



Australian Government

PMBPROD391 Produce composites using resin infusion

Release: 1

PMBPROD391 Produce composites using resin infusion

Modification History

Release 1. Supersedes and is equivalent to PMBPROD391B Produce composites using resin infusion

Application

This unit of competency covers the skills and knowledge required to operate and adjust resin infusion processes to produce product.

This competency applies to experienced operators who are required to start up and shut down resin infusion equipment, monitor equipment operation, establish a stable process, 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 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

PMBPROD291 Operate resin infusion moulding equipment

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 the most appropriate equipment to be used for production and upstream and downstream operations from production plan or request

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| | | 1.2 | Identify and check materials required, including additives |
| | | 1.3 | Implement measures to control hazards in line with procedures and duty of care |
| | | 1.4 | Identify requirements for materials, quality, production and equipment checks |
| 2 | Start resin infusion moulding process to procedures | 2.1 | Identify process settings for required product |
| | | 2.2 | Set process to required settings |
| | | 2.3 | Check materials are correct |
| | | 2.4 | Take appropriate action for non-conforming materials |
| | | 2.5 | Set up date, batch and materials markings to specifications, as required |
| | | 2.6 | Complete pre-start checks |
| | | 2.7 | Start up resin infusion moulding process |
| 3 | Operate and make adjustments to the resin infusion process to procedures | 3.1 | Operate resin infusion equipment, noting key variables |
| | | 3.2 | Monitor controls/displays/terminals for production and process data |
| | | 3.3 | Take samples as required and identify product out of specification |
| | | 3.4 | Monitor product/process quality |
| | | 3.5 | Make adjustments to remedy faults and non-conformity to standard as required |
| | | 3.6 | Establish a stable resin infusion process |
| | | 3.7 | Adjust process to minimise scrap and trim |
| | | 3.8 | Clean, adjust and check equipment damage as required |
| 4 | Shut down | 4.1 | Determine type of shutdown |

	machine to procedures	4.2	Select appropriate cleaning method
		4.3	Clean efficiently and adequately as required
		4.4	Leave machine in appropriate condition and with appropriate locks, tags or notices
		4.5	Complete relevant documentation
		4.6	Ensure area is clean and clear after the shutdown, in readiness for the next start-up
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	Seek information and assistance as required to solve problems
		5.5	Solve problems within area of responsibility
		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.
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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:

- moulds
- vacuum bags
- infusion lines
- vacuum pumps and fittings eg hoses and couplings
- programmable logic controllers (PLC) if fitted
- hand tools used in the this process, e.g. dispensing equipment.

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 (PPE).

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

- fibres, airborne and handled
- hazardous products and materials
- sharp edges, swarf and scrap
- protrusions or obstructions
- slippery surfaces, spills or leaks
- rotational equipment or vibration
- smoke, dust, vapours or other atmospheric hazards
- electricity
- gas
- gases and liquids under pressure
- structural hazards
- equipment failures
- machinery, equipment, 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:

- variations in quality
- emergency situations
- mould release problems
- stoppage of resin flow
- excess resin
- warping or cracking after moulding
- variations in vacuum
- variations affecting cure rate

- 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 PMBPROD391 Produce composites using resin infusion

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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, instruments/control panels, material labels and safety data sheets (SDS)
- set up resin infusion equipment and materials to meet specifications
- start up and operate the equipment
- monitor key variables, including:
 - operating temperatures
 - cycle time (such as the resin filling time)
 - output rate
 - vacuum pressure
 - surface finish and condition
 - equipment - adjustments/set-up
 - product weight product integrity and general conformance to specification
- make adjustments to remedy faults and non-conformity
- maintain output and product quality using appropriate instruments, controls, test information and readings
- safely shut down equipment in normal and abnormal circumstances
- leave machine in appropriate condition with any required locks, tags or notices
- identify hazards and apply relevant hazard controls
- 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
 - instrument failure/malfunction
 - electrical failure/malfunction
 - mechanical failure/malfunction
 - wrong readings
 - equipment design deficiencies

- materials properties
- process variables
- recognise and prioritise problems requiring action
- resolve 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:

- resin infusion manufacturing process and phases of the cycle
- characteristics of materials and their behaviour in relation to process conditions and stages of production
- quality requirements at each production stage
- mechanical, hydraulic, pneumatic, electrical and electronic principles which effect machine operation
- common adjustments in process variables and their impact on product quality and production output
- impact of variations in raw materials and equipment operation in relation to final product
- possible changes to materials properties to better suit specific process requirements
- 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 *PMBPROD291 Operate resin infusion moulding equipment*, it 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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