



Australian Government

Department of Education, Employment and Workplace Relations

PMBPROD360B Produce centrifugally cast polyurethane products

Revision Number: 1

PMBPROD360B Produce centrifugally cast polyurethane products

Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This competency covers the centrifugal casting of polyurethane products. It applies to both the rubber and plastics industry.

This competency is typically performed by operators working either independently or as part of a work team.

Application of the Unit

Application of this unit

This competency applies to operators who centrifugally cast polyurethane products in horizontal or vertical rotating machinery. The key factors are the appropriate setting up of the equipment and the mould, temperature control and casting of the product, and troubleshooting.

It includes

- checking job sheets for work to be done and identifying the priority in which jobs/product will be made/completed
- setting up the equipment and ensuring the equipment functions as planned
- planning the job sequence and time from material supply to stripping of the product
- preparing material prior to conducting casting operations
- conducting casting operations
- removing and inspecting the product
- identifying and minimising any hazards connected with materials and process from materials safety data sheets, labels and workplace procedures
- checking settings and adjustments of equipment
- checking materials for conformity to job requirements
- correcting materials, equipment or process variations and making appropriate adjustments
- discarding waste and scrap in accordance with workplace instructions
- solving routine and non-routine casting 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 of competency has the prerequisite of *PMBPROD246B Hand mix materials*.

Employability Skills Information

Employability Skills

The required outcomes described in this unit contain applicable Employability Skills. The Employability Skills Summary of the qualification(s) in which this unit is packaged will assist in identifying Employability Skill requirements.

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. Prepare to centrifugally cast polyurethane materials.	1.1 Interpret materials specifications. 1.2 Identify required materials, including additives and curatives. 1.3 Identify required equipment, including handling, control and material preparation equipment. 1.4 Identify materials and process hazards and plan for their elimination. 1.5 Locate and make ready appropriate safety equipment.
2. Plan centrifugal casting operations.	2.1 Confirm product and process parameters. 2.2 Ensure environmental controls are valid and in place according to operational procedures. 2.3 Identify product to be made and calculate quantity of material required to produce product of correct shape and physical dimensions. 2.4 Determine product colour and obtain appropriate agents. 2.5 Plan the sequence of events from availability of the material to stripping of the final product. 2.6 Obtain appropriate mould coating and releasing agents.
3. Set up and check centrifugal casting equipment.	3.1 Inspect and set up centrifugal casting equipment. 3.2 Ensure that mould is secured or adequately restrained to prevent separation of mould and rotational equipment. 3.3 Test run horizontal cylindrical moulds to ensure vibration free running. 3.4 Ensure work area is clean and free from hazards, and check operational sequence and procedures, particularly OHS procedures, codes and practices. 3.5 Test and confirm that equipment control settings, stop and emergency stop functions are operational. 3.6 Test run rotational equipment to assess equipment conformance to specification.
4. Centrifugally cast polyurethane products.	4.1 Following the planned sequence, identify and operate equipment according to temperature, time, rotational

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.
	speed and emergency procedures. 4.2 Pour materials at the appropriate rate per minute, angle and quantity using necessary aids and assistance to ensure pour is completed within required times and distribution requirements and using techniques to prevent excessive aeration. 4.3 Check product quality including thickness, weight and product integrity, against specifications. 4.4 Deal with material waste and scrap in accordance with workplace procedures. 4.5 Store unused materials, clean up equipment, apply lubricants, make adjustments and manage waste in accordance with workplace procedures.
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 organisation procedures and relevant regulatory requirements along with the ability to implement them within appropriate time constraints and work standards. Competence includes the ability for the practical completion of the job to apply and/or explain:

- impact of incorrect or faulty materials
- production workflow sequences and materials demand
- focus of operation of work systems and equipment
- correct selection and use of equipment, materials, processes and procedures
- hazards of the materials and process and appropriate hazard control procedures
- products, materials and material characteristics
- behaviour of materials in relation to heat, pressure and time
- quality requirements at each production stage
- function and operating principles of centrifugal casting equipment and ancillary equipment
- impact of machine speed, temperature, pressure, time during cycles on product quality and production output
- the importance of machine set-up and warm-up for effective processing of materials
- 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
- 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.

Competency also includes the ability to

- plan own work, including predicting consequences and identifying improvements
- 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
- distinguish between causes of faults.

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.

Basic numeracy is also required, eg to determine that one 30 kg batch of material and one 15 kg batch of material are required to produce a 45 kg product.

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.

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 process characteristics in relation to the process requirements and the end product
- 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
- 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:

- on an operating plant allowing for operation under all normal and a range of abnormal conditions
- in a situation allowing for the generation of evidence of the ability to respond to problems
- by using of 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 production of cast polyurethane products within the plastics and rubber industries. It includes the operation of all relevant additional equipment where that equipment is integral to the polyurethane products casting 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 such as:

- lifting equipment such as cranes and hoists not requiring licensed operators
- spanners, hammers, wrenches and other hand tools
- vertical or horizontal axis centrifugal rotational equipment
- cylindrical and other moulds
- relevant personal protective equipment
- hand tools used in the casting process
- material loading equipment used for loading of raw materials

This competency does not include the use of powered equipment/aids.

Hazards

Typical hazards include:

- spills
- noxious fumes or vapours
- hazardous materials
- manual handling hazards
- rotational equipment hazards
- temperature hazards
- mechanical lifting hazards.

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:

- variations in materials
- contamination of materials
- mechanical failures or disruptions
- incorrect casting temperatures
- physical anomalies such as variations to wall thickness
- inappropriate setting up of the mould for spinning
- machine malfunction
- mould/tooling problems
- processing problems.

Fault causes

Fault causes include:

- wrong raw materials/additives/catalyst
- incorrect quantity of materials/additives/catalyst
- contaminated materials/additives/catalyst
- variations in section thickness
- difficult product removal
- material 'shuts' and other material problems
- incorrectly or improperly prepared materials
- inadequately mixed materials.

Variables

Key variables to be monitored include:

- operating temperatures
- speed of rotation or cure
- colour
- location of pouring basin
- cycle time
- use of separating agents
- product weight
- product integrity and general conformance to specification/sample.
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Unit Sector(s)

Not applicable.