Australian Government

Department of Education, Employment and Workplace Relations

MEM07039A Write programs for industrial robots

Release: 1

MEM07039A Write programs for industrial robots

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers planning and writing computer programs for robot operations.

Application of the Unit

Application of the unit	This unit applies to the writing of programs to achieve operating specifications. Programs are in accordance with manufacturers' operating procedures, manufacturer specific language and the functional parameters of the robot. For setting robot cells, refer to Unit MEM07040A (Set multistage integrated processes). For editing robot program parameters, Unit MEM10004B (Enter and change programmable controller operational parameters) should be regarded as sufficient. **Band**: **B** **Unit Weight**: **4**

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM09002B	Interpret technical drawing
	MEM10004B	Enter and change programmable controller operational parameters
	MEM12023A	Perform engineering measurements
	MEM16008A	Interact with computing technology

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 robot requirements	1.1. Robot features and specifications are identified. 1.2. Robot language is identified. 1.3. Robot safety features are identified. 1.4. Manufacturer's operating procedures and engineering drawings are interpreted to define robot function and tool path geometry. 1.5. Required operations for robot and end effectors are determined in conjunction with appropriate technical experts or other technical reference sources.
2. Plan robot program	2.1. Programming requirements are identified. 2.2. Coordinates are calculated for tool path or robot functions. 2.3. Programming method is selected. 2.4. Program plan is developed.
3. Write basic program	3.1. Robot and computer equipment is prepared. 3.2. Program is written in required language and in accordance with standard operating procedures. 3.3. Safety features are incorporated in robot program. 3.4. Operation sheet is prepared.
4. Trial program	4.1. Program is trialled by operating robot in manual mode in conjunction with operator as appropriate. 4.2. Program performance is verified against required specifications and with appropriate technical experts or other technical reference sources. 4.3. Program is edited if necessary to adjust operation as required. 4.4. Components are checked for conformance to specifications as required.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills

REQUIRED SKILLS AND KNOWLEDGE

Look for evidence that confirms skills in:

- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, engineering drawings and other applicable reference documents
- planning and sequencing operations
- checking and clarifying task related information
- identifying robot features/applications/specifications
- calculating coordinates of all relevant points on the part or product to be produced
- writing programs in required programming language
- producing robot operation sheet(s)
- editing robot program
- checking parts/products for specification conformance
- undertaking program storage and filing procedures

Required knowledge

Look for evidence that confirms knowledge of:

- classifications/applications of industrial robots, such as:
  - welding
  - thermal cutting
  - machining
  - forming and shaping
  - pick and place
  - palletising
  - machine loading/unloading
- end effectors:
  - grippers
  - tools and tool changes
- features and specifications of robots and components
- joint movements of a robot
- drive systems used to generate robot movement
- programming methods and procedures
- function of elements in controlling operation of a robot
- safety features and requirements of robots
- type(s) of robots and end effectors and their applications
- robot operations controlled by programs
- the tool path(s) when producing a part or product
- the sequence of robot operations, including movements
- the zero point of the robot
- standard codes and languages for robot programs

REQUIRED SKILLS AND KNOWLEDGE
• procedures for completing robot operation sheets • procedures for manual operation of the robot • reasons for testing and proving the robot program • procedures for editing the robot program • the effects of editing on the operation of the robot and the part or product to be produced • the measuring equipment/techniques used to check for conformance to specification • hazards and control measures associated with programming robots, including housekeeping • safe workplace 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 write basic robot programs. 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 writing robot programming 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 should not require language, literacy and numeracy skills beyond those required in this unit. 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.	
Features and specifications	• Components • Capabilities • Speed • Reach • Load carrying capacity • Accuracy/repeatability • Classification • Polar coordinate • Cylindrical coordinate • Cartesian coordinate • Jointed elbow • SCARA • Movements • Base • Shoulder • Elbow • Pitch • Roll • Yaw • Applications • Required operating conditions • Limitations • Justification • Safety features

RANGE STATEMENT	
Language	Language appropriate to robot type
Safety features	• AS2939 - 1987 - Industrial Robot Safety - Safe Design and Usage • Physical design • Enclosures • Layout • Programming • Sensing • Personnel
Method	• Manual • Walkthrough • Leadthrough • Offline • Optical/vision or sensor systems

Unit Sector(s)

Unit sector	

Co-requisite units

Co-requisite units		

Competency field

Competency field	Machine and process operations