



Australian Government

MEM05070 Write and proof programs for NC/CNC thermal cutting machines

Release: 1

MEM05070 Write and proof programs for NC/CNC thermal cutting machines

Modification History

Release 1. New Unit.

Application

This unit of competency was developed for post trade engineering fabrication training and the recognition of post trade skills in planning, writing and proofing programs for numerical control (NC)/computer numerical control (CNC) thermal cutting operations.

It defines the skills and knowledge required to plan, write and proof programs for NC/CNC thermal cutting operations, including cutting paths, using appropriate software for machines with single or multiple nozzles, to achieve specified cutting outcomes as defined in the unit, in conjunction with its prerequisites.

The unit scope includes writing programs using the machine controller and/or offline programming using software.

Where programming of other computer-controlled machines is required, the appropriate MEM NC and CNC programming units must also be selected. Where integration of the NC/CNC thermal cutting machine with other programmable equipment is required, the unit MEM07040 Set multistage integrated processes must also be selected.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band: B

Unit Weight: 6

Pre-requisite Unit

MEM05007 Perform manual heating and thermal cutting

MEM05071 Perform advanced manual thermal cutting, gouging and shaping

MEM05009 Perform automated thermal cutting

MEM05086 Set and edit computer controlled thermal cutting machines

MEM05087 Write basic NC/CNC programs for thermal cutting machines

MEM09002 Interpret technical drawing

MEM11011 Undertake manual handling

MEM12023 Perform engineering measurements

MEM13015 Work safely and effectively in manufacturing and engineering

MEM16006 Organise and communicate information

MEM18001 Use hand tools

Competency Field

Fabrication

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. Determine thermal cutting job requirements	1.1 Identify thermal cutting requirements including relevant standards and codes from drawings, specifications and other customer and enterprise documentation 1.2 Check material to be cut is to specification and job requirement
2. Confirm NC/CNC thermal cutting machine suitability for job requirements	2.1 Identify machine features and specifications including programming language and thermal cutting capabilities 2.2 Identify machine safety features 2.3 Establish required cutting path and machine operations using drawings and cutting machine controls and software 2.4 Confirm required operations for NC/CNC thermal cutting machine
3. Prepare for thermal cutting programming	3.1 Check alignment of material to machine cutting head/s and datum points 3.2 Program cutting head centre point for job and check location and alignment 3.3 Calculate coordinates for cutting path 3.4 Check availability of logical subroutines and other standard instructions for position orientation 3.5 Check job for any positions or cutting paths requiring non-standard instructions
4. Write or record program	4.1 Write or record program in required code format for cutting path and cutting parameters using machine controller or software 4.2 Perform any additional programming required including instructions, thermal cutting recording and lower-level programming 4.3 Produce operation sheets to specification in accordance with standard operating procedures (SOPs)
5. Trial program	5.1 Trial program on test material 5.2 Verify thermal cutting and program performance against required specifications

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
	5.3 Edit program to adjust thermal cutting operations including using manual operation if necessary 5.4 Save final program and complete operation sheets and records according to enterprise procedures

Foundation Skills

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

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

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

NC/CNC thermal cutting machines include one or more of the following:	• fuel/gas machines • plasma machines • laser machines.
Thermal cutting parameters include one or more of the following:	• arc length • automatic height sensing where installed • fuel/gas mixture • voltage – operating voltage, maximum and default • frequency • cutting tool positioning • motion – acceleration, deceleration and feed rate.
Appropriate persons for enquiries about the application or interpretation of NC/CNC thermal cutting procedures or specifications include one or more of the following:	• engineers • supervisors • metallurgists • original equipment manufacturer (OEM) technicians.

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Lower level programming	lower-level programming is where the programmer creates complex instructions and data types for functions that go beyond those supplied with the standard NC CNC thermal cutting machine software.
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Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM05070 Write and proof programs for NC/CNC thermal cutting machines

Modification History

Release 1. New Unit.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include the ability to:

- identify and interpret customer specifications, engineering drawings, and other applicable reference documents for information relevant to writing programs for numerical control (NC)/computer numerical control (CNC) thermal cutting machines
- identify materials and consumables compliance against job specifications
- identify required thermal operations to be incorporated in the NC/CNC thermal cutting program
- determine coordinates for cutting path and producing operation sheets for the program and process
- record using the machine controller of weld coordinates and torch movements
- use software including G and M codes and canned cycles and sub-routines for programming thermal cutting operations
- trial the program ensuring the thermal cutting machine operates safely and correctly and cuts to specification
- edit the thermal cutting machine program to ensure compliance with specifications
- access and use the NC/CNC thermal cutting machine file library of shapes.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include the ability to:

- safety features and requirements of NC/CNC thermal cutting machines
- types of NC/CNC thermal cutting machines and their applications
- standard NC/CNC thermal cutting machine programming including the role of G and M codes and comments, and input controls for NC/CNC thermal cutting machine programs
- default positions, zero point, and other datum points used by NC/CNC thermal cutting machines
- system menus and commands including:
 - thermal cutting machine specific parameters
 - job specific parameters

- procedures for trialling and editing thermal cutting machine programs via software and the machine controller
- procedures for manual operation of the thermal cutting machine.

Assessment Conditions

- Assessors must:
 - have vocational competency in writing and proofing programs for NC/CNC thermal cutting operations at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Assessment must occur in a functioning workplace. Where assessment in the workplace would be unsafe, impractical or threatens the environment, assessment must occur in a sufficiently rigorous simulated environment that reflects the circumstances that would be experienced in a functioning workplace. Assessment must cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills.
- Knowledge assessment may be either verbal or written but must adequately reflect the knowledge requirements of the unit in a functioning workplace.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Links

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