



Australian Government

MEM29002 Commission a cyber-physical system

MEM29002 Commission a cyber-physical system

Modification History

Release	Comments
2	Unit title corrected in Assessment Conditions. Supersedes and is equivalent to MEM29002 Commission a cyber-physical system (Release 1).
1	This unit of competency was first released in MEM Manufacturing and Engineering Release 4.0.

Application

This unit describes the skills and knowledge to commission a cyber-physical system.

Cyber-physical systems (CPS) are integrations of computation, networking, and physical processes. Embedded computers and networks monitor and control the physical processes, with feedback loops where physical processes affect computations and vice versa.

The unit requires the ability to prepare for and apply commissioning procedures for a cyber-physical system before completing and reporting on the outcomes.

This unit does not cover commissioning activities covered by electrical licensing requirements in a state or territory.

Licensing/Regulatory Information

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

Pre-requisite unit(s)

No prerequisite units.

Competency field(s)

Applied technologies

Unit sector(s)

N/A

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. Prepare to commission a cyber-physical system	1.1 Identify features and characteristics of the cyber-physical system to be commissioned 1.2 Review commissioning requirements from design specifications and other approved resources 1.3 Identify workplace health and safety (WHS) procedures and risk control measures relevant to cyber-physical system commissioning 1.4 Confirm cyber security requirements associated with commissioning cyber-physical system 1.5 Prepare commissioning plan for cyber-physical system that reflects identified requirements' 1.6 Submit cyber-security commissioning plan for approval according to workplace procedures
2. Commission a cyber-physical system	2.1 Check required tools and equipment for serviceability and rectify or report any faults prior to commencement 2.2 Implement commissioning plan isolation and access control measures 2.3 Perform commissioning procedures according to plan 2.4 Monitor commissioning for non-conformances with commissioning plan and rectify or seek assistance according to scope of role and plan risk procedures 2.5 Test operation of cyber-physical system after commissioning and rectify or report non-conformances according to workplace procedures
3. Complete cyber-physical system commissioning	3.1 Liaise with relevant personnel to confirm that the system complies with relevant cyber security protocols and planned user experience 3.2 Produce required documentation and reports in line with organisational policies and procedures 3.3 Obtain approval for cyber-physical system operational status according to workplace procedures

Foundation Skills

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

Other 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.	
Other approved resources for commissioning requirements include one or more of the following:	- documentation from cyber-physical system and component suppliers - factory acceptance testing (FAT) reports - task list and work requests for the cyber-physical system - existing equipment and software specifications - relevant expert personnel.
Commissioning non-conformances include one or more of the following:	- system operations inconsistent with input commands or manufacturer guidelines on safe operating limits - machinery faults and breakdowns - data corruption or non-transmission - cyber-security non-compliances.

Unit Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM29002 Commission a cyber-physical system		This unit has been created to address a skill or task required by industry that is not covered by an existing unit of competency	Newly created

Assessment Requirements for MEM29002 Commission a cyber-physical system

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Performance Evidence

There must be evidence the candidate has demonstrated the ability to:

- prepare a commissioning plan for a cyber-physical system including:
 - identification of required materials and quantities
 - listing of required tools and equipment for each stage of commissioning
 - isolation requirements during commissioning
 - area access control requirements during commissioning
 - estimate of down time for production and other affected workplace activities because of commissioning activities
 - consultation with appropriate personnel to ensure planned work is coordinated effectively and downtime is minimised
 - cyber-security protocols to be followed during commissioning
 - life cycle management protocols to be followed during commissioning
 - risk assessment and risk control procedures
- map networking of at least two cyber-physical systems to other local and cloud-based systems
- install, configure and test a cyber-physical system, components and sub-systems
- test commissioned cyber-physical system for:
 - safety including correct operation of emergency switches, limits and other safety related equipment
 - operation against design parameters
 - compliance of external inputs with specifications

- successful integration of computation, networking, and physical processes including:
 - data capture from sensors and system equipment
 - data import and export integrity
 - human – machine/system interfaces
- user experience
- compliance with cyber-security protocols
- diagnose and rectify commissioning non-conformances, including:
 - following correct troubleshooting procedure
 - identifying root cause
 - adjusting or repairing components
 - reinstalling new or adjusted operating software and communication protocols between sensors, other components and the cloud
 - documenting and reporting non-conformances where referral to expert assistance is required.

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

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- elements and features of a plan for cyber-physical systems including:
 - physical equipment that is integrated with the embedded applications and system software of the cyber-physical system
 - components that link the physical equipment to the system software and control equipment e.g. sensors and actuators
 - software, processors, and networking equipment
 - system variations for different environments and domains
 - local integration and global integration
 - feedback loops
- tools and techniques used to configure and integrate equipment and machinery into a cyber-physical system
- cyber-security protocols related to cyber-physical systems
- Industrial Networking Topologies relevant to integrating a cyber-physical system including RFID, Bluetooth, and low power wide area network technologies
- characteristics, use and purpose of different types of data cabling and smart sensors
- product life cycle management principles as they relate to cyber-physical systems

- procedures for documenting and reporting troubleshooting outcomes.

Assessment Conditions

- Assessors must:
 - have vocational competency in commissioning cyber-physical system 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.
- Where possible, assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- There must be 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.

Link

Companion volumes, including implementation guides, are found on the national training register - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=45a7f1d5-61a5-447a-9688-7abbd7e1a5c7>.