



Australian Government

PMBPROD356 Construct moulds for composite products

Release: 1

PMBPROD356 Construct moulds for composite products

Modification History

Release 1. Supersedes and is equivalent to PMBPROD356C Construct moulds for composite products

Application

This unit of competency covers the skills and knowledge required to plan and make a moulds from which composite products can be made. The mould will be made on a suitable plug/pattern.

This unit of competency applies to experienced operators who are required to convert specification or design into a plan for the mould, construct and cure the moulds, make adjustments to remedy faults and non-conformity and solve problems within area of responsibility.

This unit of competency applies to an experienced operator demonstrating theoretical and technical knowledge and well developed skills in situations that require some discretion and judgement. The experienced operator may work alone or as a member of a team or group and will work in liaison with other shift team members, team leader and supervisor, as appropriate.

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

Pre-requisite Unit

PMBPROD247 Hand lay up composites

PMBPREP201 Prepare moulds for composites production

Competency Field

Production

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the essential outcomes.

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

- | | | | |
|---|--|-----|---|
| 1 | Plan own work requirements | 1.1 | Identify equipment and processes to be used for production process and upstream and downstream operations from production plan or request |
| | | 1.2 | Identify and check materials required, including additives |
| | | 1.3 | Implement measures to control identified hazards in line with procedures and duty of care |
| | | 1.4 | Identify requirements for materials, quality, production and equipment checks |
| | | 1.5 | Identify materials, waste management and housekeeping needs |
| | | | |
| 2 | Plan mould construction | 2.1 | Produce a plan for the mould construction to specification |
| | | 2.2 | Have design approved as necessary according to enterprise specifications |
| | | 2.3 | Plan all steps of the mould production |
| | | 2.4 | Check points are examined for measurements and tests according to specifications |
| | | | |
| 3 | Set up equipment, tools and materials | 3.1 | Clear and set up work area |
| | | 3.2 | Identify and locate materials and equipment for the mould construction according to job specification |
| | | | |
| 4 | Construct mould | 4.1 | Apply mould materials according to specification |
| | | 4.2 | Check dimensions, structural reinforcements, supports and flanges to the specifications or design |
| | | 4.3 | Cure mould and release according to procedures |
| | | 4.4 | Recheck dimensions of the finished mould |
| | | 4.5 | Check fit with other matching mould parts and adjust where necessary |

5	Anticipate and solve problems	5.1	Recognise a problem or a potential problem
		5.2	Determine problems needing priority action
		5.3	Refer problems outside area of responsibility to appropriate person, with possible causes
		5.4	Solve problems within area of responsibility
		5.5	Seek information and assistance as required to solve problems
		5.6	Follow through items initiated until final resolution has occurred

Foundation Skills

This section describes those required skills (language, literacy and numeracy) 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.

Regulatory framework The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used.

Applicable legislation, regulations, standards and codes of practice include:

- health, safety and environmental (HSE) legislation, regulations and codes of practice relevant to the workplace, manual handling and hazardous materials
- Australian/international standards relevant to the materials being used and products being made
- any relevant licence and certification requirements.

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 such requirements the legislative requirements take precedence.

Procedures All operations must be performed in accordance with relevant procedures.

Procedures are written, verbal, visual, computer-based or in some other form, and include one or any combination of:

- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes
- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant.

Tools and equipment

Tools and equipment include:

- plugs/patterns
- hand tools
- power tools
- hand application tools (e.g. rollers, trowels, brushes and filleting tools)
- ancillary equipment that is integral to the process.

Additional tools and equipment will be selected as required from:

- hoists/lifting equipment not requiring any special permits or licences
- manual handling aids such as hand carts and trolleys
- relevant personal protective equipment.

Hazards

Hazards must be identified and controlled. Identifying hazards requires consideration of:

- weight, shape, volume of materials to be handled
- hazardous products and materials
- flammability
- rotational equipment or vibration
- sharp edges, protrusions or obstructions
- slippery surfaces, spills or leaks
- smoke, dust, vapours or other atmospheric hazards

- high temperatures
- electricity
- gas
- gases and liquids under pressure
- structural hazards
- equipment failures
- machinery, equipment and product mass
- other hazards that might arise.

Problems Non-routine problems must be resolved by applying operational knowledge to develop new solutions, either individually or in collaboration with relevant experts, to:

- determine problems needing action
- determine possible fault causes
- develop solutions to problems which do not have a known solution
- follow through items initiated until final resolution has occurred
- report problems outside area of responsibility to designated person.

Non-routine problems are unexpected problems or variations of previous problems and include one or more of:

- emergency situations
- dimensional accuracy of the mould
- placement of flanges, closures and fitments
- attachment of substructures
- wrong materials for the mould construction
- incorrect fibre-to-resin ratios
- intermittent faults.

Operational knowledge includes one or more of:

- procedures
- training
- technical information, such as journals and engineering specifications
- remembered experience
- relevant knowledge obtained from appropriate people.

Unit Mapping Information

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Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=932aacef-7947-4c80-acc6-593719fe4090>

Assessment Requirements for PMBPROD356 Construct moulds for composite products

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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 demonstrate the ability to:

- read and interpret procedures, job specifications, material labels, safety data sheets (SDS) and drawings
- plan the mould according to requirements
- plan and sequence steps to construct the mould
- prepare equipment, tools and materials to meet specifications
- construct, check/test and cure the mould
- monitor key variables, including:
 - actual and set temperatures
 - surface finish/appearance
 - fibre-to-resin ratios
 - times (including curing rates)
 - product weight and output rate product integrity and general conformance to specification
- make adjustments to remedy faults and non-conformity
- identify hazards and apply relevant hazard controls
- apply approvals procedures
- apply safety procedures
- apply housekeeping procedures
- apply waste management procedures
- recognise early warning signs of equipment/processes needing attention or with potential problems
- distinguish between causes of problems, including:
 - operational problems
 - equipment malfunction/wear
 - materials properties
 - raw material variations/contamination
 - procedural errors
- recognise and prioritise problems requiring action
- resolve routine and non-routine problems
- communicate effectively with team/work group and supervisors

- complete workplace records

do basic arithmetical manipulations, including additions, subtractions, divisions, fractions and percentages.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job sufficient to operate independently and to solve routine and non-routine problems, including knowledge of:

- common composite moulding processes and function and operating principles of the moulding equipment
- characteristics of materials and their behaviour in relation to moulding process conditions and stages of production
- moulding process variables that affect mould construction and materials
- product requirements that affect mould construction and materials
- possible options/adjustments in mould construction and materials and their impact on product quality and production output
- types, grades, uses, cure reaction of resins used to construct moulds, including
 - polyester resin
 - epoxy resin
 - vinylester resin
 - dicyclopentadiene (DCPD)
- types and role of catalysts, promoters and additives used with each type of resin
- types, role and properties of reinforcement materials, including
 - E Glass
 - S2 Glass
 - Carbon
 - Aramid
- effect of increasing fibre content on reducing thickness and flexural properties
- basic effect of proportion and direction of fibre orientation
- types of finish and binders
- quality requirements at each stage of construction
- factors which may affect mould quality and appropriate remedies
- non-routine problems that may arise, the range of possible causes and appropriate actions
- organisation procedures relevant to the work environment/job role
- hierarchy of control
- hazards that may arise in the job/work environment and:
 - their possible causes
 - potential consequences
 - appropriate risk controls.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- In all plants it may be appropriate to assess this unit concurrently with units such as:
 - teamwork
 - communication.
- Where the assessee does not currently possess evidence of competency in PMBPROD247 *Hand lay up composites* and PMBPREP201 *Prepare moulds for composites production*, one or both may be co-assessed with this unit.
- The collection of performance evidence:
 - should occur over a range of situations which include typical disruptions to normal, smooth operation of an operating plant
 - will typically include a supervisor/third-party report or other evidence, focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
 - must include the use of an appropriate industrial item of equipment requiring demonstration of operation, start and stop procedures and responding to problems
 - may use industry-based simulation for all or part of the unit particularly where safety, lack of opportunity or significant cost is an issue.
- Assessment should 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.
- Assessment in a simulated environment should use evidence collected from demonstration of skills and one or more of:
 - walk-throughs
 - pilot plant operation
 - industry-based case studies/scenarios
 - ‘what ifs’.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews.
- 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.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- The regulatory framework will be reflected in workplace policies and procedures and is not required to be independently assessed.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.

- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- In addition the assessor or anyone acting in subject matter expert role in assessment shall demonstrate both technical competency and currency. If the assessor cannot demonstrate technical competency and currency they shall assess with a subject matter expert who does meet these requirements.
- Technical competence can be demonstrated through one or more of:
 - relevant VET or other qualification/Statement of Attainment
 - appropriate workplace experience undertaking the type of work being assessed under routine and non-routine conditions
 - appropriate workplace experience supervising/evaluating the type of work being assessed under routine and non-routine conditions
- Currency can be demonstrated through one or more of:
 - being currently employed undertaking the type of work being assessed
 - being employed by the organisation undertaking the type of work being assessed and having maintained currency in accordance with that organisation's policies and procedures
 - having consulted/had contact with an organisation undertaking the type of work being assessed within the last twelve months, the consultation/contact being related to assessment
 - conducting on the job training/assessments of the type of work being assessed
 - being an active member of a relevant professional body and participating in activities relevant to the assessment of this type of work.

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