



Australian Government

MEM26002 Lay up composites using vacuum closed moulding techniques

Release: 1

MEM26002 Lay up composites using vacuum closed moulding techniques

Modification History

Release 1. Supersedes and is equivalent to MEM26002A Lay up composites using vacuum closed moulding techniques

Application

This unit of competency defines the skills and knowledge required to fabricate composites using vacuum infusion processing (VIP) or other vacuum closed moulding techniques.

This unit is one of three units covering the basic composite fabrication techniques, the other two being unit MEM26001 Lay up composites using open moulding techniques and unit MEM26003 Lay up composites using pressure closed moulding techniques, which together are intended to ensure the composite tradesperson can undertake a basic fabrication using these methods.

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

Band: A

Unit Weight: 6

Pre-requisite Unit

MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information

Competency Field

Composites

Elements and Performance Criteria

Elements describe the essential outcomes. Performance criteria describe the performance needed to demonstrate achievement of the element.

1	Determine product requirements	1.1	Follow standard operating procedures (SOPs)
		1.2	Comply with work health and safety (WHS) requirements at all times

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
	1.3 Select and use appropriate personal protective equipment (PPE) in accordance with SOPs 1.4 Identify product requirements from specifications, job sheets or work instructions and customer requests 1.5 Select vacuum closed mould technique most appropriate to product requirements 1.6 Identify or develop required procedures to make product using selected process
2 Set up mould equipment and prepare materials	2.1 Select required items of equipment and ancillary equipment 2.2 Prepare and assemble all equipment and ancillary equipment as required by procedures 2.3 Pack mould according to procedures/laminate schedule 2.4 Identify required reinforcing/reinforcing system and determine quantity of reinforcing 2.5 Prepare reinforcing, including cutting to size/shape, and carry out any pre-treatment, as required 2.6 Identify required resin system 2.7 Determine quantity of resin components and confirm adequate quantities are available 2.8 Mix resin with minimised waste and test resin
3 Fabricate and adjust equipment and materials, as required	3.1 Identify and control hazards 3.2 Apply gel coat and introduce resin to mould 3.3 Ensure air is vented 3.4 Ensure required resin distribution 3.5 Cure product and remove product from mould when ready

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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| | | 3.6 | Identify typical problems and take appropriate remedial action |
| | | 3.7 | Perform final verification to meet product requirements |
| 4 | Clean up and maintain tools and equipment | 4.1 | Clean all moulding and mixing equipment |
| | | 4.2 | Undertake minor maintenance, as appropriate |
| | | 4.3 | Prepare for next use or storage |
| | | 4.4 | Inspect equipment and take appropriate action |
| | | 4.5 | Store equipment |
| | | 4.6 | Minimise waste and dispose of waste, as appropriate |
| | | 4.7 | Complete required logs and reports according to SOPs |

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

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.

Closed moulding techniques include one (1) or more of the following:

- resin infusion under flexible tooling (RIFT)
- vacuum bagging

Mould equipment includes the following:

- airlines
- catchpots
- moulds and mould components

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.

- infusion system for laminate

Typical problems include one (1) or more of the following:

- dead spots trapping air
- resin curing too quickly
- resin curing too slowly

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM26002A Lay up composites using vacuum closed moulding techniques

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM26002 Lay up composites using vacuum closed moulding techniques

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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 on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting specifications, formulas/recipes, batch sheets, customer requests for laying up composites using vacuum closed moulding techniques
- selecting appropriate closed moulding techniques in accordance with specifications and procedures
- introducing resin infusion into mould by applying the following:
 - tack tape
 - bag (pleats and sits well)
 - inlet and outlet plumbing (connect/disconnect)
 - managing flow medium (e.g. cloth), cores, flow and gel times (relationship to positioning and spacing of lines)
 - managing and monitoring vacuum pressure
 - monitoring cure cycles
 - checking for leaks
- performing vacuum bagging by applying the following:
 - resin infusion data and protect bag from contamination
 - breather cloth/films
 - peel ply and achieving correct ply location and orientation
- identifying and rectifying any typical problems and monitoring curing cycles
- undertaking minor maintenance to equipment and ancillary equipment in accordance with procedures
- minimising wastage
- completing all documentation and reports, including items requiring further action, in accordance with SOPs.

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 work practices and procedures and use of personal protective equipment (PPE)
- current state/territory work health and safety (WHS) legislation, standards and codes of practice relevant to using vacuum closed moulding techniques
- reinforcement and lay-up schedules (e.g. layers of reinforcement, direction and darts)
- release systems and processes
- tool sealing
- gel coating, times and working times
- sealing of mould (use of tack tape (e.g. butyl (or other) mastic and mechanical seals and clamps)
- vacuum and vacuum systems, adjustment and measurement, and vacuum control (e.g. switches, controls and regulators)
- resin systems applicable to process (e.g. vacuum infusion or vacuum bagging – polyester and epoxy)
- initiator/catalyst or hardener rates to temperature (hot/cold)
- free amine/amine blushes
- heat curing requirements and how it is done (e.g. ovens, hot bonders (blankets), and autoclaves) and heat curves
- TG (glass transition temperature)
- design briefs (e.g. tool design and part lines)
- Darcy's Law and its application to the flow of resins through porous media (e.g. reinforcing and cores).

Assessment Conditions

- Assessors must:
 - have vocational competency in laying up composites using vacuum closed moulding techniques 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
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills
- 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.

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