Australian Government

Department of Education, Employment and Workplace Relations

MEM26005A Make basic moulds for composites fabrication

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 make low pressure moulds for composites for routine or one-off production.

Application of the Unit

This unit covers the fundamental techniques for making basic moulds. These are required to fabricate composite products and simple moulds may be made by the composites tradesperson. Mould making may be undertaken by an individual or by a team. It will typically require liaison with a wide range of stakeholders. It would typically be undertaken in a workshop or factory environment and may be used to manufacture new products, prototypes and samples, or to make repairs.
This unit does not cover the making of the moulds which require specialist patternmaking or metal fabrication trade skills. See the relevant metals and engineering units of competency for these situations.

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	Interpret product requirements	1.1	Determine requirements of final product
		1.2	Determine features of mould required
		1.3	Identify or develop procedure to make mould
		1.4	Select tooling required to make mould
		1.5	Select materials for mould
2	Prepare for work	2.1	Prepare personal work plan
		2.2	Liaise with plug maker in relation to suitable plug
		2.3	Determine mould features
		2.4	Set up equipment/workplace
3	Prepare materials	3.1	Calculate surface area and required resin volume
		3.2	Develop cutting list for solid materials
		3.3	Mark out and cut out sheet materials, as required
		3.4	Calculate resin content
		3.5	Develop batch scale formulae for resin system
		3.6	Prepare any non-composite materials to be used
		3.7	Measure resin components, as appropriate
		3.8	Minimise waste

4	Make mould	4.1	Identify and control hazards
		4.2	Check suitability of plug
		4.3	Prepare plug, as required
		4.4	Mix resin system
		4.5	Fabricate mould
		4.6	Release mould from plug
		4.7	Detail mould
5	Clean up and maintain equipment	5.1	Label and store mould for future use
		5.2	Clean and replace tools ready for next use
		5.3	Undertake any required minor maintenance of tools/equipment
		5.4	Clean work area and leave ready for next use

6	Anticipate common problems	6.1	Recognise problem/potential problem and take appropriate actions

Required Skills and Knowledge

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

Required skills

Required skills include:

- using computer-aided design (CAD)/computer-aided manufacturing (CAM) applications
- using hand skills
- interpreting drawings
- operating a range of machine (e.g. computer numeric control (CNC) and power routers)
- developing templates (e.g. for hand moulds)
- communicating with relevant personnel

Required knowledge

Required knowledge includes:

- finishing resins
- tooling materials
- tooling resins
- parting lines
- design criteria/brief
- reverse engineering
- shrinkage
- cure values
- correct release agent
- thermal expansion
- open/closed mould (e.g. flange width and draft)
- resin transfer moulding (RTM) - metal vs composite mould
- closed mould (e.g. A/B side, bag it and silicon blanket)
- corners
- undercuts

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: • mould functions as intended • mould allows for efficient fabrication of product. 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 fabrication of suitable moulds using appropriate 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 • product drawings and/or specifications • 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
Requirements of final product	Requirements of final product may be determined from various sources, including: • drawings • product specifications • customer requests • descriptions of required use of product
Mould features	Mould features include: • relief, • parting lines • efficient lay-up
Suitability of plug	Suitability of plug includes: • release angles • parting lines

Prepare plug	Prepare plug includes: • cleaning • repairing surface blemishes • applying release systems
Detail mould	Detail mould includes: • buff • fill • get ready for production
Routine faults	Typical routine faults may include: • gel coat sag • slow curing rates • blistering • wrinkles • pinholes • brush marks • poor surface finish
Non-routine faults	Non-routine faults, which may have multiple causes, may include: • release agents failure • mould release failure • warping or cracking after moulding
Typical process and product problems	Typical process and product problems may include: • structural strength, rigidity and stability of the tooling • dimensional accuracy of the tooling • allowances in the design for shrinkage, deformations and alterations in the process from tooling to mould to finished composite product • placement of flanges, closures, fitments, supports, struts and stiffeners • variations in materials and/or contamination of materials
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
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.