



Australian Government

Department of Education, Employment and Workplace Relations

PMBPROD396B Produce composites using centrifugal casting

Revision Number: 1

PMBPROD396B Produce composites using centrifugal casting

Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This competency covers preparation and operations for forming composite products (typically pipes) using centrifugal casting processes and the solving of non-routine problems.

This competency is typically performed by advanced operators demonstrating some relevant theoretical knowledge and using a range of well-developed skills requiring some discretion and judgement.

Application of the Unit

Application of this unit

This competency applies to operators who are involved in the production of composite products by centrifugal casting equipment. The key factors are the production of material meeting quality standards and product requirements and the recognition and resolving of a range of routine and non-routine problems.

It includes:

- identifying and planning own work requirements from production requests
- identifying and minimising any hazards connected with materials and process from materials safety data sheets, labels and workplace procedures
- setting up equipment, sprays, dies, mandrels, winders, moulds and formers
- checking materials for conformity to job requirements
- monitoring equipment operation and correcting process variations
- correcting materials, equipment or process variations and making appropriate adjustments
- discarding non-conforming products ensuring discarded materials are reused where possible and waste and scrap is disposed of in accordance with workplace instructions
- solving routine and non-routine composites forming equipment and process problems, seeking guidance where necessary or appropriate
- completing logs and reports.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisites

This unit has the prerequisite of *PMBPROD296A Operate centrifugal casting equipment*.

Employability Skills Information

Employability Skills

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT ELEMENT	PERFORMANCE CRITERIA Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1. Plan own work requirements.	1.1 Identify equipment and processes used for production process and upstream and downstream operations from production plan or request. 1.2 Identify materials required, including additives. 1.3 Recognise hazards and follow appropriate hazard control/minimisation methods. 1.4 Identify and check emergency stops, guards and controls. 1.5 Identify requirements for materials, quality, production and equipment checks. 1.6 Identify materials, waste management and housekeeping needs.
2. Start up casting process.	2.1 Determine equipment requirements. 2.2 Set process to specifications as required. 2.3 Check centrifugal casting equipment settings and adjustments are as required. 2.4 Check materials, resins and fibres are correct. 2.5 Discard, or make adjustments to the process for, non-conforming materials. 2.6 Set up date, batch and materials markings to specifications, as required. 2.7 Complete other pre-start checks in accordance with procedures. 2.8 Start up casting process.
3. Operate and make adjustments as required to the centrifugal casting process.	3.1 Operate equipment to form product to specification noting key variables. 3.2 Monitor controls/displays/terminals for production/process data. 3.3 Monitor product/process quality, thickness, colour and integrity. 3.4 Make adjustments to remedy faults and non-conformity to standard as required. 3.5 Maintain continuity of process. 3.6 Collect and reprocess/discard scrap/waste and other materials in accordance with procedures.

ELEMENT ELEMENT	PERFORMANCE CRITERIA
	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
	3.7 Clean, adjust and lubricate equipment as required. 3.8 Pause or stop equipment in an emergency, following workplace and emergency procedures.
4. Shut down machine to procedures	4.1 Determine type of shut down 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 shut down, 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.

Required Skills and Knowledge

This describes the essential skills and knowledge and their level required for this unit.

Application of knowledge of the materials, equipment and process sufficient to recognise material and equipment conditions which may lead to out of specification production.

Knowledge of organization procedures and relevant regulatory requirements along with the ability to implement them within appropriate time constraints and work standards.

Application of the knowledge of managing risks using the hierarchy of controls applied to the centrifugal casting process. Application of approved hazard control and safety procedures and the use of PPE in relation to handling materials, equipment operation and cleanup.

Knowledge as a basis for solving processing and material problems including:

- products, materials and material characteristics
- properties of the materials required to form a composite structure of the required strength and surface finish
- pot life of the resins used
- quality requirements at each production stage
- function and operating principles of equipment, machine components and ancillary equipment
- impact of machine speed, temperature, pressure, time during cycles on product quality and production output
- nature of mechanical, hydraulic, pneumatic, electrical and electronic principles which effect machine operation and product development
- safety procedures and the use of PPE in relation to handling materials, equipment operation and cleanup
- the hierarchy of control, including engineering controls
- impact of variations in raw materials and equipment operation in relation to final product
- changes to materials at various stages of production
- waste management and importance of non-conforming materials
- operation or product quality
- check centrifugal casting equipment for correct set-up to job specifications and implement adjustments or report deviations immediately
- make measurements when required and identify product out-of-specification
- distinguish between causes of faults
- polymer properties and their interactions with process conditions
- relationships between polymer properties and process conditions
- changes to polymer properties to better suit process requirements.
- product problems related to polymer properties
- product problems related to process conditions
- adjustments to process conditions to meet polymer and product requirements.

Competence also includes the ability to:

- plan own work, including predicting consequences and identifying improvements
- interpret from production requests the correct selection and use of equipment, materials, processes and procedures
- maintain output and product quality using appropriate instruments, controls, test information and readings
- make adjustments to equipment operation to rectify variations in equipment

- identify and describe own role and role of others involved directly in the process
- identify factors which may affect product quality or production output and appropriate remedies
- identify when the operator is able to rectify faults and when assistance is required.

Language, literacy and numeracy requirements

This unit requires the ability to read and interpret typical product specifications, job sheets and material labels as provided to operators.

Writing is required to the level of completing workplace forms and production reports.

Numeracy is required to the level of determining required weights/volumes of materials in a resin mix for different circumstances (say using a data sheet), number of layers of impregnated matrix required to yield the required product laminate thickness, and similar activities.

Evidence Guide

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for this training package.

Overview of assessment

A holistic approach should be taken to the assessment.

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the Elements, Performance Criteria and skills and knowledge.

Where the assessee does not currently possess evidence of competency in *PMBPROD296A Operate centrifugal casting equipment*, it may be co-assessed with this unit.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

It is essential that competence is demonstrated in the knowledge and skills defined in this unit. These may include the ability to:

- identify critical materials properties and centrifugal casting composites process characteristics in relation to the process requirements and the end product
- plan own work process within workplace procedures and explain the reasons for the steps in the process
- take appropriate action to observe equipment, materials and products for out of specification results, make adjustments and identify problems to be reported.

Consistent performance should be demonstrated. For example, look to see that:

- production quality and output standards are met consistently
- problems are anticipated from process observations
- problems are efficiently resolved
- the process runs consistently and smoothly.

Assessment method and context

Assessment will occur on an industrial centrifugal casting machine(s) equipment and will be undertaken in a work-like environment.

Competence in this unit may be assessed:

- using an appropriate, industrial centrifugal casting machine
- in a situation allowing for the generation of evidence of the ability to recognise, anticipate and respond to problems
- by using a suitable simulation and/or a range of case studies/scenarios
- through a combination of these techniques.

In all cases it is expected that practical assessment will be combined with targeted questioning to assess the underpinning knowledge and theoretical assessment will be combined with appropriate practical/simulation or similar assessment. Assessors need to be aware of any cultural issues that may affect responses to questions.

Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

Specific resources for assessment

This section should be read in conjunction with the Range Statement for this unit of competency. Resources required include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.

Range Statement

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. Add any 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. Where reference is made to industry codes of practice and/or Australian/international standards, the latest version must be used.

Context

This competency applies to the production of composite products (typically pipes) by centrifugal casting processes within the plastics and rubber industries. It includes the operation of all relevant additional equipment where that equipment is integral to the composites forming process.

Procedures

All operations are performed in accordance with procedures.

Procedures include all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards.

Tools and equipment

This competency includes use of equipment and tools including:

- dies, moulds, mandrels, formers
- sprays and fibre lay up equipment
- hand tools, eg knives, cutters
- equipment for centrifugal casting and curing

- relevant personal protective equipment.

Hazards

Typical hazards include:

- hazardous vapours
- hazardous materials
- manual handling hazards
- moving machinery hazards
- temperature
- equipment operations.

Problems

'Anticipate and solve problems' means resolve a wide range of routine and non-routine problems, using product and process knowledge to develop solutions to problems which do not have a known solution/a solution recorded in the procedures.

Typical process and product problems may include:

- cracks, dents or imperfections of the mould, mandrel, former, die
- adjustment of resin and fibre applicators
- variations in materials, colour, consistency or mix
- adjustment and settings of the equipment
- contamination of materials
- curing conditions
- variations in materials and/or contamination of materials
- processing problems
- wrong raw materials/additives/catalyst
- incorrect equipment set-up, eg speed, material supply, temperature
- curing problems, conditions or equipment
- incorrect quantity of materials
- contaminated materials.

Variables

Key variables to be monitored include:

- operating temperatures
- speed
- colour
- cycle time
- output rate
- product weight
- product integrity and general conformance to specification/sample.
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Unit Sector(s)

Not applicable.