



Australian Government

MEM23117 Evaluate microcontroller applications

Release: 1

MEM23117 Evaluate microcontroller applications

Modification History

Release 1. Supersedes and is equivalent to MEM23117A Evaluate microcontroller applications.

Application

This unit of competency defines the skills and knowledge required to evaluate automated devices, machines and processes controlled by microprocessors. It includes integration of input devices/sensors, output devices/actuators, controllers, interfacing and signal conditioning, human-machine interfaces (HMIs), networking options, data and communications protocols software, programming of microcontrollers and automation safety. Analogue interfacing is included but the unit does not cover proportional integral derivative (PID) interfacing.

Microcontrollers are typically an integrated circuit consisting of a central processing unit (CPU) combined with support functions. These functions include a crystal oscillator, timers, watchdog timer, serial and optional analog input/output (I/O). There is a limited amount of read/write memory on the chip along with program memory in the form of reprogrammable flash or 'one-time programmable' ROM.

The unit applies to the evaluation of microcontrollers and their use in automated devices, machines and engineering processes. It is suitable for people working as automation, mechatronics or maintenance technicians or for those pursuing qualifications or careers in those disciplines.

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

Pre-requisite Unit

MEM23004 Apply technical mathematics

MEM23111 Select electrical equipment and components for engineering applications

MEM23112 Investigate electrical and electronic controllers in engineering applications

Competency Field

Engineering science

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>

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1. Determine scope of evaluation	1.1 Confirm and apply safe electrical working practice 1.2 Review the currents and voltages present in the microcontroller applications and check for regulatory requirements and dangerous high currents and voltages, including effects on humans and on application equipment and components 1.3 Identify work health and safety (WHS) and regulatory requirements, codes of practice, standards, risk management and organisational procedures, including those related to automation safety 1.4 Identify software techniques and graphics required for evaluation 1.5 Identify stakeholders to be consulted on evaluation tasks 1.6 Identify sources of technical and professional assistance 1.7 Investigate sustainability implications of microcontroller applications
2. Establish existing features of microprocessor applications	2.1 Review the functions and features of devices, machines and processes controlled by microprocessors 2.2 Identify features and functions of microprocessor devices and components 2.3 Review microprocessor programming and functions 2.4 Identify system integrating principles and techniques, signal conditioning and power interfacing 2.5 Identify networking and system supervision, data acquisition and systems control options
3. Evaluate microcontroller applications	3.1 Determine suitability of components of application, including sensor or transducers, microcontroller and output devices, signal conditioning and interfacing used by applications 3.2 Assess scope and suitability of microcontroller functions, software and programming to applications 3.3 Assess suitability of network, supervisory control and data acquisition (SCADA) options, communications protocols, standards and network topologies, human-machine interfaces (HMIs) and graphical user interfaces (GUIs) used by applications 3.4 Review application for compliance with WHS and regulatory requirements, codes of practice, standards and risk management procedures

Elements	Performance Criteria
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4. Report results	4.1 Record results of scoping, principles and techniques identification, and evaluation of applications 4.2 Provide documentation that includes files, layouts, programs, flow charts or state diagrams

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.

Microcontroller applications include:	• motor controllers • fault detectors • power controllers • communications • security systems • machine and process automation • automotive and transport applications • domestic appliances • medical equipment.
Appropriate technical and professional assistance includes:	• technical support and advice relating to elements which have intrinsic dangers including • professional support for technologies.
Work health and safety (WHS), regulatory requirements and organisational procedures include:	• WHS, acts, regulations and relevant standards • codes of practice from Australian and overseas engineering and technical associations and societies • risk assessments • registration requirements

	• safe work practices • state and territory regulatory requirements.
Automation safety refers to use of general and specific safety features and includes:	• emergency stop • failsafe design • redundancy • interlocks • guarding data integrity • general plant design and use • functional safety of safety-related electrical, electronic and programmable electronic control systems.
Network topologies include:	• daisy-chain • star • ring • branch • linear • tree • wired and wireless options.
Software for microcontroller applications include:	• integrated development environment software which can include: • programmer • editor • assembler • compiler • linker • simulator • emulator • HMI software • network software • modem software.
Sustainability includes:	• meeting all regulatory requirements • conforming to all industry covenants, protocols and best practice guides • minimising ecological and environmental footprint of process, plant and product • maximising economic benefit of process plant and product to the organisation and the community • minimising the negative WHS impact on employees, community and customer.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23117A Evaluate microcontroller applications.

Links

Companion Volume implementation guides are found in VETNet -

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