Australian Government

Department of Education, Employment and Workplace Relations

UEENEEI153A Design and configure Human-Machine Interface (HMI) networks

Release: 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UEENEEI153A Design and configure Human-Machine Interface (HMI) networks

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers monitoring and maintaining the operation of distributive and central control system networks. It encompasses safe working practices, installing and configuring controllers and devices, monitoring system operations, diagnosing malfunctions and faults and documenting development activities.

Application of the Unit

Application of the Unit

2)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s)	**4)**	
Competencies	**4.1)**	
	UEENEEI151A	Develop, enter and verify word and analogue control programs for programmable logic controllers.
Literacy and numeracy skills	**4.2)**	

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading   5   Writing   5   Numeracy   5

Employability Skills Information

Employability Skills	**5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to design control system networks.	1.1	OHS processes and procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The extent of control system networks is determined from network specifications/design brief and in consultation with relevant persons.
		1.4	Activities are planned to meet scheduled timelines in consultation with others involved in the work.
		1.5	Appropriate management tools and software are selected based on specified requirements and performance standard.
		1.6	Strategies are implemented to ensure network development is carried out efficiently.
2	Install, configure and manage control system networks.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Knowledge and complexities of control system networks infrastructure are applied to managing network services.
		2.3	Network infrastructure components are installed and configured in compliance with industry standards and variants as specified for the network.
		2.4	Structural components of directory services are installed and configured in compliance with industry standards and variants as specified for the network.
		2.5	Management components of network control system are configured in compliance with industry standards and requirements specified for the network.
		2.6	Security components of network control system are created in compliance with industry

ELEMENT	PERFORMANCE CRITERIA	
		standards and requirements specified for the network.
	2.7	Network malfunctions are identified and rectified using logical techniques and drawing knowledge of complex network control system infrastructure.
	2.8	Network is monitored and solutions are developed to optimise network performance and reliability in accordance with established procedures.
	2.9	Security events are analysed and actions taken in accordance with established policy.
	2.10	Approaches to issues/problems are analysed to provide most effective solutions.
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.
3 Report network administration activities.	3.1	Written justification is produced for network services development activities and appropriate person/s notified in accordance with established procedures.
	3.2	Network service development records are maintained in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and configuring Human-Machine Interface networks.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EI153A   Control system network

Evidence shall show an understanding of control systems networks to an extent indicated by the following aspects:

a) Purpose and application of control system networks systems

b) Open and common proprietary control system networks models (layers) and protocols - CANopen, ControlNet, Devicenet, Ethernet, Foundation Fieldbus, Interbus, Modbus, Pofibus.

c) Control system networks interface.

a) Domain Name Service (DNS) encompassing:

DNS Server Service

Root name server

Configuring zones - configuring for dynamic updates and delegating zone for DNS

Caching – only server

DNS client

Testing DNS Server service

Manually creating DNS source

Managing and monitoring DNS

b) Dynamic Host Configuration Protocol (DHCP)

Installation of DHCP Server Service

DHCP scopes, superscopes and multicast scopes

DHCP – DNS integration

Active DirectoryTM

Managing and monitoring DHCP

c) Network Infrastructure encompassing:

Configuring and troubleshooting remote access - remote access policy, configuration of remote access profile, Virtual Private Network (VPN), multi link connection, routing and remote access for DHCP

Managing and monitoring remote access

Remote access security - authentication protocols, encryption protocols and access policy

d) Network Protocols encompassing:

Installation, configuration and troubleshooting of network protocols - Transmission Control Protocol / Internet Protocol (TCP/IP), NWLink and network bindings

Configure TCP/IP packets

Configuring and troubleshooting network protocol security and IP Security (IPSec

Managing and monitoring network traffic

e) Internet Naming Services in a network encompassing:

Installation, configuring and troubleshooting

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REQUIRED SKILLS AND KNOWLEDGE

Configuring Internet Naming Services replication
Configuring an application networking interface
Managing and monitoring Internet Naming Services
f) IP Routing encompassing:
Installation, configuring and troubleshooting of IP routing protocols - updating routing tables, and implementing demand-dial routing
Managing and monitoring IP routing - border routing, internal routing and IP routing protocols
g) Network Address Translation (NAT) encompassing:
Installing Internet connection sharing
Installing NAT
Configure NAT properties and interfaces
h) Certificate Services encompassing:
Installing and configuring Certificate Authority
Issuing and revoking certificates
Removing the Encrypted File System recovery keys

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.
The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1)**
	Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit	**9.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be

required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Design and configure Human-Machine Interface networks as described in 8) and including:

A	Establishing network services to be developed.
B	Installing and configuring network infrastructure components.
C	Installing and configuring structural components of directory services.
D	Configuring management components of network services.
E	Creating security components of network services.
F	Identifying and rectifying network malfunctions.
G	Developing solutions to optimise network performance.
H	Documenting network services development activities.
I	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment	**9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:
Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.
The resources used for assessment should reflect current industry practices in relation to designing and configuring Human-Machine Interface networks.

Method of assessment   **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.
Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units   **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to safe working practices and designing and configuring a representative range of Human-Machine Interface networks with the following attributes:

- operation of distributive and central control system networks monitoring and maintenance
- safe working practices
- controllers and devices installation and configuration
- system operations monitoring
- malfunctions and faults diagnostics
- development activities documentation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field   11)

Instrumentation and Control