



Australian Government

PMBTECH401E Predict polymer properties and characteristics

Release: 1

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Modification History

Release 1. Unit code changed. Application changed. Elements and Performance Criteria changed. Range of Conditions removed. Assessment Requirements changed. Supersedes and is equivalent to PMBTECH401 Predict polymer properties and characteristics.

Application

This unit describes the skills and knowledge required to apply thermoplastic polymer properties and characteristics to product and process improvement.

This unit applies to an experienced technician working alone or as part of a team.

The unit principally refers to the connection between the behaviour in processing polymers and in product performance, and the physical and chemical make-up of the polymers.

No licensing or certification requirements exist at the time of publication. Relevant legislation, industry standards and codes of practice within Australia must be applied.

Pre-requisite Unit

Nil.

Competency Field

Technical – Extrusion, Injection Moulding, Masterbatch, Rotational Moulding, Thermoforming

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Predict impact of processing conditions on polymer properties	1.1 Predict property changes caused by molecular weight and temperature to inform process specifications 1.2 Identify glass transition temperature and melting point relative to ambient temperature to inform process specifications 1.3 Use knowledge of morphological changes that occur to polymers as temperature is raised to typical moulding conditions to inform process specifications 1.4 Use knowledge of effect of cooling rate on polymer morphology to inform process specifications 1.5 Predict potential product dimension or shape changes caused by

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	internal stresses resulting from molecular orientation to inform process specifications 1.6 Determine effect of post-mould annealing on degree of crystallisation and crystal size to inform process specifications
2. Predict physical properties of polymers from their morphology	2.1 Predict effects that temperature, crystal size, degree of crystallisation and molecular orientation have on physical properties using resources including phase diagrams 2.2 Predict shrinkage from morphology to inform process specifications
3. Assess likely physical failures of polymers	3.1 Assess impact physical usage conditions have on physical failures 3.2 Assess impact various polymer characteristics have on physical failures
4. Plan for and interpret polymer tests	4.1 Infer melt flow properties from flow data to inform process specifications 4.2 Select test type and method that will validly measure results against desired criteria 4.3 Interpret test results, taking account of variables and impact of variances

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

- Numeracy skills to write and interpret technical information and specifications and perform calculations.

Other foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

Supersedes and is equivalent to PMBTECH401 Predict polymer properties and characteristics.

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 PMBTECH401E Predict polymer properties and characteristics

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Performance Evidence

There must be evidence the candidate has completed the tasks outlined in the elements and performance criteria of this unit, and demonstrated the ability to:

- predict polymer properties and characteristics to support the improvement of at least one product or process.

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- function of equipment and stages of manufacturing process in at least one method or field of polymer manufacturing
- typical applications of polymer materials, and their properties
- the relationship between polymer types or characteristics and optimal job specifications
- polymer morphology using phase diagrams
- properties of polymers in relation to their morphology
- physical failure in polymers
- polymer materials test methods and property data
- changes in properties and variations in test data
- changes in physical properties due to compounding, processing or environmental conditions
- variables that may impact test results, and what may be inferred from test result variances.

Assessment Conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

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