



Australian Government

MEM29001 Work in Industry 4.0

Release: 1

MEM29001 Work in Industry 4.0

Modification History

Release 1. New unit.

Application

This unit defines the skills and knowledge required to recognise the systems and processes used in a modern automated and digitally connected workplace and to effectively contribute one's own skills and knowledge as a team member in this environment. Systems in such a modern digital 'smart' factory are often described colloquially as Industry 4.0 and for convenience the term Industry 4.0 is used in this unit. However, this term should not be regarded as prescriptive and the unit applies to all technologies that contribute to creating a cyber-physical, automated and networked industrial environment incorporating increased data collection and analysis.

The unit includes the role and importance of data in Industry 4.0 and the use of digital and cloud-based technologies to facilitate data exchange internally across departments and locations and to network externally with suppliers, customers and other organisations. The unit is relevant for current and future employees working in all stages of manufacturing and engineering including design, planning, operations, and providers of in-house and external support services.

The unit scope includes understanding the relationship between traditional manufacturing, engineering, and services operations, lean systems, automation, digital data generation and processing, networking and cloud systems. The unit also requires an individual to apply knowledge of Industry 4.0 to managing their own work plan including keeping up to date with technological advances.

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

Competency Field

Applied technologies

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. Review Industry 4.0 systems and technologies for relevance to	1.1 Identify key technologies and systems covered by the term Industry 4.0 1.2 Analyse basic principles of operation of Industry 4.0 related technologies and their relationship to lean systems and product lifecycle

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
manufacturing, engineering and related services	management that are relevant to the workplace 1.3 Research and evaluate factors, conditions, and contexts essential to effective application of Industry 4.0 technologies and systems in a manufacturing or related organisation
2. Analyse current state of digital technologies and data flow in own workplace	2.1 Review workplace operations for currently used Industry 4.0 technologies and systems 2.2 Identify communication, information and data flows within and between teams, departments and external organisations 2.3 Analyse scope of current data collection systems and identify potential for increased data collection, sharing and analysis 2.4 Identify current workplace internal and external networking systems and technology
3. Propose measures to improve workplace operations using Industry 4.0	3.1 Consult with other employees, managers and internal experts on products and processes that could be improved through Industry 4.0 systems 3.2 Identify and prioritise Industry 4.0 related systems to improve operations 3.3 Analyse risks and potential limiting factors for implementation of selected Industry 4.0 systems 3.4 Prepare a written or verbal report proposing implementation strategy for selected Industry 4.0 systems
4. Review skills and knowledge required for effective Industry 4.0 implementation	4.1 Review Industry 4.0 technologies for key skill requirements 4.2 Review state of own skills and attributes and develop strategies for continuous learning on Industry 4.0 4.3 Report on likely skills impact of Industry 4.0 implementation for team and workplace

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 two 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.

Related services include one or more of the following:

- internal support functions:
 - maintenance
 - administration
 - computer and information technology (IT)
 - sales and marketing
 - warehousing and materials handling.
 - transport
- external support providers:
 - transport and logistics
 - equipment suppliers
 - raw material suppliers
 - IT
 - security.

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 MEM29001 Work in Industry 4.0

Modification History

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Performance Evidence

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

- review at least two real or simulated workplace operations and identify potential improvements and risk factors using at least two of the following Industry 4.0 technologies:
 - automation including traditional and collaborative robots
 - CAD and CAM networking to and from manufacturing processes including:
 - additive manufacturing
 - CNC machining
 - industrial internet of things (IIoT)
 - cyber-physical systems
 - digital twins
 - cloud based storage and networking
 - virtual and augmented reality
- for the two real or simulated workplace operations used in the above review:
 - map current communication and data flows within and between teams/employees
 - identify opportunities for improved data collection, analysis and management using Industry 4.0
- prepare a self-development plan to maintain own currency with technological advances and their applications within Industry 4.0 environment
- report the potential impact of Industry 4.0 on the future of manufacturing and its relationship with Lean Manufacturing.

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:

- background and concepts of Industry 4.0 and the stages of industrial development
- key aspects of Industry 4.0, including:
 - sensors and other data collection strategies
 - digitilisation of data
 - data classification and analysis
 - robotics and automation and their relationship to data driven manufacturing
 - internal and external cloud-based networking including cyber-security

- digital twins
- strategies for merging physical and virtual worlds
- principles of product lifecycle management
- impact of Industry 4.0 on manufacturing and its relationship to Lean Manufacturing
- impact of Industry 4.0 on work organisation including remote work and cross-disciplinary teams
- methods to research the current state of Industry 4.0 technologies
- stages of Industry 4.0 implementation in enterprises including:
 - system design
 - trialling
 - commissioning
 - implementation
 - continuous improvement
- basic cyber-security procedures, guidelines, tools and methods
- the relationship between the following skills and Industry 4.0 systems and technologies including skills in:
 - problem-solving
 - teamwork
 - communication
 - numeracy
 - digital literacy
 - planning and organising.

Assessment Conditions

- Assessors must:
 - have vocational competency in industry 4.0 work 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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