Australian Government

Department of Education, Employment and Workplace Relations

PMC555031B Choose materials for an application

Revision Number: 1

INDUSTRY SKILLS COUNCILS

Creating Australia's Future

PMC555031B Choose materials for an application

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the application of the knowledge of materials characteristics to their properties so enabling the choice of an appropriate material mix for an application. It is based on *PMBTECH505A Choose polymer materials for an application*.

Application of the Unit

Application of the unit	This unit of competency applies to technicians who are able to bring together an understanding of the basics of chemistry and physics and apply this understanding to determine the properties of process materials and products. This competency applies to all work environments and sectors within the industry. This competency is typically performed by technicians developing new products or applying this knowledge to advanced process/product problem solving.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Prerequisite units		

Employability Skills Information

Employability skills	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

ELEMENT	PERFORMANCE CRITERIA
1. Determine possible product properties	1.1. Estimate product properties from different materials and processing conditions 1.2. Predict the impact of different grades of materials/additives on product properties 1.3. Predict the impact of different processing conditions on product properties
2. Choose materials/ material mix for an application	2.1. Select appropriate base materials for an application based on the material properties 2.2. Determine reinforcements/additives required to meet product specification 2.3. Predict failure mechanism for selected mix and modify selection if appropriate 2.4. Identify any health, safety or environmental issues with materials and modify selection if appropriate 2.5. Develop formulation and select appropriate production method
3. Organise testing of product and interpret test results	3.1. Select appropriate tests for product based on test purpose and limitations, and material being tested 3.2. Test colour using colour coordinates as required 3.3. Interpret test results and modify formulation/production method as required to meet product specification

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills include:

- implementing enterprise standard procedures and policies, relevant regulatory requirements and national/international standards within appropriate time constraints and in a manner relevant to the job
- adjusting/correcting/responding to work requirements
- identifying and solving problems
- working in a team or individually, as required
- reading and numeracy to interpret workplace documents and technical information

Required knowledge

Required knowledge includes:

- basic chemistry and physics as relevant to the products and process
- process and material characteristics sufficient to enable the selection of materials with appropriate base properties including:
  - property changes caused by different processing methods and conditions
  - typical processing conditions for typical products
  - property changes caused by using additives
  - mechanism of reinforcement where appropriate
  - test methods
  - properties and applications of materials

Evidence Guide

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.	
Overview of assessment	The unit will be assessed in as holistic a manner as is practical and may be integrated with the assessment of other relevant units of competency.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	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: • knowledge of material properties to the selection of appropriate materials to an application is applied.
Context of and specific resources for assessment	Competence in this unit may be assessed: • by observation of an actual design project where the assessee takes a lead technical role in the material selection • by use of a suitable project where arrangements are made to include the testing aspects. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. Assessment will occur over a range of situations which will include disruptions to normal, smooth operation. Simulation or case studies/scenarios may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual plant and will include 'walk-throughs' of the relevant competency components. A bank of scenarios/case studies/what ifs and questions will be required to probe the reasoning behind observable actions.
Method of assessment	Individual enterprises may choose to add prerequisites and co-requisites relevant to their processes.
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy

EVIDENCE GUIDE	
	capacity of the candidate and the work being performed.

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. 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	All operations are performed in accordance with standard procedures and work instructions
Standard procedures	Standard procedures refer to: • all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards
Properties	Properties include: • particle size, size distribution, particle shape and porosity • flow properties, melt viscosity • rigidity, tensile yield strength, modulus and impact strength • brittle and ductile failure • dimensional and thermal stability
Reinforcements	Reinforcements include: • silicas and clays • glass • fibres • steel
Test methods	Test methods include: • environmental tests - ultra-violet (UV), environmental stress, cracking, weatherometer and chemical resistance • mechanical tests - tensile, creep, coefficient of friction, wear resistance/abrasion and density • chemical/analytical tests • colour tests - colour coordinates (LAB), colour difference ((E)

Unit Sector(s)

Unit sector	Operational/technical

Competency field

Competency field	

Co-requisite units

Co-requisite units		