Australian Government

Department of Education, Employment and Workplace Relations

MEM07020C Program multiple spindle and/or multiple axis NC/CNC machining centre

Release: 2

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MEM07020C Program multiple spindle and/or multiple axis NC/CNC machining centre

Modification History

Single band identifier removed to clarify dual status

Unit Descriptor

Unit descriptor	This unit covers identifying NC/CNC machine program elements, writing and trialling a machine program for multiple spindle and/or multiple axis NC/CNC machining centres, and preparing an operation sheet.

Application of the Unit

Application of the unit	This unit extends to writing programs to describe machine operations including tool paths using appropriate software for machines which include multiple spindles and/or multiple axis/B axis angular, multiple tool turrets, tool changers and may include component loaders of a pallet type etc. The program may use common M and G codes and include the programming of advanced operations, using canned cycles and sub-routines. Programs are trialled and edited as necessary to adjust operation of centre. Technical difficulties are resolved in consultation with appropriate technical advisers. Work would be undertaken autonomously using predetermined standards of quality. Where machining skills in excess of MEM07005C (Perform general machining) are required, then appropriate units should also be selected. **Band:** This unit has dual status and is to be regarded as both a specialisation band A unit and Specialisation band B unit for progression to C7 (AQF level IV). **Unit Weight**: **2**

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM07015B	Set computer controlled machines/processes
	MEM07016C	Set and edit computer controlled machines/processes
	MEM07018C	Write basic NC/CNC programs
	MEM07019C	Program NC/CNC machining centre
	MEM07024B	Operate and monitor machine/process
	MEM07028B	Operate computer controlled machines/processes
	MEM09002B	Interpret technical drawing
	MEM12023A	Perform engineering measurements
	MEM18001C	Use hand tools
Path 2	MEM07005C	Perform general machining
	MEM07015B	Set computer controlled machines/processes
	MEM07016C	Set and edit computer controlled machines/processes
	MEM07018C	Write basic NC/CNC programs
	MEM07019C	Program NC/CNC machining centre
	MEM09002B	Interpret technical drawing
	MEM12023A	Perform engineering measurements
	MEM18001C	Use hand tools

Employability Skills Information

Employability skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Identify NC/CNC machine program elements	1.1. Appropriate program elements are selected for machine controller.
2. Write NC/CNC machine program	2.1. Engineering drawings are understood and interpreted to define machine function and tool path geometry. 2.2. Coordinates are calculated as required for tool path or machine functions. 2.3. Advanced operations using canned cycles and sub-routines are selected and applied appropriately. 2.4. Program is written in standard code format in accordance with standard operating procedures.
3. Write NC/CNC operation sheet	3.1. Operation sheets are produced to specification in accordance with standard operating procedures which includes appropriate Australian standard where required.
4. Trial program	4.1. Machine is operated in manual mode to test and prove program. 4.2. Program is edited if necessary to adjust operation. 4.3. Components are checked to conform to specification.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills
Look for evidence that confirms skills in: • reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents • planning and sequencing operations • checking and clarifying task related information • calculating coordinates of all relevant points on the part or product to be produced • writing NC/CNC program in standard code format and incorporating, where appropriate, canned cycles and sub-routines • producing NC/CNC operation sheet(s) • operating NC/CNC machine in manual mode

REQUIRED SKILLS AND KNOWLEDGE

- editing NC/CNC program
- checking parts or products produced for conformance with specifications

Required knowledge

Look for evidence that confirms knowledge of:

- elements of an NC/CNC program
- the function of elements in controlling the operation of an NC/ CNC machine
- machining operations to be performed in the manufacture of the given part or product
- the appropriate type(s) of NC/CNC machine to perform the required machining operations
- the machining operations to be controlled by the program to be written
- the tool path(s) to be followed when producing the part or product
- the sequence of machining operations to be programmed
- reasons for selecting the chosen tool path(s) and sequence of operations
- the zero point of the NC/CNC machine
- the canned cycles and sub-routines accessible in the particular NC/CNC machine
- the application of each canned cycle and sub-routine available
- the canned cycles and/or sub-routines to be used in the NC/CNC program
- reasons for selecting the chosen canned cycles and/or sub-routines
- standard codes used in the writing of NC/CNC programs
- applications of standard codes in NC/CNC programming
- procedures for writing NC/CNC programs in standard code format
- procedures for completing NC/CNC operation sheets
- the information to be included in NC/CNC operation sheets
- relevant Australian standards
- procedures for manual operation of the NC/CNC machine
- the reasons for testing and proving the NC/CNC program
- the procedures for editing the NC/CNC program via the machine controller
- the effects of editing on the operation of the NC/CNC machine and the part or product to be produced
- the specifications of the part or product
- the measuring equipment/techniques to be used to check for conformance with specifications
- hazards and control measures associated with numerical and computer controlled machines, including housekeeping
- safe work practices and procedures

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	A person who demonstrates competency in this unit must be able to program multiple spindle and/or multiple axis NC/CNC machining centres. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.
Context of and specific resources for assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate. This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with programming multiple spindle and/or multiple axis NC/CNC machining centres or other units requiring the exercise of the skills and knowledge covered by this unit.
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

EVIDENCE GUIDE	
Guidance information for assessment	

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	

Unit Sector(s)

Unit sector	

Co-requisite units

Co-requisite units		

Competency field

Competency field	Machine and process operations