Title	**Demonstrate knowledge of plastic product development**		
Level	**5**	**Credits**	**8**

Purpose	People credited with this unit standard are able to demonstrate knowledge of: environmental considerations for plastic product development; establishing end-use and manufacturing criteria for plastic products; and the methodology for identifying, prioritising, and selecting material for plastic product production.

Classification	Plastics Processing Technology > Plastics Materials

Available grade	Achieved
Recommended skills and knowledge	Unit 19378, *Demonstrate knowledge of polymer property relationships, their structure and polymerisation*; Unit 19381, *Demonstrate knowledge of plastics processing, fabrication and product finishing technologies*.

Explanatory notes

Physical loads include – tensile, compression, impact, flexural, abrasion, friction, fatigue, creep, vibration.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of environmental considerations for plastic product development.

Evidence requirements

1.1 The environmental considerations for selecting materials for plastic products are described.

Range examples are – weight reduction, avoiding toxic and hazardous additives and substances, avoiding ozone depleting substances, avoiding the production of greenhouse gases, reducing the variety of materials used, using recyclable materials, reducing the use of composites, minimising the use of additives, using biodegradable polymers;
evidence is required for five environmental considerations.

1.2 The environmental considerations for the design of plastic products are described.

Range examples are – minimising material use, minimising the number of parts, designing for disassembly, using fastening systems that assist recycling, standardising or modularising parts, biodegradability, efficient use of resources such as energy and water;
evidence is required for four environmental considerations.

1.3 The environmental considerations for selecting the production processes for plastic products are described.

Range examples are – minimising energy consumption, minimising solid waste, minimising production defects;
evidence is required for two environmental considerations.

1.4 The environmental considerations for the distribution of plastic products are described.

Range examples are – labelling which includes the plastics identification codes, reducing packed volumes, reducing the amount of packaging required, reusable packaging;
evidence is required for three environmental considerations.

1.5 The environmental considerations for the disposal of plastic products are described.

Range examples are – reuse, repair, recycle;
evidence is required for two environmental considerations.

Outcome 2

Demonstrate knowledge of establishing end-use and manufacturing criteria for plastic products.

Evidence requirements

2.1 The general criteria to be considered for the development of plastic products are described.

Range examples are – functional requirements, single component, assembled component, dimensional accuracy and stability, weight, service life, potential for and the consequences of misuse, applicable performance and legal codes, standards or specifications;
evidence is required for five general criteria.

2.2 The mechanical criteria to be considered for the development of plastic products are described.

Range examples are – nature, magnitude and rate of application of physical loads, short and long term loading requirements, degree of deflection acceptable in service;
evidence is required for two mechanical criteria.

2.3 The operating environment criteria to be considered for the development of plastic products are described, including the effect of the environment on other required properties.

Range examples are – chemical environment (includes atmospheric or contact presence of chemicals including water), thermal environment (includes softening temperature, deflection temperature under load, thermal conductivity, thermal expansion), electrical environment (includes resistance, conductivity, arcing, tracking), weathering environment (includes ultra violet light exposure in combination with temperature, oxygen and humidity), flammable environment, bacterial environment, fungal environment;
evidence is required for four operating environment criteria.

2.4 The packaging performance criteria to be considered for the development of plastic products are described.

Range examples are – impact on packaged product, gas and moisture barrier, sterilisation;
evidence is required for two packaging performance criteria.

2.5 The optical criteria to be considered for the development of plastic products are described.

Range examples are – clarity, light transmission, haze, black specks;
evidence is required for two optical criteria.

2.6 The appearance criteria to be considered for the development of plastic products are described.

Range examples are – shape, surface finish, colour, decoration;
evidence is required for two appearance criteria.

2.7 The assembly criteria to be considered for the development of plastic products are described.

Range examples are – fastening, welding, adhering, automation;
evidence is required for two assembly criteria.

2.8 The distribution criteria to be considered for the development of plastic products are described.

Range examples are – nesting, stacking, fragility;
evidence is required for two distribution criteria.

2.9 The production and processing criteria to be considered for the development of plastic products are described.

Range examples are – production alternatives, effects of processing on product properties, finishing alternatives, assembly alternatives, decoration alternatives;
evidence is required for three production and processing criteria.

2.10 The commercial criteria to be considered for the development of plastic products are described.

Range examples are – production demand, production lead time, unit cost, tooling cost;
evidence is required for two commercial criteria.

Outcome 3

Demonstrate knowledge of the methodology for identifying, prioritising, and selecting material for plastic product production.

Evidence requirements

3.1 The methodology for identifying and prioritising the essential and desirable required end-use characteristics, properties and manufacturing criteria of a plastic product is described, including environmental considerations.

3.2 The methodology for selecting plastics materials which meet all the essential and the maximum number of desirable and environmental end use characteristics, properties and manufacturing criteria of a plastic product is described.

Range examples of methodology are – determine if material should be thermoset or thermoplastic;
thermoset – select polymer family to match requirements and select specific polymer, grade and required additives;
thermoplastic – determine if material should be amorphous or semi-crystalline; select polymer family as required; select specific polymer, grade and additives; identify polymer suppliers and verify cost and availability.

Planned review date	31 December 2021

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	11 December 2009	31 December 2019
Review	2	15 September 2016	N/A

Consent and Moderation Requirements (CMR) reference	0013

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Please note
Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact Competenz qualifications@competenz.org.nz if you wish to suggest changes to the content of this unit standard.