Title	**Develop a simple product using engineering materials**		
Level	**1**	**Credits**	**10**

Purpose	This unit standard covers the development of a simple product using materials commonly used in mechanical engineering, and is intended mainly for use in high schools. People credited with this unit standard are able to investigate, design, and build a simple product using engineering materials under close supervision.

Classification	Mechanical Engineering > Mechanical Engineering Technology

Available grade	Achieved

Explanatory notes

1 References
Health and Safety at Work Act 2015 and supporting regulations.
SAA/SNZ HB1:1994, Technical drawing for students
Guidelines for Guarding Principles and General Safety for Machinery. Wellington: Occupational Safety and Health Service, Department of Labour, 1995. Available at: http://www.eat.worksafe.govt.nz/worksafe/information-guidance/all-guidance-items/machinery-guidelines-for-guarding-principles-and-general-safety-for/machin-g.pdf.
Safety in Technology Education: A Guidance Manual for New Zealand Schools. Wellington: Learning Media Limited, 2014 Available at: http://technology.tki.org.nz/Technology-in-the-NZC/Safety-in-Technology-Education.

2 Definitions
Close supervision should be interpreted to mean that the teacher or supervisor is present in the workshop at all times to guide and monitor workshop activities.
Product development – improving an existing product or developing a new kind of product. For the purpose of this standard, the development is limited to investigation, design, and building of a working prototype.
Simple product – product capable of being built from engineering materials with basic workshop tools, machinery and processes, and requiring an introductory level of skills and precision. Some examples are – model engines, tools, toolboxes, wrought iron work, utensils, toys, ornamental items, steel furniture.
MIG – refers to Metal Inert Gas welding.
MMAW – refers to Manual Metal Arc Welding.
TIG – refers to Tungsten Inert Gas welding.

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3 Range
Engineering materials – any of ferrous, non-ferrous, plastic.

4 Assessment information
a It is expected that the teacher or supervisor will direct and assist the investigation, design, and building of the product by providing focussing questions, providing some sources, monitoring the design process, and supervising workshop activities.
b Assessor resource materials are available from Competenz by registering at http://www.tools4work.co.nz. A log-in is required to access the resources.

Outcomes and evidence requirements

Outcome 1

Investigate development of a simple product using engineering materials.

Evidence requirements

1.1 Factors relevant to the product development are investigated.

Range examples of factors – material properties, performance requirements, available tools and machinery, methods of measurement, engineering processes, physical laws, usefulness of the product, cost, time to build. Investigation of at least two factors is required.

1.2 Investigation explores alternatives for achieving the aims of the development.

Range at least two alternatives are required.

1.3 Investigation draws on different sources of information.

Range examples of sources – library, internet, brain storming, interview, site visit, technical press, catalogue. At least three sources are required.

1.4 Sources of information relevant to the development are recorded.

Outcome 2

Design a simple product using engineering materials.

Evidence requirements

2.1 Design is developed from initial concepts, and refined, using the results of the investigation.

2.2 Design demonstrates use of sketches or drawings to communicate design details.

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Range sketches or drawings showing size and shape of object, two and three dimensional views, tolerances. Drawings may be produced manually or computer aided.

2.3 Design demonstrates the application of basic arithmetic in an engineering context.

Range basic arithmetic may include but is not limited to – addition, subtraction, multiplication, and division of digits to one decimal point.

Outcome 3

Build a simple product using engineering materials under close supervision.

Evidence requirements

3.1 Building of product demonstrates sound use of workshop tools, equipment, processes, and fixed machine tools at an introductory level.

Range examples of tools – hacksaws, chisels, files, hole punches, tin snips, drills, taps, dies, rules, scribers, punches, dividers, odd leg callipers, callipers, micrometers, vernier callipers, engineers square;
examples of workshop equipment – MMAW, TIG, MIG, oxyacetylene welding, sheetmetal folders and benders;
workshop processes may include but are not limited to – soldering, brazing, welding, riveting, bending, forming, surface finishing;
workshop fixed machine tools may include but are not limited to – milling machines, drilling machines, lathes.

3.2 Finished product functions as designed and reasons given for any variation.

3.3 Finished product is compared with the design specifications and reasons given for any variation.

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	25 July 2006	31 December 2018
Rollover and Revision	2	17 November 2011	31 December 2018
Review	3	17 November 2016	N/A

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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.

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