

40037**Set up and operate computer numerical control (CNC) machinery in an engineering environment**

Kaupae Level	3
Whiwhinga Credit	20
Whāinga Purpose	<p>This skill standard is for people who want to learn how to operate CNC machinery in an engineering environment.</p> <p>This skill standard can be used in any programme leading to qualifications and micro-credentials at Level 3 and above within the CNC engineering field.</p>

Hua o te ako me Paearu aromatawai | Learning outcomes and assessment criteria

Hua o te ako Learning outcomes	Paearu aromatawai Assessment criteria Ākongā/Learner are able to:
1. Identify and outline CNC equipment and its functions in an engineering environment.	a. Outline the main functions, types, specifications, and applications of CNC equipment and the fundamentals of CNC technology.
	b. Outline the different CNC machining tooling, machine capabilities, limitations, and basic CNC programming concepts.
	c. Outline the fundamental CNC machining techniques, including the role of axes and datums, basic tool compensation, and calculating feeds and speeds.
	d. Use Computer-Aided Design (CAD) to read and identify 2D and 3D modelling and drawings in relation to producing and checking CNC products.
2. Set up a CNC machine to undertake CNC operations.	a. Check and prepare the CNC machine according to manufacturer's instructions or workplace procedures.
	b. Load and/or select the program according to machine requirements and workplace procedures.
	c. Select and install tooling and holding devices for CNC machining operations, ensuring secure and accurate CNC machining/cutting processes.

	d. Align and configure workpieces, holding devices, and tooling using offsets, ready for CNC operations as per workplace procedures.
	e. Identify work holding practices such as soft jaws and hard jaws, using appropriate offsets and program adjustments, ready for CNC operations.
	f. Use appropriate hand tools when undertaking fitting of holding devices and tooling.
3. Monitor CNC machining processes to meet required production requirements.	a. Monitor CNC machining processes throughout the production cycle, checking for any changes to expected outcomes as per workplace procedures.
	b. Collect data as per workplace procedures.
	c. Work effectively as a team member and seek advice in the machining work environment, ensuring safe and effective operations.
	d. Collaborate with quality control personnel to resolve any quality issues and ensure the production of high-quality components.
4. Perform cross reference of measuring tools used in CNC operations to ensure products meet required tolerances consistently and accurately.	a. Identify common faults in measuring devices and seek advice about re-calibration.
	b. Under supervision, make calibration adjustments to measuring equipment as required, maintaining accuracy and reliability by following the manufacturer's specifications, workplace procedures, and industry standards.
	c. Handle and store measuring devices to preserve their integrity and condition.
5. Apply knowledge of materials used in CNC machining to meet required production requirements.	a. Identify various types of materials used in CNC, including characteristics and main uses in industry.
	b. Select holding devices, tooling, coolant, gases, and handling equipment taking into account material properties.
	c. Explain why appropriate machining adjustments are made for different materials to optimise processes and quality finish.

6. Identify and outline continuous improvement concepts and their application in order to improve production.	a. Identify potential and existing continuous improvement concepts and outline how they relate to production.
	b. Outline the effect of wasteful processes, proper care and maintenance of tools and equipment, downtime, and adherence to quality standards have on costs and sustainability.
7. Use finishing and product handling techniques to ensure CNC products meet customer and engineer specifications.	a. Perform finishing operations on CNC products, such as deburring sharp edges and cleaning parts to meet customer-specific quality standards.
	b. Follow job completion processes, including removing, handling, and storing finished components, as specified by workplace procedures, to protect them against damage during storage and transportation.
	c. Explain the importance of completing all documentation and filing as per workplace procedures and practices.

Pārongo aromatawai me te taumata paearu | Assessment information and grade criteria

Assessment specifications

- Evidence presented for assessment against this skill standard must be consistent with safe work practices and be in accordance with applicable industry standards, workplace procedures and legislative requirements.
- Evidence must demonstrate the learner's competence to undertake the skills and knowledge under limited supervision detailed in this skill standard.
- A variety of forms of evidence is accepted, such as photos, signed observation sheets, video recordings, written reports, oral presentations, etc.
- Use of appropriate, safe facilities, equipment, and resources to undertake assessment tasks effectively and safely.
- Practical assessment tasks must be verified and signed by a verifier who has relevant current industry expertise.

Definitions

- *Industry standards* refer to adherence to guidelines set by professional bodies to ensure consistency, quality, and safety, complying with industry regulations and best practices.
- *Legislative requirements* refer to laws enacted by government bodies to ensure worker safety, rights, and welfare, covering areas such as health and safety, employment rights, and environmental protection, with compliance avoiding legal consequences and penalties.
- *Safe work practices* refer to practices that minimize risks to workers' health and safety, following government WorkSafe legislation. This includes identifying and mitigating risks, providing protective gear and training, and fostering a safety-conscious culture.

- *Workplace procedures* refer to established protocols for smooth operations, dictating task performance and safety measures, promoting consistency and productivity in a safe work environment.

Ngā momo whiwhinga | Grades available

Achieved.

Ihirangi waitohu | Indicative content

CNC Machining Fundamentals

- CNC equipment functions and types
- CNC technology basics
- CNC machining tooling and programming concepts
- Understanding CNC machine capabilities and limitations
- Essential CNC machining techniques and basics.

CAD and Modelling in CNC

- Computer-Aided Design (CAD) fundamentals
- 2D and 3D modelling principles.

Preparing CNC Machines

- CNC machine preparation as per manufacturer's instructions
- CNC program loading procedures
- Tooling and holding device selection and installation
- Workpiece alignment and configuration
- Effective work holding practices and offset adjustments
- Using hand tools for holding device and tooling fitting.

Monitoring and Maintenance

- Continuous monitoring of CNC machining processes
- Real-time data collection for optimization
- Observation of machine behaviour and performance
- Monitoring tool wear and replacement
- Interpreting alarms and responding appropriately.

Collaboration and Teamwork

- Collaboration with experienced CNC machinists
- Effective teamwork in CNC machining processes
- Collaboration with quality control personnel.

Material Considerations

- Understanding material types and characteristics in CNC
- Selecting materials based on properties
- Material-specific machining techniques.

Continuous Improvement and Sustainability

- Implementing continuous improvement concepts
- Considering cost and sustainability factors
- Finishing operations and completion.

Finishing Operations in CNC Machining

- Processes for job completion
- Component removal, handling, and storage
- Ensuring safe shift loads.

Rauemi | Resources

None.

Pārongo Whakaū Kounga | Quality assurance information

Ngā rōpū whakatau-paerewa Standard Setting Body	Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council
Whakaritenga Rārangi Paetae Aromatawai DASS classification	Engineering and Technology > Mechanical Engineering > Engineering Machining and Toolmaking
Ko te tohutoro ki ngā Whakaritenga i te Whakamanatanga me te Whakaōritenga CMR	0013

Hātepe Process	Putanga Version	Rā whakaputa Review Date	Rā whakamutunga mō te aromatawai Last date for assessment
Rēhitatanga Registration	1	30 May 2024	N/A
Kōrero whakakapinga Replacement information	N/A		
Rā arotake Planned review date	31 December 2029		

Please contact Hanga-Aro-Rau Manufacturing, Engineering, and Logistics Workforce Development Council qualifications@hangaarorau.nz to suggest changes to the content of this skill standard.