



Australian Government

MEM29006 Use a SCADA system to assist Industry 4.0 operations in manufacturing and engineering

Release: 1

MEM29006 Use a SCADA system to assist Industry 4.0 operations in manufacturing and engineering

Modification History

Not applicable.

Application

This unit describes the skills and knowledge required to use, monitor and maintain a supervisory control and data acquisition (SCADA) system to support Industry 4.0 operations in a manufacturing or engineering workplace.

This unit applies to individuals who use SCADA to gather data from local or remote sensors and instruments and then transmit and display this data at one or more control sites for monitoring and control purposes. The operations of the SCADA system are used to communicate with and support other Industry 4.0 related systems including digital twins, robotics, computer aided drawing (CAD), computer aided manufacturing (CAM), additive manufacturing, cloud and local enterprise resource planning system (ERP) and the industrial internet of things (IIoT).

The unit includes using SCADA to monitor both analog and digital signals, local and remote programming and networking through local hardware, such as programmable logic controllers (PLCs) or commercial hardware modules. SCADA systems covered by this are either hardware systems or internet and web-based SCADA.

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

Pre-requisite Unit

Nil

Competency Field

Applied technologies

Unit Sector

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. Assess state of	1.1 Identify Industry 4.0 systems used in the workplace that have a

Elements	Performance Criteria
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current SCADA system integration with workplace Industry 4.0 operations	current or potential connection to SCADA system 1.2 Identify equipment and processes and required to be monitored and controlled by the SCADA system 1.3 Identify hardware, PLCs and PLC programming, networking and other features SCADA system 1.4 Identify cyber-security protocols used with the current SCADA system 1.5 Assess if an integration gap exists between current SCADA system and workplace Industry 4.0 systems
2. Use SCADA system and identify any potential improvements	2.1 Interrogate SCADA system to obtain current, historical or predicted information 2.2 Monitor and evaluate scope and integrity of SCADA information according to workplace procedures 2.3 Identify and rectify inefficient uses of SCADA system 2.4 Provide support to others in the use of SCADA system according to workplace procedures 2.5 Troubleshoot unexpected situations in consultation with relevant personnel
3. Document and maintain SCADA system	3.1 Update and maintain a library of SCADA objects and templates according to workplace procedures 3.2 Document, maintain and update operating and response instructions for SCADA system 3.3 Document connections and networking protocols between SCADA system and Industry 4.0 workplace systems 3.4 Obtain approval for documentation according to workplace procedures
4. Identify options for improved integration of SCADA with Industry 4.0 systems	4.1 Determine scope for additional SCADA data collection and control through additional sensors, instrumentation, PLC's, Remote Terminal Units (RTU's) and wired and/or WiFi networking 4.2 Assess suitability of Internet and web-based SCADA for delivering improved SCADA and Industry 4.0 integration 4.3 Prepare recommendations for improved integration of SCADA with Industry 4.0 systems

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.

Industry 4.0 related systems include one or more of the following:

- industrial internet of things (IIoT) devices
- collaborative robots
- networked and cloud connected traditional robots and other industrial automation
- networked and cloud connected supervisory control and data acquisition systems (SCADA)
- networked and cloud connected enterprise resource planning (ERP) systems
- networked and cloud connected CAD and CAM systems
- digital twins
- augmented and virtual reality systems
- networked and cloud connected CNC and additive manufacturing machines
- networked and cloud connected data storage and processing facilities
- networked and cloud connected edge devices
- other networked and cloud connected digital devices and systems relevant to the workplace.

SCADA system components include one or more of:

- supervisory computers
- remote terminal units
- programmable logic controllers (PLCs)
- communication including networking infrastructure
- human-machine interfaces.

Drawing protocols includes one or more of:

- abbreviations
- commonly used symbols
- dimensions
- hierarchy
- legends

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- lettering standards
- numbering
- paper size
- scale
- standard units of measurement.

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 MEM29006 Use a SCADA system to assist Industry 4.0 operations in manufacturing and engineering

Modification History

Release 1. New unit.

Performance Evidence

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

- source technical information on using SCADA for monitoring and controlling for at least two industrial processes including from:
 - manufacturer's manuals, documentation, and web sites
 - work orders
 - standard operating procedures (SOPs)
 - discussion with relevant experts
- interpret SCADA symbols, diagrams and the structure of alarms
- record at least two changes and adjustments to SCADA system hardware and software on a graphical user interface using standard SCADA objects, templates and drawing protocols. The changes must involve changes to monitoring and controlling multiple machines or workstations and include change at PLC and master controller level.
- acquire and analyse at least two sets of machine or process data from a SCADA system including:
 - conversion of raw data
 - manipulation of complex data within the SCADA software
 - trending
 - graphical representation
- analyse data fields for reports
- identify and rectify inefficient uses of SCADA system.

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:

- the different applications and systems that are generally associated with Industry 4.0
- advantages and disadvantages of SCADA as a system for control system for the supervision and acquisition of data from local and remote industrial processes:
- analog and digital data conversion and transmission to suit the requirements of different SCADA, systems, equipment and stakeholders
- applications of SCADA systems within an industrial process environment including:

- limitations of SCADA systems (i.e. physical and environmental limitations)
- major proprietary SCADA systems and protocols used in industry including applications and key differences
- SCADA system networking in a factory environment including
 - local area network (LAN)
 - WiFi
 - internet
 - advantages and disadvantages of different networking systems
- SCADA data acquisition including:
 - hardware requirements
 - serial port: RS232, RS422, RS485
 - USB
 - commercial systems
 - software requirements
 - drivers
 - specialist programs
- SCADA cyber security protocols
- PLC interface requirements for SCADA systems including configuring and testing data connection between SCADA system and PLCs
- test procedures to determining the accuracy of data collected by a SCADA system
- connection and configuration of voice diallers and alarm callout systems
- SCADA-related drawing protocols, objects and templates.
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Assessment Conditions

- Assessors must:
 - have vocational competency in the use of SCADA systems in an industry 4.0 context to 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.

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