

<b>Title</b>	<b>Demonstrate and apply knowledge of programming and operating CNC lathes and machining centres</b>		
<b>Level</b>	<b>2</b>	<b>Credits</b>	<b>4</b>

<b>Purpose</b>	<p>This is an entry level unit standard intended for people preparing to work in mechanical engineering trades. It is intended to be assessed off job, under supervision.</p> <p>People credited with this unit standard are able to demonstrate knowledge of programming and operating principles of CNC lathes and machining centres; and operate a CNC lathe or machining centre to produce a component.</p>
----------------	---

<b>Classification</b>	Mechanical Engineering > Engineering Machining and Toolmaking
-----------------------	---

<b>Available grade</b>	Achieved
------------------------	----------

### Guidance Information

- 1 References  
Health and Safety at Work Act 2015.
- 2 Definitions  

*CAD* – Computer aided design.  
*CAM* – Computer aided manufacturing.  
*CNC* – Computer numerical control.  
*Workplace procedures* – procedures used by the organisation carrying out the work and applicable to the tasks being carried out. Examples are – standard operating procedures, safety procedures, equipment operating procedures, codes of practice, quality management practices and standards, procedures to comply with legislative and local body requirements.
- 3 Related unit standards  

This unit standard is one of an introductory CNC machining set:

  - Unit 30276, *Demonstrate and apply knowledge of programming and operating CNC lathes and machining centres* (Level 2); an off job introductory unit standard that covers basic CNC knowledge and application to prepare candidates for employment.
  - Unit 30273, *Set up and operate a CNC lathe or machining centre* (Level 3); a workplace unit standard for candidates that covers simple setting and operation of CNC lathes and machining centres.
  - Unit 22910, *Produce a part program for a CNC engineering lathe or machining centre* (Level 3); an introductory CNC programming unit standard for creating up to 3 axis machining files; intended to be assessed on or off job.

---

## Outcomes and performance criteria

### Outcome 1

Demonstrate knowledge of programming for CNC lathes and machining centres.

#### Performance criteria

- 1.1 Main axes and typical reference points are identified for multi axis turning and machining centres.
- 1.2 The absolute and incremental reference point systems are described.
- 1.3 The difference between point-to-point and continuous path machining is explained.
- 1.4 Programming methods are explained.  
  
Range manual input, conversational, CAD/CAM.
- 1.5 The difference between the linear and circular interpolation method is explained.
- 1.6 The concepts of tool length and cutter radius compensations are described. Compensation adjustment in CNC programming for machining is explained.
- 1.7 Preparatory and Miscellaneous (G and M) programme codes are interpreted using appropriate code tables to identify corresponding machine functions.

### Outcome 2

Demonstrate knowledge of the operating principles of CNC lathes and machining centres used in mechanical engineering.

#### Performance criteria

- 2.1 The purpose and advantages of CNC are described compared to manually controlled machining.
- 2.2 The major components and accessories of CNC lathes and machining centres are identified and their functions outlined.
- 2.3 Typical programmable G and M code functions are explained.
- 2.4 Machine tool and workpiece movements are expressed in terms of Cartesian coordinates, and the purpose of the reference point (grid zero) is explained.
- 2.5 The purpose of tool compensation is explained.  
  
Range tool diameter, wear, nose radius, tool length.

- 2.6 The interaction between CAD and CAM in relation to production of components using CNC is explained.
- 2.7 Hazards in the use of CNC machines, and methods of managing the hazards, are identified.

### Outcome 3

Operate a CNC lathe or machining centre to produce a component.

#### Performance criteria

3.1 Workplace safety procedures are followed.

Range examples are – use of personal protective equipment, checking of equipment for faults, use of extraction equipment.

3.2 Files are uploaded to the machine and cut programme confirmed with supervisor in accordance with workplace procedures.

3.3 Component material is loaded and positioned in accordance with workplace procedures.

3.4 Component is cut in accordance with workplace procedures.

<b>Replacement information</b>	This unit standard replaced unit standard 22909.
--------------------------------	--

<b>Planned review date</b>	31 December 2022
----------------------------	------------------

#### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	20 July 2017	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0013
--	------

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

#### Comments on this unit standard

Please contact Competenz at [qualifications@competenz.org.nz](mailto:qualifications@competenz.org.nz) if you wish to suggest changes to the content of this unit standard.