider evidence of the candidate's performance in a productive work environment that includes a sufficient range of appropriate tasks and materials to cover the scope of application for this unit. 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.

	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.
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate and the work being performed.

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.

Procedures	Procedures may be written, verbal, computer-based or in some other form, and may include: • all work instructions • standard operating procedures • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the plant • good operating practice as may be defined by industry codes of practice (e.g. Responsible Care) and government regulations
Joining system	Joining system includes techniques and materials, such as: • bonding (e.g. adhesive, gluing, ethacrylates, sikaflex and epoxy) • using composite materials (e.g. Probond, Divelett, K-Lite and Eurmere) • secondary bonding – cured composite to cured composite • using mechanical fasteners (e.g. bolts and rivets)
Finished application properties	Finished application properties include: • permanent/removable

	• waterproof/chemical resistant • structural rigidity • strength (tensile, compressive, shear and torsional) • aesthetic
Properties of surfaces to be joined	Properties of surfaces to be joined include: • materials of construction • physical properties (e.g. strength and rigidity) • surface properties (e.g. surface finish and surface treatment/coatings) • size and shape
Preparation of surfaces	Preparation of surfaces to be joined may include: • solvent or other chemical cleaning • chemical etching • mechanical preparation such as blasting, buffing • surface smoothing (e.g. machining) • making of holes or other physical locking features
Most appropriate joining system	Most appropriate system refers to that system which has: • compliance with product requirements • greatest ease of joining • best financial return • greatest sustainability contribution
Sustainability	Sustainability incorporates the three aspects of: • survival of the ecology/physical environment – which means that an enterprise needs to manage the impact of the business to ensure the survival of the physical environment • economic viability – efficiency, cost and waste reduction and competitiveness to support survival of the business • social sustainability – an enterprise needs to manage the impact of the business to ensure its continued survival within the community and the survival of the community, including occupational health and safety (OHS)
Logs and reports	Logs and reports may include: • paper or electronic based • verbal reports • items found which require action
Appropriate action	Appropriate action includes:

	• determining problems needing action • determining possible fault causes • rectifying problem using appropriate solution within area of responsibility • following through items initiated until final resolution has occurred • reporting problems outside area of responsibility to designated person
Typical problems	Typical problems may include: • incompatible requirements • hazardous materials/preparation methods • non-uniform join
Health, safety and environment (HSE)	All operations to which this unit applies are subject to stringent HSE requirements, which may be imposed through state/territory or federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between Performance Criteria and HSE requirements, the HSE requirements take precedence

Unit Sector(s)

Composites

Custom Content Section

Not applicable.